

Ohm's law, series and parallel — in the bay, not the classroom

The one formula, plus what actually changes when loads are in series versus parallel — and how to use it to predict a reading before you take it.

PROCEDURE

1 Know the load's rating

Watts and volts are usually printed. Current is watts divided by volts.

2 Predict the resistance

Volts divided by amps. Write the number down before you measure.

3 Measure and compare

A reading far above expected means added resistance — corrosion or a partial open. Far below means a short or a wrong part.

4 Check your total

For parallel loads, add branch currents and confirm the feed wire and fuse are rated for the sum.

NUMBERS

Ohm's law	$V = I \times R$	$I = V \div R, R = V \div I$
Power	$P = V \times I$	watts; how you get current from a bulb's rating
Series resistance	R total = R1 + R2 + ...	same current everywhere, voltage divides
Parallel resistance	always less than the smallest branch	same voltage everywhere, currents add
55 W bulb on 12 V	about 4.6 A, about 2.6 Ω	cold filament reads lower than hot

COMMON MISTAKES

- Measuring a cold filament or heater and calling the resistance wrong — many loads change resistance dramatically when hot.
- Measuring resistance in a live circuit. Ohmmeters supply their own current and read nonsense with power applied.
- Forgetting parallel paths. A meter reads every path between your probes, not just the one you are thinking about.
- Adding accessories to an existing circuit without adding up the current the feed now has to carry.

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