GM Charging System Quirks Normal

The voltage gauge in the instrument panel may indicate low voltage on all 1999 to 2003 General Motors passenger cars and light duty trucks, including 2003 HUMMER H2.

Any vehicle may have a low voltage display (if equipped with gauges), lights that dim at stop lights, slow cranking, no start, low generator output at idle, or dim lights at idle when electrical loads are heavy at idle, during slow-speed driving, or when the vehicle is used infrequently. These characteristics may be more noticeable with customer–added electrical accessories, or with a discharged battery.

All of these are considered normal operating characteristics of a vehicle electrical system, and no repairs should be attempted unless a proven fault has been diagnosed.

During normal driving conditions, when the engine speed is above 1,000 rpm, the generator (alternator) is designed to do two things:

- Supply the current necessary to operate the vehicle's originally equipped electrical devices (loads).
- Recharge/maintain the battery's state of charge.

The following factors may affect generator (alternator) and battery performance:

- Non-usage of the vehicle for extended periods of time. (For example: 30 days in a garage or driving vehicle only once a week). The vehicle's computers, clocks, etc. will cause the battery state of charge to drop. These examples would be considered abnormal usage of the vehicle, with the normally expected result for the vehicle battery, generator (alternator), and electrical systems.
- At idle, vehicle electrical loads may exceed the low speed current (amperage) output of the generator (alternator). When this happens, the shortfall is supplemented by the vehicle's battery. A drop in the electrical system voltage will result during times when the battery is supplementing the additional electrical current demand.
- Extended periods of engine idling, with high electrical loads, may result in a discharged battery. Attempting to recharge a battery by letting the engine run at idle may not be beneficial, unless all electrical loads are turned off.
- Increased internal generator (alternator) temperatures from extended idling can also contribute to lower electrical system voltage. As the generator's (alternator's) internal temperature rises, the output capability is reduced due to increased electrical resistance.

Depending on the vehicle application, generator (alternator) current (amperage) output at engine idle speeds of 600 to 700 rpm can be as low as 35 percent of the full rated output. With enough electrical loads on, it is easy to exceed the generator (alternator) current (amperage) output when the engine is at an idle speed of 600 to 700 rpm. This is a normal condition.

Under these extreme circumstances, the battery supplements the demand shortfall for short periods of time. When the vehicle road speed is above approximately 15 mph (24 km/h), the engine/generator (alternator) rpm is high enough that the generator (alternator) current (amperage) output is sufficient to supply the current requirements of the vehicle, as originally equipped, and recharge the battery.

Dimming lights at idle may be considered normal for two reasons:

- As the engine/generator (alternator) speed changes, so will the current output of the generator (alternator). As the vehicle speed slows, engine/generator (alternator) rpm slows, and the current (amperage) output of the generator (alternator) may not be sufficient enough to supply the current necessary to support the electrical loads. Under these conditions, the charging system voltage will drop, and the lights will dim. Dimming of the lights is an indication that the battery is supplementing the low current supply. If the battery is already in a low state of charge, the driver may notice a more pronounced dimming in the lights than a vehicle with a fully charged battery.
- When high current loads (such as the blower, rear defogger, headlamps, cooling fan, heated seats, power seats, electric air pump, or power windows) are operating or cycled on, the generator's (alternator's) voltage regulator can delay the rise in output. This delay, usually at low engine speeds, can take up to ten seconds to ramp-up the generator (alternator) output. This delay is used in order to avoid loading the engine severely. In order to increase current (amperage) output, additional engine torque is required by the generator (alternator), which could cause engine rpm fluctuations. The power train control module (PCM) will ramp up engine/generator (alternator) speed in small steps, so engine speed variations are not noticeable to the driver of the vehicle.

Refer to TSB no. 02-06-03-008 for more information.

Source: General Motors Corp., courtesy of ALLDATA, LLC.