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1971 FORD Mustang Convertible OEM Service and Repair Workshop Manual

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C4632-1	Ω	C175T-25
C4632-2	Ω	C1591-40

Are the resistances less than 3 ohms?

Yes	GO to F5

No	REPAIR the circuit in question.

F5 CHECK THE ECT (ENGINE COOLANT TEMPERATURE) SENSOR 4 CIRCUITS FOR A SHORT TOGETHER

- Measure:

Positive Lead	Measurement / Action	Negative Lead
C4632-1	Ω	C4632-2

Is the resistance greater than 10,000 ohms?

Yes	GO to F6

No	REPAIR the circuits.

F6 CHECK THE RESISTANCE OF THE ECT (ENGINE COOLANT TEMPERATURE) SENSOR 4

- Measure:

Positive Lead	Measurement / Action	Negative Lead

No	The system is operating correctly at this time. The concern may have been caused by module connections. ADDRESS the root cause of any connector or pin issues.

Component Tests

Cooling System Pressure Test

WARNING

Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.

NOTE

Vehicles have a pressure relief cap on the degas bottle and no radiator cap.

1. Turn the engine OFF.
2. Check the coolant level and adjust as necessary.
3. Remove the degas bottle cap. Inspect the degas bottle cap and degas bottle for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-ring, etc. If any issues are found, or if coolant was expelled through the cap potentially leaving contamination in the gasket, INSTALL a new cap and/or degas bottle.
4. Attach the Pressure Tester and adaptor (Snap-On TA53 or equivalent), to the degas bottle cap. The cap must hold pressure of 145 kPa +/- 21 kPa (21 PSI +/- 3 PSI). If any issues are found, INSTALL a new cap.
5. Attach the Pressure Tester and adaptor (Snap-On TA52, AST ASSFZ-47, Redline RDL95-0750 or equivalent) to the degas bottle.

7. If no leaks are found and the pressure drops, the leak may be internal to the engine. Inspect the coolant for engine oil and the engine oil for coolant.

   REFER to: Engine - Flex Fuel – Ethanol/Full Hybrid Electric Vehicle (FHEV)/Gasoline(303-00 Engine System - General Information, Diagnosis and Testing).

8. If the pressure does not drop remove the cooling system Pressure Tester and adaptor from degas bottle.

9. Install the degas bottle cap until it contacts the hard stop.

Thermostat

Install a new thermostat only after at least one of the following tests and checks have been carried out:

- Pinpoint Test B or C
- Thermostat Visual Inspection

Thermostat Visual Inspection

1. Remove the thermostat.

2. Examine the thermostat for signs of damage including:

- Valve not fully seated (light visible through the valve)
- Foreign material lodged in the main valve
- Bent or broken frame or flange
- Bent or broken spring
- Wax leaking from wax reservoir or a bulge in the reservoir
- Any other damage or distortion

3. **NOTE**

   If no damage is found during the inspection, do not attempt to open the thermostat using hot water or other heat sources. This method is not an accurate means to test the function of the thermostat and may damage the thermostat.

   If damage is found during the inspection, remove any foreign material or broken pieces and install a new thermostat.

Radiator Leak Test, Removed From Vehicle

Engine Temperature

303-03D Engine Cooling - 3.5L V6 PowerBoost (CN)	***2022 F-150***
Diagnosis and Testing	***Procedure revision date: 11/5/2020***

Engine Temperature

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC (diagnostic trouble code)	Description	Action
PCM (powertrain control module)	P0116:00	Engine Coolant Temperature Sensor 1 Circuit Range/Performance: No Sub Type Information	GO to Pinpoint Test DL
PCM (powertrain control module)	P0125:00	Insufficient Coolant Temp For Closed Loop Fuel Control: No Sub Type Information	GO to Pinpoint Test DL
PCM (powertrain control module)	P0128:00	Coolant Thermostat (Coolant Temp Below Thermostat Regulating Temperature): No Sub Type Information	GO to Pinpoint Test DL
PCM (powertrain control module)	P017C:00	Cylinder Head Temperature Sensor Circuit Low: No Sub Type Information	GO to Pinpoint Test DL

Pinpoint Tests

PINPOINT TEST DL : CYLINDER HEAD TEMPERATURE (CHT) SENSOR

Refer to Wiring Diagrams Cell 024for schematic and connector information.

Normal Operation and Fault Conditions The CHT (cylinder head temperature) sensor is used to determine the engine coolant temperature. The PCM (powertrain control module) has a dual switching resistor circuit on the CHT (cylinder head temperature) input. A graph showing the temperature switching from the COLD END line to the HOT END line, with increasing temperature and back with decreasing temperature is included. Note the temperature to voltage overlap zone. Within this zone it is possible to have either a COLD END or HOT END value at the same temperature. For example, at 90C (194F) the voltage could read either 0.60 volt or 3.71 volts. Refer to the table for the expected values. Voltage values calculated for VREF = 5 volts. These values can vary by 15% due to sensor and VREF variations. Refer to the DTC (diagnostic trouble code) Fault Trigger Conditions. **DTC Fault Trigger Conditions**

DTC (diagnostic trouble code)	Description	Fault Trigger Condition
PCM (powertrain control module) P0116:00	Engine Coolant Temperature Sensor 1 Circuit Range/Performance: No Sub Type Information	Sets when the PCM (powertrain control module) detects the cylinder head temperature value is higher than the calibrated value and could prevent one or more OBD (on-board diagnostic) monitors from completing. The PCM (powertrain control module) runs this logic after an engine off and a calibrated soak period (typically 6 hours). This soak period allows the intake air temperature and the cylinder head temperature to stabilize and not differ by greater than a calibrated value. This DTC (diagnostic trouble code) sets when all of the following conditions are met: • The engine coolant temperature at engine start exceeds the intake air temperature at engine start by greater than a calibrated value, typically 17°C (30°F). • The engine coolant temperature exceeds a calibrated value, typically 107°C (225°F). • The fuel system, heated oxygen and misfire monitors have not completed. • The calibrated time to set this DTC (diagnostic trouble code) has expired. • Make sure the intake air temperature and the engine coolant temperature or cylinder head temperature are

PCM (powertrain control module) P1285:00	Cylinder Head Overtemperature Condition: No Sub Type Information	Sets when the PCM (powertrain control module) detects an engine overheat condition was sensed by the CHT (cylinder head temperature) sensor.
PCM (powertrain control module) P1288:00	Cylinder Head Temperature Sensor Out Of Self Test Range: No Sub Type Information	Sets when the PCM (powertrain control module) detects the CHT (cylinder head temperature) sensor is out of self-test range. The engine is not at a normal operating temperature. Bring the engine to operating temperature. If cold, repeat the self-test. If the engine overheats, check the cooling system. Refer to the appropriate 303-03 section, Engine Cooling, The Engine Overheats for cooling system diagnosis.
PCM (powertrain control module) P1289:00	Cylinder Head Temperature Sensor Circuit High: No Sub Type Information	Sets when the PCM (powertrain control module) detects a CHT (cylinder head temperature) circuit open concern is present. The DTC (diagnostic trouble code) P0118 may also set when this DTC (diagnostic trouble code) sets.
PCM (powertrain control module) P128A:00	Cylinder Head Temperature Sensor Circuit Intermittent/Erratic: No Sub Type Information	Sets when the PCM (powertrain control module) detects the CHT (cylinder head temperature) circuit is intermittently open or short while the engine is running.
PCM (powertrain control module) P1299:00	Cylinder Head Overtemperature Protection Active: No Sub Type Information	Sets when the PCM (powertrain control module) detects an engine overheat condition was sensed by the CHT (cylinder head temperature) sensor.

Possible Sources

- CHT (cylinder head temperature) sensor circuitry concern
- Base engine concerns
- Engine cooling system concerns
- CHT (cylinder head temperature) sensor (6G004)
- PCM (powertrain control module) (12A650)

Pinpoint Test Steps available in the on-line Workshop Manual.

Engine Cooling System Draining, Vacuum Filling and Bleeding

303-03D Engine Cooling - 3.5L V6 PowerBoost (CN)	***2022 F-150***
General Procedures	***Procedure revision date: 04/6/2022***

Engine Cooling System Draining, Vacuum Filling and Bleeding

Draining

NOTICE

The coolant must be recovered in a suitable, clean container for reuse. If the coolant is contaminated, it must be recycled or disposed of correctly. Using contaminated coolant may result in damage to the engine or cooling system components.

NOTICE

Use the correct coolant. Do not mix coolant types. Mixing coolant types may degrade the coolant corrosion protection and may damage the engine or cooling system. For the correct coolant specified for this vehicle, refer to Specifications.

NOTICE

Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to Cooling System Flushing. Failure to follow these instructions may damage the engine or cooling system.

NOTE

Click here to learn about symbols, color coding, and icons used in this manual.

2. With the vehicle in N (Neutral) , position it on a hoist.

   Refer to: Jacking and Lifting - Overview(100-02 Jacking and Lifting, Description and Operation).

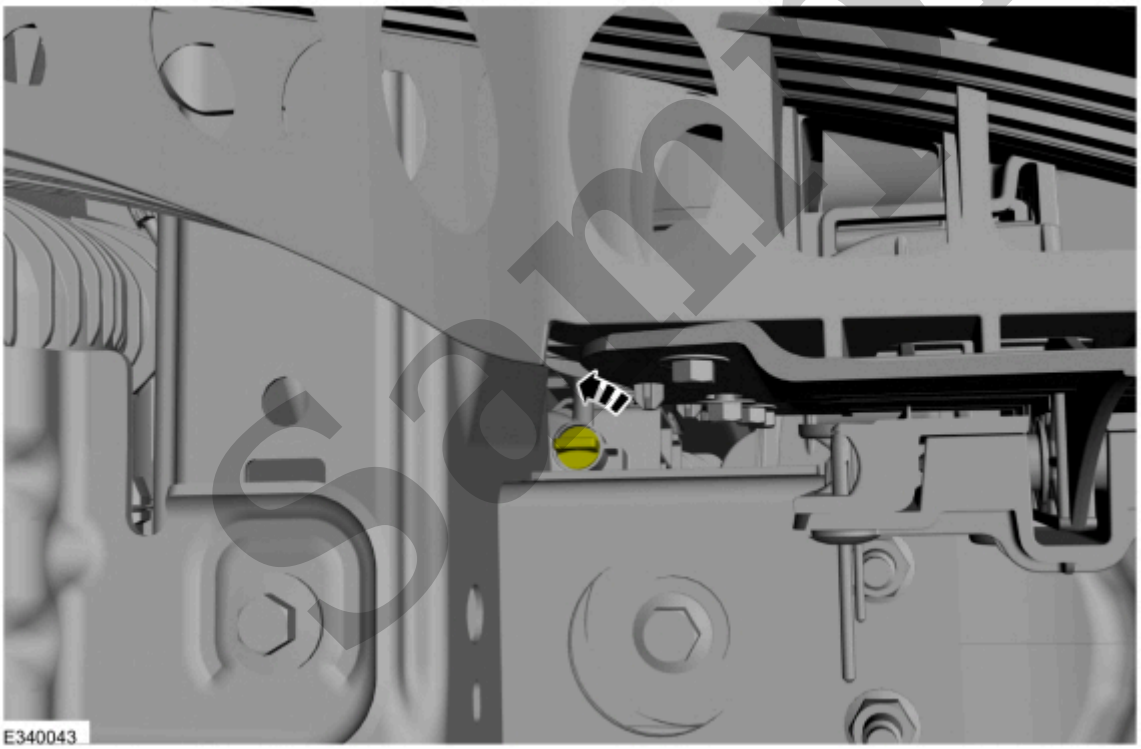
3. 

   NOTE

   Be prepared to collect escaping fluid.

   Connect a hose to drain the coolant. Open the radiator drain valve and drain the engine coolant in a suitable, clean container.

   Use the General Equipment: Fluid Container



Click here to learn about symbols, color coding, and icons used in this manual.

4. Close the radiator drain valve.

NOTE

Ford Motor Company does NOT recommend the use of recycled engine coolant since a Ford-approved recycling process is not yet available.

When adding or topping off the engine coolant:

- Measure the coolant concentration in the vehicle.

  Use Special Service Tool : ROB75240 Coolant/Battery Refractometer (Fahrenheit)

- Determine the concentration desired based on the vehicle duty cycle operating conditions (non-extreme climate, extreme hot, or extreme cold).

- **NOTICE**

  Make sure that the concentration of antifreeze is not below 40% or above 60% as engine parts could become damaged.

  Add, top-off or adjust the coolant to the correct concentration.

  Refer to: Specifications(303-03D Engine Cooling - 3.5L V6 PowerBoost (CN), Specifications).

2. Install the vacuum cooling system filler and follow the manufacturer's instructions to fill and bleed the system.

   Use the General Equipment: Cooling System Vacuum Tester and Refiller

3. Fill the degas bottle to the MAX FILL line.

4. Install the degas bottle cap until it contacts the hard stop.

5. Turn the climate control system off.

6. Start the engine and increase the engine speed to 3,500 rpm and hold for 30 seconds.

7. Turn the engine off and wait for 1 minute to purge any large air pockets from the cooling system.

8. **WARNING**

   Always allow the engine to cool before opening the cooling system. Do not unscrew the coolant pressure relief cap when the engine is operating or the cooling system is hot. The cooling system is under pressure; steam and hot liquid can come out forcefully when the cap is loosened slightly. Failure to follow these instructions may result in serious personal injury.