

Continue

















## Testing a car battery using a multimeter

This post contains affiliate links. This means I will make a commission at no extra cost to you should you click through and make a purchase [ "As an Amazon Associate, I earn from qualifying purchases." ]. Read the full disclosure here. A Comprehensive Guide: How to Test a Car Battery with a Multimeter GuideMechanic.Com Car batteries are vital components of any vehicle, providing the necessary power to start the engine and run various electrical systems. However, over time, batteries can degrade or fail, leading to issues such as difficulty starting the car or frequent stalling. To diagnose potential battery problems, one effective method is to use a multimeter to test its voltage and overall health. In this comprehensive guide, we'll explore step-by-step instructions on how to test a car battery using a multimeter. Understanding the Basics of Multimeters Check out this Fluke 117 Digital Multimeter. Non-Contact AC Voltage Detection, Measures Resistance/Continuity/Frequency/Capacitance/Min Max Average, Automatic AC/DC Voltage Selection, Low Impedance Mode Before delving into the process of testing a car battery, it's essential to understand the basics of multimeters. A multimeter is a versatile electronic instrument used to measure voltage, current, and resistance in electrical circuits. See Also: 2010 Chevy Malibu Battery It typically consists of a display screen, a dial or buttons to select different measurement functions, and two probes for making electrical connections. Preparing for the Test Before testing the car battery, ensure that the vehicle is parked in a safe and well-ventilated area away from any flammable materials. Additionally, turn off the engine, headlights, and any other electrical accessories to prevent interference with the test results. Put on safety gloves and goggles to protect yourself from potential electrical hazards. Testing Battery Voltage 1. Set the multimeter to the DC voltage setting. Most multimeters have a dedicated setting for measuring DC voltage, usually denoted by a "V" with a straight line above it. 2. Connect the multimeter probes to the battery terminals. The red probe should be connected to the positive terminal (+), marked with a plus (+) sign or the letters "POS," while the black probe should be connected to the negative terminal (-), marked with a minus (-) sign or the letters "NEG." 3. Read the voltage displayed on the multimeter. A fully charged car battery typically measures around 12.6 to 12.8 volts when the engine is off. If the voltage reading is significantly lower than this range, it indicates that the battery may be discharged or faulty. Testing Battery Load 1. Set the multimeter to the DC voltage setting as before. 2. Connect the multimeter probes to the battery terminals. 3. Have a helper start the engine while you monitor the multimeter display. 4. Read the voltage displayed on the multimeter while the engine is running. A healthy battery should maintain a voltage of around 13.5 to 14.5 volts when the engine is running. If the voltage is significantly lower, it may indicate a problem with the alternator or charging system. Testing Battery Resistance 1. Set the multimeter to the resistance (ohms) setting. This setting is typically denoted by the Greek letter omega ( $\Omega$ ) or the word "ohms" on the dial. 2. Disconnect the battery from the vehicle's electrical system by removing the terminal connections. 3. Connect the multimeter probes to the battery terminals. The red probe should be connected to the positive terminal, and the black probe should be connected to the negative terminal. 4. Read the resistance displayed on the multimeter. A healthy car battery should have a low resistance, typically less than 0.5 ohms. Higher resistance values may indicate internal battery damage or deterioration. Interpreting the Results Check out this Klein Tools 69355 Digital Multimeter Premium Electrical Test Kit with Non-Contact Voltage Tester, Receptacle Tester, Test Leads After performing the tests, it's essential to interpret the results accurately to determine the condition of the car battery. See Also: Pontiac G6 Battery 1. If the voltage readings are within the normal range both with the engine off and running, the battery is likely in good condition. 2. If the voltage readings are significantly lower than the normal range, it indicates that the battery may be discharged or faulty and needs further inspection or replacement. 3. If the resistance reading is unusually high, it suggests internal battery damage or deterioration, necessitating replacement. Conclusion Testing a car battery with a multimeter is a straightforward process that can help diagnose potential battery issues and prevent unexpected breakdowns. By following the step-by-step instructions outlined in this guide, you can accurately assess the voltage, load, and resistance of your car battery, enabling timely maintenance or replacement as needed. Remember to exercise caution and follow safety procedures when working with electrical systems to avoid accidents or injuries. See Also: 2014 Chevy Equinox Battery Last updated on March 13th, 2024 at 12:29 pmlt is typically recommended to test the car battery using a multimeter at least twice a year or every 6,000 miles. Such a procedure might help you detect diminished capacity before outright failure.A fully charged, healthy battery should read 12.6 volts or higher. A battery at 12.4 volts would still start your vehicle, but it means that it's only 75% charged. If the multimeter shows 12.0 volts or lower, the battery is weak and might continue to lose its charge.Below, you will find out how to test the car battery the right way.Step-by-step GuideGet a Reading on the Crank CycleThings to Bear in Mind1. Turn off the ignition and any accessories (like the radio or lights). You can turn the headlights on for 2 minutes to remove the surface charge, but don't forget to turn them off before testing.2. Locate the battery. You would usually be able to find it as soon as you open the hood, but if the battery location is not that obvious, consult the owner's manual. The element might have a plastic cover which would have to be removed.Locate the car battery3. Set the knob on your multimeter to "20V" in the DC range (it has a V with a straight line next to it). This will allow you to measure between 0 and 20V which is just the right range for a car battery.Set the knob to 20V dc range4. Multimeters have two probes. The red one is used for positive and the black probe - for negative. That's why when testing your car battery, you would want to make sure that the red probe is touching the positive terminal (usually red and marked +) and the black probe is touching the negative terminal (black and marked -). If the reading that you're getting has a "-" in front of it, then you have mixed up the probes.Connect RED probe to positive, BLACK probe to negative5. If the multimeter shows 12.6V, then you have nothing to worry about. But if the numbers are lower than that, you might have to disconnect the battery.6. In case you're an experienced DIYer, you shouldn't face any difficulties when disconnecting the battery. All you would have to do is loosen the nut on the negative terminal, remove the negative connector, and repeat the same with the positive terminal. Ensure that the cables are entirely out of the way and that they do not come in contact with the battery until you're finished.You should be able to lift the battery after removing the nuts that are holding the securing clamp in place.7. Use a battery charger to fully charge the element.8. Allow the battery to rest overnight. Test it in the morning while it's still disconnected. If it managed to hold the 12.6V, then something in your car is draining the battery, and you might want to have a professional check that.Now that you have determined the resting voltage, you might want to go the extra mile and measure the battery on the crank cycle. You would need a second person for this as someone has to start the ignition.As soon as the engine starts, the voltage will drop for a moment. But it should not fall below 10V. If that does happen, then your battery is prone to failure.While the motor is running, the multimeter reading should stay between 14V and 14.5V. If the voltage drops below that, it means that either the battery is unreliable or the alternator is going bad.You can also use the multimeter to test the alternator, by the way. Turn on all of the car's electrical equipment and take a look at the reading - if it drops below 13.5V, then the alternator might need to be replaced.To get an accurate reading, make sure to leave the car overnight (or even for a few days). If you have recently been driving the vehicle, the multimeter might give you a higher reading which would simply be wrong. What you need to test is the 'resting voltage' Once you expose the battery, be extra careful not to put anything metal on top of the element. If your wrench or another tool touches the terminals, it will cause a short.If there is dirt or corrosion at the battery's terminal, it might keep the multimeter from taking an accurate reading. To get rid of the buildup, you can use fine-grit sandpaper (don't forget to wear gloves).The outside temperature can affect the voltage of the battery. If you're doing the test at 0 degrees and you get about 12.5V, then the battery is fine. 12.588V at 30 degrees is good as well, but if the temperature is about 80 degrees, then the battery has to measure 12.6V and above. Article Content Testing your car battery with a multimeter is a straightforward process that can help you determine whether your battery is functioning correctly. To begin, ensure your vehicle is turned off and the key is removed from the ignition. Open the hood and locate the battery. Most car batteries have two terminals: a positive terminal (marked with a + sign) and a negative terminal (marked with a - sign).Next, set your multimeter to the DC voltage setting, typically indicated by a V with a straight line above it. The range should be set to 20V or higher to accommodate the battery's voltage. Touch the red (positive) probe of the multimeter to the positive terminal of the battery and the black (negative) probe to the negative terminal. The multimeter will display the voltage reading. A healthy car battery should read between 12.4V and 12.7V when the car is not running.If the reading is below 12.4V, your battery may be weak or dead. However, it's important to note that a low reading could also be due to a parasitic drain or other electrical issues in your vehicle. To further diagnose the issue, you can perform a load test. This involves using a battery load tester to simulate the electrical load of the car's engine starting. If the battery holds the voltage under load, it is likely still good. If the voltage drops significantly, the battery may need to be replaced.For a more comprehensive test, you can also check the battery's state of charge. Disconnect the battery and connect a battery charger to it. After charging, retest the battery using the multimeter to ensure it holds a full charge. If the battery consistently fails to hold a charge, it may be time to replace it. Regularly testing your car battery can help prevent unexpected breakdowns and ensure your vehicle is always ready to go.See also: What is the top rated tonneau cover? What is a Catalytic Converter Made Of? Materials Inside How Long Will a Plugged Tire Last: Expert Insights Diesel vs Gasoline: Key Differences Explained Hand Signals for Driving: Essential Guide to Safe Signaling Buy a Car Now, Pay Later | 0% Interest Financing Options Cost to Fix a Bumper: Repair Prices & Estimates 2008 BMW 650i Oil Pressure Switch Replacement Guide 2007 Dodge Caravan Catalytic Converter Replacement Cost Guide Cost to Fix Suspension: Repair Estimates & Prices Signs of Car Overheating: How to Know if Your Car Is Overheating Here, we check the charge, or voltage, of your car battery. This is achieved by measuring the DC voltage of the battery in parallel with the multimeter. If you are looking to test for amperage draw (parasitic draw) - testing amps in series - we cover that process in this guide. Other than trying to start the engine to see if there's charge, the best way to decipher a car battery's status is to test it using a multimeter. Digital multimeters are the best option for this since they give a more accurate reading, although you could also use an analog one. And even a cheap, category I (CAT-I) multimeter is fine as you are merely testing voltage, not amperage. If you don't know how to use a multimeter to test a car battery, read the procedure below: Step 1: Set Multimeter Ensure the ignition, lights and radio are off. Select the DC volts position on your multimeter (or the 12V setting if you have a dedicated car battery test range). DC voltage is usually marked as a V followed by a short line with a dotted line beneath it. The wavy line after a V is AC (alternating current) voltage and is for checking the mains voltage in your house. Most of the manual ranging meters have a 20V range, which is what you would need to test a car battery. The 20V range means it will measure between 0V and 20V. See below: Step 2: Test Battery With the red lead plugged into the voltage (main) terminal of the multimeter and the black lead plugged into the common (COM) terminal of the multimeter, position the red lead onto the positive (+, usually red) terminal of the battery and the black lead to the negative (-, usually black) terminal. Step 2: Read Meter The meter is now connected in parallel with the car battery and will display a reading automatically. Note the DC volts reading and compare with the table below, which indicates charge, under no-load, status: Car batteries provide 12.6V DC (direct current) through six cells, producing 2.1V each. ~12.6V: fully charged ~12.4V: 75% charge ~12.2V: 50% ~12V: 25% 11.9V and below: effectively zero charge Step 4: Check Results Anything under the 75% charge rate, or about 12.45V, generally indicates the battery is undercharged and will need recharging. It does not, however, indicate that it is bad. If after recharging it doesn't hold the charge, then it is probably on its way out. Step 5: Recharge Battery If it is under 12.45V, charge it up. You can do this with a portable charger plugged into the mains, which will apply gradual current and take time. The other option is to drive the car for around 30 minutes. Note: it is not enough to just start the engine and let it sit; you want it working under load to receive a proper charge from the alternator. Another option is to get the battery charged at your local auto parts store. After charging, perform the same test as above to see if the battery now registers in the 12.6V range. If not, consider getting it checked out fully prior to a replacement. Diagnostic Tests When fully charged, the battery can be tested further using a couple of methods: Load test: a load is applied to the battery while its voltage is monitored. You can do this by starting the engine and monitoring the voltage with a multimeter that has a Min/Max mode. This will automatically store the high and low voltages it picks up. The high voltage will likely be in the 14V area and is perfectly normal, while a drop under 9.6V during the process would indicate it can no longer effectively hold charge and needs changing. Electronic test: checks the battery cells via a frequency test. Some auto parts garages can perform these test for free, either by driving there or taking the battery in. Alternatively, repair shops may also offer a free test, plus the cost of potential repair. WARNING: if you remove it, note that battery acid burns when in contact with the skin so handle with care. Battery Chargers There are different types of automotive battery chargers, from basic 2A trickle chargers to more expensive 10A general purpose devices. So-called smart chargers adjust their voltage output depending on the status of the battery and can charge faster and more efficiently. There is also less chance of overcharging and they can detect whether the batter is 6V or 12V, as well as the type (such as wet or gel cell) and adjust the output accordingly. CAUTION: car batteries should never be overcharged. Once they reach full charge, it is time to unplug the charger. This is where smart units are advantageous, preventing damage and thus extra cost. Also, avoid running a known bad battery as you could end up ruining the alternator. They are built to maintain charge as opposed to keeping dead ones alive. Low Charge and Longevity Of course, a repeatedly low charge doesn't mean your battery is dead. It could be good and several scenarios might lead it to lose its charge, such as lights being left on, undriven for long periods, dodgy alternator, or even parasitic draw through any number of electrical circuits in the car going awry. Even an errant radio or internal light connection can repeatedly flatten a good one. But a positive outcome of the tests outlined above should prove the battery itself can hold a charge. It is worth keeping on top of a battery that continually loses its charge as one that keeps dropping below 75 percent will eventually lead to damage. Most automotive batteries can last four or five years, but one under constant strain from a defective alternator or parasitic draw may fail earlier. On the other hand, if it is four years old and starting to flatten, it may need changing. Bad Connections Charge may also be lost in the circuit through bad battery connections. As car batteries are low voltage, the connection needs to be that much better. As is the case with many cars, over time connections are prone to becoming loose, dirty and open to corrosion. You can check for voltage drop between the battery terminals and cables by first testing on the terminal and then on the wire crimps going out. Anything over around 0.1V less than what is coming out of the terminals suggests high resistance/bad connection. Clean the terminals/connections with sandpaper and tighten them up. Replacement Car Batteries When replacing a battery, it doesn't have to be the same make, but it needs to have the same ratings. The replacement should have the same Cold Cranking Amps (CCA) rating (or higher) as the original. The CCA rating is critical since it is the projected amperage an engine draws when starting in cold weather conditions - i.e. when a car battery will be put under most strain. Put a lower rated CCA battery on an engine that is rated higher CCA and you're in for problems as it will overload it. CCA is often several hundred amps, and even 1000CCA with larger vehicles. You should also check the Reserve Capacity rating (RC), which is the time (in minutes) a battery will deliver 25A and maintain 10.5V. You are looking for a higher reserve capacity should the charging system fail. Better batteries with a higher CCA rating tend to have better warranties attached to them, for obvious reasons. A new battery with a 72-month warranty would be in the premium bracket. Installation: if installing a replacement yourself, ensure the terminals and the cables are cleaned off and in sound condition. A Note About Multimeter Types Some multimeters - usually the cheaper ones - tend to have both the AC and DC voltage ranges sharing the same position on the dial selector. Unless your multimeter is specifically made for the automotive market, it will likely default to AC voltage. Don't fret as you can easily switch between the two, usually via a 'select' switch either below the display or in the center of the dial. The basic Fluke 101 is an auto ranging multimeter with separate AC and DC voltage ranges: Most meters today are auto ranging, meaning after setting it to DC voltage, you won't need to do anything else. The other, older type is a manual ranging multimeter, where you need to select the correct range regards the projected value of the circuit you are going to test. Most of the manual ranging meters have a 20V range, which is what you need to test a car battery. The 20V range means it will measure between 0V and 20V. Tip: if you are a beginner looking how to use a multimeter to test a car battery to ascertain its voltage, consider getting one that has a dedicated battery tester range on it. The INNOVA 3320 is good for this. Other popular automotive multimeters include the INNOVA 3340 and the top of the line Fluke 88V.