NAPA Temp Products

Tech Tip

Ohm's Law

As vehicle electrical systems get more and more advanced one thing will always remain the same, Ohm's law.

Some times we get so involved in tracking down an electrical problem that we fail to take a step back and look at the basics of electricity.

E = Electromotive Force (**Volts**)
I = Current / Induced (**Amps**)
R = Resistance (**Ohms**)

Voltage = Amperage x Resistance
Amperage = Voltage / Resistance
Resistance = Voltage / Amperage

It's a nice formula, some may say, but how does it relate to an Air Conditioning repair? Lets look at an example:

Rev. Taylor's 1990 Mazda 626 is blowing the A/C fuse. We **feel** that the A/C compressor is blowing the fuse, but we are not sure.

We know that the when he turns on the A/C, he blows a 20 Amp A/C fuse. To determine if the compressor is blowing the fuse, we need to find the Amp draw of the compressor. **Amperage = Voltage / Resistance.** Checking the battery voltage we find that the vehicle is putting out **13.6 Volts**, an Ohms test across the compressor clutch reveals that the resistance is **4.2 Ohms**.

Amperage = 13.6 volts / 4.2 Ohms.
Amperage = 3.24

From the test we find that the compressor is only drawing **3.24 Amps**, which would not blow a 20 Amp fuse. As we look a little further into the system we find that the condenser fan is also on the same circuit. After hooking up our Ohm Meter to the fan, we find that it has a resistance of **.63 Ohms**.

Amperage = 13.6 Volts/ .63 Ohms
Amperage = 21.89

We have found our problem, the cooling fan is drawing **21.89 Amps**.