07 - Cooling/Diagnosis and Testing

COOLING SYSTEM DIAGNOSIS

CONDITION	POSSIBLE CAUSE	CORRECTION
TEMPERATURE GAUGE READS LOW.	1. Diagnostic Trouble Code (DTC) has been set indicating a stuck open engine thermostat.	1. Replace the thermostat, if directed by DTC diagnosis (Refer to 07 - Cooling/Engine/THERMOSTAT/Removal and Installation) . If a DTC has not been set, the problem may be with the temperature gauge.
	2. Engine Coolant Temperature (ECT) sensor.	2. Check connector and wiring to and from the ECT sensor. Repair as necessary.
	3. Inoperative temperature gauge.	3. Check gauge operation (Refer to 08 - Electrical/8J - Instrument Cluster/Description and Operation) .
	4. Coolant level low during cold ambient temperature, accompanied by poor heater performance.	4. Check coolant level in the pressurized coolant bottle. Inspect the system for leaks (Refer to 07 - Cooling/Diagnosis and Testing) . Repair as necessary. Refer to WARNINGS in this section before removing the pressure cap.
TEMPERATURE GAUGE READS HIGH OR ENGINE COOLANT WARNING LAMP ILLUMINATES. COOLANT MAY OR MAY NOT BE LOST FROM SYSTEM.	1. Trailer being towed, a steep hill being climbed, vehicle being operated in slow moving traffic, or engine idling during high ambient (outside) temperatures with air conditioning on. High altitudes could also cause these conditions.	1. This may be a temporary condition and repair is not necessary. Turn off the air conditioning and drive the vehicle without any of the previous conditions. Observe the temperature gauge. The gauge should return to the normal range. If the gauge does not return to the normal range, determine the cause of the overheating and repair.
	2. Inoperative temperature gauge.	2. Check gauge operation (Refer to 08 - Electrical/8J - Instrument Cluster/Description and Operation) .
	3. Is temperature warning lamp (if equipped) illuminating unnecessarily?	3. Check warning lamp operation (Refer to 08 - Electrical/8J - Instrument Cluster/Description and Operation) .

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	4. Coolant level low in pressurized coolant bottle?	4. Check for coolant leaks and repair as necessary (Refer to 07 - Cooling/Diagnosis and Testing) .
	5. Pressure cap not installed tightly. If cap is loose, boiling point of coolant will be lowered. Also refer to the following step 6.	5. Tighten cap.
	6. Poor seals at pressure cap.	6. (a) Check condition of cap and cap seals (Refer to 07 - Cooling/Engine/CAP, Radiator - Diagnosis and Testing) . Replace cap if necessary. (b) Check condition of filler neck. If neck is warped or damaged, replace the pressurized coolant bottle (Refer to 07 - Cooling/Engine/BOTTLE, Pressurized Coolant/Removal and Installation) .
	7. Freeze point of coolant not correct. Mixture ratio may be too rich.	7. Check coolant concentration (Refer to 07 - Cooling/Engine/COOLANT - Diagnosis and Testing) . Adjust the glycol ratio as required.
	8. Coolant not flowing through system.	8. Check for coolant flow in the pressurized coolant bottle with some coolant removed, engine warm, and thermostat open. Coolant should be observed flowing into the bottle. If flow is not observed, determine the reason for lack of flow and repair as necessary.
	9. Radiator air seals missing or improperly installed.	9. Inspect air seals. Correct as necessary.
	10. Radiator or A/C condenser fins are dirty or clogged.	10. Clean obstruction from fins.
	11. Radiator core is plugged or corroded.	11. Clean or replace the radiator (Refer to 07 - Cooling/Engine/RADIATOR, Engine Cooling/Removal and Installation) .

CONDITION	POSSIBLE CAUSE	CORRECTION
	12. Fuel or ignition system problems.	12. Refer to appropriate Powertrain Diagnostic Procedures. Repair as necessary.
	13. Dragging Brakes.	13. Inspect the brake system and repair as necessary (Refer to 05 - Brakes - Diagnosis and Testing) .
	14. Bug screen or other aftermarket accessory is being used causing reduced air flow.	14. Remove bug screen or accessory.
	15. Thermostat partially or completely closed.	15. Check thermostat operation and replace as necessary (Refer to 07 - Cooling/Engine/THERMOSTAT/Removal and Installation) .
	16. Cooling fan not operating properly.	16. Check electric fan operation and repair as necessary.
	17. Cylinder head gasket leaking.	17. Check cylinder head gasket for leaks (Refer to 07 - Cooling - Diagnosis and Testing) .
	18. Heater core leaking.	18. Check heater core for leaks.
TEMPERATURE GAUGE READING IS INCONSISTENT (FLUCTUATES, CYCLES OR IS ERRATIC).	1. The gauge may cycle up and down. This is due to the cycling of the electric radiator fan.	1. A normal condition. No correction is necessary. If gauge cycling is the hot zone, check electric fan operation and repair as necessary.
	2. During cold weather operation with the heater blower in the high position, the gauge reading may drop slightly.	2. A normal condition. No correction is necessary.
	3. Temperature gauge or Engine Coolant Temperature (ECT) sensor is defective or shorted.	3. Check gauge operation (Refer to 08 - Electrical/8J - Instrument Cluster/Description and Operation) .

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	4. Gauge reading rises when vehicle is brought to a stop after heavy use (engine still running).	4. A normal condition. No correction is necessary. The gauge should return to normal range after vehicle is driven.
	5. Gauge reading high after restarting a warmed-up (hot) engine.	5. A normal condition. No correction is necessary. The gauge should return to normal range after a few minutes of engine operation.
	6. Coolant level low in radiator (air will build up in the cooling system causing the thermostat to open late).	6. Check and correct coolant leaks (Refer to 07 - Cooling - Diagnosis and Testing) .
	7. Cylinder head gasket leaking allowing exhaust gas to enter cooling system. This will cause thermostat to open late.	7. (a) Check for cylinder head gasket leaks (Refer to 07 - Cooling - Diagnosis and Testing) . Repair as necessary. (b) Check for coolant in the engine oil. Inspect for white steam emitting from exhaust system. Repair as necessary.
	8. Water pump impeller loose on shaft.	8. Check water pump and replace as necessary (Refer to 07 - Cooling/Engine/PUMP, Water/Removal and Installation) .
	9. Air leak on the suction side of water pump allows air to build up in cooling system. This will cause the thermostat to open late.	9. Locate leak and repair as necessary.
PRESSURE CAP IS BLOWING OFF STEAM AND/OR COOLANT FLOWING INTO PRESSURIZED COOLANT BOTTLE. TEMPERATURE GAUGE READING MAY BE ABOVE NORMAL, BUT NOT HIGH. COOLANT LEVEL MAY BE HIGH IN THE BOTTLE.	1. Pressure relief valve in pressure cap is defective.	1. Check condition of pressure cap and seals (Refer to 07 - Cooling/Engine/CAP, Radiator - Diagnosis and Testing) . Replace as necessary.

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COOLANT LOSS TO THE GROUND WITHOUT PRESSURE CAP BLOWOFF. GAUGE IS READING HIGH OR HOT.	1. Coolant leaks in radiator, cooling system hoses, water pump or engine.	1. Pressure test cooling system and repair as necessary (Refer to 07 - Cooling - Diagnosis and Testing) .
DETONATION OR PRE-IGNITION (NOT CAUSED BY IGNITION SYSTEM). GAUGE MAY OR MAY NOT BE READING HIGH.	1. Engine overheating. 2. Freeze point of coolant not correct.	1. Check reason for overheating and repair as necessary. 2. Check the freeze point of the coolant (Refer to 07 - Cooling/Engine/COOLANT - Diagnosis and Testing) . Adjust the glycol ratio as required.
HOSE OR HOSES COLLAPSE WHEN ENGINE IS COOLING.	1. Vacuum created in cooling system on engine cool-down is not being relieved through the pressure cap relief valve.	1. (a) Pressure cap relief valve stuck (Refer to 07 - Cooling/Engine/CAP, Radiator - Diagnosis and Testing) . Replace as necessary. (b) Vent in pressure cap is plugged. Clean vent and repair as necessary. (c) Pressurized coolant bottle is internally blocked or plugged. Check for blockage and repair as necessary.
RADIATOR FAN OPERATES ALL THE TIME.	1. Malfunctioning electrical component or circuit. 2. Check for low coolant level.	1. Refer to appropriate Powertrain Diagnostic Procedures. Repair as necessary. 2. Repair as necessary.
RADIATOR FAN WILL NOT OPERATE, GAUGE READING HIGH OR HOT.	1. Fan motor defective.	1. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the scan tool. Repair as necessary.

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	2. Fan control circuit, Powertrain Control Module (PCM) or engine coolant temperature sensor defective.	2. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the scan tool. Repair as necessary.
	3. Blown fuse in Power Distribution Center (PDC).	3. Determine cause for blown fuse and repair as necessary.
NOISY FAN.	1. Fan blade loose.	1. Replace the engine cooling fan assembly (Refer to 07 - Cooling/Engine/FAN, Cooling/Removal and Installation) .
	2. Fan blade striking a surrounding object.	2. Locate point of fan blade contact and repair as necessary.
	3. Air obstructions at radiator or A/C condenser.	3. Remove obstructions and/or clean debris from radiator and/or A/C condenser.
	4. Electric fan motor defective.	4. Replace the engine cooling fan assembly (Refer to 07 - Cooling/Engine/FAN, Cooling/Removal and Installation) .
INADEQUATE AIR CONDITIONER PERFORMANCE (COOLING SYSTEM SUSPECTED).	1. Electric radiator fan not operating when A/C is on.	1. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the scan tool. Repair as necessary.
	2. Radiator and/or air conditioning condenser is restricted, obstructed or dirty.	2. Remove restriction and/or clean as necessary.
	3. Radiator air seals missing or improperly installed.	3. Inspect air seals. Repair as necessary.

CONDITION	POSSIBLE CAUSE	CORRECTION
	4. Engine is overheating (heat may be transferred from radiator to A/C condenser). High under hood temperature due to engine overheating may also transfer heat to A/C components.	4. Correct overheating condition. Refer to this section.
INADEQUATE HEATER PERFORMANCE.	1. Has a Diagnostic Trouble Code (DTC) been set?	1. Refer to Powertrain Diagnostic Procedures.
	2. Coolant level low.	2. Check cooling system for leaks (Refer to 07 - Cooling - Diagnosis and Testing) . Repair as necessary.
	3. Obstructions in heater hose fittings at engine.	3. Remove heater hoses at both ends and check for obstructions. Repair as necessary.
	4. Heater hose kinked.	4. Locate kinked area and repair as necessary.
	5. Water pump is not pumping coolant through the heater core. When the engine is fully warmed up, both heater hoses should be hot to the touch.	5. Check accessory drive belt operation. Repair as necessary.
HEAT ODOR.	1. Various heat shields are used at certain components. One or more of these shields may be missing.	1. Locate missing shields and replace or repair as necessary.
	2. Is temperature gauge reading above the normal range?	2. Check gauge operation (Refer to 08 - Electrical/8J - Instrument Cluster/Description and Operation) .
	3. Is cooling fan operating correctly?	3. Repair as necessary.
	4. Has undercoating been applied to any unnecessary component.	4. Clean undercoating as necessary.

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	5. Engine may be running rich causing the catalytic converter to overheat.	5. Refer to appropriate Powertrain Diagnostic Procedures manual for operation of the scan tool. Repair as necessary.
POOR DRIVEABILITY (THERMOSTAT POSSIBLY STUCK OPEN). GAUGE MAY BE READING LOW.	1. Has a DTC been set?	1. Refer to the Powertrain Diagnostic Procedure manual for checking a DTC related to the thermostat.
STEAM IS COMING FROM FRONT OF VEHICLE NEAR GRILLE AREA WHEN WEATHER IS WET, ENGINE IS WARMED UP, RUNNING, AND VEHICLE IS STATIONARY. TEMPERATURE GAUGE IS IN NORMAL RANGE.	1. During wet weather, moisture (snow, ice or rain condensation) on the radiator will evaporate when the thermostat opens. This opening allows heated water into the radiator. When the moisture contacts the hot radiator, steam may be emitted. This usually occurs in cold weather with no fan or airflow to blow it away.	1. Occasional steam emitting from this area is normal. No repair is necessary.
COOLANT COLOR.	1. Coolant color is not necessarily an indication of adequate corrosion or temperature protection. Do not rely on coolant color for determining condition of coolant.	1. Check the freeze point of the coolant (Refer to 07 - Cooling/Engine/COOLANT - Diagnosis and Testing) . Adjust the glycol ratio as required.
COOLANT LEVEL CHANGES IN COOLANT RECOVERY/RESERVE BOTTLE.	1. Level changes are to be expected as coolant volume fluctuates with engine temperature. If the level in the bottle was between the FULL HOT and ADD marks at normal engine operating temperature, the level should return to within that range after operation at elevated temperatures.	1. A normal condition. No repair is necessary.