STEERING, SUSPENSION, WHEELS AND TIRES

POWER STEERING

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GENERAL DESCRIPTION

Power Steering Unit



Power Steering Pump



Legend

A. 4J series engine

Tandem Hydraulic Pump

A tandem hydraulic pump has two independent hydraulic pumps inside one casing. Its main parts can be classified into the following three.

- hydraulic pump (vane type)
- · flow control valve
- pressure relief valve

The following is a description of the functions and operation of the main parts.

Hydraulic pump

Functions

The heart of the system, namely the part that supplies hydraulic pressure, which operates the hydro boost and

B. 4H series engine

the P/S. The hydraulic pump is installed directly to the engine and is driven by gears. It smoothly adapts itself to severe conditions of use, including a wide range of rotation speeds, changes in the temperature at which it is used, and frequent changes in load pressure, and it is able to fully perform its functions.

Operation

Its drive is transmitted by gears from the engine to the drive shaft of the oil pump, and it turns a rotor that is fitted into the spline part of the drive shaft. When the rotor rotates, the ten vanes built into the rotor groove fly out by centrifugal force, are pressed against the inside surface of the cam ring, and rotate along the inside surface so that the pump operates. Suction and discharge of the hydraulic oil is done by a pressure plate and side plate attached to both ends of the cartridge.

Suction openings and discharge openings are provided in two locations each in symmetrical positions with respect to the axis of rotation, and because the load on the bearings due to the discharge pressure is balanced, a tandem oil pump is also called a balanced hydraulic pump.

Because it has a double pump effect per rotation, this pump provides large discharge flow in proportion to the space it occupies. Also, some of the hydraulic oil that is discharged is led to the base of the vanes and ensures the quality of the seal between the vane tips and the cam, and even if the vanes and cam rings become a little worn, the seal is hardly affected at all (with respect to discharge, oil tightness).

ON-VEHICLE SERVICE

Power Steering System



Legend

1. From oil pump

Preparation

- Inspect the fluid reservoir for proper fluid level.
- Inspect the pump belt for proper tension.

System Test Procedure

- 1. Place a container under the pump to catch the fluid when disconnecting or connecting the hoses.
- 2. With the engine NOT running, install the power steering fluid pressure gauge unit between the power steering unit and discharge side of oil pump. The gauge must be between the stop valve and oil pump.

Gauge kit: 5-8840-0162-1

- 3. Check the fluid level. Fill the reservoir with Dexron[®]-III to "Full" mark. Check the connections at gauge kit for leakage.
- 4. Fully open the stop valve, and bleed the system. Refer to "Power Steering System Bleeding" of this section.
- Start the engine and being idled, and raise oil temperature to 50 60°C (122 144°F). Check the fluid level again. Fill the reservoir with Dexron[®]-III to "Full" mark if required.
- 6. Hold the steering wheel in the forward position. Fully close the stop valve, and record the highest value of fluid pressure.

Caution:

Do not continue this test. It should be done within 10 seconds, because otherwise oil temperature would rise to excess to cause trouble.

2. To steering unit

Standard Operating Pressure

- NQR without HBB: 11,278 kPa (115 kg/cm²/1,635 psi)
- NPR/NPS/NQR, with HBB: 10,787 kPa (110 kg/ cm²/1,563 psi)
- except Above Models: 10,297 kPa (105 kg/cm²/ 1,493 psi)

HBB: Hydraulic Booster Brake

- If the pressure recorded is within specified range, the steering system is functioning within its specifications.
- If the pressure recorded is higher than specified range, oil pump relief valve is defective.
- If the pressure recorded is lower than specified range, oil pump or relief valve is defective.
- Fully open the stop valve and keep engine idled. Turn and hold steering wheel to full left lock, and record the highest value of fluid pressure. Turn and hold steering wheel to full right lock, and record the highest value of fluid pressure.

Caution:

Do not continue this test. It should be done within 5 seconds.

Standard Operating Pressure

- NQR without HBB: 11,278 kPa (115 kg/cm²/1,635 psi)
- NPR/NPS/NQR, with HBB: 10,787 kPa (110 kg/ cm²/1,563 psi)

- except Above Models: 10,297 kPa (105 kg/cm²/ 1,493 psi)
- HBB: Hydraulic Booster Brake
 - If the pressure recorded is within specified range, the steering system is functioning within its specifications.
 - If the pressure recorded is lower than specified range, steering unit is leaking internally and must be disassembled and repaired.

Power Steering System Bleeding

- 1. Raise the front wheels with a jack. (It is recommended that a turn-table should be placed under right hand and left hand side front wheels at this time.)
- 2. Replenish the fluid tank with ATF Dexron[®]-III, and repeat the full steering (turning to the extreme ends of the steering) in both right hand side and left hand side directions quietly with the engine stopped.

Caution:

Under this condition, the air trapped in the fluid piping will be released from the fluid tank to the atmosphere in the form of large air bubbles.

3. Whenever the fluid level in tank is lowered, replenish the tank with ATF Dexron[®]-III in the amount equivalent to the consumption.

Caution:

Pay extra care over the fluid level so that fluid will not run out.

4. Start the engine and repeat the full steering several times quietly with the engine kept idling.

Caution:

The time needed for full steering should be less than five minutes. (Prolonged full steering of more than five seconds will cause the fluid temperature to raise significantly.)

5. Lower the front wheels and turn the steering wheel in both left hand and right hand sides several times with the engine run. If no abnormal noise can be heard at this time, air might be completely released.

Caution:

If the abnormal noise (creaky, "zi-zi" sound etc.) can be heard in the piping after the step No. 5 has been completed, the air is still trapped in the piping and air release has not been completed.

In this case, continue repetition of steering wheel turn in the both directions of left hand and right hand sides until the fluid temperature is increased up to around $50 - 80^{\circ}$ C (122 - 176°F). When the temperature reaches this degree, stop the engine and leave the engine for about five minutes. (Within five minutes, air bubbles can be collected.) Start the engine again and repeat the full steering several times.

6. After air release has been completed, check the fluid level in the tank and also confirm that the joints have no fluid leak.

Power Steering Unit



Legend

- A. NHR, NKR
- B. NPR, NQR, NPS
- 1. Cotter pin
- 2. Nut
- 3. Drag link

Removal

- 1. Remove the head light assembly. (for Non-Tilt Cab Model, driver side only) Refer to "Headlight Replacement".
- 2. Remove the under panel. (for Non-Tilt Cab Model)
- 3. Remove the front bumper assembly. (for Non-Tilt Cab Model)

- 4. Universal joint
- 5. Unit fixing nut and bolt
- 6. Power steering unit
- 7. Nut
- 8. Pitman arm
- 4. Remove the oil pipe. Before disconnecting the oil pipe, clean the steering unit paying particular attention to the area around the joint and plug or tape the oil port after disconnecting the pipe to prevent entry of dust or other foreign matter.

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- 5. Cotter Pin
- 6. Nut
- 7. Drag Link

Disconnect the drag link at the knuckle arm and the pitman arm.

Remover: 5-8840-2017-0



8. Universal Joint Apply a setting mark (1) across the yoke and worm shaft in unit to ensure reassembly of the parts in the original position.

N340124E

- 9. Unit Fixing Bolt and Nut
- 10. Power Steering Unit
- 11. Nut
- 12. Pitman Arm Apply a setting mark (1) across the pitman arm and worm shaft.



Puller: 5-8840-2051-1



Installation

1. Pitman Arm Align the setting mark (1) applied at removal.



2. Nut

Tighten:

• Pitman arm nut to

NHR, NKR Rigid suspension: 216 N·m (22 kg·m / 159 lb·ft)

NPR, Wishbone suspension: 294 N·m (30 kg·m / 217 lb·ft)



- 3. Power Steering Unit
- 4. Unit Fixing Nut and Bolt

Tighten:

- Nut and bolt to 103 N·m (10.5 kg·m / 76 lb·ft)
- Universal Joint Install the parts by aligning setting marks (1) applied at removal.

Tighten:

 Universal joint bolt to M8 bolt: 25 N·m (2.5 kg·m / 18 lb·ft)



- 6. Drag Link
- 7. Nut
 - 8. Cotter Pin
 - 1) Install the drag link to the pitman arm and the knuckle arm.
 - Tighten nuts to specified torque, with just enough additional torque to align cotter pin holes. Install new cotter pin.

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Tighten:

- Nut to 167 N·m (17 kg·m / 123 lb·ft)
 - Connect the oil pipe. Tighten flare nuts to specified torque.

Tighten:

- Flare nut to 44 N·m (4.5 kg·m / 33 lb·ft)
- 9. Install the bumper assembly. (for Non-Tilt Cab Model)

Tighten:

- Bumper bolt to 40 N·m (4.1 kg·m / 30 lb·ft)
- 10. Install the under panel. (for Non-Tilt Cab Model)
- 11. Install the head light assembly, front grille and front combination light assembly. (for Non-Tilt Cab Model) Refer to "Headlight Replacement".

Notice:

After installation, adjust head light aiming. Refer to "Cab and Chassis Electrical". (Non-Tilt Cab Model)

Power Steering Pump

Preparation

- Drain the fluid through the pipe which is connected to the return board for the power steering pump.
- Disconnect the fluid piping.

Removal

4J Series Engine

- Loosen the idler pulley locking nuts (1) for the power steering pump.
- Loosen the adjusting bolts for the drive belt and remove the drive belt.
- Remove the pipe brackets (2) and clips (3) on the alternator side.
- · Remove the pump mounting brackets.



4HE1 Engine

• Block the vehicle wheels and apply the parking brake.

- Disconnect the battery ground cable.
- 1. Disconnect air intake hose at turbocharger side.
- 2. Raise the vehicle and remove front exhaust pipe with exhaust brake.
- Remove bolts at manifold, silencer and support bracket.
- 3. Place a container under the hydraulic pump assembly to catch fluid when disconnecting hoses. Clean the surfaces around fittings before removing them.



- 4. Remove power steering outlet flexible hose (1) and nut.
- 5. Remove hydraulic booster outlet pipe (2) nut.
- 6. Remove two clips for hydraulic booster lines on the flywheel housing.
- 7. Remove clip for hydraulic booster lines on the left side member.
- 8. Hydraulic booster inlet hose (3).
- 9. Power steering inlet hose (4).
- 10. Remove hydraulic booster pipe from the pump.
- 11. Remove hydraulic pump assembly with bracket and O-ring.



4HF1 Engine

• Loosen three fixing bolts for power steering pump (Two on the flywheel side (1) and one on the cylinder body side (2)) and remove them.



Installation

4J Series Engine

Tighten:

· Bolt and nut to

Pump and bracket assembly: 19 N·m (1.9 kg·m / 14 lb·ft)

Oil pipe bracket: 19 N·m (1.9 kg·m / 14 lb·ft)

Clip bolt: 10 N·m (1.0 kg·m / 87 lb·in)

• Install the drive belt for the power steering pump and adjust the belt tension. Press the middle of the belt with a 98N (10kg) weight to measure the deflection of the belt.

Belt Deflection

8 — 12 mm (0.315 — 0.472 in)



Legend

- 1. Power steering pump drive belt
- 2. A/C compressor drive belt
- 3. A/C generator cooling fan drive belt

4HE1 Engine

1. Attach new O-ring and install hydraulic pump assembly to the engine.



2. Install booster outlet pipe (2) and nut.

Tighten:

- Nut to 23.5 N·m (2.4 kg·m / 17 lb·ft)
- 3. Install power steering outlet flexible hose (1) and nut.

Tighten:

- Nut to 23.5 N·m (2.4 kg·m / 17 lb·ft)
- 4. Connect hydraulic booster inlet hose (3).
- 5. Connect power steering inlet hose (4).
- 6. Install clips for hydraulic booster lines.
- 7. Connect air intake hose.

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- 8. Install exhaust pipe with exhaust brake.
- Fill the power steering and hydraulic booster systems with DEXRON[®]-III.
 Bleed the power steering system as outlined in this section.
 Bleed the hydraulic booster system. Refer to "Hy-

draulic Booster Line Bleeding" in Section 5.

4HF1 Engine

• Attach new O-rings and tighten them to the specified torque.

Tighten:

• Power steering pump bolt to

Flywheel side: 43 N·m (4.4 kg·m / 32 lb·ft)

Cylinder body side: 44 N·m (4.5 kg·m / 33 lb·ft)

Tandem Hydraulic Pump

Removal

- Block the vehicle wheels and apply the parking brake.
- Disconnect the battery ground cable.
- 1. Disconnect air intake hose at turbocharger side.
- 2. Raise the vehicle and remove front exhaust pipe with exhaust brake.
- Remove bolts at manifold, silencer and support bracket.
- 3. Place a container under the hydraulic pump assembly to catch fluid when disconnecting hoses. Clean the surfaces around fittings before removing them.
- 4. Remove power steering outlet flexible hose (1) and nut.
- 5. Remove hydraulic booster outlet pipe nut.
- 6. Remove clips for hydraulic booster lines on the flywheel housing.
- 7. Remove clip for hydraulic booster lines on the left sidemember.
- 8. Hydraulic booster inlet hose (3).
- 9. Power steering inlet hose (4).
- 10. Remove hydraulic booster outlet pipe (2) from the pump.
- 11. Remove hydraulic pump assembly with bracket and O-ring.



Installation

- 1. Attach new O-ring and install hydraulic pump assembly to the engine.
- 2. Install booster outlet pipe (2) and nut.

Tighten:

- Bolt and nut to 23.5 N·m (2.4 kg·m / 17 lb·ft)
- 3. Install power steering outlet flexible hose (1) and nut.

Tighten:

- Bolt and nut to 23.5 N·m (2.4 kg·m / 17 lb·ft)
- Put the cap on the eye joint and clamp the cap with the fastener.
- 4. Connect hydraulic booster inlet hose (3).
- 5. Connect power steering inlet hose (4).
- 6. Install clips for hydraulic booster lines.
- 7. Connect air intake hose.
- 8. Install exhaust pipe with exhaust brake.
- Fill the power steering and hydraulic booster systems with ATF DEXRON[®]-III.
 Bleed the power steering system as outlined in this section.

Bleed the hydraulic booster system. Refer to "Hydraulic Booster Line Bleeding" in Section 5.



UNIT REPAIR

Power Steering Unit

Illustrations of this section are based on RHD model. Illustrations for LHD model are symmetrically opposite. **Power Steering Unit**



Legend

- 1. Retaining ring
- 2. Dust seal
- 3. Oil seal
- 4. Lock nut
- 5. Bolt

Disassembly

- 1. Retaining ring
- 2. Dust seal
- 3. Oil seal
 - · Clean around the stub shaft.

- 6. Sector shaft assembly and side cover assembly
- 7. Bolt
- 8. Valve housing and worm shaft assembly
- 9. Body assembly
 - Plug the hose hole on the inlet side.
 - Blow air through the hole on the outlet side to remove the oil seal.

Caution:

- Be careful because the oil seal may suddenly fly out due to air pressure.
- Take care not to damage the pipe seating area in port.



Legend

- 1. Plug
- 2. Stub shaft
- 4. Lock Nut
- 5. Bolt
- 6. Sector Shaft Assembly and Side Cover Assembly When removing, take care so as not to cause damage to the serrations, threads and oil seal.



- 7. Bolt
- Valve Housing and worm shaft Assembly Remove piston with valve housing.
 Always keep ball-nut assembly in a horizontal position and avoid holding it vertically.



9. Body Assembly

Inspection and Repair

Make necessary correction or parts replacement if wear, damage or any other abnormal conditions are found through inspection.

Visual Check

Inspect the following parts for wear, damage or other abnormal conditions.

- Gear box
- Sector shaft
- Needle roller bearing
- · Piston and worm shaft
- Oil seal, Dust cover, Y-gasket, O-ring and seal ring **Gear Box**

Check the body for cracks, and body inner surface and piston sliding surface for scratches.



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Sector Shaft

If the shaft is worn, twisted, scratched or partially worn, replace it with a new one.



Bearing

If the bearing race surface is worn, scratched or seized, replace it with a new assembly.



Piston and Worm Shaft

If the piston surface is remarkable worn or play is excessive, replace with a new assembly.



Measurement of Sector Shaft Outside Diameter Standard: 39.975 mm (1.574 in) Limit: 39.925 mm (1.572 in)



Measurement of Play between Sector Shaft and Needle Roller Bearing Limit: 0.12 mm (0.0047 in)



Valve Housing Assembly

Measure the end play of the ball screw in the axial direction.

- A: 16 mm (0.6299 in)
- F: 39 N (4 kg/11 lb)
- B (end play): 0.5 mm (0.0197 in) or less



Legend

1. Neutral position

Reassembly

- 1. Body Assembly
- 2. Valve Housing Assembly

Tighten:

- Valve housing and worm shaft assembly bolt to NHR, NKR: 59 N·m (6.0 kg·m / 43 lb·ft)
 - NPR, NQR, NPS: 103 N·m (10.5 kg·m / 76 lb·ft) Install the parts with the valve side turned to front and worm gear of piston toward the sector gear. Apply liquid to the valve housing contact surface.



- 3. Bolt
- 4. Sector Shaft Assembly and Side Cover Assembly
- 5. Bolt

Tighten:

 Side cover bolt to 59 N·m (6.0 kg·m / 43 lb·ft) Align the center tooth (1) of piston (ball nut (2)) with that of the sector shaft (3).



- 6. Lock Nut
 - 1) Install drop arm.
 - 2) Hold the sector shaft in a straight ahead position.
 - 3) With the adjuster screw, adjust the preload to specification.

Preload Between Sector Shaft and Ball Nut

1.3 N·m (0.13 kg·m/1 lb·ft) or less

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- Apply liquid gasket to the lock nut. Adhesive liquid gasket (JIS K6820 Category 1), HERME SEAL 101Y, THREE BOND 1102 or equivalent
- 5) Tighten the lock nut.

Tighten:

- Lock nut to 69 N·m (7.0 kg·m / 51 lb·ft)
- 7. Oil seal
 - Use new one.
 - Apply a thin coat of power steering fluid to the lip, and check the installation direction. Installer: 5-8522-0026-0



- 8. Dust seal
 - Face the dust lip side outward.
- 9. Retaining ring
 - Face the surface with chamfered periphery toward the oil seal side.
 - Use new one.

Side Cover and Sector Shaft Assembly



Legend

- 1. Side cover assembly
- 2. O-ring
- 3. Back up ring
- 4. Y-gasket

Disassembly

If the sector shaft is going to be fixed on the bench vice during disassembly, be sure to protect the sector shaft with cloth or other soft material.

1. Side Cover

Gradually turn the adjuster screw (1) clockwise, and the side cover assembly will be lifted. Thus, you can separate the side cover assembly (2) from the sector shaft assembly (3).

- 5. Sector shaft assembly
- 6. Retainer
- 7. Adjuster screw



- 2. O-ring
- 3. Back Up Ring

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4. Y-Gasket

Using needle, scriber or equivalent.

- 5. Sector Shaft Assembly Unless otherwise a problem, it is not necessary to disassembly.
- 6. Retainer
 - 1) Raise the two lips of the retainer.



2) Using retaining bar.



7. Adjuster Screw

Inspection and Repair

Refer to "Power Steering Unit" in this section.

Reassembly

- 1. Adjuster Screw
- 2. Retainer

Discard used retainer and install a new one. Install and fully tighten the retainer and back off 180 degrees. Retighten to a torque of 39 N (4 kg /44 lb) and back off 20 degrees. Check that the adjuster screw turns smoothly.



Caulk the retainer in position.



- 3. Sector Shaft Assembly
- Y-Gasket Install the gasket so that its lip faces to the bearing. If the lip is deformed, correct.

Apply grease to Y-gasket.

 Back Up Ring When the back up ring is installed, use installer for alignment.



Legend

- 1. Installer
- 2. Side cover
- 6. O-ring
- 7. Side Cover Assembly

Mate the screw hole at the center of the side cover (1) with the adjuster screw (2) on the sector shaft assembly (3), and fix the side cover assembly to the sector shaft assembly by turning the adjuster screw counterclockwise.



Valve Housing Assembly



Legend

- 1. Piston assembly
- 2. Ball, tube, tube grip, screw and washer
- 3. Seal ring

Disassembly

1. Piston Assembly

Hold the housing with the piston end facing downward, and turn the stub shaft counterclockwise. Then, the worn shaft can be removed from the piston.

Caution:

The steel ball put in the ball race for the piston and worm shaft will drop inside of the piston. Be careful not to let the piston fall down.

- 4. O-ring
- 5. O-ring
- 6. Valve housing and worm shaft assembly



Legend

- 1. Stub shaft
- 2. Valve housing
- 3. Piston
- 2. Ball, Tube, Tube Grip, Screw and Washer Be careful not to lose the ball when remove the ball tube.
- Number of Balls: 28
 - 3. Seal Ring



- 4. O-ring
- 5. O-ring
 - Using needle, scriber or equivalent.
- 6. Valve housing and worm shaft assembly.

Inspection and Repair

Refer to "Power Steering Unit" in this section.

Reassembly

- 1. Valve housing and worm shaft assembly
- 2. O-ring
- 3. O-ring
- Seal Ring When the O-ring and seal ring are installed, use installer for alignment.



- 5. Piston Assembly
- 6. Ball, Tube, Tube Grip, Screw and Washer
 - 1) Put the valve housing assembly (1) horizontally. Insert the ball (2) into the ball tube hole in the piston (3) while rotating the stub shaft (4). Thus, the ball can be easily mounted.



 Apply a sufficient amount of grease to the inner surface of the tube (1). Put and paste the balls (2) to the inner surface of the tube. Then, put the other ball tube onto the tube to which grease has been applied and the balls have been pasted.



3) Then, tighten the screw.

Tighten:

• Tube screw to 5 N·m (0.5 kg·m / 43 lb·in)



Legend

- 1. Tube
- 2. Tube grip

Body Assembly



Legend

- A. NHR, NKR
- B. NPR, NQR, NPS
- 1. Y-gasket
- 2. Back up ring

Disassembly

- 1. Y-gasket
- 2. Back Up Ring
- 3. Oil Seal
- 4. Body
- 5. Stud

Inspection and Repair

Refer to "Power Steering Unit" in this section (3B1-15).

Reassembly

Note the direction of installation. Apply grease to these parts.

- 3. Oil seal
- 4. Body
- 5. Stud



1. Body

2. Oil Seal Using installer.

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Legend

- 1. Installer
- 2. Oil seal
- 3. Y-gasket
- 4. Back Up Ring When the back up ring is installed, use installer (1)



5. Stud

Tighten:

• Stud to 40 N·m (4.1 kg·m / 29.5 lb·ft)

Power Steering Pump (4J Series Engine)



Legend

- 1. Bolt
- 2. Pipe, suction
- 3. O-ring
- 4. Connector
- 5. Connector
- 6. O-ring
- 7. Valve
- 8. Retaining ring
- 9. Filter
- 10. Spring
- 11. Snap ring
- 12. Shaft assembly
- 13. Bearing
- 14. Shaft

Disassembly

Preparation

Clean oil pump with solvent (its plug discharge and suction port to prevent the entry of solvent). Be careful not to expose the oil seal of shaft assembly to solvent.

- 1. Bolt
- 2. Pipe, Suction
- 3. O-ring
- 4. Connector
- 5. O-ring

- 15. Retaining ring
- 16. Oil seal
- 17. Bolt
- 18. Rear housing assembly and pump cartridge
- 19. Gasket
- 20. O-ring
- 21. O-ring
- 22. Front housing
- 23. Pressure plate
- 24. Rotor and vane
- 25. Cam
- 26. Pin
- 27. Rear housing
- 6. Valve
- 7. Retaining Ring
- 8. Filter
- 9. Spring
- 10. Retaining Ring
- 11. Shaft Assembly
- 12. Bearing
- 13. Shaft
- 14. Retaining Ring
- 15. Oil Seal

Caution:

When removing the oil seal, be careful not to damage the housing.

- 16. Bolt
- 17. Rear Housing Assembly and Pump Cartridge
- 18. Gasket
- 19. O-ring
- 20. O-ring
- 21. Front Housing
- 22. Pressure Plate
- 23. Rotor and Vane
- 24. Cam
- 25. Pin
- 26. Rear Housing

Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Reassembly

1. Rear Housing

inner wall of the cam.

- 2. Pin
- 3. Cam
- 4. Rotor and Vane Install the vane with curved face in contact with the



5. Pressure Plate

Caution:

When install pressure plate, be careful not to damage its inner surface. Damaged pressure plate may cause poor pump performance, pump seizure or oil leakage.

- 6. Front Housing
- 7. O-ring

Be sure to discard used parts, and always use new parts for installation.

8. O-ring

Be sure to discard used parts, and always use new parts for installation.

- Gasket Be sure to discard used parts, and always use new parts for installation.
- 10. Rear Housing Assembly and Pump Cartridge
- 11. Bolt

Tighten:

- Rear housing bolt to 54 N·m (5.5 kg·m / 40 lb·ft)
- 12. Oil Seal

Be sure to discard used parts, and always use new parts for installation.

Caution:

When install pressure plate, be careful not to damage its inner surface. Damaged pressure plate may cause poor pump performance, pump seizure or oil leakage.

- 13. Retaining Ring
- 14. Shaft
- 15. Bearing
- 16. Shaft Assembly
- 17. Retaining Ring
- 18. Spring
- 19. Filter
- 20. Retaining Ring
- 21. Valve
- 22. O-rina

Be sure to discard used parts, and always use new parts for installation.

23. Connector

Tighten:

- Connector to 54 N·m (5.5 kg·m / 40 lb·ft)
- 24. O-ring

Be sure to discard used parts, and always use new parts for installation.

- 25. Pipe, Suction
- 26. Bolt

Tighten:

• Suction pipe bolt to 21 N·m (2.1 kg·m / 15 lb·ft)



Power Steering Pump (4H Series Engine without Hydraulic Booster Brake)

Legend

- 1. Suction pipe
- 2. O-ring
- 3. Body and gear
- 4. Bolt
- 5. Rear cover
- 6. Pin
- 7. Bushing
- 8. Cartridge assembly
- 9. O-ring

- 10. Side plate
- 11. O-ring
- 12. O-ring
- 13. Pin
- 14. Connector
- 15. O-ring
- 16. O-ring
- 17. Valve assembly
- 18. Spring

Disassembly

- 1. Suction Pipe
- 2. O-ring
- 3. Bolt
- 4. Rear Cover
- 5. Pin

- 6. Bushing
- 7. Cartridge Assembly
- 8. O-ring
- 9. Side Plate
- 10. O-ring
- 11. O-ring

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12. Pin

Caution:

When removing the oil seat, be careful not to damage the housing.

- 13. Connector
- 14. O-ring
- 15. O-ring
- 16. Valve Assembly
- 17. Spring
- 18. Body and gear

Inspection and Repair

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.

Reassembly

- 1. Body and gear
- 2. Spring
- 3. Valve Assembly
- 4. O-ring
- 5. O-ring
- 6. Connector

Tighten:

- Connector to 49 N·m (5 kg·m / 36 lb·ft)
- 7. Pin
- 8. O-ring
- 9. O-ring
- Cartridge Assembly Install the vane with curved face in contact with the inner wall of the cam.



- 11. O-ring
- 12. Pin
- 13. Side Plate
- 14. Bushing
- 15. Rear Cover

16. Bolt

Tighten:

- Rear cover bolt to 20 N·m (2 kg·m / 14 lb·ft)
- 17. O-ring
- 18. Suction Pipe

Tighten:

Suction pipe bolt to 8 N·m (0.8 kg·m / 69 lb·in)

Tandem Hydraulic Pump



Legen	nd			
1.	O-ring	23.	Pressure plate	
2.	Hose connector: HBB	24.	O-ring	
3.	Hose connector: P/S	25.	Bolt	
4.	O-ring	26.	O-ring	
5.	Connector: HBB	27.	Side Plate	
6.	O-ring	28.	Rotor and vane: HBB	
7.	O-ring	29.	Cam	
8.	Valve	30.	Pressure plate	
9.	Spring	31.	Pin	
10.	Connector: P/S	32.	Shaft	
11.	O-ring	33.	Retainer	
12.	O-ring	34.	O-ring	
13.	Valve	35.	Oil seal	
14.	Spring	36.	Pump housing	
15.	Nut	37.	Snap ring	
16.	Gear	38.	Ball bearing	
17.	Кеу	39.	Shaft	
18.	Rear body	40.	Retainer ring	
19.	Gasket	41.	Oil seal	
20.	Pin	42.	Front body	
21.	Cam	P/S:	Power steering	
22.	Rotor and vane: P/S	HBB:	Hydraulic booster brake	
Disassembly		28.	Rotor and Vane: HBB	
	•		•	

- 1. O-ring
- 2. Hose Connector: HBB
- 3. Hose Connector: P/S
- 4. O-ring
- 5. Connector: HBB
- 6. O-ring
- 7. O-ring
- 8. Valve
- 9. Spring
- 10. Connector: P/S
- 11. O-ring
- 12. O-ring
- 13. Valve
- 14. Spring
- 15. Nut
- 16. Gear
- 17. Key
- 18. Rear Body
- 19. Gasket
- 20. Pin
- 21. Cam
- 22. Rotor and Vane: P/S
- 23. Pressure Plate
- 24. O-ring
- 25. Bolt
- 26. O-ring
- 27. Side Plate

- 29. Cam
- 30. Pressure Plate
- 31. Pin
- 32. Shaft
- 33. Retainer
- 34. O-ring
- 35. Oil Seal
- 36. Pump Housing
 - · Use a brass drift to remove the oil seal from the pump housing.
- 37. Snap Ring
 - · Use a mallet to remove the shaft assembly from the front body.
- 38. Ball Bearing
- 39. Shaft
 - · A press and rod will be necessary to remove the ball bearing from the shaft.
- 40. Retainer Ring
- 41. Oil Seal
- 42. Front Body
 - · Use a brass drift to remove the oil seal from the front body.
- Clean
 - · All parts in a suitable solvent and blow dry with compressed air. Be sure to use clean solvent to clean internal parts.

Inspection

· Cartridge assembly

- Vane tips of cartridge assembly for wear.
- Vanes for scoring or wear.
- Inner surface of the ring for scoring, wear, damage, etc.
- Fit of the vanes in the rotor. The vanes must fit property in the rotor slots, without sticking or excessive play. Also check for burrs in the rotor slots, and excessive wear at the thrust faces.
- If heavy wear is present, or if parts are damaged, replace the entire cartridge assembly.
- Side place for wear at the thrust faces.

Replace if excessive wear is evident.

- Ball bearing. If the bearing is rough or loose, replace it.
- Seal contact area of the shaft. If fretting or roughness is present, replace the shaft.
- Gear for rough or chipped teeth.
- Flow control valve assembly for scoring or burrs. Also, inspect the flow control valve bore in the pump housing for burrs.

If heavy damage is present, replace pump housing assembly together with valves.

Reassembly

- 1. Oil Seal
- 2. Front Body
 - Oil seal into the front body using a proper size rod and press or hammer.
- 3. Shaft
- 4. Ball Bearing
- Press the shaft, into the ball bearing as illustration.



Legend

- 1. Shield plate
- 2. Stamping
- 5. Retaining Ring

- Place the retaining ring in the front body and install the shaft assembly into the front body using a press or hammer.
- 6. Snap Ring
- Snap ring into front body.
- 7. Oil Seal
- 8. Pump Housing
- Oil seal into pump housing using a proper size rod and press or hammer.
- 9. O-ring
- 10. Retainer
- 11. Shaft
- 12. Pressure Plate
- 13. Cam
- 14. Rotor and Vane: HBB
- 15. Side Plate
- 16. Pin
 - Set pressure plate, cam, rotor and vane, side plate, and pins into pump housing as illustration.





3B1-34 POWER STEERING

Legend

- A. Front view
- B. Rear view
- 1. Pressure plate
- 2. Cam, Rotor and vane
- 3. Side plate
- 4. Oblong hole
- 5. Stamping

17. O-ring

- 18. Bolt
 - Attach O-rings into front body grooves and assemble front body and pump housing by tightening bolts.

Tighten:

- Bolt and nut to
 - 4 (four) bolts: 54 N·m (5.5 kg·m / 40 lb·ft)
 - 1 (one) bolt: 25 N·m (2.5 kg·m / 18 lb·ft)
- 19. O-ring
- 20. Pressure Plate
- 21. Rotor and Vane: P/S
- 22. Cam
- 23. Pin
 - Set pressure plate, rotor and vane, cam and pins into pump housing as illustration.



Legend

- A. Front view
- 1. Pressure plate
- 2. Rotor and vane, Cam
- 3. Oblong hole
- 4. Stamping
- 24. Gasket
- 25. Rear Body

Tighten:

- Bolt and nut to 34 N·m (3.5 kg·m / 25 lb·ft)
- 26. Key
- 27. Gear
- 28. Nut
 - Key, gear and nut onto shaft.
 - The long hub of the gear faces front body.

Tighten:

- Bolt and nut to 103 N·m (10.5 kg·m / 76 lb·ft)
- 29. Spring
- 30. Valve
- 31. O-ring
- 32. O-ring
- 33. Connector: P/S
 - Spring, valve, O-ring, O-rings and connector into pump housing.

Tighten:

- Bolt and nut to 54 N·m (5.5 kg·m / 40 lb·ft)
- 34. Spring
- 35. Valve
- 36. O-ring
- 37. O-ring
- 38. Connector: HBB
 - Spring, valve, O-ring, O-rings and connectors into pump housing.

Tighten:

- + Bolt and nut to 54 N·m (5.5 kg·m / 40 lb·ft)
- 39. O-ring
- 40. Hose Connector: P/S
- 41. Hose Connector: HBB

Tighten:

- Bolt and nut to 21 N·m (2.1 kg·m / 15 lb·ft)
- 42. O-ring