

CHARGING SYSTEM PROBLEMS

There's More to 'Em Than Just a Dead Battery

The next time you tackle that impossible-to-diagnose performance problem, you may want to consider a charging system related problem. And then the high or low voltage condition may be an ECM-PCM or a scan tool just leading you astray. Consider the following situations that eluded some sharp technicians.

IMPROPER TRANSMISSION SHIFTING

The used car purchase left a bad impression on the vehicle owner, the car dealer and especially the repair shop that got into a hurry and made an inaccurate diagnosis. And some tense moments followed, as more errors in the diagnostic process were incurred, resulting in more unnecessary repairs. The Buick Riviera received a transmission overhaul when a system voltage condition had been the problem all along. Intermittently, the transmission would shift erratically or not shift at all. The transmission would stay in high gear during start-up, instead of downshifting to low gear. Then it would shift properly for a day or two. The transmission fluid and filter were changed, to no avail. Eventually the vehicle was sent to a transmission facility and a total rebuild was recommended. Fourteen hundred dollars later, the customer was encountering the same condition.

Proper Test Sequence

The proper test sequence should have first included accessing the ECM/PCM memory for any stored trouble codes. And when this was eventually performed, it was determined that the Check Engine light was inoperative, due to a missing bulb. Replacing the bulb revealed an illuminated Check Engine lamp. Accessing the diagnostic memory revealed a stored Code 16, which identifies a low

or high voltage condition. This is a very important code, considering the erratic transmission shifting concern.

This is the way the system functions: The ECM monitors the battery voltage on its feed circuit. If the voltage exceeds 17.3 volts or is less than 9 volts for more than ten seconds, Code 16 will be stored in memory. *When Code 16 is stored, the transmission will shift to third gear to prevent erratic shifting, which could result in transmission damage due to improper voltage.*

With a scan tool attached, the technician observed a voltage reading exceeding 17.3 volts. And this is where a major error in the diagnostic process was made. Assuming that he had identified a charging system problem, he removed the alternator and had an electrical shop rebuild the unit. This did not correct the shifting problem, and the Code 16 reset. He was in a big hurry to make the repair, so big that he missed the diagnosis. If he had only performed the second step on the diagnostic test chart, which involves installing a DVOM meter across the battery, he would have identified a discrepancy in the scan voltage vs. the DVOM reading. The charging system voltage was within the desired range as indicated by the DVOM reading, but the scan voltage exceeded 17.3 volts. A couple more steps would have identified the ultimate solution, and that was a defective ECM.

Further, when diagnosing electrical problems or systems, always check for poor or corroded connections. With the engine running, move or wiggle the related wiring while observing for any change in engine performance or an erratic voltage reading. Follow the test charts step by step, and approach the problem in a methodical manner.

GROANING NOISES AND ENGINE VIBRATIONS

Diagnosing a complaint of a groaning noise and vibration should involve a process of elimination. Parts or components that come in contact with the vehicle structure, such as an exhaust system component touching the underbody, can result in a vibration or noise condition. On vehicles not equipped with a serpentine belt drive, the individual belt-driven components should be isolated by removing the drive belts one by one, until the component responsible for the noise is identified.

The vehicle owner had repeatedly complained of a groaning noise and a vibration with her Nissan. Two repair facilities had examined the vehicle and were not successful in identifying the source of the noise and vibration. In fact, one technician almost had her convinced that everything was fine and the problem was her imagination. It wasn't until the engine failed to start that the problem was finally identified. And she had been correct all along. A completely dead battery led to identifying a defective alternator as the cause for the electrical drain. Further, repairing the alternator smoothed the roughness of the engine and quieted the annoying noise and vibration.

A Sequence of Failures

When the lady encountered the initial noise, a single diode in the rectifier bridge had failed. Most of her driving had been done in the daytime and the alternator output was sufficient to keep the battery charged. The only symptom was a moaning condition, which was not as pronounced once the engine reached its normal operating temperature. The charge indicator never illuminated. When the second diode failed, the alternator began single phasing and a drain occurred, as well as a moaning sound and an extreme vibration throughout the steering column and chassis. Further, there was an engine miss and a hesitation on acceleration, due to AC current leakage into the system. The automotive electrical system functions on DC current. The alternator is producing AC current. Diode rectifiers make the transition from AC to DC. When a diode fails and AC current leaks into the system, you are in store for some real hard-to-diagnose problems.

Another common symptom of a charging system problem is a battery that must be charged every two or three weeks. When this occurs, a battery usually gets thrown at the symptom and then the vehicle returns in a few days with the same condition. Performing a test on the battery usually confirms it to be a good unit. The charging system warning light may never illuminate. Testing the voltage and amp output of the alternator may indicate a functional unit. The alternator may lose a single diode and you may never be aware that there is a problem. The amperage output may only be down 15% from the rated output of the system. The diodes, which are still functioning, overheat from the overload and are destined to fail. The big problem is the AC current leakage into the system, which produces major system performance problems and damage to the electronics. The electronics are oversensitive to voltage spikes.

While performing routine charging system tests, you may want to include ripple voltage as a part of your test procedure. The scope is your visual voltmeter. It will make diagnosing electrical problems a whole lot easier for you, and you will definitely identify problems that you missed before, especially defective alternators.

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