MERCURY MARINER

Service Bulletin

Bulletin No. 2015-08

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Supercharger System Troubleshooting—Verado L4 and Verado L6

NOTICE
This bulletin supersedes the previous service bulletin number 2009-16, November 2009.

⚠ WARNING
The exposed moving flywheel can cause serious injury. Keep your hands, hair, clothing, tools, and other objects away from engine when starting or running the engine. Do not attempt to reinstall the flywheel cover or top cowl when engine is running.

Scope

Worldwide

Situation

This service bulletin is intended to guide the technician to properly diagnose Verado supercharger issues. It is also designed to eliminate the unnecessary replacement of a misdiagnosed supercharger, reduce the instances of no trouble found (NTF) supercharger warranty returns, and eliminate the subsequent warranty rejection of serviceable units.

NOTE: *When diagnosing a Verado supercharger for an oil leak or noise, please refer to the following table as a quick reference guide.*

Supercharger Repair or Replace Decision Table

Oil leak (Refer to Supercharger Oil Leak)	
Possible replacement part	Complete supercharger
	End cap kit (8M0045222)
Supercharger noise (Refer to Supercharger Noise)	
Possible replacement part	Bushing kit (847803A02)
	Complete supercharger

NOTE: *When replacing a supercharger on an engine that is out of warranty, a remanufactured supercharger may be a viable option.*

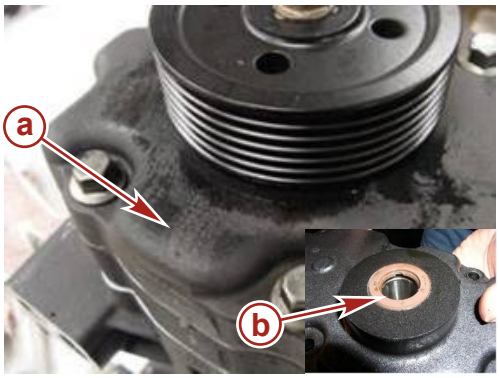
Supercharger Oil Leak

Oil Observed on Top/Front of Supercharger

Situation

- Oil leaking out of the top or front of the supercharger below the input pulley.

- Oil leak occurs during operation.



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a - Oil present at top/front of supercharger
b - Input shaft seal

Possible Causes

- Supercharger input shaft oil seal is leaking.
- Porosity or crack in the supercharger end cap.
- Engine oil is leaking at the upper crankshaft seal.

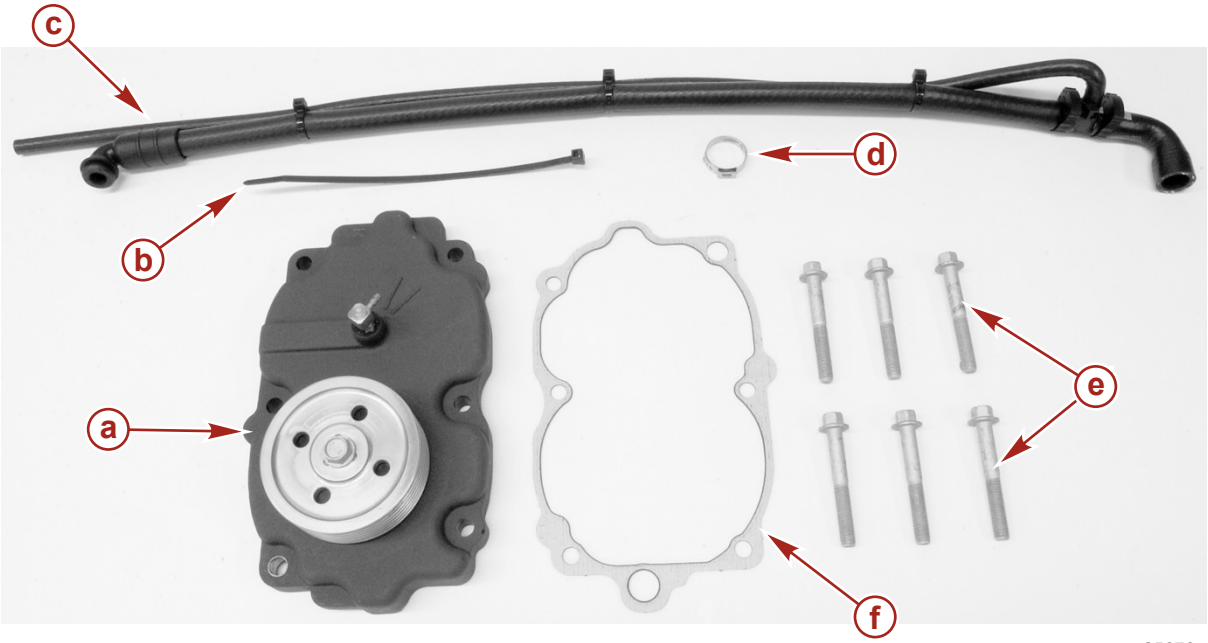
Troubleshooting

1. Clean the oil from the supercharger and engine using a degreaser.
2. Check the oil level in the engine. If the oil level is above the crosshatched region of the oil dipstick or oil dilution is suspected, perform an oil change and ensure it is filled to the proper level.
3. Remove the air filter and inspect the air intake tube to the throttle body. If oil is present in the tube, clean the air intake thoroughly.
4. Remove the engine flywheel to inspect the upper crankshaft seal. Clean area as needed and install the flywheel.
5. Run the engine for approximately 30 minutes and check for oil leaks.

Correction

- If an oil leak is observed at the supercharger input shaft seal, install the supercharger end cap kit (8M0045222).
- If an oil leak is observed from a porosity hole in the supercharger end cap, install the supercharger end cap kit (8M0045222).
- If an oil leak is observed at the upper crankshaft seal, replace the upper crankshaft seal.

NOTE: *If oil was present in the intake tube, the engine may have been past due for an oil change, the oil sump may have been overfull, or the oil separator in the cam cover may be faulty. Any of these conditions can cause oil carryover from the cam cover breather tube resulting in perceived supercharger oil leak. The supercharger should not be replaced under these conditions.*



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Supercharger end cap kit (8M0045222)

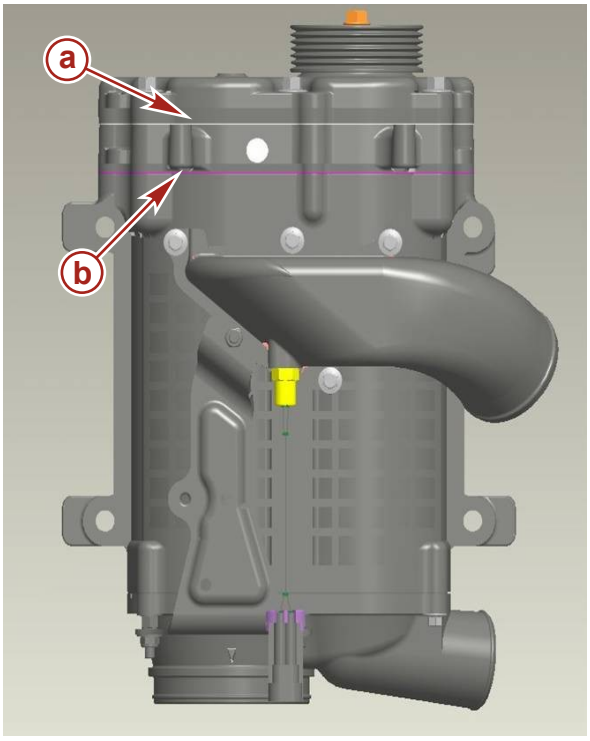
Ref.	Qty.	Description	Part Number
a	1	Supercharger end cap	NSS
b	1	Cable tie (8 in.)	816311T
c	1	Breather hose assembly	889591A05
d	1	Clamp	888988019
e	6	Bolt	NSS
f	1	Gasket	NSS

Oil Observed on the Supercharger Bearing Housing

Situation

- Oil leaking out of the supercharger bearing housing or end plate gasket joints.
- Oil is observed on the supercharger rotor housing.

- Oil leak occurs during operation.



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a - Supercharger bearing housing to end cap joint
b - Supercharger rotor housing to bearing housing joint

Possible Causes

- Clamp load on the supercharger end cap is low (loose bolts).
- Excessive oil carryover from the cam cover breather hose.

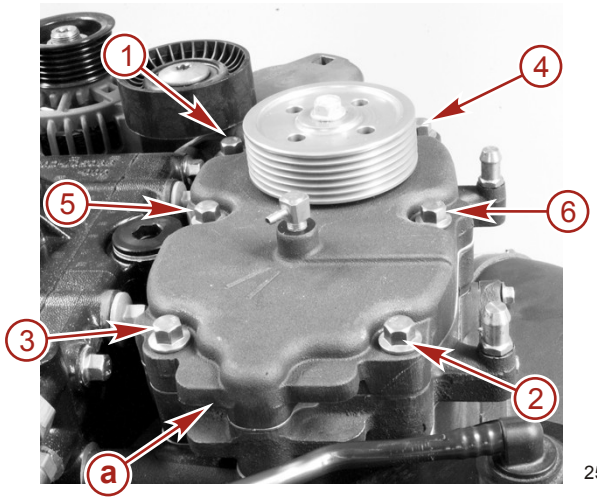
Troubleshooting

1. Clean the oil from the supercharger and engine using a degreaser.
2. Check the oil level in the engine. If the oil level is above the crosshatched region of the oil dipstick or oil dilution is suspected, perform an oil change and ensure it is filled to the proper level.
3. Remove the air filter and inspect the air intake tube to the throttle body. If oil is present in the tube, clean the air intake thoroughly.
4. Run the engine for approximately 30 minutes and check for oil leaks.

Correction

- If an oil leak is observed at the supercharger bearing housing to end cap joint, check the clamp load of the end cap bolts. Tighten the end cap mounting bolts to the specified torque.

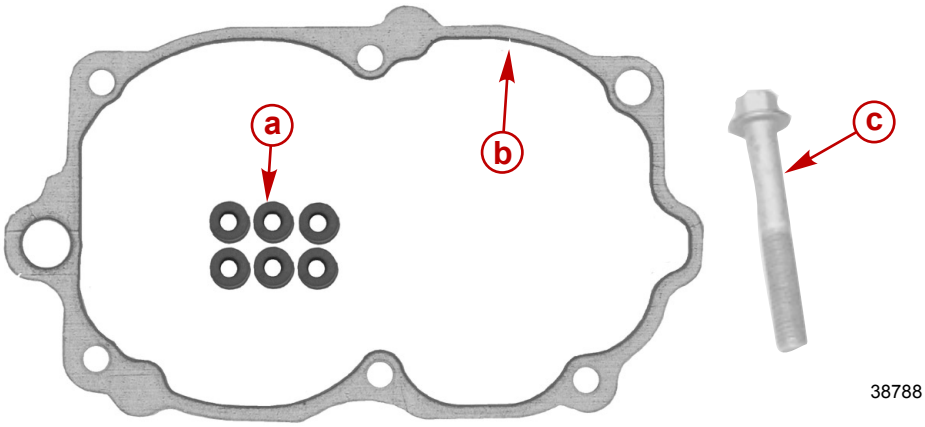
NOTE: *Number 1–6 denotes the proper torque sequence.*



a - Supercharger bearing housing to end cap

Description		Nm	lb-in.	lb-ft
End cap bolts	**First**	17	150.5	–
	Final	35	–	25.8

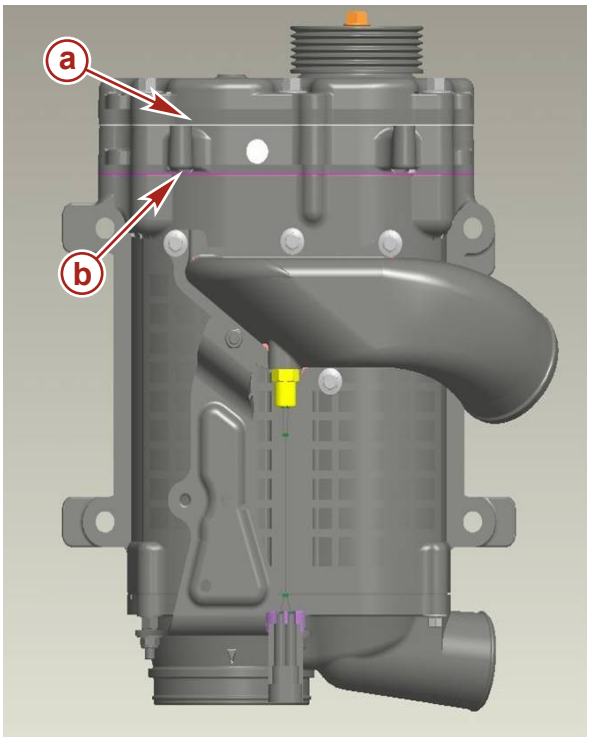
- If an oil leak is observed at the supercharger bearing housing to end cap joint due to a bad gasket, install the supercharger bushing kit.



Supercharger bushing kit (847803A02)

Ref.	Qty.	Description	Part Number
a	6	Bushing	NSS
b	1	Gasket	NSS
c	1	Bolt	NSS

- If an oil leak is observed at the supercharger rotor housing to bearing housing joint, replace the supercharger.



42668

a - Supercharger bearing housing to end cap joint
b - Supercharger rotor housing to bearing housing joint

- If an oil leak is observed from porosity in the supercharger end cap, install the supercharger end cap kit (8M0045222).
- If an oil leak is observed at the upper crankshaft seal, replace the upper crankshaft seal.

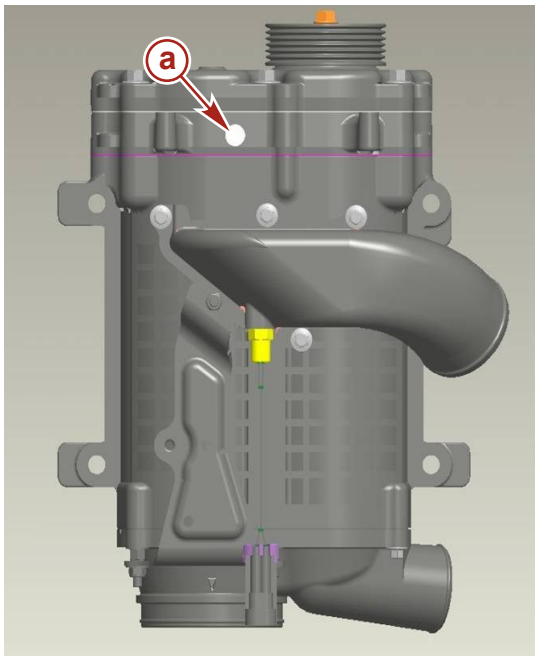
NOTE: *If oil was present in the intake tube, the engine may have been past due for an oil change, the oil sump may have been overfull, or the oil separator in the cam cover may be faulty. Any of these conditions can cause oil carryover from the cam cover breather tube resulting in perceived supercharger oil leak. The supercharger should not be replaced under these conditions.*

Oil Leaking Out of Front Air Vent of Supercharger

Situation

- Oil leaking out of the front air vent of the supercharger.
- Oil leaking out of the supercharger rotor housing.

- Oil leak occurs during operation.



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a - Front air vent filter of supercharger

Possible Causes

- The rotor shaft oil seal is leaking or excessive oil carryover from the cam cover breather hose.

Troubleshooting

1. Clean the oil from the supercharger and engine using a degreaser.
2. Check the oil level in the engine. If the oil level is above the crosshatched region of the oil dipstick or oil dilution is suspected, perform an oil change and ensure it is filled to the proper level.
3. Remove the air filter and inspect the air intake tube to the throttle body. If oil is present in the tube, clean the air intake thoroughly.
4. Run the engine for approximately 30 minutes and check for oil leaks.
5. Every 5–10 minutes of running, stop the engine and check or clean the air vent area of the supercharger. A properly operating supercharger should clear residual oil from the vent and stop the leak.

Correction

- If oil leak continues out of the air vent filter of the supercharger, replace the supercharger.

NOTE: *If oil was present in the intake tube, the engine may have been past due for an oil change, the oil sump may have been overfull, or the oil separator in the cam cover may be faulty. Any of these conditions can cause oil carryover from the cam cover breather tube resulting in perceived supercharger oil leak. The supercharger should not be replaced under these conditions.*

Oil Observed on Rear of Supercharger Rotor Housing

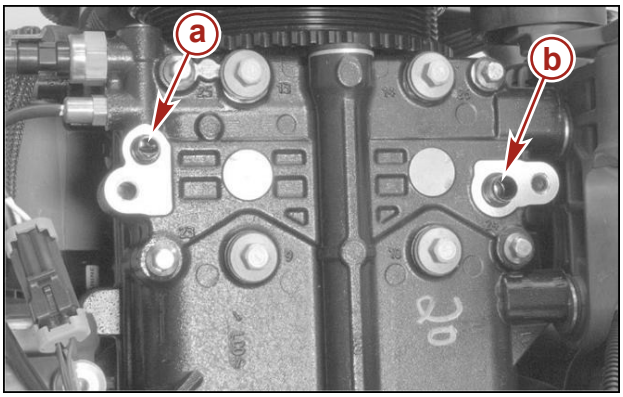
Situation

- Oil leaking from the oil supply tubes between the engine crankcase and supercharger.
- Oil is observed on the rear of the supercharger rotor housing or engine crankcase.
- Leak occurs during operation or may form drips with the engine turned off.

Possible Causes

- Oil supply tube O-rings are missing or damaged.

- Damaged supercharger mount feet, O-ring grooves, or damaged supply tube fittings.



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a - Oil delivery O-ring and dowel pin (11 mm)
b - Oil return O-ring and dowel pin (14 mm)

Troubleshooting

1. Clean the oil from the supercharger and engine using a degreaser.
2. Check the oil level in the engine. If the oil level is above the crosshatched region of the oil dipstick or oil dilution is suspected, perform an oil change and ensure it is filled to the proper level.
3. Run the engine for approximately 30 minutes and check for oil leaks.

Correction

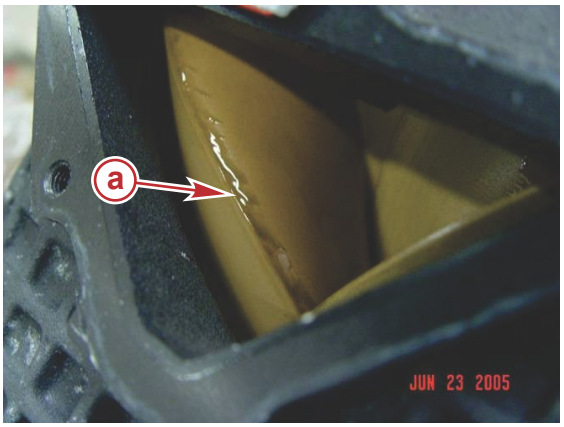
If oil is leaking from the oil supply tubes between the engine crankcase and supercharger:

- Remove the supercharger, inspect supply tubes and O-rings. Replace the O-rings and supply tubes as needed.
- Inspect the supercharger mount feet and O-ring grooves for damage. Replace the supercharger as required.

Oil Observed on Supercharger Rotors and Outlet Duct

Situation

- Engine burns oil.
- Engine smokes at start-up.



42671

a - Oil on rotors

Possible Causes

- Oil observed on supercharger rotors and in outlet duct to charge air cooler (CAC). Supercharger outlet duct housing removed.
- Excessive oil carryover from the cam cover breather hose.
- Bearing housing oil seal damage or leak.
- Excessive crankcase pressure stops oil drain back from the supercharger.

Troubleshooting

1. Remove the air filter and inspect the air intake tube to the throttle body. If oil is present in the tube, clean the air intake thoroughly.
2. Check the oil level in the engine. If the oil level is above the crosshatched region of the oil dipstick or oil dilution is suspected, perform an oil change and ensure it is filled to the proper level.

3. Run the engine for approximately 30 minutes at mid–high range and check for oil leaks.

Correction

- If oil is observed upstream of the supercharger (intake resonator, inlet boot, or inlet duct), the problem is excessive oil carryover from the cam cover breather hose. The supercharger should not be replaced under these conditions.
- If no oil is observed upstream of the supercharger, remove the supercharger outlet duct and inspect for oil coverage on the rotors and outlet duct to the charge air cooler. If oil is present, replace the supercharger.

Supercharger Noise

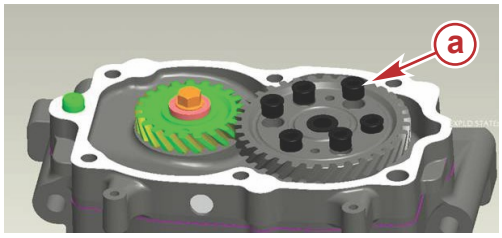
Noise or Rattle Between 1000–1300 RPM

Situation

- Noise or rattle between 1000–1300 RPM and noise goes away with the accessory drive belt removed.

Possible Causes

- Worn bushings resulting in clearance between input drive pins and supercharger driven gear.



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a - Bushing location

Correction

- If the noise is only audible with the cowl off or is difficult to hear with the cowl on, this condition is normal and is not detrimental to the supercharger or engine. No correction is needed.

NOTE: *The supercharger end cap kit 8M0045222 is recommended for repair of 2005 Verado L6 models, as it includes the upgraded supercharger vent system components as used on 2006 and newer Verado product.*

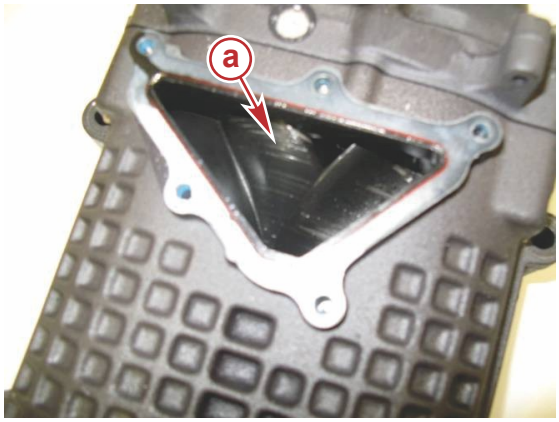
Noise Heard at All RPMs with Cowl On

Situation

- Noise that can be heard at all RPM levels with the cowl on, and noise level increases with RPM.

Possible Causes

- Possible rotor to rotor contact.



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a - Wear indicates rotor to rotor contact

- With the engine off, remove the accessory drive belt. Turn the supercharger pulley using a socket on a torque wrench. Tight spots of 10 Nm (88.5 lb-in.) or more indicate a problem.

Description	Nm	lb-in.	lb-ft
Tight spots	10	88.5	–

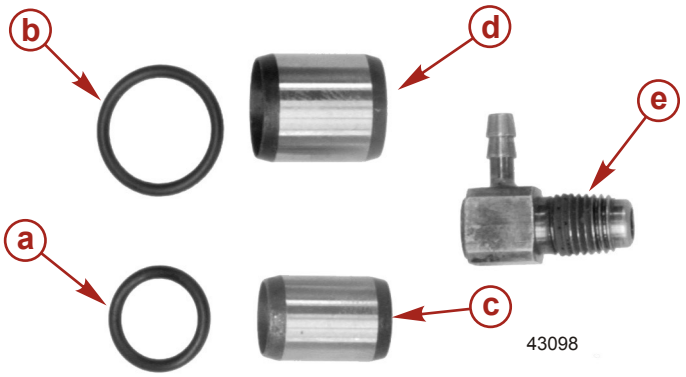
- Low hour engines (less than 10 hours of operation) may emit noise due to a slight rotor to rotor coating contact. This condition may wear or break-in and is not detrimental to the supercharger. Monitor the noise level for the first 10 hours of operation.
- Possible internal gear problems.
- Possible bearing problems.
- Input shaft pins or bushings broken or missing.

Correction

- If noise level that remains constant or increases over the first 5–10 hours of engine operation indicates that the supercharger should be replaced.
- If noise level that diminishes after the first 5–10 hours of engine operation indicates supercharger rotor coating break-in. The supercharger should not be replaced under these conditions.

Additional Repair Parts

All Verado models



Ref.	Qty.	Description	Part Number
a	1	O-ring, oil delivery dowel pin (11 mm)	884423
b	1	O-ring, oil return dowel pin (14 mm)	884409
c	1	Oil delivery dowel pin (11 mm)	884424
d	1	Oil return dowel pin (14 mm)	880524
e	1	Check valve 90°	8592352