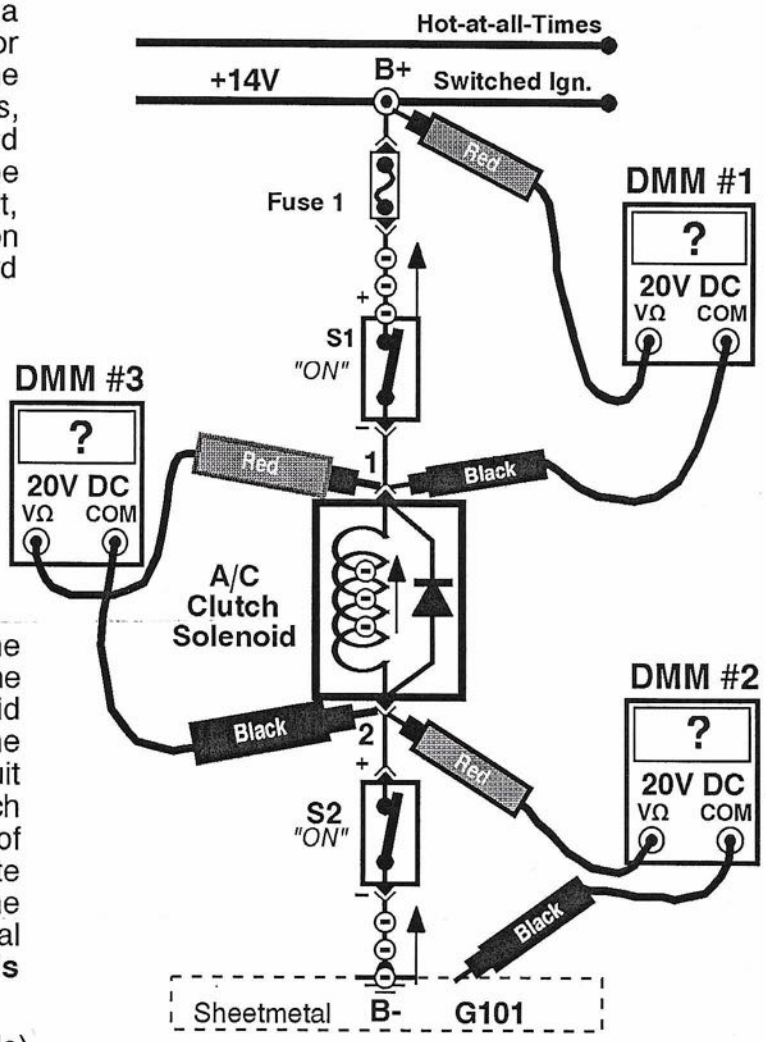
How To Use Voltage Drop Tests In Circuits

❶ Definition of Voltage Drops

As electron current flows through resistance in a circuit, a portion of the source voltage is developed (or appears) across each individual resistance in the circuit. Circuit components, such as lamps, fuses, switches and wires all contain some resistance and therefore "develop" (or drop) some voltage that can be measured across each component or wire in a circuit, ***as long as electron current is still flowing.*** Electron current is shown flowing (B-) to (B+) or in an upward direction through the circuit at the right.

Electron current ceases when the circuit is turned OFF. Any voltage drops produced with current flowing will drop to zero volt. Vds cannot exist when electron current stops. Voltage drops return to normal as soon as electron current is started again. Voltage measured across each circuit component or connection is referred to as a "**voltage drop**" and the phrase is abbreviated as "**Vd**" in Veejer's training materials.

Voltage drop measurments are shown in the schemation at the right. This circuit controls the AC/Clutch Solenoid. Switch S1 controls the solenoid on the (B+) voltage side and Switch S2 controls the solenoid on the (B-) ground side. Normally this circuit would require only one switch to control the AC Clutch Solenoid but we use two switches for purposes of instruction. Both switches must be CLOSED to operate the AC Clutch and for Vds to appear. In the schemation at the right are 3 DMMs (Digital MultiMeters) measuring the three Soleniod circuit **Vds** (voltage drops). Do the same for any circuit.



❷ DMM #1 "Vd_{VS}" (Voltage drop of the voltage side)

Identifies Solenoid's voltage side Vd. Place DMM test leads to include the entire **voltage side** of the Solenoid circuit. The **DMM (+) red test lead** connects to the B+ supply voltage source. The best place for this test point is the B+ positive post or terminal on the (alternator) generator. If this is not practical then select the B+ wire coming directly from that terminal. The **DMM (-) black test lead** connects to Pin 1 on the Solenoid. Expect about 1.00V max for Vd_{VS}. The lowest Vd_{VS} is best.

❸ DMM #2 "Vd_{GS}" (Voltage drop of the ground side)

Identifies Solenoid's ground side Vd. The DMM test leads are placed to include the entire **ground side** of the Solenoid circuit. The **DMM (+) red test lead** connects to the ground pin (2) on the Solenoid. The **DMM (-) black test lead** connects to the the sheetmetal which is confirmed to be a good electrical connection back to the case of the (alternator) generator or (B-) at negative battery terminal. Expect Vd_{GS} to be 0.05-0.10V. The lowest Vd_{GS} is best.

❹ DMM #3 "Vd_{LOAD}" (Vd of the $_{LOAD}$)

Identifies the Vd of the circuit's Load. Do This with circuit turned ON as shown at the left.

Connect **DMM (+) red** test lead to **Load Pin 1.**

Connect **DMM (-) black** test lead to **Load Pin 2.**

Vd_{LOAD} is the largest Vd of the 3 Vd tests in every circuit. Expect the Vd_{LOAD} to be high, in the range of almost B+ or 13.00V-14.50V (close as possible to the charging voltage is best).

Keep Vd_{VS} and Vd_{GS} as low as possible. If either is too high, clean and confirm tight connections then retest. The lower Vd_{VS} and Vd_{GS} is best. That will keep Vd_{LOAD} as high as possible and the better the circuit will perform.

Electrical is easy when you know how!

Figure 07-2026 How To Use Voltage Drop Tests In Circuits