I'm not a bot

Electrical continuity tester

Keeping your world up and running. Our customers count on us for rugged, reliable and accurate test instruments.We offer test, measurement and monitoring products and software that are used in electronic design, manufacturing, and network troubleshooting, as well as in electrical, industrial, medical, process and calibration applications.Click below to learn more about our companies. Keeping your world up and running.®Leader in test and measurement softwareFluke Corporation is the world leader in professional electronic test tools and software for measuring and condition monitoring. Fluke tools are known for portability, safety, ease-of-use, accuracy and rigid standards of quality. Precision, performance, confidence.™A leader in precision calibration instruments, equipment, service and software for electrical, RF, temperature, pressure and flow measurements.Fluke Calibration products are all now on fluke.com! The Fluke family includes many brands around the world including PLS, Pomona and Amprobe.Please use the drop down menu below to select the company you are looking for. Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material for any purpose, even commercially. The licensor cannot revoke these freedoms as long as you follow the license terms. Attribution — You must give appropriate credit , provide a link to the license, and indicate if changes were made . You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. ShareAlike — If you remix, transform, or build upon the material, you must distribute your contributions under the same license as the original. No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits. You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation . No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material. If you are looking for a simple circuit to test continuity of wires and long conductors, the explained 7 easy to build continuity circuits are the ones which you can try and might fulfill your requirement.What is a Continuity TesterA continuity tester is a device which is used for identifying the correct continuity of a particular conductor in question. Or in other words the device may be used for tracing faults or breaks in a particular conductor or a wire.The device is actually a simple LED and a cell circuit, where the LED is made to switch by passing the cell voltage to the LED via the conductor in question.If the conductor is not broken, the cell voltage circulates through it and reaches the LED to complete the circuit and in the course illuminates the LED, providing the relevant information.If the conductor is open internally, the cell voltage is unable to complete the circuit and the LED remains shut OFF, indicating the fault.1) Using One LED and ResistorThe first circuit diagram shows a very simple continuity circuit where only a LED/resistor set up along with a 3 volt source is used.The prods are connected across the ends of the wires or the conductor which needs to be checked. The results regarding the status of the wire is achieved as explained above.However this circuit is quite crude and won't be able to check big cable networks where the fed voltage may drop substantially in the path and might fail to illuminate the LED properly.For checking complex and large wire or cable bundles, rather a much sensitive circuit may be required.2) Using Two TransistorsThe next circuit shows a configuration which is much rugged and highly sensitive.Moreover the wire ends may be checked via finger touches, which simply avoids th need of lengthy prods from the continuity tester.The circuit employs a couple of cheap hi-gain transistors which are coupled together in such a way that the over all gain of the circuit becomes very high.Even a few milli volts is enough for making the circuit conduct and illuminate the LED.The connections can be seen in the figure, how through easy finger touch operations, even the staus of big wire bundles may be identified in seconds.If the wire bundle is without breaks, the LED lights up brightly, and in case the wire is open somewhere, keeps the LED completely shut OFF.This sensitive circuit can also be used as a line tester, the 3volt point is held with hand, and the 1M end is touched to the point where the LINE presence needs to be tested.The presence of phase, lights up the LED and vice versa.3) Using LM3909 The following miniature tester is built using just 4 inexpensive components, and operated from a AAA 1.5 V dry cell. It can be used for testing continuity tests across wiring harnesses and on circuit networks, through appropriate test prods hooked up to points A and B.After some trial and error effort, you will be able to perfectly judge the contact resistance by comparing the differences in the level of the sound frequency.Another great application of this unit could be in the form of a mini siren or simply as a morse code practice which can be done by connecting a morse key between A and B.4) Simple Continuity Tester Circuit using IC 555In the following second project learn how to make a simple continuity checker circuit using 555 timer. And what makes this circuit so special is that no transistor is used in it and hence this is indeed the simplest continuity checker.By Ankit NegiWe all know the importance of 555 TIMER in electronics.The fact that they are used even today, 45 years after their first appearance in electronics industry makes it a key component of our day to day circuit.There’s hardly anything this 555 timer cannot do for you. From using it as a clock generator to voltage regulator. And so here we are, making yet another very useful circuit using this invincible IC.As we already know a continuity checker is a simple electronic tool that checks the continuity between two terminals of a circuit. For let’s say you have a wire, which you want to check for continuity.So you have to just connect its two terminal to the continuity checker and if there’s no break in the circuit it will indicate it(either by a glowing led or buzzer) and if there’s break than nothing will happen.COMPONENTS REQUIRED:1. A 555 timer2. One buzzer (**if you do not have buzzer then use LED)3. 9v battery4. One 4.7 k resistor5. One 47 k resistor6. One 10uf ceramic capacitor7. One 0.1 uf ceramic capacitor8. Two connecting probes(red and black)Circuit diagram:There are total 8 pins in 555 timer as shown in circuit diagram make connections as shown and don’t forget to connect capacitors as they are as important as any other components in this circuit.Connecting probes are connected between trigger terminal (2) and ground.**If you do not have a buzzer than connect led in series with 1k resistor in place of buzzer**CIRCUIT WORKING:Before I explain its working you must know these two points:A. If voltage at trigger pin is less than 1/3v of the applied voltage (9v in this case), only than the output will be 1(HIGH).B. If voltage at threshold pin is greater than 2/3v of the applied voltage then the capacitor (10 uf) starts discharging through discharge pin (7th) to ground.As you can see in the above iC 555 based continuity tester circuit, to check continuity you place the circuit between probes (connected to trigger terminal and ground).Case1—if there is a break in circuitIf this case arises then that means there is infinite resistance(open circuit) between pin 2 and ground which causes all voltage drop between pin 2 and ground which is obviously greater than 1/3 of 9 volt, hence(from point 1) we get 0 volt as output from pin 3 at which buzzer or led is connected. Hence buzzer will produce no sound indicating a break in circuit.Case2—if there is no break in circuitIf this case arises then that means there is almost 0 volts (short circuit) between pin 2 and ground which causes all voltage drop across 4.7k resistor and thus pin 2 get 0 volt which is obviously less than 1/3 of 9 volt, hence(from point 1) we get 1 volt as output from pin 3 at which buzzer is connected. Hence buzzer will produce sound indicating continuity in circuit.5) Enhanced Continuity Tester CircuitYou might be thinking you are obtaining a perfect reading on the meter and afterward surprised to discover that you had been in fact looking across a coil or low resistance system?The 5th proposed enhanced super continuity tester circuit specifically can be a time saver which handles this type of situations, and can additionally verify resistances as high as around 150k.How it WorksAs shown in the figure, a reference voltage (as determined by the potentiometer R1) is put on the inverting input of the IC (1/4th of an LM339 quad comparator).Potentiometer R1 could be a trimmer type variable resistor, in case you intend to make use of the device for continuity tests, R1 must be a multi-turn type for simplicity of adjustment.The relationship to be examined is placed across the test probes and to ground, and across the junction of R2 and R3.Parts R3 and D1 safeguard against unintentional application of voltage to the circuit.Considering that the non-inverting input possesses a high impedance, the intersection of R3 is almost just like the non-inverting input so far as proportions are involved.Once the voltage at the non-inverting input of U1 at pin 5 drops under that at the inverting input, the output becomes low. This leads to the buzzer becoming active and sounding, showing continuity.Potentiometer R1 adjusts the limit where the buzzer gets triggered and sounds.When resistance is detected across the R2 /R3 junction and ground, a voltage divider is created, and this is referenced to the voltage divider established by potentiometer R1.In case the resistance is very small in comparison to the R1 value adjustment, the buzzer starts making noise.How to CalibrateIn order to scale and calibrate the tester, you will need a couple of resistors; 100 ohms and 120 ohms. Hook up the 100 ohm resistor across the test probes and start tweaking R1 until the buzzer starts making noise.Next, hook up the 120 ohm resistor and ensure the buzzer remains perfetly silent. The continuity tester is at this point fixed at examine any resistance below 100 ohms. None of the components values are critical, and neither is the battery voltage because the comparator is configured for voltage ratios only and not specific values.6) Smart Continuity TesterThe majority of continuity testers currently available are susceptible to false results.They won't show wrong results intentionally, yet when they find a smallish resistance, they are going to still show you that there's probably a continuity.The following 6th continuity tester design takes a different approach. In case there is continuity, it is going to inform you about the same.But during a low resistance via an electronic component, the circuit can confirm that too without fail. Referring to the figure above, we find the circuit makes use of a couple of 741 opamps.It provides a short-circuit test current of lower than 200uA. It picks up resistance values of lower than 10 ohms. Sweetest of all, it will never malfunction when it comes across PN junction or a diode.7) Simple Audible Continuity Tester Circuit using a Single UJTAudible continuity checkers are fantastic since you don't have to look at a meter scale, allowing you to concentrate on where you're putting the probes!Here, in the 7th design, the UJT is set up as a straightforward oscillator in the audio band, with a piezo transducer serving as the audible output.Once the black and red probes are attached, the oscillator circuit completes. Q1 oscillates, and the voltage pulses that are generated across R2 drive the piezo transducer, which causes the beep to be heard.Changing R1 or the value of the 2u2 capacitor will alter the oscillator pitch. You'll see that the output pitch lowers in circuits that are being tested when the resistance is about 1K or higher. This may be helpful! PayPal Credit and PayPal Pay in 3 are trading names of PayPal UK Ltd, 5 Fleet Place, London, United Kingdom, EC4M 7RD. Terms and conditions apply. Credit subject to status, UK residents only, Toolstation Ltd. acts as a broker and offers finance from a restricted range of finance providers. PayPal Pay in 3 is not regulated by the Financial Conduct Authority. Pay in 3 eligibility is subject to status and approval. 18+. UK residents only. Pay in 3 is a form of credit. Check if affordable and how you will repay. May make other borrowing more difficult or expensive. See product terms for more details. *Representative example: Representative 23.9% APR (variable) - Purchase rate 23.9% p.a (variable) - Assumed credit limit £1,200 - More info Learn how to test electrical continuity with a multimeter, understand its importance, and ensure safety measures for accurate results. In this comprehensive guide, I'll discuss the concept of Continuity in Electricity, delve into its symbol, and learn how to conduct a Continuity Test using a Multimeter. Additionally, I'll emphasize crucial safety measures to ensure a secure testing environment.Understanding Continuity in ElectricityContinuity, in the realm of electricity, refers to the unbroken conductive path that facilitates the flow of electrical current. This conductive path can manifest as an insulated copper electric wire or as a circuit on a Printed Circuit Board (PCB). The quintessential example of continuity lies in an operational closed circuit where electrons can move seamlessly, forming an uninterrupted path for the electrical current.Continuity Symbol on MultimeterBefore diving into the practical aspects of Continuity Testing, it's essential to recognize the symbol associated with continuity on a Multimeter. This symbol typically resembles a sound wave or a series of concentric arcs. Familiarizing yourself with this symbol is crucial for a seamless testing experience.Applications of Continuity Test in Electrical and ElectronicsThe utility of Continuity Testing extends across a spectrum of applications in both electrical and electronic domains:Multifaceted Testing: A Multimeter, be it Analog or Digital, serves as a versatile tool for Continuity Testing. It can effectively determine whether an electric wire is intact, test the functionality of fuses, switches, circuit tracks, and inspect various electronic components.Open and Closed Circuit Verification: Continuity Tests play a pivotal role in discerning whether a circuit is open or closed. It's imperative to emphasize that only a fully closed circuit will successfully pass the Continuity Test, underlining the importance of a seamless conductive path.Resistance Measurement: Beyond its primary function of determining continuity, this test method can also be employed to measure resistance in an electric circuit. This dual functionality enhances the diagnostic capabilities of Continuity Testing.How to Perform a Continuity Test with a Digital MultimeterMastering the art of conducting a Continuity Test with a Digital Multimeter involves a systematic approach. Follow these steps for an accurate and reliable test:Probe Configuration: Insert the Black Test Probe Lead into the COM jack, and the Red Test Probe Lead into the VΩ jack.Mode Selection: Set the Multimeter pointer to Continuity Test mode. Refer to the symbol associated with continuity, usually found on the Multimeter's interface.Target Connection: Carefully touch the Test Leads to the two ends of the electrical wire or the legs/terminals of the component under examination.Auditory Feedback: A functional Digital Multimeter will produce a distinctive beep sound if the conductive path is closed, indicating a successful Continuity Test. Conversely, no sound will be emitted if the circuit is open.Power Conservation: After completing the test, it's crucial to turn off the Multimeter to preserve battery life.Continuity Test Safety MeasuresWhile delving into Continuity Testing, safety should be paramount. Adhering to these safety measures ensures a secure testing environment:No Live Wire Testing: Never perform a continuity test on a live wire or circuit. Prior to testing, switch off and unplug the device under examination to eliminate the risk of electric shock.Voltage Verification: Before initiating any tests, ensure there is no voltage present in the circuit being examined. This precautionary step is vital for personal safety and the longevity of the testing equipment.Capacitor Discharge: Verify that all capacitors in the circuit are fully discharged. Capacitors can retain electrical charge even after disconnection, posing a risk if not properly discharged before testing.ConclusionIn conclusion, understanding Continuity in Electricity and mastering the art of Continuity Testing are fundamental skills for anyone working with electrical and electronic systems. Whether you are a seasoned professional or a curious enthusiast, incorporating these practices into your repertoire ensures not only efficient troubleshooting but, more importantly, a safe working environment. Continuity Testing, when performed diligently and with due regard for safety, becomes a powerful tool in the hands of those navigating the intricate pathways of electrical circuits.What is continuity in electricity?Continuity in electricity refers to the uninterrupted flow of electric current through a circuit, ensuring a consistent power supply without disruptions.What can cause a break in continuity?Factors such as blown fuses, tripped circuit breakers, faulty wiring, loose connections, or power outages can lead to a break in continuity.How do I restore continuity after a power outage?To restore continuity after a power outage, check the circuit breaker panel, reset tripped breakers, inspect and replace blown fuses. If issues persist, contact an electrician or your utility company.Why is continuity important in electrical systems?Continuity is crucial as many electrical devices, appliances, and industrial processes depend on a consistent power supply. Interruptions can lead to data loss, equipment damage, and service disruption.How can I ensure continuity in my electrical setup?Ensure continuity by regularly inspecting and maintaining your electrical system. Tighten loose connections, replace damaged wiring, and keep circuit breakers and fuses in good condition. Consider using surge protectors to guard against voltage spikes. Prasun Barua is an Engineer (Electrical & Electronic) and Member of the European Energy Centre (EEC). His first published book Green Planet is all about green technologies and science. His other ... In Electronics & Electrical systems, electrical wiring installations, maintenance, troubleshooting and repairing works. a continuity test is checking of a circuit to see if the current can flow through it or not. It basically determines if a circuit is open or closed. What is Continuity Test? Continuity Test is the testing of an electrical circuit to determine if the current can pass through it (known as close or complete circuit). In a continuity test, a small voltage is applied to the two points of the circuit that need to be checked. The current flow between these two points determines if it’s an open or closed circuit. Usually, there is a buzzer or led in series (inside continuity meter) to identify if the current flows through it or not. A close-circuit provides a closed path for the current flow & an open circuit does not allow the current flow. These circuits can be distinguished using the continuity test. Related Post: How to Test a Capacitor by Digital & Analog Multimeter ? Continuity test very important test in troubleshooting of any circuit. Various uses of continuity tests are: To check the wire connection inside the circuit. These wires may be broken. It is used for Identifying damaged component. It is also used for checking the quality of soldering. It is used for identifying a specific wire or electrical connection. Procedure Of Continuity Test There are mainly two methods for checking the continuity of a circuit using a multimeter. The first method is to use the continuity mode in the multimeter, which is specially made for this purpose. The second method is to use the Ohmmeter. Using Continuity Mode The steps for continuity test using continuity mode is given below: De-energize the circuit, if it has any power input. Set the dial of the multimeter in continuity mode (continuity mode is shown by the symbol of sound) Insert the black probe into the COM port. Insert the red probe into the V, Ω port. Now touch the probes with each other. If the meter beeps or gives reading 0 that means the meter works fine. Now connect the probes to both ends of the component or wire that you want to test. If the meter shows 0 and beeps, it means the path is complete (close) or the component allows the flow of current. If the meter does not beep & show 1 or OL, it means the path is broken (open) or the component does not allow the flow of current. The continuity in non-directional, it does not matter which probe should be connected to which side. The result is always the same except some cases like diodes which allow the flow in only one direction. Related Post: How to Test a Relay & Relay Coils by Multimer? An Ohmmeter can also be used to determine the circuit whether it is a closed or open circuit, which is the main purpose of a continuity test. Steps for continuity test using an ohmmeter First de-energize the circuit, if it has any power source. Set the dial of the multimeter to resistance mode Ω. If it has many ranges, set the dial to the minimum range. Insert the black probe into the COM socket of multi-meter. Put the red probe into the V, Ω socket. Connect the probes to both ends of the wire or component you want to test. If the meter reads 0 Ohm or near to 0 Ohm, the path is complete and close. If the meter reads 1 or OL, the wire connection is broken (open). Related Post: How to Test a Diode using Digital & Analog Multimeter? Continuity Test For Capacitor You can test a capacitor using the continuity test. Remove the capacitor if it is in a circuit. Discharge it carefully if charged. Using Continuity Mode Set the Multi-meter in continuity mode & insert the black & red probe as described above. Place the red and black probes of multi-meter across positive & negative terminals of the capacitor respectively. If the capacitor is good, the reading should start from ‘0’ as the capacitor is charging from the multi-meter. The reading will increase & eventually becomes infinity or OL, which means that the capacitor became fully charged & open. If a capacitor is damaged, multi-meter will either show very low value (short) or infinity OL (open). Related Post: How to Check a Transistor by Multimeter (DMM+AVO) ? Set the dial of the multimeter in resistance mode. Place the red probe on the positive terminal and black probe on the negative terminal of the capacitor If the resistance starts increasing from 0 Ohm to infinity, the capacitor is good. Because it was charging at the beginning. If the meter reads very high resistance initially even when it was discharged, the capacitor is damaged (open). If the readings show very low resistance, the capacitor is short. Related Post: How to find The value of Burnt Resistor ? Continuity Test For Inductor: You can also test an inductor using the continuity test. An inductor is a coil & both terminals of the coil are electrically short. First, you need to remove the inductor from its circuit. It can be tested while connected in a circuit but it depends on the circuit itself. Best way to test it is to remove it. Using Continuity Mode Turn the knob of Multi-meter in continuity mode. Insert the black & red probe in COM & V-ohm jack respectively. Place the probes of multi-meter across both terminals of the Inductor respectively. If the Inductor is good, the multimeter will beep and the reading will show very low values. But it will not Identify any damaged or short turns. If the inductor is damaged, multi-meter will not beep and the reading will be 1 or OL (open). Related Post: How to Test & Fix the Printed Circuit Board (PCB) Defects? Using Resistance Mode Set the dial of the multimeter in resistance mode & set it to the lowest possible settings. Place the probes on both terminals of the inductor. If the ohm-meter shows a resistance of few Ohm, the inductor is good If the resistance is very low (close to 0), then the inductor has probably short turns. If the meter reads very high resistance, the inductor is damaged (open). We have a detailed article on How To Test Electrical & Electronics Components such as Switches/Push buttons, Fuse, Wire/Cables, batteries, resistor etc with Multimeter? Homemade Continuity Tester You can even make a continuity tester yourself at home using a 9v battery, resistor, buzzer or LED and two wires. The simplest tester can be made as shown in the figure below: You can also tweak this design by adding switch button for on/off & LED for visual identification. Related Posts: In Electronics & Electrical systems, electrical wiring installations, maintenance, troubleshooting and repairing works. a continuity test is checking of a circuit to see if the current can flow through it or not. It basically determines if a circuit is open or closed. What is Continuity Test? Continuity Test is the testing of an electrical circuit to determine if the current can pass through it (known as close or complete circuit). In a continuity test, a small voltage is applied to the two points of the circuit that need to be checked. The current flow between these two points determines if it’s an open or closed circuit. Usually, there is a buzzer or led in series (inside continuity meter) to identify if the current flows through it or not. A close-circuit provides a closed path for the current flow & an open circuit does not allow the current flow. These circuits can be distinguished using the continuity test. Related Post: How to Test a Capacitor by Digital & Analog Multimeter ? Continuity test very important test in troubleshooting of any circuit. Various uses of continuity tests are: To check the wire connection inside the circuit. These wires may be broken. It is used for Identifying damaged component. It is also used for checking the quality of soldering. It is used for identifying a specific wire or electrical connection. Procedure Of Continuity Test There are mainly two methods for checking the continuity of a circuit using a multimeter. The first method is to use the continuity mode in the multimeter, which is specially made for this purpose. The second method is to use the Ohmmeter. Using Continuity Mode The steps for continuity test using continuity mode is given below: De-energize the circuit, if it has any power input. Set the dial of the multimeter in continuity mode (continuity mode is shown by the symbol of sound) Insert the black probe into the COM port. Insert the red probe into the V, Ω port. Now touch the probes with each other. If the meter beeps or gives reading 0 that means the meter works fine. Now connect the probes to both ends of the component or wire that you want to test. If the meter shows 0 and beeps, it means the path is complete (close) or the component allows the flow of current. If the meter does not beep & show 1 or OL, it means the path is broken (open) or the component does not allow the flow of current. The continuity in non-directional, it does not matter which probe should be connected to which side. The result is always the same except some cases like diodes which allow the flow in only one direction. Related Post: How to Test a Relay & Relay Coils by Multimer? An Ohmmeter can also be used to determine the circuit whether it is a closed or open circuit, which is the main purpose of a continuity test. Steps for continuity test using an ohmmeter First de-energize the circuit, if it has any power source. Set the dial of the multimeter to resistance mode Ω. If it has many ranges, set the dial to the minimum range. Insert the black probe into the COM socket of multi-meter. Put the red probe into the V, Ω socket. Connect the probes to both ends of the wire or component you want to test. If the meter reads 0 Ohm or near to 0 Ohm, the path is complete and close. If the meter reads 1 or OL, the wire connection is broken (open). Related Post: How to Test a Diode using Digital & Analog Multimeter? Continuity Test For Capacitor You can test a capacitor using the continuity test. Remove the capacitor if it is in a circuit. Discharge it carefully if charged. Using Continuity Mode Set the Multi-meter in continuity mode & insert the black & red probe as described above. Place the red and black probes of multi-meter across positive & negative terminals of the capacitor respectively. If the capacitor is good, the reading should start from ‘0’ as the capacitor is charging from the multi-meter. The reading will increase & eventually becomes infinity or OL, which means that the capacitor became fully charged & open. If a capacitor is damaged, multi-meter will either show very low value (short) or infinity OL (open). Related Post: How to Check a Transistor by Multimeter (DMM+AVO) ? Set the dial of the multimeter in resistance mode. Place the red probe on the positive terminal and black probe on the negative terminal of the capacitor If the resistance starts increasing from 0 Ohm to infinity, the capacitor is good. Because it was charging at the beginning. If the meter reads very high resistance initially even when it was discharged, the capacitor is damaged (open). If the readings show very low resistance, the capacitor is short. Related Post: How to find The value of Burnt Resistor ? Continuity Test For Inductor: You can also test an inductor using the continuity test. An inductor is a coil & both terminals of the coil are electrically short. First, you need to remove the inductor from its circuit. It can be tested while connected in a circuit but it depends on the circuit itself. Best way to test it is to remove it. Using Continuity Mode Turn the knob of Multi-meter in continuity mode. Insert the black & red probe in COM & V-ohm jack respectively. Place the probes of multi-meter across both terminals of the Inductor respectively. If the Inductor is good, the multimeter will beep and the reading will show very low values. But it will not Identify any damaged or short turns. If the inductor is damaged, multi-meter will not beep and the reading will be 1 or OL (open). Related Post: How to Test & Fix the Printed Circuit Board (PCB) Defects? Using Resistance Mode Set the dial of the multimeter in resistance mode & set it to the lowest possible settings. Place the probes on both terminals of the inductor. If the ohm-meter shows a resistance of few Ohm, the inductor is good If the resistance is very low (close to 0), then the inductor has probably short turns. If the meter reads very high resistance, the inductor is damaged (open). We have a detailed article on How To Test Electrical & Electronics Components such as Switches/Push buttons, Fuse, Wire/Cables, batteries, resistor etc with Multimeter? Homemade Continuity Tester You can even make a continuity tester yourself at home using a 9v battery, resistor, buzzer or LED and two wires. The simplest tester can be made as shown in the figure below: You can also tweak this design by adding switch button for on/off & LED for visual identification. Related Posts: