

PART NO. WDEE-EN-00

HITACHI

Reliable solutions

Workshop Manual

ZX85USB-5A Hydraulic Excavator

ZX85USB-5A HYDRAULIC EXCAVATOR WORKSHOP MANUAL

Service Manual consists of the following separate Part No.

Technical Manual (Operational Principle) : Vol. No.TODEE-EN

Technical Manual (Troubleshooting) : Vol. No.TTDEE-EN

Workshop Manual : Vol. No.WDEE-EN

Engine Manual : Vol. No.ETADB-EN, EWADB-EN

 **Hitachi Construction Machinery Co., Ltd.**

URL:<http://www.hitachi-c-m.com>

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WDEE-EN-00

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SAFETY

General Precautions for Cab

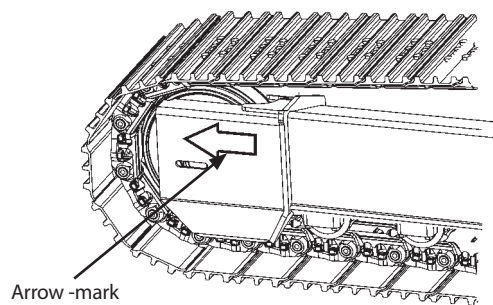
- Before entering the cab, thoroughly remove all dirt and/or oil such as mud, grease, soil or stones that may mess up the cab from the soles of your work boots. If any controls such as a pedal is operated while with dirt and/or oil on the soles of the operator's work boots, the operator's foot may slip off the pedal, possibly resulting in a personal accident.
- Do not mess up around the operator's seat with parts, tools, soil, stones, obstacles that may fold up or turn over, cans or lunch box. The levers or pedals become inoperable if obstacle jams in operation stroke of the travel levers/pedals, pilot control shut-off lever or control levers, which may result in serious injury or death.
- Avoid storing transparent bottles in the cab. Do not attach any transparent type window decorations on the windowpanes as they may focus sunlight, possibly starting a fire.
- Refrain from listening to the radio, or using music headphones or mobile telephones in the cab while operating the machine.
- Keep all flammable objects and/or explosives away from the machine.
- After using the ashtray, always cover it to extinguish the match and/or tobacco.
- Do not leave cigarette lighters in the cab. When the temperature in the cab increases, the lighter may explode.
- Use proper floor mat dedicated to the machine. If another floor mat is used, it may be displaced and contact with the travel pedals during operation, resulting in serious injury or death.

SAFETY

- Avoid swinging the upperstructure on slopes. Never attempt to swing the upperstructure downhill. The machine may tip over. If swinging uphill is unavoidable, carefully operate the upperstructure and boom at slow speed.
- If the engine stalls on a slope, immediately lower the bucket to the ground. Return the control levers to neutral. Then, restart the engine.
- Be sure to thoroughly warm up the machine before ascending steep slopes. If hydraulic oil has not warmed up sufficiently, sufficient performance may not be obtained.
- Use a signal person when moving, swinging or operating the machine in congested areas. Coordinate hand signals before starting the machine.
- Before moving machine, determine which way to move travel pedals/levers for the direction you want to go. When the travel motors are in the rear, pushing down on the front of the travel pedals or pushing the levers forward moves the machine forward, towards the idlers. An arrow-mark seal is stuck on the inside surface of the side frame to indicate the machine front direction.
- Select a travel route that is as flat as possible. Steer the machine as straight as possible, making small gradual changes in direction.
- Before traveling on them, check the strengths of bridges and road shoulders, and reinforce if necessary.
- Use wood plates in order not to damage the road surface. Be careful of steering when operating on asphalt roads in summer.
- When crossing train tracks, use wood plates in order not to damage them.
- Do not make contact with electric wires or bridges.
- When crossing a river, measure the depth of the river using the bucket, and cross slowly. Do not cross the river when the depth of the river is deeper than the upper edge of the upper roller.
- When traveling on rough terrain, reduce engine speed. Select slow travel speed. Slower speed will reduce possible damage to the machine.
- Avoid operations that may damage the track and undercarriage components.
- During freezing weather, always clean snow and ice from track shoes before loading and unloading machine, to prevent the machine from slipping.



M104-05-008



M178-03-001



SA-011

SAFETY

Practice Safe Maintenance

To avoid accidents:

- Understand service procedures before starting work.
- Keep the work area clean and dry.
- Do not spray water or steam inside cab.
- Never lubricate or service the machine while it is moving.
- Keep hands, feet and clothing away from power-driven parts.

Before servicing the machine:

1. Park the machine on a level surface.
2. Lower the bucket to the ground.
3. Turn the auto-idle switch off.
4. Run the engine at slow idle speed without load for 5 minutes.
5. Turn the key switch to OFF to stop engine.
6. Relieve the pressure in the hydraulic system by moving the control levers several times.
7. Remove the key from the key switch.
8. Attach a "Do Not Operate" tag on the control lever.
9. Pull the pilot control shut-off lever to the LOCK position.
10. Allow the engine to cool.

- If a maintenance procedure must be performed with the engine running, do not leave the machine unattended.
- If the machine must be raised, maintain a 90 to 110° angle between the boom and arm. Securely support any machine elements that must be raised for service work.
- Inspect certain parts periodically and repair or replace as necessary. Refer to the section discussing that part in the "MAINTENANCE" chapter of operator's manual.
- Keep all parts in good condition and properly installed.
- Fix damage immediately. Replace worn or broken parts. Remove any buildup of grease, oil, or debris.
- When cleaning parts, always use nonflammable detergent oil. Never use highly flammable oil such as fuel oil and gasoline to clean parts or surfaces.
- Disconnect battery ground cable (–) before making adjustments to electrical systems or before performing welding on the machine.



SA-028



SA-527

SAFETY

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

Beware of Asbestos and Silicon Dust and Other Contamination

- Take care not to inhale dust produced in the work site. Inhalation of asbestos fibers may be the cause of lung cancer. Inhalation of silicon dust or other contamination may cause sickness.
 - Depending on the work site conditions, the risk of inhaling asbestos fiber, silicon dust or other contamination may exist. Spray water to prevent asbestos fibers, silicon dust or other contamination from becoming airborne. Do not use compressed air.
 - When operating the machine in a work site where asbestos fibers, silicon dust or other contamination might be present, be sure to operate the machine from the upwind side and wear a mask rated to prevent the inhalation of asbestos, silicon dust or other contamination.
 - Keep bystanders out of the work site during operation.
 - Asbestos fibers might be present in imitation parts. Use only genuine Hitachi Parts.



SA-029

SECTION 1 GENERAL

Group 1 Precautions for Disassembling and Assembling

Precautions for Disassembling and Assembling

Precautions for Disassembling

- **Clean the Machine**
Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling / assembling, resulting in damage to machine components, as well as decreased efficiency in service work.
- **Inspect the Machine**
Be sure to thoroughly understand all disassembling / assembling procedures beforehand to help avoid incorrect disassembling of components as well as personal injury.
Check and record the items listed below to prevent problems from occurring in the future.
 - The machine model, machine serial number, and hour meter reading.
 - Reason for disassembly (symptoms, failed parts, and causes).
 - Clogging of filters and oil, water or air leaks, if any. Capacities and condition of lubricants.
 - Loose or damaged parts.
- **Prepare and Clean Tools and Disassembly Area**
Prepare the necessary tools to be used and the area for disassembling work.

Precautions for Disassembling and Assembling

- **Precautions for Disassembling**
 - Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach an identification tag onto the connectors, hoses, and pipes for assembling.
 - Before disassembling, clean the exterior of the components and place on a workbench.
 - Drain hydraulic oil and gear oil from the hydraulic components and reduction gear.
 - Be sure to provide appropriate containers for draining fluids.
 - Use matching marks for easier reassembling if necessary.
 - Be sure to use the specified special tools when instructed.

- If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause (s), then take the appropriate measures to remove it.
- Orderly arrange disassembled parts. Mark and tag them if necessary.
- Store common parts, such as bolts and nuts with reference to where they are to be used and in a manner that will prevent loss.
- Inspect the contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
- Measure and record the degree of wear and clearances.
- **Precautions for Assembling**
 - Be sure to clean all parts and inspect them for any damage. If any damage is found, repair or replace part.
 - Dirt or debris on the contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces.
 - Apply appropriate lubricant oil onto parts in order to prevent them from seizing.
 - Be sure to replace O-rings, backup rings, oil seals, and floating seals with new ones once they have been disassembled. Apply grease before installing
 - Be sure that liquid-gasket-applied surfaces are clean and dry.
 - If an anti-corrosive agent has been used on a new part, be sure to thoroughly clean the part to remove the agent.
 - Fit the matching marks made when disassembling and assemble them.
 - Be sure to use the designated tools to assemble bearings, bushings, and oil seals.
 - Keep a record of the number of tools used for disassembly / assembly. After assembling is completed, count the number of tools so as to make sure that no forgotten tools remain in the assembled machine.

SECTION 1 GENERAL

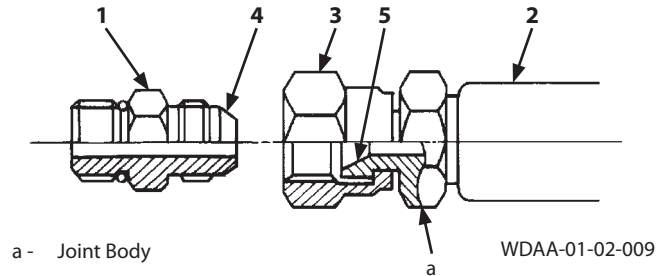
Group 2 Tightening

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.

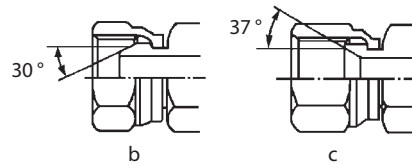
IMPORTANT:

- **Do not over-tighten union nut (3). Excessive force will be applied to metal sealing surfaces (4) and (5), possibly cracking the adapter. Tighten union nut (3) to the specifications.**
- **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.**



2013/09


Description	Wrench Size mm	Tightening Torque	
		N·m	(lbf·ft)
30 ° male	Union Nut		
	17	25	(18.5)
	19	30	(22)
	22	40	(29.5)
	27	80	(59)
	32	140	(103)
	36	180	(133)
	41	210	(155)
	50	350	(260)
37 ° female	17	25	(18.5)
	19	30	(22)
	22	40	(29.5)
	27	80	(59)
	32	140	(103)
	36	180	(133)
	41	210	(155)
	50	350	(260)



b - Male Union Joint

c - Female Union Joint

WDAA-01-02-010

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

SECTION 1 GENERAL

Group 4 Bleeding Air

Bleeding Air from Fuel System

Air in the fuel system may make the engine hard to start or make it run irregularly. After draining water and sediment from the fuel filter, replacing the fuel filter, or running the fuel tank dry, be sure to bleed the air from the fuel system.

Air Bleeding Procedures

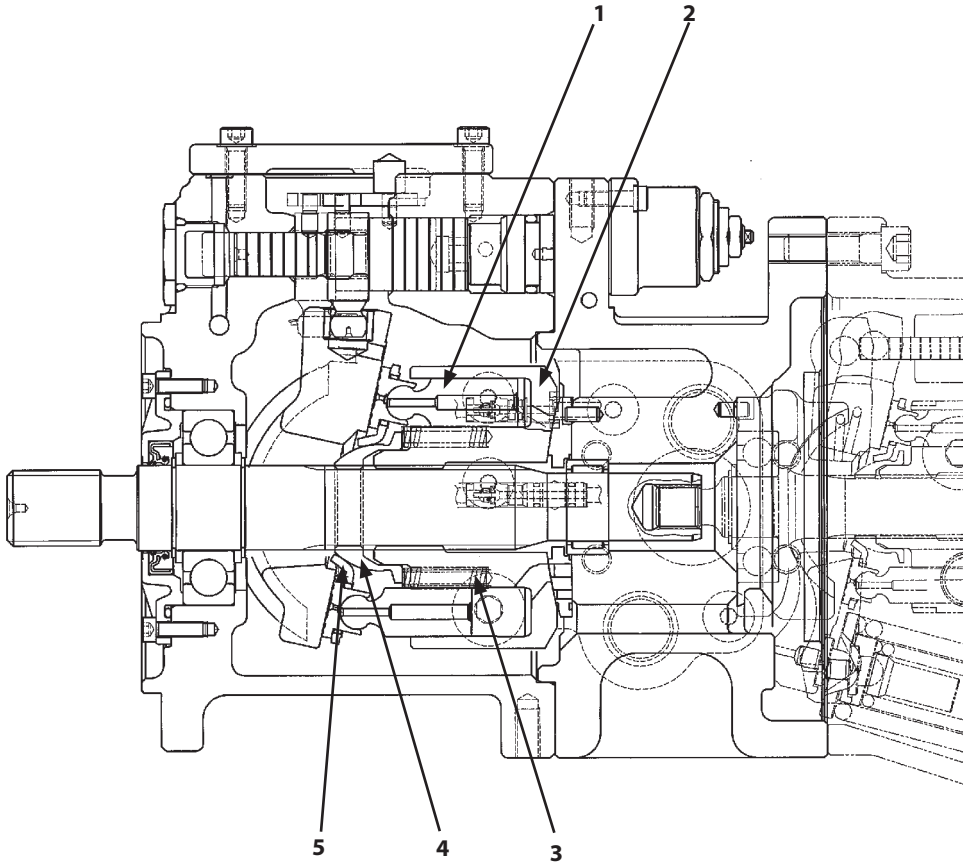
Automatic bleeding device is provided on this machine.

1. Confirm that the fuel level is more than one-half of the fuel tank capacity. If the fuel is lower, add fuel.
2. Set the key switch to the ON position and hold it for 10 to 15 seconds.
3. Start the engine and check the fuel system for fuel leaks.

SECTION 2 MAINTENANCE STANDARD

Group 1 Upperstructure

Main Pumps 1, 2



WDEA-03-08-007

1- Piston (9 Used)
2- Cylinder Block

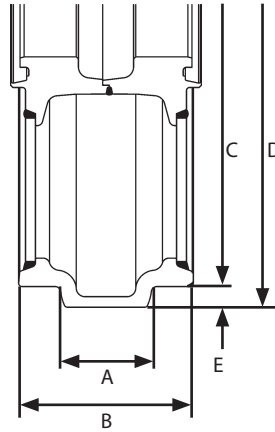
3- Spring (6 Used)
4- Spherical Bushing

5- Retainer

SECTION 2 MAINTENANCE STANDARD

Group 2 Undercarriage

Front Idler



WDCA-02-01-002

Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	43 (1.69)	[33.7 (1.33)]	Replace
B	100 (3.94)	-	
C	390 (15.4)	[376 (14.8)]	
D	434 (17.1)	-	
E	22 (0.87)	-	

NOTE: Values in [] are just for reference.

Axle and Bushing

Unit: mm (in)

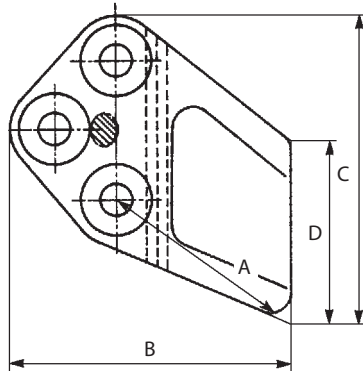
		Standard	Allowable Limit	Remedy
Axle	Outer Diameter	55.0 (2.17)	[54.2 (2.13)]	Replace
Bushing	Inner Diameter	55.0 (2.17)	[56.0 (2.21)]	
	Flange Thickness	2 (0.08)	[1.2 (0.05)]	

NOTE: Values in [] are just for reference.

SECTION 2 MAINTENANCE STANDARD

Group 3 Front Attachment

Side Cutter (3053595, 3053596)



W505-04-01-001

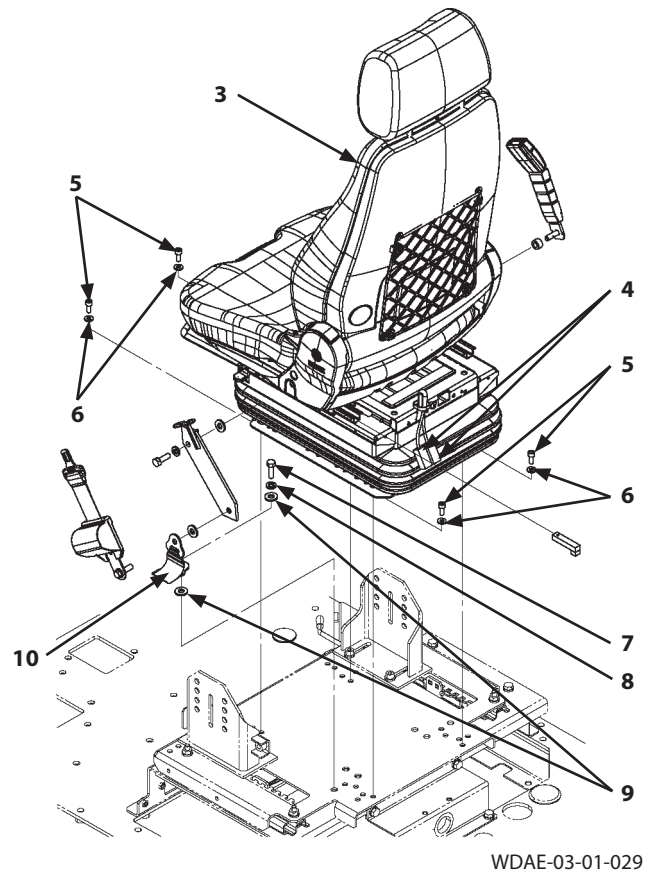
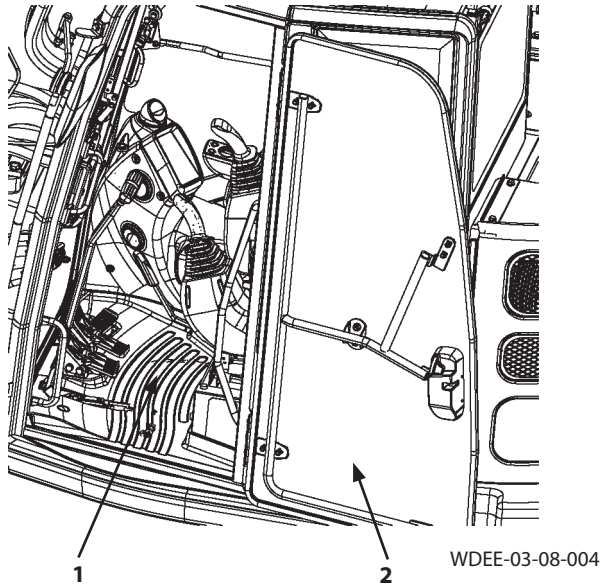
Unit: mm (in)

	Standard	Allowable Limit	Remedy
A	213 (8.39)	138 (5.43)	Replace
B	250 (9.84)	-	
C	295 (11.6)	-	
D	150 (5.91)	-	

SECTION 3 UPPERSTRUCTURE

Group 1 Cab


Removal and Installation of Cab



IMPORTANT Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach an identification tag onto the connectors, hoses, and pipes for assembling. Connect the hoses and install the clips in case the clips which secure the hoses have been removed.

CAUTION: Seat (3) weight: 45 kg (100 lb)


5. Remove socket bolts (5) (4 used) and washers (6) (4 used). Remove seat (3).

 : 6 mm

6. Remove floor mat (1).

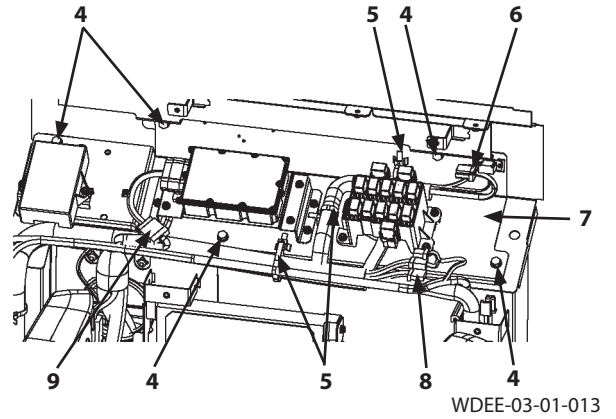
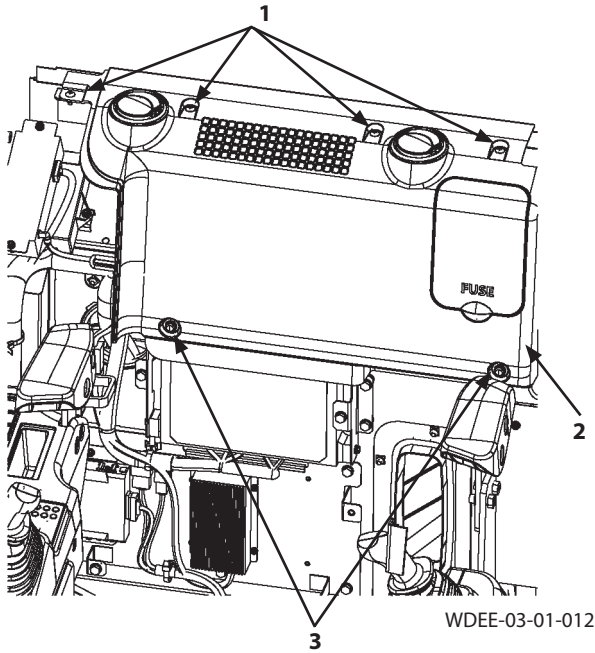
Removal

1. Set the machine position for inspection and maintenance. (Refer to W1-6-1.)
2. Open door (2).
3. Disconnect connectors (4) (2 used).
4. Remove bolt (7), spring washer (8), and washers (9) (2 used). Remove seat belt (10).

 : 16 mm

SECTION 3 UPPERSTRUCTURE

Group 1 Cab



31. Remove screws (1) (4 used) and screws (3) (2 used).
Remove cover (2).


32. Disconnect connectors (6) (2 used).

33. Disconnect connectors (8) (3 used).

34. Disconnect connector (9).

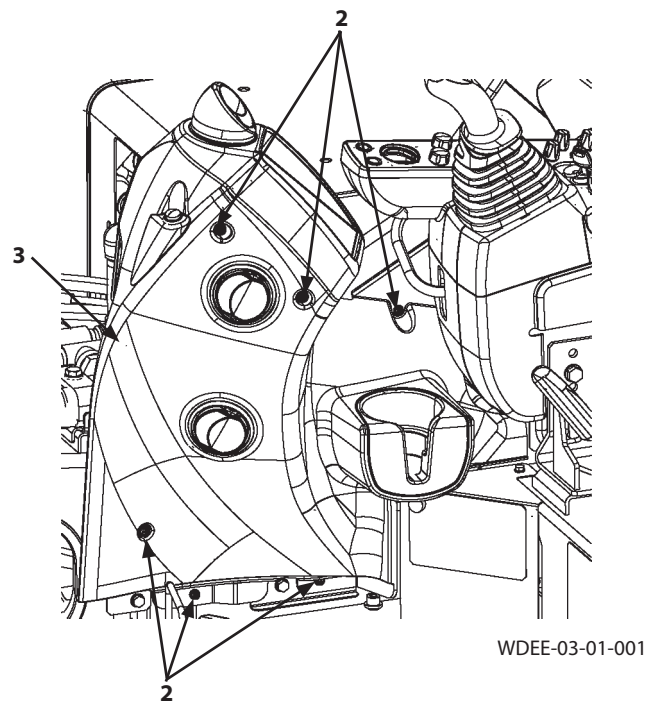
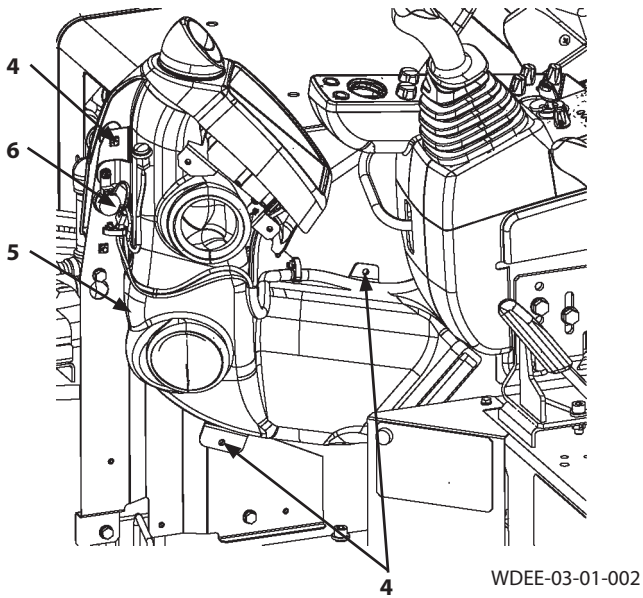
35. Remove clamps (5) (3 used).

36. Remove bolts, washers (4) (5 used). Remove the
bracket (7) assembly.

 : 13 mm

SECTION 3 UPPERSTRUCTURE

Group 1 Cab



29. Install buzzer (6) and duct (5) with screws (4) (3 used).
30. Install cover (3) with screws (2) (6 used).

SECTION 3 UPPERSTRUCTURE

Group 1 Cab

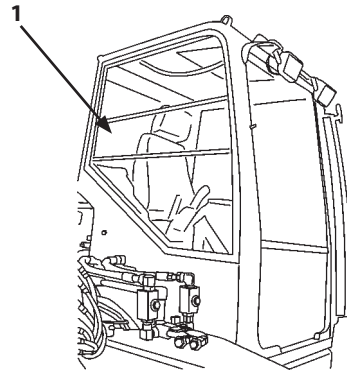
Procedure to Install Cab Glass

Procedures to Install Right-Hand Glass (1), Rear Glass (2), and Rear Left-Hand Sash

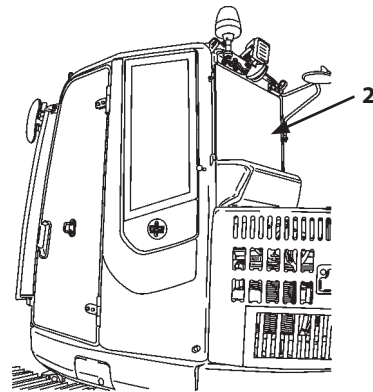
1. Cut off the residual adhesive from the cab (7) side by using a knife or similar.

In addition, remove the dam rubber completely.

 **NOTE:** Do not damage the cab (7) paint.

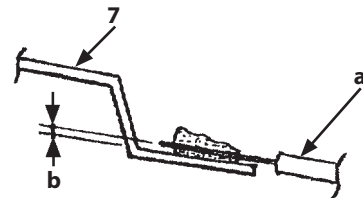


WBAT-06-01-099



WBAT-06-01-007

2. Clean the cutting edge of adhesive at cab (7) side by using white spirit.



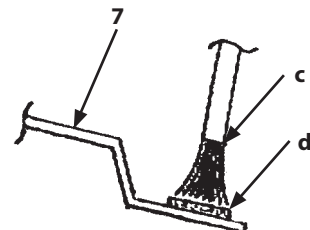
W1SE-02-01-036

IMPORTANT: Primer should be shaken for about 1 minute and mix thoroughly before opening the cap. After opening Primer, apply Primer as quickly as possible and close the cap immediately after using. After opening Primer, all the contents should be used within 180 days (or 2 hours with the cap off).

3. Apply Primer for paint (SUNSTAR #435-95) to the cutting edge of adhesive at cab (7) side by using a brush. Wait for about 15 minutes in order to let it dry by itself.

a- Knife

b- Cut off adhesive by 1 to 2 mm deep.



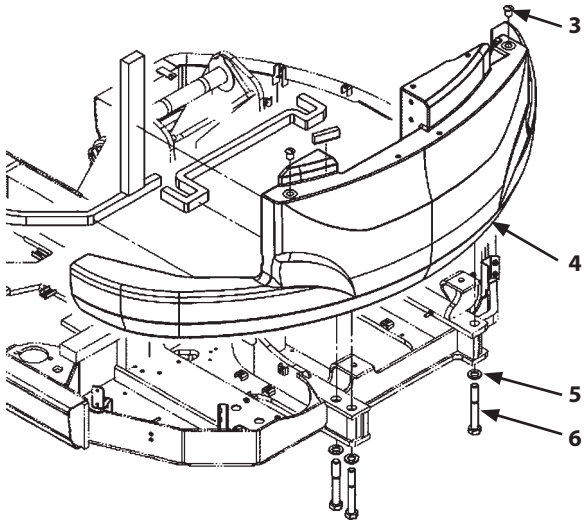
W1SE-02-01-038

c- Apply Primer by using a brush.

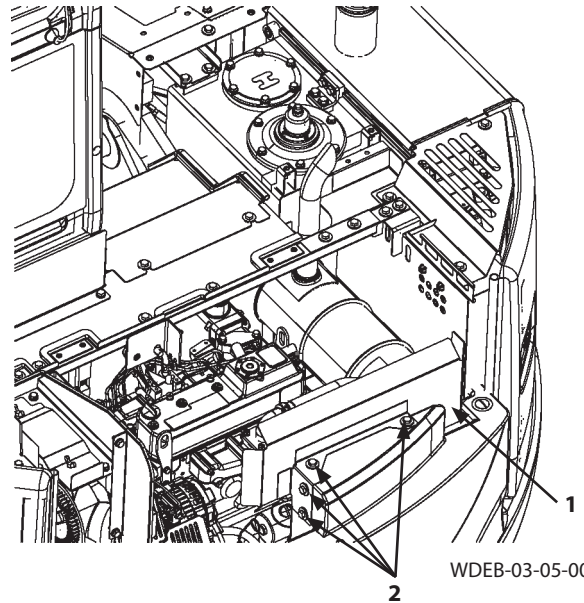
d- Cutting edge of adhesive at cab (7) side

SECTION 3 UPPERSTRUCTURE

Group 2 Counterweight



WDEB-03-02-003



WDEB-03-05-007

Installation

CAUTION: Counterweight (4) weight: 1440 kg (3180 lb)

1. Install the Freno-Linkbolt (A-24, M20, Pitch 3.0 mm) to the cap (3) mounting holes (2 places). Attach the wire ropes onto the Freno-Linkbolts. Hoist counterweight (4).
2. Install counterweight (4) with washers (5) (3 used) and bolts (6) (3 used).
🔧 : 41 mm
🔩 : 1300 N·m (130 kgf·m, 960 lbf·ft)
3. Remove the Freno-Linkbolts from the cap (3) mounting holes (2 places). Install caps (3) (2 used).

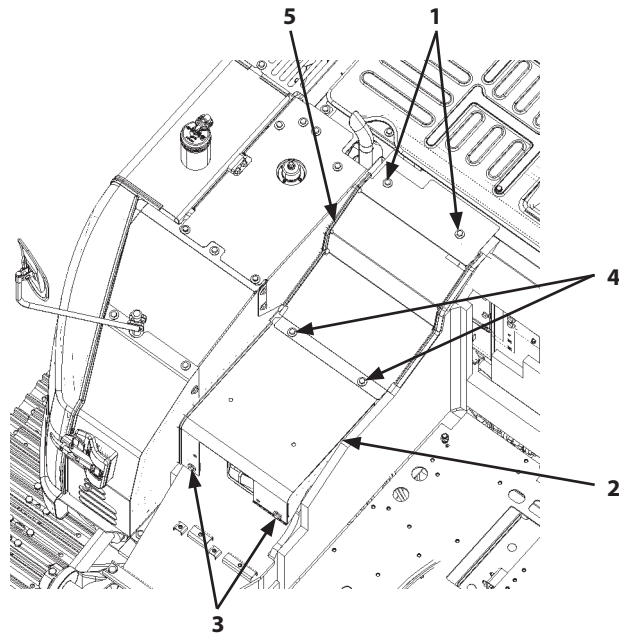
4. Install cover (1) with bolts, washers (2) (4 used).

🔧 : 17 mm

🔩 : 50 N·m (5 kgf·m, 37 lbf·ft)

SECTION 3 UPPERSTRUCTURE

Group 3 Main Frame




WDEE-04-03-001


17. Install the engine (Refer to W3-4-1.)
18. Install the cab. (Refer to W3-1-1.)
19. Install the front attachment. (Refer to W5-1-1.)
20. Install the boom cylinder. (Refer to W5-2-1.)
21. Bleed air from the hydraulic system. (Refer to W1-4-1.)

IMPORTANT: Check the hydraulic oil level. Start the engine and check for any oil leaks.


22. Install the counterweight. (Refer to W3-2-1.)


23. Install cover (2) with bolts, washers (3) (2 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

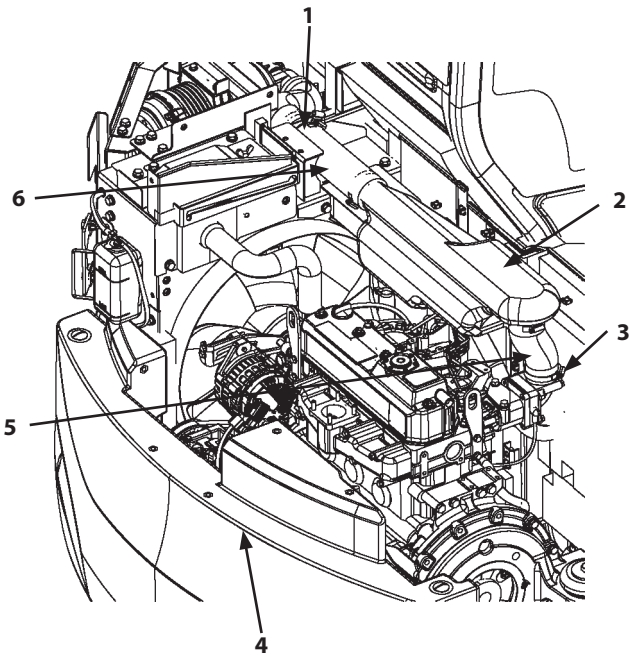
24. Install cover (5) with bolt, washers (1) (2 used) and bolts, washers (4) (2 used).

 : 17 mm

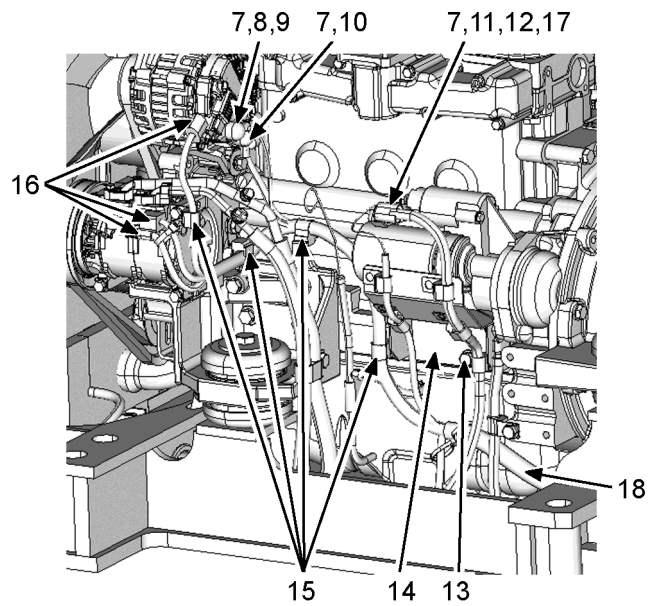
 : 50 N·m (5 kgf·m, 37 lbf·ft)

SECTION 3 UPPERSTRUCTURE

Group 4 Engine




WDEB-03-04-005




WDEB-03-04-006

33. Remove clamp (3). Disconnect the engine side of hose (5).
34. Remove clamp (1). Disconnect the air cleaner side of hose (6). Remove the resonator (2) assembly.
35. Remove counterweight (4). (Refer to W3-2-1.)
36. Remove the pump device. (Refer to W3-5-1.)


37. Disconnect connectors (16) (3 used). Remove caps (7) (3 used). Remove nut (8) and washer (9). Remove screw (10). Remove clamps (15) (4 used). Remove harness (18).

 : 13 mm

38. Remove nut (11) and washer (12). Disconnect terminal (17).

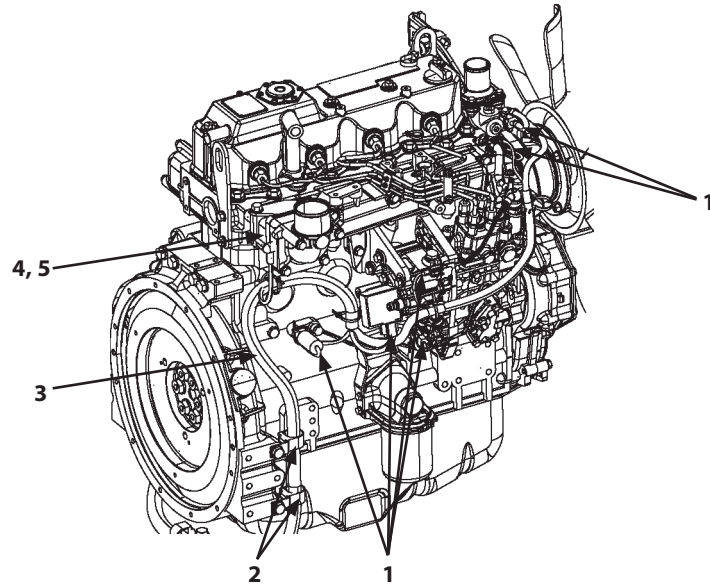
 : 13 mm

39. Remove bolts, washers (13) (2 used). Remove bracket (14).

 : 17 mm


SECTION 3 UPPERSTRUCTURE


Group 4 Engine



WDEB-03-04-016

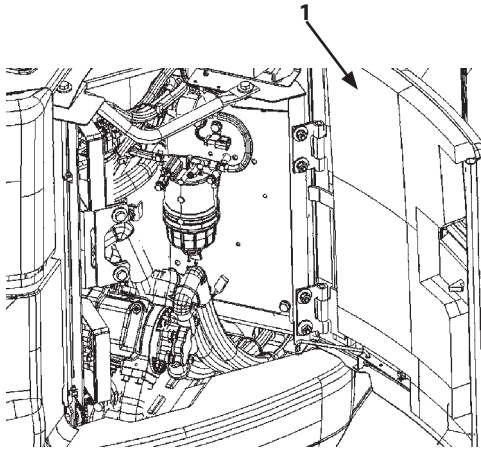
20. Install harness (3) with clamps (2) (2 used).
21. Connect connectors (1) (6 used).
22. Install nut (5) and cap (4).

 : 10 mm

 : 3 to 4 N·m (0.3 to 0.4 kgf·m, 2.2 to 3 lbf·ft)

SECTION 3 UPPERSTRUCTURE


Group 4 Engine




MDEC-07-008

61. Bleed air from the hydraulic system. (Refer to W1-4-1.)

- Pump Air Bleed Plug

 : 27 mm

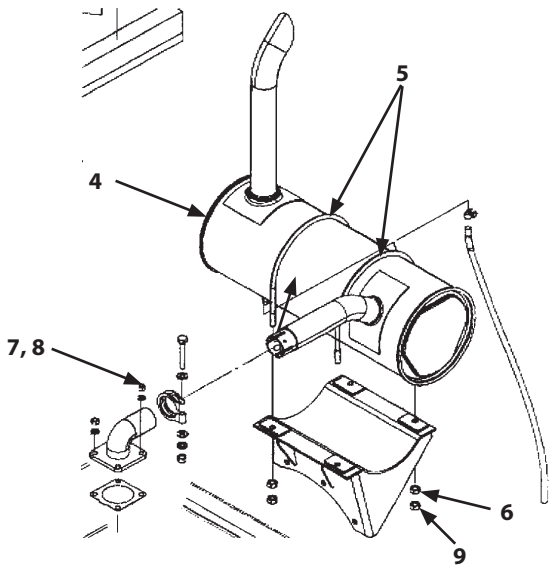
 : 95 N·m (9.5 kgf·m, 70 lbf·ft)

IMPORTANT: Check the hydraulic oil level. Start the engine and check for any oil leaks.

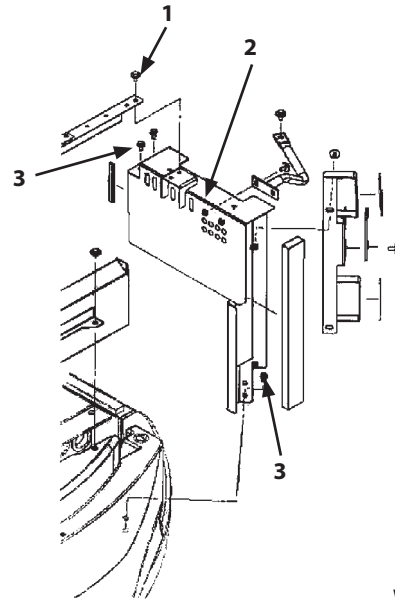
62. Close door (1).

SECTION 3 UPPERSTRUCTURE

Group 5 Pump Device





WDEB-03-05-010




WDEB-03-05-009


7. Install muffler (4) with U-bolts (5) (2 used) and nuts (6) (4 used).

 : 17 mm


 : 10 N·m (1 kgf·m, 7.4 lbf·ft)


8. Install nuts (9) (4 used).

 : 17 mm


 : 35 N·m (3.5 kgf·m, 26 lbf·ft)


9. Install spring washers (8) (4 used) and nuts (7) (4 used).

 : 13 mm

 : 26 ± 3 N·m (2.6 ± 0.3 kgf·m, 19 ± 2.2 lbf·ft)

10. Install the cover (2) assembly with bolts, washers (1) (2 used) and bolts, washers (3) (4 used).

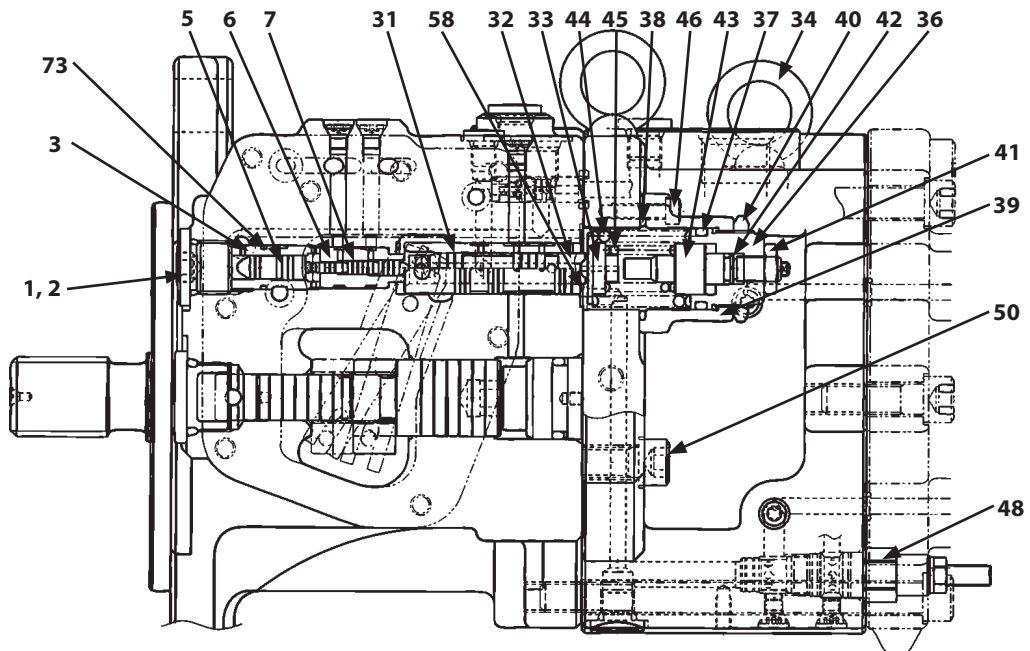
 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

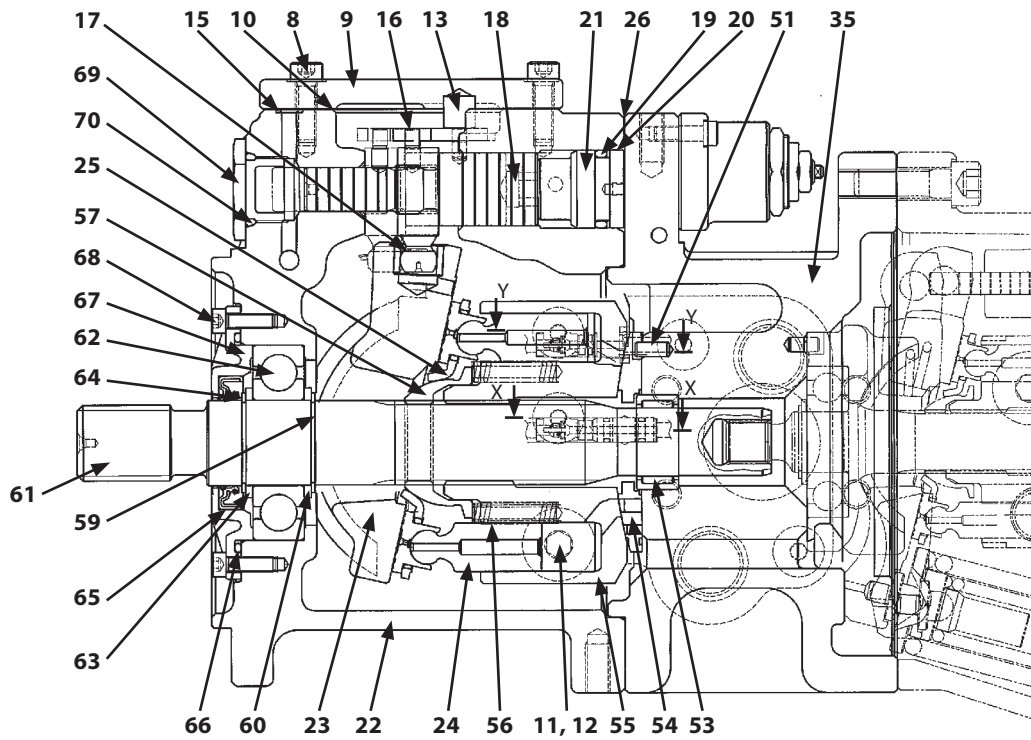
SECTION 3 UPPERSTRUCTURE

Group 5 Pump Device

Assembly of Main Pumps 1, 2



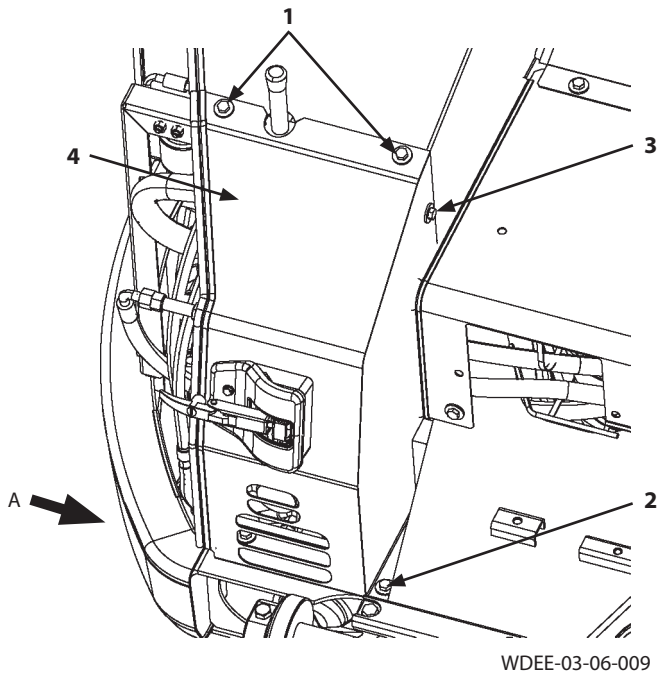
WDEB-03-05-002



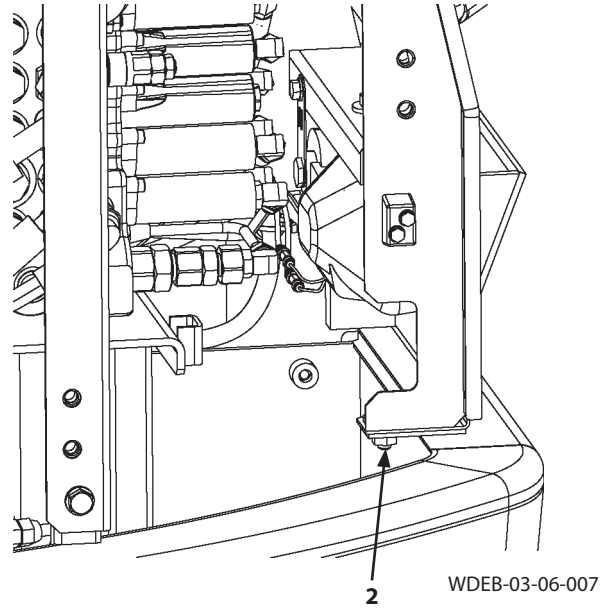
WDEA-03-08-007

SECTION 3 UPPERSTRUCTURE


Group 6 Control Valve



View A



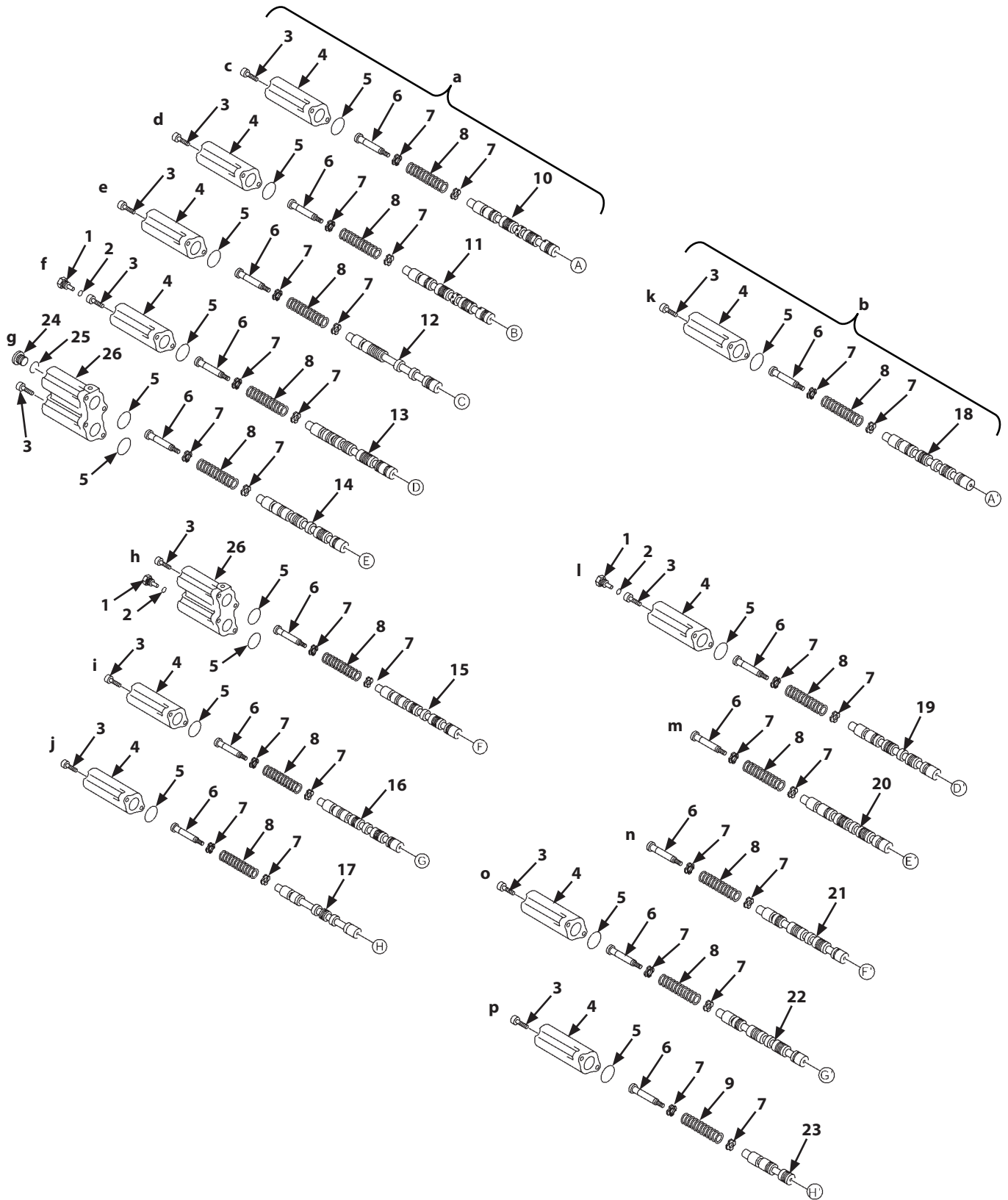
6. Remove bolts, washers (3), bolts, washers (1) (2 used) and bolts, washers (2) (2 used). Remove cover (4).

 : 17 mm

SECTION 3 UPPERSTRUCTURE

Group 6 Control Valve

Disassembly of Control Valve



WDDE-03-06-004

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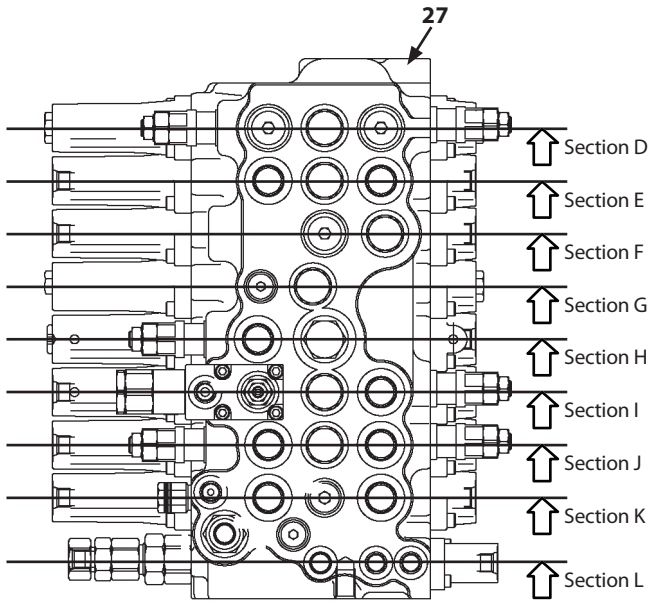


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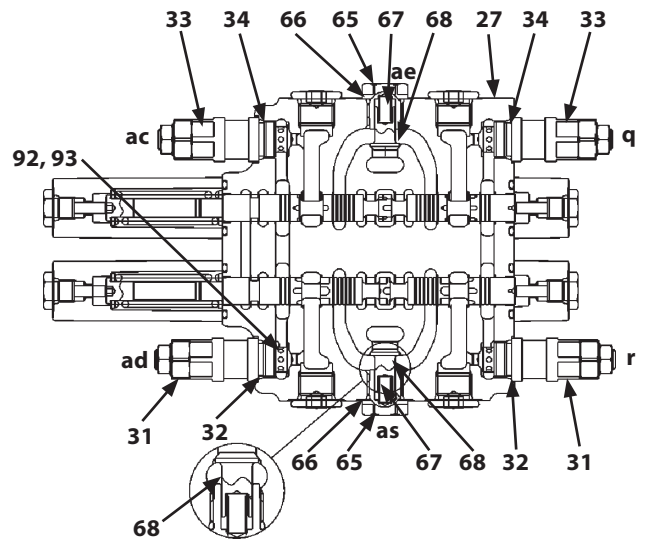
SECTION 3 UPPERSTRUCTURE

Group 6 Control Valve



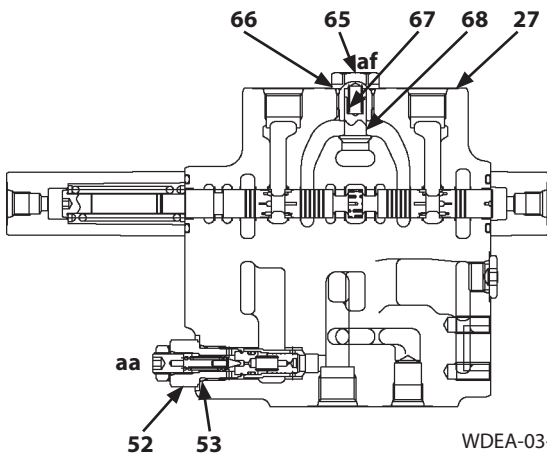
Right-Side View

WDEA-03-09-012



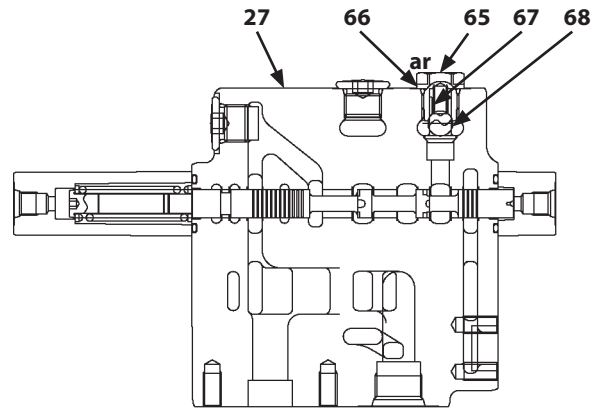
Section D

WDEE-03-06-003



Section E

WDEA-03-09-004



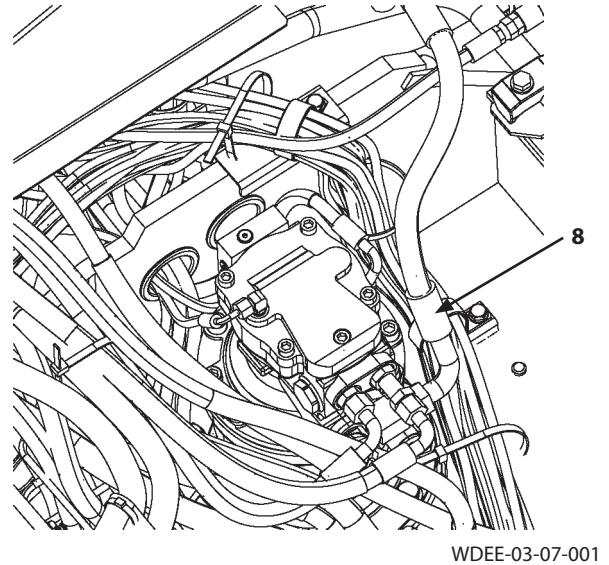
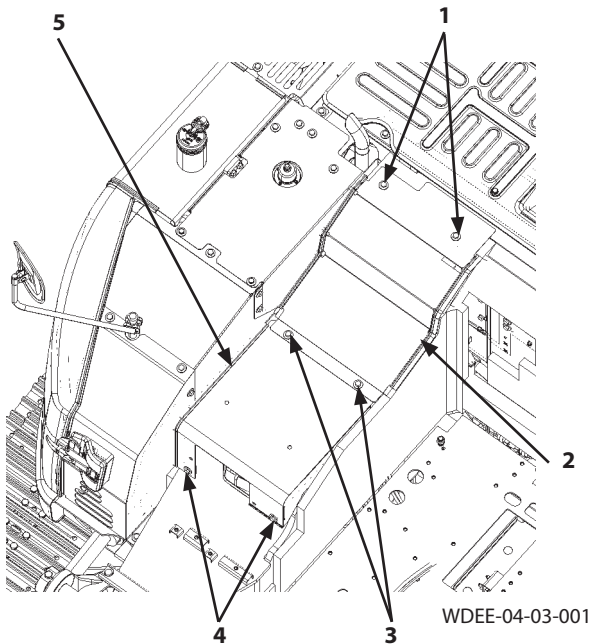
Section F

WDEA-03-09-005

SECTION 3 UPPERSTRUCTURE

Group 7 Swing Device

Removal and Installation of Swing Device



IMPORTANT: The hose and pipe contain hydraulic oil. When removing the hose and pipe, receive oils with a container in order to avoid spilling oils.


IMPORTANT: Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach an identification tag onto the connectors, hoses, and pipes for assembling. Connect the hoses and install the clips in case the clips which secure the hoses have been removed.

Removal


1. Set the machine position for inspection and maintenance. (Refer to W1-6-1.)

CAUTION: Bleed air from the hydraulic oil tank. (Refer to W1-4-1.)


2. Remove bolts, washers (1) (2 used).

 : 17 mm


3. Remove bolts, washers (3) (2 used). Remove cover (2).

 : 17 mm

4. Remove bolts, washers (4) (2 used). Remove cover (5).

 : 17 mm


5. Disconnect hose (8).


 : 36 mm

SECTION 3 UPPERSTRUCTURE

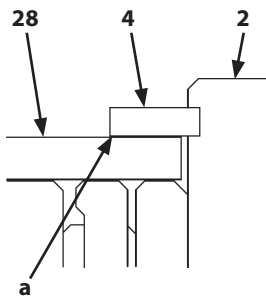
Group 7 Swing Device

9. Fit the matching marks made when disassembling and install ring gear (23) to housing (20) with socket bolts (13) (13 used).

 : 12 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)

IMPORTANT: Install retaining rings (4) (3 used) with the chamfered par (a) side facing to the plate (28) side.



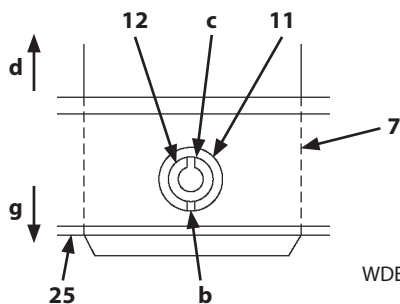
WBAT-06-01-006

a- Chamfered Part

10. Install inner rings (29) (3 used), needle bearings (5) (3 used), first stage planetary gears (6) (3 used), first stage sun gear (27), and plate (28) to first stage carrier (2). Install plate (28) with retaining rings (4) (3 used).
11. Install needle bearings (9) (3 used) to second stage planetary gears (10) (3 used). Install thrust plate (24), plates (8) (6 used), second stage planetary gears (10) (3 used), and pins (7) (3 used) to second stage carrier (25).

IMPORTANT: Replace spring pins (11, 12) (3 used for each) with the new ones. When installing, set slit (b) of spring pin (11) and slit (c) of spring pin (12) oppositely (180°). When installing, face slit (b) of spring pin (11) and slit (c) of spring pin (12) to swing motor side (d) and machine mounting side (g).

12. Fit the holes of second stage carrier (25) and pin (7) (3 used). Install spring pins (11, 12) (3 used for each).



WDEB-03-07-005

b- Slit of Spring Pin (11)
c- Slit of Spring Pin (12)


d- Swing Motor Side
g- Machine Mounting Side


13. Install the second stage carrier (25) assembly to shaft (17).
14. Install second stage sun gear (26) to second stage carrier (25).
15. Install the first stage carrier (2) assembly to second stage carrier (26).
16. Add hydraulic oil through drain hole (e) of the swing reduction gear.

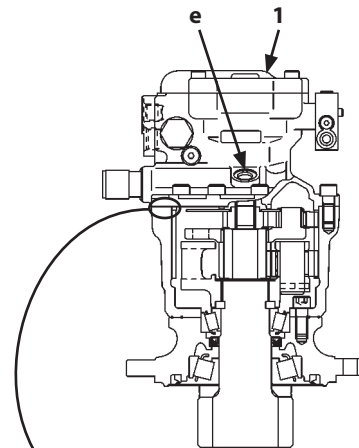
 NOTE: Amount of oil: 2 L

IMPORTANT: When installing the motor, release drain hole (e) in order to protect the oil seal.

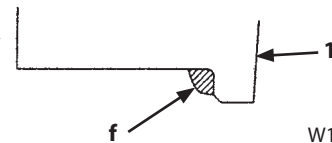
17. Apply THREEBOND #1215 (f) onto the stepped part at the swing motor (1) side. Fit the matching marks made when disassembling and install swing motor (1) to ring gear (23) with socket bolts (3) (8 used).

 : 12 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)



WBAT-06-01-002



W1CD-02-06-015

e- Drain Hole

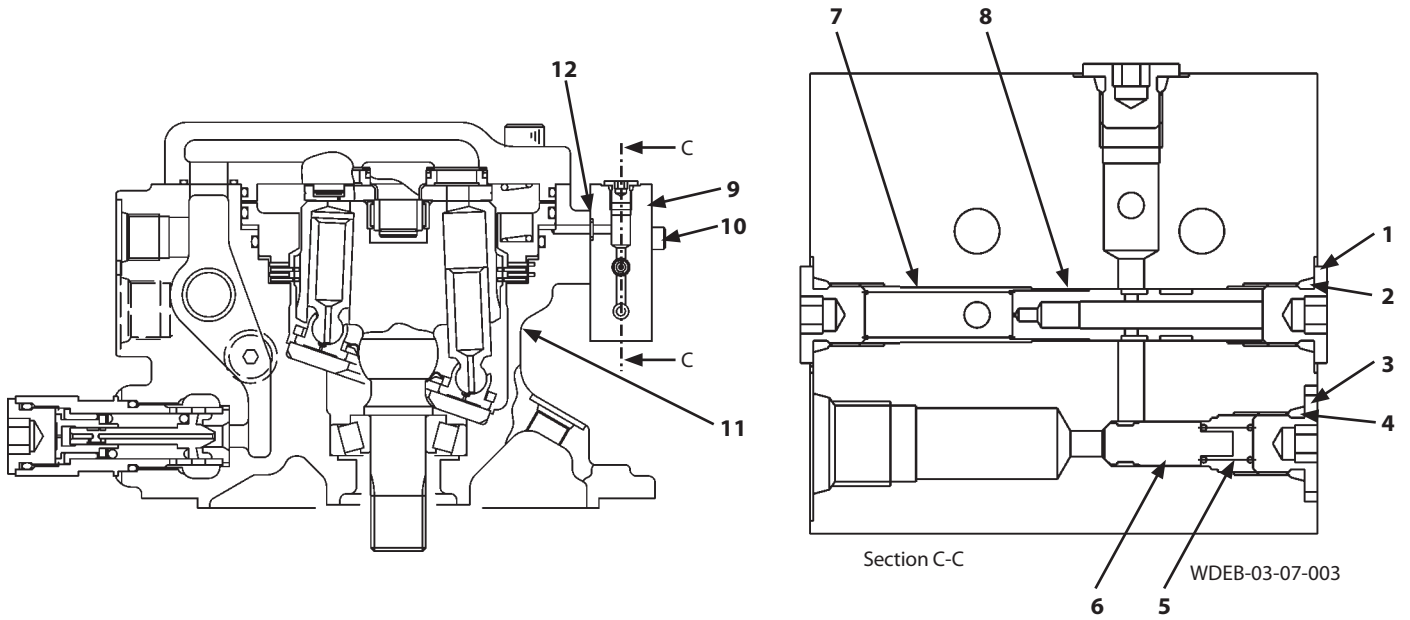
f- THREEBOND #1215

18. Install a cap to drain hole (e) of the swing device.

SECTION 3 UPPERSTRUCTURE

Group 7 Swing Device

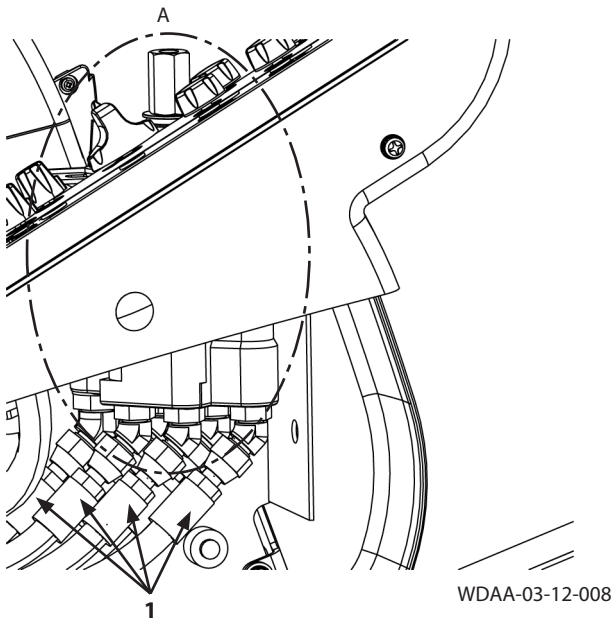
Assembly of Valve Block



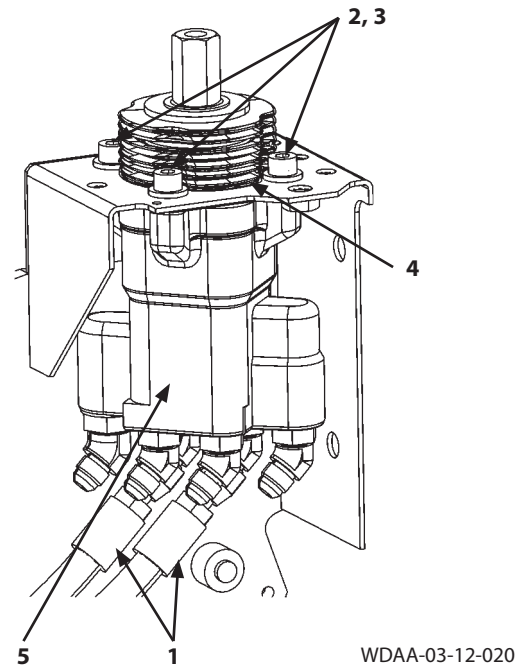
- | | | | |
|-----------|-----------|-----------|--------------------------|
| 1- Plug | 4- O-Ring | 7- Spring | 10- Socket Bolt (2 Used) |
| 2- O-Ring | 5- Spring | 8- Spool | 11- Housing |
| 3- Plug | 6- Spool | 9- Block | 12- O-Ring (2 Used) |

SECTION 3 UPPERSTRUCTURE

Group 8 Pilot Valve





Detail A




Installation


1. Install all removed adapters to pilot valve (5).
2. Install pilot valve (5) and boot (4) with washers (3) (4 used) and socket bolts (2) (4 used).

 : 6 mm

 : 20 N·m (2 kgf·m, 15 lbf·ft)

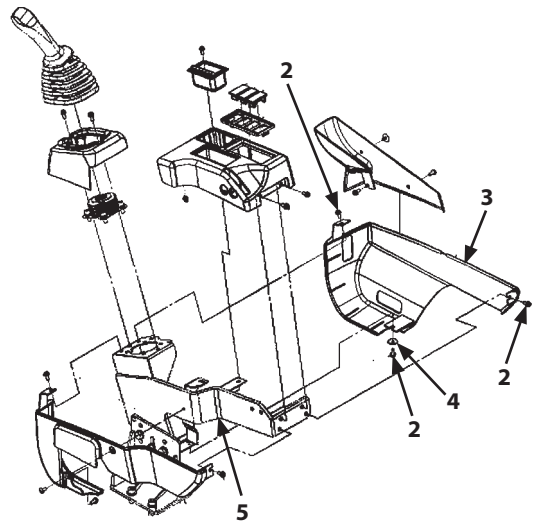
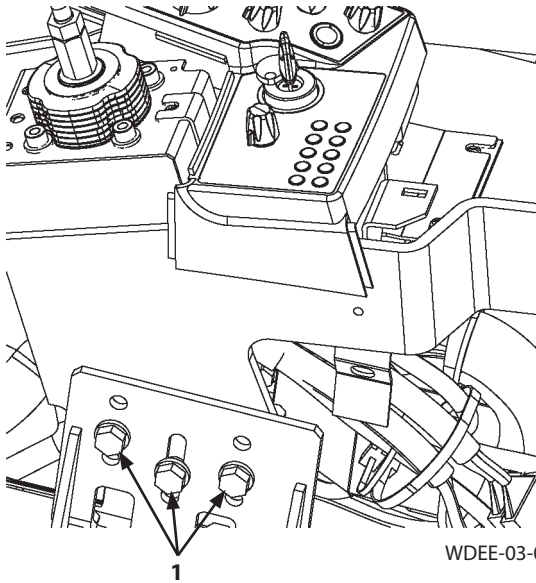
3. Connect hoses (1) (6 used).

 : 17 mm


 : 25 N·m (2.5 kgf·m, 18.5 lbf·ft)

SECTION 3 UPPERSTRUCTURE


Group 8 Pilot Valve



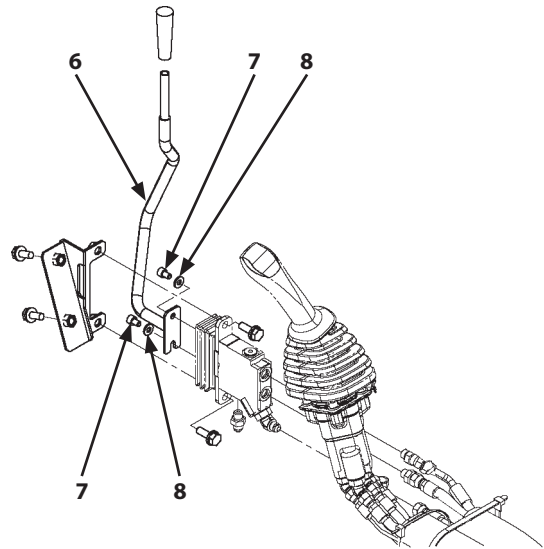
9. Remove bolts, washers (1) (3 used). Tilt the bracket (5) assembly with the cover (3) side up.

 : 17 mm

10. Remove socket bolts (7) (2 used) and washers (8) (2 used). Remove lever (6).

 : 6 mm

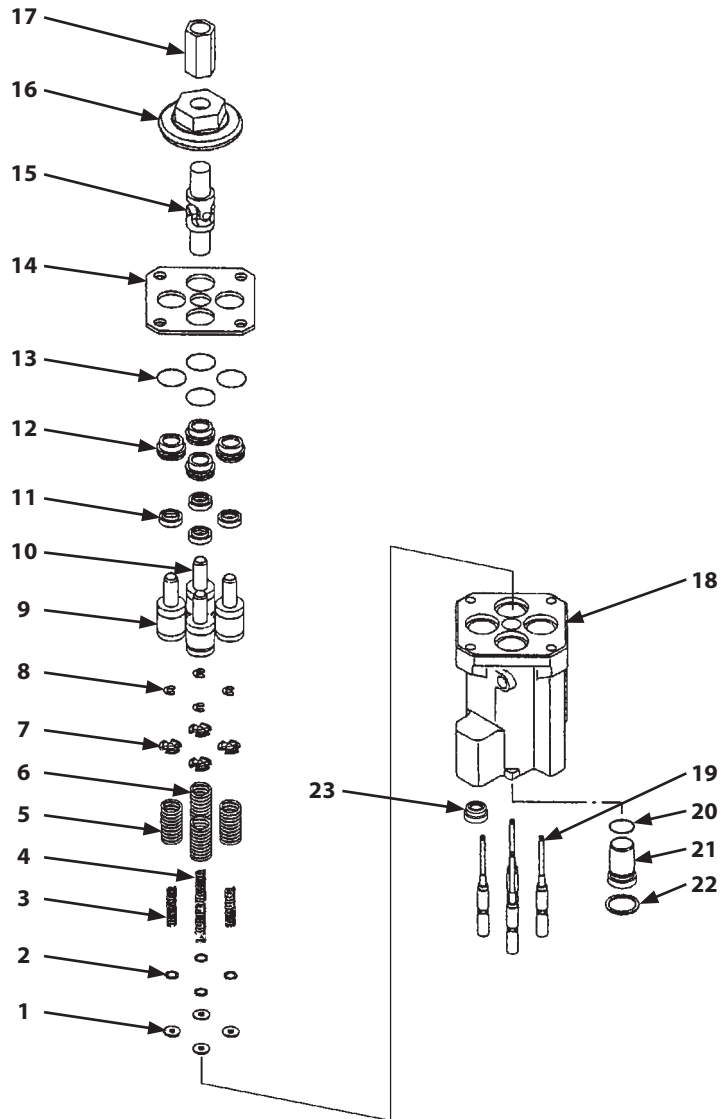
11. Remove screws (2) (3 used) and washer (4). Remove cover (3).



SECTION 3 UPPERSTRUCTURE

Group 8 Pilot Valve

Disassembly of Pilot Valves (Right and Left)



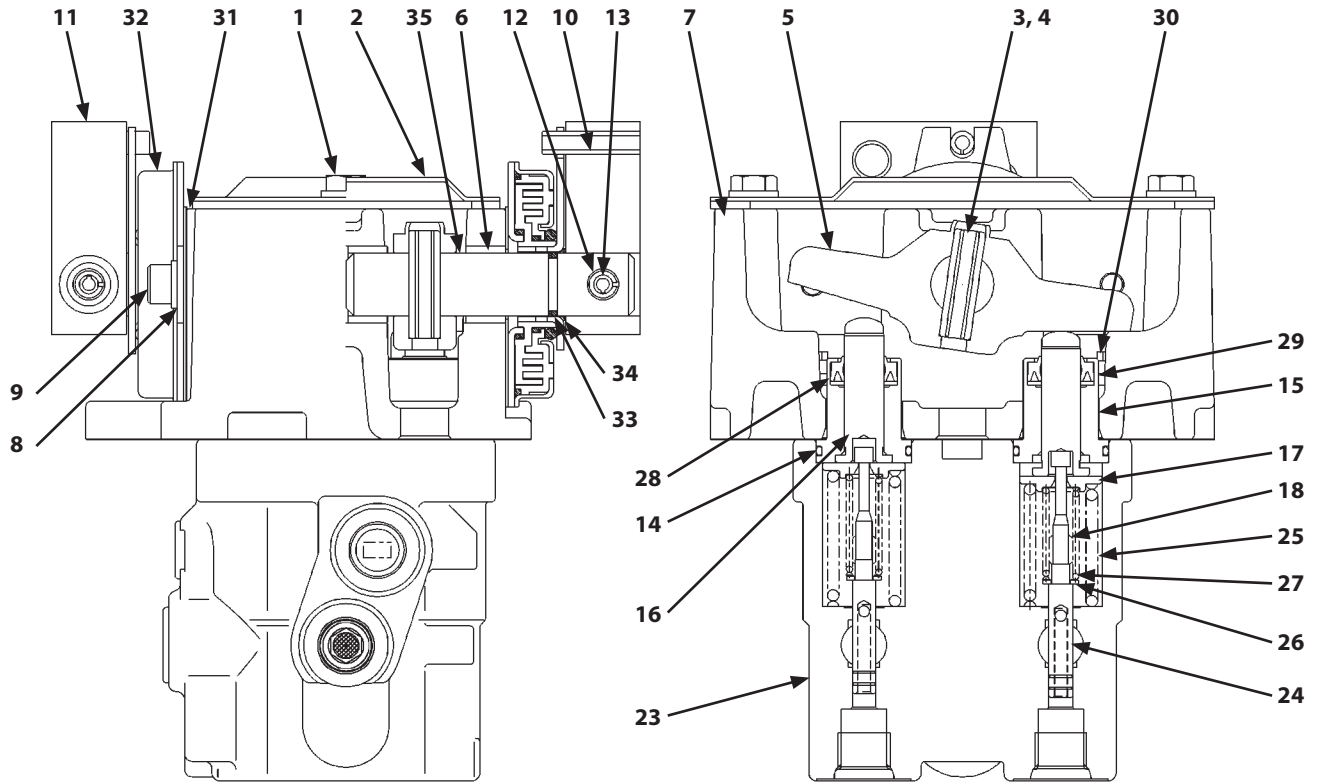
WDAA-03-12-021

- | | | | |
|----------------------------|----------------------------|---------------------|--------------------|
| 1- Spacer (4 Used) | 7- Spring Guide (4 Used) | 13- O-Ring (4 Used) | 19- Spool (4 Used) |
| 2- Shim (Several) | 8- Retaining Ring (4 Used) | 14- Plate | 20- O-Ring |
| 3- Balance Spring (2 Used) | 9- Pusher (2 Used) | 15- Universal Joint | 21- Plug |
| 4- Balance Spring (2 Used) | 10- Pusher (2 Used) | 16- Cam | 22- Retaining Ring |
| 5- Return Spring (2 Used) | 11- Oil Seal (4 Used) | 17- Screw Joint | 23- Filter |
| 6- Return Spring (2 Used) | 12- Sleeve (4 Used) | 18- Casing | |

SECTION 3 UPPERSTRUCTURE


Group 8 Pilot Valve

Assembly of Travel Pilot Valve



WDAA-03-12-025

- | | | | |
|---------------------------|-----------------------------|----------------------|----------------------------|
| 1- Bolt, Washer (2 Used) | 10- Spring Pin (2 Used) | 19- *O-Ring (2 Used) | 28- Oil Seal (4 Used) |
| 2- Cover | 11- Bracket (2 Used) | 20- *Plug (2 Used) | 29- Spring Washer (2 Used) |
| 3- Spring Pin (2 Used) | 12- Spring Pin (2 Used) | 21- *Plug (2 Used) | 30- Socket Bolt (2 Used) |
| 4- Spring Pin (2 Used) | 13- Spring Pin (2 Used) | 22- *O-Ring (2 Used) | 31- Rubber Seat (2 Used) |
| 5- Cam (2 Used) | 14- O-Ring | 23- Casing | 32- Damper (2 Used) |
| 6- Bushing (4 Used) | 15- Bushing (4 Used) | 24- Spool (4 Used) | 33- O-Ring (2 Used) |
| 7- Holder | 16- Pusher (4 Used) | 25- Spring (4 Used) | 34- O-Ring (2 Used) |
| 8- Spring Washer (4 Used) | 17- Spring Guide (4 Used) | 26- Spacer (4 Used) | 35- Pin (2 Used) |
| 9- Socket Bolt (4 Used) | 18- Balance Spring (4 Used) | 27- Shim (12 Used) | |

 **NOTE:** As for the parts with mark *, refer to W3-8-6-1.

SECTION 3 UPPERSTRUCTURE

Group 8 Pilot Valve

Assembly of Pilot Valve

IMPORTANT: Before assembling, apply hydraulic oil onto parts in order to prevent them from seizing.

IMPORTANT: The pilot valve is the susceptible hydraulic component to contamination. Keep the parts clean when assembling.

IMPORTANT: Install shims (01) as the same condition before disassembling.

1. Insert spacer (00), shims (01) (3 used), and balance spring (02) to spool (15B) in sequence.

IMPORTANT: Install spring guide (03) with the stepped part down.

2. Compress balance spring (02) by hand. Install spring guide (03) to spool (15B).

IMPORTANT: Before installing the parts to holder (06) and casing (15A), apply hydraulic oil.

3. Secure casing (15A) in a vise. Install return spring (16) to casing (15A).

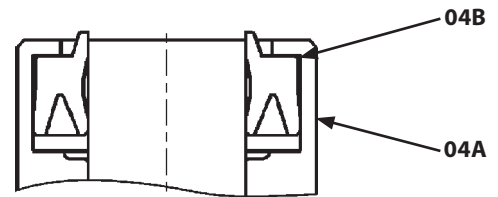
IMPORTANT: Install the spool (15B) assembly to the original port before disassembling.

4. Install the spool (15B) assembly to casing (15A) by rotating.

IMPORTANT: Do not deform and damage the sliding surface when installing oil seal (04B).

IMPORTANT: Check the direction to install oil seal (04B).

5. Apply grease (NOK KLUBER #L60) onto oil seal (04B). Install oil seal (04B) to bushing (04A).



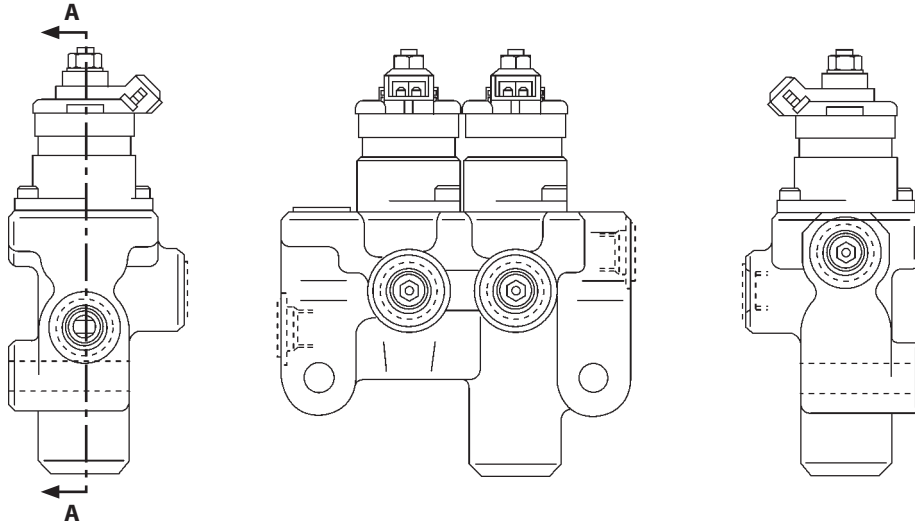
WDAD-03-11-003

6. Apply grease (NOK KLUBER #L60) onto the sliding surface of bushing (04A) and O-ring (04C). Install O-ring (04C) and pusher (04D) to bushing (04A).
7. Install the pusher (04D) assembly to casing (15A).
8. Install other spools (15B) and pushers (04D) in the same way as step 1 to step 7.

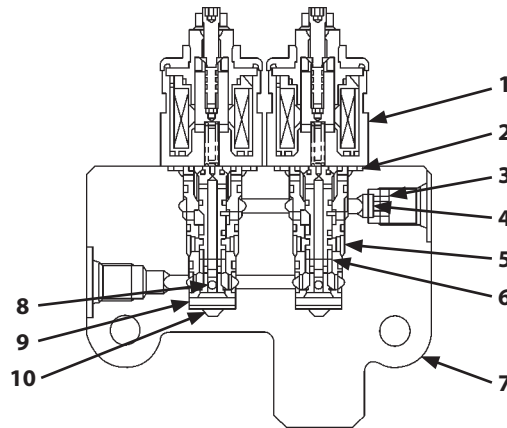
SECTION 3 UPPERSTRUCTURE

Group 9 Solenoid Valve

Structure of 2-Spool Solenoid Valve Unit



W8HT-02-03-008



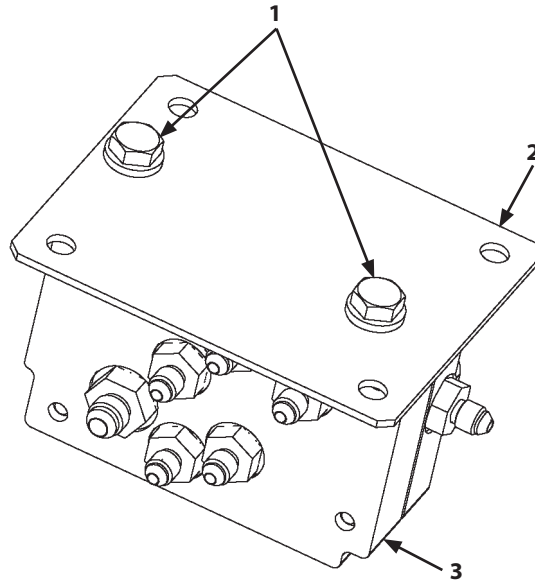
Cross Section A-A

W8HT-02-03-009

No.	Part Name	Q'ty	Wrench Size (mm)	Tightening Torque			Remark
				N·m	(kgf·m)	(lbf·ft)	
1	Solenoid	2					
2	O-ring	2					
3	Plug	1					
4	Filter	1					
5	Sleeve	2					
6	Spool	2					
7	Body	1					
8	Orifice	2					
9	Plate	2					
10	Wave spring	2					

SECTION 3 UPPERSTRUCTURE


Group 10 Shockless Valve




WDEE-03-10-001

Installation

1. Install all removed adapters to shockless valve (3).
2. Install bracket (2) with bolts, washers (1) (2 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)

SECTION 4

UNDERCARRIAGE

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Removal and Installation of Swing Bearing	W4-1-1-1
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Assembly of Swing Bearing.....	W4-1-2-4

Group 2 Travel Device

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Disassembly of Travel Motor	W4-2-3-1
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Assembly of Brake Valve	W4-2-4-4
Precautions for Using Floating Seal.....	W4-2-5-1

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Replacement of Body	W4-3-2-6

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Removal and Installation of Track Adjuster	W4-4-1-1
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Assembly of Track Adjuster	W4-4-2-5

Group 5 Front Idler

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Disassembly of Front Idler	W4-5-2-1
Assembly of Front Idler.....	W4-5-2-4
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Group 6 Upper and Lower Rollers

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Assembly of Lower Roller.....	W4-6-3-3
Precautions for Using Floating Seal.....	W4-6-4-1

Group 7 Track

Removal and Installation of Track.....	W4-7-1-1
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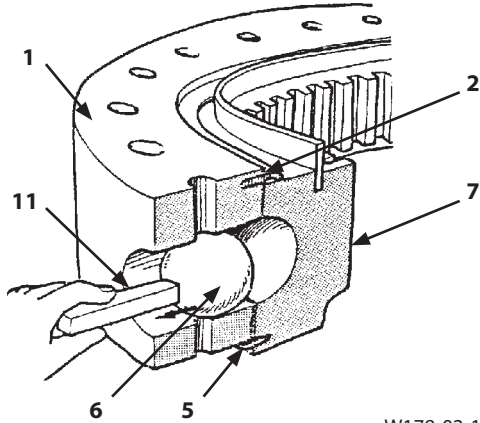
Group 8 Blade Cylinder

Removal and Installation of Blade Cylinder	W4-8-1-1
Disassembly of Blade Cylinder	W4-8-2-1
Assembly of Blade Cylinder.....	W4-8-2-4

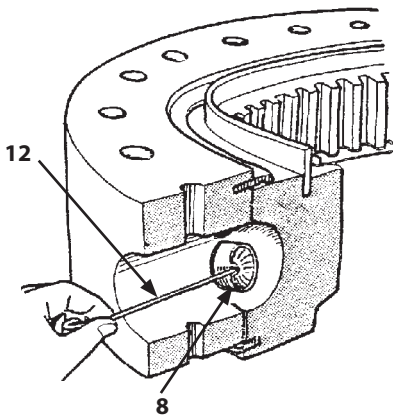
SECTION 4 UNDERCARRIAGE

Group 1 Swing Bearing


5. Remove balls (6) (79 used) and supports (8) (79 used) from the plug (4) hole while rotating outer race (1).



W178-02-11-197



W178-02-11-198

 **NOTE:** Remove ball (6) by using magnet (11). Use wire (12) and remove support (8).

6. Remove seals (2, 5) from outer race (1) and inner race (7) by using a scrapper.

SECTION 4 UNDERCARRIAGE

Group 2 Travel Device

Assembly of Travel Reduction Gear

IMPORTANT: Before assembling, apply gear oil onto parts in order to prevent them from seizing.

CAUTION: Ring gear (12) weight: 20 kg (45 lb)

1. Install ring (5) to ring gear (12). Install ball bearings (4, 6) to ring gear (12) by using a bar and a plastic hammer.

IMPORTANT: Handle floating seal (3) with care. (Refer to W4-2-5.)

2. Install floating seal (3) to ring gear (12).

CAUTION: Travel motor (1) weight: 41 kg (91 lb)


3. Place travel motor (1) with the brake valve side down.


IMPORTANT: Handle floating seal (2) with care. (Refer to W4-2-5.)

4. Install floating seal (2) to travel motor (1).
5. Install eyebolts (M16, Pitch 2.0 mm) (2 used) to the sprocket (33) mounting holes of ring gear (12). Attach nylon slings onto the eyebolts. Hoist and fit ring gear (12) to travel motor (1).
6. Install the ring gear (12) assembly to travel motor (1) by using a bar and a plastic hammer.


CAUTION: Sprocket (33) weight: 24 kg (53 lb)

7. Apply LOCTITE #262 onto bolts (32) (16 used).
8. Install sprocket (33) to ring gear (12) with bolts (32) (16 used).

 : 24 mm

 : 270 N·m (27 kgf·m, 200 lbf·ft)

9. Install bearing nut (7) to travel motor (1).
 - After tightening bearing nut (7) with the force (170 N·m (17 kgf·m, 125 lbf·ft)), rotate sprocket (33) both clockwise and counterclockwise by 4 to 5 turns. Tap bearing nut (7) by using a hammer and tighten it with the force (170 N·m (17 kgf·m, 125 lbf·ft)) again. Repeat these works two times.
 - Check the positions where the claws of lock plate (31) mesh with the outer surface of bearing nut (7). Install lock plate (31).
 - If the claws of lock plate (31) do not mesh correctly, tighten bearing nut (7) again.
 - Install thrust plates (8) (2 used) to other two places.
10. Install rings (10) (4 used), needle bearings (11) (4 used), and planetary gears (9) (4 used) to travel motor (1).
11. Install thrust plate (16) to travel motor (1) with flash bolts (17) (4 used).

 : 21 N·m (2.1 kgf·m, 15.5 lbf·ft)

SECTION 4 UNDERCARRIAGE

Group 2 Travel Device


IMPORTANT: Install valve plate (3) with the thrust side of the brass up.


IMPORTANT: Apply grease onto the back side of valve plate (3) in order not to prevent it from dropping down.

19. Fit spring pin (1) of brake valve assembly (26) to valve plate (3). Install valve plate (3) to brake valve assembly (26).

IMPORTANT: Take care not to drop and damage valve plate (3) when installing.

20. Fit the holes for bolt (2). Install brake valve assembly (26) to housing (12). At this time, as brake piston (6) is not completely pushed in housing (12), the clearance between brake valve assembly (26) and housing (12) is approx. 10 mm (0.39 in). Install brake valve assembly (26) while pushing brake piston (6) into and tightening socket bolts (2) (6 used) evenly.

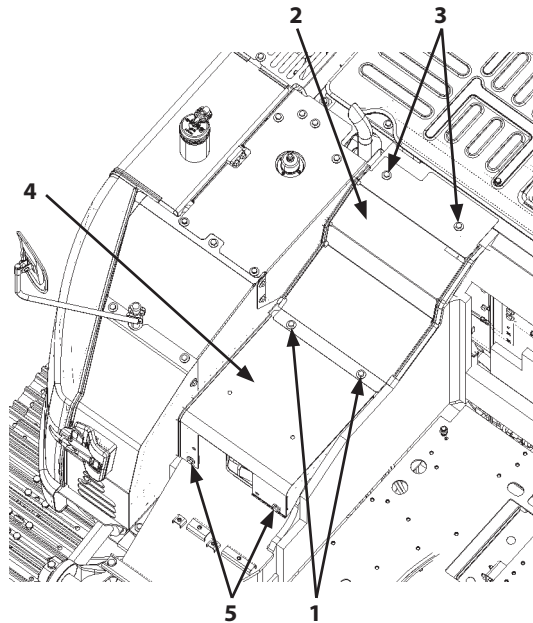
 : 12 mm

 : 140 N·m (14 kgf·m, 103 lbf·ft)

SECTION 4 UNDERCARRIAGE

Group 3 Center Joint

Removal and Installation of Center Joint



WDEE-04-03-001

IMPORTANT: The hose and pipe contain hydraulic oil. When removing the hose and pipe, receive oils with a container in order to avoid spilling oils.

IMPORTANT: Cap the open ends in case the hoses and pipes have been disconnected. In addition, attach an identification tag onto the connectors, hoses, and pipes for assembling. Connect the hoses and install the clips in case the clips which secure the hoses have been removed.

Removal


1. Set the machine position for inspection and maintenance. (Refer to W1-6-1.)

CAUTION: Bleed air from the hydraulic oil tank. (Refer to W1-4-1.)


2. Remove bolts, washers (1) (2 used).

 : 17 mm

3. Remove bolts, washers (3) (2 used). Remove cover (2).

 : 17 mm

4. Remove bolts, washers (5) (2 used). Remove cover (4).

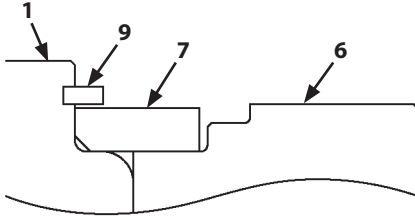
 : 17 mm

SECTION 4 UNDERCARRIAGE

Group 3 Center Joint


IMPORTANT: Install ring (7) with the chamfered surface facing to the spindle (1) side.


4. Install ring (7) and retaining ring (9) to body (6).

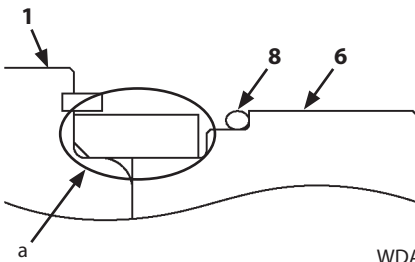


WDAD-04-03-005

5. Install O-ring (8) to spindle (1).
6. Apply hydraulic oil onto sliding surface (a) of ring (7). Install cover (10) to body (6) with bolts, washers (11) (4 used).

 : 17 mm

 : 50 N·m (5 kgf·m, 37 lbf·ft)



WDAD-04-03-006


a- Ring (7) Sliding Part

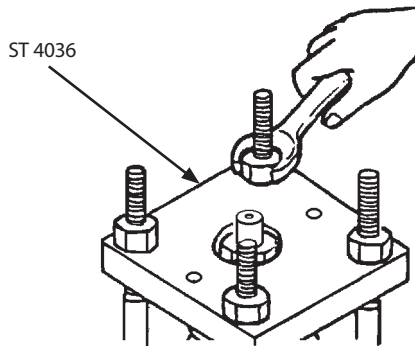
SECTION 4 UNDERCARRIAGE

Group 4 Track Adjuster

CAUTION: Plate (ST 4036) weight: 34 kg (75 lb)

4. Install washer (11) to cylinder (1). Install the plate (ST 4036) to washer (11).

 : 46 mm



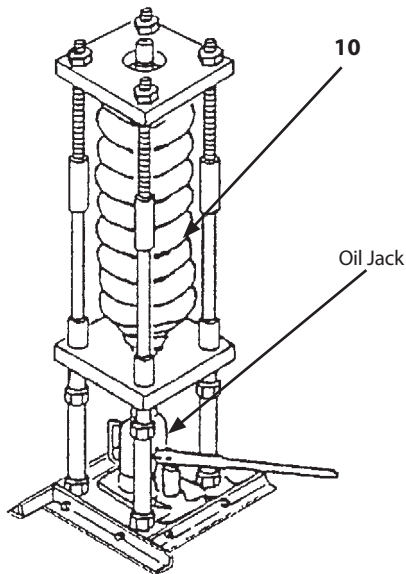
W105-03-04-012

5. Operate the oil jack. Compress spring (10) to the specified length.

Specified length:

Steel Crawler: 267 mm (10.5 in)


Rubber Crawler: 242 mm (9.5 in)




W105-03-04-026


6. Install nut (12) and valve (13) to cylinder (1). Install plug (14) to nut (12).

Nut (12)


 : 60 mm


Plug (14)

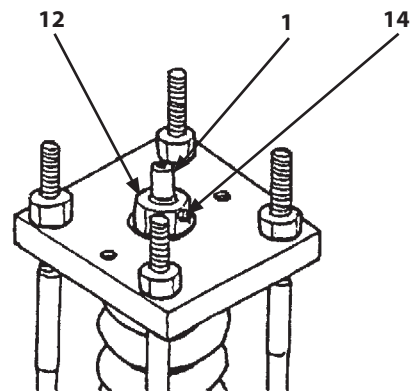
 : 5 mm

 : 14.8 N·m (1.5 kgf·m, 11 lbf·ft)

Valve (13)

 : 24 mm


 : 90 N·m (9 kgf·m, 66 lbf·ft)

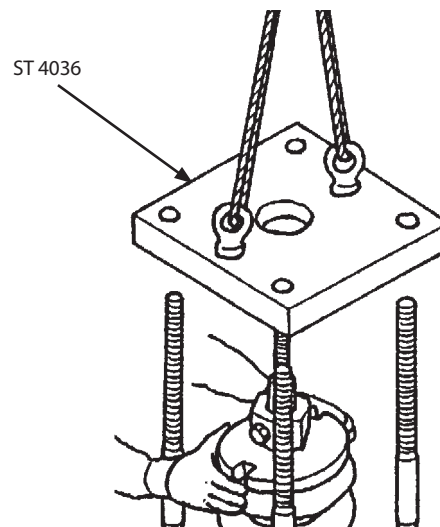


W105-03-04-014

CAUTION: Plate (ST 4036) weight: 34 kg (75 lb)

7. Loosen the oil jack. Remove the nuts. Remove the plate (ST 4036).

 : 46 mm



W105-03-04-011

SECTION 4 UNDERCARRIAGE

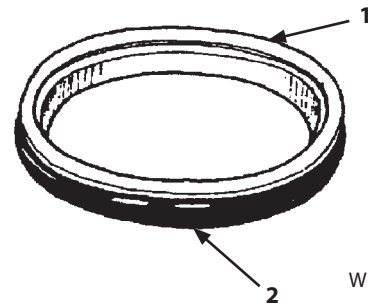
Group 5 Front Idler

Precautions for Using Floating Seal

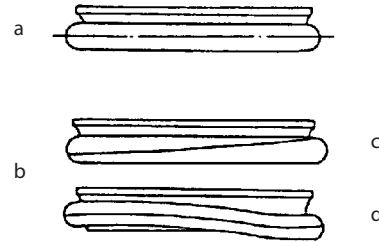
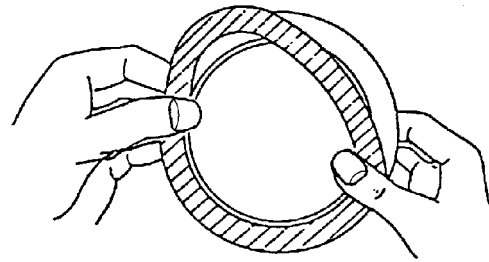
1. In general, replace the floating seal with a new one after disassembling.

If the floating seal is required to be reused, follow these procedures:

- Keep seal rings together as a matched set with seal ring (1) surfaces together. Apply oil onto sliding surface (e) of seal ring (1).
 - Check sliding surface (e) of seal ring (1) for scuffing, scoring, corrosion, deformation, or uneven wear. Check the step part of seal ring (1).
 - Check O-ring (2) for tears, breaks, deformation, or hardening.
2. If incorrectly assembled, oil leakage or damage will occur. Be sure to do the following to prevent trouble.
- Clean the floating seal and seal mounting bores with cleaning solvent. Use a wire brush to remove mud, rust, or dirt from seal mounting bores. After cleaning, thoroughly dry parts with compressed air.
 - Clean seal ring (1) and O-ring (2) mounting bores. Check the bore surface for scuffing or scoring by touching the surface with finger.
 - After installing the floating seal, check that O-ring (2) is not twisted, and that it is installed correctly on seal ring (1).
 - After installing the floating seal, check that O-ring (2) and seal ring sliding surface (e) is parallel with seal mating surface (f) by measuring the distances (e) and (f) at point (A) and (B), as illustrated. If these distances differ, correct O-ring (2) seating.

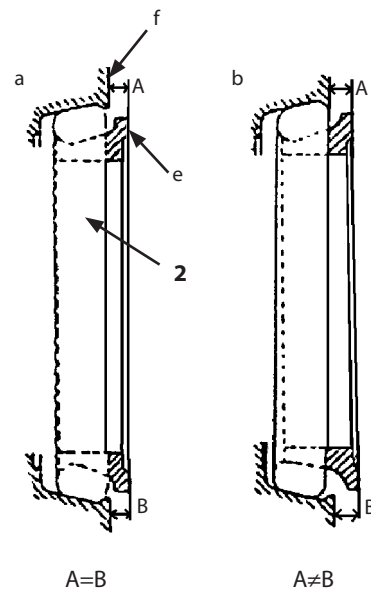


W178-02-11-001



W178-02-11-002

- a - Correct
- b - Incorrect
- c - Twist of O-Ring
- d - Bend of O-Ring



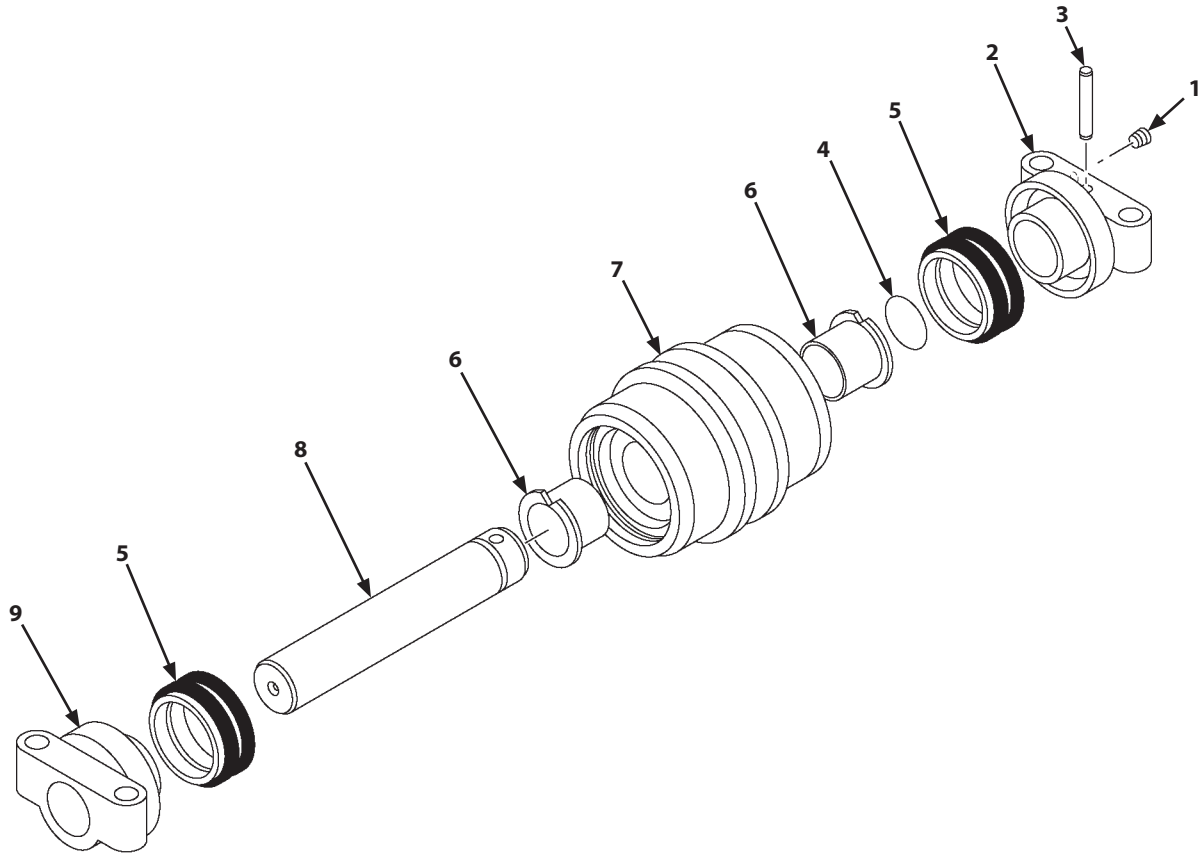
W178-02-11-003

- a - Correct
- b - Incorrect
- e - Sliding Surface
- f - Seal Mating Surface

SECTION 4 UNDERCARRIAGE

Group 6 Upper and Lower Rollers

Disassembly of Lower Roller



WDEA-04-05-001

1- Plug
2- Collar
3- Pin

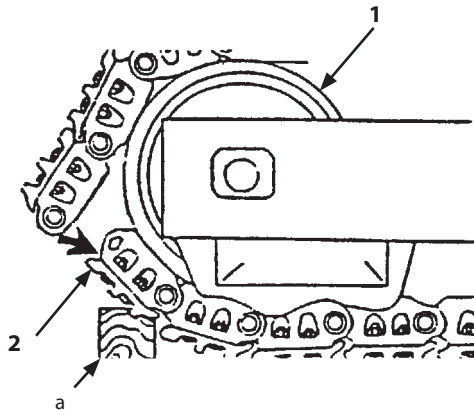
4- O-Ring
5- Floating Seal (2 Used)

6- Bushing (2 Used)
7- Roller

8- Axle
9- Collar

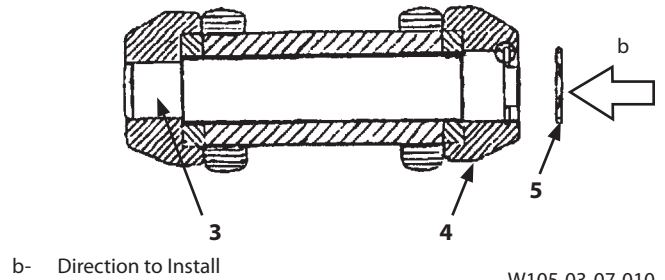
SECTION 4 UNDERCARRIAGE

Group 7 Track

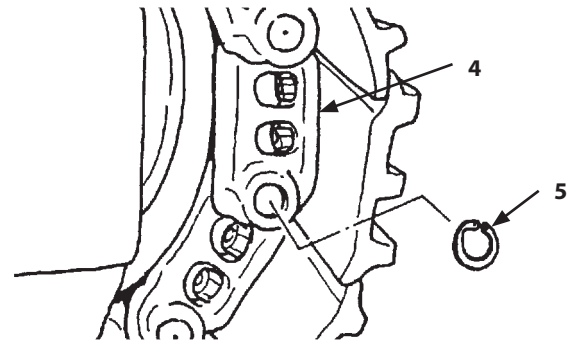


W105-03-07-016

a- Wooden Block



W105-03-07-010



W105-03-07-009

4. Wind the track link until the connection part of the track link reaches the front idler (1) side. Lower the machine. Place wooden blocks (a) under shoe (2) and support shoe (2).

IMPORTANT: Master pin (3) can be installed to only one direction. Check direction (b) to install master pin (3).

5. Install master pin (3) to the track.

IMPORTANT: Replace snap ring (5) with the new one.

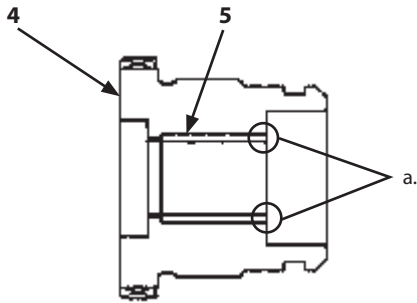
6. Install snap ring (5). Snap ring (5) has the direction to install. Install snap ring (5) to the groove of master link (4) with the flat surface of a pair of pliers hole facing the near side.

SECTION 4 UNDERCARRIAGE

Group 8 Blade Cylinder

Assembly of Blade Cylinder

IMPORTANT: Check that bushing (5) is not out from the U-ring (6) mounting part in cylinder head (4) in order not to damage rod packing (6).

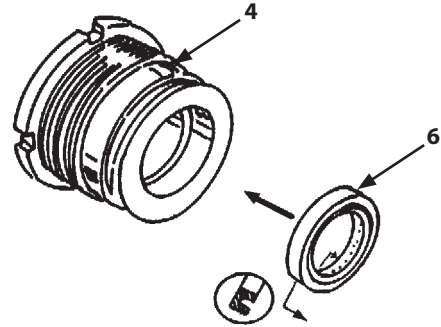


a- Check that bushing (5) is not out.

WDEA-05-02-011

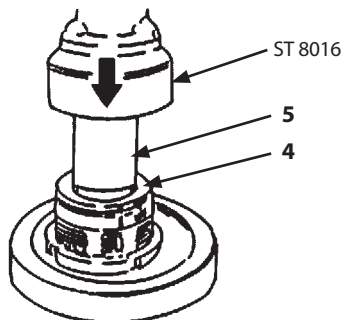
IMPORTANT: Check the direction to install rod packing (6).

2. Install U-ring (6) to cylinder head (4).



W1LD-04-02-004

1. Apply hydraulic oil onto the inside of cylinder head (4). Install bushing (5) to cylinder head (4) by using the special tool (ST 8016).



W506-04-02-010

3. Install wiper ring (3) and snap ring (2) to cylinder head (4) by using the special tool (ST 8016).



W506-04-02-012

4. Install O-rings (7, 9) and backup ring (8) to cylinder head (4).

SECTION 5 FRONT ATTACHMENT

Group 1 Front Attachment

Installation

CAUTION: Front attachment weight: 1000 kg (2210 lb)


1. Hoist the front attachment. Fit the boom foot part to the mounting hole of the swing post. Insert the thrust plates (8) to both right and left of the boom foot parts and adjust the right and left clearances within 1 mm (0.039 in).


CAUTION: Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, helmets, etc in order to prevent personal injury.

2. Install boom foot pin (5) by using a hammer.


IMPORTANT: Install nut (6) so that the clearance between nut (6) and the swing post boss should be 2 to 3 mm.


3. Apply LOCTITE #262 onto bolt (4). Install bolt (4) and nuts (6) (2 used).


 : 24 mm


 : 80 N·m (8 kgf·m, 59 lbf·ft)

4. Connect hoses (9, 10) (2 used each).

 : 27 mm

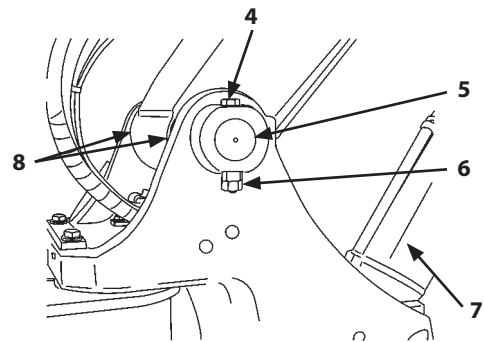
 : 95 N·m (9.5 kgf·m, 70 lbf·ft)

 : 36 mm

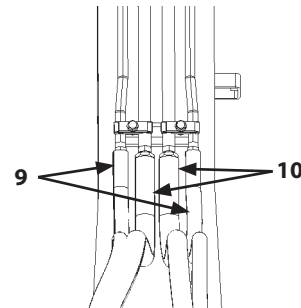
 : 180 N·m (18 kgf·m, 133 lbf·ft)

CAUTION: Boom cylinder (7) weight: 88 kg (195 lb)

5. Attach nylon slings onto boom cylinder (7). Hoist and hold boom cylinder (7).



WBAT-06-01-075





WDEE-05-01-002

SECTION 5 FRONT ATTACHMENT


Group 2 Cylinder


5. Connect hose (3) to arm cylinder (1). Apply grease.

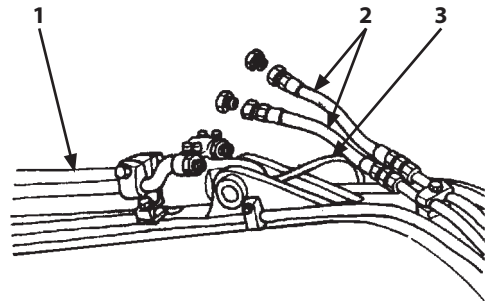
 : 19 mm

 : 30 N·m (3 kgf·m, 22 lbf·ft)

6. Connect hoses (2) (2 used) to arm cylinder (1).

 : 36 mm

 : 180 N·m (18 kgf·m, 133 lbf·ft)



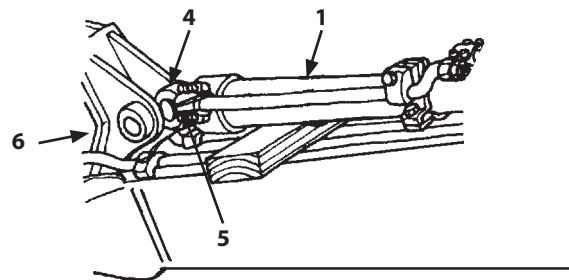
IMPORTANT: Check the hydraulic oil level. Start the engine and check for any oil leaks.

7. Remove wires (5) from rod (4) of arm cylinder (1). Start the engine. Operate the arm control lever and fit the hole at cylinder rod side to the mounting hole on arm (6).


W102-04-02-014

IMPORTANT: Use one or more thrust plates (7) respectively at the right and left sides.

8. Fit the holes of thrust plates (7) and the left and right sides at cylinder rod side. Adjust the clearance between cylinder rod side and cylinder mounting hole of arm (6) within 1 mm (0.039 in).




W187-04-02-010


 **NOTE:** Thrust plate (7) thickness: 1 mm (0.039 in), 2 mm (0.079 in)

 **CAUTION:** Metal fragments may fly off when a hammer is used. Wear necessary protection, such as goggles, helmets, etc in order to prevent personal injury.

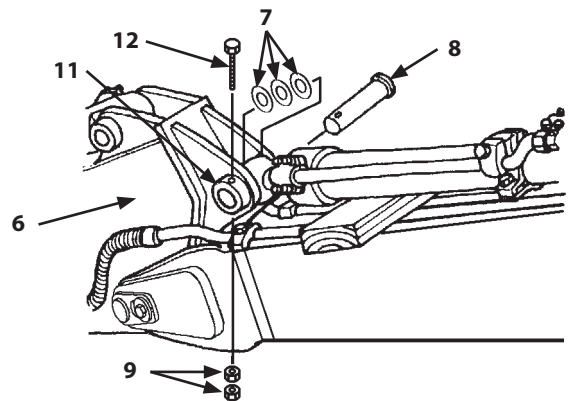
9. Install pin (8) by using a hammer.

10. Apply LOCTITE # 262 onto bolt (12). Install bolt (12) to pin (8) and stopper (11) with nuts (9) (2 used).

 : 24 mm

 : 80 N·m (8 kgf·m, 59 lbf·ft)

IMPORTANT: After completing the work, operate the arm cylinder several times to the stroke end and bleed air from the circuit.

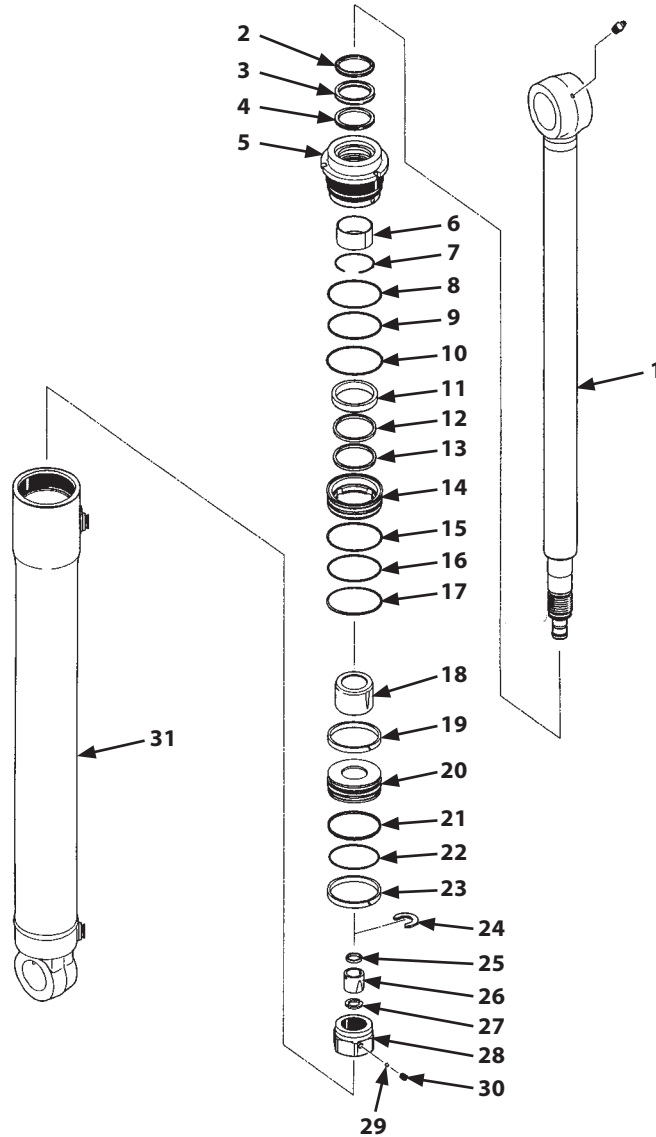


W187-04-02-006

SECTION 5 FRONT ATTACHMENT

Group 2 Cylinder

Disassembly of Boom Swing Cylinder



WBAT-04-02-004

- | | | | |
|-------------------|------------------|---------------------|-----------------------------|
| 1- Cylinder Rod | 9- O-Ring | 17- Backup Ring | 25- Cushion Seal |
| 2- Wiper Ring | 10- O-Ring | 18- Cushion Bearing | 26- Cushion Bearing |
| 3- U-Ring | 11- Collar | 19- Slide Ring | 27- Halved Stopper (2 Used) |
| 4- Buffer Ring | 12- Cushion Seal | 20- Piston | 28- Nut |
| 5- Cylinder Head | 13- Cushion Seal | 21- Seal Ring | 29- Steel Ball |
| 6- Bushing | 14- Holder | 22- O-Ring | 30- Set Screw |
| 7- Retaining Ring | 15- Backup Ring | 23- Slide Ring | 31- Cylinder Tube |
| 8- Backup Ring | 16- O-Ring | 24- Retaining Ring | |

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