

- d. On vehicles with manually adjusted valves, check for excessive valve clearance or worn valve train parts. Adjust the valves to specification or replace worn and defective parts.
- e. Check for a loose or improperly tensioned timing belt or timing chain and adjust or replace parts as necessary.
- f. Check for a bent or sticking exhaust or intake valve. Remove the engine cylinder head to access and replace.

### **6. Engine makes a heavy knocking noise**

- a. Check for a loose crankshaft pulley or flywheel; replace and torque the mounting bolt(s) to specification.
- b. Check for a bent connecting rod caused by a hydro-lock condition. Engine disassembly is necessary to inspect for damaged and needed replacement parts.
- c. Check for excessive engine rod bearing wear or damage. This condition is also associated with low engine oil pressure and will require engine disassembly to inspect for damaged and needed replacement parts.

### **7. Vehicle has a fuel odor when driven**

- a. Check the fuel gauge level. If the fuel gauge registers full, it is possible that the odor is caused by being filled beyond capacity, or some spillage occurred during refueling. The odor should clear after driving an hour, or twenty miles, allowing the vapor canister to purge.
- b. Check the fuel filler cap for looseness or seepage. Check the cap tightness and, if loose, properly secure. If seepage is noted, replace the filler cap.
- c. Check for loose hose clamps, cracked or damaged fuel delivery and return lines, or leaking components or seals, and replace or repair as necessary.
- d. Check the vehicle's fuel economy. If fuel consumption has increased due to a failed component, or if the fuel is not properly ignited due to an ignition related failure, the catalytic converter may become contaminated. This condition may also trigger the check engine warning light. Check the spark plugs for a dark, rich condition or verify the condition by testing the vehicle's emissions. Replace fuel fouled spark plugs, and test and replace failed components as necessary.

### **8. Vehicle has a rotten egg odor when driven**

- a. Check for a leaking intake gasket or vacuum leak causing a lean running condition. A lean mixture may result in increased exhaust temperatures, causing the catalytic converter to run hotter than normal. This condition may also trigger the check engine warning light. Check and repair the vacuum leaks as necessary.
- b. Check the vehicle's alternator and battery condition. If the alternator is overcharging, the battery electrolyte can be boiled from the battery, and the battery casing may begin to crack, swell or bulge, damaging or shorting the battery internally. If this has occurred, neutralize the battery mounting area with a suitable baking soda and water mixture or equivalent, and replace the alternator or voltage regulator. Inspect, service, and load test the battery, and replace if necessary.

### **9. Vehicle has a sweet odor when driven**

- a. Check for an engine coolant leak caused by a seeping radiator cap, loose hose clamp, weeping cooling system seal, gasket or cooling system hose and replace or repair as needed.
- b. Check for a coolant leak from the radiator, coolant reservoir, heater control valve or under the dashboard from the heater core, and replace the failed part as necessary.
- c. Check the engine's exhaust for white smoke in addition to a sweet odor. The presence of white, steamy smoke with a sweet odor indicates coolant leaking into the combustion chamber. Possible causes include a failed head gasket, cracked engine block or cylinder head. Other symptoms of this condition include a white paste build-up on the inside of the oil filler cap, and softened, deformed or bulging radiator hoses.

### **10. Engine vibrates when idling**

- a. Check for loose, collapsed, or damaged engine or transmission mounts and repair or replace as necessary.
- b. Check for loose or damaged engine covers or shields and secure or replace as necessary.

### **11. Engine vibrates during acceleration**

- a. Check for missing, loose or damaged exhaust system hangers and mounts; replace or repair as necessary.
- b. Check the exhaust system routing and fit for adequate clearance or potential rubbing; repair or adjust as necessary.

## **1-D. Engine Electrical System**

### **1. Battery goes dead while driving**

- a. Check the battery condition. Replace the battery if the battery will not hold a charge or fails a battery load test. If the battery loses fluid while driving, check for an overcharging condition. If the alternator is overcharging, replace the alternator or voltage regulator. (A voltage regulator is typically built into the alternator, necessitating alternator replacement or overhaul.)
- b. Check the battery cable condition. Clean or replace corroded cables and clean the battery terminals.
- c. Check the alternator and voltage regulator operation. If the charging system is over or undercharging, replace the alternator or voltage regulator, or both.
- d. Inspect the wiring and wire connectors at the alternator for looseness, a missing ground or defective terminal, and repair as necessary.
- e. Inspect the alternator drive belt tension, tensioners and condition. Properly tension the drive belt, replace weak or broken tensioners, and replace the drive belt if worn or cracked.

### **2. Battery goes dead overnight**

- a. Check the battery condition. Replace the battery if the battery will not hold a charge or fails a battery load test.
- b. Check for a voltage draw, such as a trunk light, interior light or glove box light staying on. Check light switch position and operation, and replace if defective.
- c. Check the alternator for an internally failed diode, and replace the alternator if defective.