



Service Manual

FC

DP70N

AT20D-10011-up

machinecatalogic.com

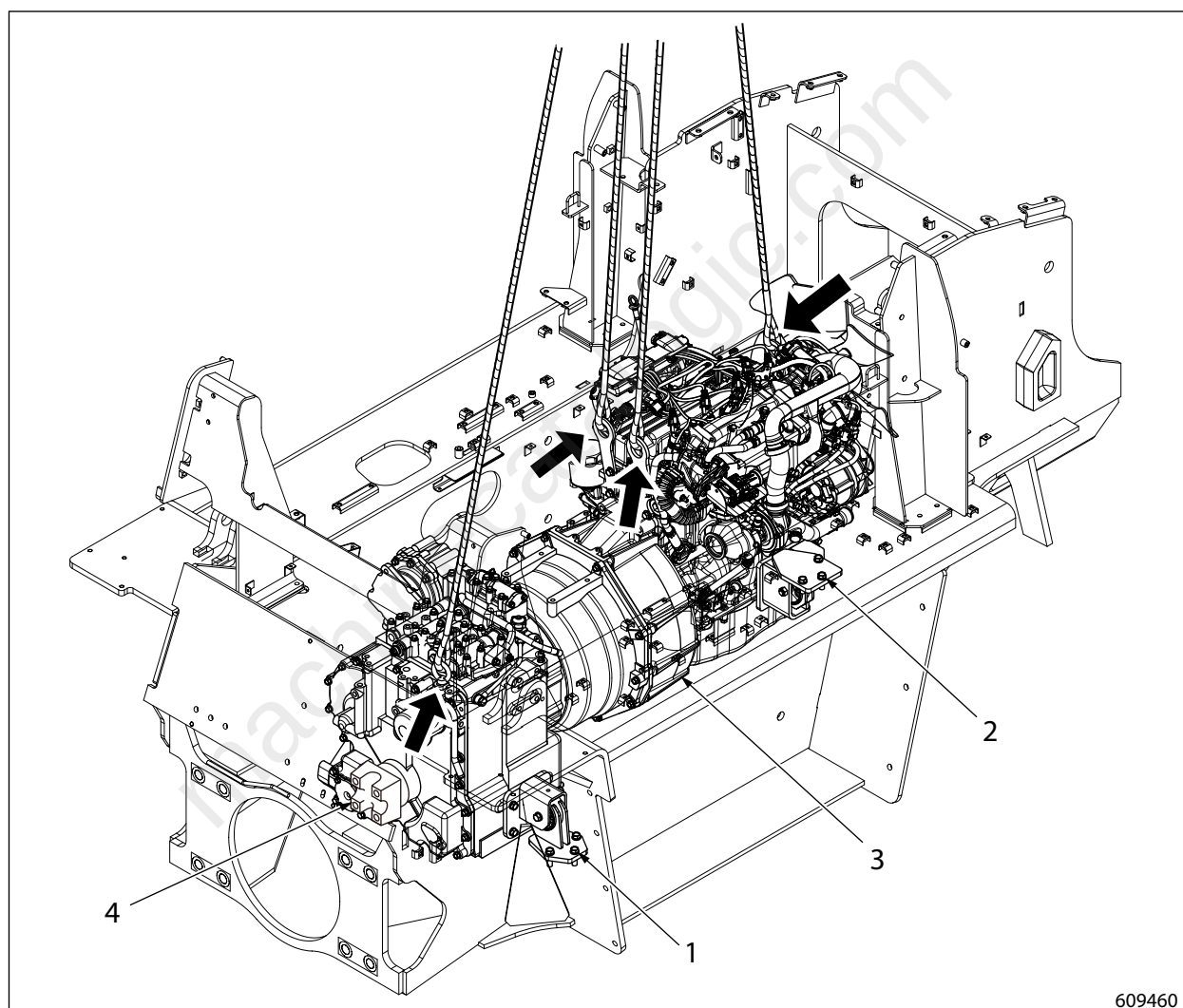
1.5 Removing Engine and Transmission Unit

Preparation

- (1) Drain oil from the engine and transmission.
- (2) Prepare a workbench sturdy enough to support the engine and transmission unit, and place the workbench on a hard and level surface.
- (3) Suspend the engine and transmission unit with a hoist by attaching steel wire ropes or chains to the lifting hooks (four places) on the engine and transmission unit.

Weight
Approx. 580 kg (1278.7 lb.) (dry)

Removal sequence



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- | | |
|-------------------------------|-------------------------------------|
| 1. Transmission mounting bolt | 3. Engine and transmission assembly |
| 2. Engine mounting bolt | 4. Universal joint |

Suggestions for removal

- (1) Remove the bolts of universal joint, and disconnect.
- (2) To remove mounting bolts, lift the engine and transmission unit high enough to lighten the weight on the mount cushion. To remove mounting bolts on the engine side, remove the support mounting bolt first.
- (3) Attach steel wire ropes or chains to the lifting hooks (four places) on the engine and transmission assembly. Slightly move it backward first and then gently lift it while maintaining its balance until it is removed.
- (4) Gently place the engine and transmission assembly on the workbench while aligning the mounting positions.

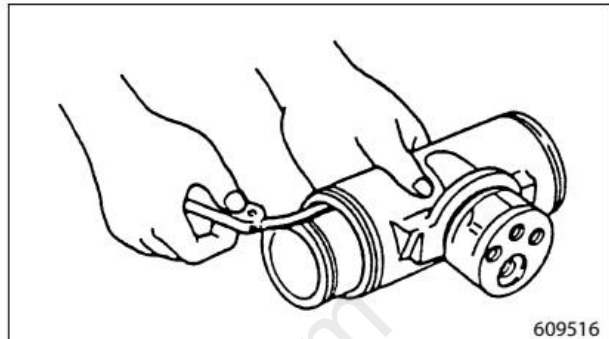
3.5 Inspecting and Repairing Wheel Cylinder

Cylinder body

- Inspect the cylinder bore for rust, corrosion, or scoring.
- Inspect threads of both the bleeder screw and oil pipe for damage.

Piston

- Inspect sliding surfaces for rust or scratches.
- With the piston installed in the cylinder body, measure the piston-to-cylinder clearance. Replace if the clearance exceeds the limit.
Replace as a wheel cylinder assembly.



Item	Standard	Limit
Clearance between piston and cylinder	0.020 to 0.105 mm (0.0008 to 0.0041 in.)	0.15 mm (0.0059 in.)

Piston cup

Check for swelling, damage, or other defects. Replace the cup if defective even slightly.

Item	Standard	limit
Interference between piston cup and cylinder body	1.85 mm (0.0728 in.)	0.65 mm (0.0256 in.)

Boot

Replace if damaged or aged and deteriorated. Replace every year.

3.6 Assembling Wheel Cylinder

To assemble, follow the disassembly sequence in reverse and observe the instructions below:

- (1) Apply an even coat of brake fluid on the cylinder inner face and piston cups.
- (2) Be careful not to damage the lips of the cups.
- (3) Pay attention to the orientation of the cup when installing.

6.3 Suggestions for Disassembly

Removing carriage

- Attach wire ropes to guide bar mounting holes (right and left) and lower plate at center to support at three points with a crane.
- Lift the carriage until the carriage is disengaged from the lift bracket, and then move the carriage towards arrow direction (illustration). When disengaged, lift and remove.

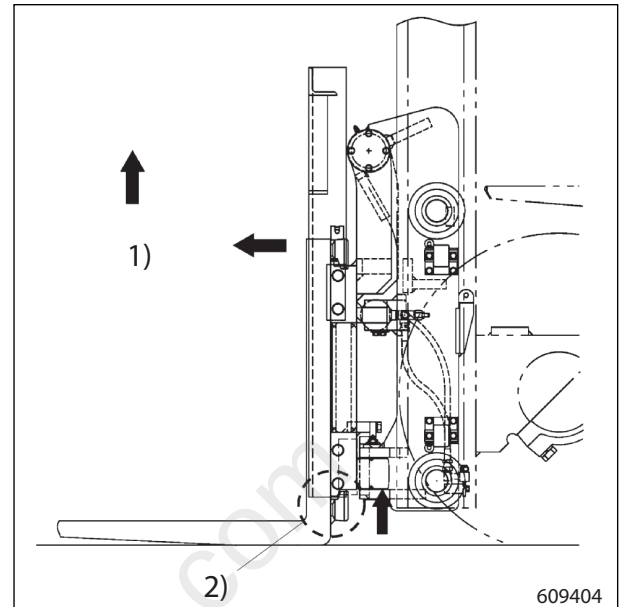
Disconnecting pipes and hoses

Disconnect hose at the connector of cylinder, and with the plate attached, remove pipe together with hose.

Removing side shifter

Remove carefully so as not to cause damage to cylinder rod and connector threaded portion.

Cylinder rod should be fully contracted for removal.



1) Lift up when removed

2) Disengage by lifting

7. Inspecting and Repairing Side Shifter Assembly

- (1) Lift bracket
 - Check main rollers and side rollers for binding, wear, and cracks.
 - Check welded areas of lift bracket for cracks.
 - Check guide bar for bend and distortion.
- (2) Forks
 - Check fork blades for bend, uneven height of the tips, and cracks.
- (3) Hose
 - Replace the hoses every two years.
- (4) Carriage
 - Check welded areas for cracks.
 - Check for sliding surface flaws.
 - Check bushing inner surface of fork shift screw for damage.
 - Check for threaded portion of fork shift screw for damage.

8. Assembling Side Shifter Assembly

To assemble, follow the disassembly sequence in reverse.

8.1 Suggestions for Assembly

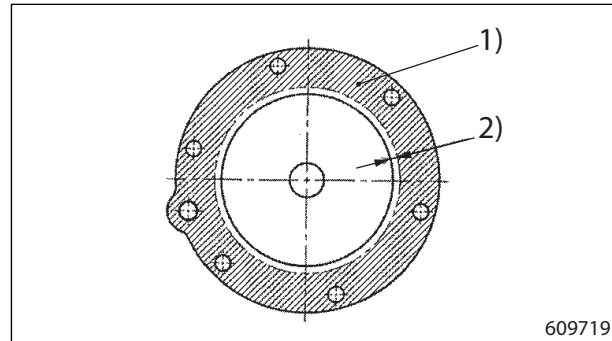
- (1) Installing main rollers:
 - Use a tapping-in tool, and be careful not to hit the outer ring of roller.

Assembling planetary carrier

Before inserting planetary pin, apply oil on bushing inner surface of planetary gear.

Applying liquid gasket on wheel hub cover mounting surface

- (1) Evenly apply liquid gasket on the wheel hub cover mounting face (shaded area).
(Liquid gasket: ThreeBond 1215 or equivalent)
- (2) When applying liquid gasket, be careful not to allow liquid gasket to enter the bolt holes.



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1) Shaded portion (application surface)

2) 5 mm (0.20 in.)
(no application)

Filling with oil

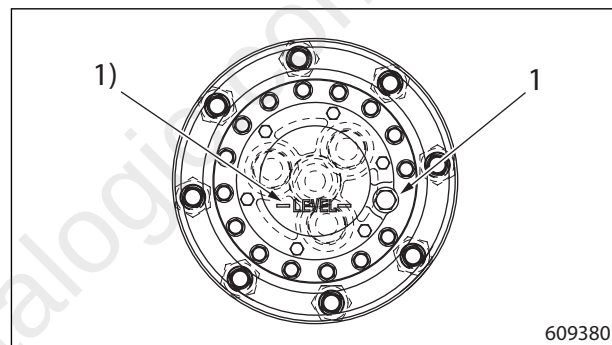
Place the level mark of either the right or left cover in horizontal position. Make sure that the other side of the level plug hole is located above the center. Remove both right and left level plug from the wheel hub cover.

Then, remove the plug on axle housing differential side and fill with oil. As the oil has a high viscosity, it takes time to come out from the level plug. Be careful not to spill the oil from filler port.

Hypoid gear oil SAE 90

(API Category GL-4)

Approximately 14 L (3.70 US gal.)



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1. Oil level plug

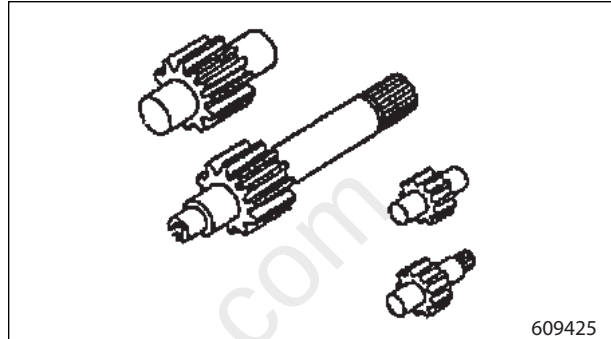
1) Level mark

7.2 Suggestions for Disassembly

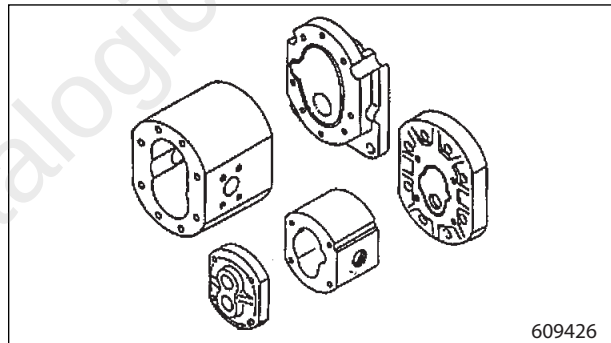
- (1) Remove the bolts and washers **1**, separate remaining parts as gear pump assembly, and then disassemble the assembly in a step-by-step manner to obtain the parts ranging from rear cover **2** to driven gear **9**.
- (2) Do not tap parts such as front cover **14**, rear cover **2**, adapter plate **11** and bearings **6** and **18** with a metal hammer, as these are made of aluminum alloy and can be easily damaged. Use either a wooden or a plastic hammer.

8. Inspecting and Repairing Gear Pump

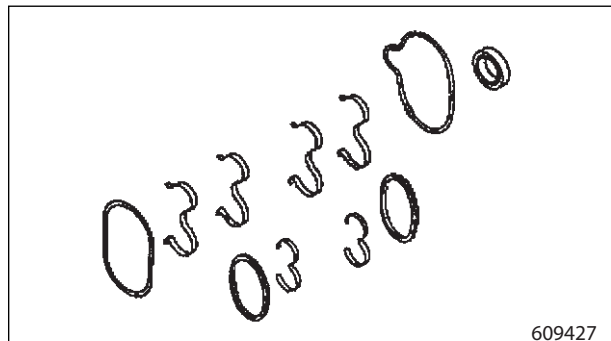
- (1) Drive and driven gears
 - Check gear teeth flank and top faces for wear or damage.
 - Check the side faces of the gears for wear or damage.
 - Check the shaft portion for wear or damage.



- (2) Check covers, body, and adapter plate for wear and damage.



- (3) Check oil seal, gasket and O-ring for damage, wear, and loss of flexibility.



4. Inspecting Fan Belt

- (1) Check the belt for contamination by oil, grease or dust. Replace the belt as required. When contamination is not so severe, clean it with a rag or paper towel.

Note: Do not wash with gasoline, oil, etc.

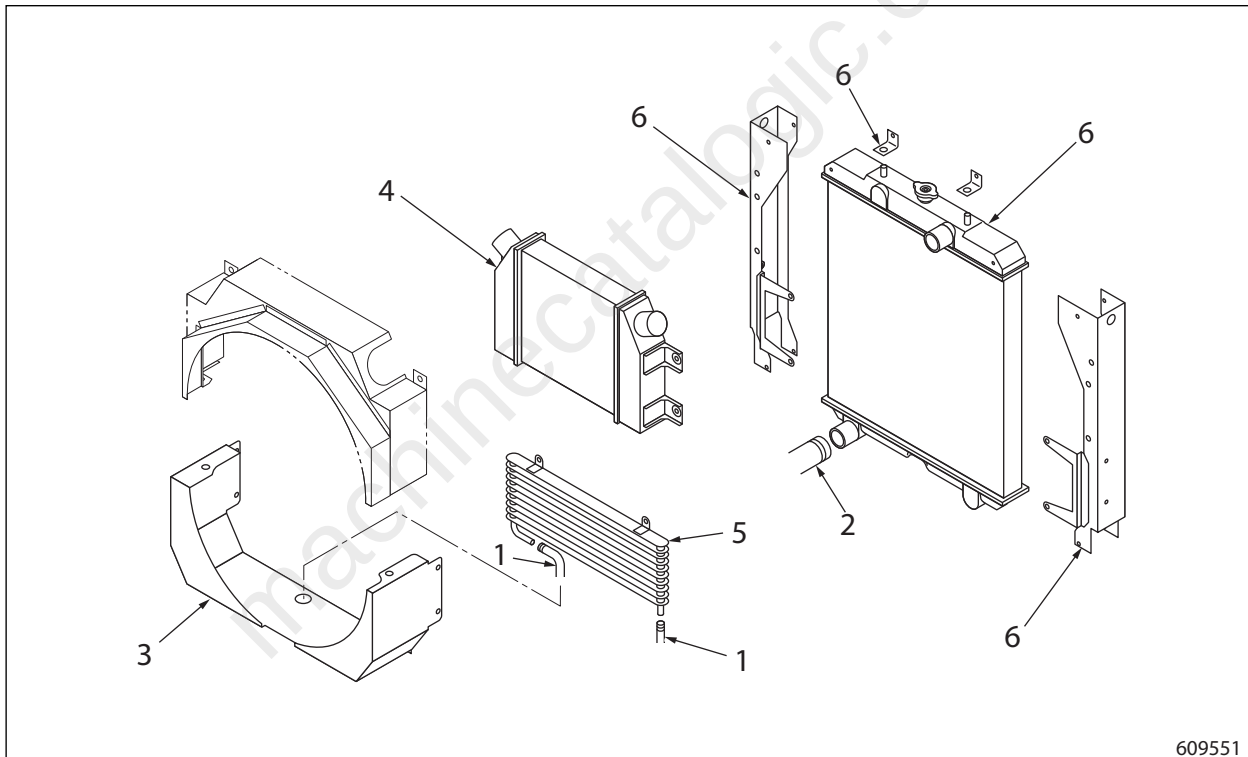
- (2) During the engine overhaul or belt tension adjustment, check the condition of the belt. Replace the belt if it has any damage.

5. Removing Intercooler, Oil Cooler, and Radiator

5.1 Preparation

Drain coolant, see 2-3 "Preparation".

5.2 Removal Sequence



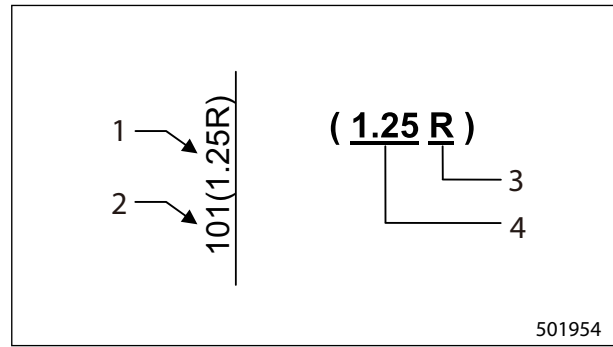
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|--|--------------------------------|
| 1. Oil hose of transmission oil cooler | 4. Intercooler |
| 2. Lower hose of radiator | 5. Oil cooler for transmission |
| 3. Lower cowl | 6. Radiator, Bracket |

5.3 Installation

To install, follow the removal sequence in reverse.

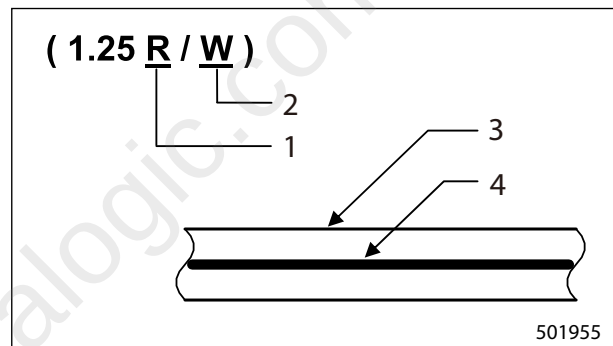
2.3 Connecting Lines

- (1) There are two thicknesses of the line which connect between elements in the circuit diagram. Each line is used as follows:
 - Thick line: Connecting lines for the electric wires size of 20 mm^2 (0.78 in^2) or above.
 - Thin line: All other connecting lines except the above.
- (2) Connecting lines are represented by the circuit number, wire diameter and wire color. For the connecting lines of 0.5 mm^2 (0.02 in^2) wire size, the wire diameter is omitted.



1. Wire diameter, wire color
2. Circuit number
3. Wire color
4. Wire diameter

- (3) Here are two types of wires: the one having only one color and the one having a colored stripe (combination of two colors).



1. Base color
2. Stripe color
3. Base color
4. Stripe color

Color codes

Symbol	Color	Symbol	Color	Symbol	Color
B	Black	Br	Brown	P	Pink
W	White	L	Blue	Sb	Sky blue
R	Red	Lg	Light green	V	Purple
G	Green	O	Orange		
Y	Yellow	Gr	Gray		

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