

11-10 TROUBLESHOOTING

- c. Check the exhaust for an internal restriction and replace failed parts.
- d. Check for a restricted fuel filter and, if restricted, replace the filter.
- e. Inspect the fuel filler cap vent. When removing the filler cap, listen for excessive hissing noises indicating a blockage in the fuel filler cap vents. If the filler cap vents are blocked, replace the cap.
- f. Check the fuel system for restrictions and repair as necessary.
- g. Check for low engine compression and inspect for external leakage at the glow plugs or nozzles. If no external leakage is noted, repair or replace the engine.

ENGINE PERFORMANCE TROUBLESHOOTING HINTS

When troubleshooting an engine running or performance condition, the mechanical condition of the engine should be determined *before* lengthy troubleshooting procedures are performed.

The engine fuel management systems in fuel injected vehicles rely on electronic sensors to provide information to the engine control unit for precise fuel metering. Unlike carburetors, which use the incoming air speed to draw fuel through the fuel metering jets in order to provide a proper fuel-to-air ratio, a fuel injection system provides a specific amount of fuel which is introduced by the fuel injectors into the intake manifold or intake port, based on the information provided by electronic sensors.

The sensors monitor the engine's operating temperature, ambient temperature and the amount of air entering the engine, engine speed and throttle position to provide information to the engine control unit, which, in turn, operates the fuel injectors by electrical pulses. The sensors provide information to the engine control unit using low voltage electrical signals. As a result, an unplugged sensor or a poor electrical contact could cause a poor running condition similar to a failed sensor.

When troubleshooting a fuel related engine condition on fuel injected vehicles, carefully inspect the wiring and electrical connectors to the related components. Make sure the electrical connectors are fully connected, clean and not physically damaged. If necessary, clean the electrical contacts using electrical contact cleaner. The use of cleaning agents not specifically designed for electrical contacts should not be used, as they could leave a surface film or damage the insulation of the wiring.

The engine electrical system provides the necessary electrical power to operate the vehicle's electrical accessories, electronic control units and sensors. Because engine management systems are sensitive to voltage changes, an alternator which over or under-charges could cause engine running problems or component failure. Most alternators utilize internal voltage regulators which cannot be adjusted and must be replaced individually or as a unit with the alternator.

Ignition systems may be controlled by, or linked to, the engine fuel management system. Similar to the fuel injection system, these ignition systems rely on electronic sensors for information to determine the optimum ignition timing for a given engine speed and load. Some ignition systems no longer allow the ignition timing to be adjusted. Feedback from low voltage electrical sensors provide information to the control unit to determine the amount of ignition advance. On these systems, if a failure occurs the failed component must be replaced. Before replacing suspected failed electrical com-

ponents, carefully inspect the wiring and electrical connectors to the related components. Make sure the electrical connectors are fully connected, clean and not physically damaged. If necessary, clean the electrical contacts using electrical contact cleaner. The use of cleaning agents not specifically designed for electrical contacts should be avoided, as they could leave a surface film or damage the insulation of the wiring.

1-C. Engine Noises, Odors and Vibrations

1. Engine makes a knocking or pinging noise when accelerating

- a. Check the octane rating of the fuel being used. Depending on the type of driving or driving conditions, it may be necessary to use a higher octane fuel.
- b. Verify the ignition system settings and operation. Improperly adjusted ignition timing or a failed component, such as a knock sensor, may cause the ignition timing to advance excessively or prematurely. Check the ignition system operation and adjust, or replace components as needed.
- c. Check the spark plug gap, heat range and condition. If the vehicle is operated in severe operating conditions or at continuous high speeds, use a colder heat range spark plug. Adjust the spark plug gap to the manufacturer's recommended specification and replace worn or damaged spark plugs.

2. Starter motor grinds when used

- a. Examine the starter pinion gear and the engine ring gear for damage, and replace damaged parts.
- b. Check the starter mounting bolts and housing. If the housing is cracked or damaged replace the starter motor and check the mounting bolts for tightness.

3. Engine makes a screeching noise

- a. Check the accessory drive belts for looseness and adjust as necessary.
- b. Check the accessory drive belt tensioners for seizing or excessive bearing noises and replace if loose, binding, or excessively noisy.
- c. Check for a seizing water pump. The pump may not be leaking; however, the bearing may be faulty or the impeller loose and jammed. Replace the water pump.

4. Engine makes a growling noise

- a. Check for a loose or failing water pump. Replace the pump and engine coolant.
- b. Check the accessory drive belt tensioners for excessive bearing noises and replace if loose or excessively noisy.

5. Engine makes a ticking or tapping noise

- a. On vehicles with hydraulic lash adjusters, check for low or dirty engine oil and top off or replace the engine oil and filter.
- b. On vehicles with hydraulic lash adjusters, check for collapsed lifters and replace failed components.
- c. On vehicles with hydraulic lash adjusters, check for low oil pressure caused by a restricted oil filter, worn engine oil pump, or oil pressure relief valve.