PART NO. W4GB-E-00

HITACHI

Workshop Manual

ZW 220 250

Wheel Loader (EU Specification)

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle)	: Vol. No.TO4GB-E
Technical Manual (Troubleshooting)	: Vol. No.TT4GB-E
Workshop Manual	: Vol. No.W4GB-E

ZW220 · 250 WHEEL LOADER (EU SPECIFICATION) WORKSHOP MANUAL

Hitachi Construction Machinery
URL:http://www.hitachi-c-m.com

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OPERATE ONLY FROM OPERATOR'S SEAT

- Inappropriate engine starting procedures may cause the machine to runaway, possibly resulting in serious injury or death.
  - Start the engine only when seated in the operator's seat.
  - NEVER start the engine while standing on the track or on ground.
  - Do not start engine by shorting across starter terminals.
  - Before starting the engine, confirm that all control levers are in neutral.
  - Before starting the engine, confirm the safety around the machine and sound the horn to alert bystanders.

SA-431

012-E01B-0431

JUMP STARTING

- Battery gas can explode, resulting in serious injury.
  - If the engine must be jump started, be sure to follow the instructions shown in the “OPERATING THE ENGINE” chapter in the operator’s manual.
  - The operator must be in the operator’s seat so that the machine will be under control when the engine starts.
  - Jump starting is a two-person operation.
  - Never use a frozen battery.
  - Failure to follow correct jump starting procedures could result in a battery explosion or a runaway machine.

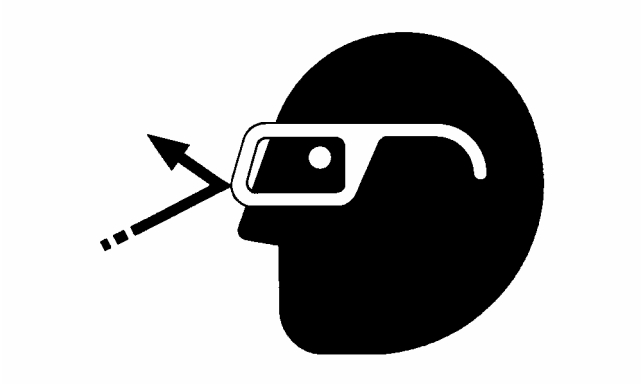
SA-032

S013-E01A-0032 SA-032

PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
  - Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
  - Keep bystanders away from the working area before striking any object.

031-E01A-0432



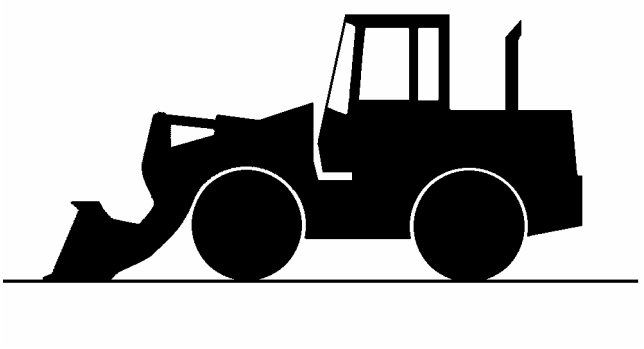
SA-432

PARK MACHINE SAFELY

To avoid accidents:

- Park machine on a firm, level surface.
- Lower bucket to the ground.
- Place the F-N-R lever in neutral, and put the park brake switch in the ON (parking brake) position.
- Run engine at slow idle speed without load for 5 minutes.
- Turn key switch to OFF to stop engine.
- Remove the key from the key switch.
- Lower the lock lever to the LOCK position.
- Close windows, roof vent, and cab door.
- Lock all access doors and compartments.

033-E07B-0456



SA-456

AVOID HEATING NEAR PRESSURIZED FLUID LINES

- Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.
  - Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.
  - Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fireresistant guards to protect hoses or other materials before engaging in welding, soldering, etc..

SA-030

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

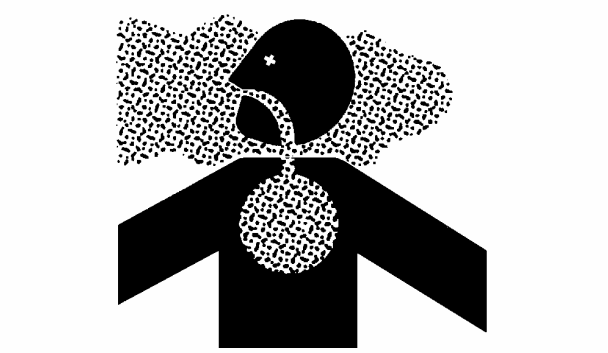
- Do not weld or flame cut pipes or tubes that contain flammable fluids.
- Clean them thoroughly with nonflammable solvent before welding or flame cutting them.

510-E01B-0030

REMOVE PAINT BEFORE WELDING OR HEATING

- Hazardous fumes can be generated when paint is heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.
  - Avoid potentially toxic fumes and dust.
  - Do all such work outside or in a well-ventilated area. Dispose of paint and solvent properly.
  - Remove paint before welding or heating:

1. If you sand or grind paint, avoid breathing the dust. Wear an approved respirator.
2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.

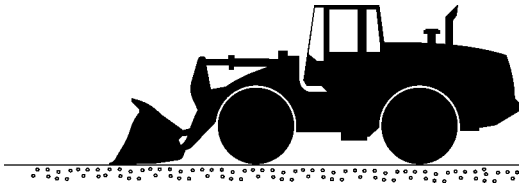


SA-029

511-E01A-0029

- Bleeding Air from Hydraulic Circuit

  - After refilling hydraulic oil, start the engine. While operating each cylinder, operate the machine under light loads for 10 to 15 minutes. Slowly start each operation (never fully stroke the cylinders during initial operation stage). As the pilot oil circuit has an air bleed device, air trapped in the pilot oil circuit will be bled while performing the above operation for approx. 5 minutes.
  - Reposition the front attachment to check hydraulic oil level.
  - Stop the engine. Recheck hydraulic oil level. Replenish oil as necessary.



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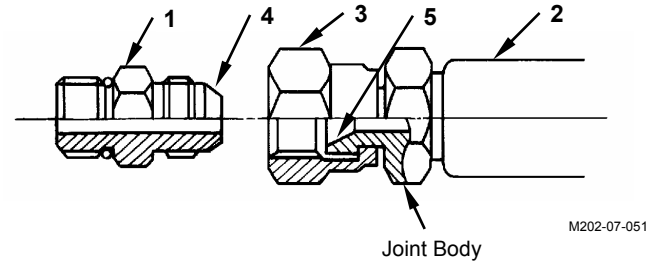
PIPING JOINT

IMPORTANT: The torques given in the chart below are for general use only.
Do not use these torques if a different torque is given for a specific application.

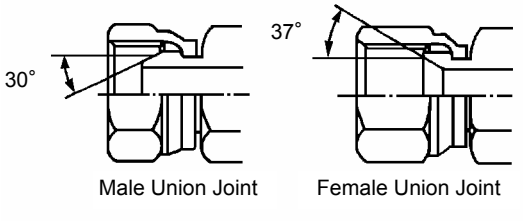


M202-07-051

Union Joint

Metal sealing surfaces (4) and (5) of adapter (1) and hose (2) fit together to seal pressure oil. Union joints are used to join small-diameter lines.

IMPORTANT:
1. **Do not over-tighten nut (3). Excessive force will be applied to metal sealing surfaces (4) and (5), possibly cracking adapter (1). Be sure to tighten nut (3) to specifications.**
2. **Scratches or other damage to sealing surfaces (4) or (5) will cause oil leakage at the joint. Take care not to damage them when connecting/disconnecting.**



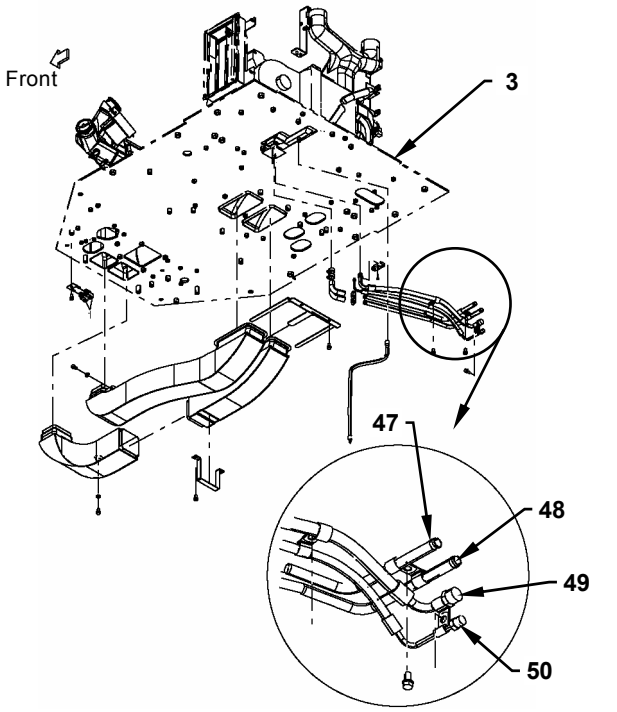
W105-01-01-017

Description	Wrench Size mm	Wrench Size mm	Tightening Torque
	Union Nut	Joint Body	N·m (kgf·m, lbf·ft)
37° female	17	14	24.5 (2.5, 18)
	19	17	29.5 (3.0, 21.5)
	22	19	39 (4.0, 28.5)
	27	22	93 (9.5, 69)
	32	27	137 (14.0, 101)
	36	32	175 (18.0, 129)

NOTE: Tightening torque of 37° male coupling without union is similar to tightening torque of 37° female.

MEMO

4. Connect hoses (49, 50) under cockpit (3). Connect heater pipings (47, 48).
   - : 17 mm
   - : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)
   - : 19 mm
   - : 29.4 N·m (3 kgf·m, 21.5 lbf·ft)
   - : 24 mm
   - : 39 N·m (4 kgf·m, 28.5 lbf·ft)
   - : 27 mm
   - : 78 N·m (8 kgf·m, 57.5 lbf·ft)



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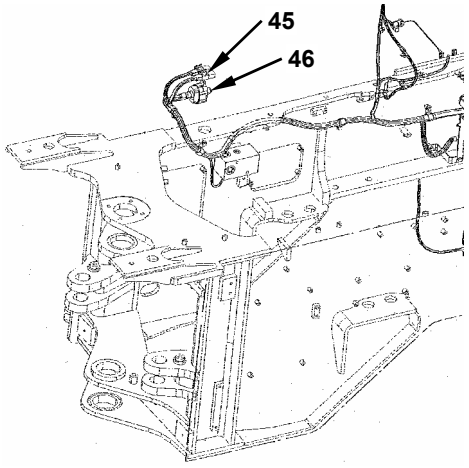
5. This machine uses new freon R134a as refrigerant. Check for any gas leakage after injecting gas for the required amount.

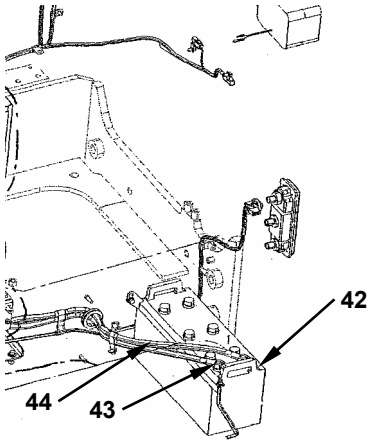
Type	Refrigerant Number	Q'ty kg (lb)
HFC	R134a	1.05±0.05 (2.32±0.11)

6. Connect connectors (45, 46) of the wire harness under the cab.



W4GB-02-01-011

7. Connect battery cable (44) to terminal minus of battery (42) with bolt (43).
   - : 12 mm
   - : 10 N·m (1 kgf·m, 7.2 lbf·ft)



W4GB-02-01-010

Disassemble Center Hinge

CAUTION: The center hinge is required to disassemble for the major maintenance work such as removal of the front frame from the rear frame. At this time, move the machine into the factory.

Preparation

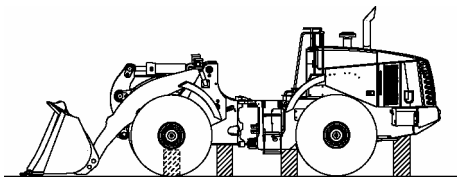
Carry out the following procedures before disassembling the center hinge.

1. Remove the cab and the cockpit.

2. Remove the mounting component between the front frame and the rear frame.
   - Propeller Shaft
   - Steering Cylinder
   - Hydraulic Hose
   - Brake Piping
   - Wire Harness

Removal of Hinge Pin

1. Support the front frame and the rear frame by using the firm support stands.



W4GB-02-03-002

2. Remove bolts (2) (ZW220 (3 used), ZW250 (4 used)) and bolts (3) (ZW220 (4 used), ZW250 (6 used)) from flange (4) of the upper hinge part. Remove flange (4), shims (5) (2 used) and pin (22) from front frame (25).
   : 24 mm

3. Remove bolt (11) and washers (12, 13) from pin (14). Remove pin (14) from front frame (25).
   : 24 mm

4. Remove bushing (6) from front frame (25). (Remove bushing (6) after cutting by gas or pulling out by welding a cardboard.)

CAUTION: Front frame (25) weight:
ZW220: 1450 kg (3200 lb)
ZW250: 1910 kg (4250 lb)

5. Attach a nylon sling onto front frame (25). Hoist and move front frame (25) so that bearing (10) can be removed.

6. Remove bushing (20) from front frame (25).

7. Remove bolts (21) (6 used) from cap (19). Remove caps (7, 19) and shim (8) from front frame (25).
   ZW220
   : 17 mm
   ZW250
   : 24 mm

8. Remove dust seals (9) (2 used) from caps (7, 19).

9. Remove bearing (10) from front frame (25).

REMOVAL AND INSTALLATION OF HYDRAULIC OIL TANK

CAUTION: Hydraulic oil tank (5) weight:
ZW220: 165 kg (365 lb)
ZW250: 170 kg (375 lb)

Removal

1. Remove the hood. (Refer to W2-4-1.)
2. Remove the left and right side fenders.
   : 17 mm
3. Remove bolts (1) (6 used) and washers (2) (6 used) from cover (3). Remove cover (3) and suction filter (4) from hydraulic oil tank (5).
   : 14 mm
4. Drain the hydraulic oil from the suction filter mounting part of hydraulic oil tank (5) by using a pump.

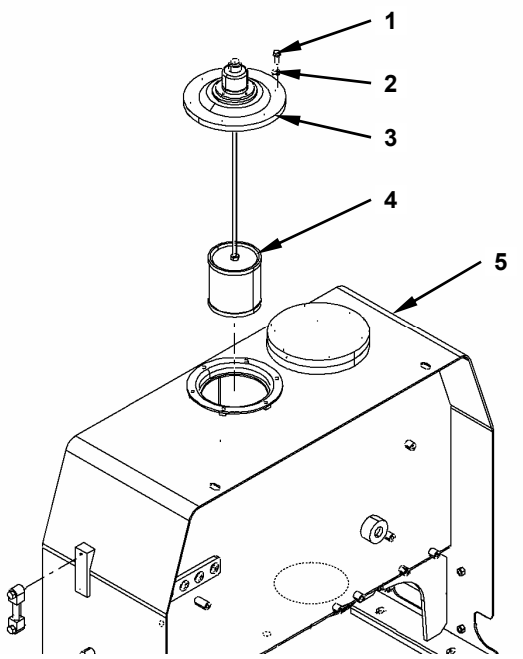
CAUTION: Drain the hydraulic oil from the suction pipe at the bottom of hydraulic oil tank (5).

CAUTION: Attach an identification tag onto each hose connected to hydraulic oil tank (5) for assembling.

5. Disconnect hose (6) from hydraulic oil tank (5).
   : 22 mm
6. Disconnect hose (8) and remove O-ring (7) from hydraulic oil tank (5).
   : 36 mm

CAUTION: O-ring (7) cannot be reused.

7. Loosen hose clamps (9) (2 used). Disconnect hose (10) from hydraulic oil tank (5) and pipe (11).



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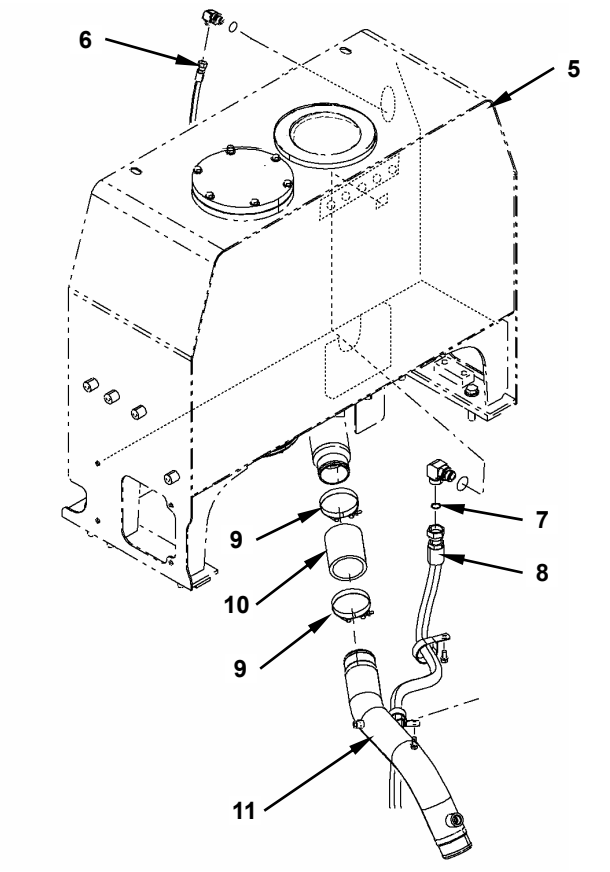

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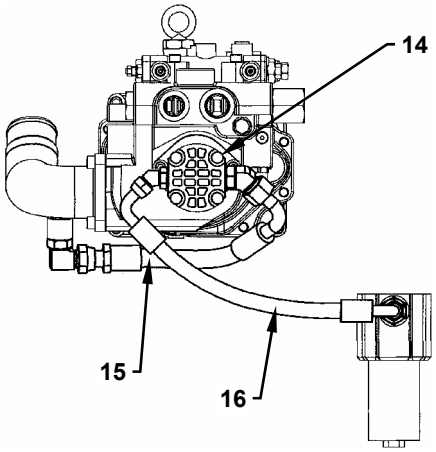
7. Disconnect hoses (15, 16) from pilot pump (14). Cap the open ends.
   : 27 mm, 36 mm



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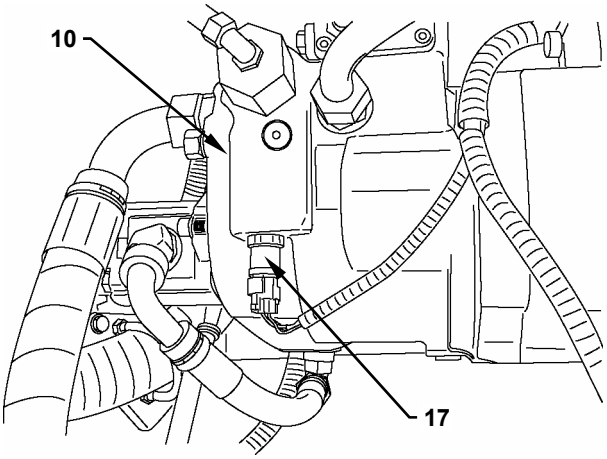
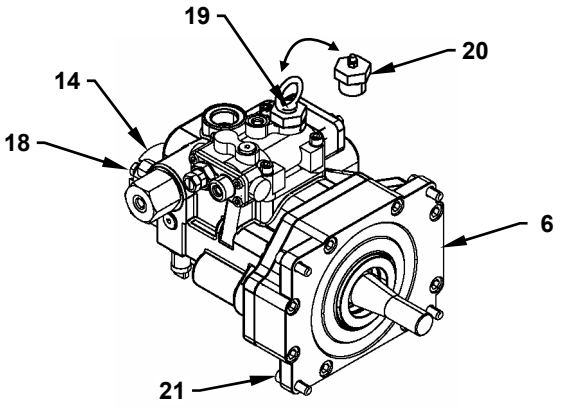
8. Disconnect the connector of pump delivery pressure switch (17) under priority valve (10).



W4GB-02-04-016

9. Remove socket bolts (18) (2 used) from pilot pump (14). Remove pilot pump (14) from main pump (6).
   Remove reducer (20) from the regulator. Install plug (19) (with eyebolt attached) (screw size G1, wrench size 41 mm) to the regulator.
   : 8 mm
   : 41 mm

10. Attach a nylon sling onto eyebolt. Hoist and hold main pump (6). Remove socket bolts (21) (4 used) from main pump (6). Hoist and remove main pump (6) from the engine.
    : 10 mm



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Disassembly of Main Pump

CAUTION: Pump device weight:
ZW220: 83 kg (185 lb)
ZW250: 107 kg (240 lb)

1. Secure the pump device on a workbench with the pilot pump side facing downward.

CAUTION: Front casing (8) weight:
ZW220: 36 kg (79.5 lb)
ZW250: 48 kg (110 lb)

2. Remove socket bolts (9) (8 used) from front casing (8).
   ZW220
   : 12 mm
   ZW250
   : 14 mm

IMPORTANT: Inner race (12) installed to drive shaft (11) cannot be replaced. Do not damage inner race (12).

3. Remove the front casing (8) assembly from pump casing (2). At this time, drive shaft (11), the rotor (4) assembly and restrictor pin (43) are removed together with front casing (8).

NOTE: When removing front casing (8), raise the pump casing (2) side a little in order to prevent rotor (4) from falling off.

NOTE: Do not remove restrictor pin (43) unless necessary.
Restrictor pin (43) may stay in pump casing (2).

4. Place front casing (8) onto a wooden block of more than 30 square mm (1.2 square in) with the rotor (4) side facing upward.

IMPORTANT: The valve plate (3) side of rotor (4) is a sliding surface. Do not damage the sliding surface.

5. Put a hand on retainer (18) and remove the rotor (4) assembly from drive shaft (11). Place the rotor (4) assembly with the valve plate side facing downward.

6. Put a hand under retainer (18) and remove retainer (18) with servo piston (17) together from rotor (4).

7. Remove bushing (16), springs (15) (ZW220 (7 used), ZW250 (4 used)) from rotor (4).

8. Remove plate (19) from swash plate (6).

NOTE: By tapping the yoke part with plate (19) facing upward plate (19) is floated.

9. Remove socket bolts (10) (4 used) from cradle plate (22). Remove cradle plate (22) from front casing (8).
   : 6 mm

10. Remove drive shaft (11) with roller bearing (34) together from front casing (8) by hands.

IMPORTANT: When removing retaining ring (32), do not damage the seal lip surface of drive shaft (11).

11. Remove retaining rings (32) (2 used) from drive shaft (11).

12. Remove the roller and the outer ring of roller bearing (34).

Assembly of Regulator

IMPORTANT: Inner diameters of the two holes for sleeve on casing (9) are the same. The shapes of each part is similar. Check the illustration when assembling.

1. Clean all parts and apply hydraulic oil.

IMPORTANT: Check the direction to install sleeve (7) and spool (8).

2. Insert spool (8) into sleeve (7). Install the sleeve (7) assembly to the center of casing (9) by using a round bar.

3. Install O-ring (24) to cylinder (11).

4. Insert piston (6) into cylinder (11). Install the cylinder (11) assembly to casing (9).

IMPORTANT: Check the direction to install sleeve (20) and spool (19).

5. Insert spool (19) into sleeve (20). Install the sleeve (20) assembly to the center of casing (9) by using a round bar.

6. Install O-rings (14, 16) and backup ring (15) to cylinder (18).

7. Insert piston (17) into cylinder (18). Install the cylinder (18) assembly to casing (9).

8. Install O-ring (5) and piston (6) to the stopper (4) assembly installed to cover (30). Install the cover (30) assembly to casing (9) with socket bolts (29) (4 used).
   : 6 mm
   : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

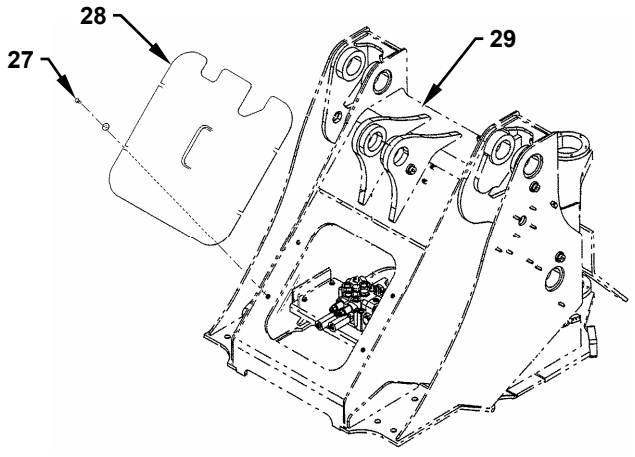
9. Install O-ring (24) and springs (21, 22) to the stopper (23) assembly installed to cover (35). Install the cover (35) assembly to casing (9) with socket bolts (29) (4 used).
   : 6 mm
   : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

Removal (ZW220)

CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)

CAUTION: Attach an identification tag onto the disconnected hose and the pipe for assembling.

1. Remove sems bolts (27) (4 used) from cover (28). Remove cover (28) from front frame (29).
   : 14 mm



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2. Remove sems bolt (8) from clamp (9). Remove clamp (9) from piping (7).
   : 17 mm

3. Remove sems bolt (12) from clamp (13). Remove clamp (13) from piping (11).
   : 17 mm

4. Remove pipings (7, 11) from control valve (5). Cap the open ends.
   : 35 mm

5. Disconnect hoses (2, 4) from control valve (5). Cap the open ends.
   : 41 mm

6. Disconnect hoses (16, 17) from control valve (5). Cap the open ends.
   : 36 mm, 41 mm

7. Disconnect hoses (18, 19, 20, 21, 22, 23 and 24) from control valve (5). Cap the open ends.
   : 19 mm, 22 mm

CAUTION: Control valve (5) weight: 41 kg (90.5 lb)

8. Remove socket bolts (25) (3 used) from control valve (5).
   : 10 mm

9. Attach a nylon sling onto control valve (5). Hoist and remove control valve (5) from front frame (29).

Disassembly of Control Valve (ZW220)

1. Remove plug (10) from housing (31).
   : 17 mm

2. Remove plug (13) from housing (31). Remove poppet (15) and spring (14) from housing (31). Remove O-ring (4) from plug (13).
   : 36 mm

3. Remove relief valve (29) from housing (31).
   : 32 mm

CAUTION: Attach a spanner onto the hexagonal part of the relief valve case.

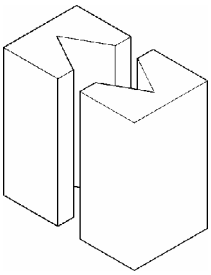
4. Remove socket bolts (11) (6 used) from pilot housings (38) (2 used), pilot housing (25). Remove pilot housing (25) and pilot housing (38) (2 used) from housing (31).
   : 8 mm

5. Remove socket bolts (23) (2 used) from pilot housing (24). Remove pilot housing (24) from pilot housing (28).
   : 8 mm

6. Remove O-rings (12) (4 used) from pilot housings (24, 25) and pilot housings (38) (2 used).

7. Slowly turn and remove spools (33, 36) from housing (31).

8. Secure spools (33, 36) in a vise by using wooden pieces as illustrated.



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9. Remove bolt (26) from spool (36). Remove spring seat (20), spring (27) and spring seat (20) from spool (36).
   : 19 mm

10. Remove bolt (22) from spool (33). Remove spring seat (20), spring (21), and spring seat (20) from spool (33).
    : 19 mm

11. Remove plug (37) from spool (33). Remove O-ring (32) from plug (37).
    : 8 mm

12. Remove socket bolts (11) (3 used) from pilot housing (28). Remove pilot housing (28).
    : 8 mm

13. Remove O-rings (12, 18) and backup ring (19) from pilot housing (28).

14. Remove spring (17) and poppet (16) from housing (31).

Disassembly of Control Valve (ZW250)

- Put the matching marks on the spools for assembling.

1. Remove socket bolts (23) (4 used) from caps (22, 24). Remove caps (22, 24) from housing (32).
   : 5 mm

2. Remove O-rings (18) (2 used) from housing (1).

CAUTION: Turn and remove spools (35, 38) slowly. If the spools stick even a little, try again instead of pulling roughly.
Put the matching marks on spools (35, 38) corresponding to the matching marks on housing (32) in order not to be confused.

3. Remove the spools (35, 38) assemblies from housing (32).

4. Remove the relief valve (28) assembly from housing (30).
   : 38 mm

5. Remove the relief valve (27) assemblies (2 used) from housing (32).
   : 32 mm

6. Remove the relief valve (33) assembly from housing (32).
   : 38 mm

7. Remove the relief valve (17) assembly from housing (32).
   : 32 mm

8. Remove the anti-void valve (34) assembly from housing (32).
   : 32 mm

9. Remove socket bolts (1) (4 used) from flange (2). Remove flange (2), spring (4), poppet (5), and O-ring (3) from housing (32).
   : 5 mm

10. Remove socket bolts (11) (4 used) from body (12). Remove body (12), spacer (14), spring (15), poppet (16), and O-rings (3, 13) from housing (32).
    : 5 mm

11. Remove socket bolts (6) (2 used) from flange (7). Remove flange (7), spring (9), poppet (10), and O-ring (8) from housing (32).
    : 5 mm

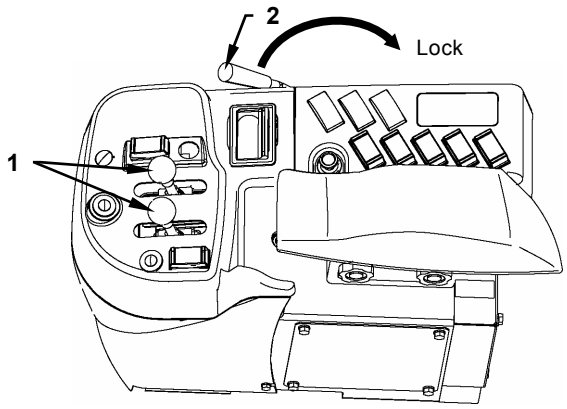
12. Remove socket bolts (29) (4 used) from housing (30). Remove cover (30) and O-ring (31) from housing (32).
    : 12 mm

13. Remove socket bolts (23) (4 used) from covers (37) (2 used). Remove caps (37) (2 used), spacers (36) (2 used), and O-rings (18) (2 used) from housing (32).
    : 5 mm

REMOVAL AND INSTALLATION OF PILOT VALVE

CAUTION: Before doing any work, lower the lift arm, lower the bucket on the ground. Pull control lever lock (1) backward and set in the Lock state. Release the remaining pressure by operating the control lever.

CAUTION: Bleed air from the hydraulic oil tank before doing any work. (Refer to BLEED AIR FROM HYDRAULIC OIL TANK on W1-4-1.)



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Removal

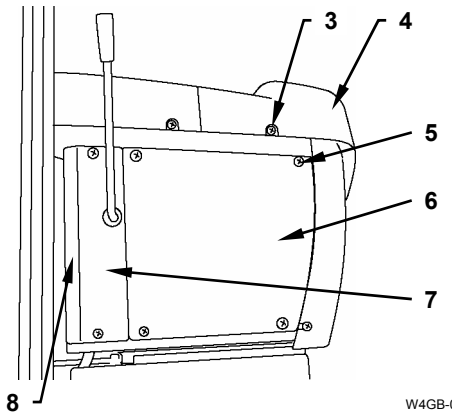
1. Remove screws (5) (6 used) from covers (6, 7). Remove cover (6), covers (7) (2 used) from bracket (8).

2. Remove grips (1) (2 used) of the control lever. (In case of the multi-function lever, loosen the nut in the boot and remove the lever or the boot.)

3. Disconnect the connector connected to pilot valve (9) and upper cover (4).

4. Remove screws (3) (4 used) from upper cover (4). Remove upper cover (4) from bracket (8).

5. Disconnect hoses (12) (6 used) from pilot valve (9). Cap the open ends. Attach an identification tag onto the disconnected hose for assembling.
   : 19 mm, 22 mm



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27. Remove O-rings (13) (4 used) from covers (9) (2 used).

[A port without a detent]

28. Remove push rod (18) from detent bushing (15).

NOTE: Record the combination of detent bushing (15) and push rod (18).

[A port with a detent]

29. Hold detent rings (10) (3 used) and compress springs (11) (3 used). Remove steel balls (16) (12 used).

NOTE: Prevent steel ball (16) from falling off.

30. Remove push rods (12) (3 used) from detent bushing (15).

NOTE: Record the combination of detent bushing (15) and push rod (12).

31. Remove detent rings (10) (3 used) and springs (11) (3 used) from detent bushings (15) (3 used).

32. Remove scrapers (17) (4 used) from detent bushings (15) (4 used).

NOTE: Do not damage the inner surface of detent bushing (15) when removing scraper (17).

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Disassembly of 2-Way Lever Type Pilot Valve for Additional Circuit

- Thoroughly read and understand Cautions on Disassemble and Assemble on W1-1-1 before starting any disassembling work.
- As spool (15) has been selected to match the hole of casing (21), they can not be replaced in units of single component.
- Clearly identify the port number of the disassembled.

IMPORTANT: Put the matching marks on cam (9), pin (10), cover (11) and casing (21) before disassembling.

1. Secure the pilot valve in a vise. Remove boot (7) from cover (11).

2. Remove set screw (8) from cam (9). Remove pin (10). Remove cam (9) from cover (11).

NOTE: LOCTITE is applied onto the set screw (8) part.

NOTE: Steel ball (5) cannot be disassembled from cam (9).

3. Loosen and remove socket bolts (6) (2 used) alternately. Remove cover (11) from casing (21).

4. Remove the pusher (20) assemblies (2 used) from casing (21).

5. Remove bushings (2) (2 used) from the pusher (20) assembly. Remove O-rings (1) (2 used) and packings (3) (2 used) from bushings (2) (2 used).

IMPORTANT: Clearly identify the port number in order not to confuse.

6. Remove the spool (15) assemblies (2 used) and springs (14) (2 used) from casing (21).

7. Remove spring guides (19) (2 used), springs (18) (2 used), washers (16) (2 used) and shims (17) (2 used) from the spool (15) assemblies (2 used).

IMPORTANT: As the spool (15) assemblies (2 used) are adjusted by the pressure of shim (17), do not disassemble the spool (15) assemblies. If disassembling the spool (15) assemblies, record the quantity and thickness of shim (17) as they differ.

IMPORTANT: Do not remove bushing (4) from cover (11) unless it is damaged.

8. Remove bushings (4) (2 used) from cover (11).

Assembly of Pilot Shut-Off Valve

1. Apply LOCTITE #262 onto socket bolt (6). Install socket bolt (6) to body (5).
   : 6 mm
   : 29.5 N·m (3.0 kgf·m, 21.5 lbf·ft)

2. Install O-ring (8), backup ring (9) and washer (10) to body (5).

3. Apply hydraulic oil onto spool (7). Rotate and install spool (7) to body (5) from the socket bolt (6) direction. At this time, check the direction to install spool (7).

4. Install O-ring (4), Backup ring (3) and washer (2) to body (5). Install retaining rings (1, 11) to spool (7).

Disassembly of Fan Pump

1. Secure the mounting part of front cover (3) in a vise with the rear cover (12) side facing upward.

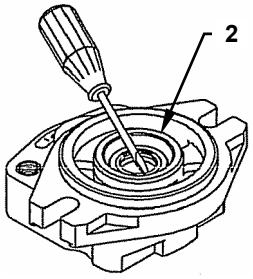
2. Put the matching marks at the jointed surface between front cover (3) and body (8), and body (8) and rear cover (12) before disassembling.

3. Remove bolts (14) (4 used) and washers (13) (4 used) from rear cover (12). Disassemble rear cover (12) and body (8) in this order.
   : 10 mm

4. Although gaskets (4, 5) and side plate (7) are the same type, the directions to install are different. Therefore, identify the respective position and direction of the parts for assembling.

5. Put the mark on driven gear (11) to identify the direction for assembling as driven gear (11) is symmetrical.

6. Remove retaining ring (1) from oil seal (2). Fasten the screwdriver tip onto the inner side of oil seal (2) and remove oil seal (2). Do not damage the oil seal (2) holes on front cover (3).



W4GB-02-08-012

SECTION 3
BODY (TRAVEL SYSTEM)

— CONTENTNS —

Installation

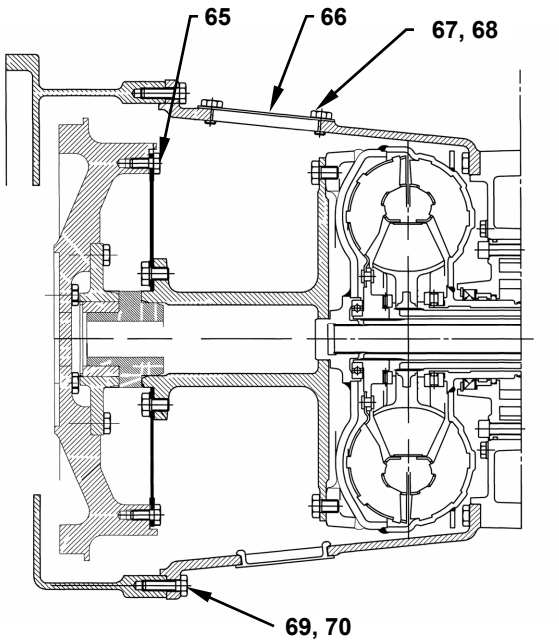
CAUTION: Engine (12) weight: 1050 kg (2350 lb)
Drive unit (4) weight: 1900 kg (4200 lb)

1. Install the gasket on the engine connecting part of the torque converter housing.

2. Hoist drive unit (4) and place it near the engine (12) mounting part.

3. Align and connect the center of torque converter and the hole at the center of flywheel of the engine.

4. Install the flywheel housing of engine (12) and the torque converter housing of drive unit (4) with bolts (69) (12 used) and washers (70) (12 used).
   : 14 mm
   : 41 N·m (4 kgf·m, 30 lbf·ft)

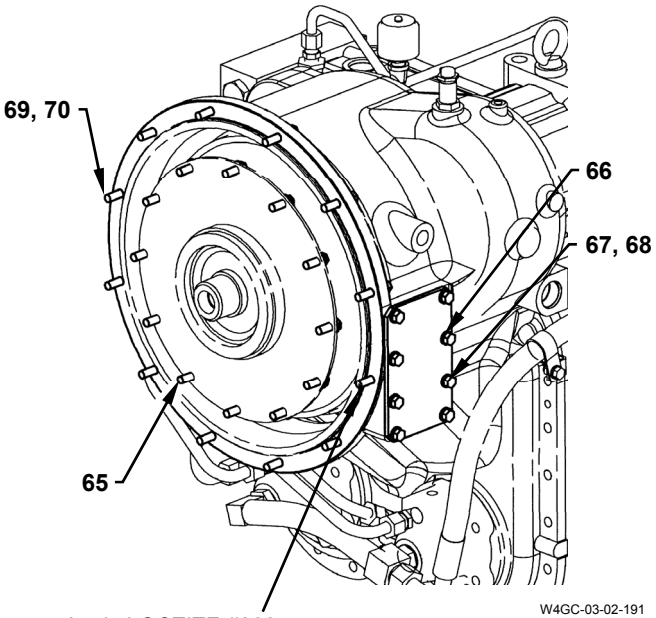


W4GB-03-02-181

IMPORTANT: Apply LOCTITE #262 only to the thread part of the bolt indicated in the right figure.

5. Install the input plate of the torque converter to the flywheel of the engine with socket bolts (65) (8 used).
   : 14 mm
   : 30.6 to 45.9 N·m
   (3.1 to 4.7 kgf·m, 22.5 to 34 lbf·ft)

6. Install cover (66) to the torque converter housing with bolts (67) (4 used) and washer (68).
   : 14 mm
   : 41 N·m (4.2 kgf·m, 30 lbf·ft)



W4GC-03-02-191

1. Install converter housing (1) to flange (11) with bolts (8) (18 used).
   : 14 mm
   : 68 N·m (7 kgf·m, 50 lbf·ft)

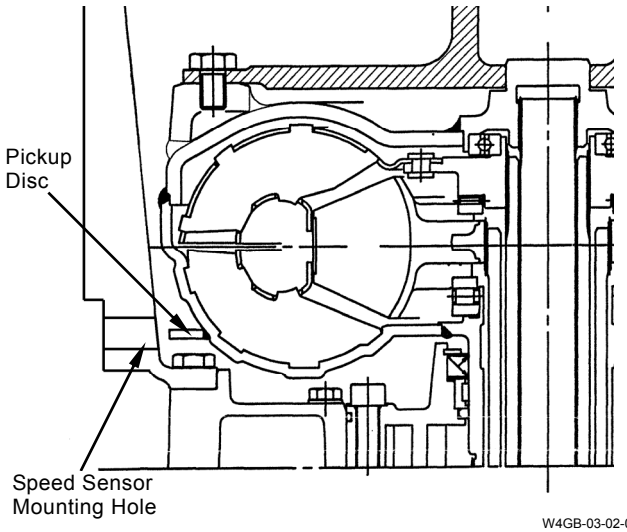
2. Apply LOCTITE #262 to bolts (5) (4 used). Install spacer ring (6) to torque converter (7) with bolts (5) (4 used).
   : 17 mm
   : 115 N·m (12 kgf·m, 85 lbf·ft)

3. Install eyebolts (M12, Pitch 1.25 mm) (2 used) to the diagram (3) mounting part of spacer ring (6).

4. Attach a nylon sling onto the eyebolt. Hoist and install torque converter (7) to the transmission.

IMPORTANT: Check the engagement of the spline of the turbine shaft and the spline of the turbine wheel inside torque converter (7).
Check the engagement of the spline of the pump wheel boss part and the spline of the drive gear of the charging pump.

IMPORTANT: Check in the arrow part that the pickup disc is in the center of the speed sensor (10) mounting hole of converter housing (9).



W4GB-03-02-004

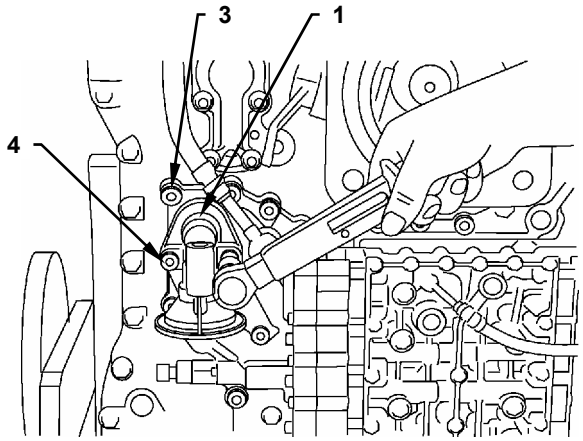
IMPORTANT: Apply grease to the lip part in order not to damage the oil roll of the charging pump with the spline part of the pump wheel boss part.

5. Remove eyebolts (2 used) from spacer ring (6). Install shims (4) (8 used), diaphragms (3) (2 used) to spacer ring (6) with bolts (1) (8 used) and washers (2) (8 used).
   : 17 mm
   : 115 N·m (12 kgf·m, 85 lbf·ft)

6. Install speed sensor (10) to converter housing (9).

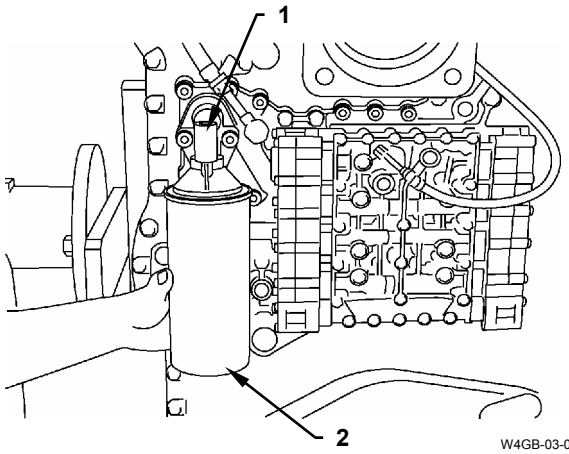
INSTALLATION OF OIL FILTER

1. Install filter head (1) to duct plate (3) with socket bolts (4) (2 used).



W4GB-03-02-010

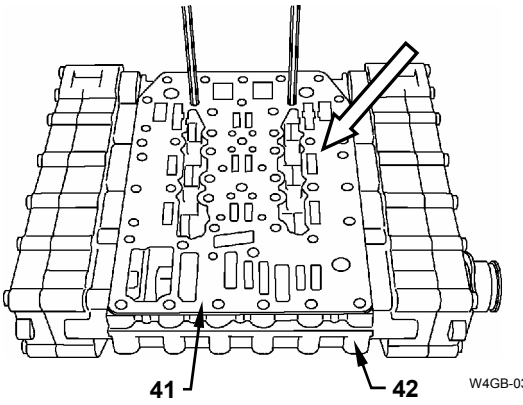
2. Apply oil onto the sealing surface of filter (2). Tighten filter (2) by hand to filter head (1).



W4GB-03-02-011

19. Install adjusting screws (2 used) to housing (42). Install gasket (41) to housing (42).

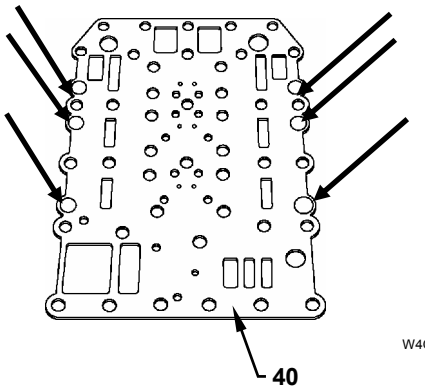
IMPORTANT: As there are 2 kinds of gaskets, check with the figure.



W4GB-03-02-033

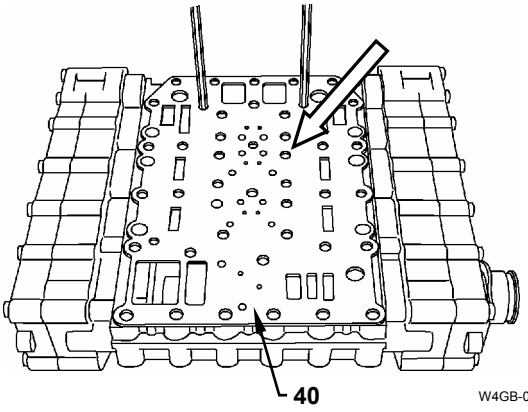
20. Install screens (43) (6 used) to the position indicated by the arrows on middle sheet (40).

IMPORTANT: Install screens (43) (6 used) in the direction facing the duct plate side.



W4GB-03-02-034

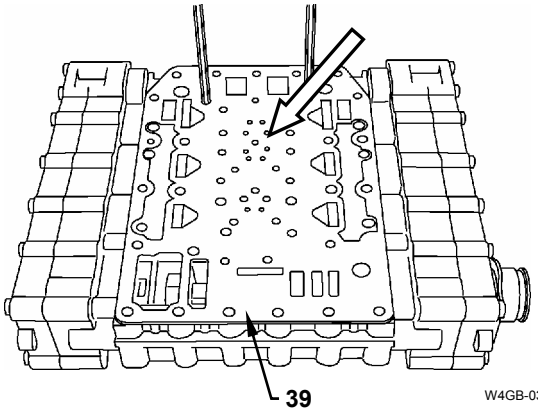
21. Place middle sheet (40) on top of gasket (41). Turn screens (43) (6 used) to the duct plate (38) side.



W4GB-03-02-035

22. Install gasket (39) to middle sheet (40).

IMPORTANT: As there are 2 kinds of gaskets check with the figure.

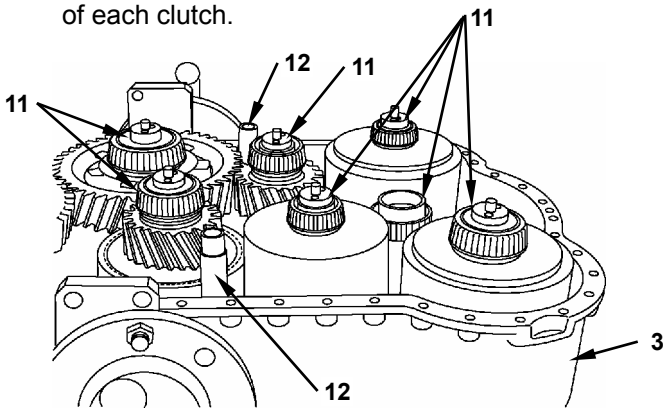


W4GB-03-02-036

Removal of Clutch

IMPORTANT: A special tool is required for removal of clutch.
ZF No: 5870 260 010
Name: Handle

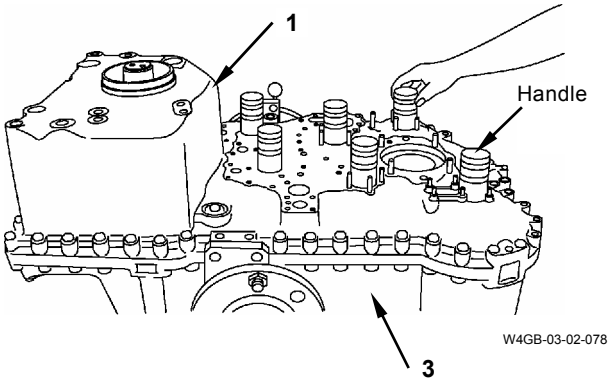
7. Remove oil pipes (12) (2 used) from housing (3) and piston rings (11) (7 used) from shafts (7 used) of each clutch.



W4GB-03-02-077

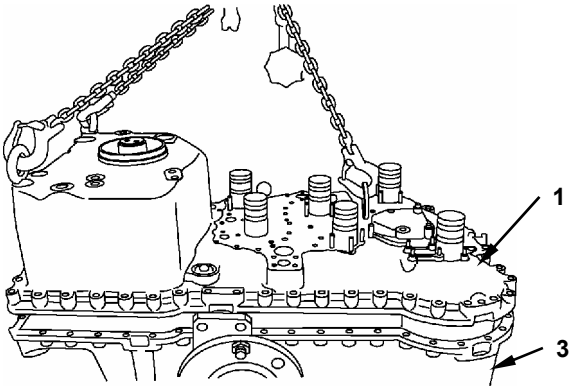
8. Install housing cover (1) to housing (3) again. Check that both sides match completely and install the handle to the shaft of all clutches.

IMPORTANT: Flat washer and nut (M10) can be used for the handle as used in the figure.



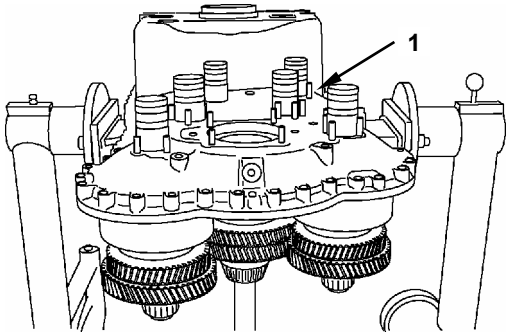
W4GB-03-02-078

9. Hoist and remove the housing cover (1) assembly from housing (3) with the clutch.



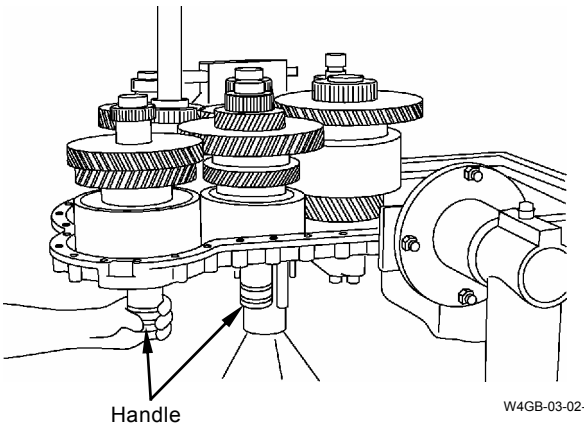
W4GB-03-02-079

10. Install the housing cover (1) assembly to the maintenance stand.



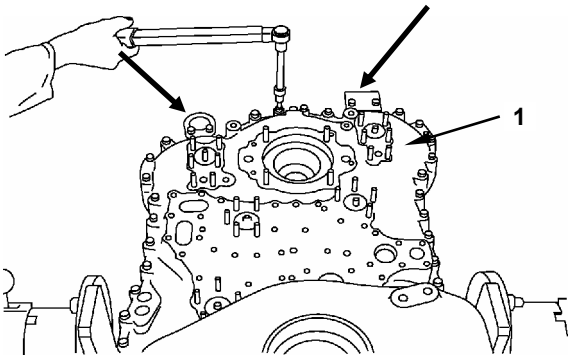
W4GB-03-02-080

11. Reverse the housing cover (1) assembly and remove all handles.



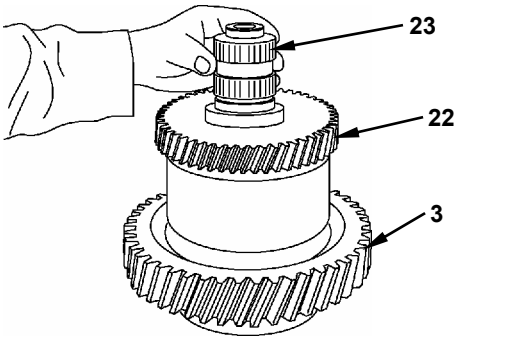
W4GB-03-02-081

31. Install housing cover (1) to housing (3) with socket bolts.
    : 14 mm
    : 46 N·m (4.7 kgf·m, 34 lbf·ft)



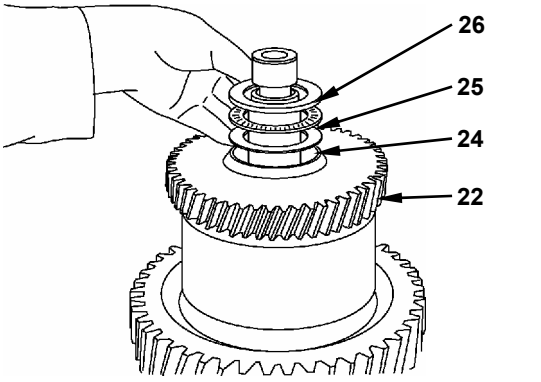
W4GB-03-02-120

15. Install needle cage (23) to idler (22).



W4GB-03-02-140

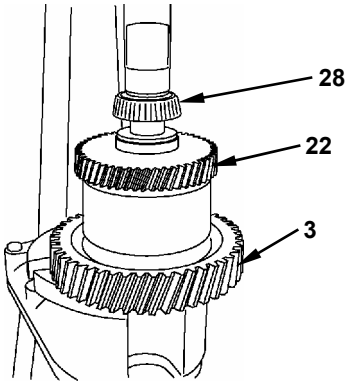
16. Install auxiliary washer (24), auxiliary needle cage (25), and running disc (26) to idler (22). Face the chamfered side of running disc (26) to the auxiliary needle cage (25) side.



W4GB-03-02-141

IMPORTANT: If the installation was done correctly, the level difference of the upper surface of running disc (26) and shaft (3) are the same.
If the running disc (26) is higher, check the engagement of idler (22) and inner clutch disc (15).

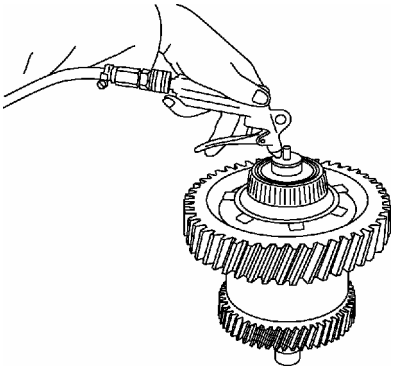
17. Install the inner rings of taper roller bearings (1) and (28) to both ends of shaft (3).



W4GB-03-02-142

18. Supply low pressure air and check the operation of the clutch.

IMPORTANT: Check the operation of the clutch by sound.



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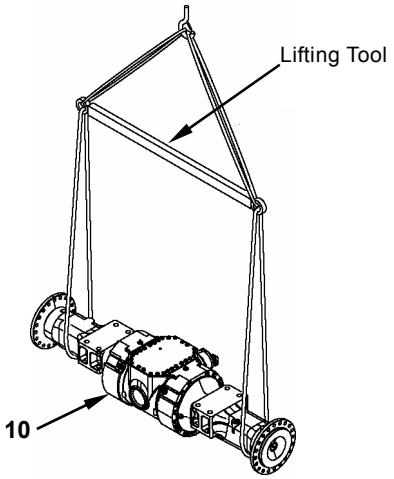
(Blank)

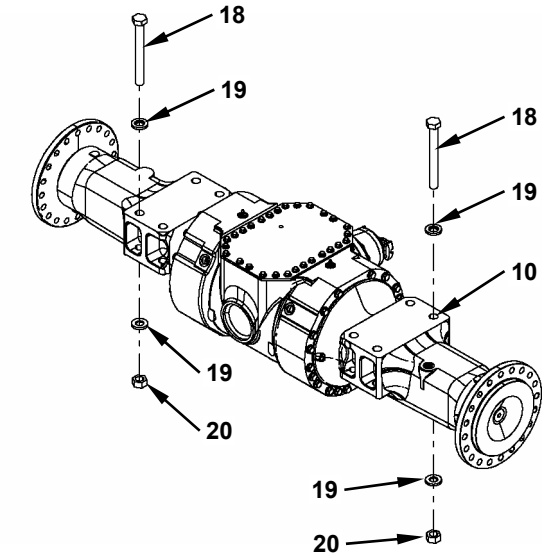
7. Hoist and hold front axle (10).

CAUTION: Front axle (10) weight:
ZW220: 1020 kg (2250 lb)
ZW250: 1190 kg (2650 lb)



W4GB-03-03-104

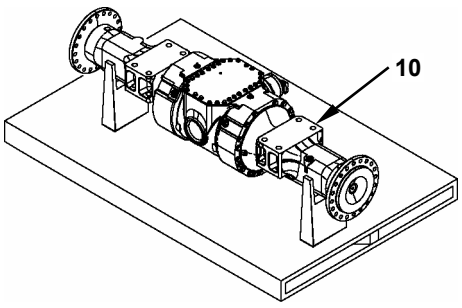
8. Remove nuts (20) (8 used), washers (19) (16 used), and bolts (18) (8 used) from front axle (10) and front front frame (4).
: 27 mm



W4GB-03-03-105

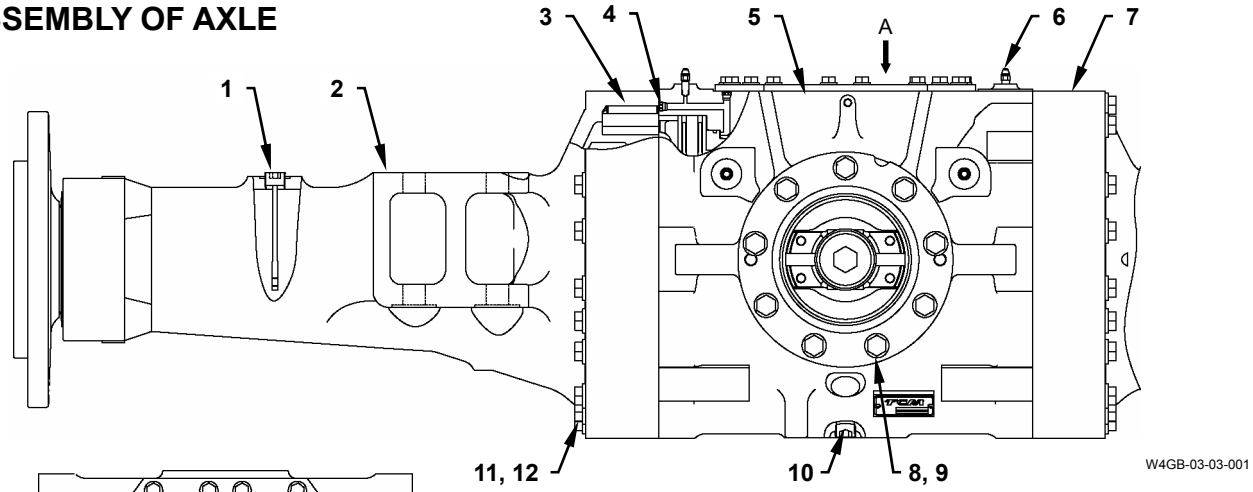
9. Slowly lower front axle (10) from front frame (4). Place front axle (10) onto a holder. Withdraw front axle (10) from the machine.

IMPOTANT: When removing the front axle for a long time, Place the axle holding part of front frame onto a holder and stabilize the machine.

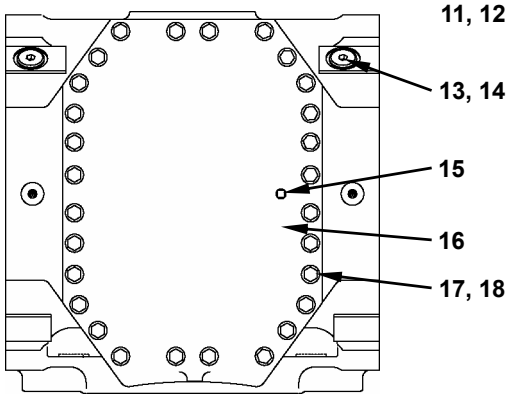


W4GB-03-03-106

DISASSEMBLY OF AXLE



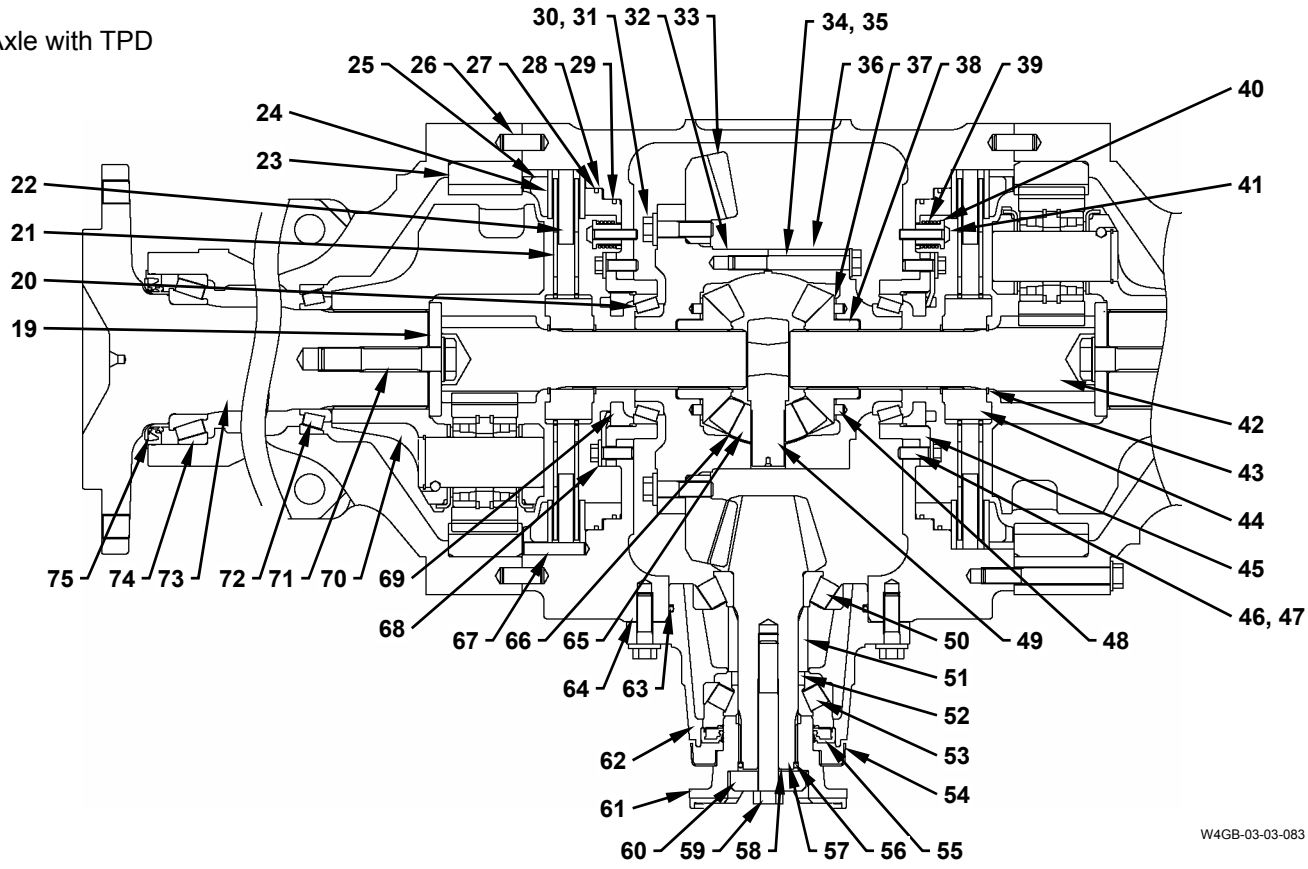
W4GB-03-03-001



View A

W4GB-03-03-082

- Axle with TPD

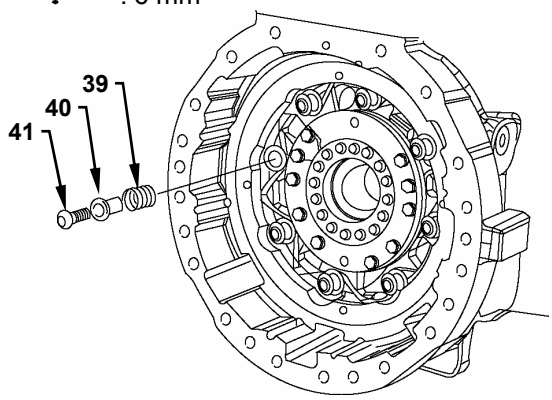


W4GB-03-03-083

Removal of Brake

22. Remove end plate (25), brake ring (24), brake disc (21), brake ring (22), brake disc (21), and brake ring (24) from the inside of differential gear body (5) in this order. Remove pins (67) (8 used) from differential gear body (5).

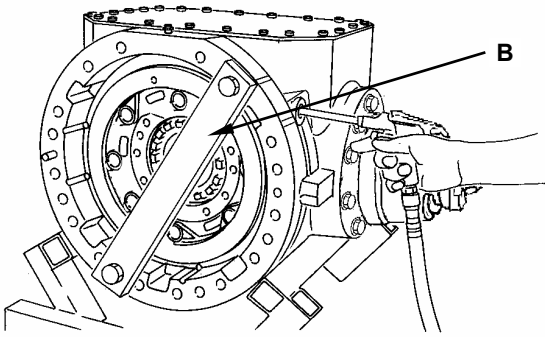
23. Remove button bolts (41) (8 used), adapters (40) (8 used), and springs (39) (8 used) from brake piston (28).
    : 6 mm



W4GB-03-03-016

24. Install piston fly off prevention stopper (B) by using the tube mounting side of differential gear body (5).

25. Supply compressed air from the hydraulic pressure port slowly, and remove piston (28) from differential gear body (5).



W4GB-03-03-017

26. Remove D-rings (27, 29) from the large diameter part and small diameter part of brake piston (28).

27. Remove brake on the opposite side in the same way.

Removal of Bearing Cage (62) Assembly

28. Remove bolts (17) (28 used) and washers (18) (28 used) from cover (16). Remove cover (16) from differential gear body (5).
    : 19 mm

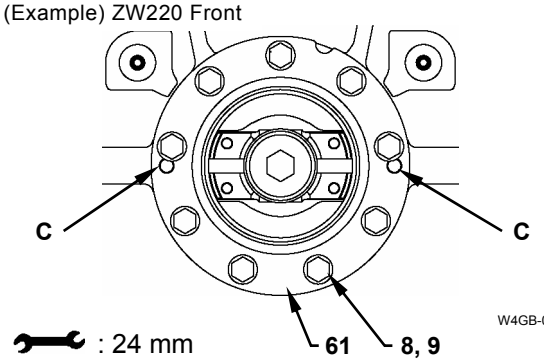
29. Record gear teeth contact state and backlash of ring gear (33).

30. Remove bolt (8) and washer (9) from bearing cage (62).
    : 24 mm
    Quantity of bolts and washers:
    ZW220 Front/Rear: 9 used/10 used
    ZW250 Front/Rear: 13 used /14 used

31. Install the removed bolts (8) (2 used) to the thread part (C) for pullers of bearing cage (62). Tighten bolts (8) (2 used) evenly and detach the bearing surface. Remove bearing cage (62) and pinion gear (57) as an assembly.

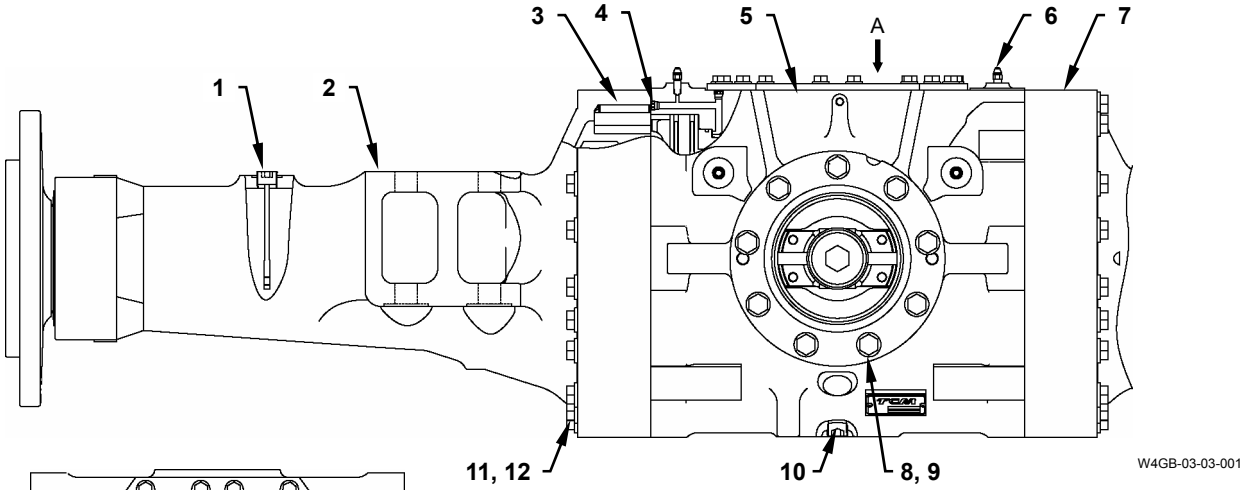
NOTE: Half shim (64) is installed between differential gear body (5) and bearing cage (62), be careful at the time of removal.

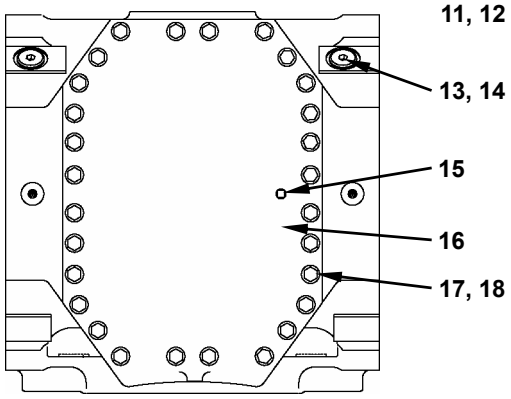
(Example) ZW220 Front



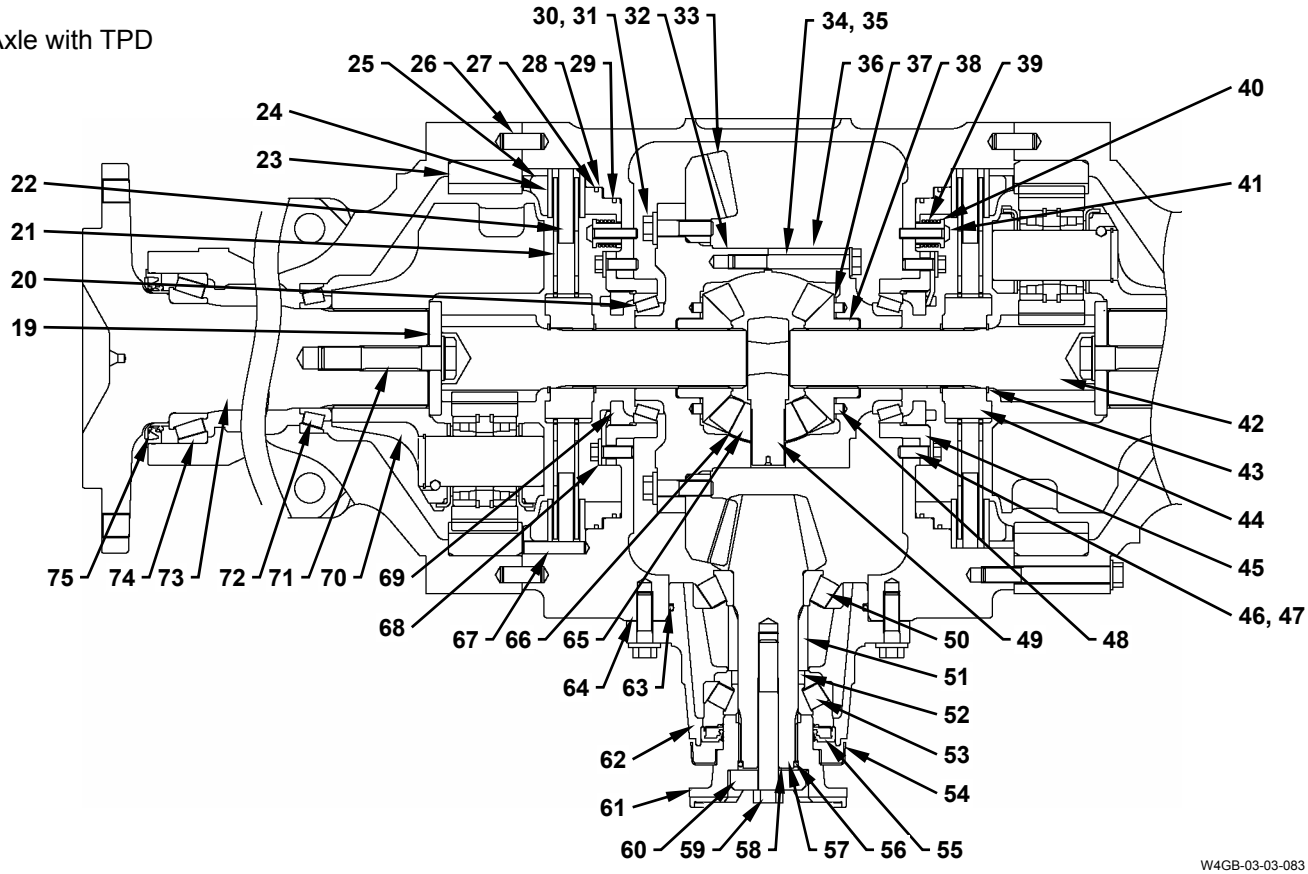
W4GB-03-03-018

ASSEMBLY OF AXLE

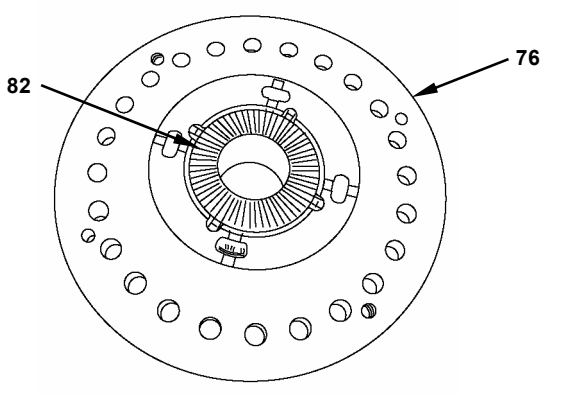




- Axle with TPD

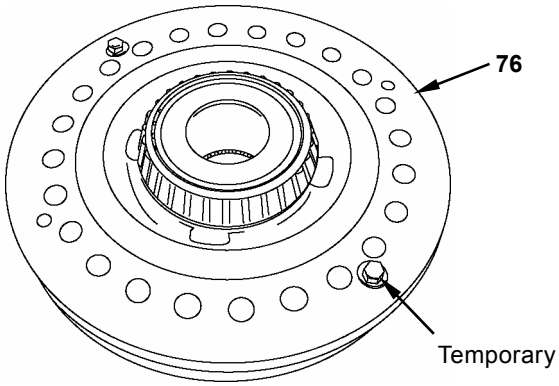


7. Install plate (82) to case A (76). Apply grease onto plate (82) so that it does not fall when reversing case A (76). (Install plate (82) with the groove side facing side gear (79))



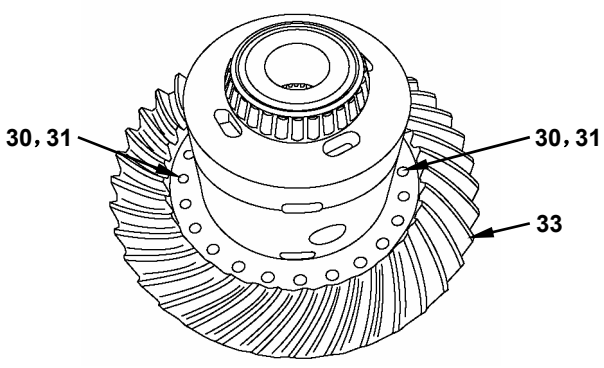
W4GB-03-03-039

8. Reverse case A (76). Install case A (76) to case B (77). At this time, temporarily install case B (77) to case A (76) by using the hole (M10, Pitch 1.5 mm) of case A (76). (2 places)
   : 17 mm



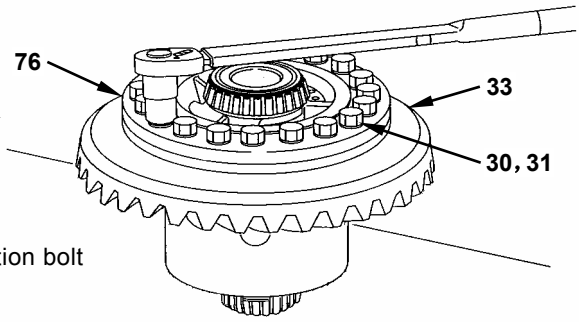
W4GB-03-03-040

9. Reverse the temporarily assembled differential case. Turn ring gear (33) to make the gear side face upward, install it tightly to the flange surface of the differential case by using a plastic hammer, and then temporarily tighten it with installation bolts (30) (2 used) and washers (31) (2 used) from beneath.



W4GB-03-03-041

10. Apply LOCTITE #262 to bolts (30) (2 used). Turn over ring gear (33) assembly. Secure ring gear (33) to case A (76) and case B (77) with bolts (30) (20 used) and washers (31) (20 used).
    : 24 mm
    : 225 N·m (23 kgf·m, 165 lbf·ft)

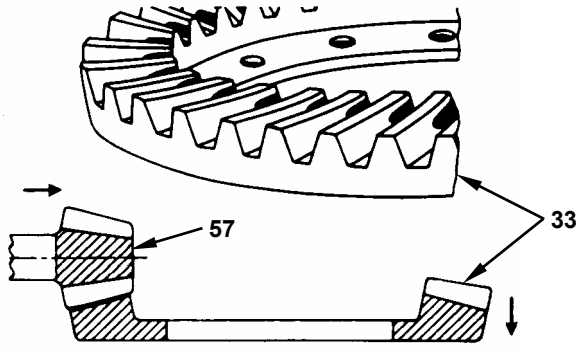


W4GB-03-03-042

b. Contact of tow part

To adjust, loosen adjust nut (69) at the side of flange half case (32), tighten adjust nut (69) at the side of plain half case (36), and set apart ring gear (33) from pinion gear (57).

Thin out the thickness of shim (64) of bearing cage (62), and bring pinion gear (57) close to ring gear (33).

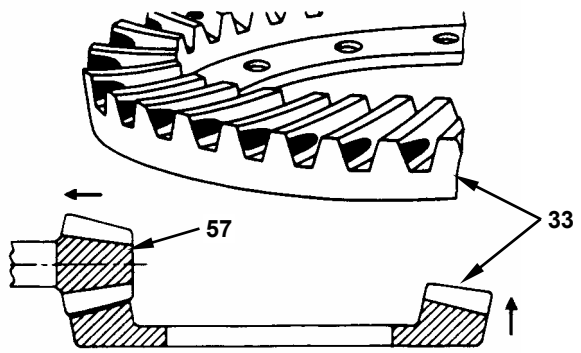


W4GB-03-03-057

c. Contact of heel part

To adjust, loosen adjust nut (69) at the side of plain half case (36), tighten adjust nut (69) at the side of flange half case (32), and bring ring gear (33) close to pinion gear (57).

Thicken the thickness of shim (64) of bearing cage (62), and set apart pinion gear (57) from ring gear (33).

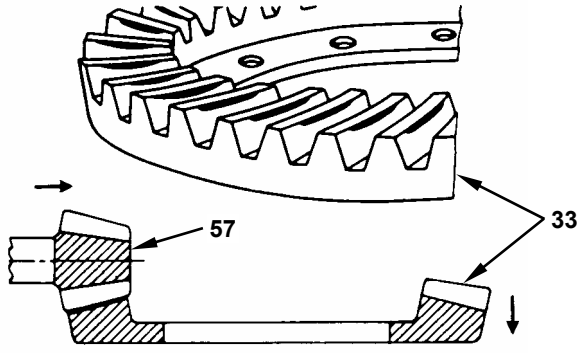


W4GB-03-03-058

d. Contact of face part

To adjust, thin out the thickness of shim (64) of bearing cage (62), and bring pinion gear (57) close to ring gear (33).

Loosen adjust nut (69) at the side of flange half case (32), tighten adjust nut (69) at the side of plain half case (36), and set apart ring gear (33) from pinion gear (57).

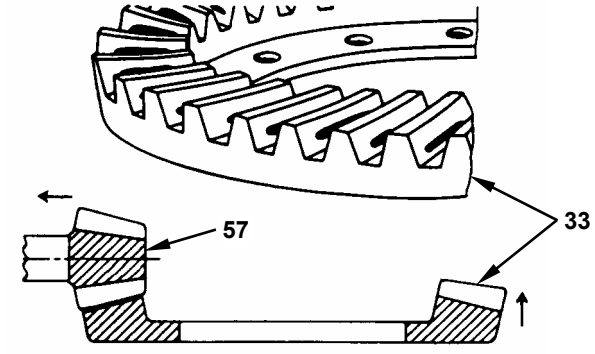


W4GB-03-03-059

e. Contact of flank part

To adjust, thicken the thickness of shim (64) of bearing cage (62), and set apart pinion gear (57) from ring gear (33).

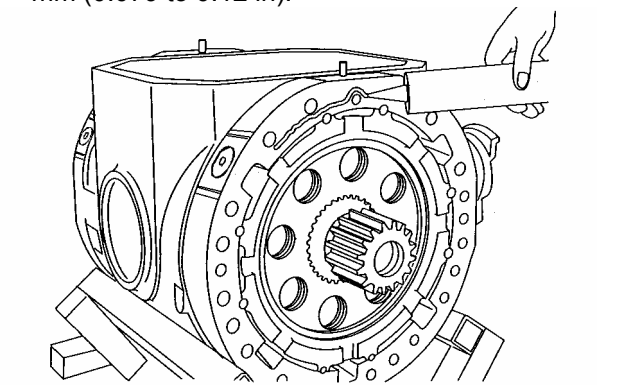
Loosen adjust nut (69) at the side of plain half case (36), tighten adjust nut (69) at the side of flange half case (32), and bring ring gear (33) close to pinion gear (57).



W4GB-03-03-060

Installation of Axle Tube

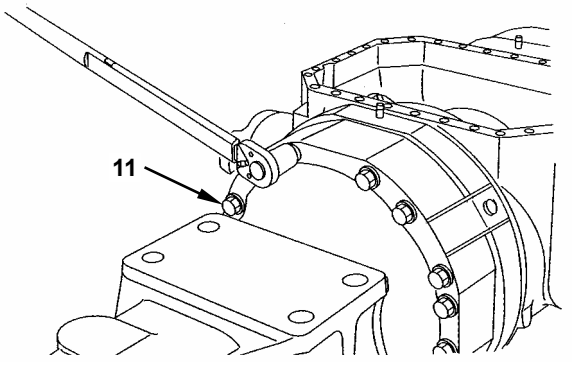
69. Apply LOCTITE FMD-127 to the mating surface of axle tube (2) and differential gear body (5). Apply LOCTITE so that there is no bead missed on the inside of the line of bolt holes. Bead width is 2 to 3 mm (0.079 to 0.12 in).



W4GB-03-03-076

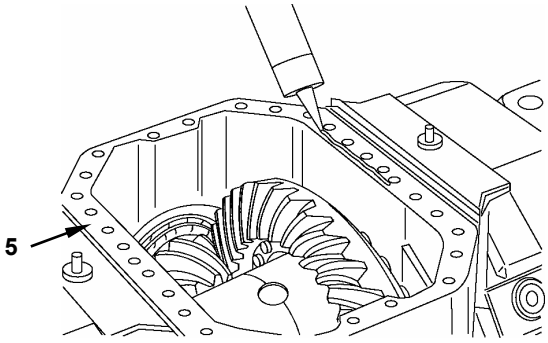
CAUTION: Axle tube (2) weight:
ZW220
Front: 301 kg (665 lb)
Rear: 270 kg (600 lb)
ZW250
Front: 374 kg (825 lb)
Rear: 329 kg (730 lb)

70. Apply LOCTITE #262 to bolt (11).
Hoist axle tube (2) assembly horizontally, align shaft (42) of differential gear body (5) and bolt hole, and install differential gear body (5). Install the axle tube (2) assembly to differential gear body (5) with bolts (11) (20 used) and washers (12) (20 used).
Install the axle tube (7) assembly on the opposite side in the same way.
: 24 mm
: 225 N·m (23 kgf·m, 165 lbf·ft)



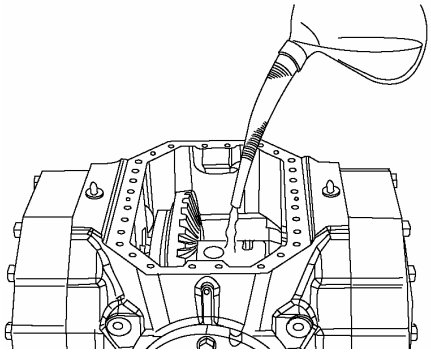
W4GB-03-03-077

71. Apply LOCTITE FMD-127 to cover (16) installation side of differential gear body (5). Apply LOCTITE so that there is no pause on bead inside bolt hole.



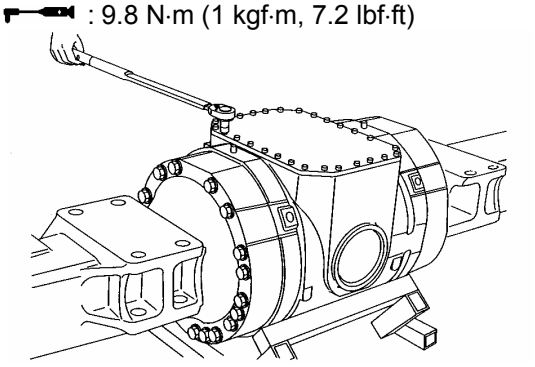
W4GB-03-03-078

72. Apply LOCTITE #572 to drain plug (10). Install drain plug (10) to differential gear body (5). Add oil to differential gear body (5).
: 14 mm
- Oil quantity ZW220: 32 L (8.45 US gal.)
ZW250: 40 L (10.6 US gal.)



W4GB-03-03-079

73. Install cover (16) to differential gear body (5) with bolts (17) (28 used) and washers (18) (28 used).
: 19 mm
: 9.8 N·m (1 kgf·m, 7.2 lbf·ft)



W4GB-03-03-080

Installation (between transmission and ar axle)

1. Install propeller shaft (24) to the body.

IMPORTANT: Apply LOCTITE #262 to the mounting bolts.

IMPORTANT: Align the flanges of propeller shafts (24) at the front and the rear. Install propeller shaft (24) so that grease fittings (18) of propeller shafts (24) at the front and the rear are on the same side. At this time, raise the body so that the tire can be rotated. (Refer to W3-4-1.)

IMPORTANT: Install propeller shaft (7) with the spline shaft side facing to the transmission side.

2. Install bolts (17, 20) (4 used for each).
   : 17 mm
   : 143 N·m (15 kgf·m, 105 lbf·ft)

3. Install grease fitting (18). Apply grease.

11. Remove socket bolts (33) (3 used) and spring washers (32) (3 used) from mounting plate (31). Remove mounting plate (31) from cover (24).
    : 6 mm

12. Remove dust cover (29) and seat (30) from input spool (25).

13. Remove socket bolts (13) (4 used) from body (12). Separate into bodies (12, 5) and cover (24). Remove springs (10, 19, 17) and spring seat (18) from bodies (12, 5).
    : 6 mm

14. Place body (12) an a workbench with the body (5) side facing down ward. Remove C-ring (16), plug (15) and spring (10) from body (12). Remove O-ring (14) from plug (15).

15. Remove spools (1) (2 used) carefully from each bodies (12, 5). Remove plungers (2) (2 used), retaining rings (9) (2 used), spring seats (8) (2 used), orifices (4, 13) and O-rings (3) (2 used).
    : 5 mm

16. Remove input spool (25) with the spring carefully attached from cover (24).

17. Place cover (24) on a workpench with the body (4) side facing downword. Remove C-ring (28) from cover (24). Remove stopper (27) and oil seal (26) from cover (24).

CAUTION: Use a protective layer in order not to damage the outer diameter of input spool (25) when loosening a bolt While securing camp input spool (25) in a vise.

18. Remove socket bolt (21) from input spool (25). Remove retainer (22), spring (20) and spring seat (23) from cover (14).
    : 4 mm

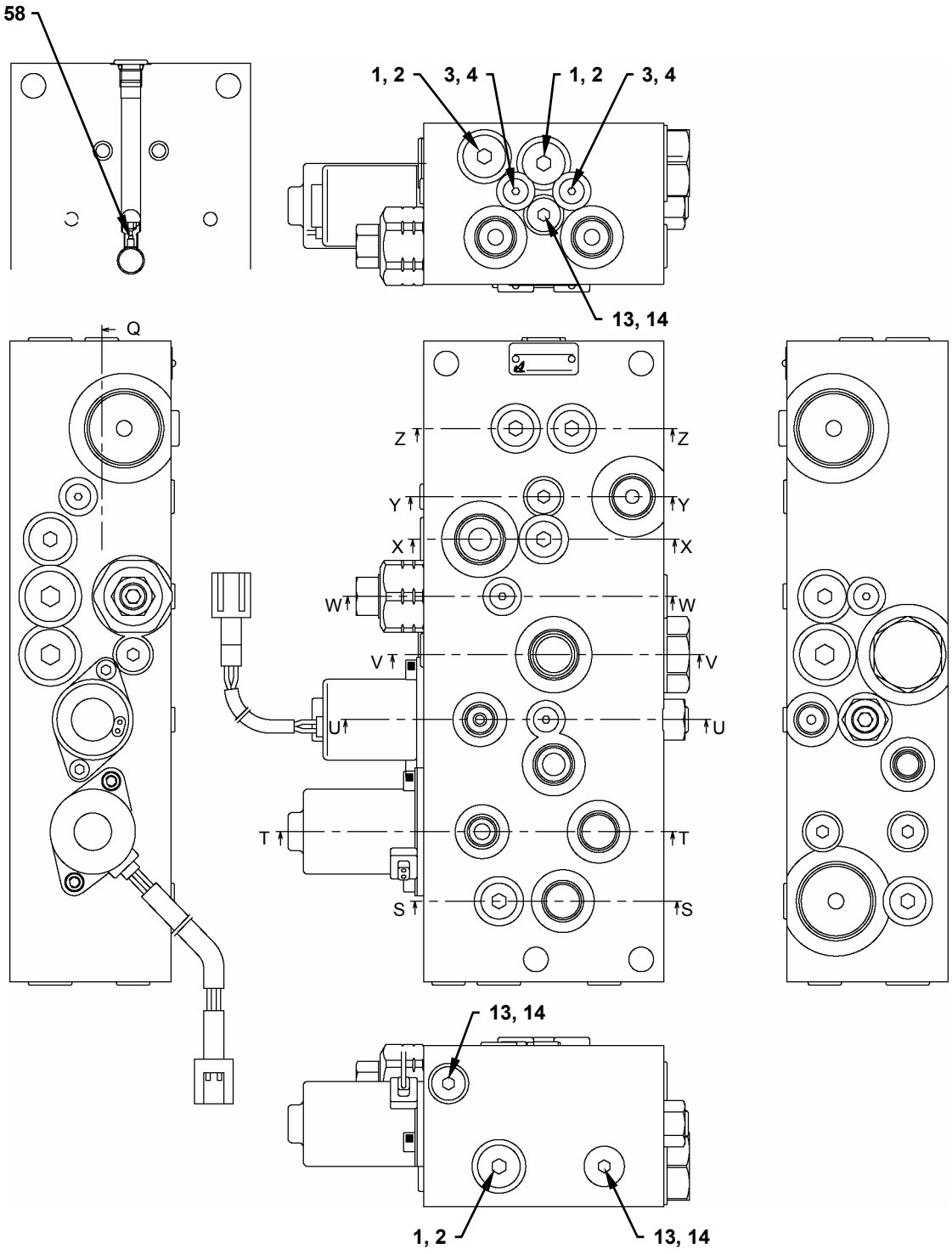
23. Install roller (37), collars (36) (2 used), pedal pin (35), L pin (34), washer (40) and pin (41) to pedal (38) at the right side in the same way as step 18. Apply grease onto the inner surface of roller (37) and the outer surface of pedal pin (35).

24. Install pedal (38) at the right side, mounting plate (48), pedal collar (52) and bushings (51) (2 used) to right pedal (38) with shaft (53). Install with bolt (42), washer (45) and nut (46). At this time, apply grease onto the inner surface of bushing (51) and the outer surface of shaft (53).
    : 14 mm
    : 29.5 to 34.5 N·m
    (3 to 3.5 kgf·m, 22 to 25 lbf·ft)

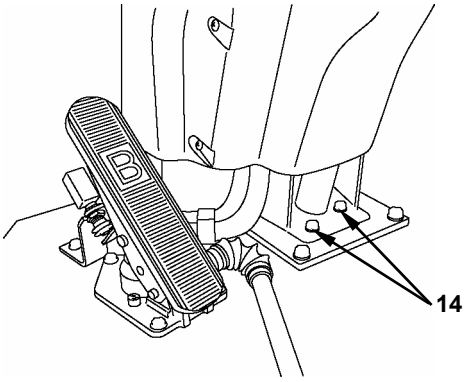
25. Install pedal covers (39) (2 used) to pedals (38) (2 used) at the left side.

26. Install bolt (50) and nut (49) to mounting plate (48). Fully stroke pedal (38) at the left side. Adjust the clearance between bolt (50) and roller (37) within 1.7 to 2.0 mm (0.067 to 0.079 in) by using bolt (50). Tighten nut (49).
    : 19 mm
    : 44 to 59 N·m
    (4.5 to 6.0 kgf·m, 32.5 to 43 lbf·ft)

ASSEMBLY OF CHARGING BLOCK



6. Remove bolts (14) (4 used) from the lower part of the steering wheel column. Remove steering pilot valve (9) from the hand column.
   : 14 mm

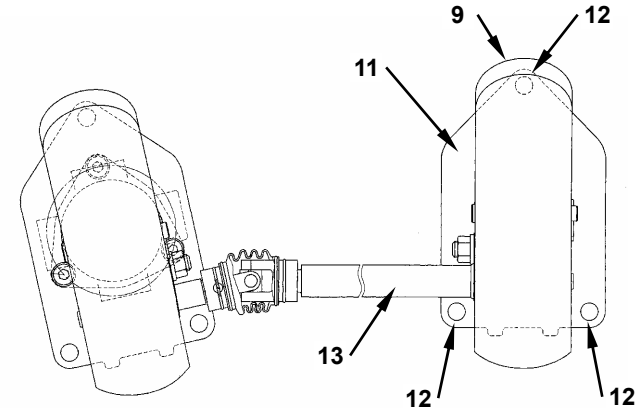


W4GB-03-07-014

Installation

1. Install steering pilot valve (9) to the steering wheel column with bolts (14) (4 used).
   : 14 mm
   : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)

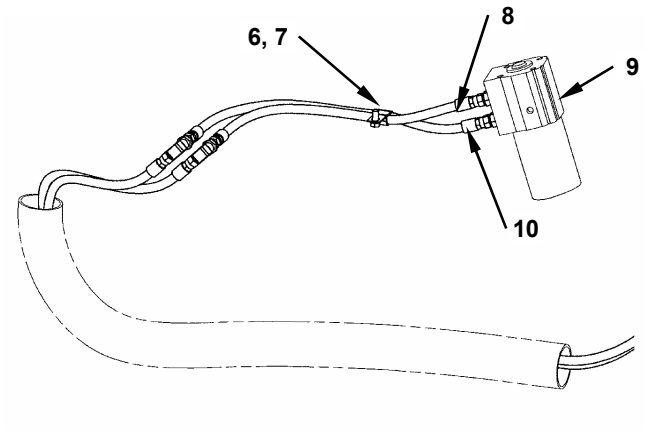
2. Align mounting plate (11) and the hole of steering pilot valve (9). Secure mounting plate (11) with bolts (12) (3 used).
   : 12 mm
   : 9.5 N·m (1 kgf·m, 7 lbf·ft)



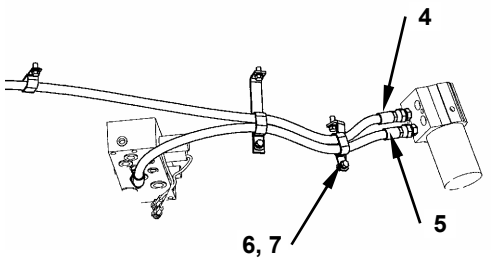
W4GB-03-07-013

3. Connect hydraulic hoses (4, 5, 8, 10) to steering pilot valve (9).
   : 22 mm
   : 39 N·m (4 kgf·m, 29 lbf·ft)
   : 27 mm
   : 93 N·m (10 kgf·m, 69 lbf·ft)

4. Secure hoses (4, 5, 8, 10) with clamps (6) (2 used) and bolts (7) (4 used).
   : 14 mm
   : 19.5 N·m (2 kgf·m, 14.5 lbf·ft)



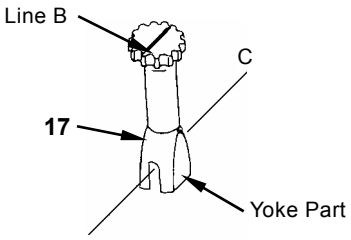
W4GB-03-07-012



W4GB-03-07-011

IMPORTANT: The following steps 11 to 13 are important procedures for deciding the valve timing of the unit. Install carefully.

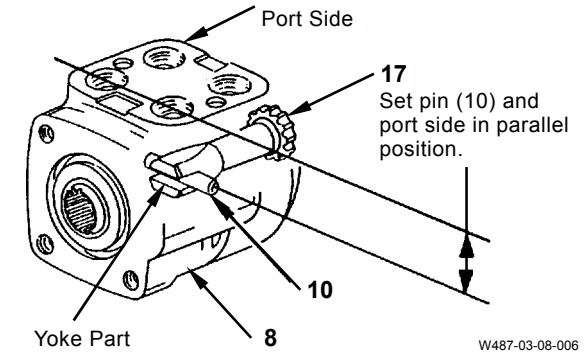
11. Turn spool (13) and the sleeve (9) assembly and set the port side of pin (10) and housing (8) in parallel position. Attach line B to the spline side edge so that it is in parallel position with line C of the yoke part of drive (17). Install drive (17) and fit the yoke part of drive (17) to pin (10). (Set line B of the spline side edge of drive (17) and port side of housing (8) in parallel position.)



W487-03-08-006

12. Install O-ring (16) to rotor (18).

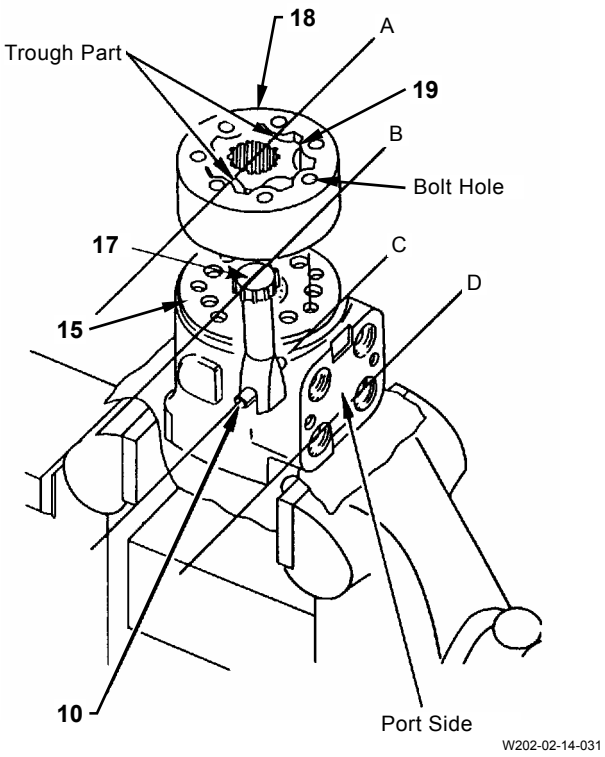
13. Turn the O-ring (16) side of rotor (18) to plate (15) side. Align the splines of star (19) and drive (17) so that line A, which connects star (19) trough part (a), is parallel with line B of drive (17). Check that lines A, B, C, and D are parallel as shown in the right figure. Align the bolt holes of rotor (18) without removing the engagement of drive (17) and star (19).



W487-03-08-006

14. Install spacer (20) to rotor (18). Install O-ring (16) to cap (21). Place cap (21) onto rotor (18).

15. Install cap (21) to housing (8) with screws (25) (6 used) and (24). Tighten with specified torque.
    : 5/16 inch
    : 23 N·m (2.3 kgf·m, 17 lbf·ft)



W202-02-14-031

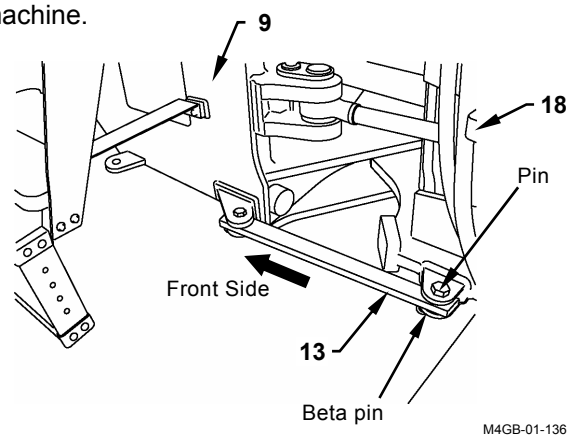
Removal

CAUTION: Steering cylinder (11, 20) weight:
ZW220: 32 kg (71 lb)
ZW250: 36 kg (80 lb)
ZW310: 36 kg (80 lb)

CAUTION: Before disconnecting each hose, operate the steering wheel right and left several times, and release any pressure in the circuit.

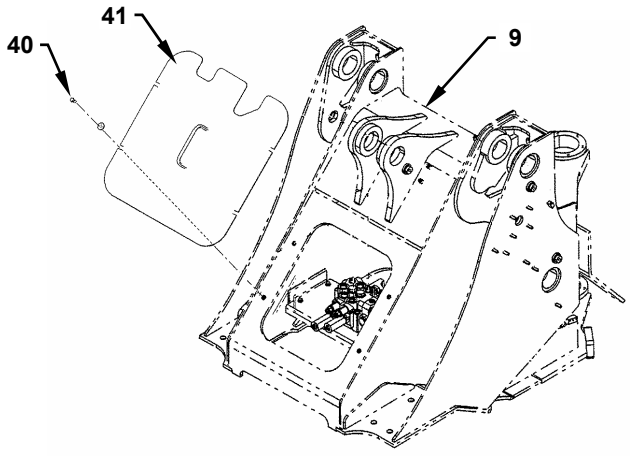
CAUTION: Before disconnecting each hose, bleed any air pressure in the hydraulic oil tank, and minimize the quantity of oil which flows out from the hose.

1. Keep the machine in straight travel position. Connect front frame (9) and rear frame (18) with articulation lock bar (13) on the right side of the machine.



M4GB-01-136

2. Remove sems bolts (40) (4 used) from cover (41). Remove cover (41) from front frame (9).



W4GB-02-05-022

3. Disconnect hoses (27, 31, 33, 38) from steering cylinders (11, 20). Cap the open ends.
   : 14 mm, 17 mm, 19 mm, 22 mm, 27 mm, 36 mm

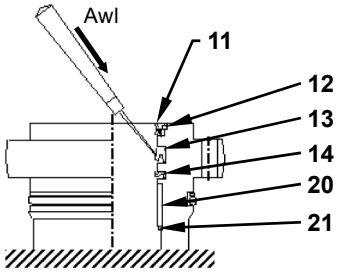
4. Disconnect lubrication pipes (2 used) from pins (4, 8).
   : 14 mm

5. Remove bolts (1, 5) and washers (2, 3, 6, 7) from pins (4, 8). Remove pins (4, 8) from front frame (9).
   : 17 mm

6. Attach a nylon sling in order to hoist and hold steering cylinder (11, 20). Remove bolts (17, 22) and washers (15, 16, 23, 24) from pins (14, 25). Remove pins (14, 25) from rear frame (18).
   : 17 mm

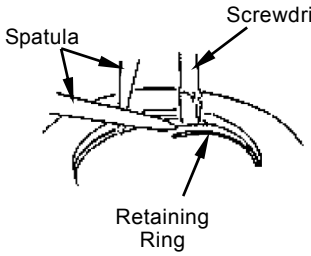
7. Remove steering cylinders (11, 20) from rear frame (18).

17. Pierce U-packing (13) and buffer seal (14) with a pointed awl, pull inward, and remove from head cover (15).



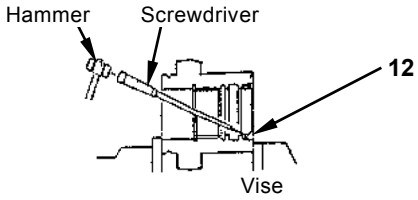
W4GB-04-02-007

18. Remove retaining ring (11) from head cover (15).



W4GB-04-02-008

19. Remove dust seal (12) from head cover (15).



W4GB-04-02-009

20. As rod bushing (20) is compressed in rod cover (15), removing is difficult.
    If replacement of the damaged or worn bushing is needed, carry out from the following procedures.

    - Remove retaining ring (21).
    - Install rod cover (15) to turning machine and align correctly.
    - Cut off the bushing until it becomes thin. Remove bushing (20) by using a screwdriver.

Special instrument for packing (2) seal ring attachment and reform.

- For special tool for seal ring attachment: Refer to figure 4 + table 4
- For special tool for seal ring reform: Refer to figure 5 + table 4

Unit: mm

	Cylinder	A	B	C	D	E	F	G
For attachment	ZW220 bucket	163±0.1	166±0.1	155	145	18	63	86
	ZW250 bucket							
	ZW220 lift arm	128±0.1	131±0.1	120	110	24	63	92
	ZW250 lift arm							
	ZW220, ZW250, Steering	68±0.1	71±0.1	60	50	15	63	83
For reform	ZW220 bucket	175	185	167±0.1	46	75	10 to 15	100
	ZW250 bucket							
	ZW220 lift arm	140	150	132±0.1				
	ZW250 lift arm							
	ZW220, ZW250, Steering	78	88	72±0.1	34	60		

Table 4

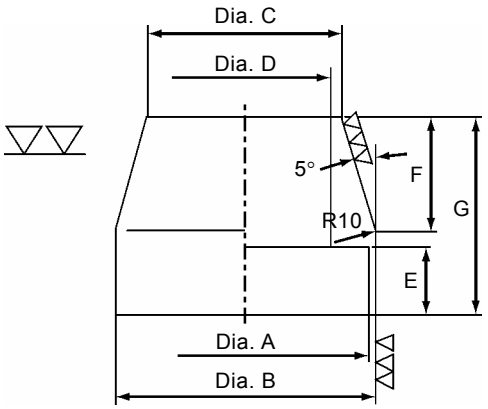


Figure 4: Special Tool for Piston Seal Attaching

W4GB-03-09-006

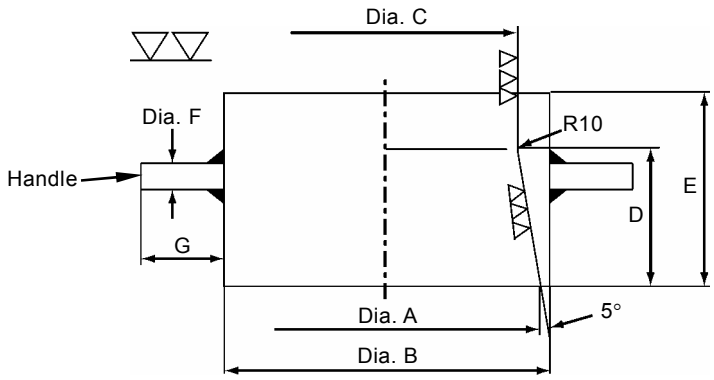
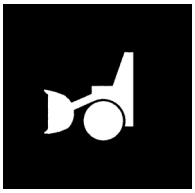


Figure 5: Special Tool for Piston Seal Reforming

W4GB-03-09-007

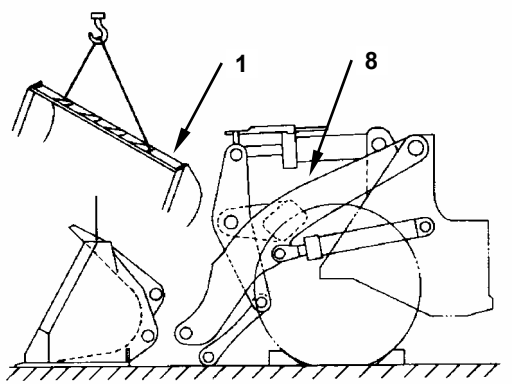
SECTION 4
FRONT ATTACHMENT



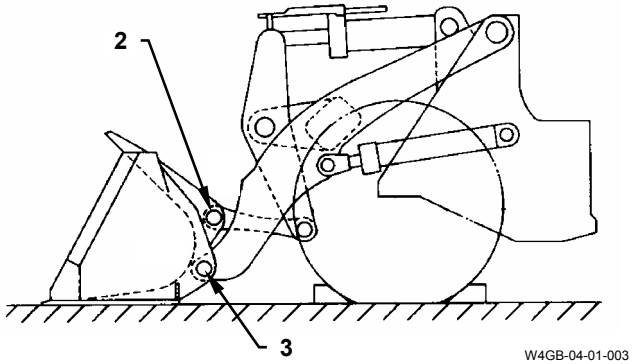
— CONTENTS —

CAUTION: Bucket (1) weight:
ZW220 : 1500 kg (3350 lb)
(3.1 m^3 (4.06 yd^3) bolt on cutting edges)
ZW250 : 1800 kg (4000 lb)
(3.4 m^3 (4.45 yd^3) bolt on cutting edges)

9. Attach a nylon sling to the spill guard part of bucket (1). Hoist, and place the bucket onto the mounting position on lift arm (8).



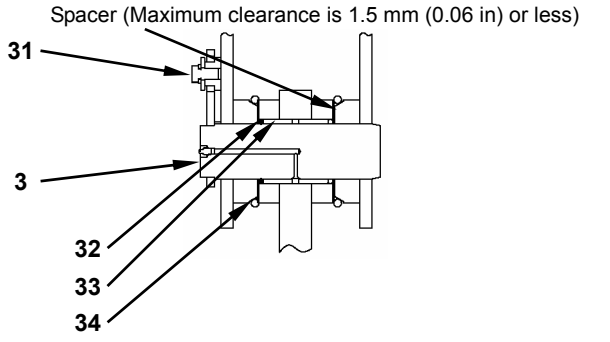
W4GB-04-01-004



W4GB-04-01-003

(The connection part between bucket and lift arm: E)

10. The connection part between bucket and lift arm: E
    Press fit bushing (33) into the center of the boss. Apply grease onto the lip part of dust seal (32). Press fit dust seal (32) with O-ring (34) into both side of the bushing. Apply grease and insert pin (3). Install the spring washer, washer and bolt (31).
    : 24 mm
    : 87 N·m (9 kgf·m, 64 lbf·ft)



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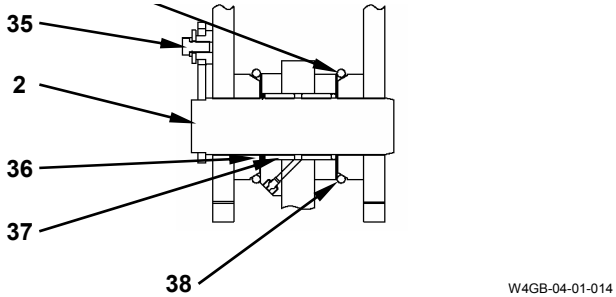
(The connection part between bucket and bucket link: F)

11. The connection part between bucket and bucket link: F
    Press fit bushing (37) into the center of the boss. Apply grease onto the lip part of dust seal (36). Press fit dust seal (36) with O-ring (38) into both side of bushing. Apply grease and insert pin (2). Install the spring washer, washer and bolt (35).
    : 24 mm
    : 87 N·m (9 kgf·m, 64 lbf·ft)



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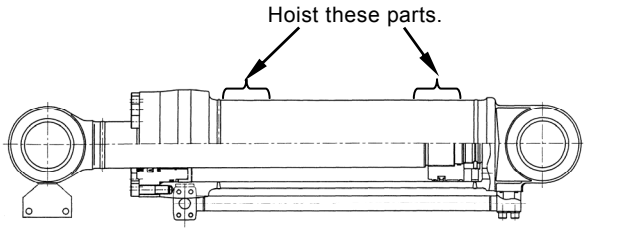
Installation

CAUTION: Bucket cylinder (15) weight:
ZW220: 170 kg (380 lb)
ZW250: 180 kg (400 lb)

1. Attach a nylon sling onto the rod side and the bottom side of bucket cylinder (15). Lift and hold the bucket cylinder.



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2. Align the bottm side of bucket cylinder (15) with the mounting hole on front frame (21).

IMPORTANT: Spacer (16) thickness: 2.3 mm (0.091 in)

3. Align the hole on the bottom side of bucket cylinder (15) with the pin hole on front frame (21). Install spacer (16).

4. Apply a film of grease on the outer side of pins (17). Install pins (17) and lock the bottom sides of bucket cylinders (15) on front frame (21).

5. Lock pin (17) on front frame (21) with washer (18), spring washer (19), and bolt (20).
   : 24 mm
   : 210 N·m (22 kgf·m, 155 lbf·ft)

6. Install O-ring (7) to hose (8). Connect hose (8) to bucket cylinder (15) with split flanges (5) (2 used) and socket bolts (6) (4 used).
   : 14 mm
   : 210 N·m (22 kgf·m, 155 lbf·ft)

7. Install O-ring (2) to hose (3). Connect hose (3) to bucket cylinder (15) with split flanges (4) (2 used) and socket bolts (1) (4 used).
   : 14 mm
   : 210 N·m (22 kgf·m, 155 lbf·ft)

8. Start the engine and extend the piston rods of bucket cylinders (15). Align the bucket cylinders with the pin holes of bellcrank (9).

IMPORTANT: Spacer (14) thickness: 2.3 mm (0.091 in)

9. Insert spacers (14) between bellcrank (9) and the rod ends. Apply a film of grease on the outer side of pin (10). Install pin (10) to bellcrank (9).

10. Lock pin (10) on bellcrank (9) with washer (11), spring washer (12), and bolt (13).
    : 24 mm
    : 210 N·m (22 kgf·m, 155 lbf·ft)

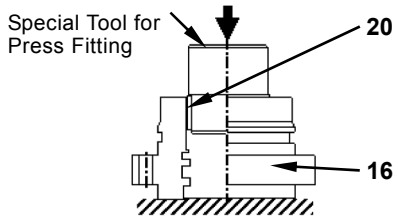
(Blank)

(Blank)

Assembly of Lift Cylinder

1. Press fit rod bushing (20) by using a special tool.
   Special tool: Refer to W3-9-24.

IMPORTANT: Align rod bushing (20) with the mounting hole and place vertically. Apply oil to the inner surface of the mounting hole and press fit rod bushing (20). After press fitting, clean again and remove metal powder.



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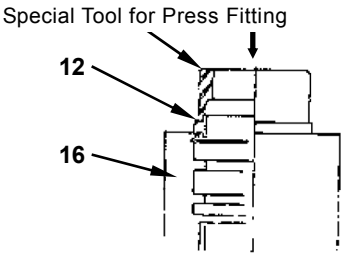
2. Install retaining ring (21).

IMPORTANT: Check that rod bushing and retaining ring are installed completely.

3. Press fit dust seal (12) by using a special tool and a hammer.
   Special tool: Refer to W3-9-25.

IMPORTANT: Align dust seal (12) with the mounting hole and place vertically. Evenly contact a special tool with the metal part of dust seal (12). Before press fitting, apply oil to the inner surface of the hole. After press fitting, clean again and remove metal powder.



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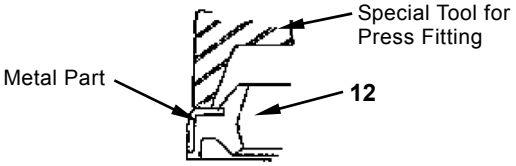

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4. Install retaining ring (13).

IMPORTANT: Check that rod bushing and retaining ring are installed completely.