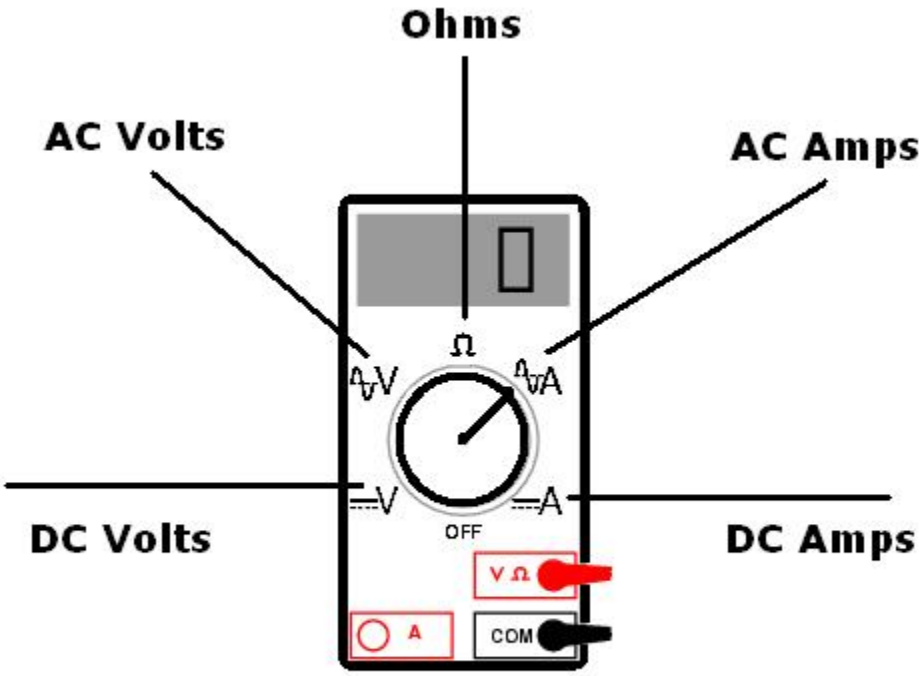
techtips

Using Your Digital Meter

4 in the **Installation Training Series** from Directed Electronics

Today's vehicles have more computer electronics than ever. Air bag wires aren't always in yellow tubing, and not all transistorized outputs can light a test lights bulb without shorting out! Even the computer safe or led test lights are not safe! They often draw too large of an amount of current and can cause damage to sensitive computers in vehicles.



IMPORTANT! This wiring information is being provided free of charge on an "as is" basis, without any representation or warranty. It is the dealer's responsibility to verify any circuit before interfacing with it using a digital multi-meter. Directed Electronics Inc. assumes no responsibility with regards to the accuracy or currency of this information. Proper installation in every case remains the responsibility of the installer. Directed Electronics Inc. assumes no liability or responsibility resulting from an improper installation, even in reliance of this information.

How to find (+) 12V ignition with a meter

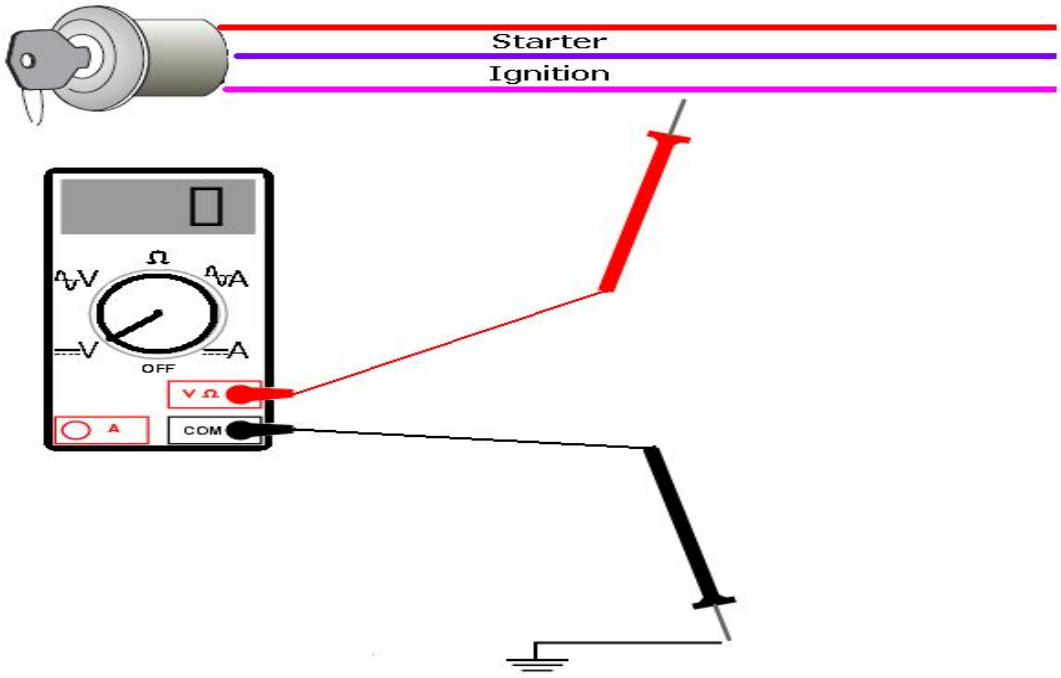
1. Set to DCV or DC voltage (12V or 20V is fine)

2. Attach the (-) probe of the meter to chassis ground

3. Probe the suspect ignition wire with the (+) lead of the meter. This wire can usually be found around the steering column area, or sometimes it may be easier to take apart the shroud around the steering column and going directly to the key cylinder.

4. Turn the ignition key to the run position. If your meter reads (+) 12V go to the next step. If it doesn't you must probe another wire.

5. Now turn the key to the start position. The meter display should stay steady, not dropping by more than a few tenths of a volt. If it drops close or all the way to zero, go back to step 3. If it stays steady at (+) 12V then you have your ignition wire. The diagram is on the following page.



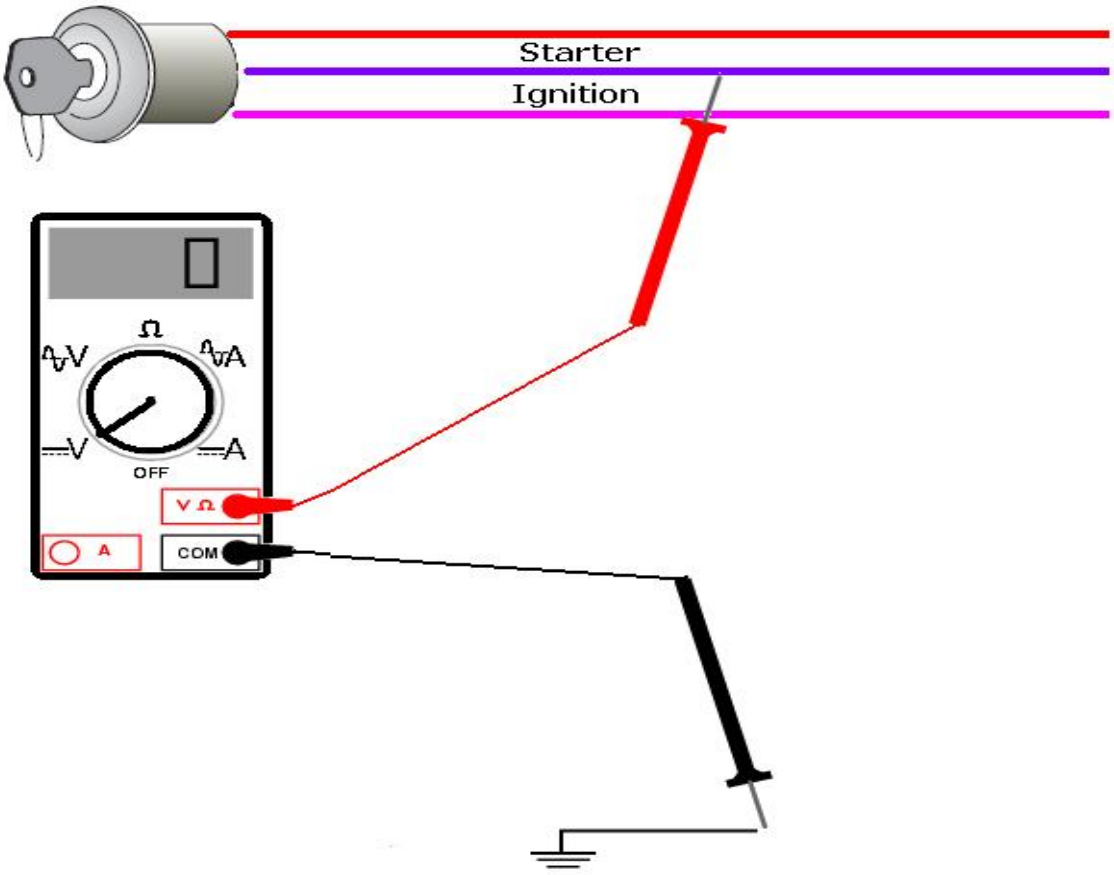
How to find the (+) 12V starter wire with a meter

1. Set to DCV or DC voltage (12V or 20V is fine)

2. Attach the (-) probe of the meter to chassis ground

3. Probe the suspect starter wire. This wire can usually be found around the steering column area, or sometimes it may be easier to take apart the shroud around the steering column and going directly to the key cylinder.

4. Turn the key to the start position. NOTE: Make sure the car is not in gear!!! This is the only position the meter should read (+) 12V. It should not show voltage in the run or accessory positions. If this is not how the wire tests you will need to probe another wire.



How to find the (+) 12V accessory with a meter

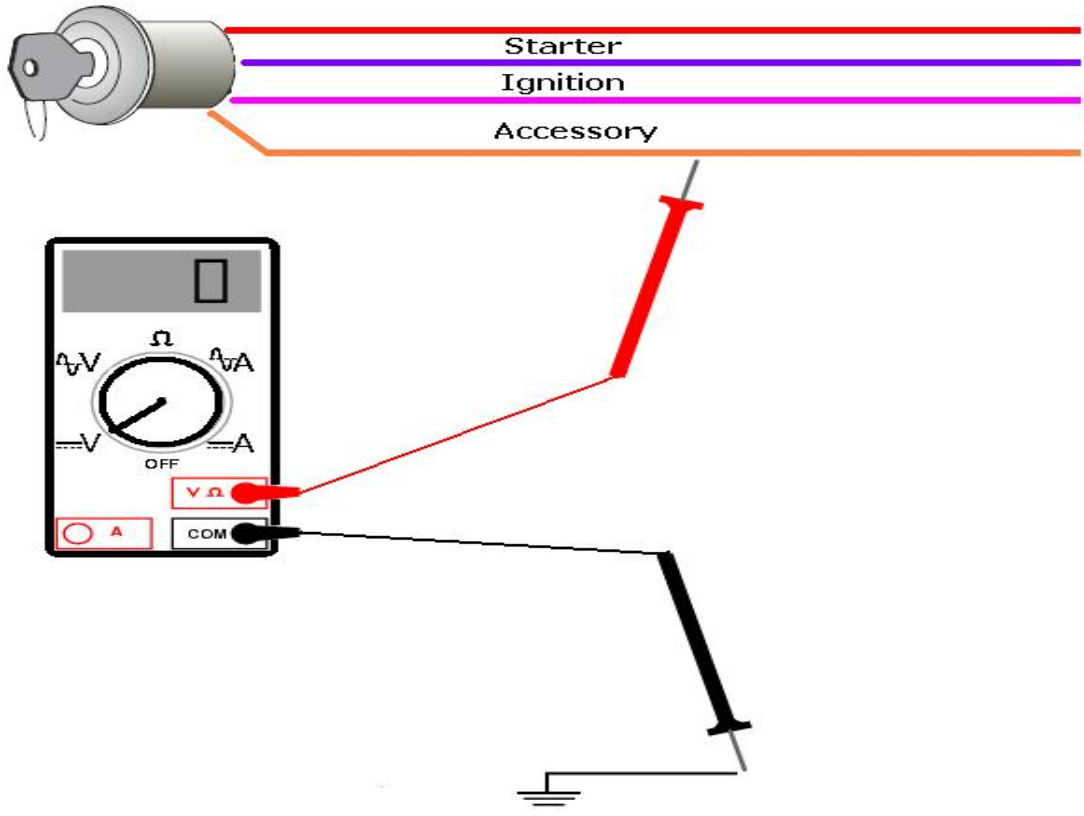
1. Set to DCV or DC voltage (12V or 20V is fine)

2. Attach the (-) probe of the meter to chassis ground

3. Probe the suspect accessory with the (+) lead of the meter. This wire can usually be found around the steering column area, or sometimes it may be easier to take apart the shroud around the steering column and going directly to the key cylinder.

4. Turn the ignition key to the run position. If your meter reads (+) 12V go to the next step. If it doesn't you must probe another wire.

5. Now turn the key to the start position. The meter display should drop out completely. Once the key is back in the run position the meter should go back to (+) 12V. If it tests like this you have an accessory. If the wire does not drop out during crank it would be an ignition and you would need to probe another wire.



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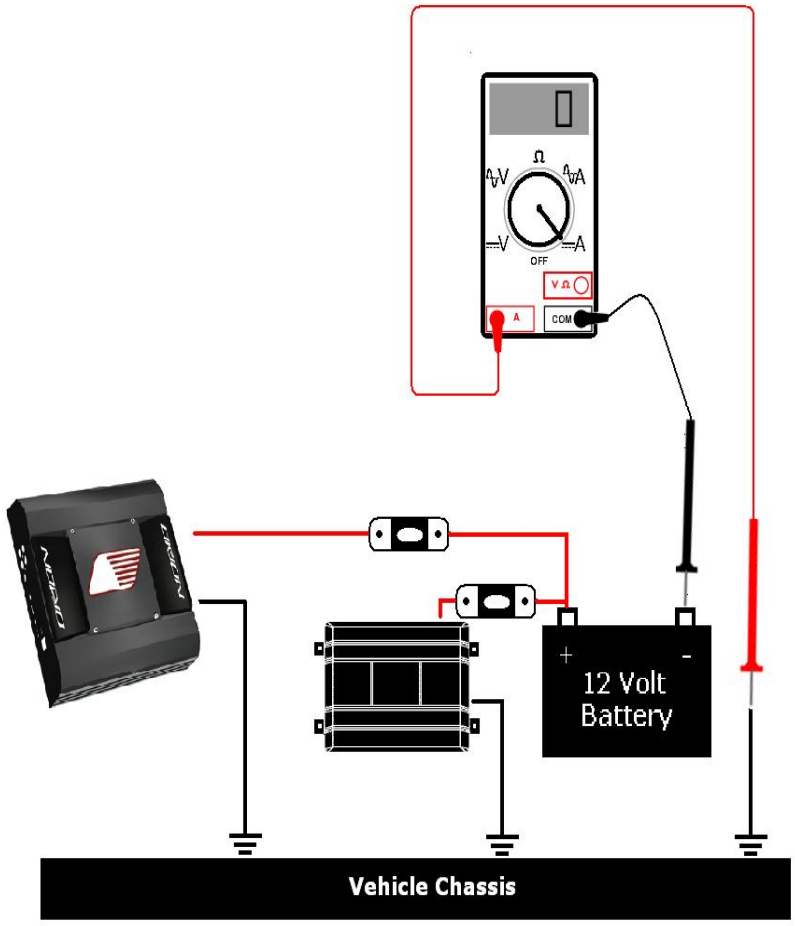
How to measure standby current draw with a meter

1. The (+) lead of your meter should be in the jack marked "A" and the black lead should be in the "COM" position.
2. Set the meter to DC Amperes.
3. Disconnect the negative battery terminal of the vehicle.
4. The (+) 12V probe goes to the loose negative battery cable.
5. The (-) probe goes to the negative battery post.
6. Leave alone for 30 seconds to 1 minute. The current draw needs to settle.
7. Check the measurement on the display. Pull the fuses from the components that are suspected of the current draw. A standard alarm/remote start will be right around 15ma. Most cars from the factory would have a standby current draw of 30ma – 45ma. Some newer SUV's are up to 60ma right from the factory. The diagram is on the following page.



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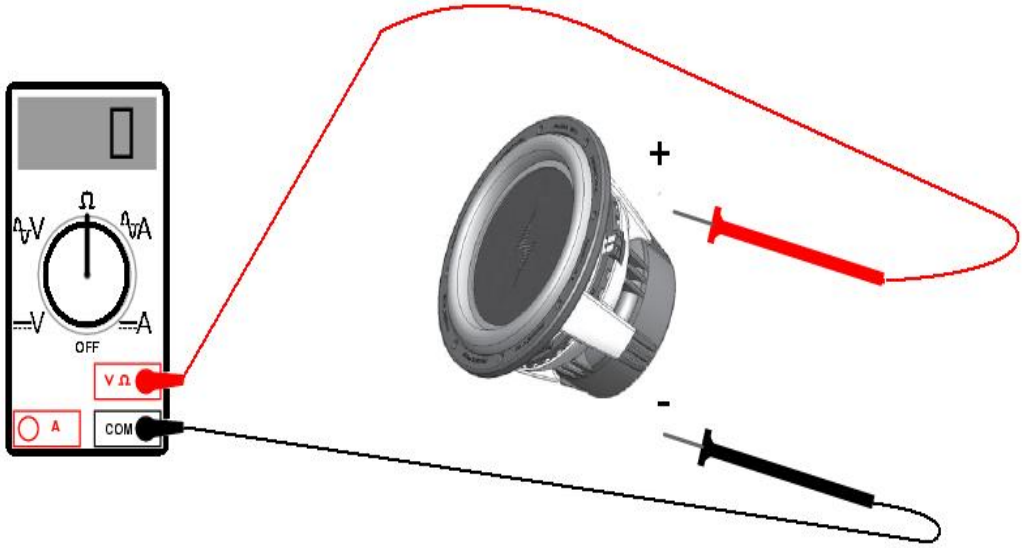
How to measure voice coil resistance with a meter

1. Set the meter to ohms. If the meter is a manual ranging meter, be sure it is set to the correct setting.

2. Place the meter leads between the points to be measured. In this case it would be the (+) and (-) terminals of the speaker.



How to measure resistance in vehicle with meter

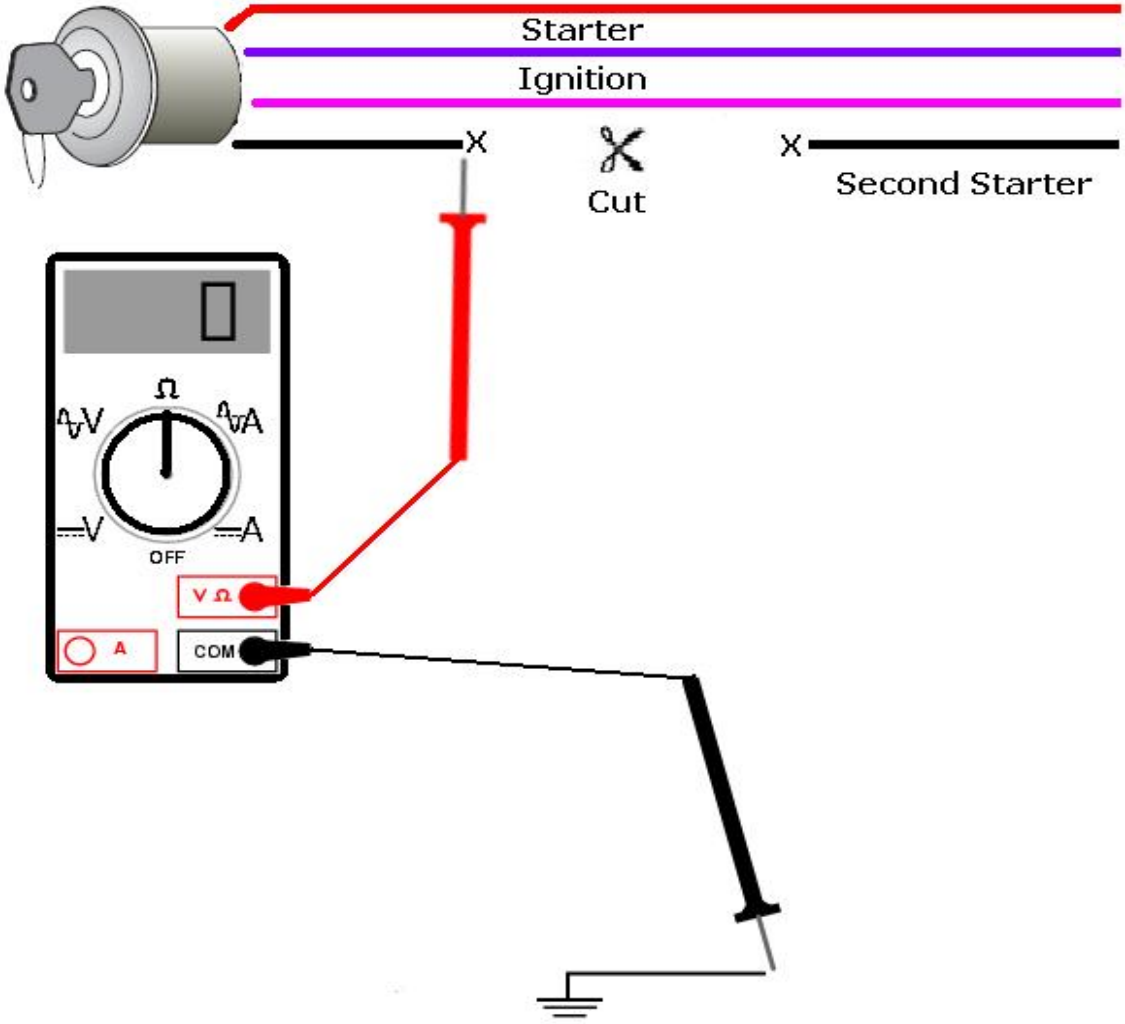
1. Set the meter to ohms. If the meter is a manual ranging meter, be sure it is set to the correct setting.

2. Cut the suspect wire. Resistance can not be measured in a live circuit.

3. (+) probe of meter goes to the switch side of the wire.

4. (-) probe of meter goes to chassis ground.

5. Activate the circuit and hold to the position. Read the meter.



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How to measure lock resistance with a meter

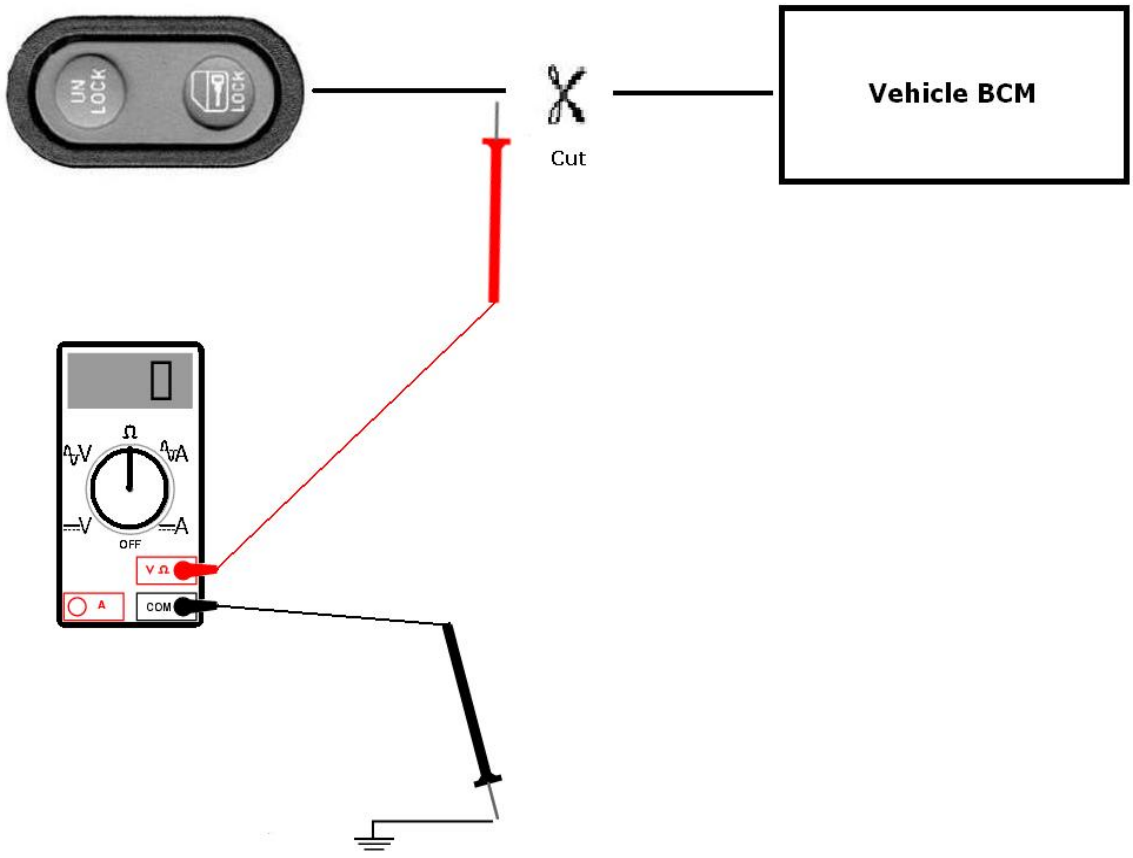
1. Set the meter to ohms. If the meter is a manual ranging meter, be sure it is set to the correct setting.

2. Cut the suspect wire. Resistance can not be measured in a live circuit.

3. (+) probe of meter goes to the switch side of the wire.

4. (-) probe of meter goes to chassis ground.

5. Activate the circuit and hold to the position. This could be either using the switch or using the key cylinder depending on the wire that is being tested. Read the meter.



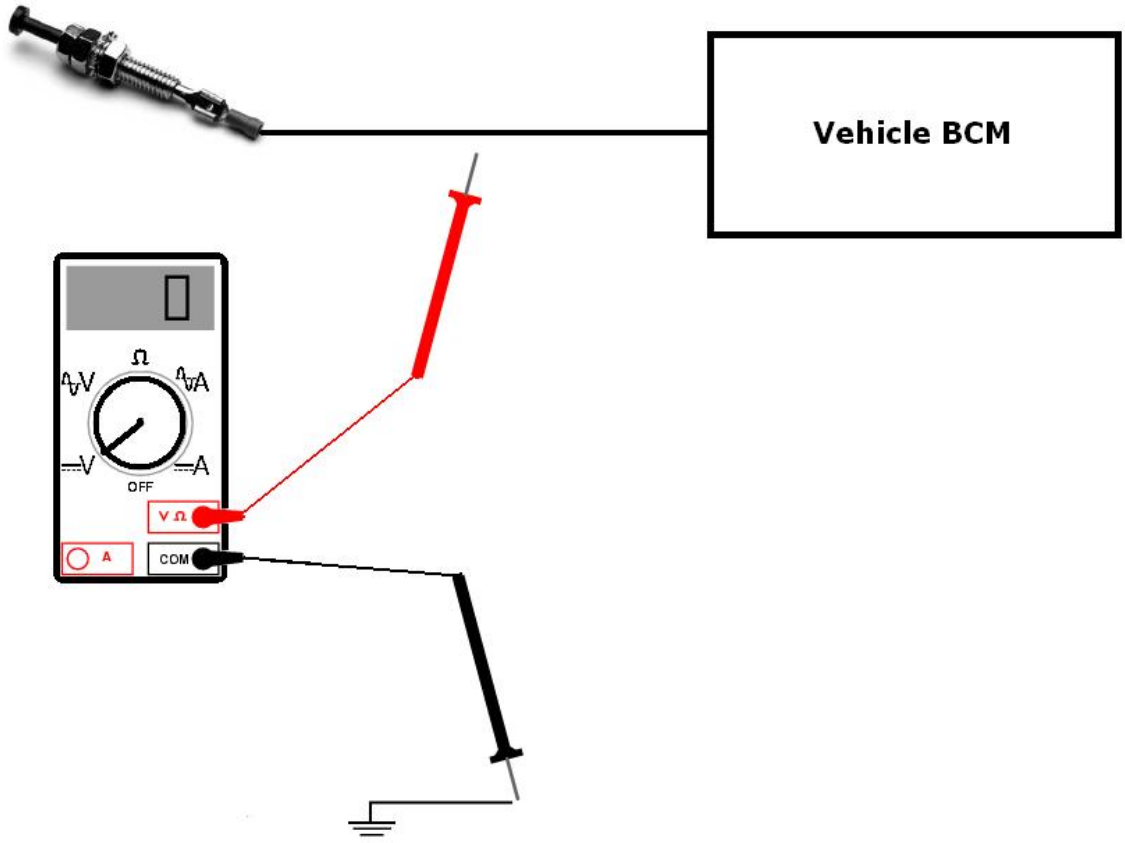
How to test for (+) door trigger with a meter

1. Set to DCV or DC voltage (12V or 20V is fine)

2. Attach the (-) probe of the meter to chassis ground

3. Probe the suspect door trigger with the (+) lead of the meter.

4. Open the door. The meter should read (+) 12V. Close the door. The meter should go back to zero.



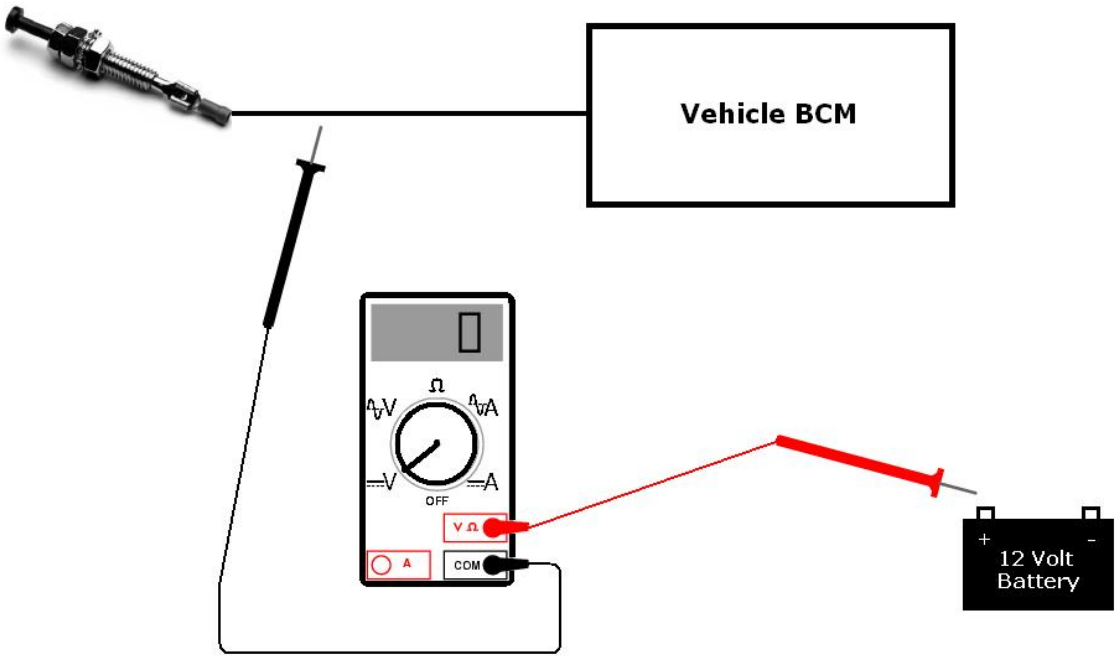
How to test for (-) door trigger with a meter

1. Set to DCV or DC voltage (12V or 20V is fine)

2. Attach the (+) probe of the meter to a (+) 12V constant source.

3. Probe the suspect door trigger with the (-) lead of the meter.

4. Open the door. The meter should read (+) 12V. Close the door. The meter should go back to zero. On some newer vehicles the meter will read (+) 12V and then go to zero once the door is open. If this is the case it is a door trigger that rests at ground and then goes to open with the door open. In these situations it is best to use the wire that is listed for dome supervision.



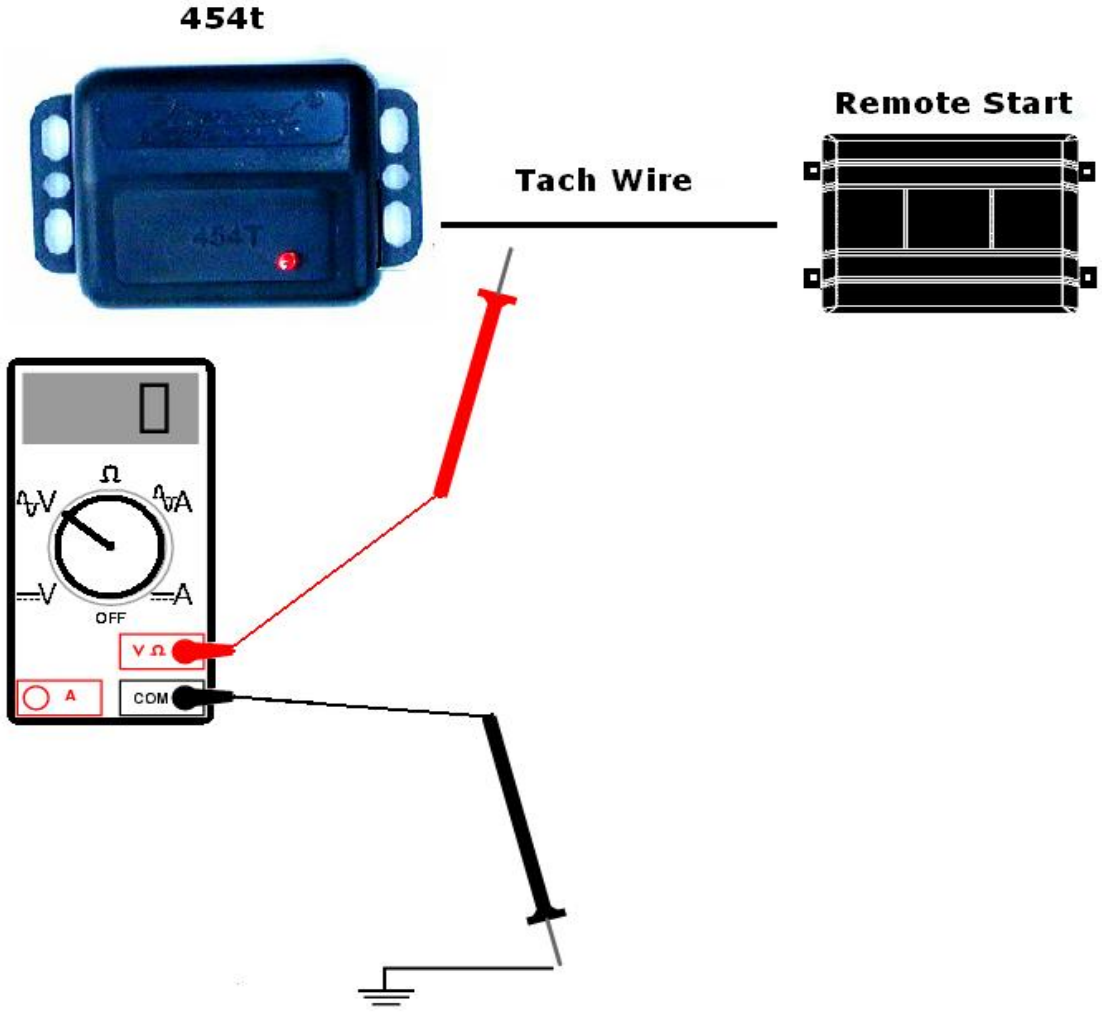
How to test for a tach wire with a meter

1. Set the meter to AC volts

2. Attach the (-) probe of the meter to chassis ground

3. Probe the suspect tach wire with the (+) lead of the meter.

4. Start the engine. The voltage should fluctuate between 1 and 6 volts when RPM varies. In vehicles with multiple coils, the individual coil wires could show a voltage that is lower than 1 volt. If the wire does not fluctuate with the engine RPM or is showing a voltage that is much higher than described above test another wire.



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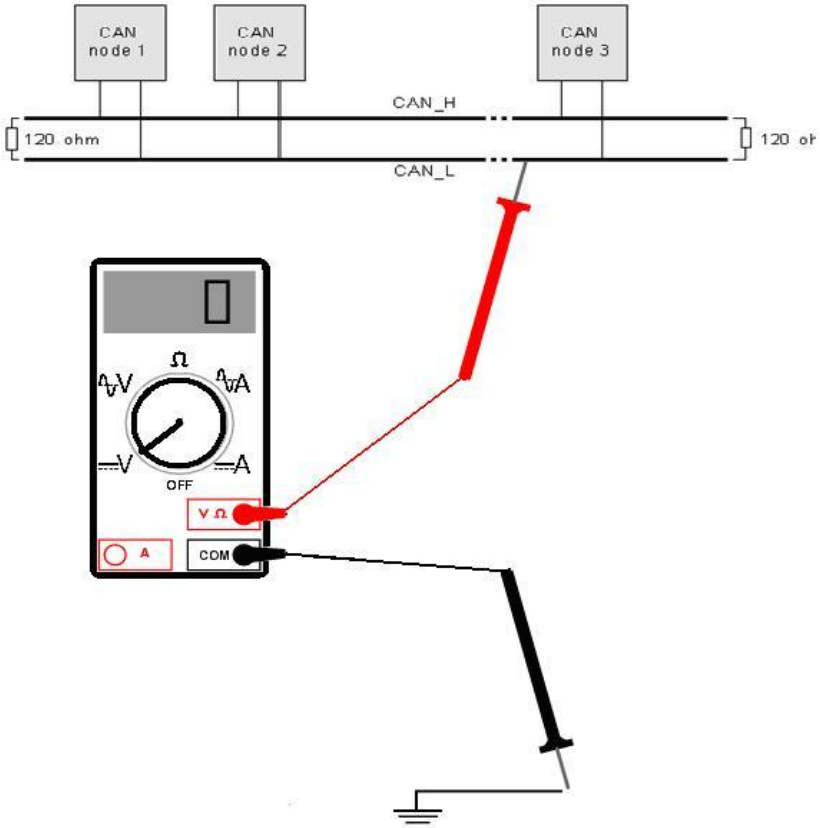
Testing for CAN Bus Wires

The CAN network is constructed with twisted pairs of wires and terminating resistors. These are both 120 ohms. This then becomes two 120 ohm resistors in parallel, which measured anywhere on the system should show 60 ohms between the two CAN wires. A reading of 120 ohms means an open in one leg, either CAN L or CAN H. A reading of less than 60 ohms means there is a resistance in one of the modules connected to the network or a short between the two systems.

This can be measured using a digital voltmeter (works best with “peak & hold”). This method is simply to determine and differentiate the CAN H (high) from the CAN L (low) wires, *not* to examine the data as with a scope. In the recessive or dormant state (ie: ign key off), you should read 2.5 VDC with respect to ground on both the CAN Hi and CAN Lo metered one at a time. When the signals are active or dominant, you should see 3.5 VDC on the CAN Hi with respect to ground and 1.5 VDC on the CAN Lo with respect to ground. It’s a great way to differentiate the two.



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