

Differential Cooler

DTC Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

PCM DTC Chart

DTC	Description	Action
P1888	Differential Oil Temperature Sensor Circuit Failure	GO to Pinpoint Test A.
P1889	Oil Pressure Pump Performance	GO to Pinpoint Test B.
P188A	Differential Oil Temperature Too High / Too Low	GO to Pinpoint Test B.
P188E	Oil Pressure Pump Control Circuit	GO to Pinpoint Test C.
—	All Other PCM DTCs	REFER to Section 303-14.

Symptom Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices. Refer to Diagnostic Methods in Section 100-00 for information about these practices.

Symptom Chart		
Condition	Possible Sources	Action
The PCM does not respond to the scan tool	- Fuse(s) - Wiring, terminals or connectors - PCM	REFER to Section 418-00 to diagnose the no communication concern.
The differential oil pump never runs	- Fuse(s) - Wiring, terminals or connectors - Temperature sensor - Differential oil pump relay - Differential oil pump - PCM	RETRIEVE and RECORD all PCM DTCs. REFER to the PCM DTC Chart. If there are no DTCs present, GO to Pinpoint Test D.
The differential oil pump runs continuously	- Wiring, terminals or connectors - Temperature sensor - Differential oil pump relay - PCM	RETRIEVE and RECORD all PCM DTCs. REFER to the PCM DTC Chart. If there are no DTCs present, GO to Pinpoint Test D.

Diagnostic Routines

Pinpoint Test A: DTC P1888

Refer to Wiring Diagrams Cell 25 , Electronic Engine Controls - 5.8L for schematic and connector information.

Normal Operation and Fault Conditions

The temperature sensor is hardwired to the PCM. The PCM utilizes a fixed resistor (pull-up resistor) in series with the temperature sensor to monitor the entire temperature sensor circuit. As the differential oil temperature changes, the resistance in the temperature sensor changes which causes a variation in total circuit current flow resulting in a varying voltage drop across the pull-up resistor. The voltage signal used by the PCM to determine oil temperature is equal to the reference voltage minus the voltage drop across the pull-up resistor. Any circuit faults in the temperature sensor circuits or in the temperature sensor cause the PCM to set a DTC.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P1888	Differential Oil Temperature Sensor Circuit Failure	This DTC sets in continuous memory and on-demand when the PCM detects a short to ground or an open in one or both of the temperature sensor circuits or in the sensor.

Possible Causes

- Wiring, terminals or connectors
- Differential oil temperature sensor
- PCM

Visual Inspection and Diagnostic Pre-checks

- Inspect the differential oil temperature sensor for any obvious signs of damage.
- Make sure the differential oil temperature sensor electrical connector is connected.

PINPOINT TEST A: DTC P1888

Test Step	Result / Action to Take																
A1 CHECK THE TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO VOLTAGE																	
- Ignition OFF. - Disconnect: Differential Oil Temperature Sensor C379. - Disconnect: PCM C175T. - Ignition ON. - Measure the voltage between: <table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>C379-1</td><td>VET66 (GN)</td><td>—</td><td>Ground</td></tr><tr><td>C379-2</td><td>RE406 (GY/VT)</td><td>—</td><td>Ground</td></tr></table>	Positive Lead		Negative Lead		Pin	Circuit	Pin	Circuit	C379-1	VET66 (GN)	—	Ground	C379-2	RE406 (GY/VT)	—	Ground	Yes REPAIR the affected circuit(s). No GO to A2.
Positive Lead		Negative Lead															
Pin	Circuit	Pin	Circuit														
C379-1	VET66 (GN)	—	Ground														
C379-2	RE406 (GY/VT)	—	Ground														



- Is any voltage present?

A2 CHECK THE TEMPERATURE SENSOR CIRCUITS FOR A SHORT TO GROUND

- Ignition OFF.
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C379-1	VET66 (GN)	—	Ground
C379-2	RE406 (GY/VT)	—	Ground

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- Are the resistances greater than 10,000 ohms?

Yes
GO to A3.

No
REPAIR the affected circuit(s).

A3 CHECK THE TEMPERATURE SENSOR CIRCUITS FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C379-1	VET66 (GN)	C175T-20	VET66 (GN)
C379-	RE406	C175T-	RE406

Yes
GO to A4.

No
REPAIR the affected circuit(s).

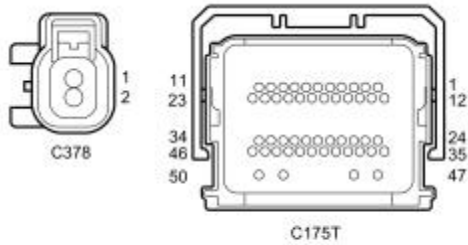
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(GY/VT)

38

(GY/VT)

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- Are the resistances less than 3 ohms?

A4 CHECK THE TEMPERATURE SENSOR CIRCUITS FOR A SHORT TOGETHER

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C379-1	VET66 (GN)	C379-2	RE406 (GY/VT)

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- Is the resistance greater than 10,000 ohms?

Yes

GO to A5.

No

REPAIR the affected circuit(s).

A5 CHECK THE PCM TEMPERATURE SENSOR OUTPUT

- Connect: PCM C175T.
- Ignition ON.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C379-1	VET66 (GN)	—	Ground

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Yes

INSTALL a new differential oil temperature sensor.

No

GO to A6.



- Is the voltage approximately 5 volts?

A6 CHECK THE PCM FOR CORRECT OPERATION

- Ignition OFF.
- Disconnect and inspect all PCM electrical connectors.
- Repair:
 - corrosion (install new connector or terminals — clean module pins)
 - damaged or bent pins — install new terminals/pins
 - pushed-out pins — install new pins as necessary
- Connect all PCM electrical connectors, make sure all connectors seat and latch correctly.
- operate the system and determine if the concern is still present.
- Is the concern still present?

Yes

CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSBs address this concern, INSTALL a new PCM. REFER to Section 303-14.

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.

Pinpoint Test B: DTC P1889 or P188A

Refer to Wiring Diagrams Cell 25 , Electronic Engine Controls - 5.8L for schematic and connector information.

Normal Operation and Fault Conditions

When the differential oil temperature reaches a predetermined level, the PCM grounds the differential oil pump relay which activates the differential oil pump. Once the oil temperature is reduced to another predetermined level, the PCM stops grounding the relay. While the relay is activated, the PCM continues to monitor the differential oil temperature and expects to see a reduction in the temperature. If the PCM does not see a reduction in the temperature or if the temperature continues to rise, a DTC is set. Blocked air flow through the oil cooler, a blockage or restriction in the cooling hoses/tubes or an inoperative oil pump all contribute to poor cooling system performance.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
• P1889	Oil Pressure Pump Performance	This DTC sets in continuous memory when the differential oil temperature exceeds system capability due to blockage, a component failure or system failure.

• P188A	Differential Oil Temperature Too High / Too Low	This DTC sets in continuous memory when the differential oil temperature exceeds 145° C (293° F).
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Possible Causes

- Restricted air flow through the oil cooler
- Restricted oil flow through the cooler system
- Fuse
- Wiring, terminals or connectors
- Differential oil pump relay
- Differential oil temperature sensor
- Differential oil pump

Visual Inspection and Diagnostic Pre-checks

- Make sure the differential oil is at the correct level.
- Make sure the differential and differential cooler system are free of any leaks.
- Make sure there are no air flow blockages or restrictions through the oil cooler.

PINPOINT TEST B: DTC P1889 OR P188A

Test Step	Result / Action to Take
B1 CHECK FOR OTHER PCM DTCS	
• Ignition ON. • Using a scan tool, carry out the PCM KOEO self-test. • Is DTC P1888 or P188E present?	Yes For DTC P1888, GO to Pinpoint Test A. For DTC P188E, GO to Pinpoint Test C. No For all other PCM DTCs, REFER to Section 303-14. If no other PCM DTCs are present, GO to B2.
B2 CHECK THE DIFFERENTIAL OIL PUMP OPERATION	
• Using a scan tool, toggle the rear differential fluid pump (R_DIFF_PUMP) PID ON. • Does the pump motor run?	Yes TOGGLE the R_DIFF_PUMP PID OFF. GO to B3. No TOGGLE the R_DIFF_PUMP PID OFF. GO to Pinpoint Test D.
B3 CHECK THE DIFFERENTIAL COOLER SYSTEM FOR BLOCKAGES AND RESTRICTIONS	
• Inspect the following items for damage, blockages or restrictions: ▪ Oil cooler ▪ Oil cooler fins ▪ Oil cooler hoses ▪ Differential outlet port ▪ Differential inlet port • Is any damage, blockages or restrictions present?	Yes REPAIR or INSTALL new components as necessary. No INSTALL a new differential cooler oil pump. REFER to Section 205-02.

Pinpoint Test C: DTC P188E

Refer to Wiring Diagrams Cell 25 , Electronic Engine Controls - 5.8L for schematic and connector information.

Normal Operation and Fault Conditions

When the differential oil temperature reaches a predetermined level, the PCM grounds the differential oil pump relay which activates the differential oil pump. Once the oil temperature is reduced to another predetermined level, the PCM stops grounding the relay.

DTC Fault Trigger Conditions

DTC	Description	Fault Trigger Conditions
P188E	Oil Pressure Pump Control Circuit	This DTC sets in continuous memory and on-demand when the PCM detects a short to ground or an open in the differential oil pump relay control circuit. Also, an open in the relay, the relay power supply circuit or BJB fuse 46 (5A) also cause this DTC to set.

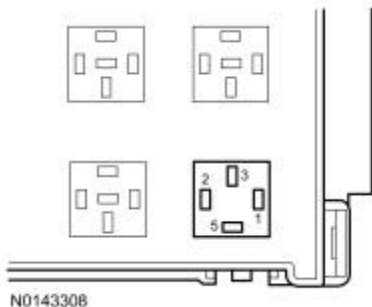
Possible Causes

- Fuse
- Wiring, terminals or connectors
- Differential oil pump relay
- PCM

Visual Inspection and Diagnostic Pre-checks

- Make sure BJB fuse 46 (5A) is OK.
- Make sure the differential oil pump relay is present and fully seated in the BJB.

PINPOINT TEST C: DTC P188E

Test Step	Result / Action to Take												
C1 CHECK THE VOLTAGE TO THE DIFFERENTIAL OIL PUMP RELAY • Ignition OFF. • Disconnect: Differential Oil Pump Relay. • Measure the voltage between: <table><tr><th colspan="2">Positive Lead</th><th colspan="2">Negative Lead</th></tr><tr><th>Pin</th><th>Circuit</th><th>Pin</th><th>Circuit</th></tr><tr><td>Relay Cavity 1</td><td>CBB46 (WH/BU)</td><td>—</td><td>Ground</td></tr></table> •  • Is the voltage greater than 11 volts?	Positive Lead		Negative Lead		Pin	Circuit	Pin	Circuit	Relay Cavity 1	CBB46 (WH/BU)	—	Ground	Yes GO to C2. No VERIFY BJB fuse 46 (5A) is OK. If OK, REPAIR the circuit. If not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.
Positive Lead		Negative Lead											
Pin	Circuit	Pin	Circuit										
Relay Cavity 1	CBB46 (WH/BU)	—	Ground										
C2 CHECK THE DIFFERENTIAL OIL PUMP RELAY • Carry out the mini ISO relay component test.	Yes GO to C3.												

Refer to Wiring Diagrams Cell 149 , Component Testing for component testing.

- Does the relay pass the test?

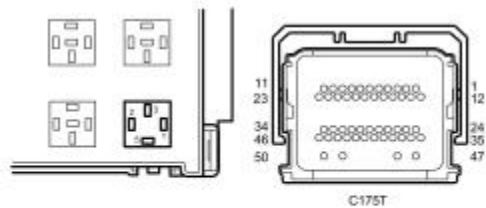
No
INSTALL a new relay.

C3 CHECK THE DIFFERENTIAL OIL PUMP RELAY CONTROL CIRCUIT FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
Relay Cavity 1	CBB46 (WH/BU)	C175T-2	CBB46 (WH/BU)

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- Are the resistances less than 3 ohms?

Yes
GO to C4.

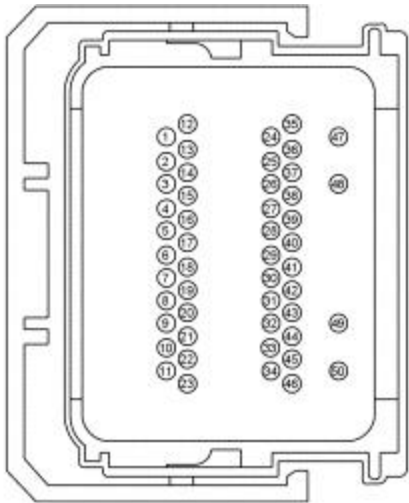
No
INSPECT in-line connector C110 for corrosion, bent pins and pushed-out terminals. VERIFY in-line connector C110 is fully seated and connected. REPAIR or INSTALL new as necessary. If in-line connector C110 is OK, REPAIR the circuit.

C4 CHECK THE DIFFERENTIAL OIL PUMP RELAY CONTROL CIRCUIT FOR A SHORT TO GROUND

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C175T-2	CE621 (YE/GY)	—	Ground

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- Is the resistance greater than 10,000 ohms?

Yes
GO to C5.

No
REPAIR the affected circuit.

C5 CHECK THE PCM FOR CORRECT OPERATION	
- Ignition OFF. - Disconnect and inspect all PCM electrical connectors. - Repair: - corrosion (install new connector or terminals — clean module pins) - damaged or bent pins — install new terminals/pins - pushed-out pins — install new pins as necessary - Connect all PCM electrical connectors, make sure all connectors seat and latch correctly. - operate the system and determine if the concern is still present. Is the concern still present?	Yes CHECK OASIS for any applicable TSBs. If a TSB exists for this concern, DISCONTINUE this test and FOLLOW the TSB instructions. If no TSBs address this concern, INSTALL a new PCM. REFER to Section 303-14. 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.

Pinpoint Test D: The Differential Cooler Pump Never Runs Or Runs Continuously

Refer to Wiring Diagrams Cell 25 , Electronic Engine Controls - 5.8L for schematic and connector information.

Normal Operation and Fault Conditions

When the differential oil temperature reaches a predetermined level, the PCM grounds the differential oil pump relay which activates the differential oil pump. Once the oil temperature is reduced to another predetermined level, the PCM stops grounding the relay.

Possible Causes

- Fuse
- Wiring, terminals or connectors
- Differential oil pump relay
- PCM

Visual Inspection and Diagnostic Pre-checks

- Make sure BJB fuses 46 (5A) and 12 (20A) are OK.
- Make sure the differential oil pump relay is present and fully seated in the BJB.

PINPOINT TEST D: THE DIFFERENTIAL COOLER PUMP NEVER RUNS OR RUNS CONTINUOUSLY

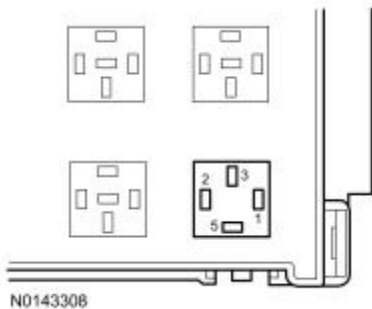
Test Step	Result / Action to Take
D1 CHECK THE DIFFERENTIAL OIL PUMP OPERATION	
- Ignition ON. - Listen for differential oil pump operation. Is the differential oil pump operating?	Yes GO to D2. No GO to D3.
D2 CHECK THE DIFFERENTIAL OIL PUMP RELAY	
- Disconnect: Differential Oil Pump Relay. Is the differential oil pump still operating?	Yes REPAIR circuit CYT14 (VT/OG) for a short to voltage. No INSTALL a new relay.

D3 CHECK THE VOLTAGE TO THE DIFFERENTIAL OIL PUMP RELAY

- Ignition OFF.
- Disconnect: Differential Oil Pump Relay.
- Measure the **voltage** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
Relay Cavity 1	CBB46 (WH/BU)	—	Ground
Relay Cavity 3	SBB12 (GN/RD)	—	Ground

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- Are the voltages greater than 11 volts?

Yes
GO to D4.

No
VERIFY BJB fuse 46 (5A) is OK.

If OK, REPAIR circuit CBB46 (WH/BU). VERIFY BJB fuse 12 (20A) is OK.

If OK, REPAIR circuit SBB12 (GN/RD). If either fuse is not OK, REFER to the Wiring Diagrams Manual to identify the possible causes of the circuit short.

D4 CHECK THE DIFFERENTIAL PUMP VOLTAGE SUPPLY CIRCUIT FOR A SHORT TO GROUND

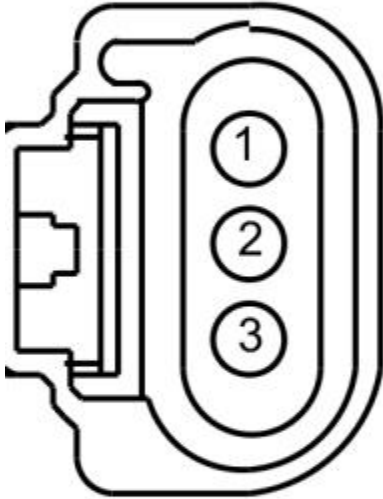
- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C3427-1	CYT14 (VT/OG)	—	Ground
C3427-2	CYT14 (VT/OG)	—	Ground

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Yes
GO to D5.

No
REPAIR the circuit.



- Is the resistance greater than 10,000 ohms?

D5 CHECK THE DIFFERENTIAL PUMP VOLTAGE SUPPLY CIRCUIT FOR AN OPEN

- Measure the **resistance** between:

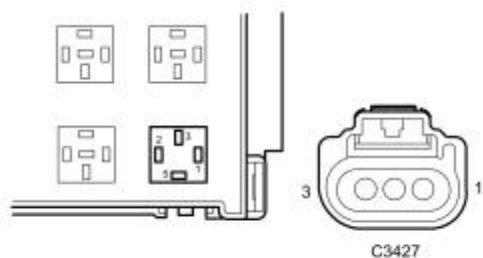
Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
Relay Cavity 5	CYT14 (VT/OG)	C3427-1	CYT14 (VT/OG)
Relay	CYT14	C3427-	CYT14

Yes
GO to D6.

No
INSPECT in-line connector C237 for corrosion, bent pins and pushed-out terminals. VERIFY in-line connector C237 is fully seated and connected. REPAIR or INSTALL new as necessary. If in-line connector C237 is OK, REPAIR the circuit.

Cavity 5	(VT/OG)	2	(VT/OG)
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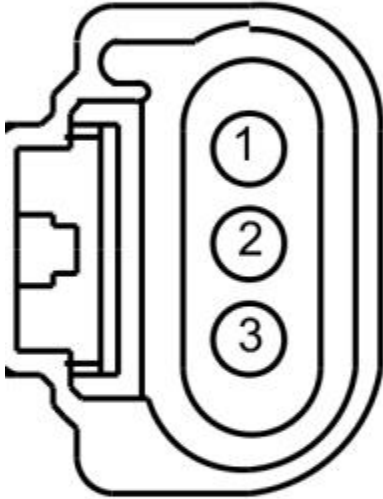
- Is the resistance less than 3 ohms?

D6 CHECK THE DIFFERENTIAL PUMP GROUND CIRCUIT FOR AN OPEN

- Measure the **resistance** between:

Positive Lead		Negative Lead	
Pin	Circuit	Pin	Circuit
C3427-3	GD171 (BK/GY)	—	Ground

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- Is the resistance less than 3 ohms?