



TT430: TWIN-COOLED SYSTEM DIAGNOSTICS

2019-12-10



Engine

APPLIES TO	SYMPTOMS
All Twin-Cooled Touring and Trike models	• Cooling system issues

Reason for Revision

Refer to Table 1.

Table 1. Document History

Date	Revision Description
2013-09-26	Initial release
2019-12-10	Updated bulletin title, section title pressure values
	* Updated Purpose for Technical Tip - Basic Operation, Cooling System Pressure Cap, Loss of Coolant from Right Fairing Lower Overflow Hose

Purpose for Technical Tip - Basic Operation

The coolant pump runs always when the engine is running. Operation of the fans is based on vehicle speed and coolant temperature threshold.

The fans will run after engine shutdown until coolant temperature reaches 95 °C (203 °F), or 3 min, whichever occurs first.

Cooling System Pressure Cap

Note that a loose pressure cap can easily be misdiagnosed. See Figure 1. You MUST visually confirm that the ears on the cap are against the stop (2) on the neck. If the cap is loose, it allows the system to boil. Checking the cap is covered in the PDI (Predelivery Inspection) manual.

There is a vacuum valve in the tip of the pressure cap. The valve looks like a brass washer on the tip of the cap stem. A valve that is stuck open or has debris under it can cause boil-over. Make sure that the brass valve sits flush against the rubber washer inside the cap.

The system must maintain pressure of 124–152 kPa (18–22 psi) for 2 min. If in doubt, pressure test the cap and system to verify that the pressure is maintained.

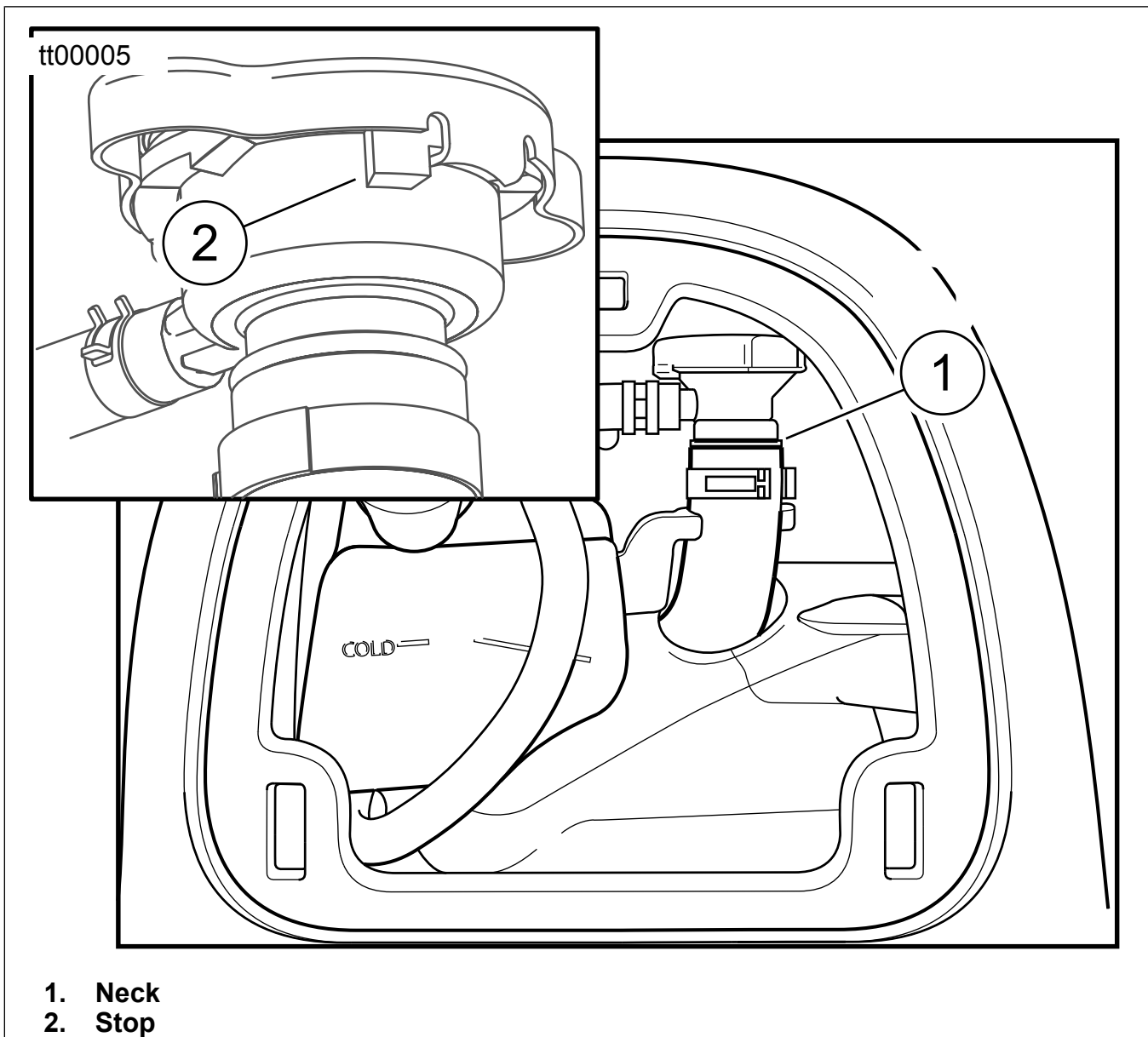


Figure 1. Coolant Filler Cap

System Bleed and Fill

Any time the cooling system is repaired or coolant loss has occurred, the system must be filled and bled correctly. If all air in the system is not purged before engine operation, the system may continue to have issues. This process takes about 5 min to perform correctly. See Drain and Fill Cooling System in Chapter 1 of the 2014 Touring Service Manual.

Troubleshooting DTC 1019

This is a correlation error between ET (Engine Temperature) and ECT (Engine Coolant Temperature). Using DT II (Digital Technician II), you should be able to watch ET and ECT as the engine is running. ET should rise and ECT will begin to rise at a later point. If they exceed approximately 70° of separation, DTC (Diagnostic Trouble Code) 1019 will set. This typically means the coolant temperature is not rising as engine temperature rises. The most likely causes are either no coolant circulation or a thermostat that is not opening. Thermostat failure, while possible, is not seen as a likely situation. Focus on the pump.

1. Turn ignition on. Open throttle more than 50% to activate coolant pump and both fans. Verify that the pump is running by feeling the pump body.

NOTE

Do not be confused by the slight vibration the fans create. Make certain the pump is running.

2. If the pump is not running when it should, check all electrical connections, wiring pinouts, voltage and grounds at the pump connector.
3. If the pump motor is running but coolant still does not seem to be circulating (the hose from the thermostat to the left radiator should become warm as the engine and coolant warm-up while running and the thermostat opens) verify that the impeller inside the pump is free (not bound up) as follows:
 - See Figure 2. Remove the spring clamp (3) from the hose fitting (2) on the bottom of the pump (90° angle to the pump) and coolant will drain. With the pump not running, **gently** insert a small screwdriver into the fitting on the pump and move the impeller blades. You should be able to feel the impeller turning as you roll the impeller blades with the screwdriver tip.
 - Once the impeller is turning, remove the screwdriver, install and clamp the hose. Fill and bleed the system following the service manual procedure.

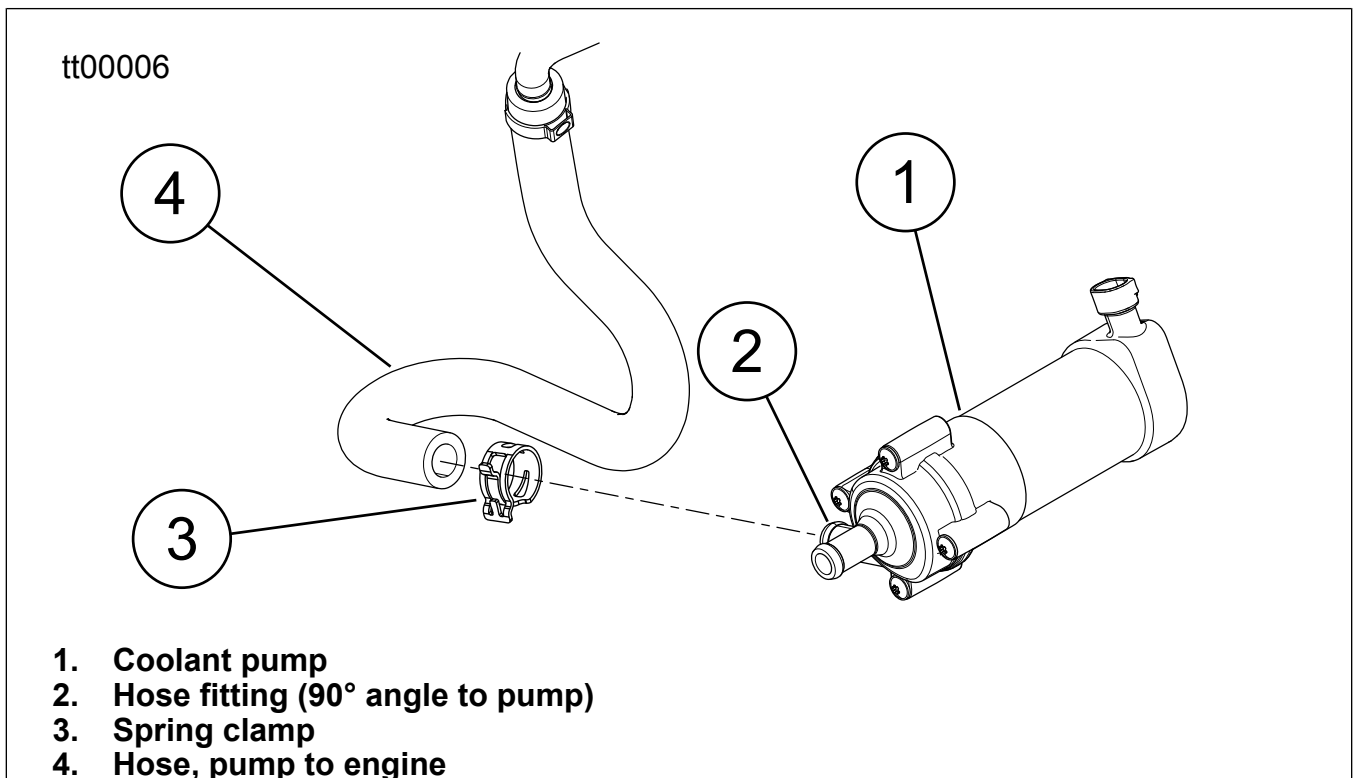


Figure 2. Accessing Coolant Pump Impeller

Electrical Issues

The other source of a coolant system failure could be electrical. Carefully check connections at the pump, temp sensor, cooling fans, connectors under the pump (where the fan and sensor jumpers attach) and the ECM (Electronic Control Module). Make sure that no connections were missed or have bent pins, wires swapped or pin push-back. Use DIGITAL TECHNICIAN II (PART NUMBER: HD-48650) and the BREAKOUT BOX (PART NUMBER: HD-50390-1) to verify wiring harness integrity.

Loss of Coolant from Right Fairing Lower Overflow Hose

1. Verify precisely what the customer's concern is and how and when the problem occurred.
2. Verify if any current or historic trouble codes DTCs (Diagnostic Trouble Codes) are present.
3. See Figure 1. Verify that the pressure cap is fully tightened to the stop (2).
4. Verify that both lowers have perforated intake panels on the front side.

NOTE

Solid panels are used only on air-cooled models.

5. Turn ignition on. Open throttle more than 50% to activate coolant pump and both fans. Verify the following:
 - Both fans are running and the air exits the side ducts in each fairing lower.
 - The pump is running (touch the pump body to verify).
 - The hose exiting the pump going up to the cylinder heads on the left side of the vehicle feels as though coolant is moving through it (pulsing).

If all conditions are met, turn ignition off.

6. With engine cool, remove pressure cap and verify that coolant is in the filler neck. Pressure test the cap using COOLANT SYSTEM PRESSURE TESTER (PART NUMBER: HD-45335). Verify that the cap maintains a pressure of 124–152 kPa (18–22 psi) for 2 min. Replace the cap if it fails.
7. Pressure test the coolant system using COOLANT SYSTEM PRESSURE TESTER (PART NUMBER: HD-45335). Verify that the system maintains of pressure of 152 kPa (22 psi) for 2 min. If not, locate and repair the source of the leak.

NOTE

A system pressure leak may also be due to an issue with the filler neck. Carefully check the cap and filler neck to be certain that pressure can be maintained.

8. If the concern was coolant loss, perform the following procedure:
 - While system is open, activate the coolant pump and fans.
 - Slowly add coolant until the level is visible in the filler neck. You may need to run the system for several minutes to bleed out any air. Allow 3–5 min to complete the bleed procedure with the coolant pump and fans running in test mode.
 - Install a known good pressure cap, making sure that the cap is tightened to the stop.
 - Fill the expansion tank to the full line and install the fill plug.
9. Test ride and verify that the coolant system is functioning correctly. Check the coolant level in the expansion tank upon return and engine cool down.

Engine Idle Temperature Management System (EITMS) Operation

NOTE

Note that EITMS (Engine Idle Temperature Management System) (rear cylinder cut-out) uses ambient air temperature (monitored by the sensor on the left side of the steering head) to activate

and deactivate at air temperatures above 27 °C (81 °F). EITMS is completely independent from cooling system operation.

For additional information on EITMS operation, see service bulletin M1351.