RECOGNIZE SAFETY INFORMATION

- This is the **SAFETY ALERT SYMBOL**.
  - When you see this symbol on your machine or in this manual, be alert to the potential for personal injury.
  - Follow recommended precautions and safe operating practices.



001-E01A-0688

SA-688

UNDERSTAND SIGNAL WORDS

- On machine safety signs, signal words designating the degree or level of hazard - DANGER, WARNING, or CAUTION - are used with the safety alert symbol.
  - **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
  - **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
  - **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
  - **DANGER or WARNING safety signs** are located near specific hazards. General precautions are listed on **CAUTION safety signs**.
  - Some safety signs don't use any of the designated signal words above after the safety alert symbol are occasionally used on this machine.
- **CAUTION** also calls attention to safety messages in this manual.
- To avoid confusing machine protection with personal safety messages, a signal word **IMPORTANT** indicates a situation which, if not avoided, could result in damage to the machine.
- ***NOTE*** indicates an additional explanation for an element of information.



SA-1223

002-E01C-1223

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TIGHTENING TORQUE SPECIFICATIONS

Bolt and Nut on Base Machine Standard Torques

Torque Specifications

No.	Descriptions			Bolt Dia mm	Q'ty	Wrench Size mm	Torque		
							N·m	kgf·m	lbf·ft
1	Engine cushion rubber mounting bolt	Front	Engine cushion rubber	16	2	24	205	21	152
			Cushion rubber-machine	16	2	24	205	21	152
		Rear	Engine cushion rubber	22	2	32	540	55	400
			Cushion rubber-machine	16	4	24	205	21	152
2	Radiator mounting bolt			16	4	24	205	21	152
3	Hydraulic oil tank mounting bolt			16	8	24	205	21	152
4	Fuel tank mounting bolt			16	8	24	205	21	152
5	ORS fittings for hydraulic hoses and piping			1-3/16-12UNF		36	175	18	130
				1-7/16-12UNF		41	205	21	152
6	Pump transmission mounting bolt			7/16-14UNF	14	16	69	7	51
7	Pump device mounting bolt			20	8	30	390	40	290
8	Control valve mounting bolt			20	4	30	390	40	290
9	Swing device mounting bolt			22	26	32	740	75	540
	Ring gear housing mounting bolt (hexagonal wrench)			18	24	14	295	30	215
10	Swing motor mounting bolt (hexagonal wrench)			12	16	10	88	9	65
11	Battery mounting nut			12	2	19	34	3.5	25.5
12	Cab mounting bolt		STD, LC	16	4	24	205	21	152
			H, LCH	16	6	24	205	21	152
13	Swing bearing mounting bolt to upperstructure			30	36	46	1910	195	1410
	Swing bearing mounting bolt to undercarriage			30	36	46	1720	175	1270

Continued on next page

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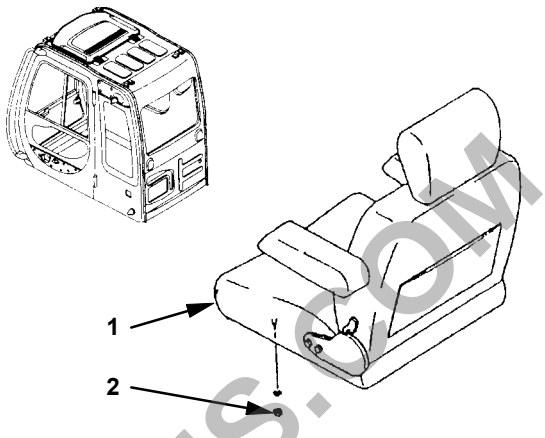
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REMOVE AND INSTALL CAB

Remove Cab

1. Remove seat mounting nut (2) to remove seat (1).

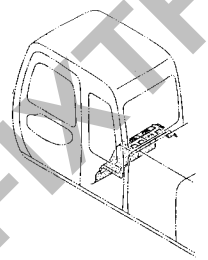
   : 13 mm



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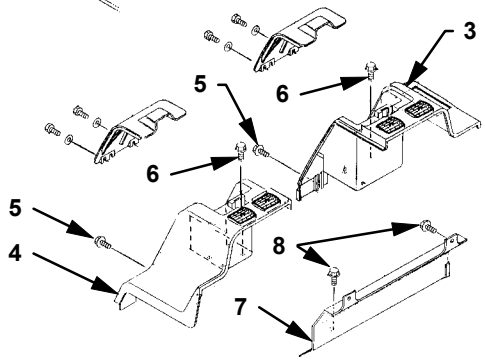
2. Loosen bolt (5) in the cab rear section and bolt (6) in rear boxes (3 and 4) to remove rear boxes (3 and 4).

   : 13 mm



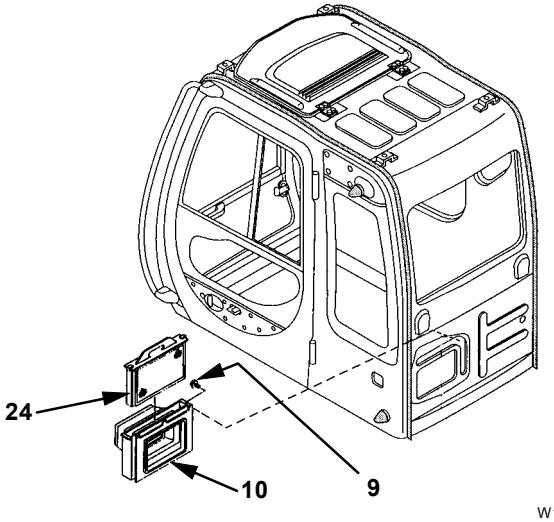
3. Loosen bolt (8) to remove lower cover (7) of the rear box.

   : 13 mm



W157-02-01-017

4. Remove filter (24) and loosen screw (9) to remove duct (10) from the cab.

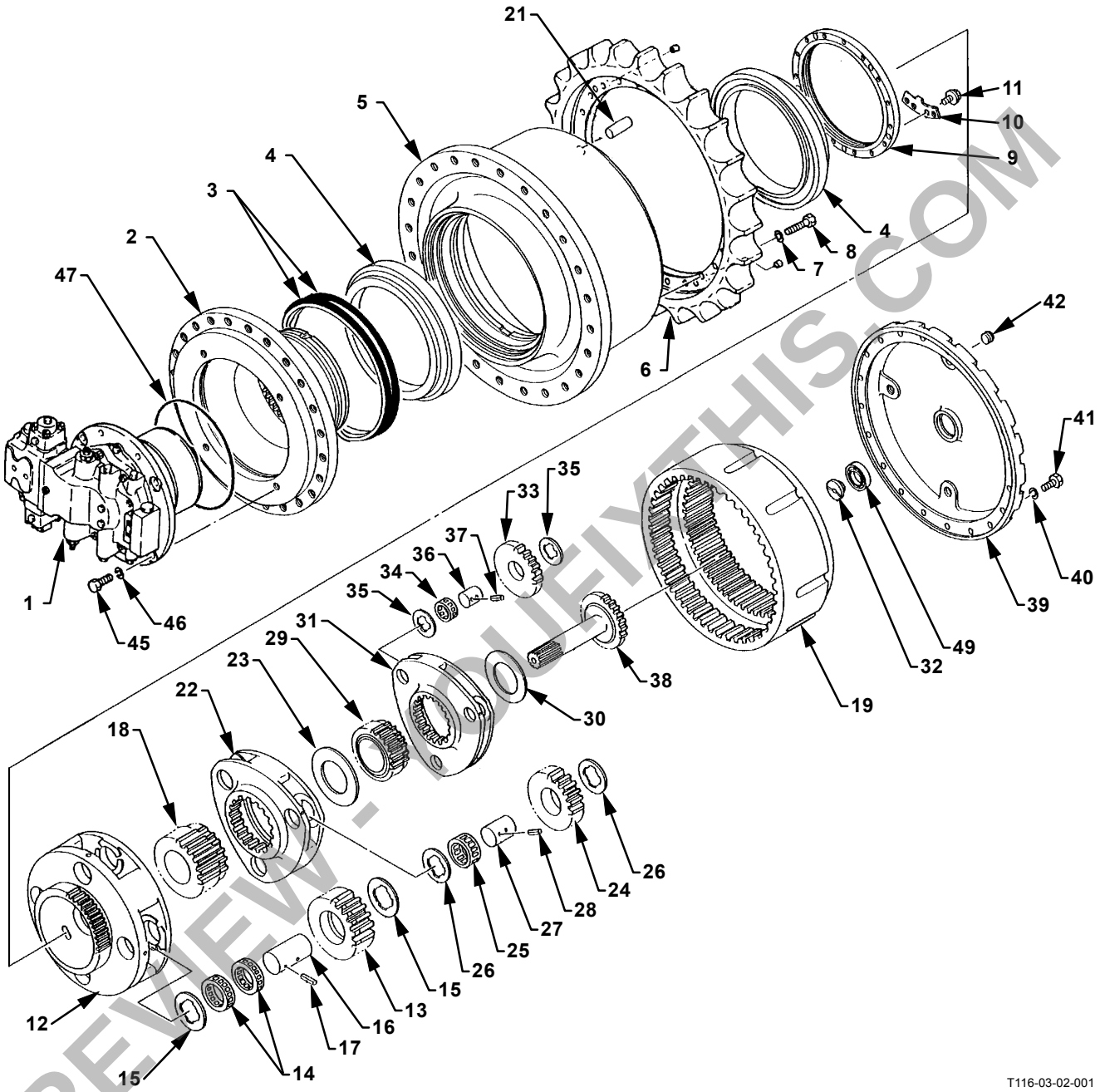


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DISASSEMBLE TRAVEL DEVICE

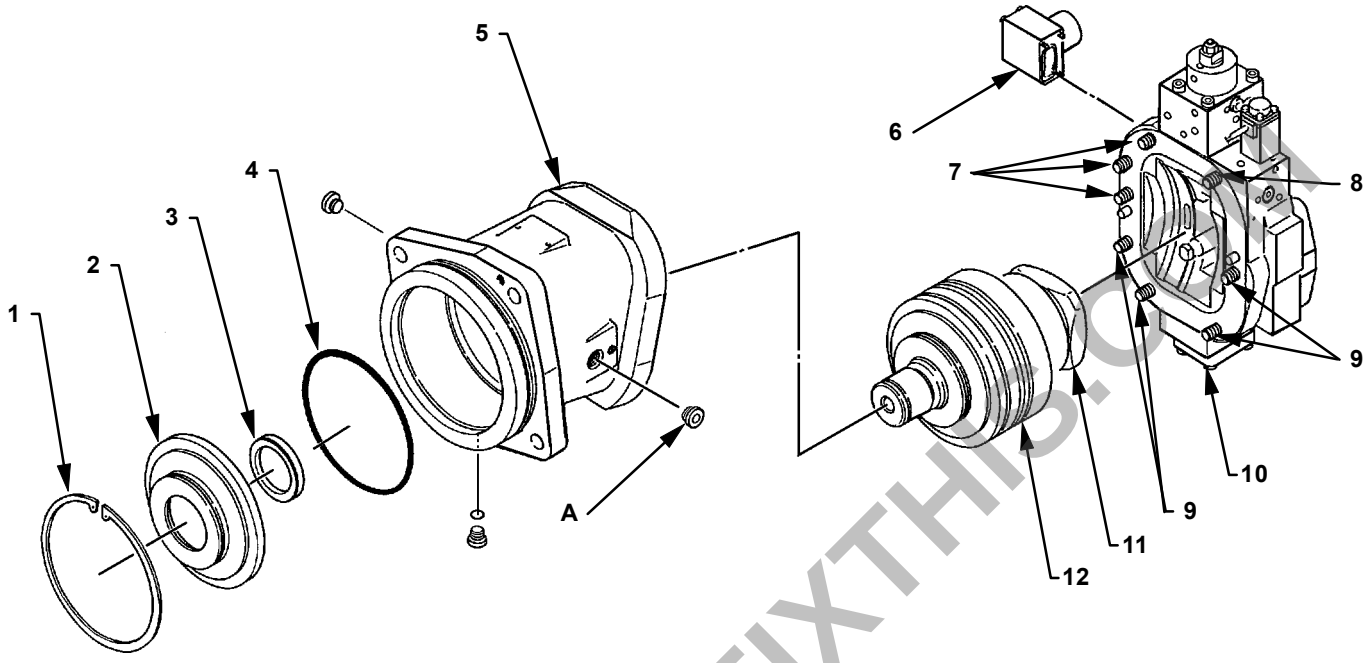


T116-03-02-001

1 - Motor
2 - Housing
3 - Floating Seal
4 - Roller Bearing (2 Used)
5 - Drum
6 - Sprocket
7 - Spring Washer (24 Used)
8 - Bolt (24 Used)
9 - Bearing Nut
10 - Lock Plate
11 - Bolt (2 Used)
12 - Third Stage Carrier
13 - Third Stage Planetary Gear (4 Used)
14 - Needle Bearing (8 Used)
15 - Thrust Plate (8 Used)
16 - Pin (4 Used)
17 - Spring Pin (4 Used)
18 - Third Stage Sun Gear
19 - Ring Gear
21 - Knock Pin (8 Used)
22 - Second Stage Carrier
23 - Spacer
24 - Second Stage Planetary Gear (3 Used)
25 - Needle Bearing (3 Used)
26 - Thrust Plate (6 Used)
27 - Pin (3 Used)
28 - Spring Pin (3 Used)
29 - Second Stage Sun Gear
30 - Spacer
31 - First Stage Carrier
32 - Stopper Pin
33 - First Stage Planetary Gear (3 Used)
34 - Needle Bearing (3 Used)
35 - Thrust Plate (6 Used)
36 - Pin (3 Used)
37 - Spring Pin (3 Used)
38 - Propeller Shaft
39 - Cover
40 - Spring Washer (20 Used)
41 - Bolt (20 Used)
42 - Plug (3 Used)
45 - Bolt (4 Used)
46 - Spring Washer (4 Used)
47 - O-Ring
49 - Bearing

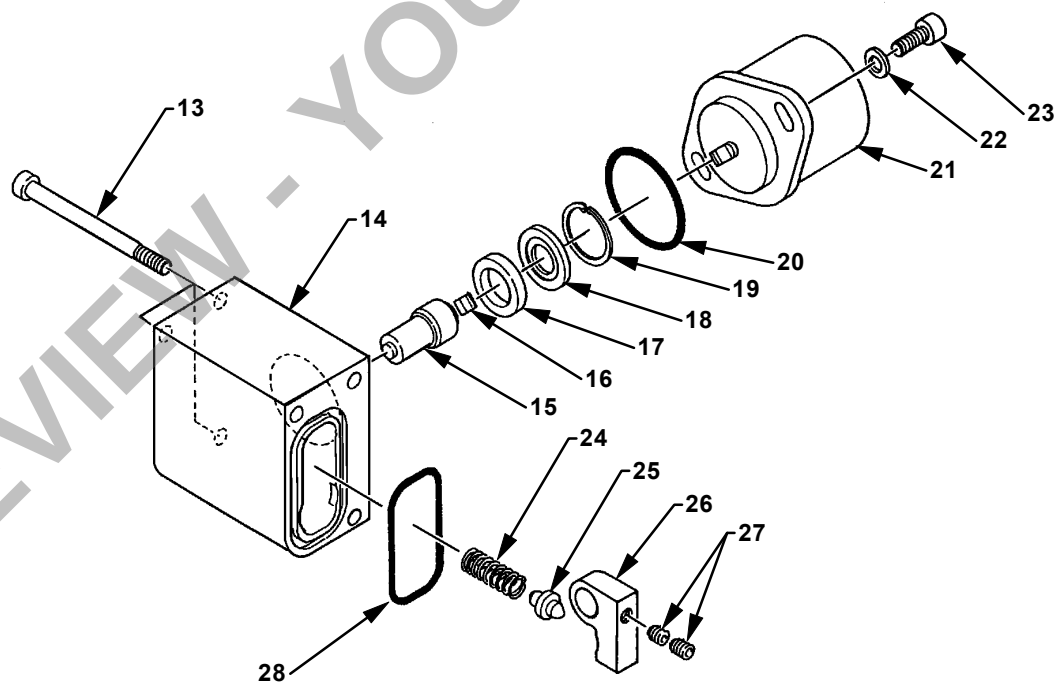
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DISASSEMBLE MAIN PUMP



W116-02-04-048

Pump displacement Angle Sensor (6)



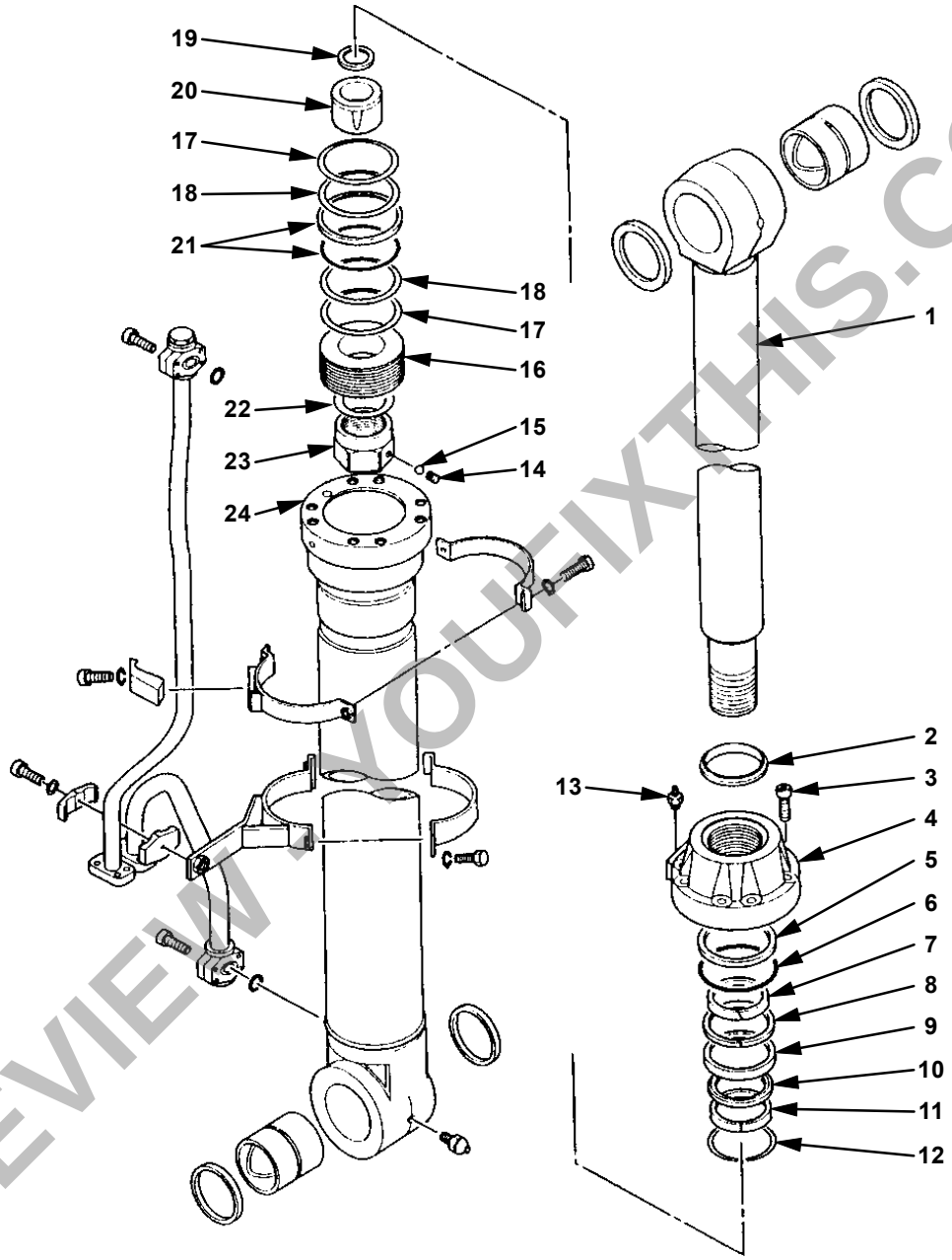
W116-02-04-049

1 - Retaining Ring	8 - Socket Bolt	15 - Shaft	22 - Washer
2 - Seal Case	9 - Socket Bolt (4 Used)	16 - Spring	23 - Socket Bolt (2 Used)
3 - Oil Seal	10 - Regulator	17 - Oil Seal	24 - Spring
4 - O-Ring	11 - Control Plate	18 - Retainer	25 - Spring Seat
5 - Housing	12 - Rotary Group	19 - Retaining Ring	26 - Arm
6 - Pump Displacement Angle Sensor (A-Sensor)	13 - Socket Bolt (3 Used)	20 - O-Ring	27 - Set Screw (2 Used)
7 - Socket Bolt (3 Used)	14 - Case	21 - Potentiometer	28 - O-Ring

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DISASSEMBLE CYLINDER

Boom Cylinder

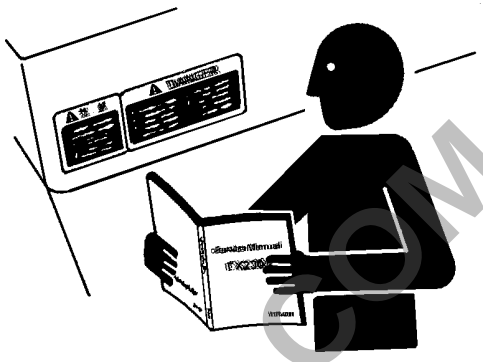


W162-04-02-001

1 - Cylinder Rod
2 - Wiper Ring
3 - Socket Bolt (8 Used)
4 - Cylinder Head
5 - Backup Ring
6 - O-Ring
7 - Slide Ring
8 - Backup Ring
9 - U-Ring
10 - Buffer Ring
11 - Bushing
12 - Retaining Ring
13 - Air Bleed Plug
14 - Set Screw
15 - Steel Ball
16 - Piston
17 - Slide Ring (2 Used)
18 - Slide Ring (2 Used)
19 - Cushion Seal
20 - Cushion Bearing
21 - Seal Ring
22 - Shim
23 - Nut
24 - Cylinder Tube

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FOLLOW SAFETY INSTRUCTIONS

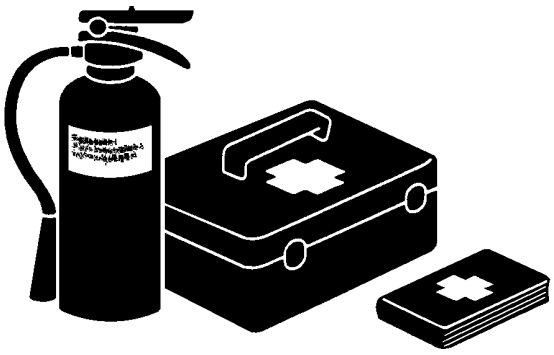


SA-003

- Carefully read and follow all safety signs on the machine and all safety messages in this manual.
- Safety signs should be installed, maintained and replaced when necessary.
  - If a safety sign or this manual is damaged or missing, order a replacement from your authorized dealer in the same way you order other replacement parts (be sure to state machine model and serial number when ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorized personnel to operate the machine.
- Keep your machine in proper working condition.
  - Unauthorized modifications of the machine may impair its function and/or safety and affect machine life.
- The safety messages in this SAFETY chapter are intended to illustrate basic safety procedures of machines. However it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any questions, you should first consult your supervisor and/or your authorized dealer before operating or performing maintenance work on the machine.

003-E01B-0003

PREPARE FOR EMERGENCIES



SA-437

- Be prepared if a fire starts or if an accident occurs.
  - Keep a first aid kit and fire extinguisher on hand.
  - Thoroughly read and understand the label attached on the fire extinguisher to use it properly.
  - To ensure that a fire-extinguisher can be always used when necessary, check and service the fire-extinguisher at the recommended intervals as specified in the fire-extinguisher manual.
  - Establish emergency procedure guidelines to cope with fires and accidents.
  - Keep emergency numbers for doctors, ambulance service, hospital, and fire department posted near your telephone.

004-E01A-0437

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SERVICE AIR CONDITIONING SYSTEM SAFELY

- If spilled onto skin, refrigerant may cause a cold contact burn.
  - Refer to the freon container for proper use when servicing the air conditioning system.
  - Use a recovery and recycling system to avoid venting freon into the atmosphere.
  - Never let the freon stream make contact with the skin.

513-E01A-0405



SA-405

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, 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. That way you will know exactly what the risks are and how to do the job safely. Then follow procedures and use recommended equipment.

S515-E01A-0309



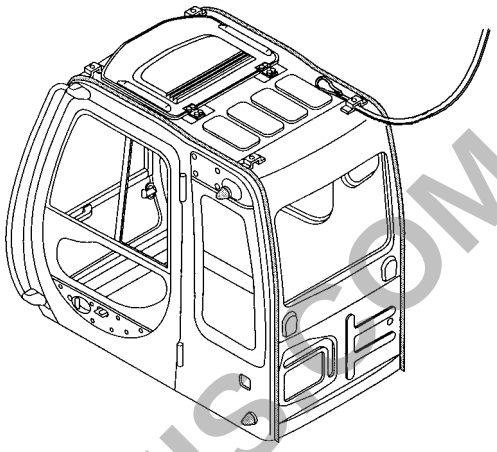
SA-309

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9. Attach a sling belt to the top of the cab.

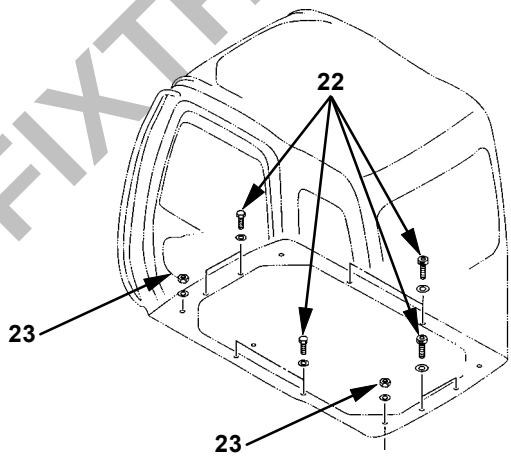
CAUTION: Cab weight: 260 kg (573 lb)



W157-02-01-009

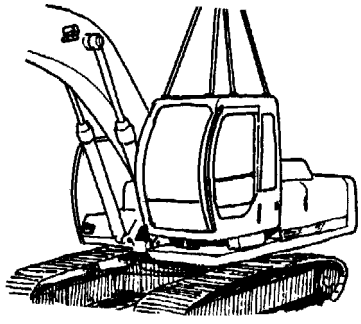
10. Remove cab mounting bolt (22) and nuts (23).

: 17 mm
: 24 mm
: 8 mm



W157-02-01-010

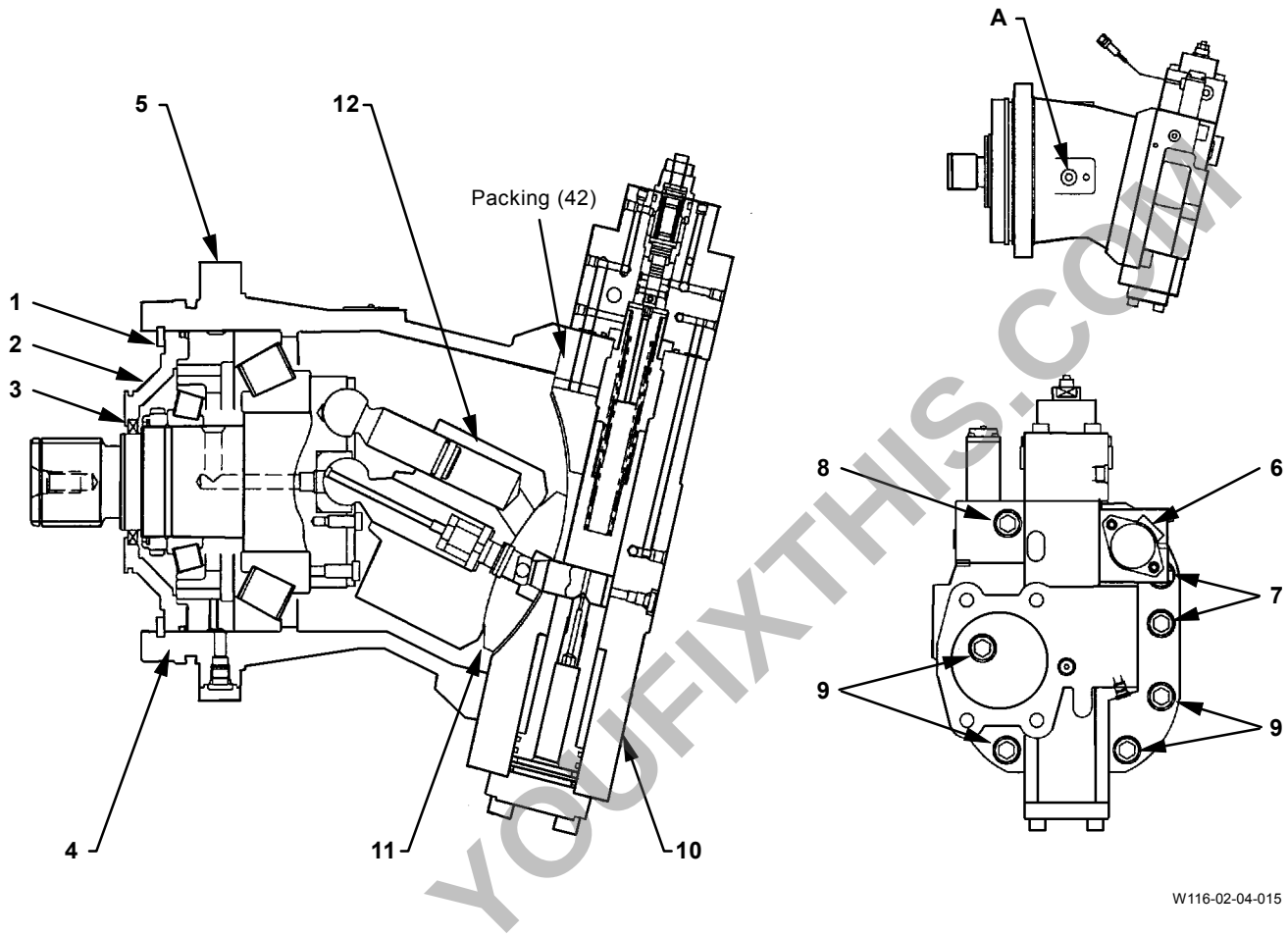
11. Slowly lift the cab with a crane to remove the cab from the machine.



W157-02-01-001

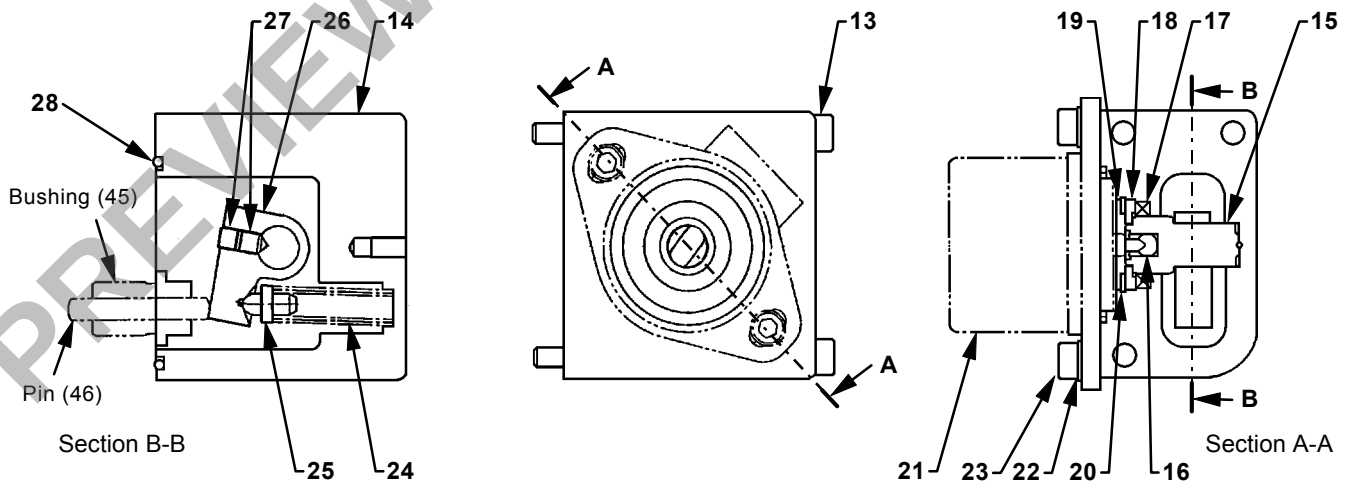
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W116-02-04-015

A-Sensor



W116-02-04-016

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Assemble Control Valve 2

Load Check Valve

(Swing)

1. Install check valve (5) and spring (6) into housing (31).

2. Install O-ring (1) and back up ring (2) onto cap (7), and install cap (7) to housing (31).

: 14 mm
: 345 N·m (35 kgf·m, 255 lbf·ft)

(Except for Swing)

3. Install check valve (5), spring (6) and check valve (8) into housing (31).

4. Install O-rings (1) and backup rings (2) onto caps (4, 9, 10, 29 and 30). Install caps (4, 9, 10, 29 and 30) to housing (31).

: 14 mm
: 345 N·m (35 kgf·m, 255 lbf·ft)

Holding Valve

5. Install O-ring (26) and backup ring (25) onto popper (28). Install poppet (28) and spring (27) into housing (31).

6. Install O-rings (17 and 18) and backup rings (16 and 19) into sleeve (15).

7. Install piston (23), sleeve (15), popper (14) and spring (13) into cover (20).

8. After installing O-rings (12) onto caps (11) (2 used), install caps (11) (2 used) into cover (20).

: 10 mm
: 49 N·m (5 kgf·m, 36 lbf·ft)

9. Install O-ring (24) on cover (20).

10. Install cover (20) on housing (31) with socket bolts (22) (4 used).

: 12 mm
: 175 N·m (18 kgf·m, 130 lbf·ft)

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Removal

1. Disconnect hoses (1 to 5) and (7 to 8).

: 36 mm
: 157 N·m (16 kgf·m, 116 lbf·ft)
: 27 mm
: 93 N·m (9.5 kgf·m, 69 lbf·ft)
: 22 mm
: 39 N·m (4 kgf·m, 29 lbf·ft)
: 19 mm
: 34 N·m (3.5 kgf·m, 25 lbf·ft)
: 8 mm
: 64 N·m (6.5 kgf·m, 47 lbf·ft)

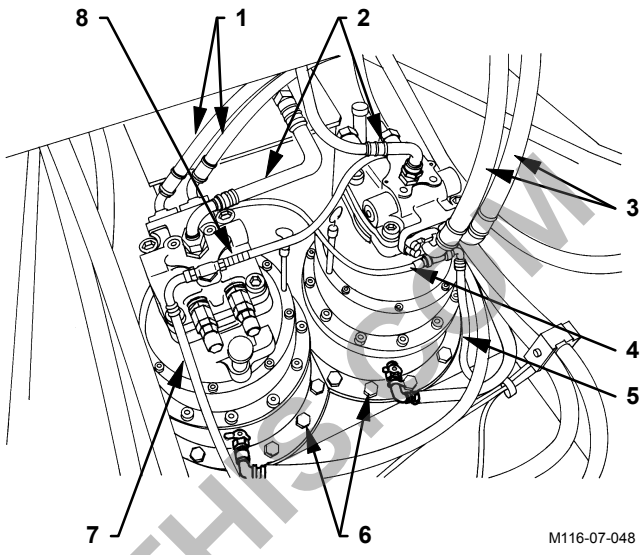
NOTE: Cap the disconnected hose and pipe ends.

2. Install eye bolt s (M10, pitch 1.5) (2 used) into two bolt holes on the swing motor for slinging with a wire rope.

CAUTION: Swing device weight: 325 kg (720 lb)

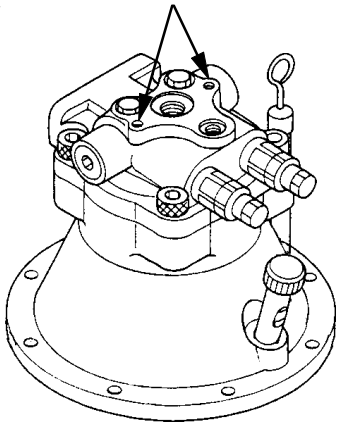
3. After removing bolts (6), remove the swing device by slinging the swing device with a crane.

: 32 mm
: 740 N·m (75 kgf·m, 540 lbf·ft)



M116-07-048

Eye Bolt Tightening Location


W167-02-05-001

Installation

NOTE: Refer to "Removal" section for wrench sizes and tightening torque.

1. Apply liquid packing to the reduction gear side and the reduction gear mounting face on the frame. Secure the swing device with bolts (6).

2. Connect hoses (1 to 5) and (7 to 8).

IMPORTANT: After installation, refill the hydraulic oil in the swing motor. Check the oil level. Start the engine and check for oil leaks.

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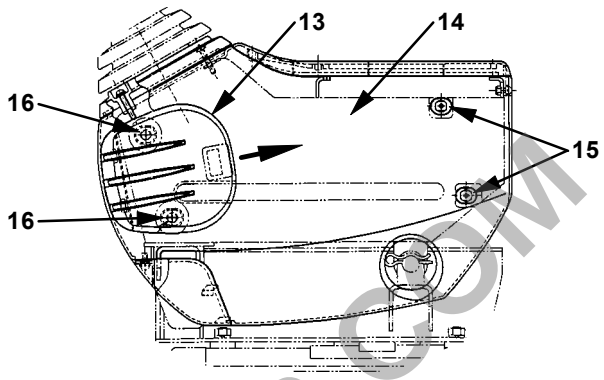
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4. Remove pat (13). After pushing pat (13) in the direction of the arrow, detach the teeth at two places. Then, move the pat to the opposite direction of the arrow to remove the pat.

5. Loosen two screws (15) and two screws (16) to remove cover (14).

6. Loosen screw joint (17) to remove the lever.

: 19 mm



W157-02-07-010

IMPORTANT: Attach an identification tag to each hose to aid re-assembly.

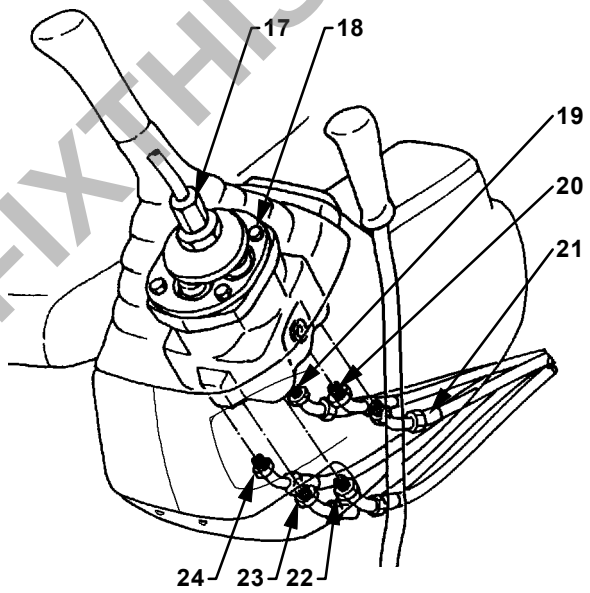
7. Disconnect hoses (19 to 24).

: 22 mm

NOTE: Cap all disconnected hose ends.

8. Loosen bolts (18) to remove the pilot valve.

: 13 mm



W157-02-07-003

19 - Hose D : (To arm roll in side control valve)
20 - Hose P2 : (From pilot shut-off valve)
21 - Hose E : (To left swing control valve)
22 - Hose C : (To arm roll out side control valve)
23 - Hose T5 : (To hydraulic oil tank)
24 - Hose F : (To right swing control valve)

Installation

1. Install the pilot valve with bolts (18).

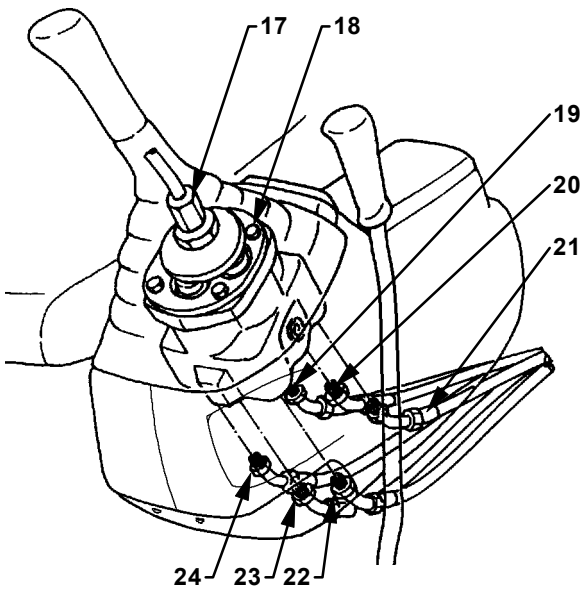
: 13 mm
: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

2. Connect hoses (19) to (24).

: 22 mm
: 39 N·m (4.0 kgf·m, 29 lbf·ft)

3. Install the lever with screw joint (17).

: 19 mm
: 88 N·m (9.0 kgf·m, 65 lbf·ft)



W157-02-07-003

19 - Hose D : (To arm roll in side control valve)
20 - Hose P2 : (From pilot shut-off valve)
21 - Hose E : (To left swing control valve)
22 - Hose C : (To arm roll out side control valve)
23 - Hose T5 : (To hydraulic oil tank)
24 - Hose F : (To right swing control valve)

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REMOVE AND INSTALL THREE-SPOOL SOLENOID VALVE

CAUTION:

1. **Escaping fluid under pressure can penetrate the skin or eyes, causing serious injury. Avoid this hazard by relieving pressure before disconnecting hydraulic lines.**
2. **Hot hydraulic oil may spout after operation, possibly causing severe burns. Wait for oil to cool before starting any repair work.**
3. **The hydraulic oil tank cap may fly off if removed without releasing internal pressure first. Thoroughly release any remaining pressure before removing the cap.**

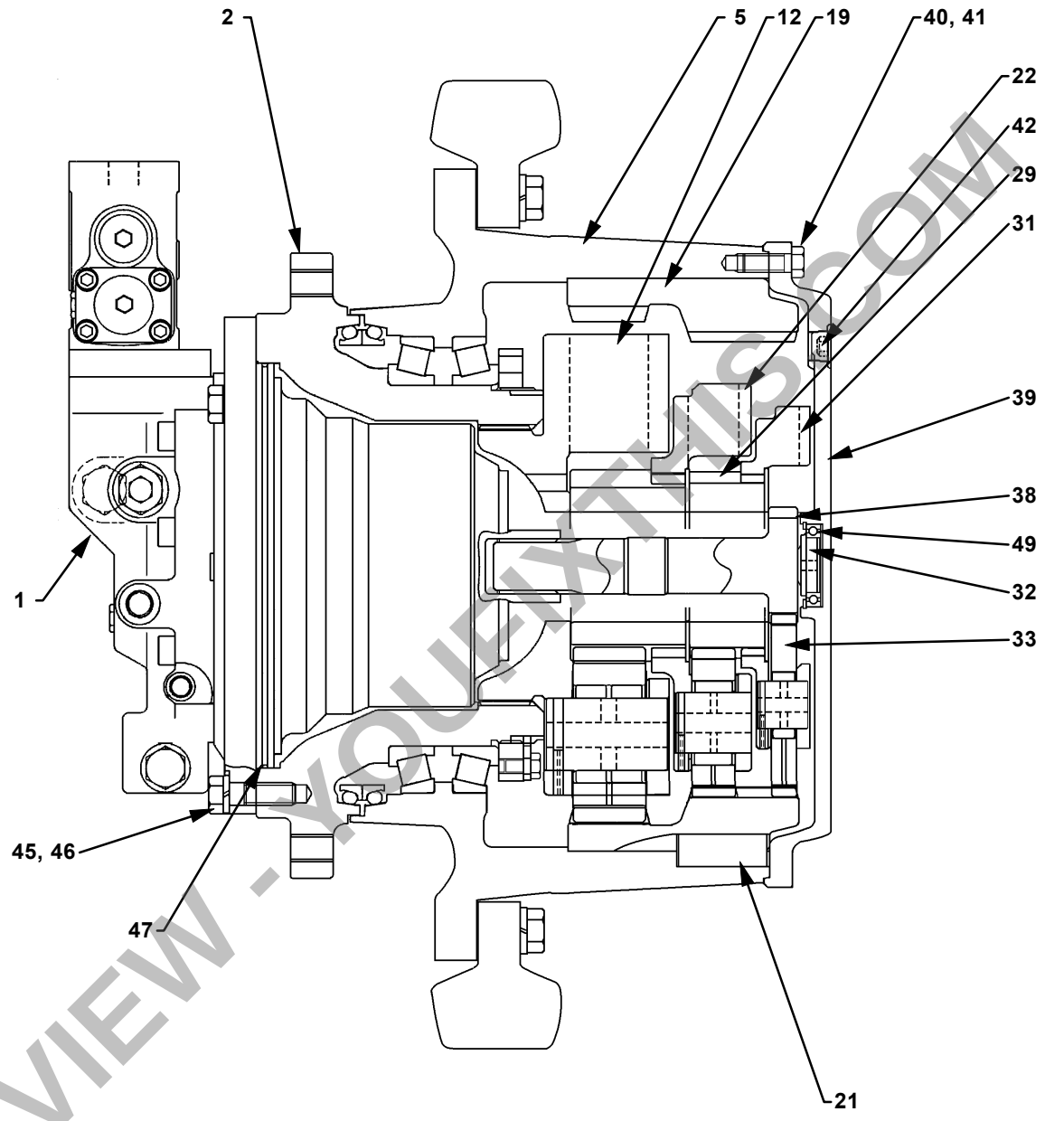
Preparation

1. Park the machine on a solid level surface. Lower the bucket to ground.
2. Stop the engine. Move all control levers to release pressure remaining in the system. Rotate the hydraulic oil tank cap approx. 30° counterclockwise to release pressure remaining in the hydraulic oil tank.
3. Remove the hydraulic oil tank cap. Connect a vacuum pump and operate it continuously to maintain negative pressure in the hydraulic oil tank.

NOTE: Run the vacuum pump continuously while working on the hydraulic system.

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T116-03-02-002

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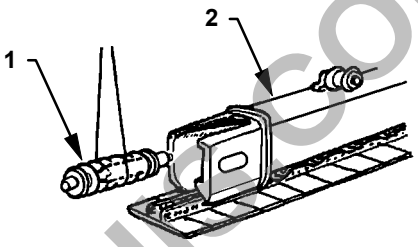
REMOVE AND INSTALL TRACK ADJUSTER

Before removing the track adjuster, the tracks and the front idler must be removed first. For removal and installation of the tracks and the front idler, refer to applicable removal / installation sections. In this section, the procedure starts on the premise that the tracks and the front idler have already been removed.

Removal

CAUTION: Track adjuster weight: 300 kg (660 lb)

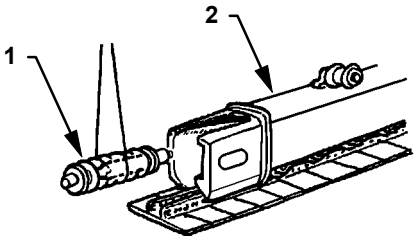
1. After removing the front idler and yoke, remove track adjuster (1) from track frame (2) by prying it with a crowbar.



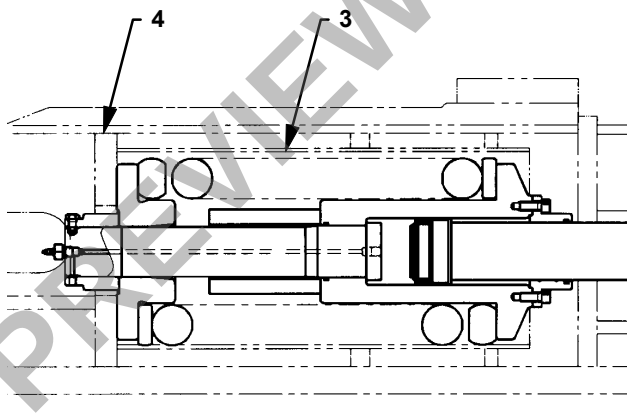
W142-03-04-002

Installation

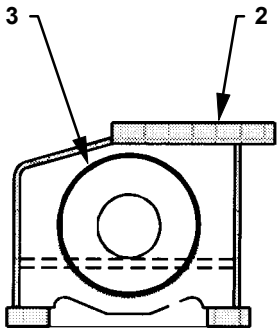
1. As illustrated, install track adjuster (1) into spring guide (3) on track frame (2). Check that the end face of track adjuster (1) comes into contact with the face of plate (4).



W142-03-04-002



W167-03-04-005



W167-03-04-003

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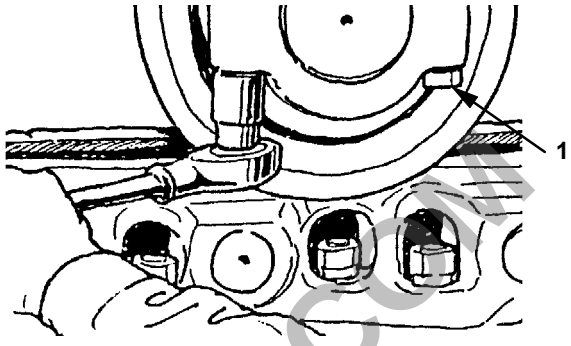
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REMOVE AND INSTALL LOWER ROLLER

Removal

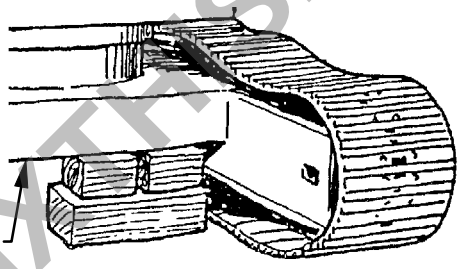
1. Remove the track guard and loosen bolts (1).

: 36 mm



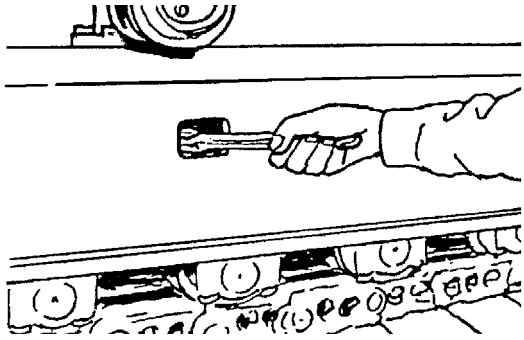
W105-03-06-008

2. Lift one side of the track frame height enough to remove the lower roller.
   Insert wooden blocks under track frame (2).



W105-03-06-009

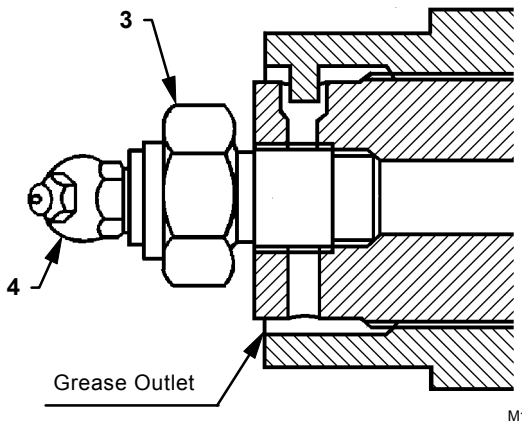
CAUTION: Do not loosen valve (3) quickly or loosen it too much as high-pressure grease in the adjusting cylinder may spout out. Loosen carefully, keeping body parts and face away from valve (3).
Never loosen grease fitting (4).



W105-03-06-001

3. Loosen valve (3) to drain enough grease to permit the roller removal.

: 24 mm



M104-07-119

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