TIGHTENING TORQUE SPECIFICATION

No.	Descriptions	Bolt Dia mm	Q'ty	Wrench Size (mm)	Torque N·m	Torque (kgf·m)	Torque (lbf·ft)
1	Engine cushion rubber mounting nut	14	4	22	140	(14.0)	(103)
2	Engine cushion rubber mounting bolt	16	2	24	235	(24)	(175)
	Engine bracket mounting bolt	10	7	17	50	(5.1)	(37)
	Engine bracket mounting nut	10	1	17	50	(5.1)	(37)
3	Hydraulic oil tank mounting bolt	16	4	24	210	(21.5)	(155)
4	Fuel tank mounting bolt	16	4	24	210	(21.5)	(155)
5	ORS and metal face seal fittings for hydraulic hoses and piping			17 19 22 27 32 36 41	24.5 30 40 95 140 175 210	(2.5) (3.1) (4.1) (9.7) (14.3) (17.8) (21.5)	(18) (22) (30) (70) (105) (130) (155)
6	Pump mounting bolt	10	8	17	50	(5.1)	(37)
7	Control valve mounting bolt	14	4	22	140	(14.0)	(103)
8	Control valve bracket mounting bolt	16	4	24	210	(21.5)	(155)
9	Swing device mounting bolt	20	10	30	500	(51)	(370)
10	Swing motor mounting bolt	10 (Hex. Wrench)	7	8	65	(6.6)	(48)
11	Battery mounting nut	10	2	17	50	(5.1)	(37)
12	Cab mounting nut	16	4	24	210	(21.5)	(155)
13	Swing bearing mounting bolt to upperstructure	18	30	27	400	(41.0)	(295)
	Swing bearing mounting bolt to chassis	16	36	24	270	(27.5)	(200)
14	Center joint lock mounting bolts ※	16	5	24	270	(27.5)	(200)
15	Transmission mounting bolts ※	20	3	30	550	(56.0)	(410)
16	Travel motor mounting bolts ※	16 (Hex. Wrench)	4	14	270	(27.5)	(200)
17	Propel shaft mounting nuts ※	10	32	14	76	(8)	(60)
19	Rear axle mounting bolts ※	20	8	30	560	(57)	(410)
20	Wheel pin nuts	20	40	30	500	(51)	(370)
21	Cover mounting bolt	6 10 12	- - -	10 17 19	10 50 90	(1) (5.1) (9.2)	(7.4) (37) (66)
22	Flexible master coupling of piping	8	4 pairs	13	10.3 to 12.4	(1.05 to 1.26)	(7.59 to 9.11)
23	T-bolt clamp of low pressure piping	-	-	11	6.0	(0.6)	(4.3)

※ Apply LOCTITE to the threads.

NOTE 1.Apply lubricant (e.g. white zinc B dissolved into spindle oil) to bolts and nuts to reduce friction coefficient of them. (Except for Sprocket mounting bolt.)

2.Make sure bolt and nut threads are clean before installing.

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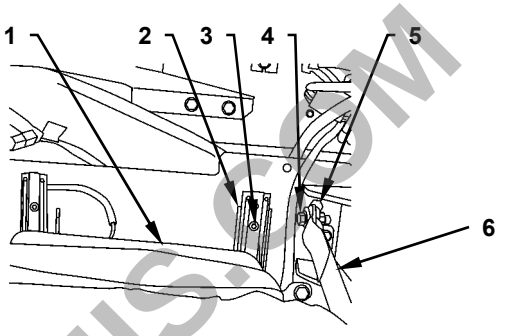
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REMOVAL AND INSTALLATION OF CAB

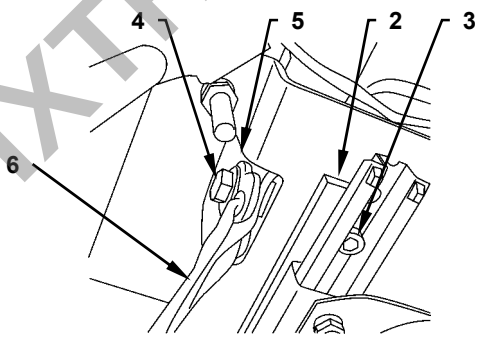
Removal

CAUTION: Seat (1) weight: 40 kg (90 lb)

1. Remove sems bolts (4) (2 used) from safety belts (6) (2 used). Remove safety belts (6) (2 used) from brackets (5) (2 used).
   : 16 mm

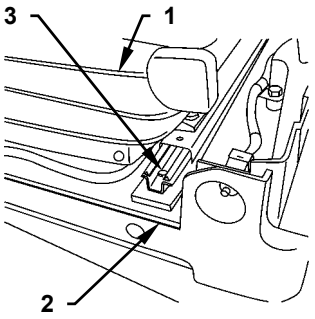


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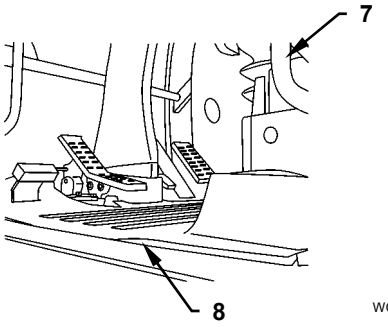
WCEB-02-01-017

2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from plate (2).
   : 6 mm



WCEB-02-01-002

3. Remove mat (8) from the inside of cab (7).

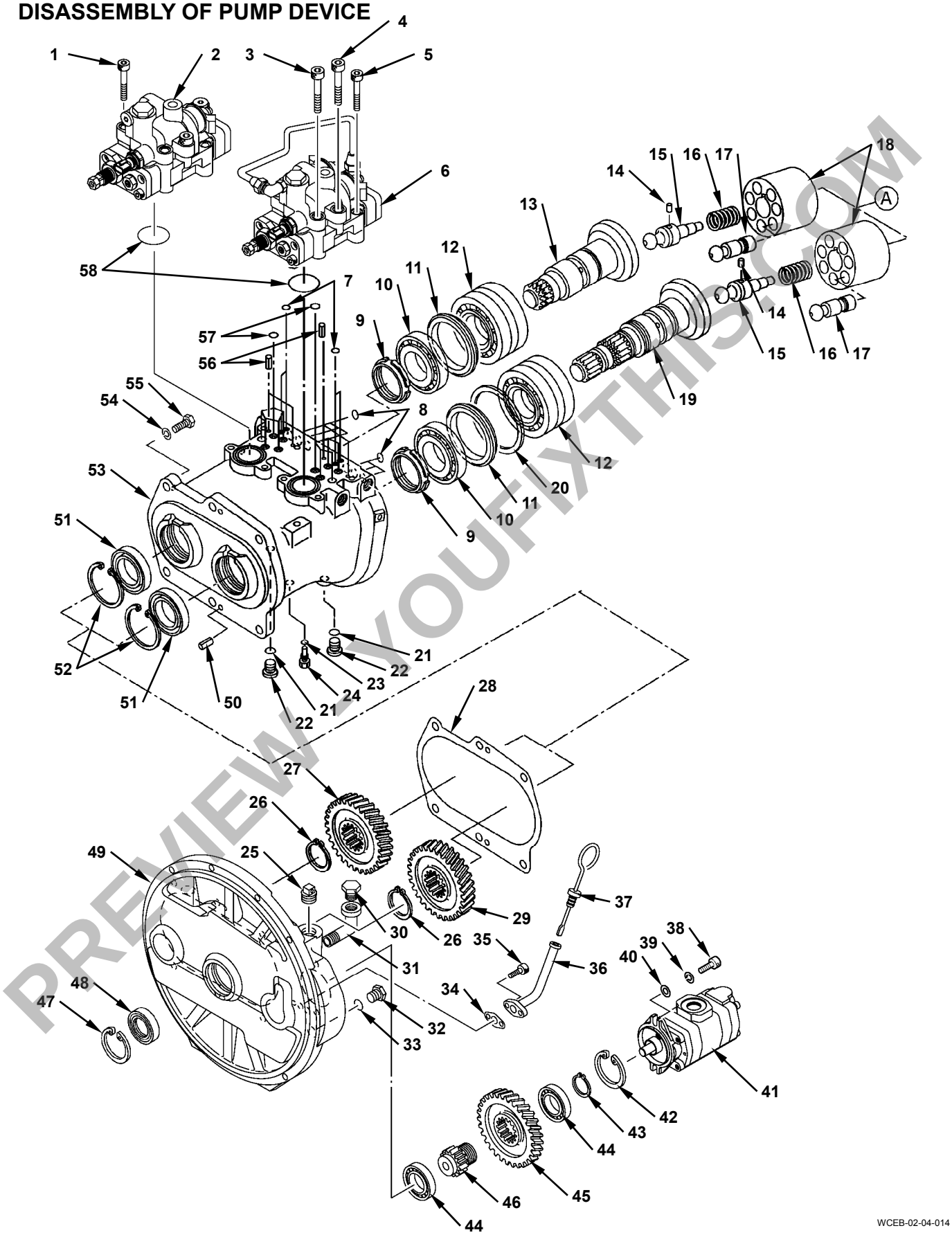


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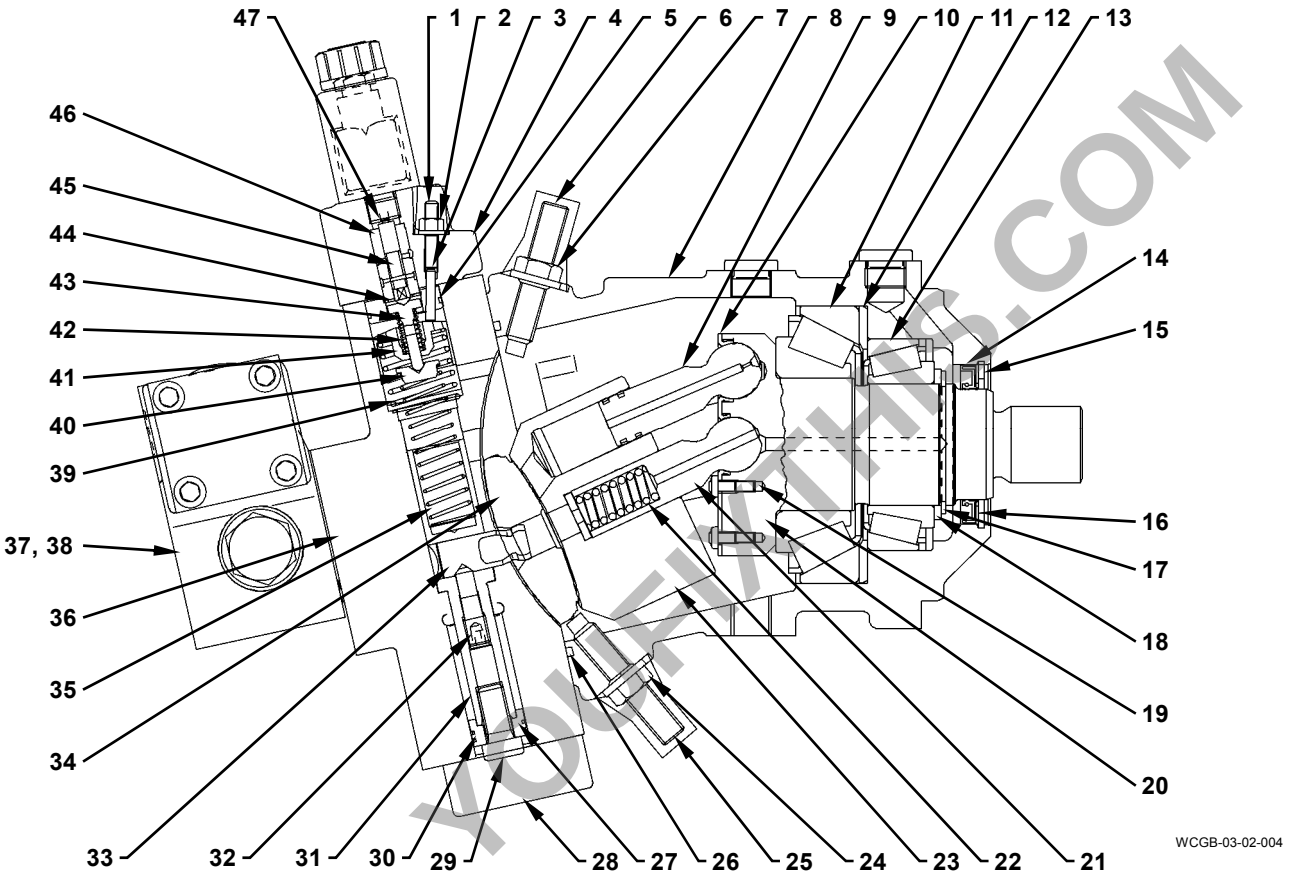
DISASSEMBLY OF PUMP DEVICE

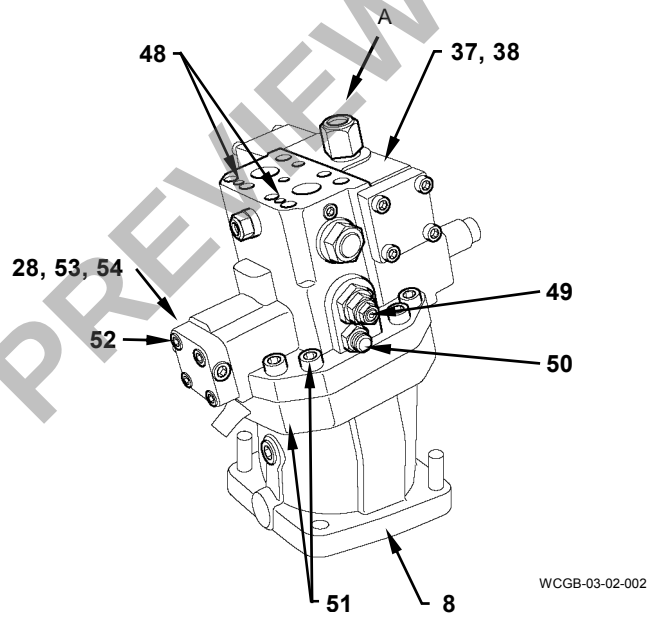


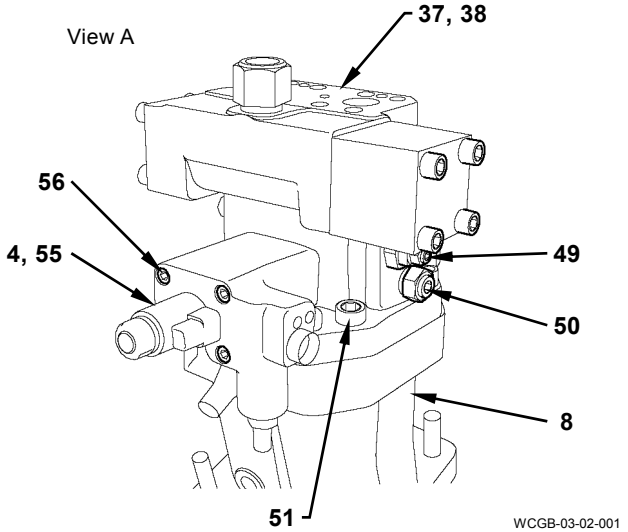
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DISASSEMBLY OF TRAVEL MOTOR





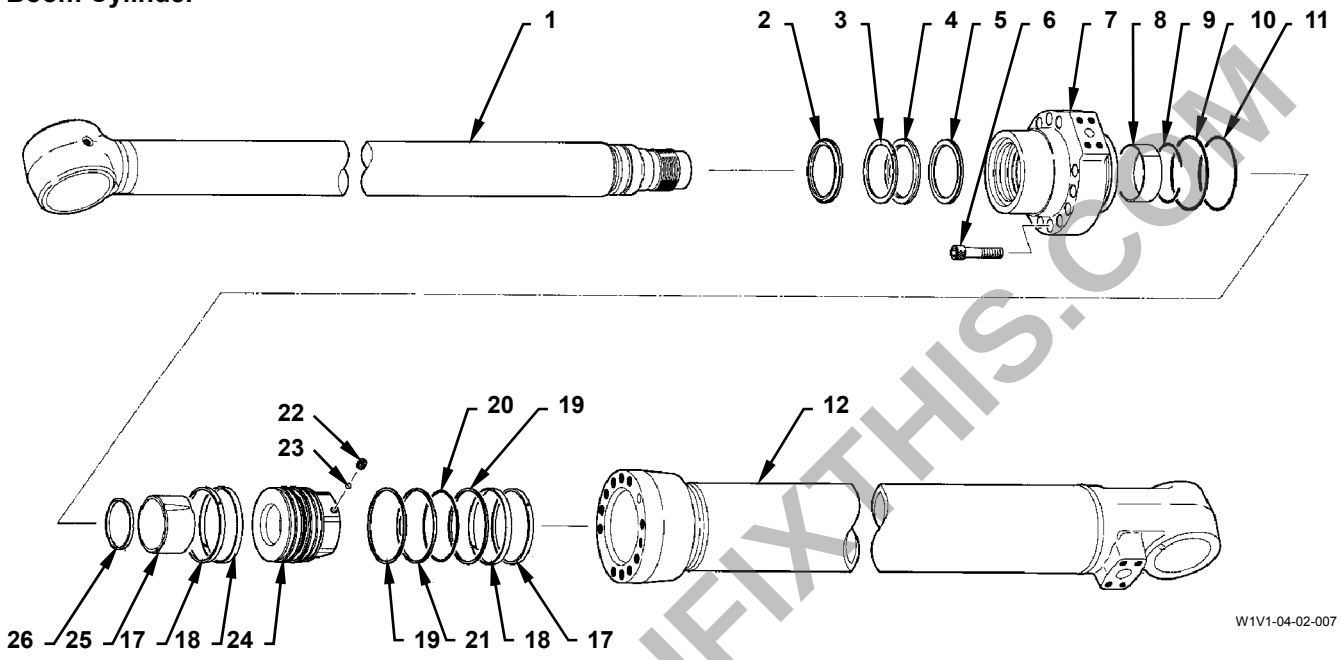


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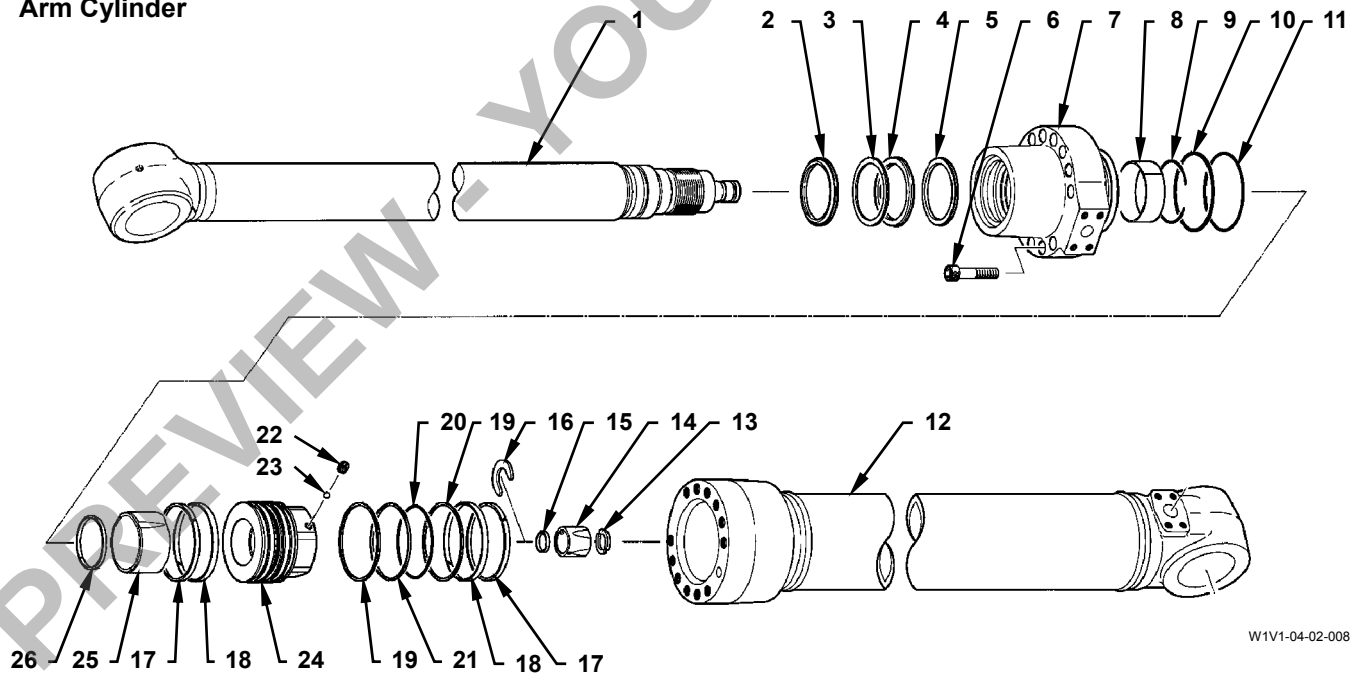
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DISASSEMBLY OF BOOM, ARM AND BUCKET CYLINDERS

Boom Cylinder



Arm Cylinder



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SECTION AND GROUP CONTENTS

WORKSHOP MANUAL

All information, illustrations and specifications in this manual are based on the latest product information available at the time of publication. The right is reserved to make changes at any time without notice.

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SECTION 1 GENERAL INFORMATION

Group 1 Precautions for disassembling and Assembling
Group 2 Tightening
Group 3 Painting
Group 4 Bleeding Air from Hydraulic Oil Tank

SECTION 2 UPPERSTRUCTURE

Group 1 Cab
Group 2 Counterweight
Group 3 Main Frame
Group 4 Pump Device
Group 5 Control Valve
Group 6 Swing Device
Group 7 Pilot Valve
Group 8 Electric Lever
Group 9 Signal Control Valve
Group 10 Shockless Valve
Group 11 Solenoid Valve
Group 12 Pilot Shut-Off Solenoid Valve
Group 13 Steering Valve
Group 14 Brake Valve
Group 15 Accumulator Charging Valve

SECTION 3 UNDERCARRIAGE

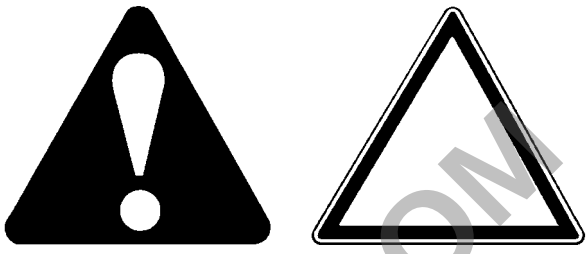
Group 1 Swing Bearing
Group 2 Travel Motor
Group 3 Center Joint
Group 4 Transmission
Group 5 Axle
Group 6 Axle Lock Cylinder
Group 7 Operate-Check Valve
Group 8 Solenoid Valve
Group 9 Transmission Changeover Solenoid Valve
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SECTION 4 FRONT ATTACHMENT

Group 1 Front Attachment
Group 2 Cylinder
Group 3 Hose-Rupture Valve
Group 4 Operate-Check Valve

RECOGNIZE SAFETY INFORMATION

- These are the **SAFETY ALERT SYMBOLS**.
  - When you see these symbols on your machine or in this manual, be alert to the potential for personal injury.
  - Follow recommended precautions and safe operating practices.



001-E01A-0001

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.
- 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-E01A-1223

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SAFETY ALERT SYMBOL AND HEADLINE NOTATIONS

In this manual, the following safety alert symbol and signal words are used to alert the reader to the potential for personal injury of machine damage.

⚠ This is the safety alert symbol. When you see this symbol, be alert to the potential for personal injury.
Never fail to follow the safety instructions prescribed along with the safety alert symbol.
The safety alert symbol is also used to draw attention to component/part weights.
To avoid injury and damage, be sure to use appropriate lifting techniques and equipment when lifting heavy parts.

- ⚠ **CAUTION:**
  Indicated potentially hazardous situation which could, if not avoided, result in personal injury or death.

- **IMPORTANT:**
  Indicates a situation which, if not conformed to the instructions, could result in damage to the machine.

- *NOTE:*
  Indicates supplementary technical information or know-how.

UNITS USED

- SI Units (International System of Units) are used in this manual.
  MKSA system units and English units are also indicated in parenthheses just behind SI units.
  Example : 24.5 MPa (250 kgf/cm^2, 3560 psi)

  A table for conversion from SI units to other system units is shown below for reference purposees.

Quantity	To Convert From	Into	Multiply By	Quantity	To Convert From	Into	Multiply By
Length	mm	in	0.03937	Pressure	MPa	kgf/cm^2	10.197
	mm	ft	0.003281		MPa	psi	145.0
Volume	L	US gal	0.2642	Power	kW	PS	1.360
	L	US qt	1.057		kW	HP	1.341
	m^3	yd^3	1.308	Temperature	°C	°F	°C×1.8+32
Weight	kg	lb	2.205	Velocity	km/h	mph	0.6214
Force	N	kgf	0.10197		min^{-1}	rpm	1.0
	N	lbf	0.2248	Flow rate	L/min	US gpm	0.2642
Torque	N·m	kgf·m	1.0197		mL/rev	cc/rev	1.0
	N·m	lbf·ft	0.7375				

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SECTION 1
GENERAL



— CONTENTS —

Group 1 Precautions for Disassembling and Assembling

Precautions for Disassembling and Assembling W1-1-1
Maintenance Standard Terminology W1-1-7

Group 2 Tightening

Tightening Torque Specification W1-2-1
Torque Chart W1-2-2
Piping Joint W1-2-5
Periodic Replacement of Parts W1-2-9

Group 3 Painting

Painting W1-3-1

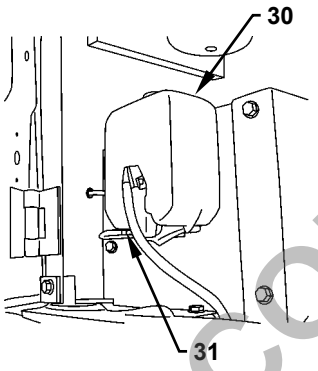
Group 4 Bleeding Air from Hydraulic Oil Tank

Bleeding Air from Hydraulic Oil tank W1-4-1

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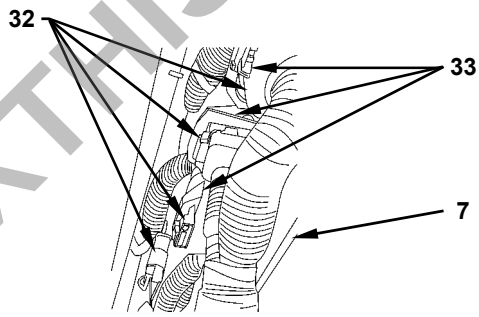
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14. Disconnect vinyl hose (31) from washer tank (30). Cap the open ends.



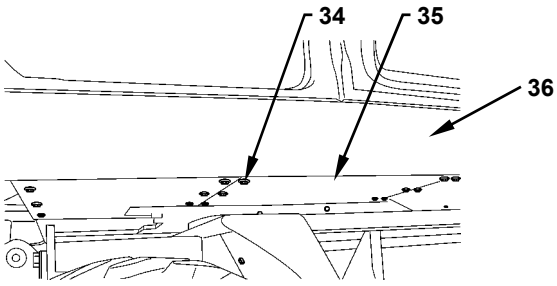
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15. Remove clamps (33) (3 used) from the outside of the cab (7) rear. Disconnect connectors (32) (5 used).



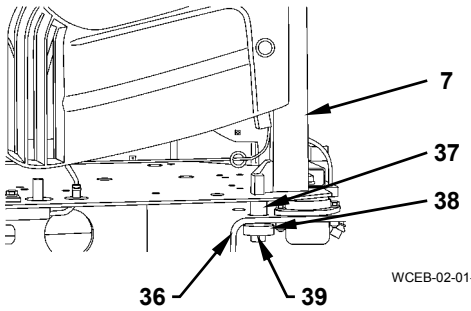
WCEB-02-01-014

16. Remove sems bolts (34) (6 used) from cover (35). Remove cover (35) from main frame (36).
: 17 mm



WCEB-02-13-001

17. Remove anchor bolt (39), washer (38) and spacer (37) from cab (7) and main frame (36).
: 32 mm

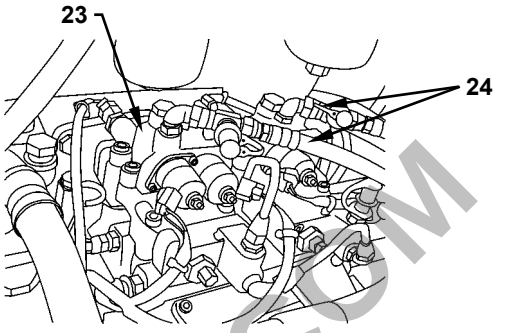


WCEB-02-01-013

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11. Disconnect hoses (24) (2 used) from regulators (23) (2 used). Cap the open ends.
    : 19 mm

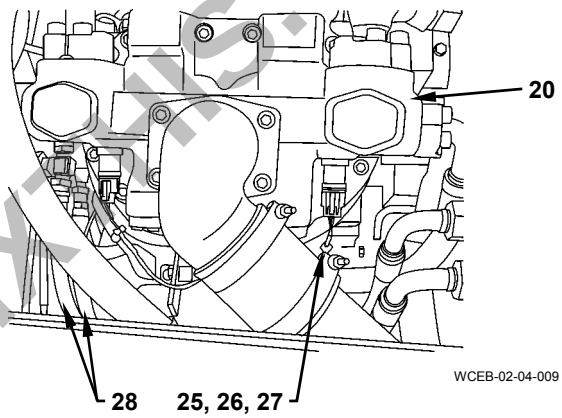


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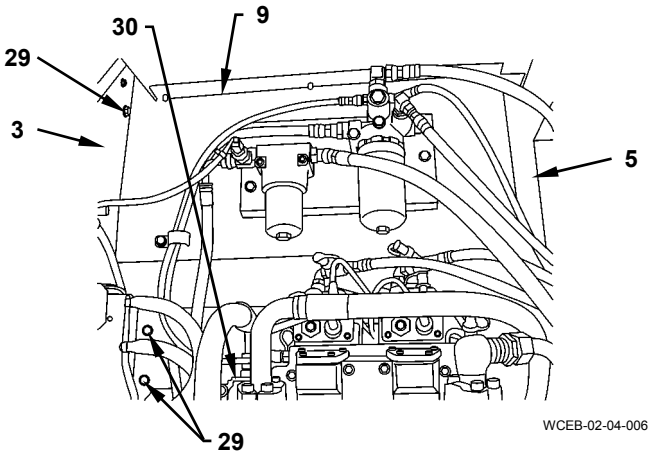
12. Remove socket bolts (27) (2 used) from clips (26) (2 used). Remove clips (26) (2 used) from connectors (25) (2 used) and pump device (20).
    : 6 mm

13. Disconnect hoses (28) (3 used) from pilot pump (30). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
    : 27 mm

14. Remove sems bolts (29) (6 used) from cover (9). Remove the cover (9) assembly from cover (3) and support (5).
    : 17 mm

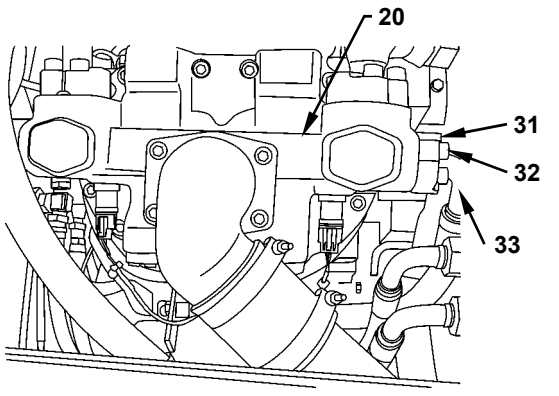


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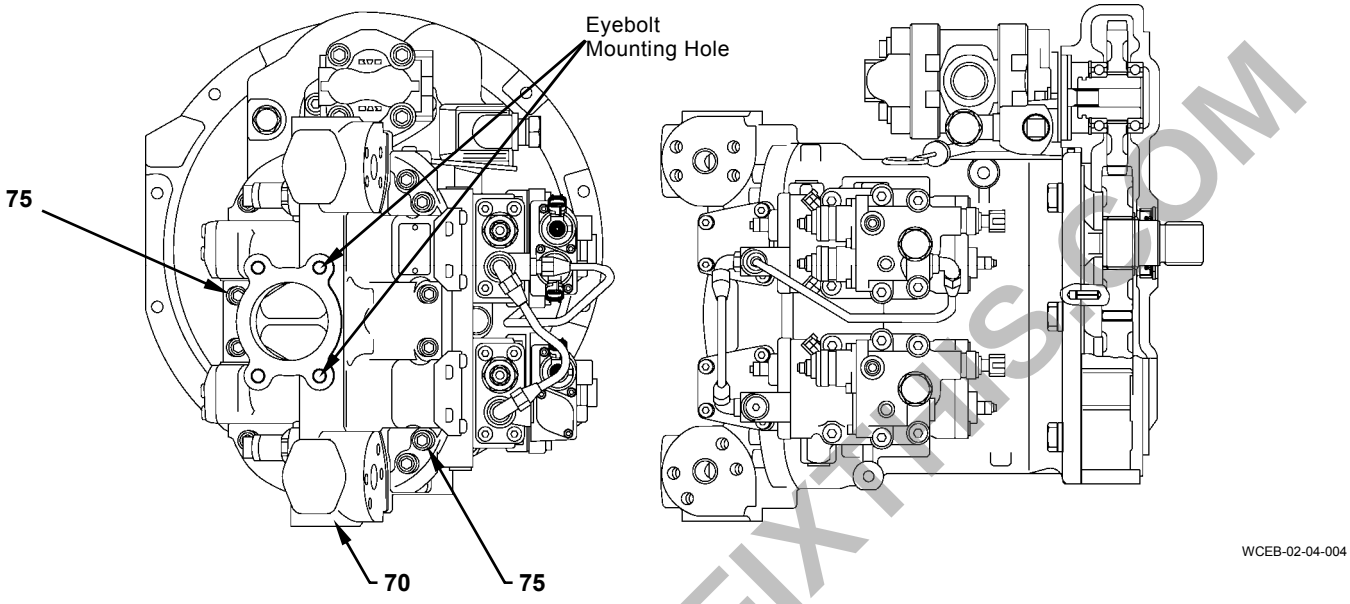
15. Remove socket bolts (32) (8 used). Remove split flanges (31) (4 used). Disconnect hoses (33) (2 used) from pump device (20). Cap the open ends.
    : 8 mm



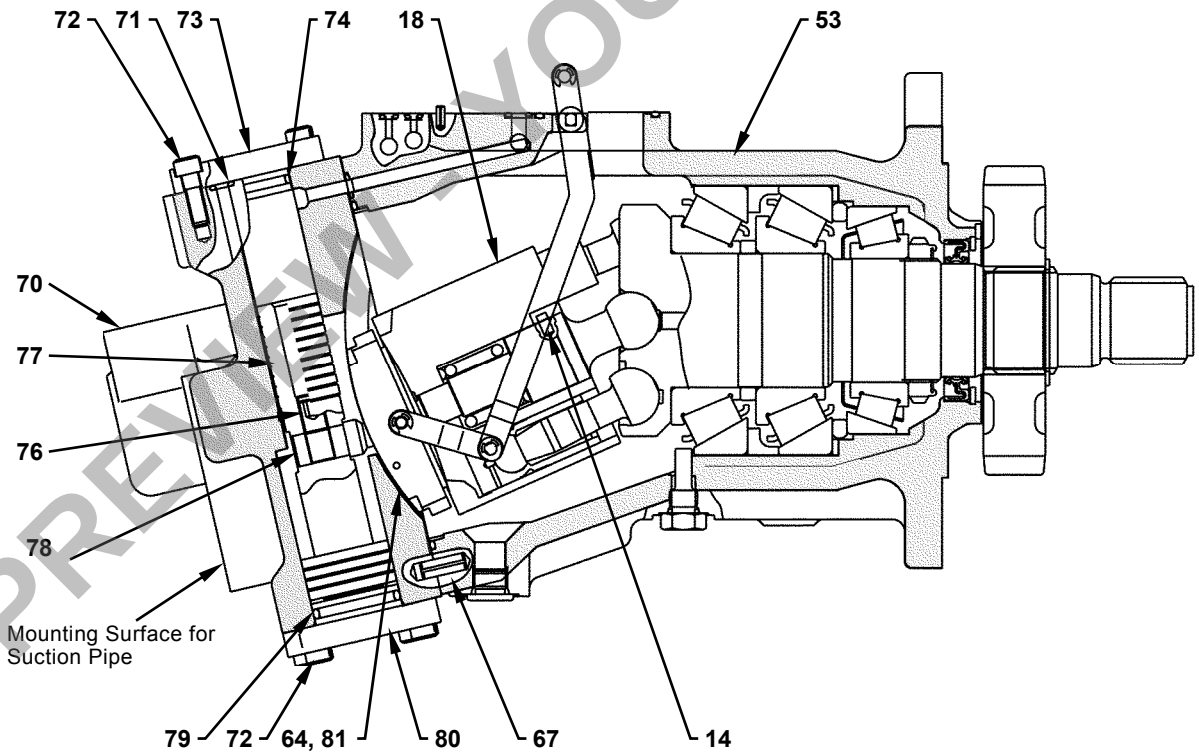
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W178-02-04-016

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Disassembly of 5-Spool Side (Upper)

1. Remove socket bolts (191) (10 used) from pilot housing (194). Remove pilot housing (194) from housing (195).
   : 6 mm

2. Remove arm anti-drift valve assembly (133 to 146), O-ring (132) and backup ring (131) from pilot housing (194).

NOTE: Remove the arm anti-drift valve assembly from pilot housing (194) by prying by hand.

3. Remove plug (146), spring (143), washer (142) and spool (141) from sleeve (140). Remove backup ring (144) and O-ring (145) from plug (146).

4. Remove plug (133), O-rings (134, 135, 136, 139) and backup rings (137, 138) from sleeve (140).

5. Remove main spool assemblies (162, 168, 178, 184, 190) and O-rings (152, 157, 163, 173, 179, 185) from housing (195).

IMPORTANT: Put the matching marks on main spools (162, 168, 178, 184, 190) and housing (195).

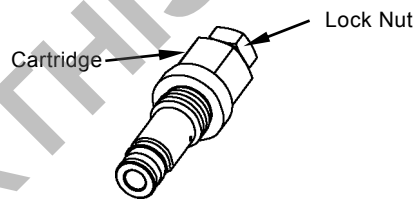
6. Clamp main spools (162, 168, 178, 184, 190) in a vise by using wooden pieces. Remove bolts (158, 164, 174, 180, 186), spring seats (159, 165, 175, 181, 187), springs (160, 166, 176, 182, 188) and spring seats (161, 167, 177, 183, 189) from main spools (162, 168, 178, 184, 190).

7. Remove plug (172), spring (170) and poppet (169) from main spool (168). Remove O-ring (171) from plug (172).

8. Remove spring (147), poppet (148), backup ring (149) and O-ring (150) from housing (195).

IMPORTANT: Do not turn the lock nut as the set pressure is changed.

9. Turn the cartridges of overload relief valves (151) (3 used) and the cartridge of main relief valve (156). Remove them from housing (195).
   : 27 mm

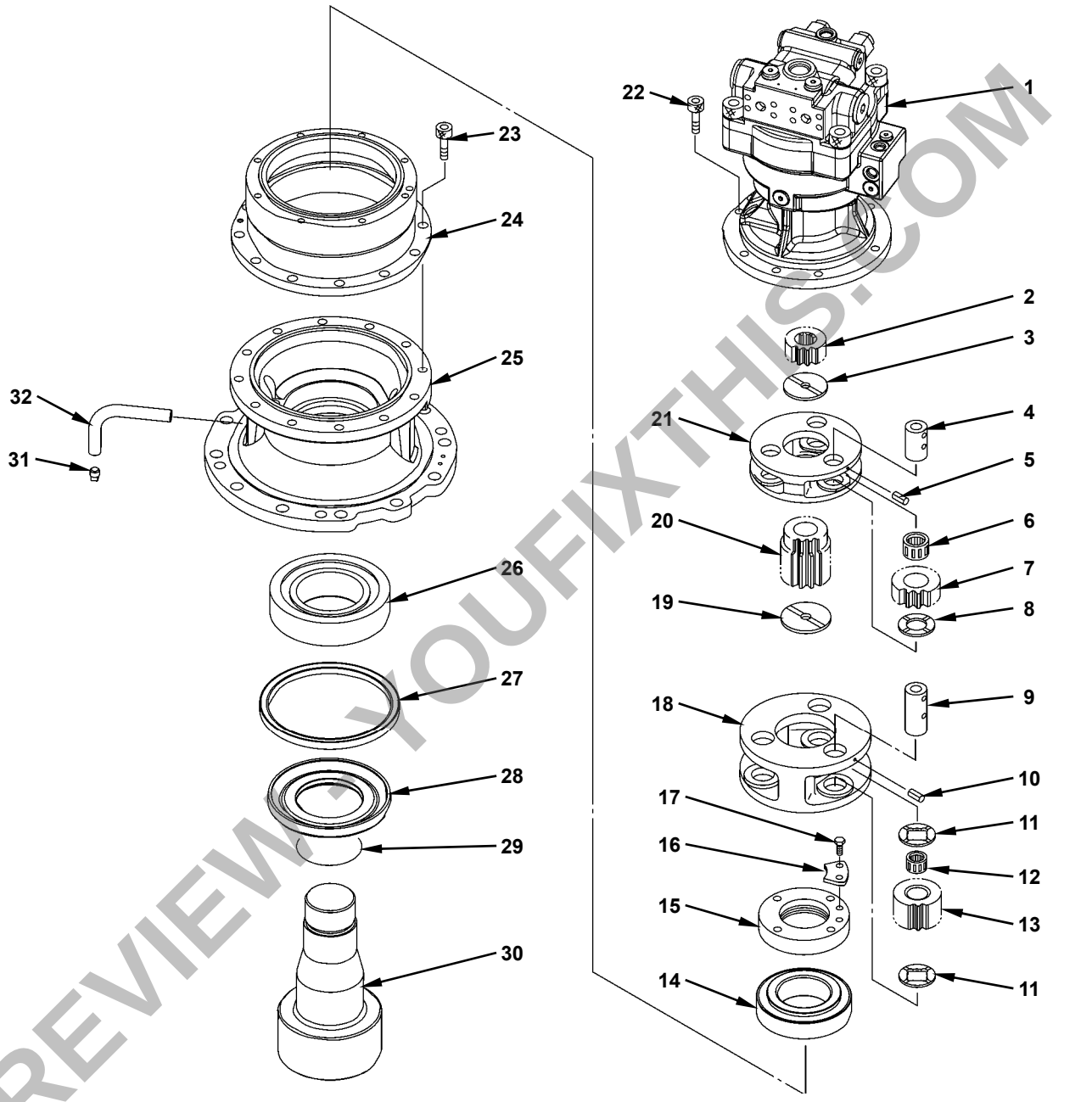


W176-02-06-017

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DISASSEMBLY OF SWING DEVICE



WCEB-02-06-004

1 - Swing Motor
2 - First Stage Sun Gear
3 - Thrust Plate
4 - Pin (3 Used)
5 - Spring Pin (3 Used)
6 - Needle Bearing (3 Used)
7 - Planetary Gear (3 Used)
8 - Thrust Plate (3 Used)
9 - Pin (3 Used)
10 - Spring Pin (3 Used)
11 - Thrust Plate (6 Used)
12 - Needle Bearing (3 Used)
13 - Planetary Gear (3 Used)
14 - Roller Bearing
15 - Bearing Nut
16 - Lock Plate
17 - Bolt (2 Used)
18 - Second Stage Carrier
19 - Thrust Plate
20 - Second Stage Sun Gear
21 - First Stage Carrier
22 - Socket Bolt (7 Used)
23 - Socket Bolt (12 Used)
24 - Ring Gear
25 - Housing
26 - Roller Bearing
27 - Oil Seal
28 - Sleeve
29 - O-Ring
30 - Shaft
31 - Drain Plug
32 - Pipe

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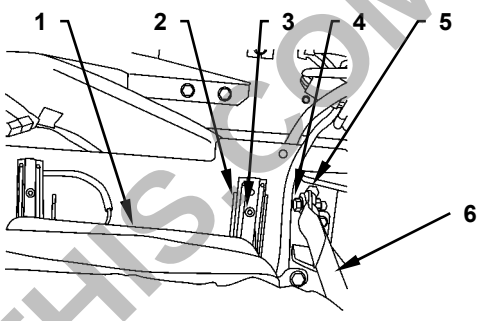
REMOVAL AND INSTALLATION OF PILOT VALVE

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

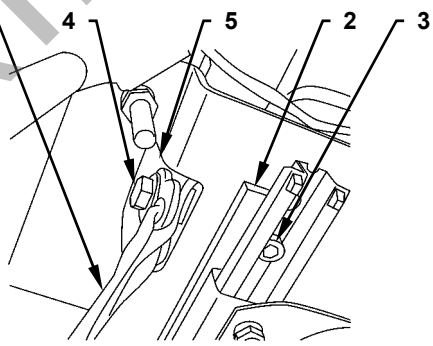
Removal of Left Pilot Valve

CAUTION: Seat (1) weight: 40 kg (90 lb)

1. Remove sems bolts (4) (2 used) from seat belts (6) (2 used). Remove seat belt (6) from brackets (5) (2 used).
   : 16 mm

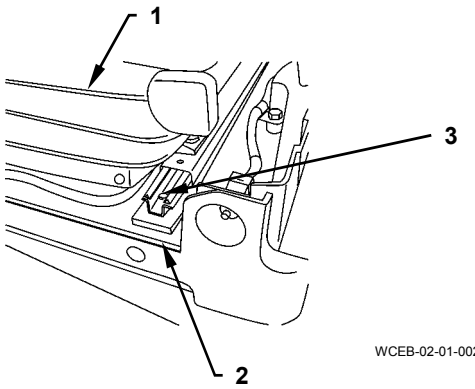


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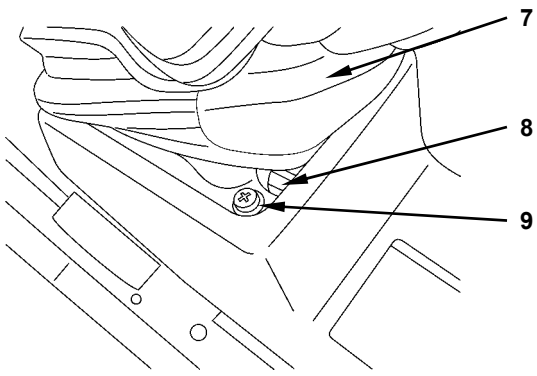
WCEB-02-01-017

2. Remove socket bolts (3) (4 used) from seat (1). Remove seat (1) from plate (2).
   : 6 mm



WCEB-02-01-002

3. Remove screws (9) (4 used) from boot (7). Raise boot (7) from bracket (8).



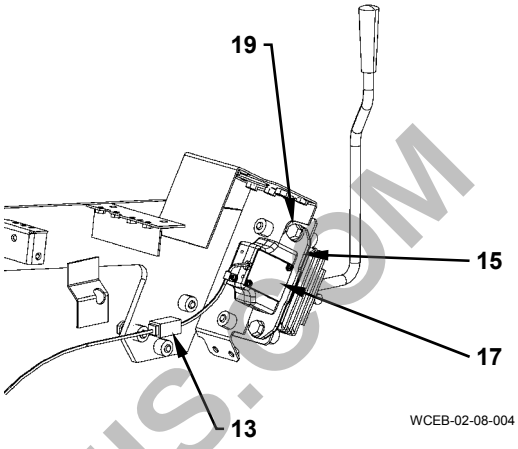
W1JB-02-07-002

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Installation of Blade/Outrigger Electric Lever

1. Install electric lever (17) to bracket (15) with sems bolts (19) (2 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)

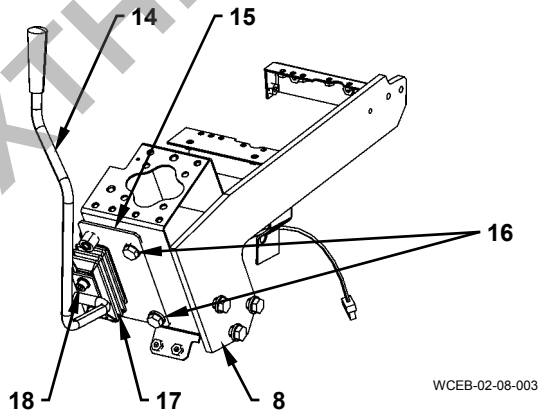
2. Connect connector (13).



WCEB-02-08-004

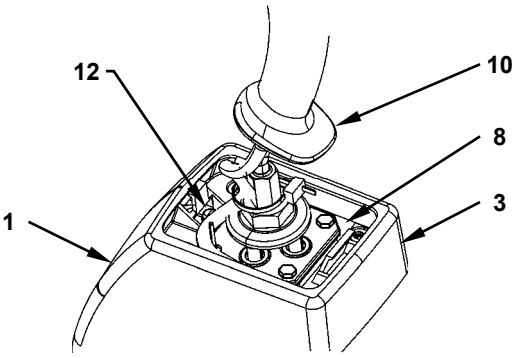
3. Install the bracket (15) assembly to bracket (8) with sems bolts (16) (2 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)

4. Install lever (14) to electric lever (17) with socket bolts (18) (2 used).
   : 6 mm
   : 20 N·m (2 kgf·m, 15 lbf·ft)



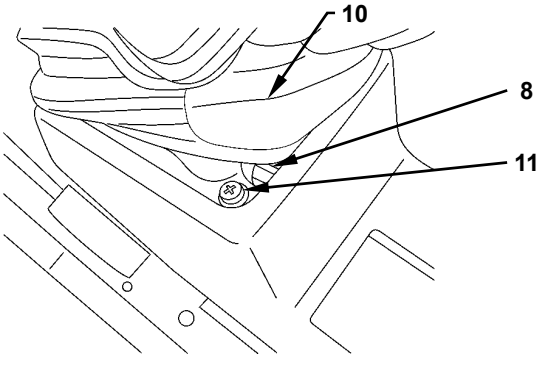
WCEB-02-08-003

5. Install covers (1, 3) to bracket (8) with screw (12).



W1JB-02-07-016

6. Install boot (10) to bracket (8) with screws (11) (4 used).

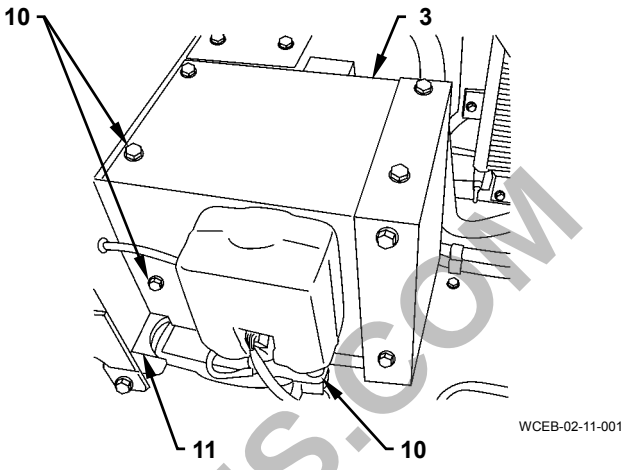


W1JB-02-07-002

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6. Remove sems bolts (10) (4 used) from cover (3). Remove the cover (3) assembly from bracket (11).
   : 17 mm

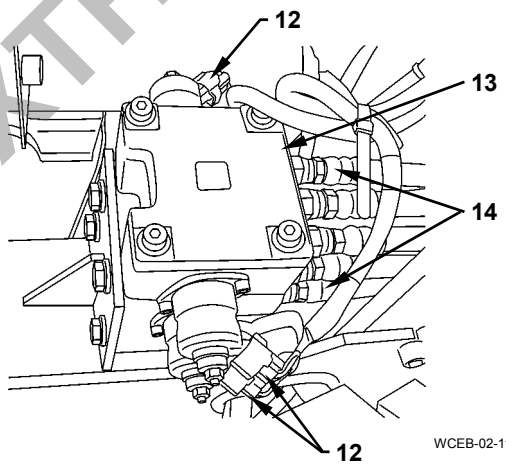


WCEB-02-11-001

7. Disconnect connectors (12) (5 used) from solenoid valve unit (13).

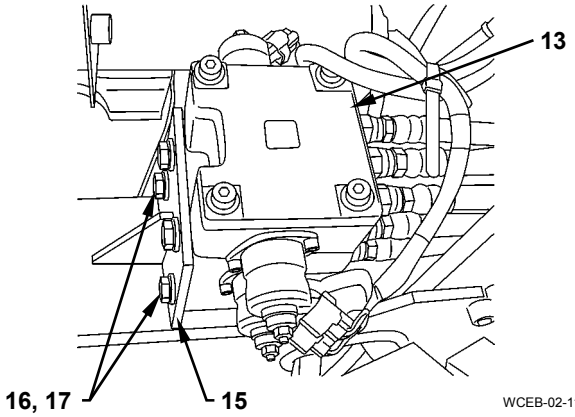
8. Disconnect hoses (14) (9 used) from solenoid valve unit (13). Cap the open ends. Attach an identification tag onto the disconnected hoses for assembling.
   : 19 mm

NOTE: The number of solenoid valve units, the connectors and the hoses differ depending on the front attachment specifications.



WCEB-02-11-004

9. Remove bolts (16) (4 used) and washers (17) (4 used) from bracket (15). Remove solenoid valve unit (13) from bracket (15).
   : 17 mm



WCEB-02-11-004

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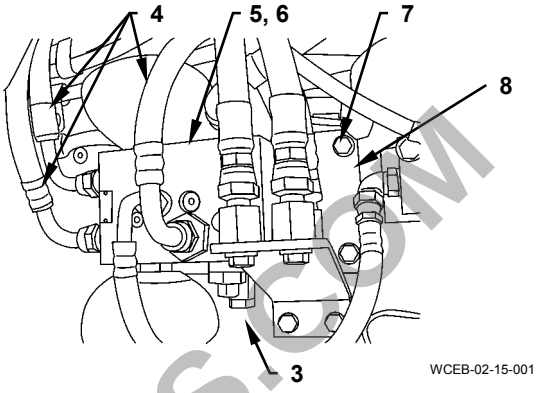
Installation

1. Install accumulator charge valve (5) to bracket (8) with sems bolts (6) (4 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)

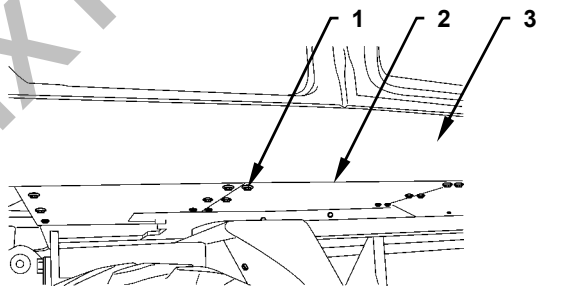
2. Install the bracket (8) assembly to main frame (3) with sems bolts (7) (4 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)

3. Connect hoses (4) (8 used) to accumulator charge valve (5).
   : 17 mm
   : 24.5 N·m (2.5 kgf·m, 18 lbf·ft)
   : 22 mm
   : 39 N·m (4 kgf·m, 29 lbf·ft)
   : 27 mm
   : 78 N·m (8 kgf·m, 58 lbf·ft)

4. Install cover (2) to main frame (3) with sems bolts (7) (6 used).
   : 17 mm
   : 50 N·m (5 kgf·m, 37 lbf·ft)



WCEB-02-15-001



WCEB-02-13-001

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CAUTION: After warming up housing (8), start the work.

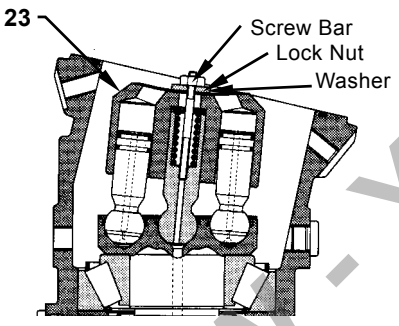
15. Warm up housing (8) to 50 to 80 °C (122 to 176 °F). Install the drive shaft (20) assembly to housing (8). If the drive shaft (20) assembly cannot be inserted, insert it by using a bar.

16. Face the rotor (23) side in housing (8) downward. Install oil seal (14), shim (15) and retaining ring (16) to housing (8).

17. Set the travel motor onto a wooden block (100×500 mm, 3.9×19.7 in) with the drive shaft (20) side facing downward.

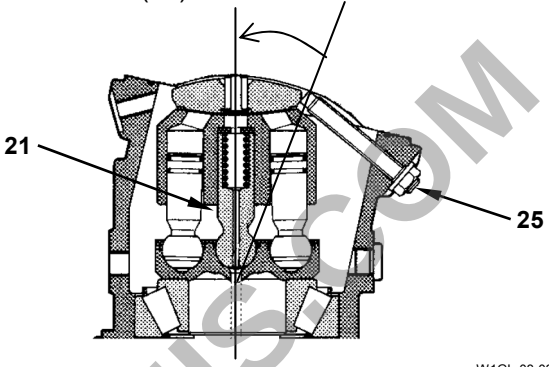
NOTE: When the workbench is used.
Workbench: ST 5092
Upper Plate: ST 7333

18. Remove the screw bar, the lock nut and the washer from rotor (23).



W1GL-03-02-003

19. Temporarily install adjusting screw (25) (M12, Pitch 1.75 mm, Length 100 mm) to the adjusting screw (6) mounting part, so that the angle of center shaft (21) should be zero.

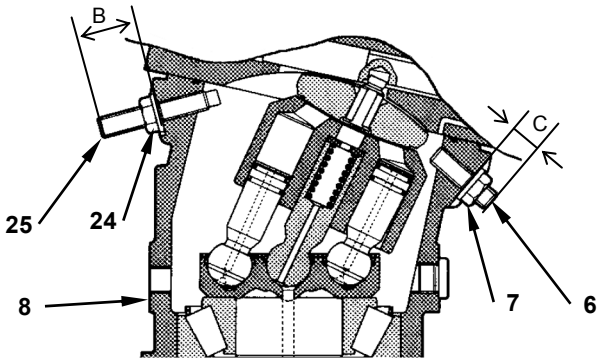


W1GL-03-02-008

20. Align the matching marks. Install head cover (36) to housing (8) with socket bolts (51) (8 used).

21. Remove temporarily installed adjusting screw (25) from housing (8).

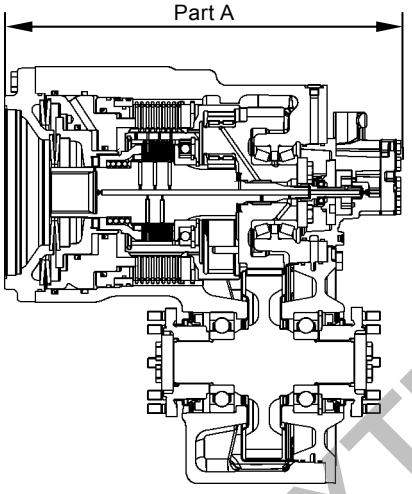
22. Install adjusting screw (25), lock nut (24), adjusting screw (6) and lock nut (7) to housing (8) so that the dimensions of part B and part C should be the same dimensions before disassembling.



W1GL-03-02-005

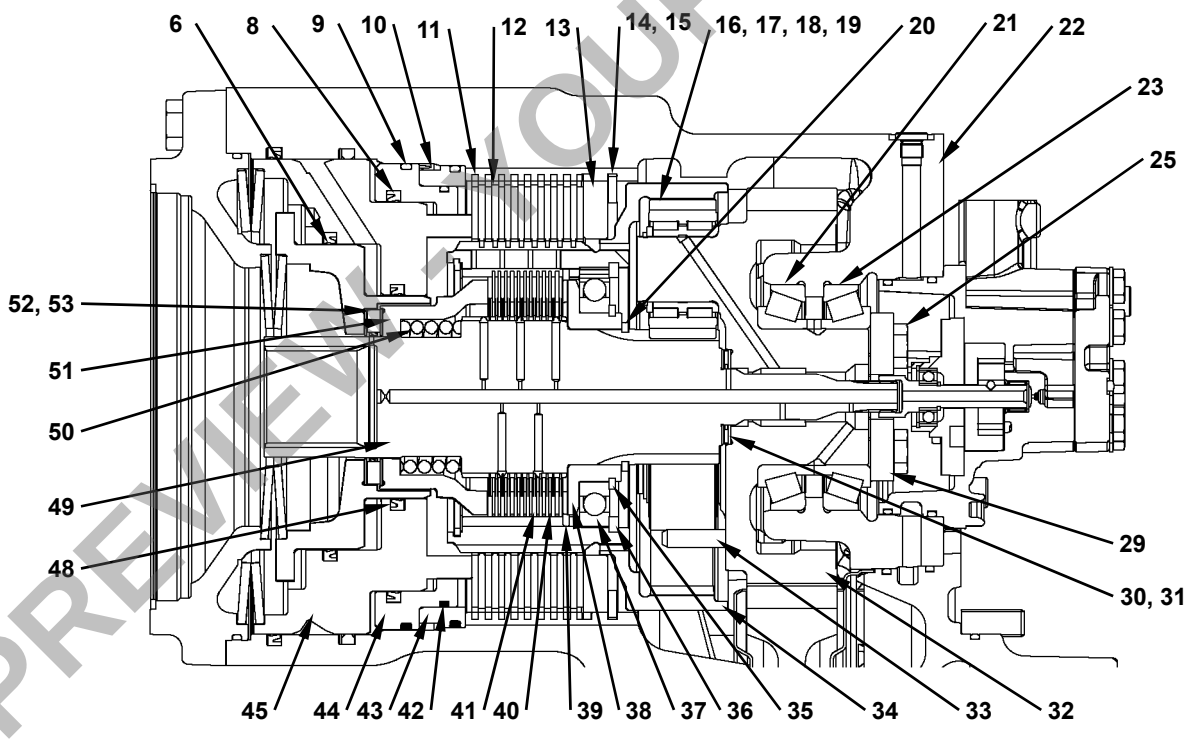
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WCGB-03-04-001

Part A



WCGB-03-04-002

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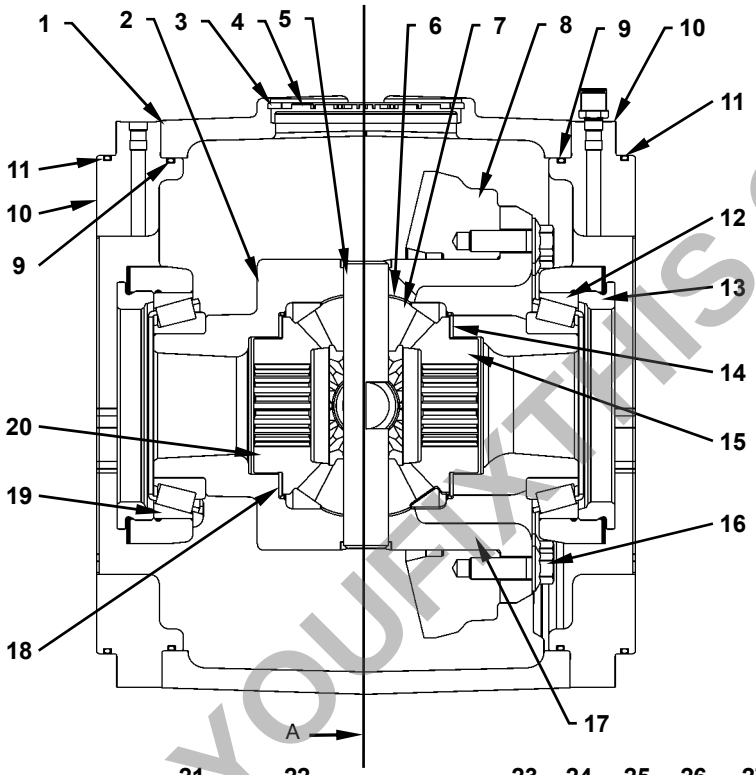
1 - Drive Housing
2 - Plug
3 - Axle Casing
4 - Washer (16 Used)
5 - Bolt (16 Used)
6 - Nut
7 - Lock Bolt
8 - Retaining Ring (2 Used)
9 - Bearing
10 - Seal Ring
11 - Bushing
12 - O-Ring
13 - Double Joint Shaft
14 - Shaft Seal
15 - Bushing
16 - Plug
17 - Pin
18 - Socket Bolt (6 Used)
19 - Shim
20 - Seal Ring
21 - Bushing
22 - Knuckle
23 - O-Ring
24 - O-Ring
25 - Backup Ring
26 - O-Ring
27 - Backup Ring
28 - Piston
29 - Friction Plate (4 Used)
30 - Plate (5 Used)
31 - Cover (4 Used)
32 - Socket Bolt (16 Used)
33 - Bolt (3 Used)
34 - Spring (3 Used)
35 - Socket Bolt (3 Used)
36 - Pin
37 - Bolt (6 Used)
38 - Seal Ring
39 - Ball Bushing
40 - Plug
41 - Seal Ring
42 - Bearing
43 - Hub Carrier
44 - O-Ring
45 - Bearing
46 - Snap Ring
47 - Ring Gear
48 - Support
49 - Retaining Ring (3 Used)
50 - Planetary Gear (3 Used)
51 - Roller Bearing (3 Used)
52 - Planetary Carrier
53 - Plug
54 - Plug
55 - Plate
56 - Nut (8 Used)

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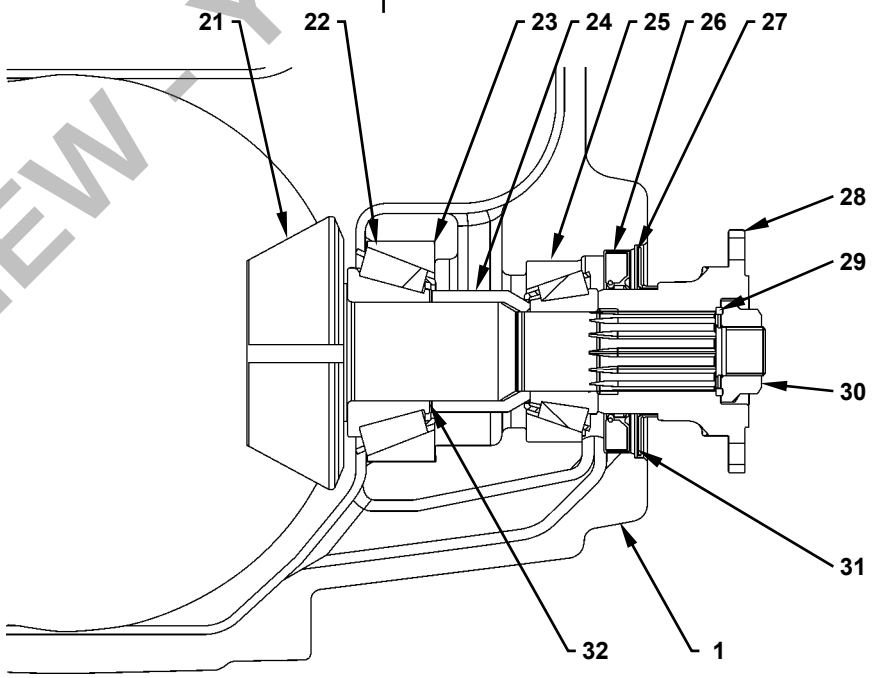
DISASSEMBLY OF DIFFERENTIAL

NOTE: Disassembly of the differential is common to the front axle and the rear axle.
The illustration shows the front axle.



WCEB-03-05-008

Section A



WCEB-03-05-012

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SECTION 4
FRONT ATTACHMENT



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Installation of Arm Cylinder

IMPORTANT: If a hammer is used when installing the bushing, the bushing may be damaged. Use a press.

CAUTION: Arm cylinder (1) weight: 160 kg (360 lb)

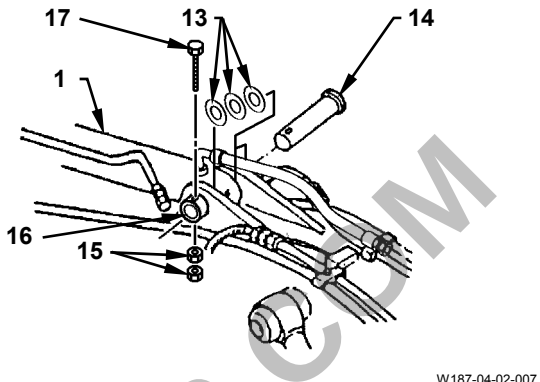
1. Attach a nylon sling at the center of gravity of arm cylinder (1). Hoist arm cylinder (1). Align the hole on the cylinder tube side hole with the cylinder mounting hole on the boom.

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

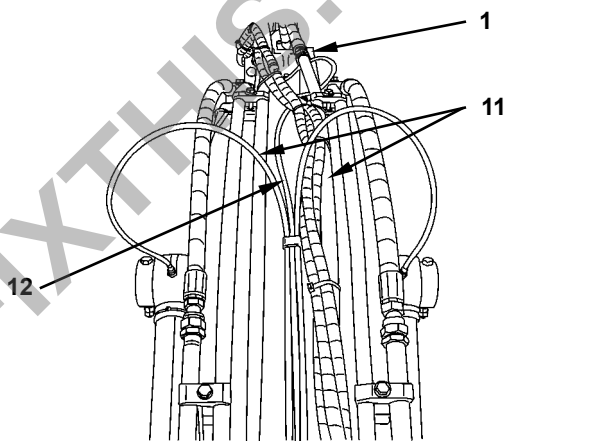
2. Install thrust plate (13) and pin (14). Secure pin (14) and stopper (16) with bolt (17) and nuts (15) (2 used).
   : 30 mm
   : 550 N·m (56 kgf·m, 410 lbf·ft)

3. Connect lubrication hose (12) and pipings (11) (2 used) of arm cylinder (1).
   : 19 mm
   : 29.5 N·m (3 kgf·m, 22 lbf·ft)
   : 36 mm
   : 175 N·m (18 kgf·m, 129 lbf·ft)

IMPORTANT: Fill hydraulic oil to the specified level. Start the engine and check for any oil leaks at the hose connections.



W187-04-02-007



WCGB-04-01-001

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5. Cut away the crimped part by using a hand drill and remove set screw (20) from piston nut (21).

NOTE: Set screw (20) has been crimped by using a punch at 2 places after installing.

: 4 mm

6. Remove piston nut (21) from piston rod (1) by using special tool (ST 3335). Remove piston (14) from piston rod (1) by using special tool (ST 3338).

7. Remove seal ring (17), slide ring (15), wear ring (16), O-ring (18), retaining rings (19) (2 used) and backup rings (17) (2 used) from piston (14).

8. Remove cylinder head (3) from piston rod (1).

9. Remove bushing (9) from cylinder head (3) by using special tool (ST 2613). Remove O-rings (11, 12), backup rings (6, 13), dust seal (5), U-ring (7), buffer ring (8) and retaining rings (4, 10) from bushing (9).

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