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## 1991 FORD Orion OEM Service and Repair Workshop Manual

Go to manual page

by a refrigerant heat exchanger (chiller). A temperature sensor in the high voltage battery circuit provides the control module with coolant temperature.

The upper temperature limit for the high voltage battery circuit is 55°C (131°F).

**SOBDMC DTC Chart**

| DTC | Description | Action |
|---|---|---|
| P0A06:00 | SOBDMC (secondary on-board diagnostic control module C) / TCM (transmission control module) Coolant Pump A Control Circuit Low | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |
| P0A07:00 | SOBDMC (secondary on-board diagnostic control module C) / TCM (transmission control module) Coolant Pump Control Circuit High | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |
| P0C48 | Battery Pump Circuit Open | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |
| P0CDF (if equipped) | Battery Diverter Valve Circuit Open | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |
| P0C73:35 | SOBDMC (secondary on-board diagnostic control module C) / TCM (transmission control module) Coolant Pump A Control Performance Signal High Time | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |
| P0C73:92 | SOBDMC (secondary on-board diagnostic control module C) / TCM (transmission control module) Coolant Pump A Control Performance or Incorrect Operation | REFER to: High Voltage Battery, Mounting and Cables - Electric(414-03A High Voltage Battery, Mounting and Cables, Diagnosis and Testing). |

**Pinpoint Tests**

**PINPOINT TEST A : LOSS OF COOLANT**

**Normal Operation and Fault Conditions**

The cooling system is a closed system providing for coolant expansion and contraction as well as changes in pressure as coolant warms and cools with operation. Various gaskets, seals, hoses and clamps contain

**NOTE**

Allow the system to cool before checking the engine coolant level.

- Ignition OFF
- Visually inspect the engine coolant level at the coolant expansion tank and adjust as necessary. Pressure test the engine cooling system. Refer to Component Tests, Cooling System Pressure Test in this section.

**Does the engine cooling system leak externally?**

| | |
|---|---|
| **Yes** | REPAIR or INSTALL new components. |

| | |
|---|---|
| **No** | Check the high voltage battery for coolant leak.<br>REFER to: Cooling System Filling and Bleeding<br>(303-03F Electric Powertrain Cooling - 3.5L V6 PowerBoost (CN), General Procedures). |



**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 coolant expansion tank and no radiator cap.

1. Turn the engine OFF.
2. Check the coolant level and adjust as necessary.
3. Remove the coolant expansion tank cap. Inspect the coolant expansion tank cap and coolant expansion tank for any issues that would cause improper sealing, such as for cross-threading, burrs, damaged o-

If the plunger of the pressure tester is pressed too fast, an erroneous pressure reading results.

To pressurize the engine cooling system, slowly press the plunger of the pressure test pump and increase the pressure to between 124 - 138 kPa (18 - 20 PSI). Observe the gauge reading for approximately 2 minutes. Pressure should not drop during this time. If the pressure drops within this time, inspect for leaks and repair as necessary.

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 coolant expansion tank.

9. Install the coolant expansion tank cap until it contacts the hard stop.

**Radiator Leak Test, Removed From Vehicle**

**NOTICE**

Never leak test an aluminum radiator in the same water that copper/brass radiators are tested in. Flux and caustic cleaners may be present in the cleaning tank and they will damage aluminum radiators.

**NOTE**

Clean the radiator before leak testing to avoid contamination of tank.

1. Leak test the radiator in clean water with air pressurized to the maximum pressure listed in the Specifications table.

During normal vehicle operation, coolant can change color. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

**NOTE**

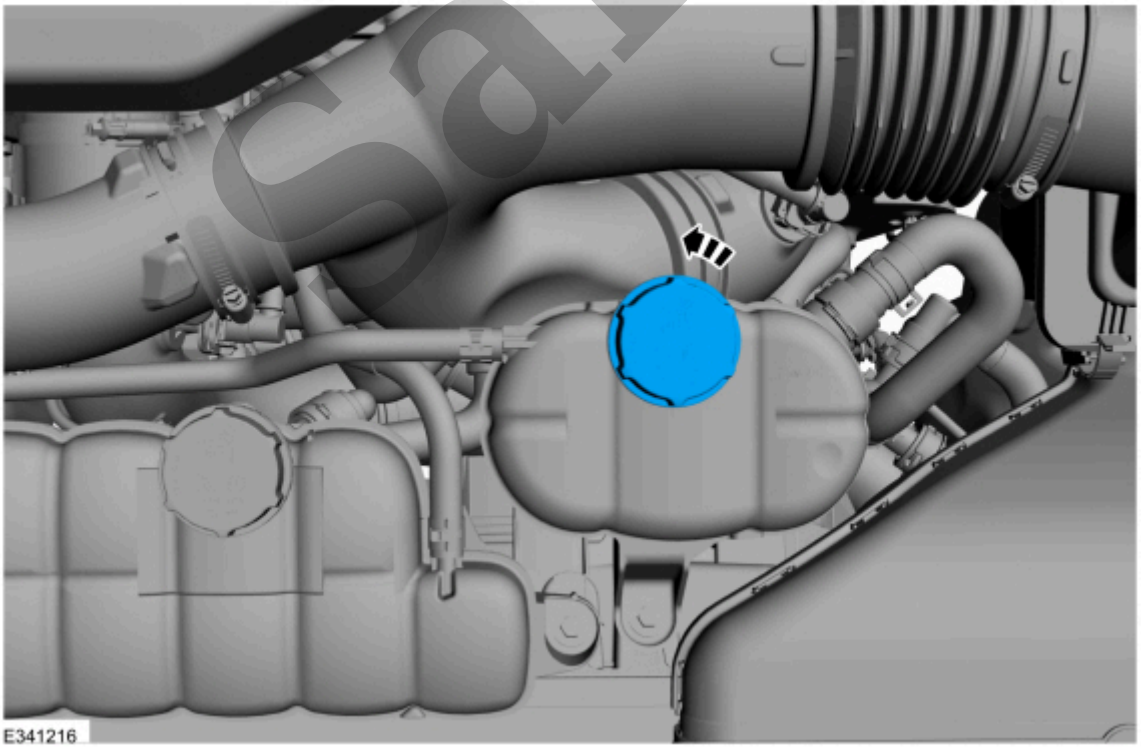
Less than 80% of coolant capacity can be recovered with the engine in the vehicle. Dirty, rusty or contaminated coolant requires replacement.

1. 

**WARNING**

When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.

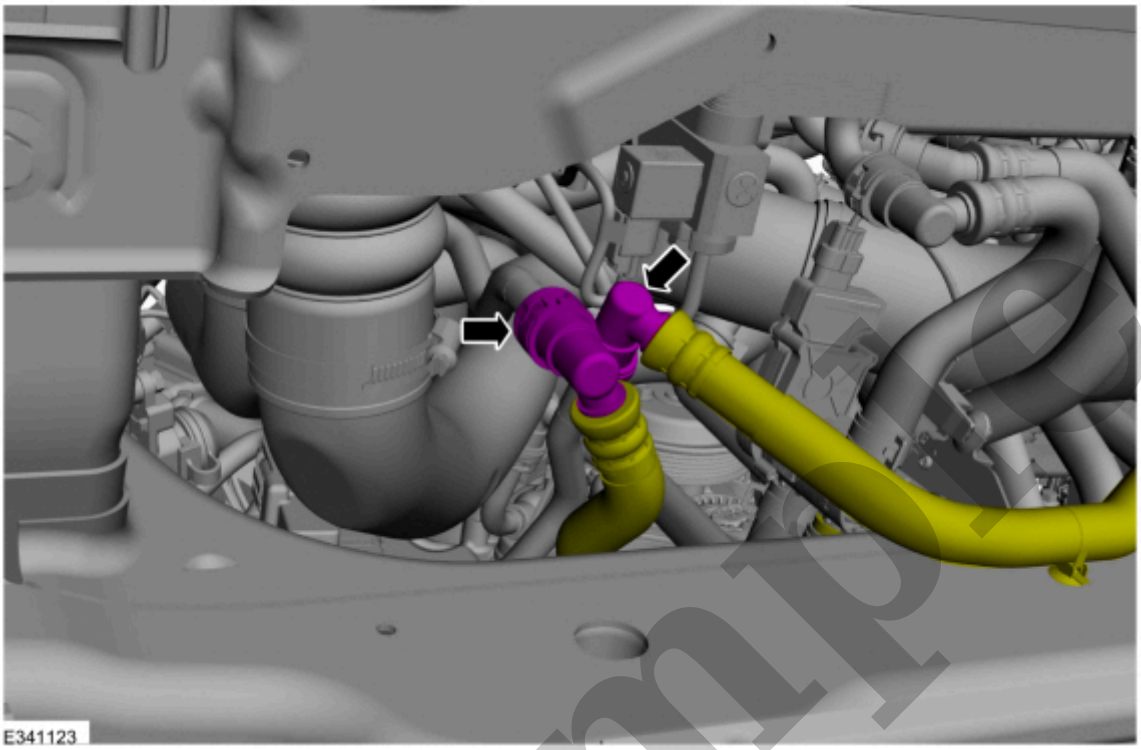
Remove the pressure relief cap.



1. Follow the directions to connect quick release coupling type 3.

   Connect the coolant tubes.

   Refer to: Quick Release Coupling(310-00D Fuel System - General Information - 3.5L V6 PowerBoost (CN), General Procedures).




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

2. • **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.

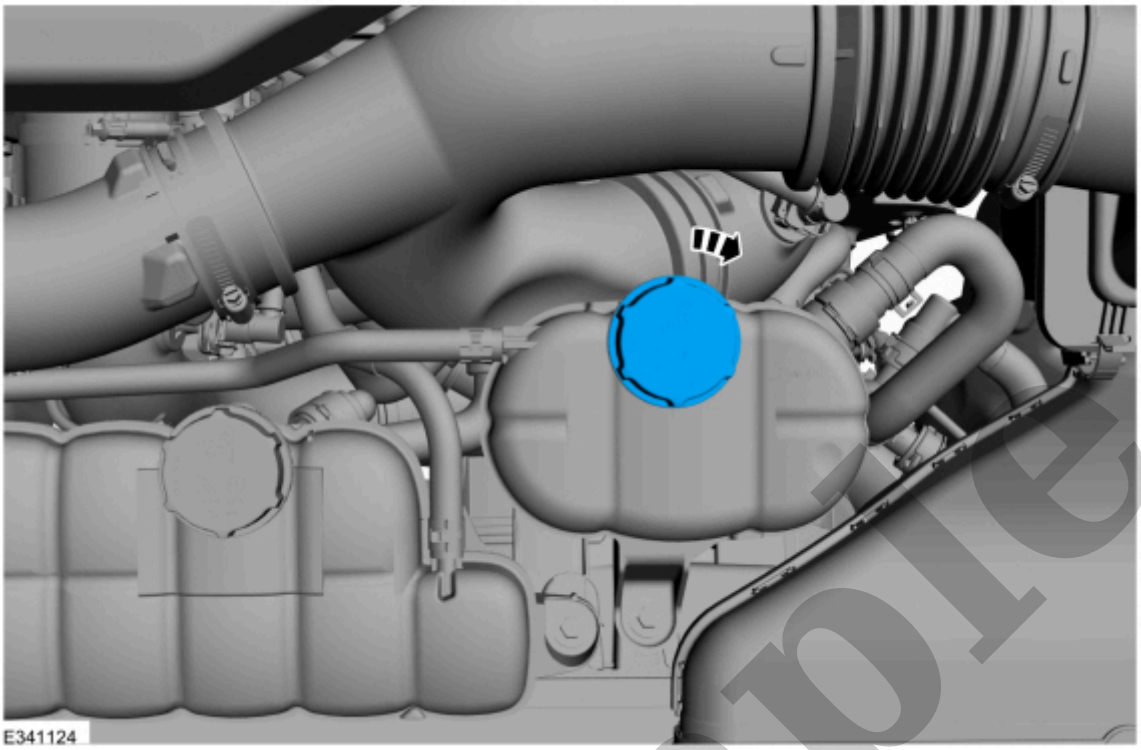
   **NOTICE**

   Engine coolant provides boil protection, corrosion protection, freeze protection and cooling efficiency to the engine and cooling components. In order to obtain these protections, maintain the engine coolant at the correct concentration and fluid level in the degas bottle.

   **NOTICE**

Use the General Equipment: Cooling System Vacuum Tester and Refiller

4. Install the pressure relief cap.

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**Bleeding**

1. Place transmission selector in park.
2. **NOTE**

   The gas engine may or may not start.

   Using the scan tool, run the service fill mode procedure for the electric powertrain cooling system. Monitor the coolant level in the coolant expansion tank throughout the process and add coolant if the fill level drops below the MIN mark. Confirm that the SOBDMC (secondary on-board diagnostic control module C) / TCM (transmission control module)  coolant pump is running by feeling for vibration at the pump.
3. Exit the service fill mode and turn OFF the ignition.
4. Check and fill the coolant expansion tank until the coolant level is between the MIN and MAX marks.

   Refer to:  Specifications(303-03F Electric Powertrain Cooling - 3.5L V6 PowerBoost (CN), Specifications).

# Coolant Expansion Tank

| | |
|---|---|
| ***303-03F Electric Powertrain Cooling - 3.5L V6 PowerBoost (CN)*** | ***2022 F-150*** |
| ***Removal and Installation*** | ***Procedure revision date: 10/2/2020*** |

## Coolant Expansion Tank

### Removal

**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**

Removal steps in this procedure may contain installation details.

1. 

**WARNING**

When releasing the cooling system pressure, cover the coolant expansion tank cap with a thick cloth.