Component Procedures: Engine Lubrication

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Parts and Labor (itype_189)

Labor

Operation	Qualifier Path	Skill	Std Hrs	Wty Hrs
Service	Periodical Maintenance > Lube & Filter, Servi?	C	0.7	0.0
Service	Periodical Maintenance > Lube & Filter, Servi?		0.1	
Remove & Replace	Filters > Oil Filter, R&R	C	0.3	0.3
Remove & Replace	Filters > Oil Filter, R&R > NOTE > To Change ?		0.1	
Remove & Replace	Oil Cooler > Oil Cooler, R&R	B	0.7	0.6
Remove & Replace	Oil Cooler > Oil Line, R&R	B	0.4	0.3
Remove & Replace	Oil Pan > Filter Adapter, R&R	B	2.1	0.0
Remove & Replace	Oil Pan > Oil Pan Gasket, R&R	B	10.8	8.0
Remove & Replace	Oil Pan > Oil Pan, R&R	B	10.8	8.0
Remove & Replace	Oil Pump > Oil Pump, R&R	B	6.8	4.3
Remove & Replace	Senders > Oil Level Sensor, R&R	B	0.6	0.4
Remove & Replace	Senders > Oil Temp Sending Unit, R&R	B	0.9	0.0

Specifications Quick Reference (itype_439)

Quick Specifications
- item

Lubrication Description (Article 12014)

A structural diecast aluminum oil pan incorporates an oil suction tube and a windage tray. The oil suction tube is bolted into the oil pan and seals to the bottom of the block with O-ring gasket. The windage tray is bolted to the upper portion of the oil pan and reduces friction losses at high speed.

A crankshaft driven gerotor oil pump with internal pressure-relief valve is mounted to the front of the engine block and pulls oil from the oil suction tube through the lower passage in the engine block. The oil pump then directs the flow of pressurized oil back through the upper passage in the block to the left side of the engine block where the oil filter adapter is mounted.

An oil filter adapter is mounted with a gasket to the left side of the engine block.

RWD Applications : The oil filter adapter incorporates a top-access, cartridge style oil filter. The filter is accessed through a screw on cap with an O-ring gasket. The oil filter adapter cap has a built-in oil bypass valve. The oil filter adapter housing incorporates a drain back control valve and a threaded oil pressure sending unit . Oil flows through the lower passage in the oil filter adapter up to and through the oil filter cartridge . Filtered oil travels back through the upper passage of the oil filter adapter and back into the engine block.

FWD Applications : An oil filter adapter is mounted with a gasket to the left side of the engine block. The oil filter adapter incorporates a bottom-access, spin-on oil filter. The oil filter adapter housing incorporates a threaded oil pressure sending unit. Oil flows through the lower passage in the oil filter adapter to and through the oil filter. Filtered oil travels back through the upper passage of the oil filter adapter and back into the engine block.

Oil is directed up and across the engine block front through several drilled passages. These front passages feed oil to each cylinder head , oil to the passage for the main bearings and piston oil jets, oil to the right and left secondary idler sprockets, and oil to the primary timing drive chain tensioner.

Each cylinder head passage directs oil into the cylinder head where it is directed to oiling circuits for the stationary hydraulic lifter assemblies (SHLAs) and the camshaft bearing journals. Oil is also directed through 2 passages each with a spring-loaded check-ball valve to the 2 chambers where the camshaft position actuator oil control solenoid valves are mounted. Each chamber contains a camshaft position actuator oil control solenoid valve with built-in oil filter screen. One camshaft position actuator oil control solenoid valve is used to control the exhaust camshaft position actuator and 1 camshaft position actuator oil control solenoid valve is used to control the intake camshaft position actuator. The engine control module (ECM) electrically controls each camshaft position actuator oil control solenoid valve. When energized by the ECM the camshaft position actuator oil control solenoid valve directs oil to pass up through the cylinder head front camshaft bearing cap. Oil passes through the camshaft bearing cap passage into oil holes drilled into the side of the front camshaft journal and onto the front of the camshaft mounting surface. Oil passes through to matching passages in the camshaft position actuator. Oil is directed by the camshaft position actuator oil control solenoid valve to the appropriate passage in the system to pressurize oil on the vanes on the inside of the of

the camshaft position actuator. Oil acting on the vanes rotates the camshaft mounted to the inner camshaft position actuator rotor relative to the sprocket mounted to the outer camshaft position actuator housing. An internal lock pin locks the inner rotor to the outer camshaft position actuator housing at idle and maintains the camshaft position actuator in the home or default position during start-up conditions. Oil pressure directed by the camshaft position actuator oil control solenoid valve unlocks the pin and allows the camshaft position actuator to function. An additional passage in the cylinder head also directs oil to the secondary timing drive chain tensioner mounted to each cylinder head.
The oil passage that supplies oil to the main bearings also supplies oil to pressure-actuated piston-cooling oil jets. Each oil jet is mounted between opposing cylinder bore s and directs oil to the 2 bores to provide extra cooling and control piston temperatures.
Oil is directed from the front passages to the front of the block where the right and left secondary idler sprockets and the primary timing drive chain tensioner are mounted. Each camshaft timing drive chain tensioner relies on a gasket in order to maintain an oil reserve after the engine is turned OFF. All camshaft timing drive chain tensioners incorporate a small oil jet to supply an oil spray onto the camshaft timing drive chain components.
Oil returns to the oil pan sump either through the camshaft timing drive chain area or through the cast oil drain back passages on the outboard walls of the cylinder heads and engine block.

All New Technical Service Bulletins (itype_432)

Tsbs
- Information on Internal Engine Noise or Damage After Oil Filter Replacement (07-06-01-016K, 2025/07/17)
- Information on Spin-On Oil Filter Replacement for Gas Engines Designed with New Oil Pump Control Systems (17-NA-157, 2025/11/19)
- Fuel and Oil Additives - Facts and Myths - Maximizing Gasoline Fuel Economy (05-00-89-072H, 2026/05/05)
- Information on Engine Oil Consumption Guidelines (01-06-01-011S, 2025/07/28)

All Technical Service Bulletins (itype_100)

Tsbs
- PIP5257D: Cooling System Contaminated With Engine Oil (PIP5257D, 2020/04/17)
- Needle Bearings Found In The Oil Pan During An Oil Change (PIP5226D, 2020/07/27)
- Fuel and Oil Additives - Facts and Myths - Maximizing Gasoline Fuel Economy (05-00-89-072H, 2026/05/05)
- Engine Oil Dye May be Mistaken for Contamination on Low Mileage Engines (PI0275B, 2012/02/17)
- Information on Internal Engine Noise or Damage After Oil Filter Replacement (07-06-01-016K, 2025/07/17)
- Engine Ticking Noise or oil pressure fluctuation On Cold Start (PIP5191C, 2018/11/06)
- Engine - dexos 1(R) and dexos 2(R) Oil Specs/Information (11-00-90-001B, 2013/05/21)
- Information on Spin-On Oil Filter Replacement for Gas Engines Designed with New Oil Pump Control Systems (17-NA-157, 2025/11/19)
- Information on New Torque Specification and Installation Procedure for ACDelco Spin-On Oil Filters (22-NA-009, 2023/03/17)
- Information on Improved Oil Filter Gasket Design for Spin-On Oil Filters PF63 PF64 and PF48 (20-NA-213, 2020/10/30)
- Engine - Oil Leak Prevention After Oil/Filter Change (15-00-90-001, 2015/03/06)
- Information on Engine Oil Consumption Guidelines (01-06-01-011S, 2025/07/28)
- Information for Repairing Engine Front Cover Oil Leak, Sealing Surface Preparation and Applying RTV Sealant (12-06-01-003D, 2022/05/02)

Repair Tips (itype_110)

Tsbs
- Engine - dexos 1(R) and dexos 2(R) Oil Specs/Information (11-00-90-001B, 2013/05/21)
- Engine - Oil Leak Prevention After Oil/Filter Change (15-00-90-001, 2015/03/06)

Engine Oil Pressure Indicator Malfunction (Article 11026)

Diagnostic Instructions
- Perform the Diagnostic System Check - Vehicle prior to using this diagnostic procedure.
- Review Strategy Based Diagnosis for an overview of the diagnostic approach.
- Diagnostic Procedure Instructions provides an overview of each diagnostic category.

Circuit/System Description
The engine oil pressure sensor changes voltage based on the engine oil pressure. The engine oil pressure sensor is a 3-wire sensor comprised of the signal circuit, the low reference circuit and the 5V reference

circuit. The engine control module (ECM) supplies 5V to the engine oil pressure sensor via the 5–V reference circuit and provides ground via the engine oil pressure sensor low reference circuit. The ECM monitors the signal circuit of the engine oil pressure sensor to determine the engine oil pressure sensor voltage is within the normal operating range of approximately 1–4V. When the engine oil pressure is high, the engine oil pressure sensor voltage is high and the sensor senses a high signal voltage. When the engine oil pressure is low, the engine oil pressure sensor voltage is low and the ECM senses a low signal voltage. The ECM sends the engine oil pressure sensor information via serial data to the body control module (BCM). The BCM then sends the engine oil pressure sensor information via serial data to the instrument cluster.

Reference Information

Schematic Reference

Instrument Cluster Schematics

Connector End View Reference

Component Connector End Views

Description and Operation

Indicator/Warning Message Description and Operation

Electrical Information Reference

- Circuit Testing
- Connector Repairs
- Testing for Intermittent Conditions and Poor Connections
- Wiring Repairs

Scan Tool Reference

Control Module References for scan tool information

Circuit/System Verification

- Ignition ON.
- Verify the engine oil pressure indicator turns on & off when commanding the All Indicators ON and OFF with a scan tool.
- If the engine oil pressure Indicator does not turn on and off. Replace the P16 Instrument Cluster.
- If the engine oil pressure Indicator turns on and off
- Verify the scan tool Engine Oil Pressure Switch parameter is Low.
- If not Low Refer to DTC P0521, P0522, or P0523 .
- If Low
- Engine running.
- Verify the scan tool Engine Oil Pressure Sw itch parameter is OK.
- If not OK Refer to DTC P0521, P0522, or P0523 .
- If OK
- All OK.

Repair Instructions

Perform the Diagnostic Repair Verification after completing the repair.

Control Module References for Instrument Cluster or ECM replacement, programming, and setup.

Leaks (itype_149)

Tsbs

- Information for Repairing Engine Front Cover Oil Leak, Sealing Surface Preparation and Applying RTV Sealant (12-06-01-003D, 2022/05/02)

Out of specification (itype_158)

Tsbs

- PIP5257D: Cooling System Contaminated With Engine Oil (PIP5257D, 2020/04/17)
- Needle Bearings Found In The Oil Pan During An Oil Change (PIP5226D, 2020/07/27)

Fluids, Chemicals and Additives (itype_112)

Tsbs

- Fuel and Oil Additives - Facts and Myths - Maximizing Gasoline Fuel Economy (05-00-89-072H, 2026/05/05)

OEM Policies and Procedures (itype_120)

Tsbs

- Information on Spin-On Oil Filter Replacement for Gas Engines Designed with New Oil Pump Control Systems (17-NA-157, 2025/11/19)
- Information on New Torque Specification and Installation Procedure for ACDelco Spin-On Oil Filters

(22-NA-009, 2023/03/17)
- Information on Improved Oil Filter Gasket Design for Spin-On Oil Filters PF63 PF64 and PF48 (20-NA-213, 2020/10/30)
- Engine Oil Dye May be Mistaken for Contamination on Low Mileage Engines (PI0275B, 2012/02/17)
- Information on Engine Oil Consumption Guidelines (01-06-01-011S, 2025/07/28)