Many of you probably have heard about 42-volt systems in cars and trucks. If you are curious about the reasons for this probable change, this newsletter is for you.

First, a few basics about electricity. It can be compared to the water system in your house. Voltage, the driving force behind electrical current flow, is analogous to the pressure inside the pipes. If no valves (switches) are open, no water (current) flows, but the pressure (voltage) is there. When you open a valve (switch), water (electricity) flows. With an electrical circuit, a switch is an on-off device, but water valves (usually) open slowly, from a trickle to full flow. Once the valve is fully open, the amount of water that flows is determined by a combination of the water pressure and the resistance to flow created by the piping and the valve. For an electrical circuit, the volume of current is expressed in amperes. The amperage that flows through a given circuit depends on the resistance of the wiring and on the electrical load. A major difference between the flow of water and the flow of electricity is that the resistance to electrical flow can cause the conductor(s) to overheat if they carry too much current; if they are not properly sized, they will burn off their insulation, possibly melt, and may start a fire. Electrical circuits, therefore, are protected with devices like fusible links, fuses, and circuit breakers.

The concept of electrical power is not quite as simple, although many of us are familiar with the term kilowatt, because our electrical company charges us for the kilowatt-hours we use. The basic unit of electrical power is one watt, which is the power represented by a flow of one ampere driven by a potential difference of one volt. One kilowatt is one thousand watts. A kilowatt could be represented by a flow of one ampere driven by a potential difference of one thousand volts, a flow of one thousand amperes driven by a potential difference of one volt, or by any combination of amperage and voltage that resulted in a product of 1000. All conductors have some resistance to the passage of current, and the passage of larger current causes the creation of higher temperatures in the conductor; the heat generated by a conducting wire is purely a function of the amperage, and therein lies the motivation for higher voltage. To safely handle one thousand amperes of current requires a huge conductor (a ten-gauge wire is considered safe for no more than thirty amperes continuous flow in many configurations), but to safely insulate a conductor for one thousand volts requires very little covering, and an extremely small conductor can carry one ampere with no significant heat accumulation.

So, back to your car. Each passing decade has brought devices which place new and higher demands on a car's electrical system. Originally, cars didn't even have a battery: a car was started with a crank at the front and a strong arm! With passing time, electric starting motors were added to cars, but that required a battery. Since the battery was there, electrical devices were added. More and more, electrical devices replaced vacuum-operated equipment (like windshield wipers—they were originally driven by vacuum-operated motors), and more and more electrical devices were designed and installed (power windows, power seats, high-power stereo systems, two-way radios, etc.) And technology has brought us more electrical devices: ABS with traction control, GPS-based navigation systems with displays, on-board DVD viewers, computer controlled engines and transmissions, and other comfort, safety, and reliability systems and components.

If you would like more information on this topic, please write your name plus your telephone number or email address:_____

Or, you may contact me directly with your questions, by the method of your choosing.

If you have any comments, questions, or suggestions regarding content of this or future newsletters, I welcome them. You may use this form to comment by filling in the lines and mailing it, or, as always, you are welcome to contact me by any method of your convenience:_____