Article No. 93-24-8	• HESITATION—ROUGH IDLE—ENGINE COOLANT DOES NOT REACH NORMAL OPERATING TEMPERATURE—MEDIUM TRUCKS WITH 7.0L ENGINES • HESITATION/STALL DURING ACCELERATION OR DECELERATION • IDLE—ROUGH—ENGINE COOLANT DOES NOT REACH NORMAL OPERATING TEMPERATURE • HEATER/DEFROSTER—POOR HEATER OUTPUT—THERMOSTAT STUCK OPEN • COOLING SYSTEM—NEW DIAGNOSTICS FOR ENGINES THAT DO NOT REACH NORMAL OPERATING TEMPERATURE

FORD: 1983-94 ESCORT
1984-87 EXP
1984-94 CROWN VICTORIA, MUSTANG, TEMPO, THUNDERBIRD
1986-94 TAURUS

LINCOLN-MERCURY: 1984-86 CAPRI
1984-87 LYNX
1984-92 MARK VII
1984-94 CONTINENTAL, COUGAR, GRAND MARQUIS, TOPAZ, TOWN CAR
1986-94 SABLE
1988-89 TRACER
1991-94 CAPRI, TRACER

MERKUR: 1985-89 XR4TI
1988-89 SCORPIO

LIGHT TRUCK: 1984-94 BRONCO, ECONOLINE, F-150-350 SERIES, RANGER
1985-90 BRONCO II
1986-94 AEROSTAR
1988-94 F SUPER DUTY
1991-94 EXPLORER

MEDIUM/HEAVY TRUCK: 1993-94 F & B SERIES

This TSB article is being republished in its entirety to include 1994 model year vehicles.

ISSUE: Engine performance concerns such as hesitation or stall, rough idle, and/or poor fuel economy may be caused by the thermostat stuck in an open position or opening at a temperature lower than specified.

ACTION: Use the following "Cooling System Diagnosis" procedure to diagnose a cooling system that may not be reaching normal operating temperature. Follow the "Thermostat Diagnosis" procedure to determine if the thermostat may be at fault. Check the thermostat without removing it from the vehicle by using Rotunda Service Coolant Temperature Monitor Harness 007-00064.

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A new cooling system diagnosis procedure has been developed for engines that do not reach normal operating temperature. A new thermostat diagnosis procedure also has been developed, using a new service coolant temperature monitor harness.

COOLING SYSTEM DIAGNOSIS CHART

CONDITION	POSSIBLE SOURCE	ACTION
• Engine fails to reach normal operating temperature	• Coolant level	• Check level in radiator and coolant recovery reservoir.
	• Leakage	• Check for leaks using pressure test.
• Low gauge reading	• Thermostat operation	• Check thermostat. Refer to "Thermostat Diagnosis" procedure.
	• Temperature gauge or sending unit	• Check gauge and gauge sender. Refer to Service Manual Section 13-01.
• Poor heater/defroster performance	• Coolant level	• Check level in radiator and coolant recovery reservoir.
	• Leakage	• Check for leaks using pressure test.
	• Thermostat operation	• Check Thermostat. Refer to "Thermostat Diagnosis" procedure.
	• Blend door operation	• Check blend door for binding and proper operation.
	• Mode door operation	• Check mode door for binding and proper operation.
	• Blower fan operation	• Check blower fan for proper operation and control.
	• Heater core plugged	• Flush cooling system.

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NOTE: THIS PROCEDURE WILL DIAGNOSE ONLY COOLING SYSTEMS THAT MAY NOT BE REACHING NORMAL OPERATING TEMPERATURE. IT WILL NOT DIAGNOSE A THERMOSTAT THAT CAUSES AN ENGINE OVERHEAT CONDITION.

NOTE: THE ESCORT/TRACER SPECIFIC APPLICATION FOR THIS ARTICLE IS AS FOLLOWS:

- **1983-1990 Escort - 1.9L and 1.6L**
- **1991-1994 Escort - 1.9L**
- **1991-1994 Tracer - 1.9L Only**

THERMOSTAT DIAGNOSIS

***NOTE: DISCONNECTING THE POWERTRAIN* CONTROL MODULE (PCM) TO ATTACH A BREAKOUT BOX OR AN EEC IV MONITOR WILL ERASE THE ADAPTIVE LEARNING FROM MEMORY AND MAY "HIDE" A DRIVE CONCERN TEMPORARILY UNTIL THE ADAPTIVE LEARNING IS RE-LEARNED.**

NOTE: THIS PROCEDURE IS MOST ACCURATE IF PERFORMED INDOORS AT LESS THAN 100°F (38°C) AMBIENT TEMPERATURE. THIS TEST MAY BE PERFORMED WITH OR WITHOUT THE HOOD OPEN AND WITH THE ENGINE WARM OR COLD.

CAUTION: ALWAYS VENT THE EXHAUST TO THE OUTSIDE WHEN PERFORMING THIS TEST.

1. Check the coolant level in the radiator and coolant recovery reservoir.
2. With the key in the "off" position, proceed as follows:
   a. Remove the engine coolant temperature (ECT) sensor harness connector.
   b. Attach Rotunda Service Coolant Temperature Monitor Harness 007-00064 as a jumper between the PCM and the ECT.
   c. Attach Rotunda 73 Digital Multimeter 105-00051 or equivalent to the thermostat monitor harness. Voltage values (0-5vdc) may now be monitored while the sensor retains its connection to the wiring harness.

***NOTE: A ROTUNDA NEW GENERATION STAR* TESTER (NGS) 007-00500 OR THE ROTUNDA SERVICE BAY DIAGNOSTIC SYSTEM (SBDS) 001-00001 MAY BE USED TO MONITOR THE ECT ON VEHICLES EQUIPPED WITH DATA COMMUNICATIONS LINK (DCL). THE SBDS SEQUENCE TO USE FOR THE SCREEN IS "TOOLBOX - ELECTRONIC ENGINE CONTROL AND DCL - ITEM".**

3. Vehicles equipped with electric engine cooling fan(s) must have a fan running during this test (high or low speed may be used). Two methods may be used to turn the fan(s) on:
   a. Disconnect the A/C compressor clutch power supply and turn the climate control to A/C "ON". Or

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b. Disconnect the power supply to the cooling fan and supply 12 volts direct to the fan connector from the battery.

NOTE: A GROUND MAY BE REQUIRED FOR SOME APPLICATIONS.

4. Place transmission in "park" or "neutral".

NOTE: RUNNING THIS TEST WITH THE VEHICLE IN GEAR OR WITH THE A/C COMPRESSOR CLUTCH ENGAGED (RUNNING) WILL CAUSE IMPROPER DIAGNOSIS

5. Start the engine and allow to idle throughout this test:

   a. Allow engine to run for 2 minutes, then record ECT voltage.

   b. From now on, record ECT voltage every 60 seconds.

   c. When the ECT voltage trend changes direction or changes only slightly (0.03 volts or less) from the previous reading, record this as the thermostat opening voltage.

   d. Use the "Voltage and Corresponding Temperature Chart" shown below to obtain actual coolant temperatures.

6. If the opening voltage is **GREATER** than 0.75 volts (less than 180° F/ 82° C), or 0.85 volts (170° F/ 77° C) for 2.3L HSC engine only, replace the thermostat. Refer to the dealer Master Parts Catalog for correct thermostat usage.

7. If the thermostat opening voltage is **LESS** than 0.75 volts (greater than 180° F/ 82° C), or 0.85 volts (170° F/ 77° C) for 2.3L HSC engine only, the thermostat is good and should NOT be replaced. The "Cooling System Diagnosis Chart" should be referenced for further instructions.

NOTE: The 10° F opening temperature difference for the 2.3L HSC engine is due to the ECT sensor location.

VOLTAGES AND CORRESPONDING TEMPERATURES							
ECT (volts)	3.00	2.01	1.01	0.75	0.59	0.50	0.40
Coolant Temperature (°F)	71	109	159	180	195	206	221
Coolant Temperature (°C)	22	43	71	82	91	97	105

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OTHER APPLICABLE ARTICLES: NONE
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