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431 Disassembly, Inspection, Maintenance and Assembly of Engine Block Assembly

4311 Exploded View of Engine Block Assembly

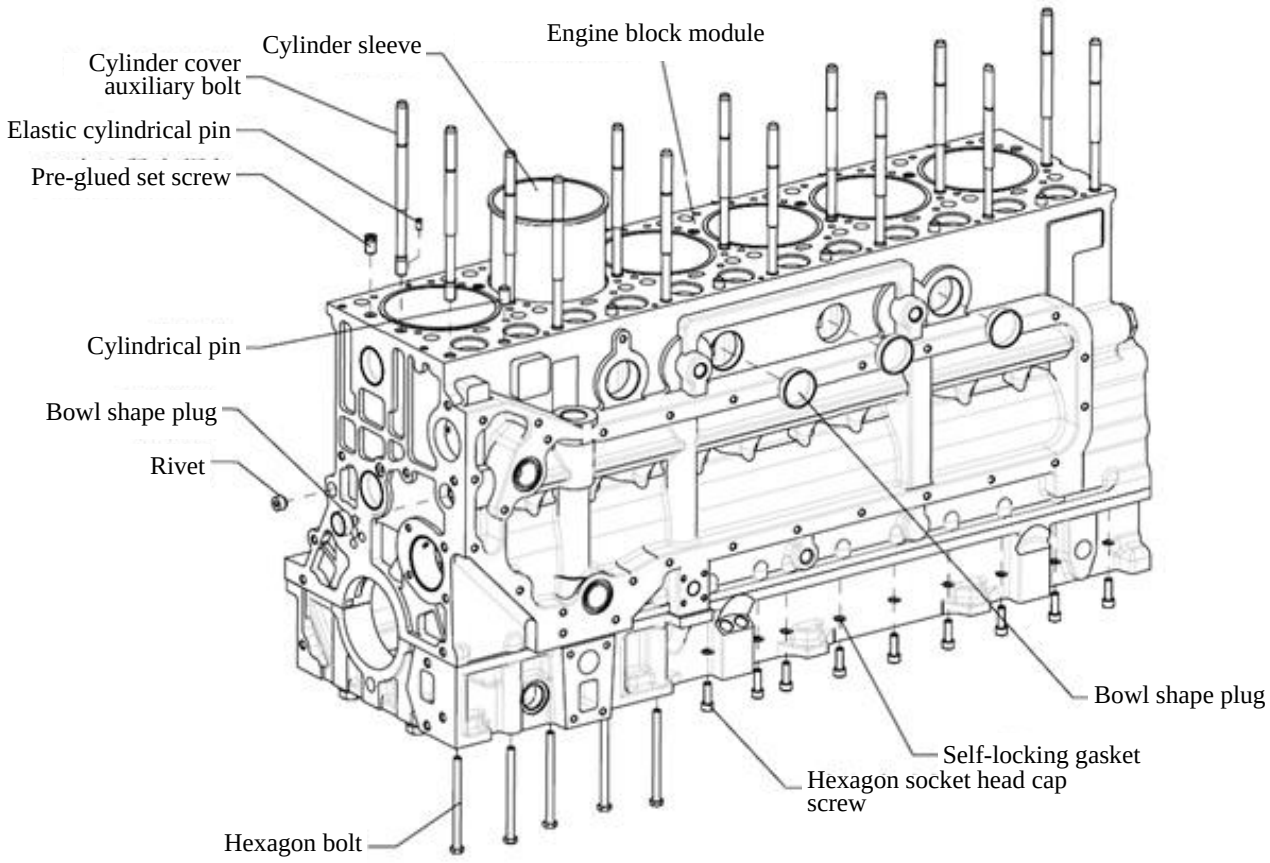

Fig. 4-19 Exploded view of engine block assembly

side with oil groove should be outward.

4384 Steps to Assemble Thrust Plates

(1) Install crankshaft;

(2) Install upper thrust plates (without lug);

(3) Install lower thrust plates (key point 1).

439 Disassembly, Inspection, Maintenance and Assembly of Front and Rear Oil Seals

4391 Exploded View of Front and Rear Oil Seals

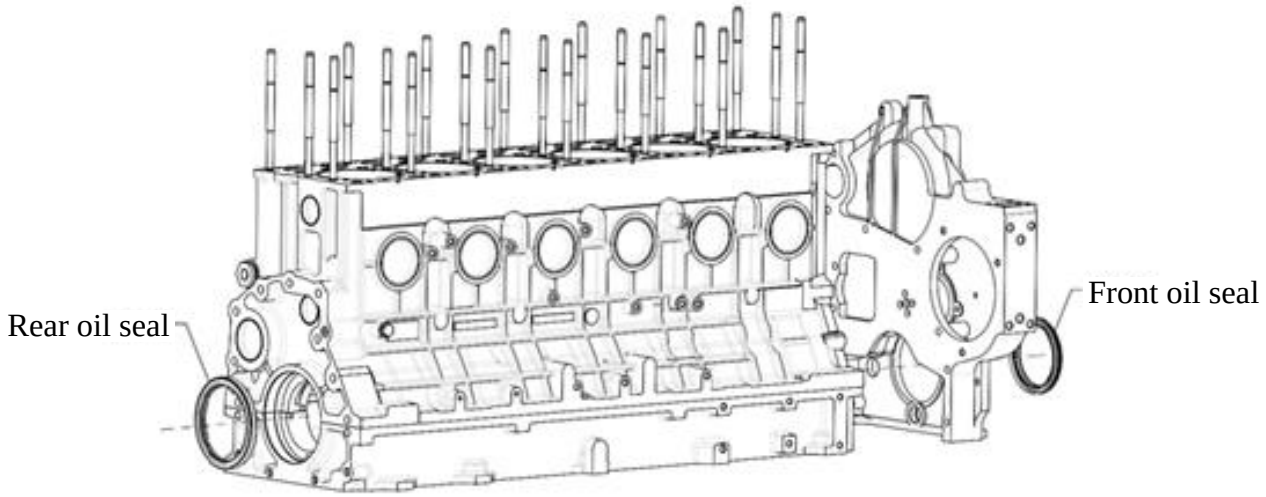

Fig. 4-31 Exploded view of front and rear oil seals

4392 Steps to Disassemble Front and Rear Oil Seals

(1) Remove gear housing (refer to section 434);

(2) Remove front oil seal (key point 1);

(3) Remove crankcase (refer to section 432);

(4) Remove rear oil seal (key point 1);

4393 Inspection and Maintenance of Front and Rear Oil Seals

Key point 1:

Assembling:

Clean up the oil seals and fitting holes before assembling, no dirt is allowed. Apply lubricating oil on the oil seal and the dedicated press-fitting tool first, and then press-in the seal slowly with the

(3) Install valve tappet and pushrod, refer to assembly of valve tappet and pushrod for details;

(4) Assemble intake and exhaust valves, refer to assembly of valves for details;

(5) Install rocker and rocker shaft, refer to assembly of rocker and rocker shaft for details;

452 Disassembly, Inspection, Maintenance and Assembly of Camshaft

4521 Exploded View of Camshaft

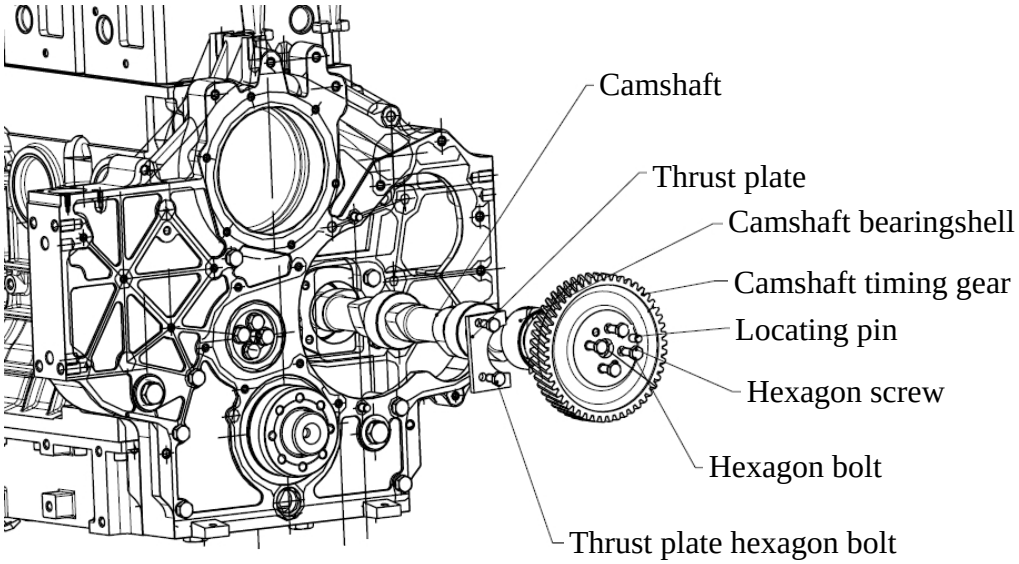

Fig. 4-42 Exploded view of camshaft

4522 Steps to Disassemble Camshaft

(1) Rotate camshaft to check whether camshaft and timing gear are flexible and smooth;

(2) Measure camshaft axial movement with a dial gauge, compare it with required range 0.1~0.4mm;

(3) Check timing gear backlash;

(4) Rotate crankshaft until camshaft timing gear is in cylinder 1 TDC. Remove the hexagon bolts of camshaft timing gear and take down the gear and locating pins;

(5) Remove the hexagon bolts of camshaft thrust plate, take down the plate;

(6) Take down camshaft.

4523 Inspection and Maintenance of Camshaft

(1) Check whether there is wear trace on cam working surface, check main journal for seizure and

(10) Remove engine oil cooler bypass valve.

4913 Steps to Assemble Lubricating System

Assembling steps are contrary to disassembling ones.

492 Disassembly, Inspection, Maintenance and Assembly of Engine Oil Pump

4921 Exploded View of Engine Oil Pump

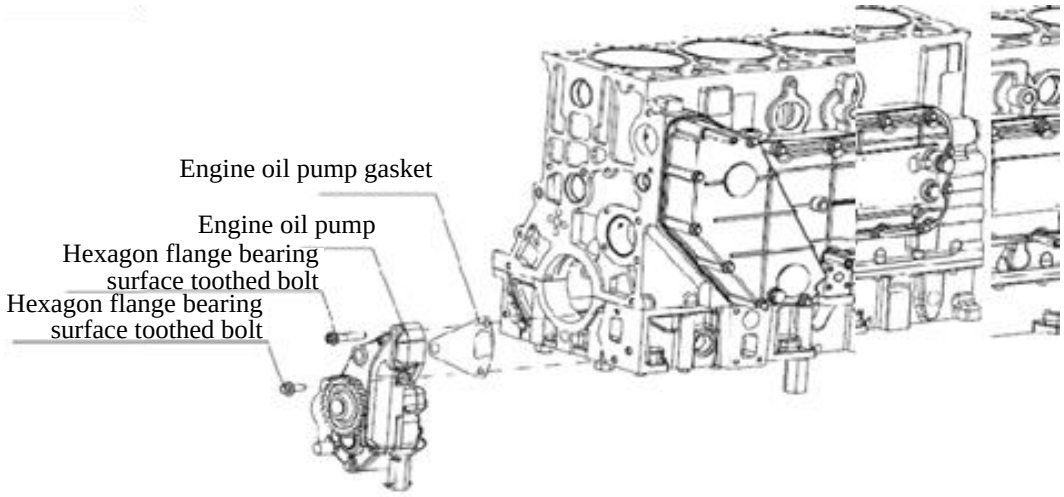

Fig. 4-66 Exploded view of engine oil pump

4922 Steps to Disassemble Engine Oil Pump

Remove the two hexagon flange bearing surface toothed bolts, take down engine oil pump and gasket, as shown in Fig. 4-66.

4923 Inspection and Maintenance of Engine Oil Pump

(1) Check the engine oil pump for crack damage, check whether its inner cavity is smooth, replace it if necessary.

(2) Check engine oil pump gasket for oil leakage, replace the gasket if necessary.

4924 Steps to Assemble Engine Oil Pump

(1) Check the pump and pump gasket before assembling, make sure there is no manufacturing defect and damage.

(2) Clean up the fitting surface between oil pump and crankcase.

(3) Install engine oil pump gasket.

(4) Install engine oil pump.

(5) Install and tighten the two toothed hexagon bolts.

493 Disassembly, Inspection, Maintenance and Assembly of Engine Oil Pump Intermediate Gear

4931 Exploded View of Engine Oil Pump Intermediate Gear

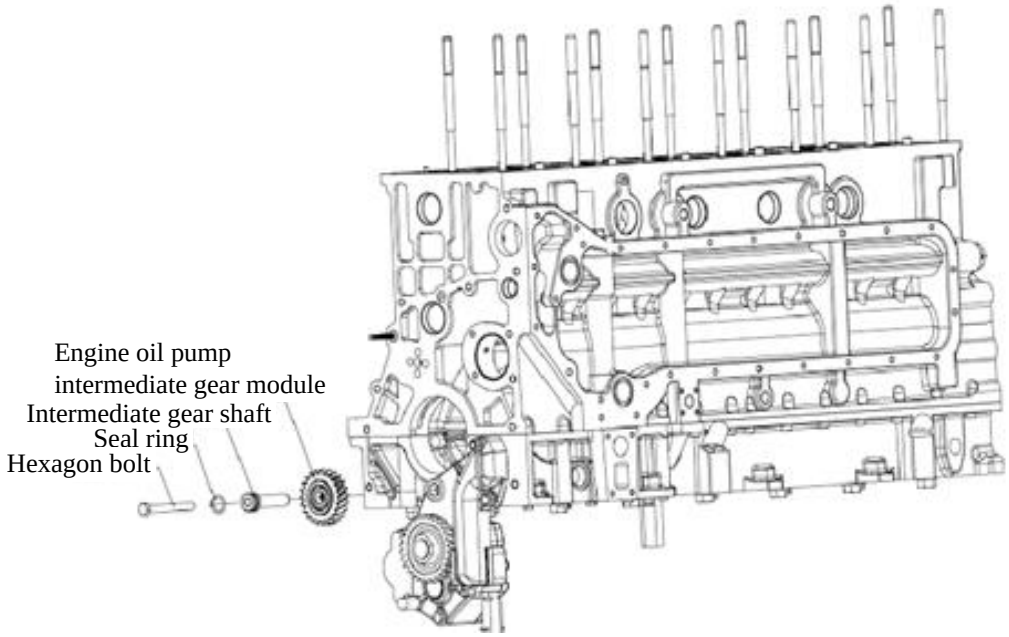

Fig. 4-67 Exploded view of engine oil pump intermediate gear

4932 Steps to Disassemble Engine Oil Pump Intermediate Gear

(1) Screw off the hexagon bolt;

(2) Pull out the intermediate gear shaft with dedicated tool, and then remove engine oil pump intermediate gear module.

4933 Inspection and Maintenance of Engine Oil Pump Intermediate Gear

(1) Check whether there is crack on intermediate gear and intermediate gear shaft. Replace if necessary.

(2) Check the seal ring for breakage and replace it if so.

4934 Steps to Assemble Engine Oil Pump Intermediate Gear

(1) Before the assembly, check engine oil pump intermediate gear module, intermediate gear shaft, hexagon bolt and seal ring, make sure there is no manufacturing and use defect and damage.

(2) Clean up engine oil cooler bypass valve and valve fitting hole on engine block.

(3) Install safety valve, safety valve spring and compound gasket orderly.

(4) Install the hexagon plug and tighten it.

499 Disassembly, Inspection, Maintenance and Assembly of Engine Oil Strainer

4991 Exploded View of Engine Oil Strainer

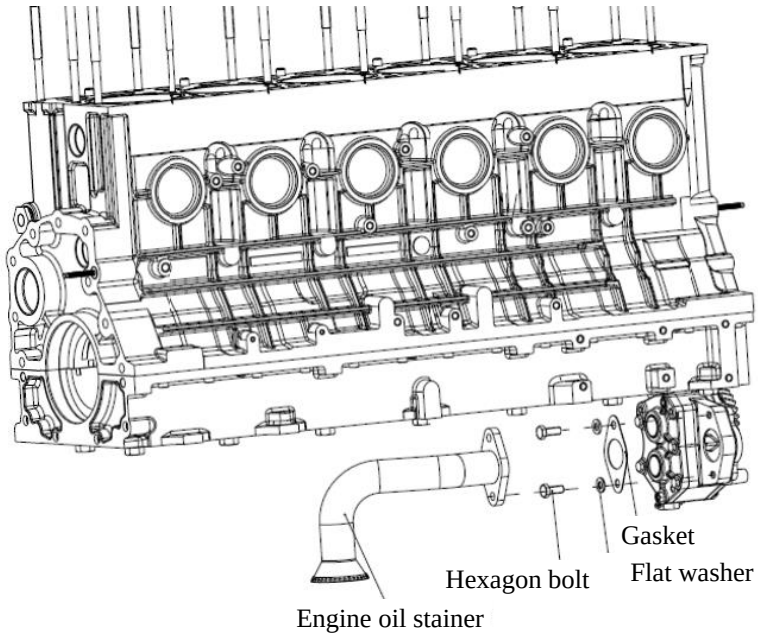

Fig. 4-73 Exploded view of engine oil strainer

4992 Steps to Disassemble Engine Oil Strainer

Screw off the two hexagon bolts, take down the oil strainer and gasket, as shown in Fig. 4-73.

4993 Inspection and Maintenance of Engine Oil Strainer

Check the strainer and gasket for crack damage, replace if necessary.

4994 Steps to Assemble Engine Oil Strainer

(1) Check the strainer and gasket before assembling, make sure there is no manufacturing defect and damage.

(2) Clean up fitting surface between oil strainer and engine oil pump, clean up the strainer inner cavity.

(3) Install the strainer and gasket.

(4) Install and tighten the hexagon bolts.

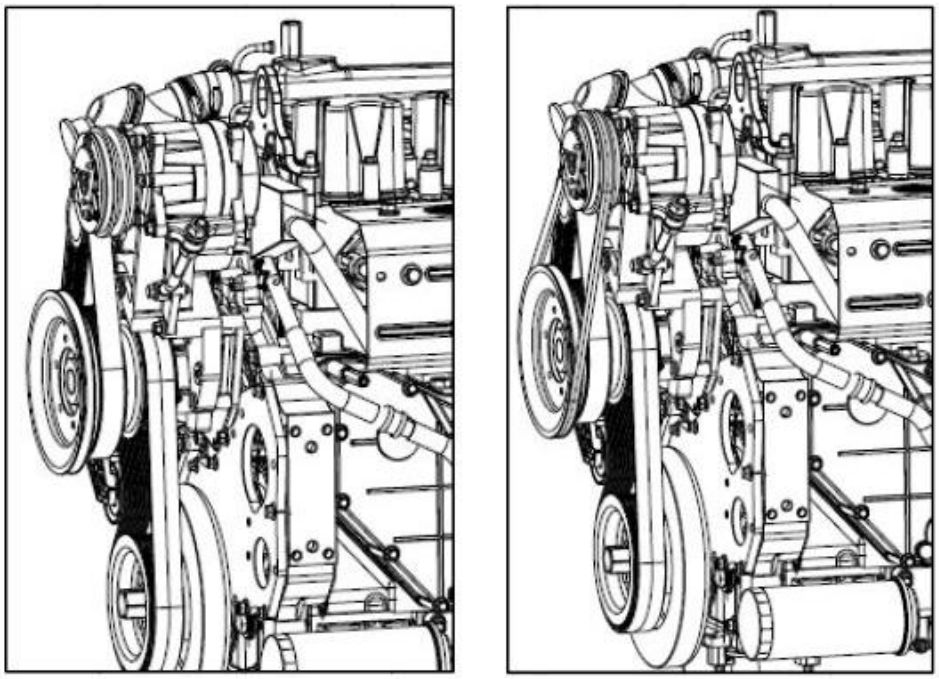

Fig. 4-81 Assembly of A/C compressor

(2) Install A/C compressor V-belt.

(3) Adjust the location of compressor and tension the V-belt with the draw-in rod, tighten compressor fixing bolts and nuts, as shown in Fig. 4-81.

Assembly of air compressor and its pipelines

(1) Place the O-shape seal ring in compressor ring groove. Make sure compressor main axis is perpendicular to engine timing gear housing fitting surface, and push the compressor into the mounting hole gently, ensure the helical gears are normally engaged and air compressor flange face should be parallel with engine fitting surface, loose-fit the compressor with three M10 hexagon bearing surface toothed bolts, and tighten the bolts with 13mm open end wrench (or double offset ring spanner).

(2) Install air compressor water inlet pipe, water outlet pipe, oil inlet pipe and intake pipe, fix the pipes with clamps. As shown in Fig. 4-82.

Fault 2: Low charging voltage		
Phenomenon	Fault detection	Troubleshooting
Battery is occasionally underpowered, low charging voltage, and the voltage declines markedly once loaded.	Check whether generator output power is reasonably matched with electrical appliances. a. Check whether voltmeter is damaged. b. Check generator speed. c. Check the quality and tensioning situation of generator belt and relevant pulley belts. d. Check generator pulley. e. Check whether electric wires are reasonably connected, measure the voltage of generator and battery. f. Check whether wires in charging system are loose, oxidized and producing too much heat, check whether bolt connections are loose. g. Measure output voltage of generator W/R/AC terminal (should be about half of B+ terminal voltage). h. Check whether battery charging is normal.	Measure generator B+ terminal voltage, which should be within 27.8~28.4V, if the voltage is normal, then it means voltmeter failure or voltmeter sampling point is in fault, repair or replace. a. It is recommended the generator idling speed should exceed 1600rpm. b. Generator speed should be 2000rpm and above, or the voltage should be about 27V when high power load appliance like air condition is working c. Check the quality of generator belt and relevant pulley belts, for belt involved severe coking, breakage, deformation or wear should be replaced. Tension generator belt and relevant pulley belts. **ATTENTION: If the to-be replaced belt is in twin-drive belt system, then the belts should be replaced together.** d. Tension it if it is loose. e. If voltage drop is bigger than 1V in heavy load condition (thin wire results in big voltage drop), the wire should be replaced. 0~35A $S \geq 6mm^2$ 35~70A $S \geq 12mm^2$ 70~100A $S \geq 20mm^2$ 100~150A $S \geq 25mm^2$ If the wire or connector gets too hot in heavy load condition, then the wire or connector should be replaced. f. Oxidized lead foot and the housing that used to install grounding bolts should be polished before reassembling. Retighten the loose nuts and lug plates, re-plug the loose connectors firmly. **ATTENTION: Reassembled or retightened parts should be run in heavy load and will be overheat, check whether the overheat is still there 3~5min later.** g. If there is big difference between terminal W/R/AC output voltage and normal range and big voltage drop happened after the engine loaded, then it means failure in generator rectifier bridge or stator, repair or replace. h. If charging current drops to about 10A 10min later, or charging current reaches to 30-90A for a long time, then the battery is damaged, repair or replace the battery.

3) Check measure wear condition and fitting condition of air compressor cylinder sleeve, piston and piston ring, severely worn parts should be replaced.
4) For compressor air cooling parts, please: Clean up accumulated oil dirt, soot and other dirty materials on cooling fin. Check the cooling fin and should replace the damaged parts. For compressor water cooling parts, please: Check the cooling pipe size (recommended minimum pipe diameter is 9.5mm), Check the flow rate of air refrigerant, minimum allowed flow rate is 5L/min when the engine is running. If refrigerant flow rate is small, check whether cooling pipe and accessories are rusted or twisted.
5) Check and ensure water temperature is under 93^{o}C; check the air valve on gasholder and ensure it can work normally. It is suggested to equip the machine with automatic exhaust valve and air drier.
6) When the brake is not used, air leakage (pressure drop) should not exceed 6.9kPa/min, and when depressing the brake, that value is 20.7kPa/min. If there is severe leakage, check the system and remove the fault. Check whether unloading system is working and repair it.
7) Check whether oil pressure in crankcase is too high, replace or repair ventilating device of crankcase if so. If the oil dipstick is loose or partially raised, then oil pressure in crankcase is in problem.
8) Check engine oil pressure (air compressor oil inlet port), compare it with rated pressure.
9) Replace with qualified lubricating oil (engine oil).

Only after ruling all the causes above out should the air compressor be repaired or replaced.

(4) Air compressor produces abnormal sound.

Fault phenomenon: Metal crash, rhythmic knock or grinding squeal

Possible causes:

1) Connecting rod sleeve or bearing shells are severely worn, connecting rod bolts are loose, main bearing shell is worn or damaged that result in crash noise.
2) The belt is too loose, driving and driven pulley groove type is not uniform, which lead to slipping squeal.
3) No engine oil is supplied to air compressor, dry friction of metal leading to squeal.
4) Loose fixing bolts.
5) Loose gear fastening nuts results in oversized tooth space, which will bring rhythmic knock.
6) Foreign matter in piston head.

Troubleshooting:

1) Check whether connecting rod bearing shells, connecting rod sleeve and main bearing shell is

surface, and push the pump (with a sealing gasket) into the mounting hole gently, ensure the helical gears are normally engaged and steering pump flange face should be parallel with the fitting surface, loose-fit the pump with two M10 hexagon bolts and wave spring washers, and tighten the bolts diagonally with 16mm open end wrench (or double offset ring spanner) to 50~60Nm, make sure not to damage the sealing gasket in this process. As shown in Fig. 4-93.

(2) Two applicable connecting types of oil inlet and outlet joints: copper washer (or combination flat gasket) and O-shape ring. Thread seal tape or thread sealant is strictly prohibited.

(3) Steering pump oil inlet and outlet joint screwing-in length should be suitable, neither too short nor too long. Refer to Fig. 4-94 and Fig. 4-95.

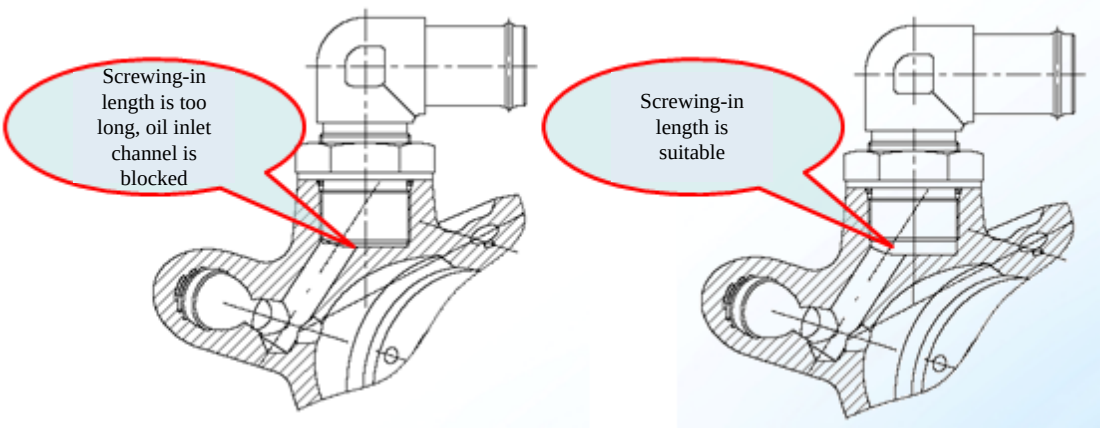

Fig. 4-94 Oil inlet joint screwing-in length is too long

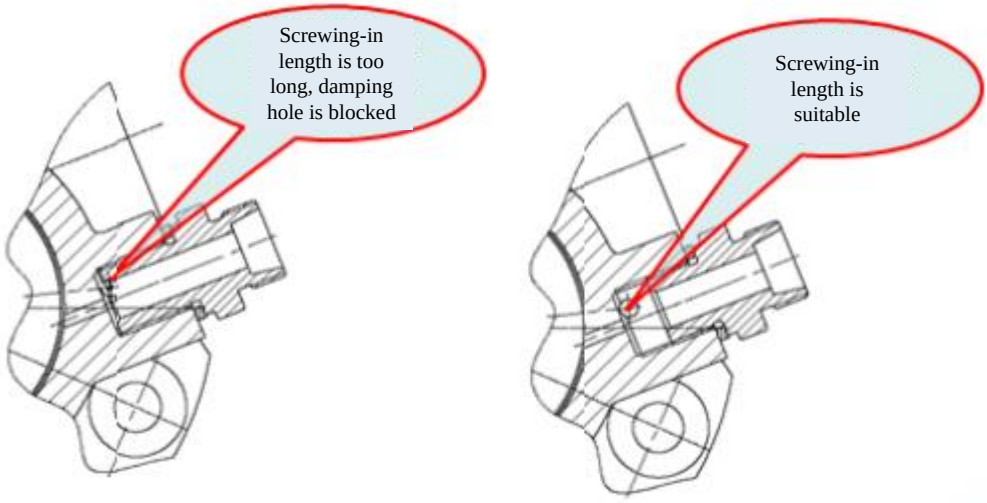

Fig. 4-95 Oil outlet joint screwing-in length is too long