PART NO. WAFD90-EN-00

HITACHI

Reliable solutions

Workshop Manual

ZX65USB-5B

Hydraulic Excavator

ZX65USB-5B HYDRAULIC EXCAVATOR WORKSHOP MANUAL

Hitachi Construction Machinery Co., Ltd.

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

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WAFD90-EN-00

Service Manual consists of the following separate Part No.

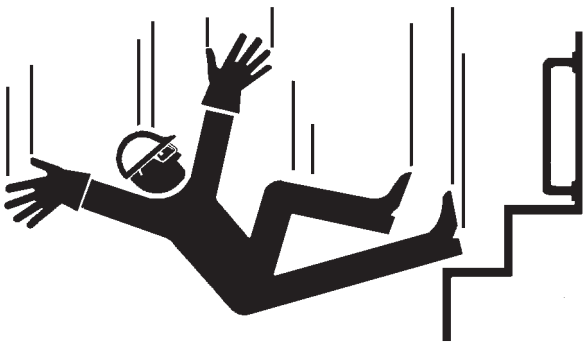
Technical Manual	: Vol. No.TAFD90-EN
Workshop Manual	: Vol. No.WAFD90-EN
Engine Manual	: Vol. No.ETDEP-EN, EWDEP-EN

General Precautions for Cab

- Always keep inside the cab clean by observing instructions below, to prevent any personal accidents from occurring.
  - 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. If 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.

Use Handrails and Steps

- Falling is one of the major causes of personal injury.
  - When you get on and off the machine, always use the crawler instead of the step for safety. Also get on and off from the position of the crawler that can secure your feet space enough.
  - When you get on and off the machine, always face the machine.
  - Maintain a three-point contact with the steps and handrails.
  - Do not use any controls as handholds.
  - Never jump on or off the machine. Never mount or dismount a moving machine.
  - In case adhered slippery material such as oil, grease, or mud is present on steps, handrails, or platforms, thoroughly remove such material.

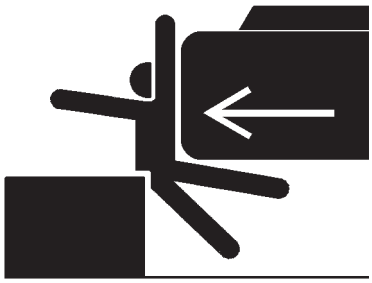


SA-439

Avoid Injury From Back-over and Swing Accidents

- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.
  To avoid back-over and swing accidents:
  - Always look around BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.
  - Keep the travel alarm in working condition (if equipped). ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.
  - USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.
    Use hand signals, which conform to your local regulations, when work conditions require a signal person.
  - No machine motions shall be made unless signals are clearly understood by both signal person and operator.
  - Learn the meanings of all flags, signs, and markings used on the job and confirm who has the responsibility for signaling.
  - Keep windows, mirrors, and lights clean and in good condition.
  - Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
  - Read and understand all operating instructions in the operator's manual.

SA-383



SA-384

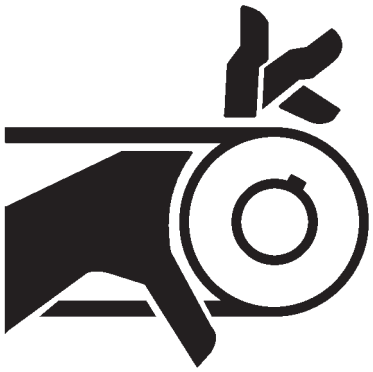
Support Machine Properly

- Never attempt to work on the machine without securing the machine first.
  - Always lower the attachment to the ground before you work on the machine.
  - If you must work on a lifted machine or attachment, securely support the machine or attachment with stays or blocks strong enough to support the machine and/or attachment weight.

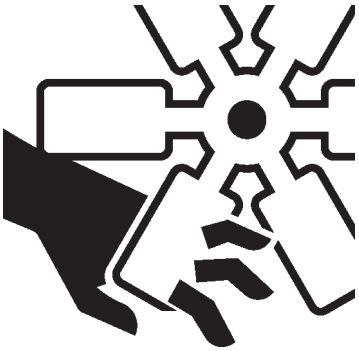
SA-527

Stay Clear of Moving Parts

- Contact with moving parts can cause serious injury or death due to amputation or entanglement.
  - To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working around rotating parts.



SA-026



SA-2294

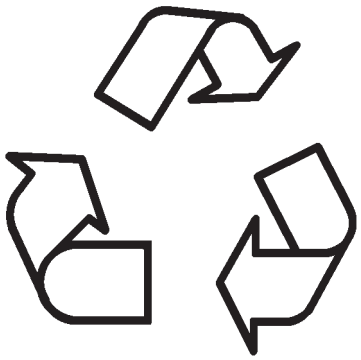
Handle Chemical Products Safely

- Direct exposure to hazardous chemicals can cause serious injury. Potentially hazardous chemicals used with your machine include such items as lubricants, electrolyte, coolants, paints, and adhesives.
  - A Material Safety Data Sheet (MSDS) provides specific details on chemical products: physical and health hazards, safety procedures, and emergency response techniques.
  - Check the MSDS before you start any job using a hazardous chemical. Then follow the correct procedures and use recommended equipment.
  - See your authorized dealer for MSDS.

SA-309

Dispose of Waste Properly

- Improperly disposing of waste can threaten the environment and ecology. Potentially harmful waste used with HITACHI equipment includes such items as oil, fuel, coolant, brake fluid, filters, and battery.
  - When draining fluid, use a leakproof container with a capacity larger than the drained fluid volume to receive it.
  - Do not pour waste onto the ground, down a drain, or into any water source.
  - Inquire on the proper way to dispose of harmful waste such as oil, fuel, coolant, brake fluid, filters, and battery from your local environmental or recycling center.

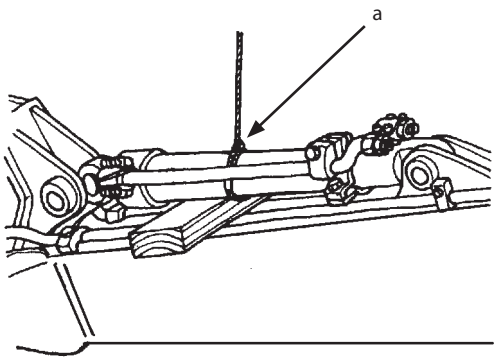


SA-226

Precautions for Using Nylon Sling

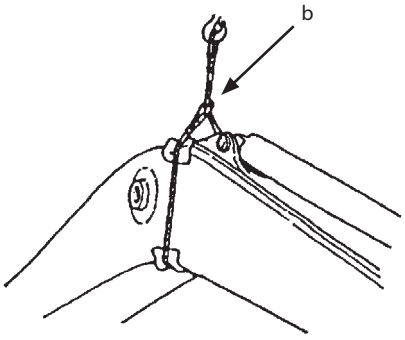
1. Follow the precautions below to use nylon slings safely.

- Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
- Lower the temperature of the lifted load to lower than 100 °C (212 °F). If unavoidably lifting a load with a temperature of 100 °C (212 °F) or more, reduce the load weight.
- Do not lift acid or alkali chemicals.
- Take care not to allow the sling to become wet. The load may slip.
- When required to use more than one sling, use slings with the same width and length to keep the lifted load balanced.
- When lifting a load using an eyehole, be sure to eliminate any gaps between the sling and load. (Refer to the right illustration.) Reduce the load weight so that it is less than 80 % of the sling breaking force.
- Avoid using twisted, bound, connected, or hitched slings.
- Do not place any object on twisted or bent slings. (Refer to the right illustration.)
- When removing the slings from under the load, take care not to damage the nylon slings. Avoid contact with protrusions.
- Avoid dragging slings on the ground, throwing slings, or pushing slings with a metal object.
- When using with other types of slings (wire rope) or accessories (shackle), protect the joint so that the nylon sling is not damaged.
- Store the nylon slings indoors so that they won't deteriorate with heat, sun light, or chemicals.



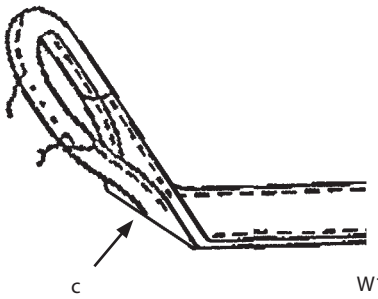
W102-04-02-016

a - Correct Eyehole Lifting Method



W105-04-01-008

b - Incorrect Eyehole Lifting Method



W162-01-01-009

c - Bent of Sling

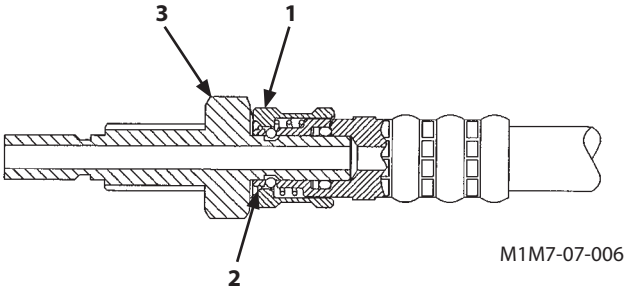
Quick Coupling

1. Coupling procedure

- Push socket ring (1) into plug (3) by rotating it fully counterclockwise and then pulling it toward you.
- Release socket ring (1). Check that socket ring (1) is returned by the spring force and the coupling is locked completely by ball (2). At this time, check if socket ring (1) is returned to the original position (to the rightmost direction).

2. Separating procedure

- Remove the hose by rotating socket ring (1) fully counterclockwise and then pulling it. Because no check function is attached inside, be careful that oil flows out.
- Cap the removed hoses using special plug.



M1M7-07-006

CAUTION:

- **When disconnecting, do not damage joint surface.**
- **When disconnecting, clean the joint part and thoroughly wipe off the cleaning solution to prevent any foreign material from entering.**
- **Complete the joint disconnecting / connecting procedure. Check enough if oil leaks especially after installation.**
- **After installation, check if socket ring (1) is returned to the original position (to the rightmost direction).**

Releasing Pressure in Hydraulic Circuit

Release any remaining pressure in the following procedures when removing and installing the front attachment.

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. Tilt up the floor. (Refer to the operator's manual.)

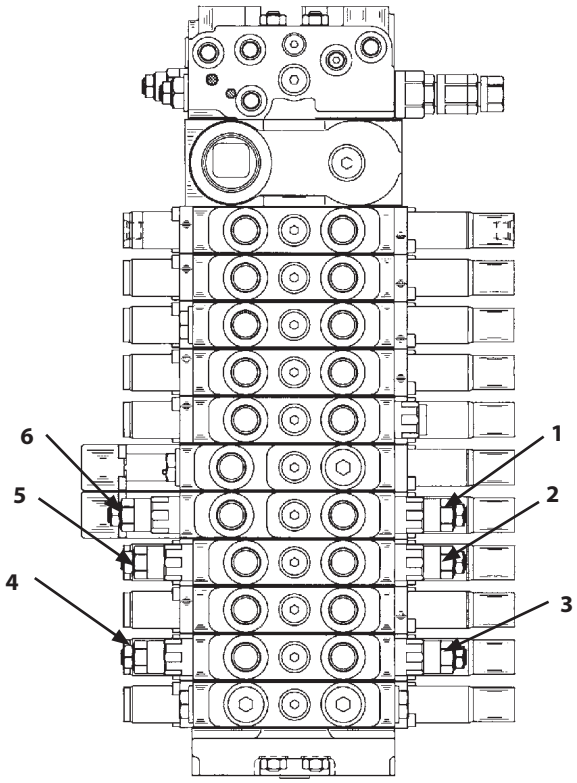
CAUTION: Each attachment may move rapidly in case the overload relief valve is loosened rapidly. Check that the machine has set in the position for inspection and maintenance and loosen it slowly. Do not loosen it more than 3/4 turns as hydraulic oil may spout.

IMPORTANT: Do not turn lock nut (8) and adjusting screw (9). If turning, the setting changes.

3. Slowly loosen body (7) of the overload relief valve in which any remaining pressure will be released.

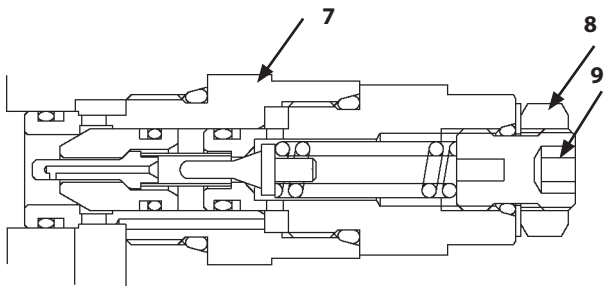
: 24 mm

: 70 to 80 N·m (7 to 8 kgf·m, 52 to 59 lbf·ft)



T1N0-03-04-003

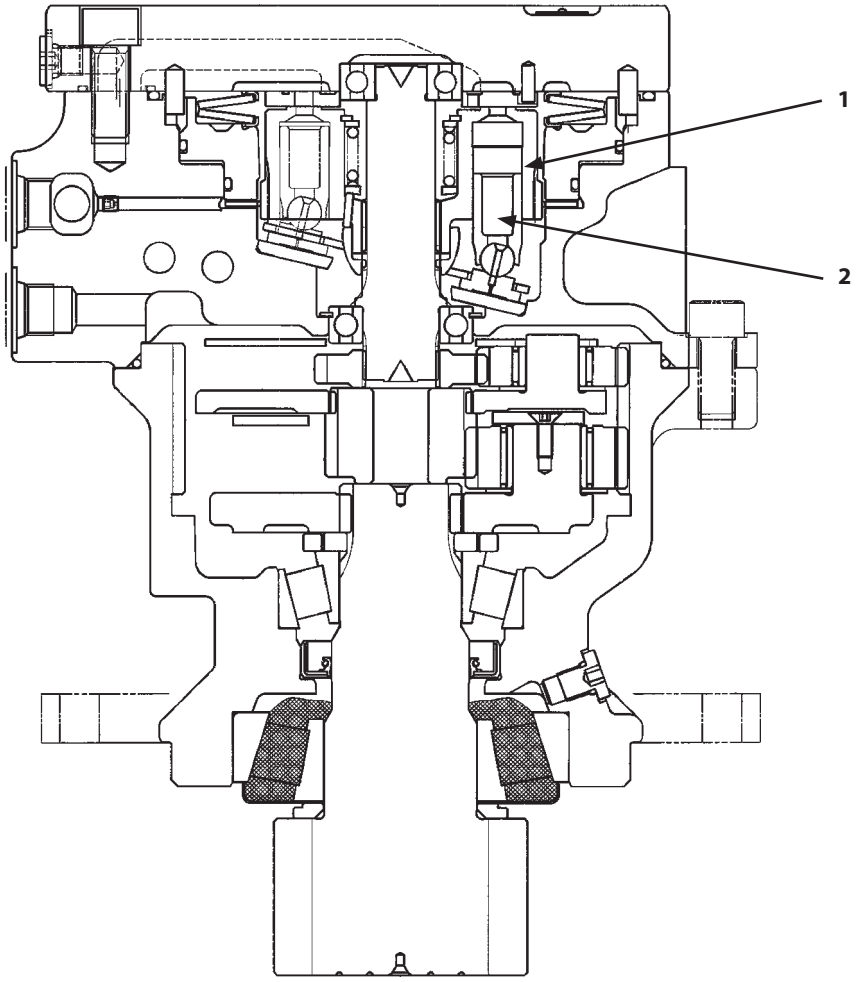
1- Overload Relief Valve (Boom Lower)
2- Overload Relief Valve (Arm Roll-Out)
3- Overload Relief Valve (Bucket Roll-Out)
4- Overload Relief Valve (Bucket Roll-In)
5- Overload Relief Valve (Arm Roll-In)
6- Overload Relief Valve (Boom Raise)



TAEA-03-04-013

7- Body
8- Lock Nut
9 - Adjusting Screw

Swing Motor



WADB-03-07-002

1- Rotor
2- Plunger (9 Used)

Track

Rubber Crawler Crack

1. Outside of Rubber Crawler

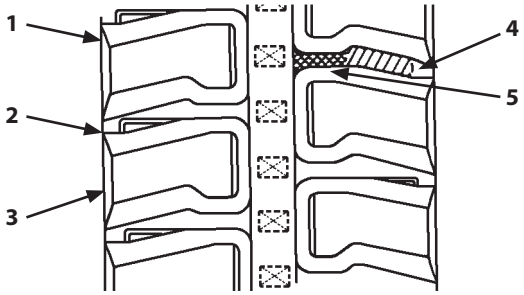
   If there is a crack on lug base (1) with depth of 3 mm (0.12 in) or more, repair the track.

   If there is a crack between lugs (2) with depth of 3 mm (0.12 in) or more, repair the track.

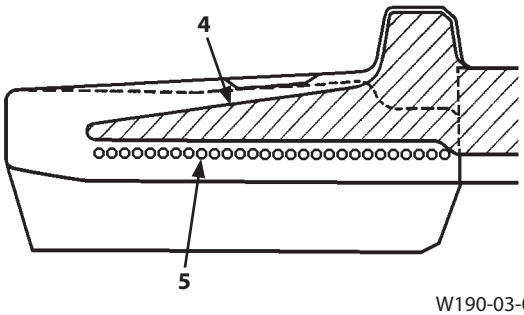
   If there is a crack on lugs (3) or between lugs (2) and it reaches steel code (5) or steel core (4) with length of 30 mm (1.18 in) or more, immediately repair the track.

2. Inside of Rubber Crawler (Roller (6) Side)

   If there is a crack that reaches steel code (5) or steel core (4), immediately repair the track.



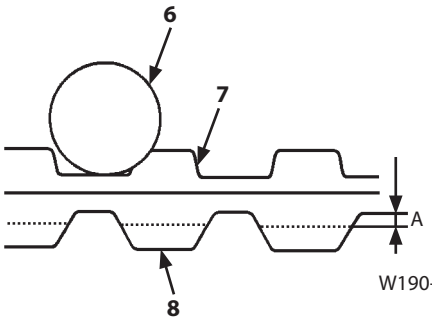
W190-03-07-001



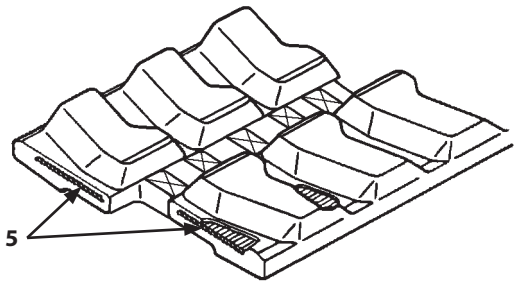
W190-03-07-002

Lug Wear

1. If height (A) of lug (8) is less than 5 mm (0.2 in), replace rubber crawler (7) as an assembly.
2. If any part of steel code (5) appeared on the track, replace the worn rubber crawler as an assembly.



W190-03-07-003



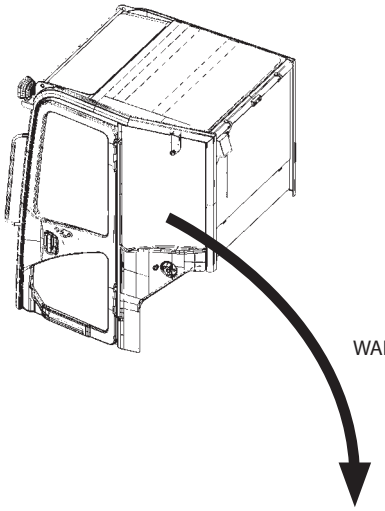
W190-03-07-004

SECTION 3

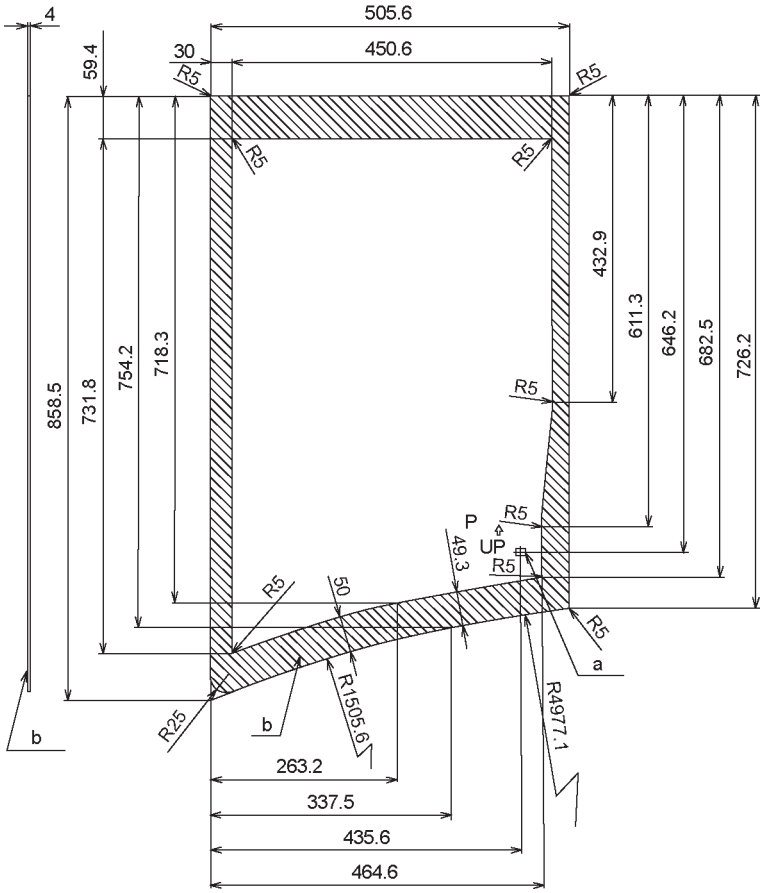
UPPERSTRUCTURE

CONTENTS

Unit: mm



WAFA-03-01-001

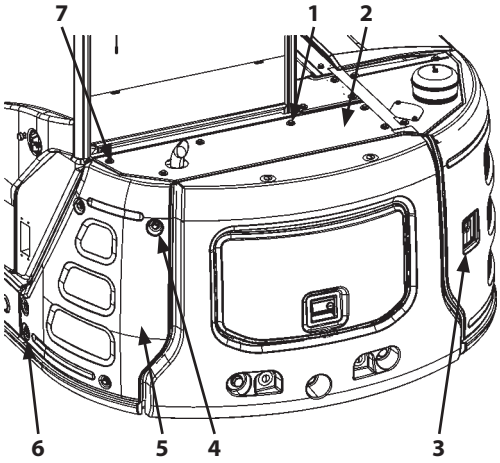


WAFA-03-01-002

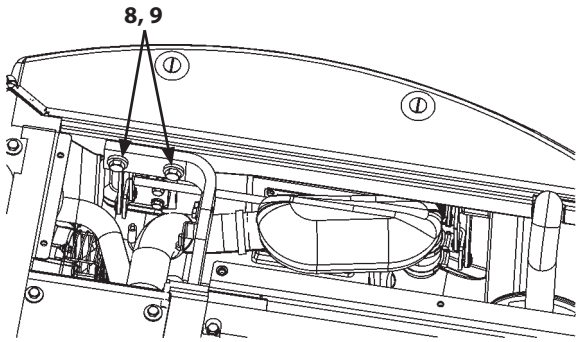
a - Mark Position

b - Black Ceramic Coating Surface

Removal and Installation of Counterweight



WAFA-03-02-001



WAFA-03-02-002

Removal

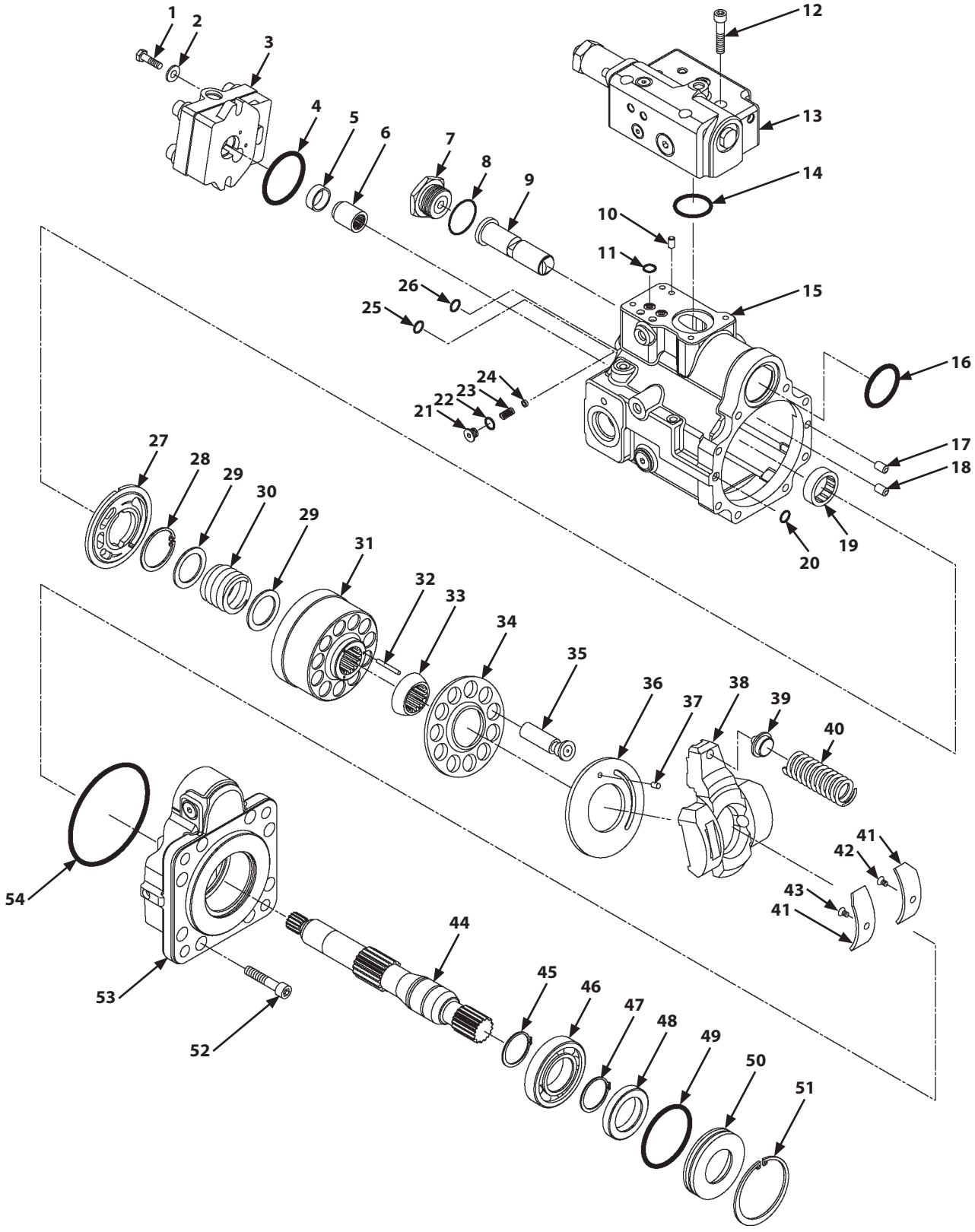
1. Set the machine position for inspection and maintenance. (Refer to W1-6-1.)
2. Tilt the cab assembly to the front side. (Refer to the operator's manual.)
3. Remove bolts, washers (4) (3 used) and bolts, washers (6) (2 used). Remove cover (5).

   : 17 mm
4. Open cover (3).
5. Remove bolt, washer (1) and bolts, washers (7) (5 used). Remove cover (2).

   : 17 mm
6. Remove bolts (8) (2 used) and washers (9) (2 used).

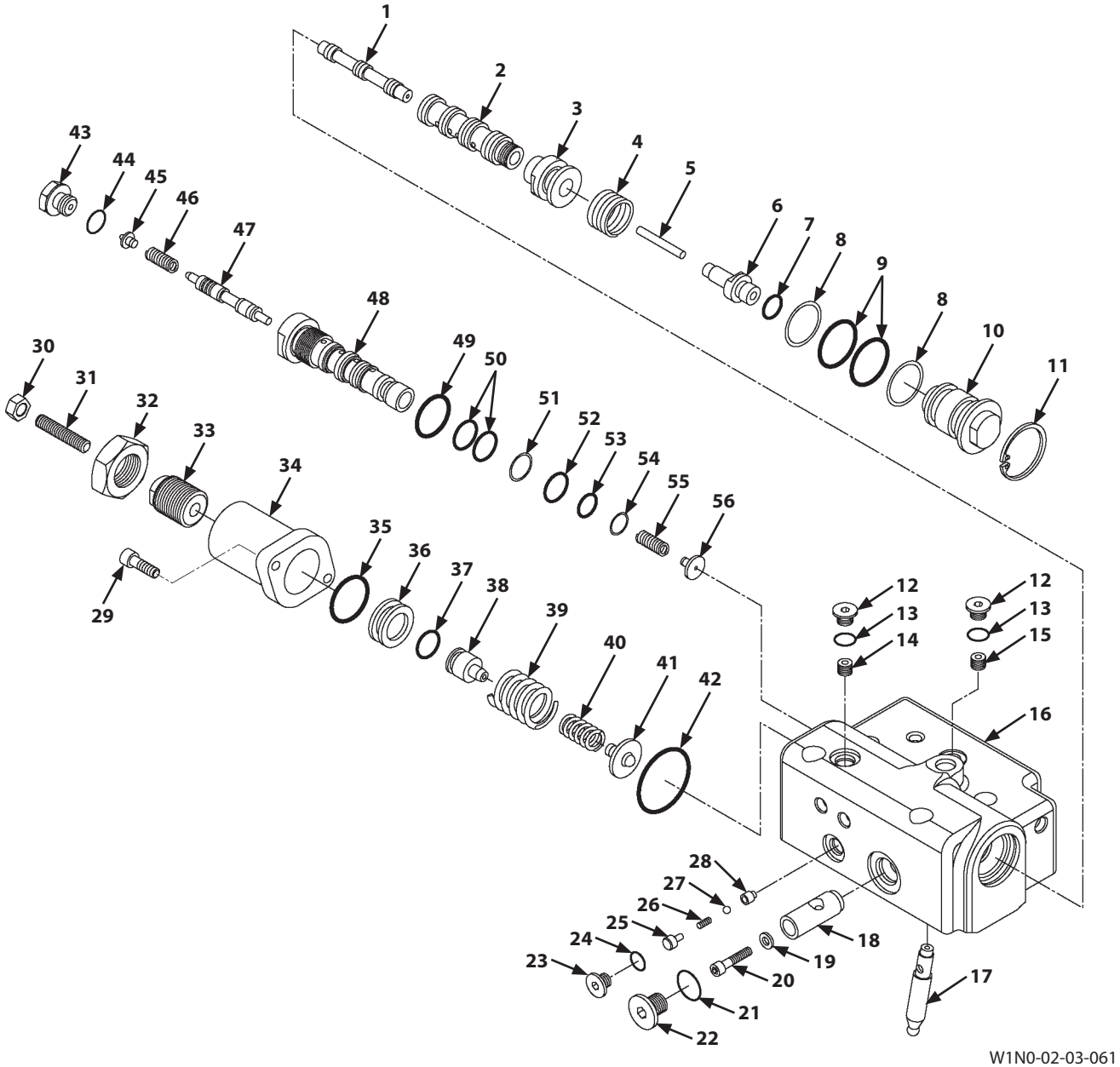
   : 24 mm

Disassembly of Pump Device



W1N0-02-03-051

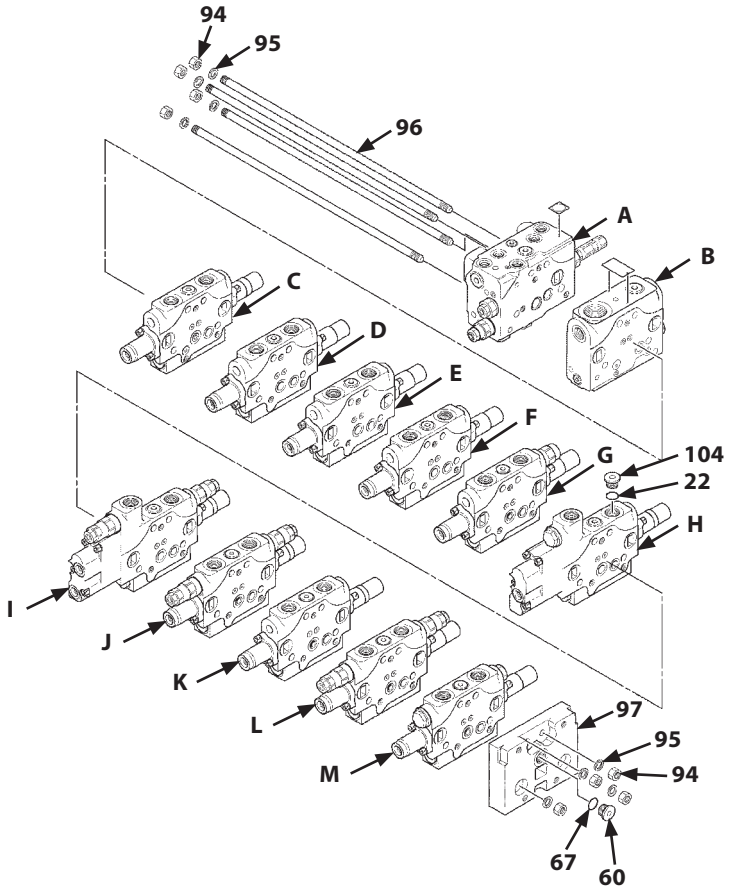
Disassembly of Regulator



W1N0-02-03-061

1- Spool
2- Sleeve
3- Connector
4- Spring
5- Needle Roller
6- Retainer
7- O-Ring
8- Backup Ring (2 Used)
9- O-Ring (2 Used)
10- Plug
11- Retaining Ring
12- Plug (2 Used)
13- O-Ring (2 Used)
14- Orifice
15- Orifice
16- Valve Body
17- Lever
18- Retainer
19- Spring Washer
20- Socket Bolt
21- O-Ring
22- Plug
23- Plug
24- O-Ring
25- Stopper
26- Spring
27- Steel Ball
28- Valve Seat
29- Socket Bolt (2 Used)
30- Nut
31- Adjusting Screw
32- Nut
33- Adjusting Screw
34- Cover
35- O-Ring
36- Spring Guide
37- O-Ring
38- Spring Guide
39- Spring
40- Spring
41- Spring Seat
42- O-Ring
43- Adjusting Screw Kit
44- O-Ring
45- Spring Seat
46- Spring
47- Spool
48- Sleeve
49- O-Ring
50- O-Ring (2 Used)
51- Backup Ring
52- O-Ring
53- O-Ring
54- Backup Ring
55- Spring
56- Spring Seat

Disassembly and Assembly of Control Valve



WAFA-03-06-005

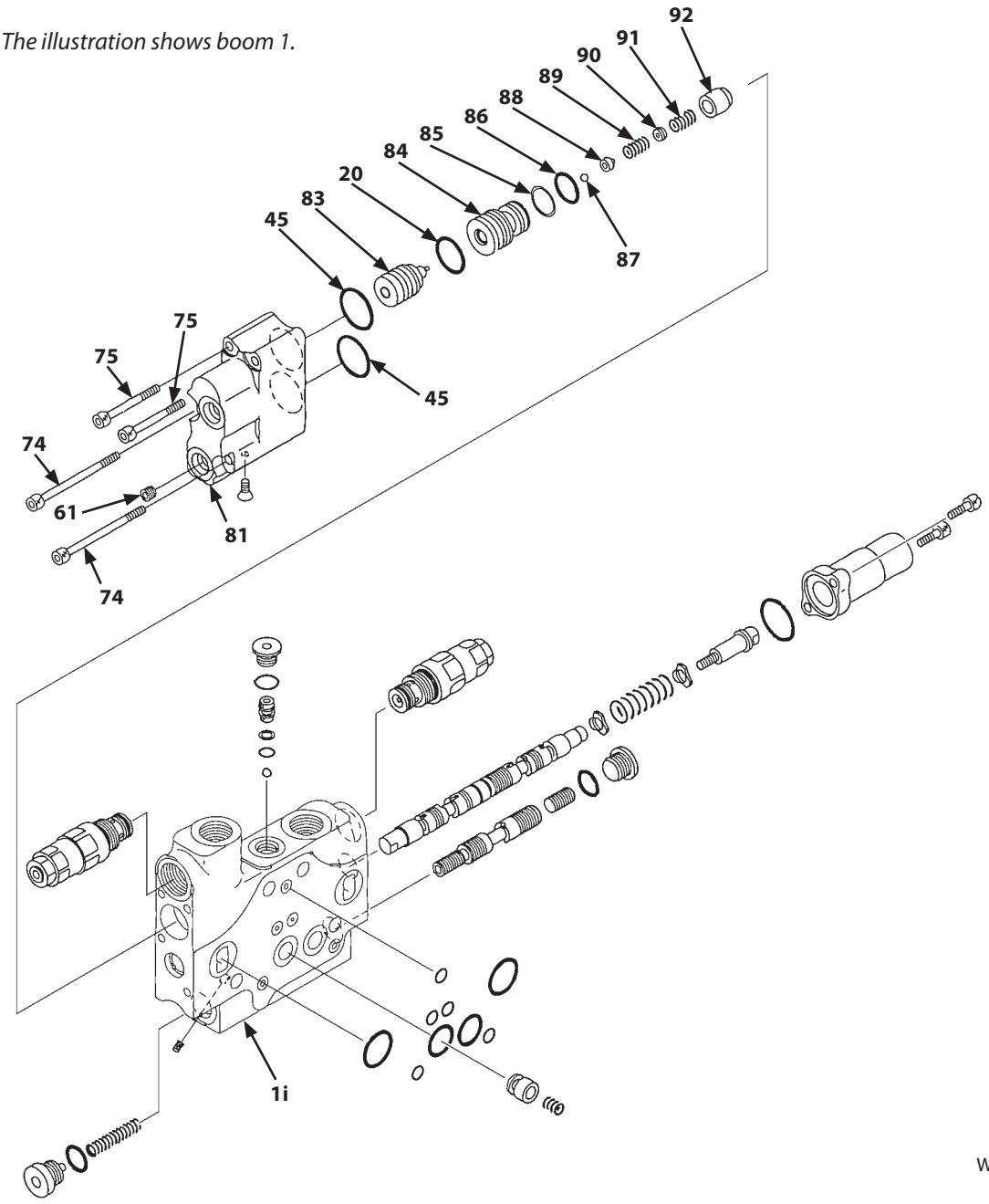
A- Unload Section
B- Piping Port Section
C- Swing Section
D- Blade Section
E- Travel (Left) Section
F- Travel (Right) Section
G- Boom Swing Section
H- Boom 2 Section
I- Boom 1 Section
J- Arm 1 Section
K- Arm 2 Section
L- Bucket Section
M- Auxiliary Section
22- O-Ring
60- Plug
67- O-Ring
94- Nut (8 Used)
95- Washer (8 Used)
96- Tie Rod (4 Used)
97- Block
104- Plug

A- Unload Section
B- Piping Port Section
C- Swing Section
D- Blade Section
E- Travel (Left) Section
F- Travel (Right) Section
G- Boom Swing Section
H- Boom 2 Section
I- Boom 1 Section
J- Arm 1 Section
K- Arm 2 Section
L- Bucket Section
M- Auxiliary Section

1a- Body (Unload)
1b- Body (Piping Port)
1c- Body (Swing)
1d- Body (Blade)
1e- Body (Travel (Left))
1f- Body (Travel (Right))
1g- Body (Boom Swing)
1h- Body (Boom 2)
1i- Body (Boom 1)
1j- Body (Arm 1)
1k- Body (Arm 2)
1l- Body (Bucket)
1m- Body (Auxiliary)
20- O-Ring (25 Used)
21- O-Ring
22- O-Ring (25 Used)
24- O-Ring (63 Used)
36- O-Ring (2 Used)
64- Spring (9 Used)
65- Check Valve (9 Used)
70- Plug (3 Used)
73- Make-Up Valve
93- Overload Relief Valve (6 Used)
94- Nut (8 Used)
95- Washer (8 Used)
96- Tie Rod (4 Used)
97- Block

Disassembly of Boom Anti-Drift Valve

NOTE: The illustration shows boom 1.

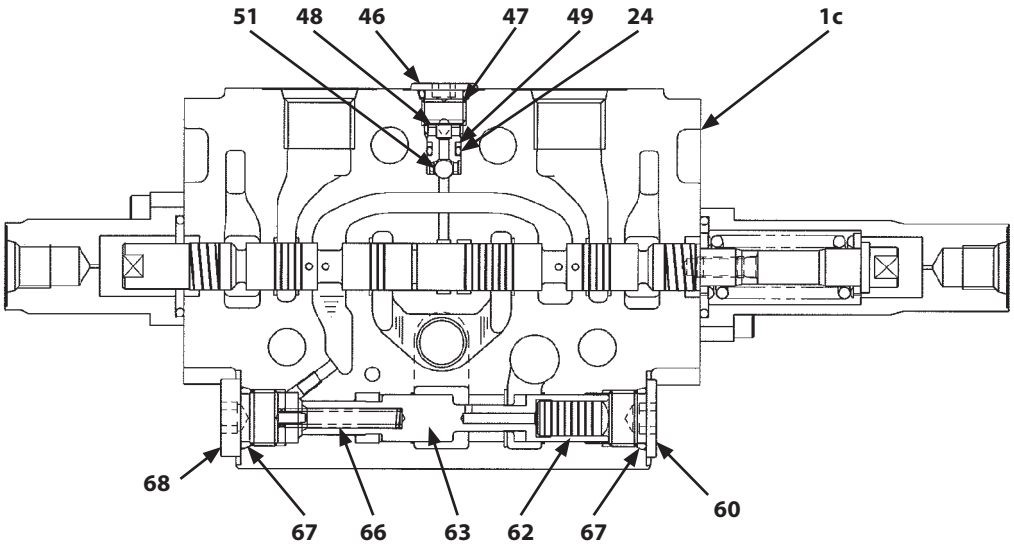


WAEB-03-06-007

1i- Body (Boom 1)
20- O-Ring
45- O-Ring (2 Used)
61- Orifice
74- Socket Bolt (2 Used)
75- Socket Bolt (2 Used)
81 Cover
83- Piston
84- Sleeve
85- Backup Ring
86- O-Ring
87- Steel Ball
88- Spring Guide
89- Spring
90- Orifice
91- Spring
92- Poppet

Assembly of Shuttle Valve and Pressure Compensator

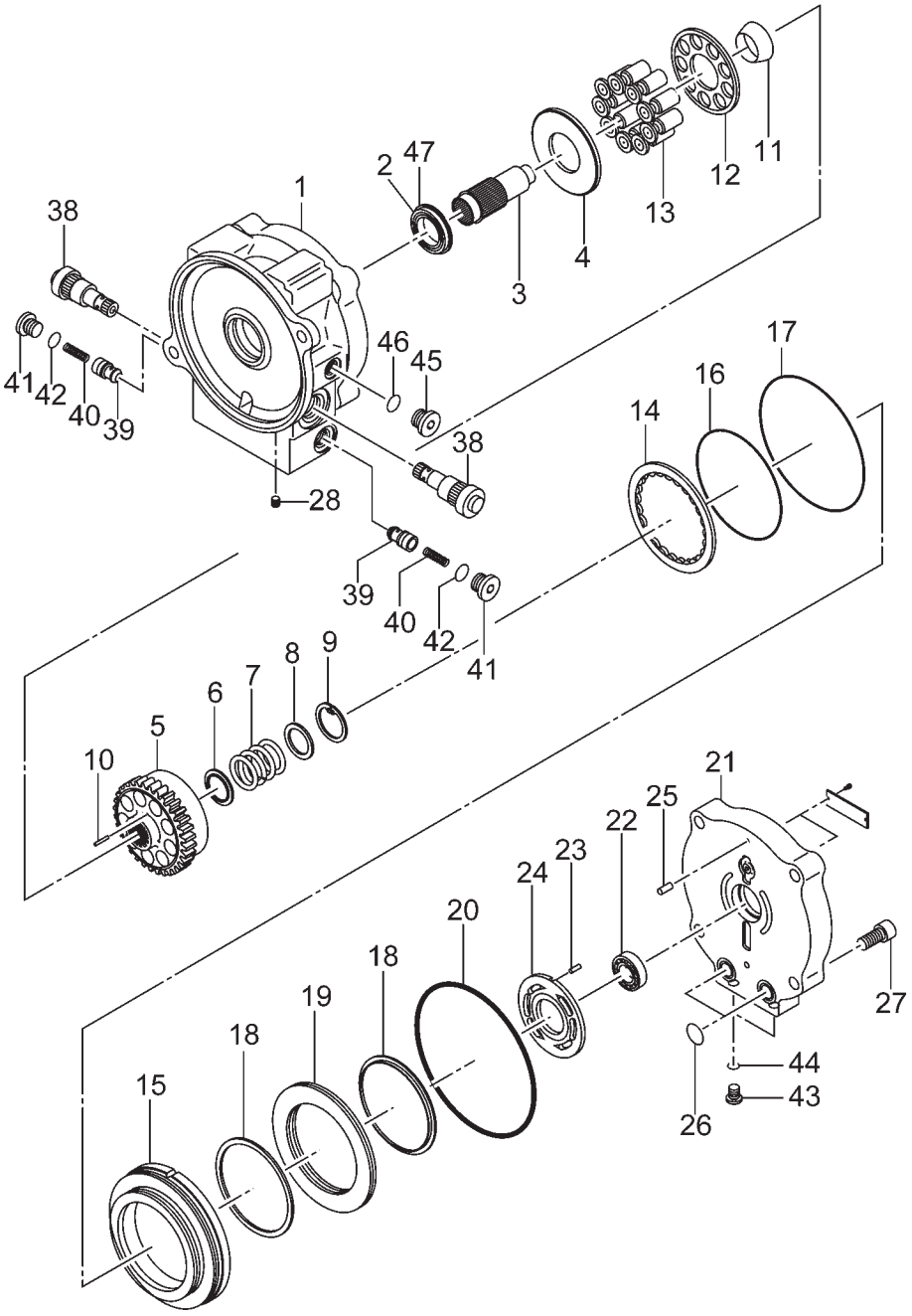
NOTE: The illustration shows the swing section.



W1NG-02-04-010

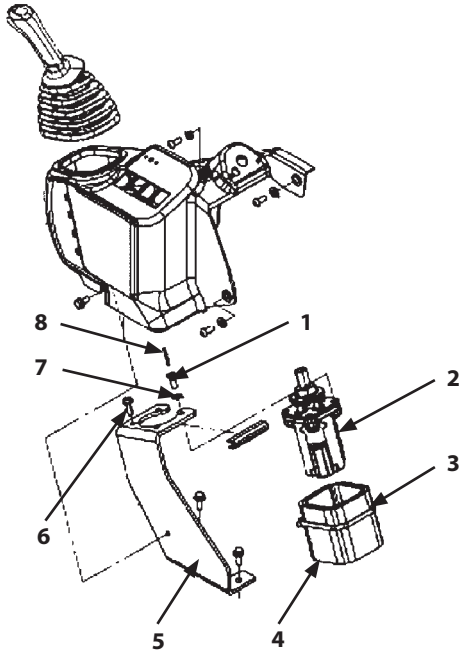
1c- Body (Swing)
24- O-Ring
46- Plug
47- O-Ring
48- Seat
49- Backup Ring
51- Steel Ball
60- Plug
62- Piston
63- Spool
66- Spring
67- O-Ring (2 Used)
68- Plug

Disassembly of Swing Motor

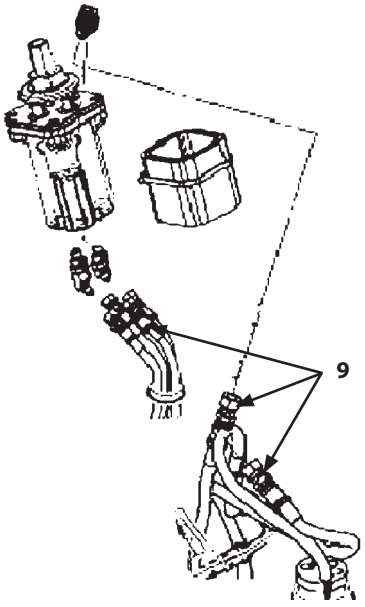


WADB-03-07-003

1- Casing
2- Ball Bearing
3- Shaft
4- Swash Plate
5- Rotor
6- Collar
7- Spring
8- Washer
9- Retaining Ring
10- Pin (3 Used)
11- Holder
12- Retainer
13- Plunger (9 Used)
14- Disc Plate
15- Brake Piston
16- O-Ring
17- O-Ring
18- Spring Seat (2 Used)
19- Disc Spring (2 Used)
20- O-Ring
21- Cover
22- Ball Bearing
23- Pin
24- Valve Plate
25- Pin (2 Used)
26- O-Ring (2 Used)
27- Socket Bolt (5 Used)
28- Orifice
38- Relief Valve (2 Used)
39- Check Valve (2 Used)
40- Spring (2 Used)
41- Plug (2 Used)
42- O-Ring (2 Used)
43- Plug
44- O-Ring
45- Plug
46- O-Ring
47- Retaining Ring



WADB-03-08-015



WADB-03-08-017

6. Disconnect hoses (9) (6 used) from pilot valve (2).

   : 17 mm

7. Put the matching marks on bracket (5) and pilot valve (2). Remove spring pin (8), bolt (1), washer (7), and bolts, washers (6) (3 used) from bracket (5). Remove pilot valve (2) from bracket (5).

   : 13 mm

8. Remove clip band (3) and glass wool (4) from pilot valve (2).

9. Remove the adapters with pilot valve (2) attached if necessary.

Removal and Installation of Boom Swing Pilot Valve

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.

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.)

Removal

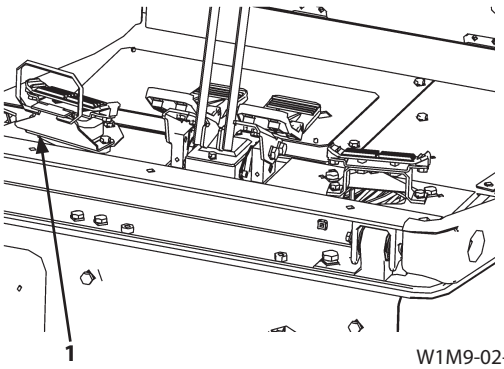
2. Remove bolts, washers (2) (2 used). Remove pedal (3) from bracket (6).

   : 13 mm

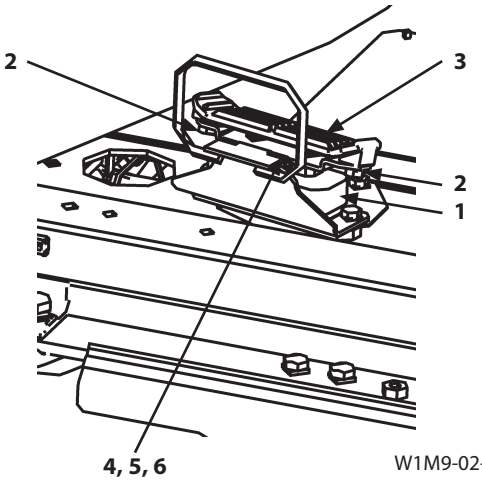
3. Remove socket bolts (4) (2 used) and spring washers (5) (2 used). Remove bracket (6) from pilot valve (1).

   : 6 mm

4. Tilt up the floor. (Refer to Operator's Manual.)



W1M9-02-06-008



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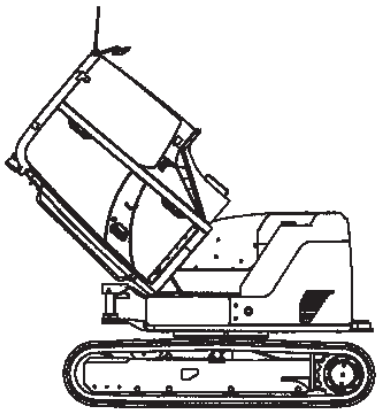
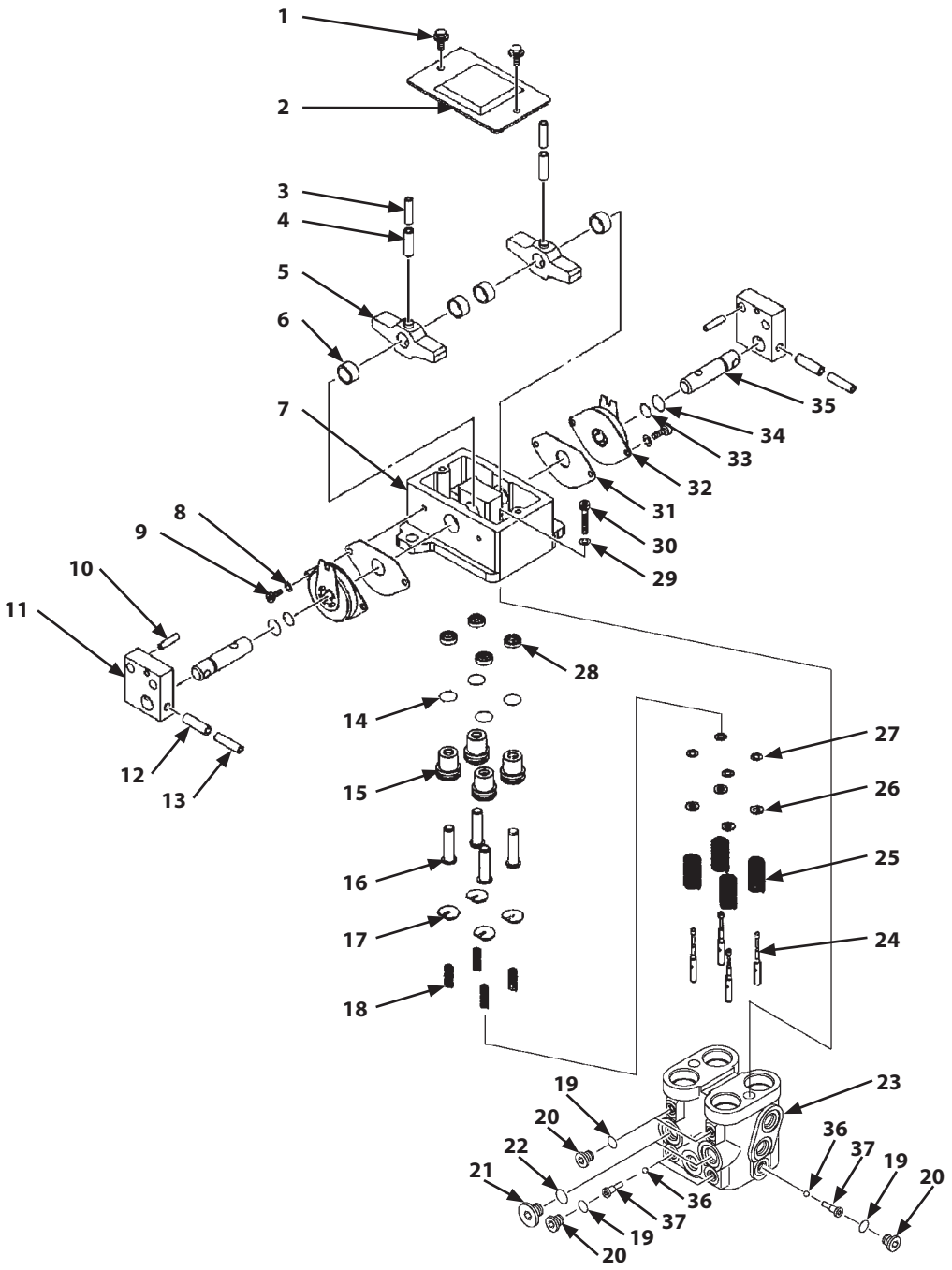

M1M0-07-032

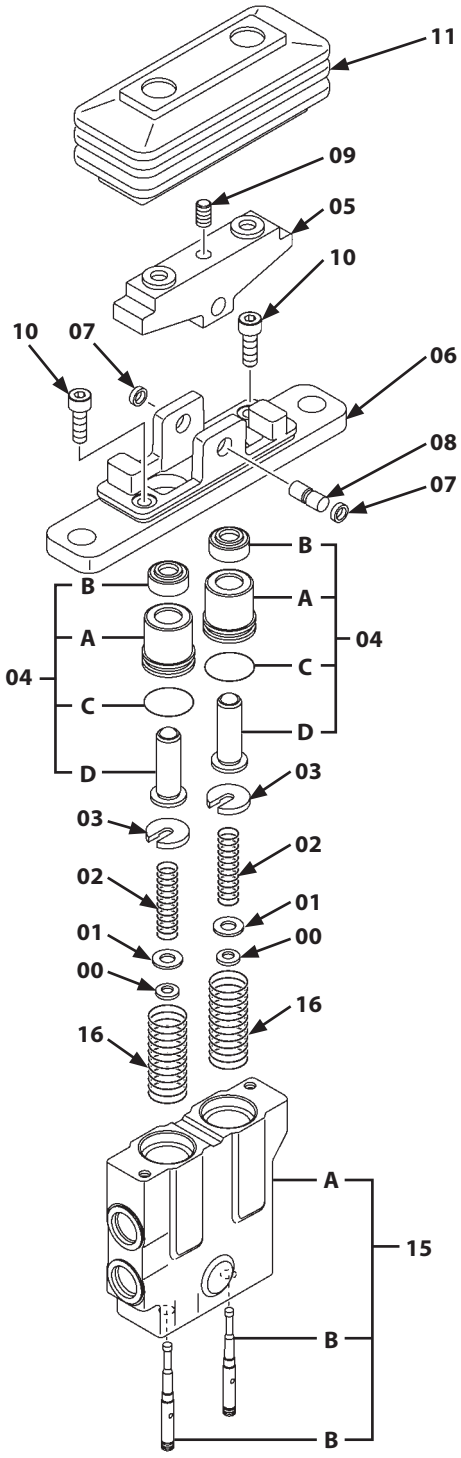
Disassembly of Travel Pilot Valve



WAFA-03-08-001

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

Disassembly of Pilot Valves for Boom Swing, Blade, Auxiliary (Optional)



WADB-03-08-001

00- Spacer (2 Used)
01- Shim (6 Used)
02- Balance Spring (2 Used)
03- Spring Guide (2 Used)
04A- Bushing (2 Used)
04B- Oil Seal (2 Used)
04C- O-Ring (2 Used)
04D- Pusher (2 Used)
05- Cam
06- Holder
07- Bushing (2 Used)
08- Pin
09- Set Screw
10- Socket Bolt (2 Used)
11- Boot
15A- Casing
15B- Spool (2 Used)
16- Return Spring (2 Used)

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 shim (01) as the same quantity before disassembling.

1. Install spacer (00), shims (01) (several), and balance spring (02) to spool (15B) in sequnce.

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: When 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).

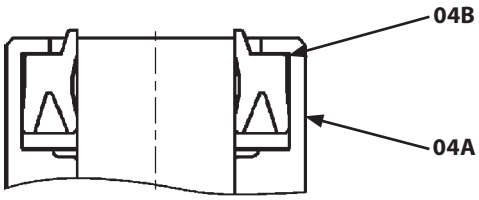
IMPORTANT: Install the spool (15B) assembly into the original port before disassembling.

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).

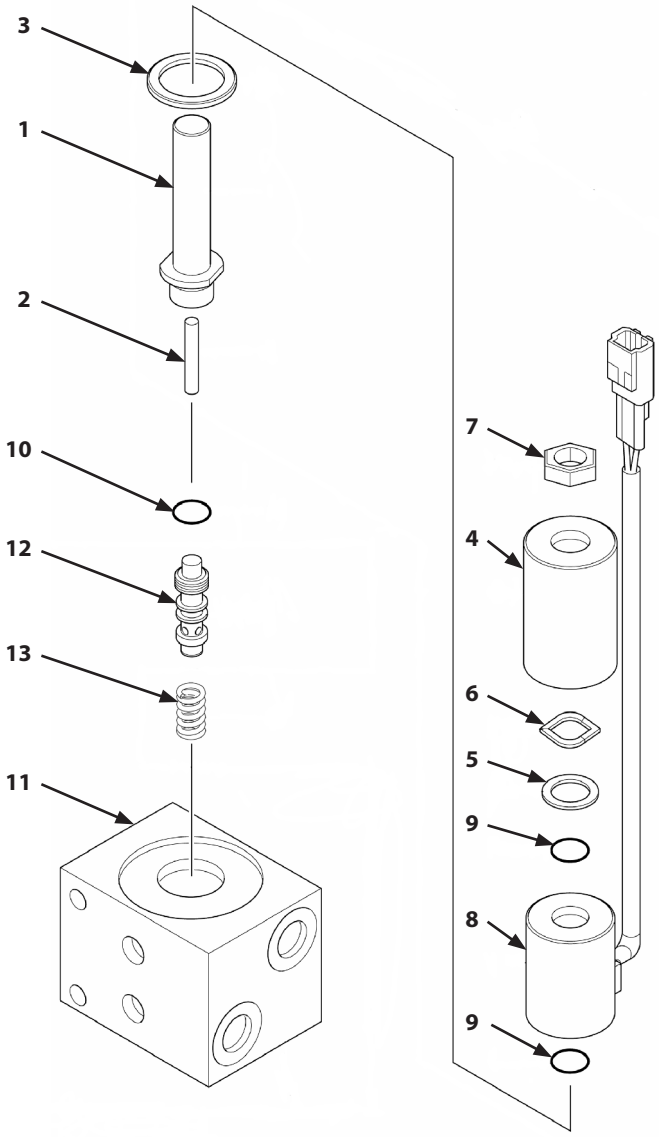
5. Apply grease onto oil seal (04B). Install oil seal (04B) to bushing (04A).



WDAD-03-11-003

6. Apply grease onto the bushing (04A) sliding surface and O-ring (04C). Install O-ring (04C) and pusher (04D) to bushing (04A).
7. Install the pusher (04D) assembly to cashing (15A).
8. Install other spool (15B) and pusher (04D) in the same way as step 1 to step 7.

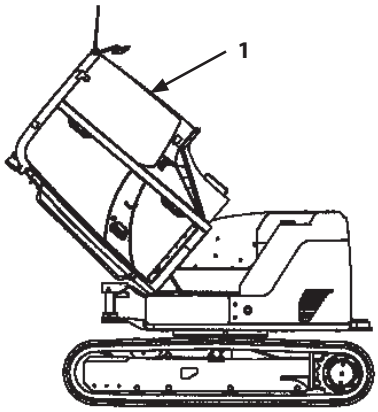
Disassembly of LS Cut Solenoid Valve



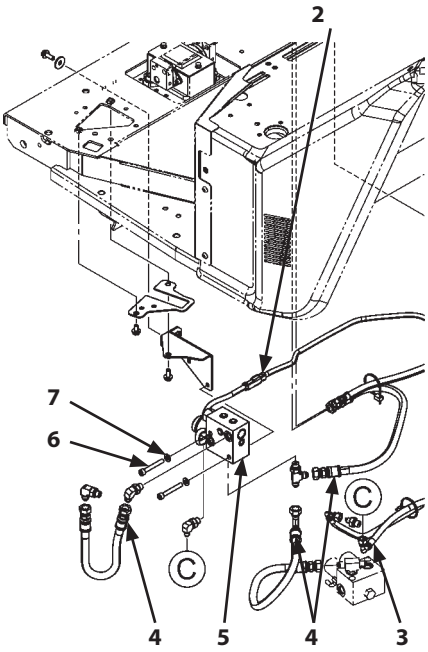
W1NG-02-07-003

1- Piston
2- Pin
3- Plate
4- Casing
5- Plate
6- Wave Washer
7- Lock Nut
8- Solenoid
9- O-Ring (2 Used)
10- O-Ring
11- Body
12- Spool
13- Spring

Removal and Installation of Auxiliary Flow Rate Selector Valve (OP)



M1M0-07-032



WAEA-03-11-001

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.)

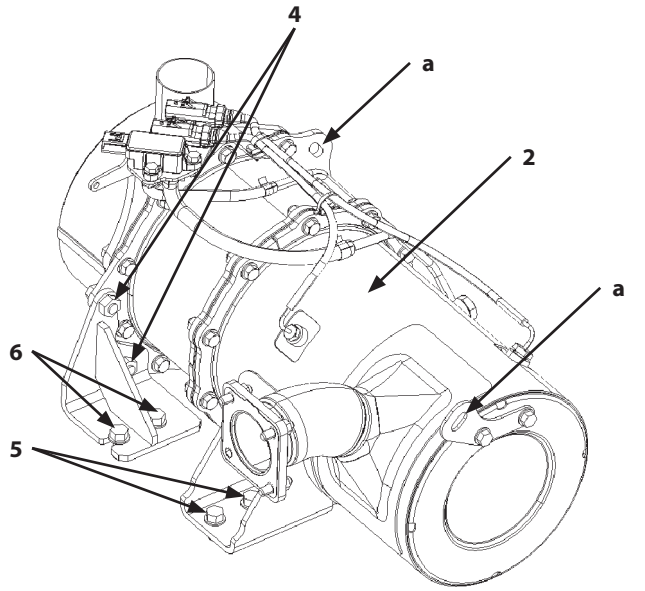
CAUTION: Bleed air from the hydraulic oil tank. (Refer to W1-4-1.)

2. Tilt the cab (1) assembly to the front side. (Refer to the operator's manual.)
3. Disconnect connector (2).
4. Disconnect hoses (4) (3 used).

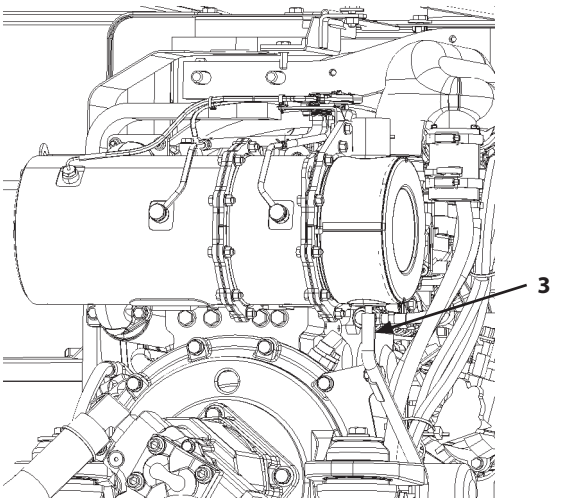
   : 19 mm
5. Disconnect hose (3).

   : 17 mm
6. Remove socket bolts (6) (2 used) and washers (7) (2 used). Remove auxiliary flow rate selector valve (5).

   : 6 mm
7. Remove the adapters with auxiliary flow rate selector valve (5) attached if necessary.



WDEP-03-11-007



WAFD90-03-12-003

a- Lifting Bracket

Installation

CAUTION: The muffler filter (2) assembly weight: 23 kg (51 lb)

1. Loosen bolts (4) (2 used).

   : 14 mm

2. Install shackles (2 used) to lifting brackets (a) (2 places) of muffler filter (2). Attach nylon slings onto the shackles (2 used). Hoist the muffler filter (2) assembly.

IMPORTANT: Check the direction to install the muffler filter (2) assembly.

IMPORTANT: Take care not to break pipe (3).

3. Install the muffler filter (2) assembly while fitting to pipe (3).
4. Temporarily tighten bolts, washers (5, 6) (2 used for each).

   : 14 mm

SECTION 4

UNDERCARRIAGE

CONTENTS

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.

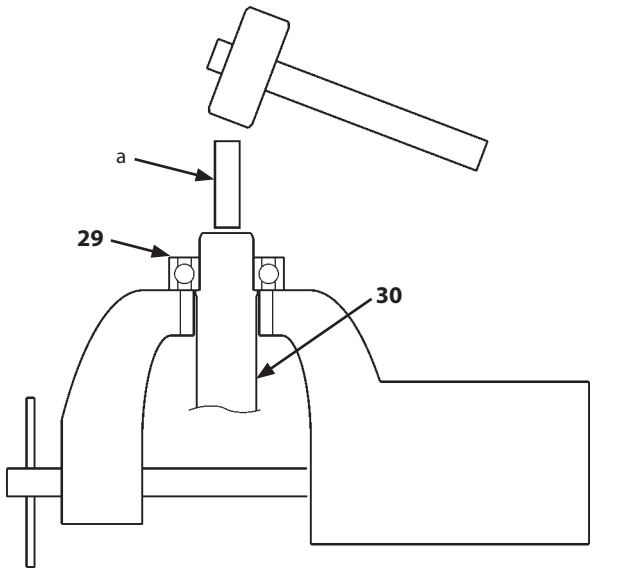
24. Remove bearing (24) from body (27) by using a bar and a hammer.

IMPORTANT: Handle floating seal (26) with care. (Refer to W4-2-4.)

25. Remove floating seal (26) from body (27) and ring gear (20) by using a screwdriver.
26. Remove the shaft (30) assembly from body (27) by using a bar and a plastic hammer.

IMPORTANT: Oil seal (28) cannot be reused.

27. Remove oil seal (28) from the shaft (30) hole of body (27) by using a screwdriver.
28. Secure the inner race part of ball bearing (29) which is remained in shaft (30) in a vise. Remove ball bearing (29) from shaft (30) by using a bar and a plastic hammer.



W172-03-02-003

a- Bar

Precautions for Using Floating Seal

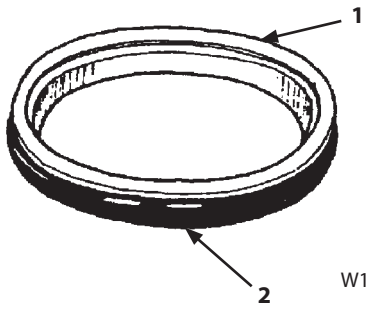
1. In general, replace the floating seal with a new one after disassembling.

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

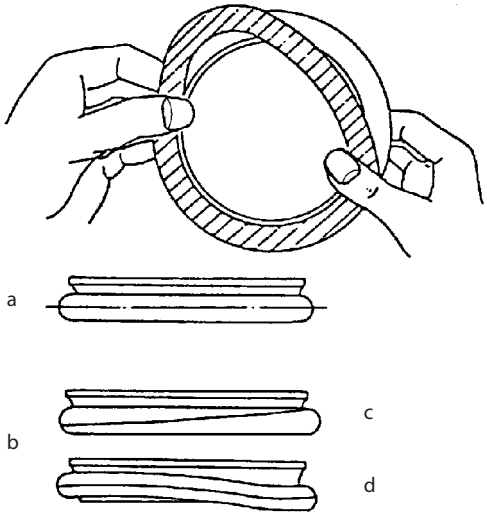
- Keep seal rings together as a matched set with seal ring (1) surfaces together. Apply oil onto sliding surface (e) of seal ring (1).
- Check sliding surface (e) of seal ring (1) for scuffing, scoring, corrosion, deformation, or uneven wear. Check the step part of seal ring (1).
- Check O-ring (2) for 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.

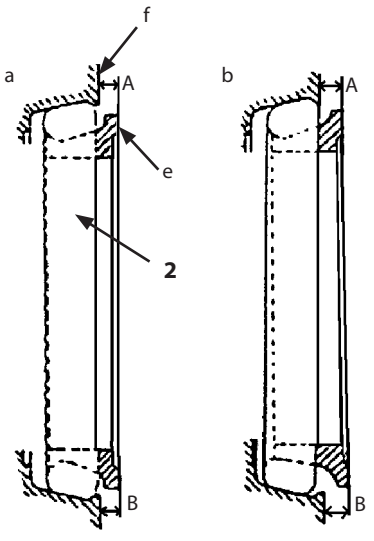


W178-02-11-001



W178-02-11-002

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

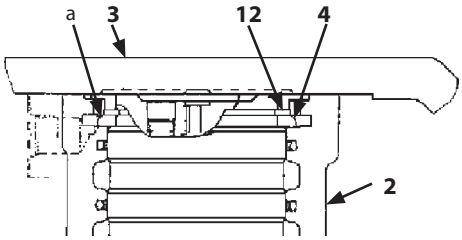


W178-02-11-003

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

IMPORTANT: Install ring (4) with the chamfered surface facing to the flange (3) side.

6. Install ring (4) and retaining ring (12) to body (2).



WADB-04-03-006

a - Chamfered Surface

7. Install O-ring (8) to body (2).
8. Install flange (3) to body (2) with bolts (14) (4 used) and spring washers (15) (4 used).

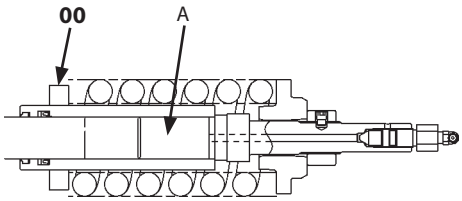
: 17 mm

: 55 N·m (5.5 kgf·m, 41 lbf·ft)

Assembly of Track Adjuster

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

1. Apply grease onto the inner surfaces of seal (06) and dust seal (07). Install seal (06) and dust seal (07) to cylinder (00).
2. Apply grease onto the inner surface of cylinder (00). Fill grease in portion A at the bottom of cylinder (00).

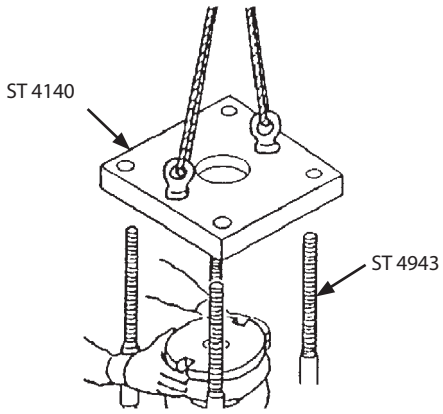


WADB-04-04-003

3. Install piston rod (05) to the cylinder (00) assembly. Bleed air from cylinder (00).
4. Install spring (01) to cylinder (00).
5. Install eyebolt (M16, Pitch 1.5 mm) to the valve (08) hole of cylinder (00). Attach the nylon sling onto the eyebolt. Hoist the spring (01) assembly. Place the spring (01) assembly on the special tool (ST 4943).
6. Remove the eyebolt from cylinder (00).
7. Install washer (10) to spring (01).

CAUTION: Special tool (ST 4140) weight: 36 kg (80 lb)

8. Attach the nylon slings onto the eyebolts (2 used) of the special tool (ST 4140). Hoist the special tool (ST 4140). Install the special tool (ST 4140) to the special tool (ST 4943).



WDAD-04-04-004

Removal and Installation of Upper Roller

IMPORTANT: The upper roller cannot be disassembled. Replace it as an assembly.

Removal

CAUTION: The pressure inside the track adjuster cylinder is high. As valve (1) may fly out and the high-pressure grease may spout out from the grease outlet (a), do not loosen valve (1) quickly and/or excessively. Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

IMPORTANT: Loosening valve (1) by 1 to 1.5 turns is enough. Do not loosen it over those turns.

IMPORTANT: When gravel or mud is packed between the sprockets and the track links, remove them before loosening.

1. Set the machine position for inspection and maintenance. (Refer to W1-6-1.)
2. Loosen valve (1) in the track adjuster. Drain grease and loosen the track tension.

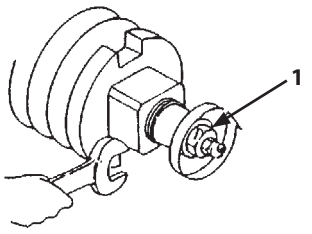
   : 19 mm

IMPORTANT: Use nonskid cloth (c) between track frame (3) and oil jack (d) in order not to slip.

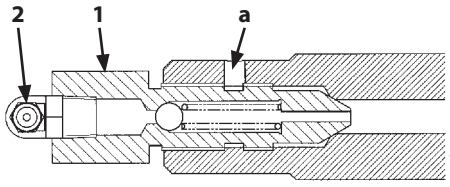
3. Raise track (6) by using oil jack (d) until enough clearance is observed between upper roller (5) and track (6). Place wooden blocks (b) between track (6) and track frame (3).
4. Remove bolt (7), nut (9), and spring washer (8). Remove upper roller (5).

   : 24 mm

NOTE: LOCTITE #262 has been applied on bolt (7).

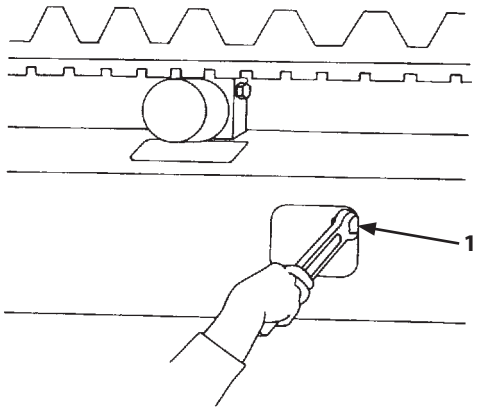


W105-03-07-002

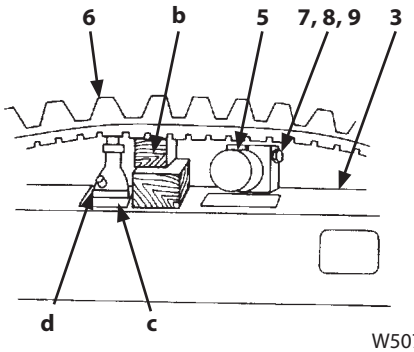


W1NC-03-06-001

a- Grease Outlet



W507-03-06-001



W507-03-06-003

b- Wooden Block
c- Nonskid Cloth
d- Oil Jack

Removal and Installation of Rubber Crawler

Removal

CAUTION: Rubber crawler weight: 245 kg (545 lb)

CAUTION: Securely support the raised machine by using the blocks.

1. Raise the machine off the ground by using the front attachment.

CAUTION: The pressure inside cylinder of the track adjuster is high. As valve (1) may fly out and the high-pressure grease may spout out from the grease outlet (c), do not loosen valve (1) quickly and/or excessively. Keep body parts and face away from valve (1) and loosen valve (1) carefully. Do not loosen grease fitting (2).

IMPORTANT: Loosening valve (1) 1 to 1.5 turns is enough. Do not loosen valve (1) over those turns.

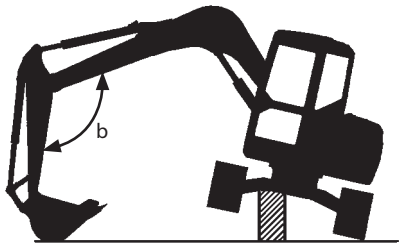
IMPORTANT: When gravel or mud is packed between sprockets and track links, remove them before loosening.

2. Loosen valve (1) in the track adjuster slowly and drain grease.

: 19 mm

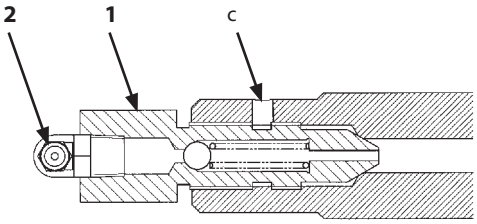
NOTE: If rotating the track in forward and reverse direction with valve (1) loosened, the track can be removed and installed easily.

3. Insert steel pipe (3) into the track. Rotate the sprocket in reverse direction. After the front idler is floated by steel pipe (3), slide and remove the track transversely.



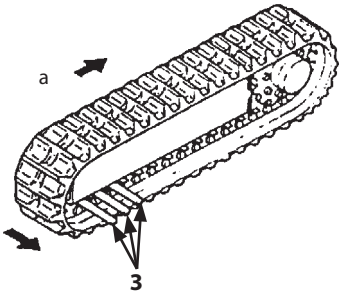
M195-07-003

b- 90 to 110 °



W1NC-03-06-001

c- Grease Outlet



M503-07-062

a- Rotating Direction

Installation

CAUTION: Blade cylinder (1) weight: 46 kg (105 lb)

1. Apply grease onto the bushing inside and the lip part of the dust seal for blade cylinder (1) (both bottom and rod sides).
2. Apply grease onto pin (5). Attach nylon slings onto blade cylinder (1). Hoist blade cylinder (1). Fit the pin (5) holes of blade cylinder (1) and blade (9).

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.

3. Install blade cylinder (1) to blade (9) with pin (5) by using a hammer. Apply LOCTITE #262 onto bolt (7). Secure pin (5) with lock (6), bolts (7) (2 used), and washers (8) (2 used).

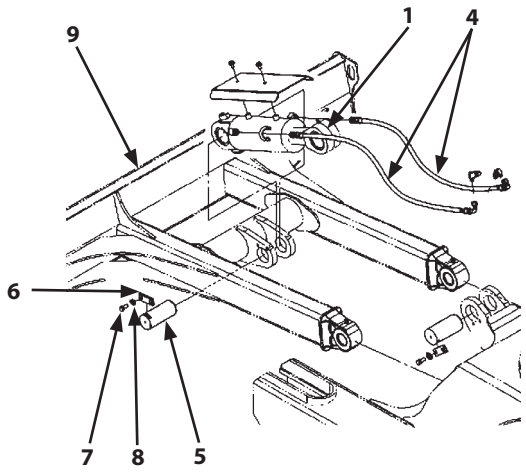
   : 19 mm

   : 110 N·m (11 kgf·m, 81 lbf·ft)

4. Connect hoses (4) (2 used) to blade cylinder (1).

   : 22 mm

   : 40 N·m (4 kgf·m, 29.5 lbf·ft)



WAFA-04-08-003

MEMO

Installation

CAUTION: Boom cylinder (4) weight: 78 kg (175 lb)

IMPORTANT: Insert at least one shim to both left and right sides of all pins respectively. When the shims should be used in order to adjust the clearance, the shims should be inserted at both sides respectively. (Clearance: 0.5 mm or less)

1. Apply grease onto the lip part of the dust seal for boom cylinder (4), the boss side, and the bushing inside (both bottom and rod sides).
2. Apply grease onto pin (1). Attach the nylon sling onto boom cylinder (4). Hoist boom cylinder (4). Fit the pin (1) holes of boom cylinder (4) and swing post (3). Insert the shims to both sides of the cylinder tube boss.

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.

3. Fit the bolt (2) holes of swing post (3) and pin (1). Install pin (1) by using a hammer.

IMPORTANT: Install nut (5) so that the clearance between nut (5) and the swing post (3) boss should be 3 to 5 mm.

4. Apply LOCTITE #262 onto bolt (2). Install bolt (2) and nuts (5) (2 used).

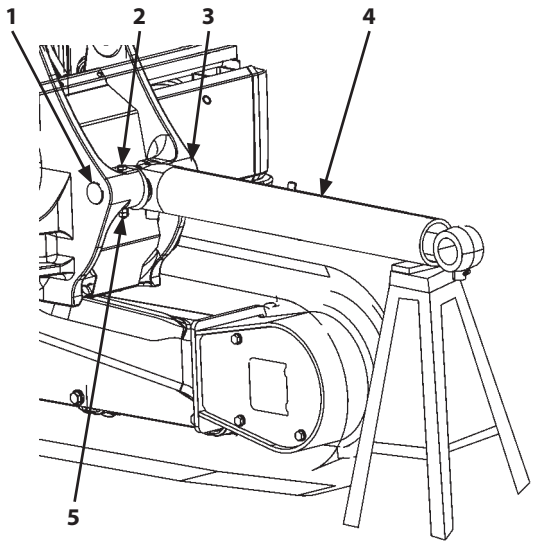
   : 24 mm

   : 270 N·m (27 kgf·m, 200 lbf·ft)

5. Connect hoses (6) (2 used) to boom cylinder (4).

   : 27 mm

   : 80 N·m (8 kgf·m, 59 lbf·ft)



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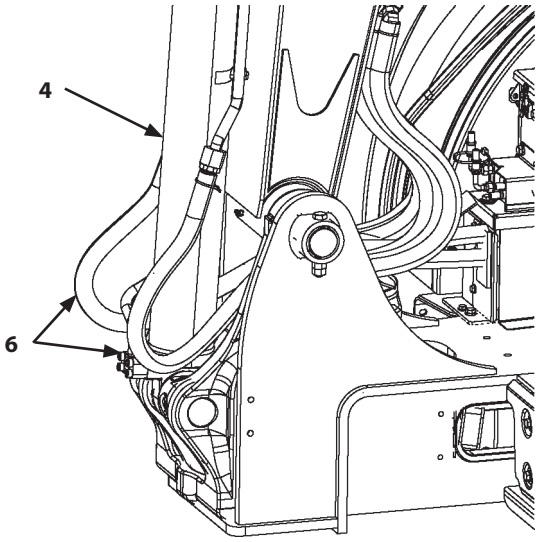
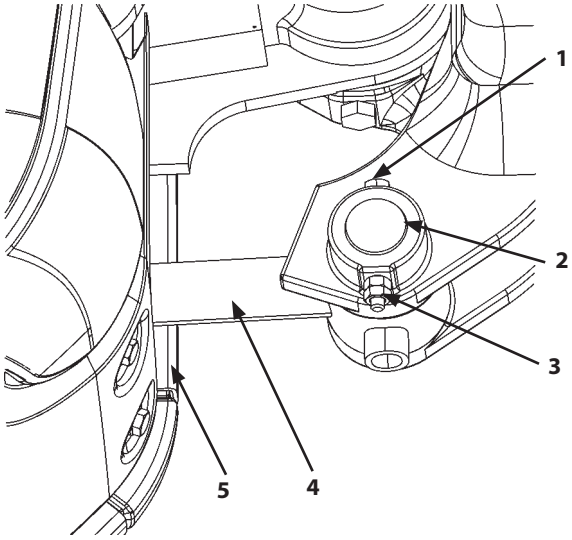


WAFA-05-01-001

Removal and Installation of Boom Swing Cylinder

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.



WADB-05-02-007

Removal

- The procedure starts on the premise that the front attachment has swung to the left.

1. Park the machine on a solid, level surface. Fully retract the bucket and arm cylinders and lower the arm top onto the ground.

CAUTION: Boom swing cylinder (4) weight: 45 kg (100 lb)

2. Set wooden blocks between boom swing cylinder (4) and main frame (5). Support boom swing cylinder (4). Remove nuts (3) (2 used). Remove stopper pin (1) from pin (2). Remove pin (2) from the swing post.

: 22 mm

NOTE: LOCTITE #262 has been applied on stopper pin (1).

NOTE: When removing stopper pin (1), pin (2) may come off. Put the matching marks on the boss of swing post and pin (2) for assembling.

3. Start the engine. Retract the cylinder rod to the stroke end. In order not to extend the cylinder rod, pass wires through the boss of cylinder rod and secure it.

11. Install steel ball (21) and set screw (22) to piston (15). Crimp set screw (22) by using a punch (2 places).

    : 6 mm

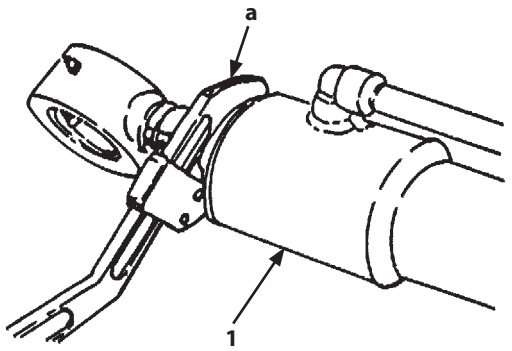
    : 20±2 N·m (2±0.2 kgf·m, 15±1.5 lbf·ft)

IMPORTANT: When installing the cylinder rod (2) assembly, do not drop dust ring (16) and wear ring (18) from piston (15).

12. Secure cylinder tube (1) in a vise horizontally. Install the cylinder rod (2) assembly to cylinder tube (1).
13. Tighten cylinder head (3) to cylinder tube (1) by using hook wrench (a). Bend the lock washer in order not to loosen.

    Diameter of cylinder head (3): 129 mm

    : 950±95 N·m (95±9.5 kgf·m, 700±70 lbf·ft)

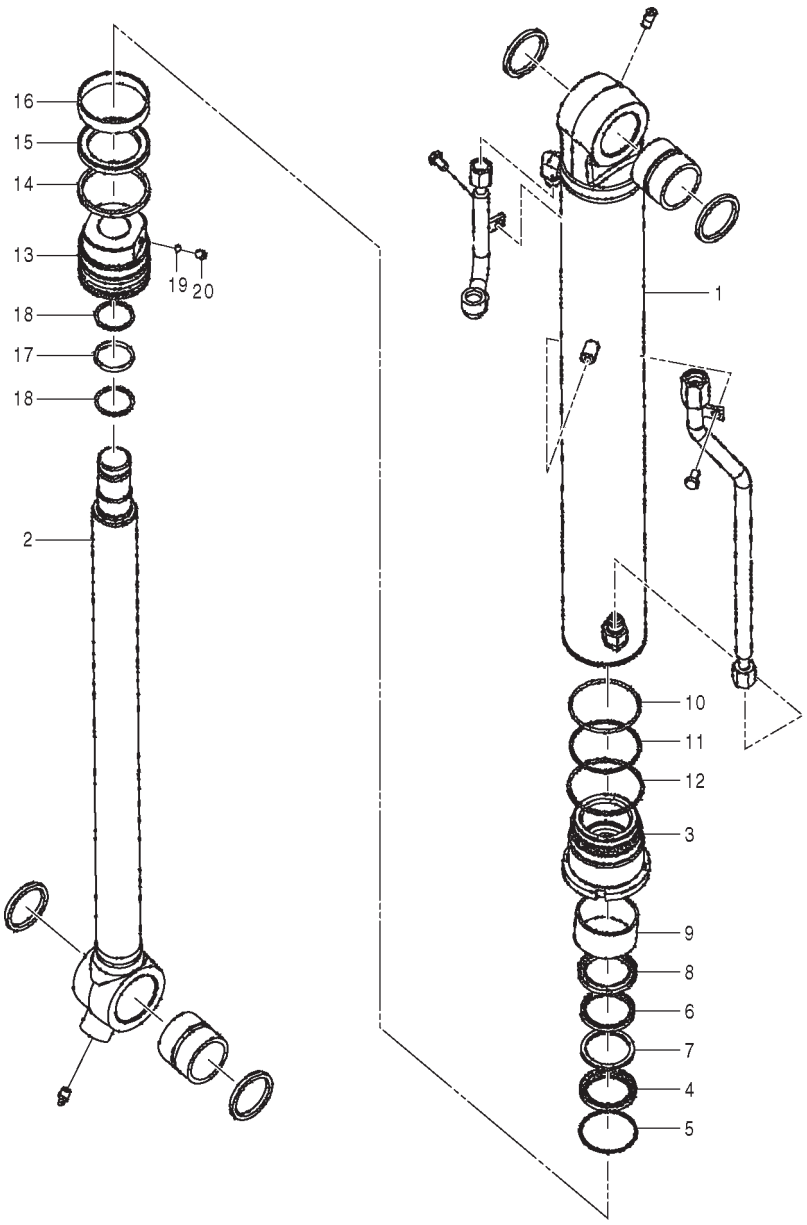


W506-04-02-019

a- Hook Wrench

Disassembly of Bucket, Boom Swing Cylinders

Bucket Cylinder



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