

<b>Technical Service Bulletin Number</b>
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TSB140019
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## Technical Service Bulletin

### Subject

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Fuel Pump - Plunger and Tappet Roller Inspection and Repair

### Warranty Statement

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The information in this document has no effect on present warranty coverage or repair practices, nor does it authorize TRP or Campaign actions.

### Contents

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#### Product Affected

- ISX12 CM2350 X102
- ISX12/ISX11.9 CM2250
- ISX15 CM2250
- ISX15 CM2250 SN
- ISX15 CM2350 X101
- PowerGen QSX15 CM2250
- PowerGen QSX15 CM2250 ECF
- QSX11.9 CM2250 ECF
- QSX15 CM2250 ECF
- QSX15 CM2350 X105
- QSX15 CM2350 X106

This document, in conjunction with the information provided within the manuals listed in Table 1 provides inspection and repair guidelines following the malfunction of a fuel pump pumping plunger and/or roller tappet assembly.

The level of progressive damage to the fuel pump and other engine components will vary with

every incident; however, the repair direction will depend on **only** a few key criteria.

Previous versions of this document provided specific repair directions according to the vintage of the fuel pump and type of pumping plungers. Repair directions have now been made common and apply to all fuel pumps regardless of vintage, pumping plunger type, or tappet roller assembly type.



Figure 1, Fractured Fuel Pump Ceramic Pumping Plunger.

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Figure 2, Fuel Pump Tappet Roller Assemblies.

### Preliminary Inspection and Repair Direction for all Fuel Pump Malfunctions

Inspect and verify the condition of the fuel pump tappet rollers. Reference Figure 2 above and Procedure 005-227 in Table 3 below.

Scenario 1: The fuel pump tappet rollers are damaged:

- Remove, cut open, and inspect the lubricating oil filter for debris. See Procedure 007-083 in Table 3.
- Connect INSITE™ electronic service tool to the service tool data link and review any logged fault codes.
- Reference Table 1 below for repair direction.

Scenario 2: The fuel pump tappet rollers are **not** damaged:

- Connect INSITE™ electronic service tool to the service tool data link and review any logged fault codes.
- Reference Table 1 below for repair direction.

<b>Table 1, Repair Direction Decision Matrix</b>
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Symptoms	Are Any Symptoms Present?	Repair Direction to Follow
<ul style="list-style-type: none"> <li>• Non-wear debris or particles are evident in the lubricating oil filter element.</li> <li>• Fault Codes 415 or 143 are logged in the engine control module (ECM) within the last 8 hours of engine operation.</li> <li>• Engine is seized, or engine rotating assembly produces abnormal noise.</li> </ul>	Yes	Repair Direction A
	No	Repair Direction B

## CAUTION

Immediately upon removal of the lubricating oil cooler assembly, a plug must be inserted into the housing and cylinder block oil passage drillings. Failure to insert the oil passage plug can result in a bearing failure, crankshaft failure, or both.

## CAUTION

Do not allow dirt or foreign material to enter oil passages in the cylinder block when cleaning the gasket sealing surfaces. Connecting rod bearing failures can be caused if debris is introduced into the cylinder block or lubricating oil cooler housing oil passages. Therefore, use of power tools combined with abrasive pads to clean gasket surfaces is not recommended.

### Repair Direction A:

1. Replace the fuel pump. Table 2 below **must** be referenced for specific instruction by product type. See Procedure 005-016 in Table 3 below.
2. Drain the lubricating engine oil. See Procedure 007-037 in Table 3.
3. Thoroughly clean the lubricating oil cooler housing. See Procedure 007-003 in Table 3.
4. Replace the following lubricating oil system components:
  - Lubricating oil cooler element. See Procedure 007-007 in Table 3.
  - Lubricating oil filter bypass valve. See Procedure 007-014 in Table 3.
  - Lubricating oil thermostat. See Procedure 007-039 in Table 3.
5. Remove the lubricating oil pan, and clean thoroughly. See procedure 007-025 in Table 3.
6. Remove and inspect the lubricating oil pump for reuse. See Procedure 007-031 in Table 3.
7. Remove number 1 and number 4 main bearing caps and main bearings. See procedure 001-006 in Table 3.
8. Inspect number 1 and number 4 main journals of the crankshaft for reuse. See Service Bulletin Crankshaft Reuse Guidelines for Cummins® Engines, Bulletin 5411180.
  - If the crankshaft meets reuse guidelines:
    - Inspect number 1 and number 4 main bearings for signs of significant debris

- embedding. If significant debris is found, remove the number 1 and number 4 connecting rod bearings for inspection.
  - If damage is observed on the number 1 and number 4 connecting rod bearings, roll new connecting rod bearings in on all 6 journals. See Procedure 001-006, 001-007, and 001-014 in Table 3.
  - Roll new main bearings in on all 7 main journals and install new thrust bearings on number 4 main journal.
- If the crankshaft does **not** meet reuse guidelines:
  - Dealers should contact RAPIDSERVE™ Catastrophic group for pre-authorization if the engine is under warranty.
  - Cummins® Distributors should follow their local catastrophic process or contact RAPIDSERVE™ for repair direction if the engine is under warranty.
- 9. Install the lubricating oil pan and other components removed to access main bearings. See procedure 007-025 in Table 3
- 10. Install a new lubricating oil filter. See Procedure 007-013 in Table 3.
- 11. Prime and fill the engine with new lubricating oil. See Procedure 007-037 in Table 3.
- 12. Perform an aftertreatment diesel particulate filter (DPF) regeneration. See Procedure 014-013 in Table 3.
- 13. Perform a second lubricating oil and lubricating oil filter change. Priming the lubricating oil system a second time is **not** required. See Procedure 007-013 and 007-037 in Table 3.

**Repair Direction B:**

1. Replace the fuel pump. Table 2 below **must** be referenced for specific instruction by product type. See Procedure 005-016 in Table 3.
2. Drain the engine lubricating oil and remove the lubricating oil filter. See Procedure 007-013 and 007-037 in Table 3.
3. Replace the lubricating oil filter bypass valve. See Procedure 007-014 in Table 3.
4. Fit a new lubricating oil filter and refill the engine lubricating oil system. Priming the lubricating oil system is **not** required. See Procedure 007-013 and 007-037 in Table 3.

Table 2, Fuel Pump Replacement Matrix		
Product	Fuel Pump Variation	Additional Action Needed When Replacing the Fuel Pump
ISX15 CM2250	Two-cylinder pumps and fuel pump gear pump top mount fuel lines	There is a cost effective option to use a fuel pump short block service kit. Reference TSB150033.
ISX15 CM2250 SN		
PowerGen QSX15 CM2250		
PowerGen QSX15 CM2250 ECF	Three cylinder, two piston fuel pumps	Reference TSB110064.
QSX15 CM2250	Fuel pump gear pump with bottom mount fuel lines	New fuel lines are required. Reference TSB130044.

ISX15 CM2350 X101	None	There is a cost effective option to use a fuel pump short block service kit. Reference TSB150033. If fuel pump head assembly, Part Number 4307004, does <b>not</b> meet reuse guidelines; replace.
QSX15 CM2350 X105		
QSX15 CM2350 X106		
ISX12 CM2350 X102	None	None
ISX12/ISX11.9 CM2250		
QSX11.9 CM2250 ECF		

Table 3, Associated Procedures			
Procedure Title	Procedure Number	Service Model Name	Bulletin Number
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	ISX15 CM2250	4022250
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	ISX15 CM2250 SN	4310736
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	ISX12/ISX11.9 CM2250	2883445
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	ISX15 CM2350 X101	4310641
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	QSX15 CM2250 ECF	2883557
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	QSX11.9 CM2250 ECF	2883561
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	QSX15 CM2350 X105	4332667
Fuel Pump	<a href="#">Refer to Procedure 005-016</a>	QSX15 CM2350 X106	4332712
Fuel Pump Head	<a href="#">Refer to Procedure 005-227</a>	ISX15 CM2250	4022250
Fuel Pump	<a href="#">Refer to Procedure 005-227</a>	ISX15 CM2250 SN	4310736
Fuel Pump Head	<a href="#">Refer to Procedure 005-227</a>	ISX12/ISX11.9 CM2250	2883445

Fuel Pump Head	Refer to Procedure 005-227	ISX15 CM2350 X101	4310641
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2250 ECF	2883557
Fuel Pump Head	Refer to Procedure 005-227	QSX11.9 CM2250 ECF	2883561
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2350 X105	4332667
Fuel Pump Head	Refer to Procedure 005-227	QSX15 CM2350 X106	4332712
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2250	4022250
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2250 SN	4310736
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Cooler	Refer to Procedure 007-003	ISX15 CM2350 X101	4310641
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2250 ECF	2883557
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2350 X105	4332667
Lubricating Oil Cooler	Refer to Procedure 007-003	QSX15 CM2350 X106	4332712
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2250	4022250
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2250 SN	4310736
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Cooler Element	Refer to Procedure 007-007	ISX15 CM2350 X101	4310641
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX15 CM2250 ECF	2883557
Lubricating Oil Cooler Element	Refer to Procedure 007-007	QSX11.9 CM2250 ECF	2883561

Lubricating Oil Cooler Element	<a href="#">Refer to Procedure 007-007</a>	QSX15 CM2350 X105	4332667
Lubricating Oil Cooler Element	<a href="#">Refer to Procedure 007-007</a>	QSX15 CM2350 X106	4332712
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	ISX15 CM2250	4022250
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	ISX15 CM2250 SN	4310736
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	ISX15 CM2350 X101	4310641
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	QSX15 CM2250 ECF	2883557
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	QSX15 CM2350 X105	4332667
Lubricating Oil Filter (Spin-On)	<a href="#">Refer to Procedure 007-013</a>	QSX15 CM2350 X106	4332712
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	ISX15 CM2250	4022250
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	ISX15 CM2250 SN	4310736
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	ISX15 CM2350 X101	4310641
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	QSX15 CM2250 ECF	2883557
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	QSX11.9 CM2250 ECF	2883561
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	QSX15 CM2350 X105	4332667
Lubricating Oil System	<a href="#">Refer to Procedure 007-037</a>	QSX15 CM2350 X106	4332712
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	ISX15 CM2250	4022250



Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	ISX15 CM2250 SN	4310736
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	ISX15 CM2350 X101	4310641
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	QSX15 CM2250 ECF	2883557
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	QSX15 CM2350 X105	4332667
Lubricating Oil Filter Bypass Valve	<a href="#">Refer to Procedure 007-014</a>	QSX15 CM2350 X106	4332712
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	ISX15 CM2250	4022250
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	ISX15 CM2250 SN	4310736
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	ISX15 CM2350 X101	4310641
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	QSX15 CM2250 ECF	2883557
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	QSX11.9 CM2250 ECF	2883561
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	QSX15 CM2350 X105	4332667
Lubricating Oil and Filter Analysis	<a href="#">Refer to Procedure 007-083</a>	QSX15 CM2350 X106	4332712
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	ISX15 CM2250	4022250
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	ISX15 CM2250 SN	4310736
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	ISX12/ISX11.9 CM2250	2883445
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	ISX15 CM2350 X101	4310641

Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	QSX15 CM2250 ECF	2883557
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	QSX11.9 CM2250 ECF	2883561
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	QSX15 CM2350 X105	4332667
Lubricating Oil Thermostat	<a href="#">Refer to Procedure 007-039</a>	QSX15 CM2350 X106	4332712
Aftertreatment Testing	<a href="#">Refer to Procedure 014-013</a>	ISX15 CM2250	4022250
Aftertreatment Testing	<a href="#">Refer to Procedure 014-013</a>	ISX12/ISX11.9 CM2250	2883445
Aftertreatment Testing	<a href="#">Refer to Procedure 014-013</a>	QSX15 CM2250 ECF	2883557
Aftertreatment Testing	<a href="#">Refer to Procedure 014-013</a>	QSX11.9 CM2250 ECF	2883561
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	ISX15 CM2250	4022250
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	ISX15 CM2250 SN	4310736
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	ISX12/ISX11.9 CM2250	2883445
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	ISX15 CM2350 X101	4310641
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	QSX15 CM2250 ECF	2883557
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	QSX11.9 CM2250 ECF	2883561
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	QSX15 CM2350 X105	4332667
Main Bearings	<a href="#">Refer to Procedure 001-006</a>	QSX15 CM2350 X106	4332712

## Document History

Date	Details
2014-2-14	Module Created
2014-9-4	none
2014-10-24	Fixed broken link.

2014-10-29	Typo corrected.
2015-1-7	Procedure steps updated.
2015-3-17	Added the fuel pump short block service kit TSB reference.
2015-10-19	Modified the fuel pump tappet rollers are damaged section step 1 and options a, b, and c.
2016-4-5	Modified title. Added Product Affected section. Updated repair direction and Table 3.
2016-7-5	Removed "Ceramic" from title. Modified Table 2.

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**Last Modified: 06-Jul-2016**

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