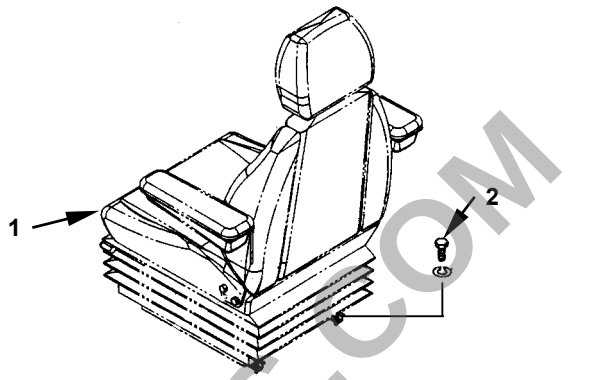
REMOVE AND INSTALL CAB

Removal

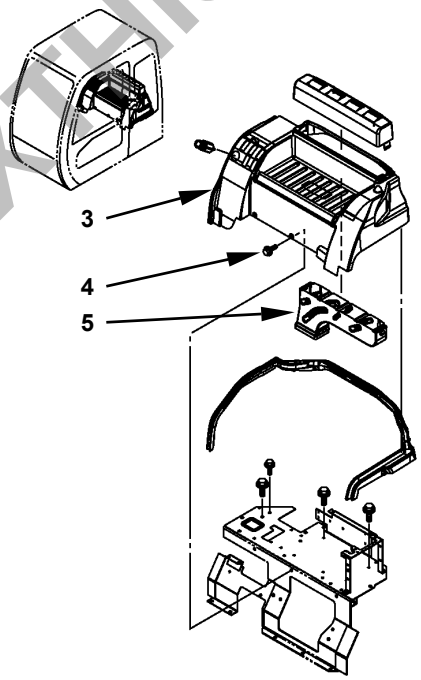
1. Remove seat mounting nuts (2) (4 used) to remove seat (1).
   : 17 mm



W1F3-02-01-001

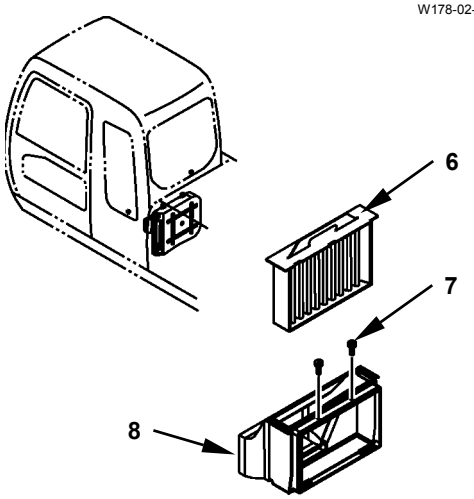
2. Remove bolts (4) (2 used) behind the cab to remove rear deck (3).
   : 17 mm

3. Raise duct (5) to remove it.



W178-02-01-012

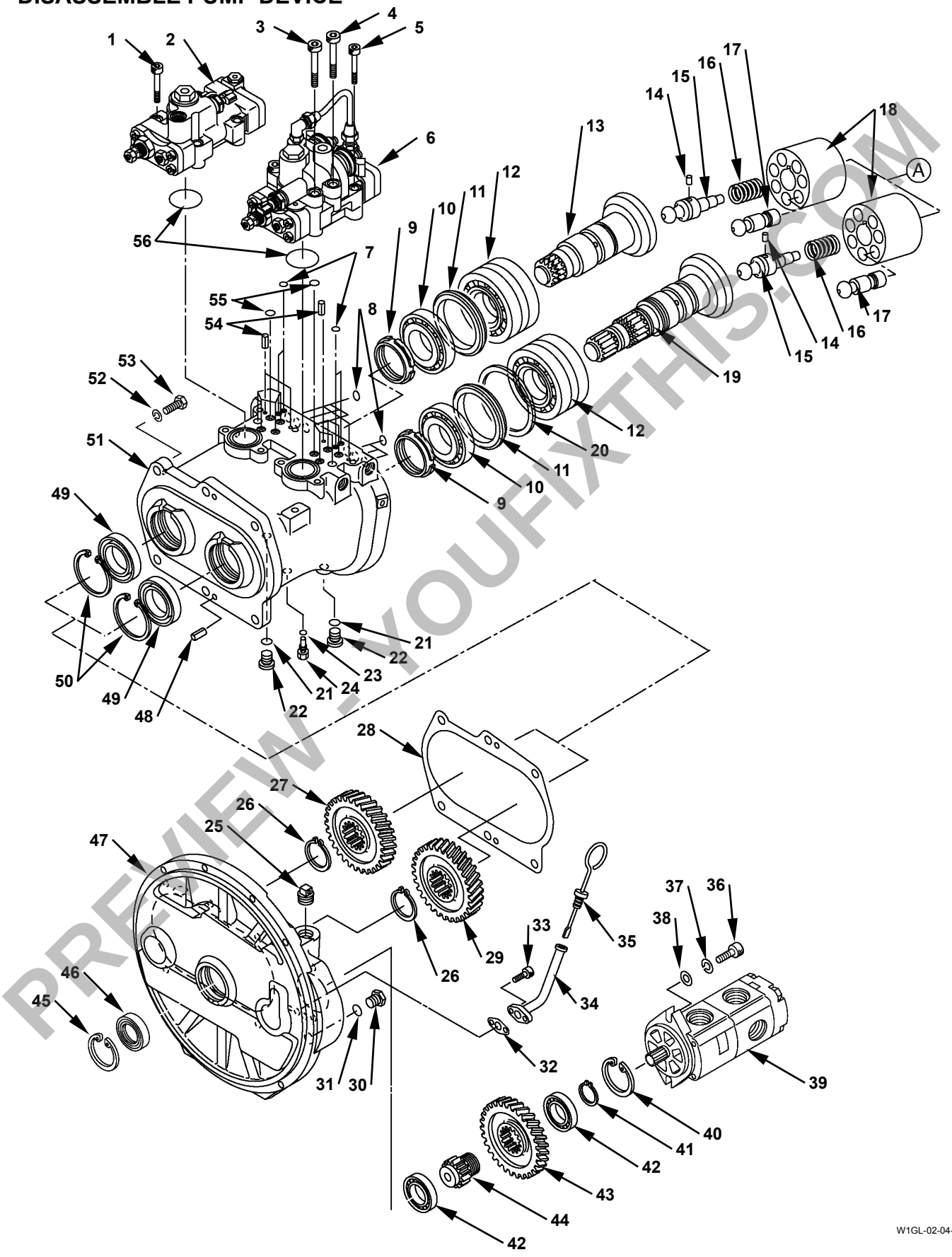
4. Remove air filter (6). Remove clips (7) (2 used) with a plier, then remove duct (8) from the cab.



W1F3-02-01-002

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DISASSEMBLE PUMP DEVICE



W1GL-02-04-001

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TIGHTENING TORQUE SPECIFICATION

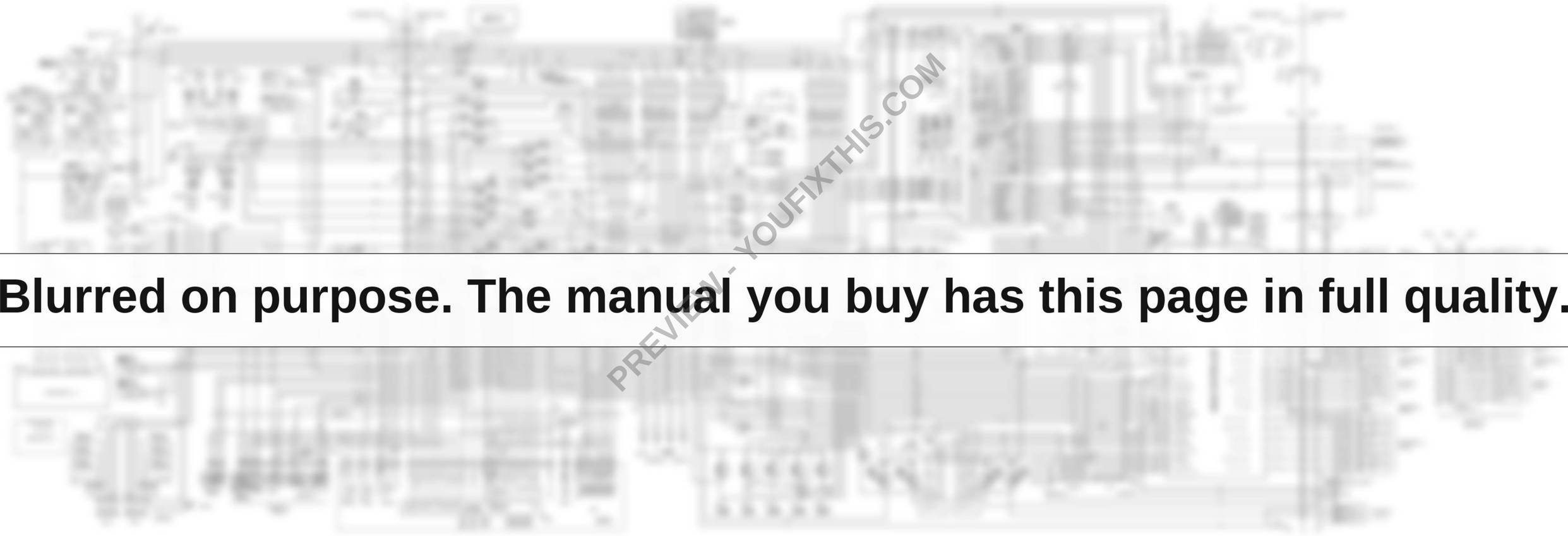
No.	Descriptions	Bolt Dia	Q'ty	Wrench	Torque

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ZX4/6 1600/2100K ELECTRICAL CIRCUIT DIAGRAM



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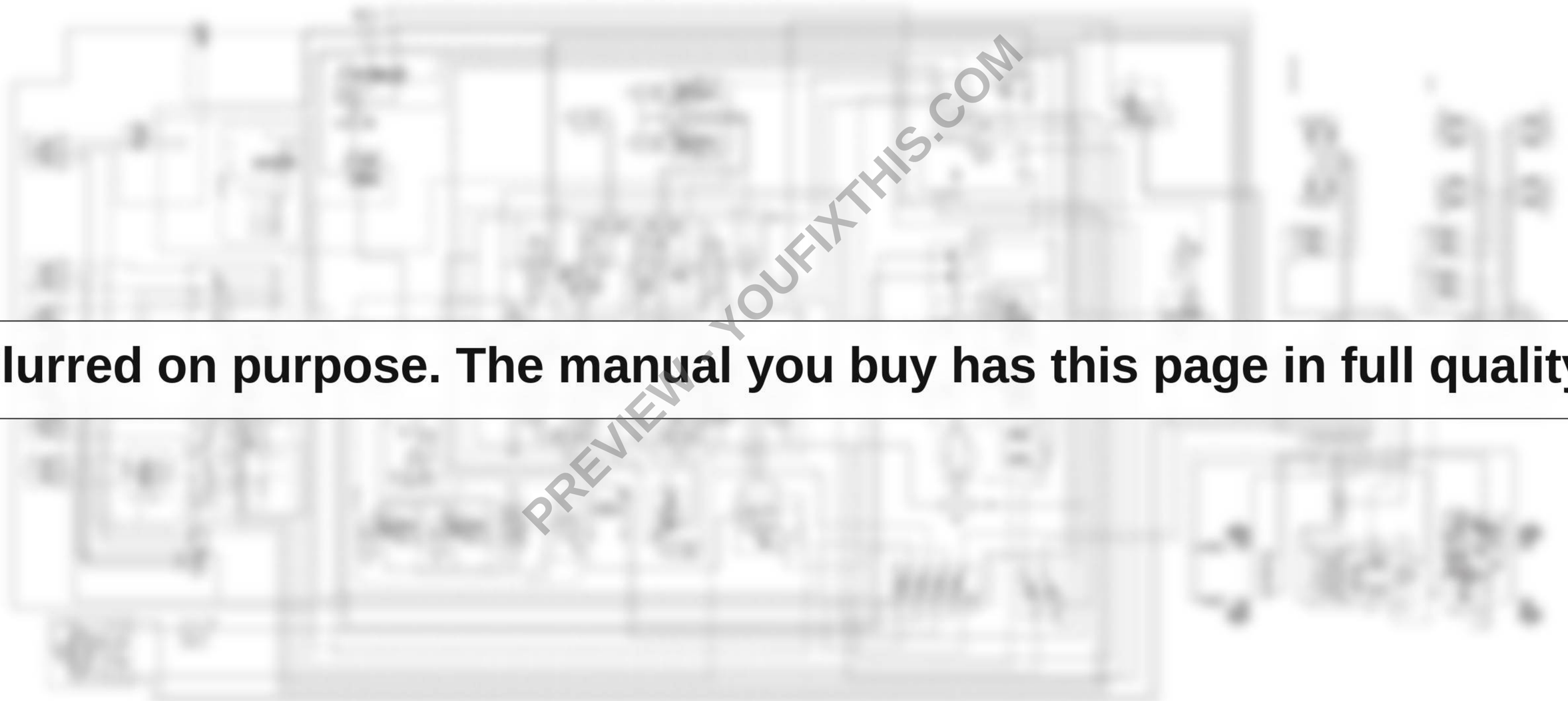
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Attach to Vol. No. : TTCDBE-00

ZAXIS 210W HYDRAULIC CIRCUIT DIAGRAM (STANDARD)

NOTE: Refer to the perrformance standard table in the Technical Manual for the set pressure of each relief valve.



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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.



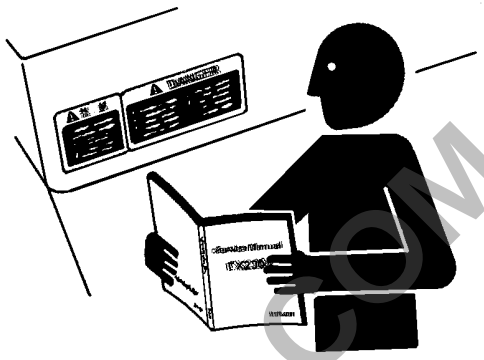
002-E01C-1223

SA-1223

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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

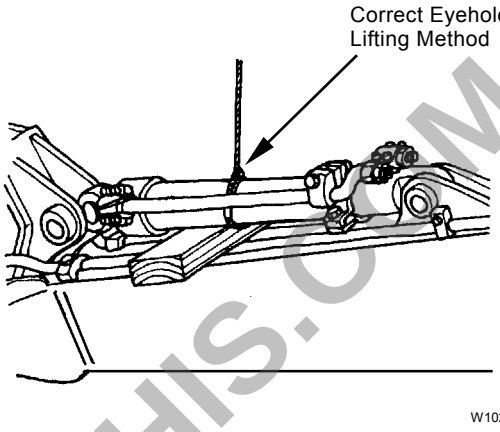
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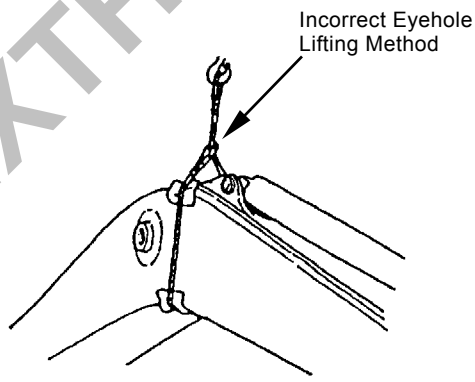
Precautions for Using Nylon Sling

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

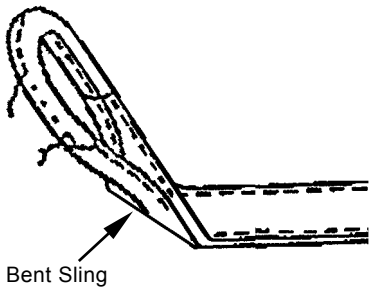
- Attach protectors (soft material) on the corners of the load so that the nylon sling does not directly contact the corners. This will prevent the nylon sling from being damaged and the lifted load from slipping.
- Lower the temperature of the lifted load to lower than 100 °C (212 °F). If unavoidably 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 they won't deteriorate with heat, sun light, or chemicals.



W102-04-02-016



W105-04-01-008



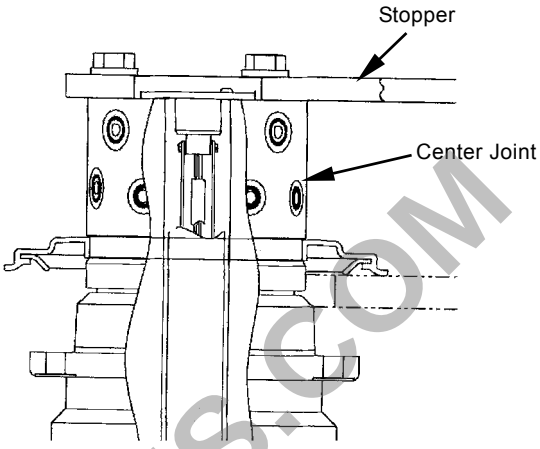
W162-01-01-009

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CAUTION: Center joint weight: 93 kg (210 lb)

3. Remove the stopper and hoses.
   (Refer to “Remove and Install Center Joint” group.)
   : 24 mm, 36 mm



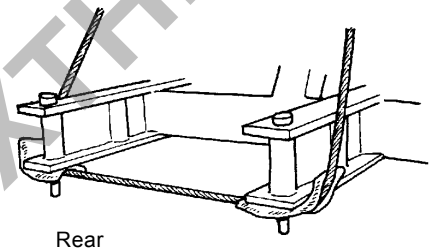
W1F3-03-03-003

CAUTION: Upperstructure weight: 4980 kg (10980 lb)

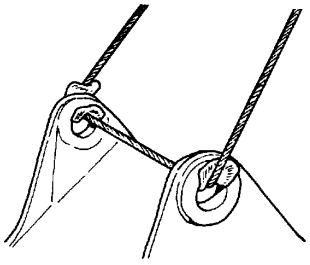
IMPORTANT: Make sure rear wire ropes not to touch engine.

4. Attach wire ropes to the rear (counterweight bracket) of the frame and boom bracket.

NOTE: It is easy to adjust the wire ropes length and level the frame if a chain block is used.



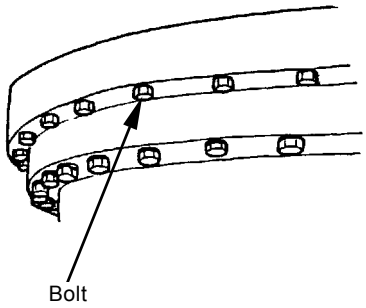
W105-02-03-004



W105-02-03-005

5. Put mating marks on the upperstructure and the outer race of the swing bearing.
   Loosen the mounting bolt of the swing bearing and remove it.
   : 27 mm

NOTE: Chain block shall be used to adjust and level the frame, then lift it slightly off the undercarriage.



W1F3-03-01-002

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Assemble Auxiliary Control Valve

1. Secure seat (37) in a vice. Install O-ring (38), valve (39), spring (40), sleeve (41) and O-ring (42).
   : 36 mm
   : 59 N·m (6 kgf·m, 43 lbf·ft)

2. Install poppet (44) and spring (43) into housing (62).

3. Install sleeve (41) assembly (37 to 42) to housing (62).
   : 36 mm
   : 59 N·m (6 kgf·m, 43 lbf·ft)

IMPORTANT: As each set pressure is different, be sure to install overload relief valve assemblies (1 to 18) and (19 to 36) correctly.

4. Install overload relief valve assembly (1 to 18) and (19 to 36) to housing (62).
   : 32 mm
   : 59 N·m (6 kgf·m, 43 lbf·ft)

5. Secure spool (57) with wooden pieces in a vice. Install O-ring (58) to plug (59). Install plug (59) to spool (57). Install seat (55), springs (53, 54), seat (52), and end spool (51) to spool (57).
   : 5 mm
   : 9.8 N·m (1 kgf·m, 7.4 lbf·ft)
   : 8 mm
   : 18.6 N·m (1.9 kgf·m, 13.7 lbf·ft)

IMPORTANT: After installing spool (57) assembly (51 to 59) into housing (62), push them by hand to confirm smoothness.

6. Insert spool (57) assembly (51 to 59) to housing (62) through port A1 side.

NOTE: When installing the spool assembly, be sure to install it straight to prevent it from damaging spool (57) inside housing (62).

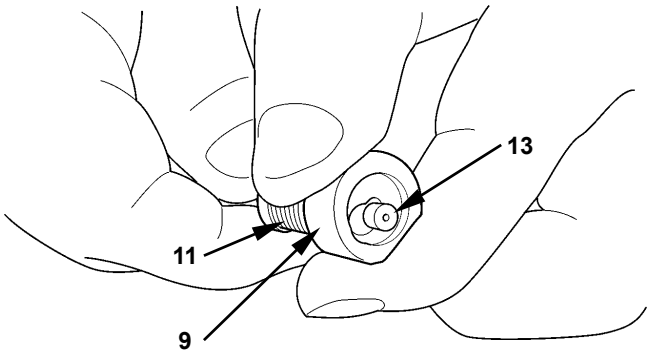
7. Install O-ring (56) to cover (50) and O-ring (47) to cover (46). Install them to housing (62) with socket bolts (45) (2 used), (48), and (49).
   : 6 mm
   : 25.5 N·m (2.6 kgf·m, 18.8 lbf·ft)

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IMPORTANT: Do not remove the spool (13) assembly unless necessary.

IMPORTANT: When removing spool (13) from spring seats (9) (4 used), push the spool in the spring seat, then direct it towards the bigger hole while remove it. However, do not push the spring seat in more than 6 mm (0.24 in).



W577-02-06-004

7. Remove spring seats (9) (4 used), springs (11) (4 used) and washers (12) (4 used) from spool (13).

8. Clamp the pilot valve on a vise and secure the pilot valve with the port plate (18) facing upward.

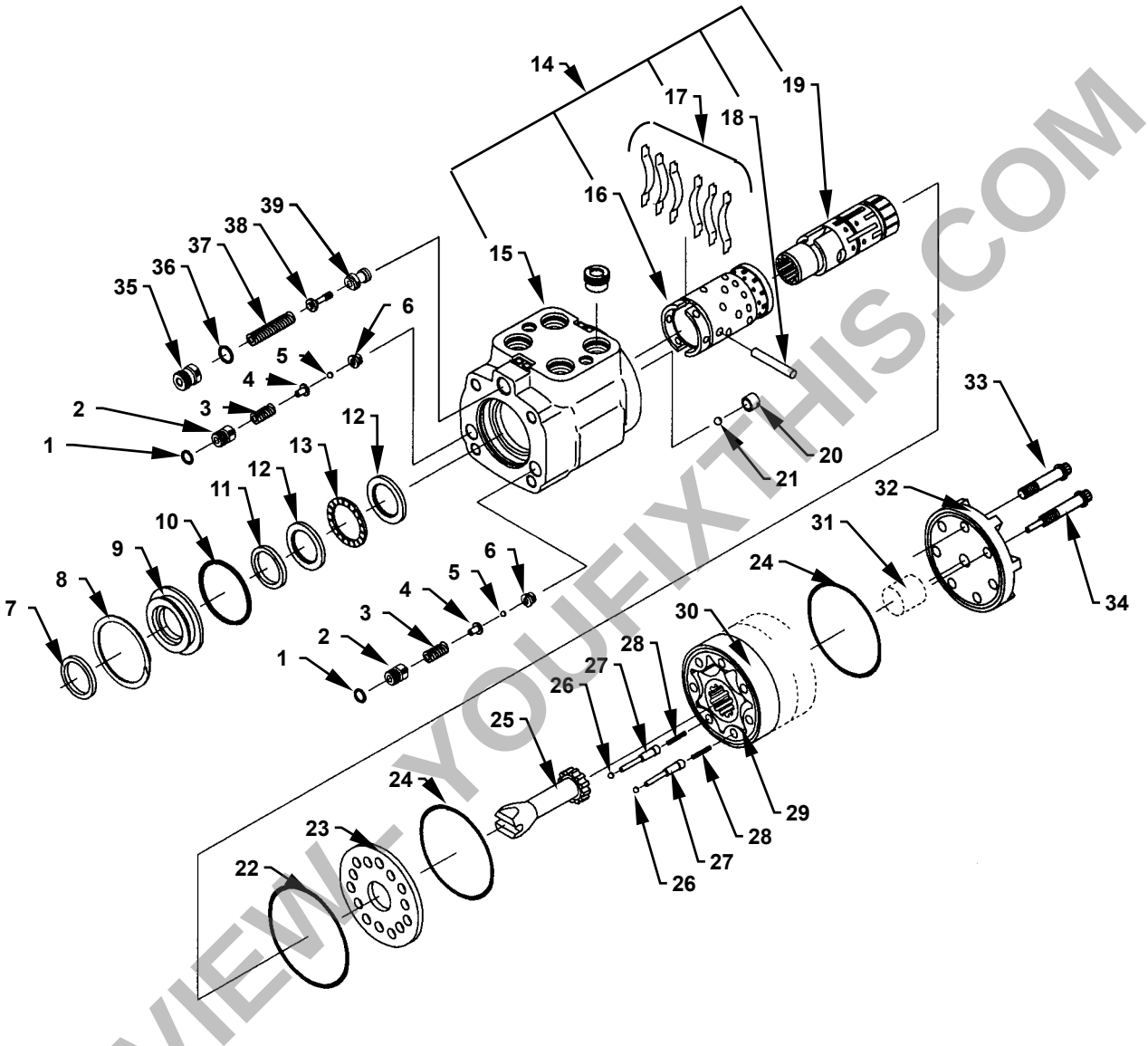
9. Remove socket bolts (20) (2 used) from casing (14).
   : 6 mm

10. Remove port plate (18), O-ring (15) and bushing (16) from casing (14).

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DISASSEMBLE STEERING VALVE



T1F3-03-07-004

1 - O-Ring (2 Used)
2 - Plug (2 Used)
3 - Spring (2 Used)
4 - Holder (2 Used)
5 - Ball (2 Used)
6 - Seat (2 Used)
7 - Dust Seal
8 - Retaining Ring
9 - Bushing
10 - O-Ring
11 - Seal
12 - Bearing Race (2 Used)
13 - Thrust Needle
14 - Housing Assembly
15 - Housing
16 - Sleeve
17 - Center Spring (6 Used)
18 - Pin
19 - Spool
20 - Screw
21 - Ball
22 - O-Ring
23 - Plate
24 - O-Ring (2 Used)
25 - Drive
26 - Ball (2 Used)
27 - Plug (2 Used)
28 - Spring (2 Used)
29 - Star
30 - Rotor
31 - Spacer
32 - Cap
33 - Screw (6 Used)
34 - Screw
35 - Plug
36 - O-Ring
37 - Spring
38 - Poppet
39 - Valve Seat

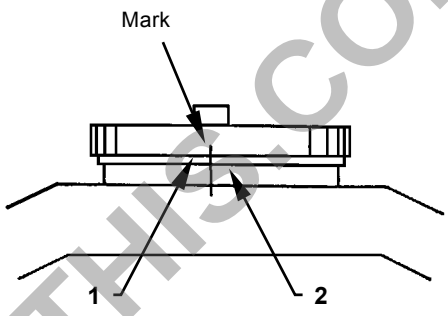
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REMOVE AND INSTALL SWING BEARING

Before removing the swing bearing, the upperstructure must be removed first. For removal and installation of the upperstructure, refer to “Remove and Install Main Frame” section.
In this section, the procedure starts on the premise that the upperstructure has already been removed.

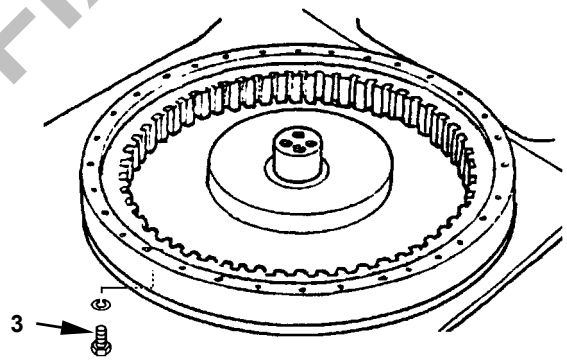
Removal

1. Put mating marks on inner race (1) of swing bearing (4) and chassis (2).



W105-03-01-001

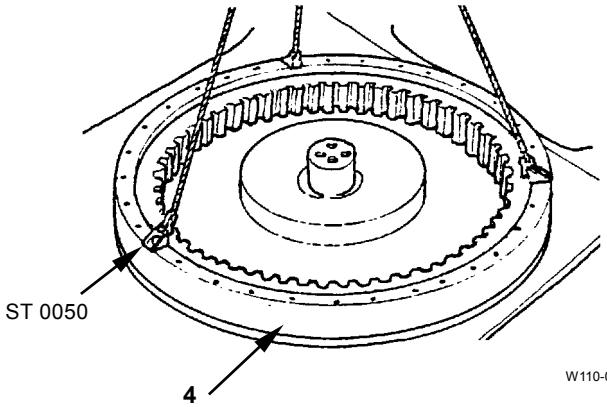
2. Remove bolts (3) (36 used) from inner race (1) of swing bearing (4).
   : 30 mm



W158-03-01-001

CAUTION: Swing bearing weight: 220 kg (490 lb)

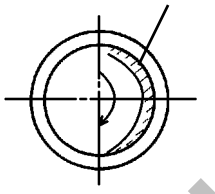
3. Attach lifting tools (ST 0050), lift swing bearing (4) off.



W110-03-01-004

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MAINTENANCE STANDARD

Parts Name		Allowable Limit (basis of judgement)	Remedy
Bushing		1. Wear more than 0.2 mm (0.008 in)	Replace
		2. Scored, abnormal wear	Replace
		3. Uneven wear (wear range is less than 180°) uneven wear  T157-01-01-040	Replace
Body, Spindle	Sliding surface of sealed part	Scored or something hurt it.	Replace
	Sliding surface of body and spindle except sealed part	1) Scored more than 0.1 mm (0.004 in).	Replace
		2) Scored less than 0.1 mm (0.004 in) deep.	Repair with oil stone
	Sliding surface of plate	1) Wear more than 0.5 mm (0.02 in) deep. Abnormal wear.	Replace
		2) Wear less than 0.5 mm (0.02 in) deep.	Repair to smooth
		3) Scored less than 0.5 mm (0.02 in) deep and able to repair.	Repair to smooth
Cover	Sliding surface of plate	1) Wear less than 0.5 mm (0.02 in).	Replace
		2) Wear less than 0.5 mm (0.02 in).	Repair to smooth
		3) Scored less than 0.5 mm (0.02 in) and able to repair.	Repair to smooth

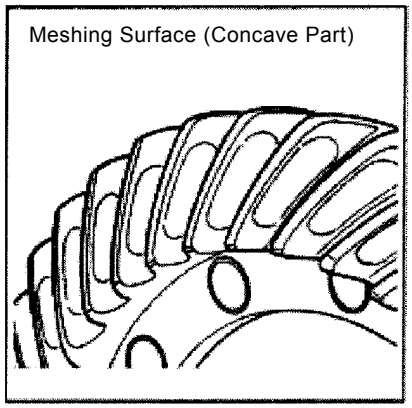
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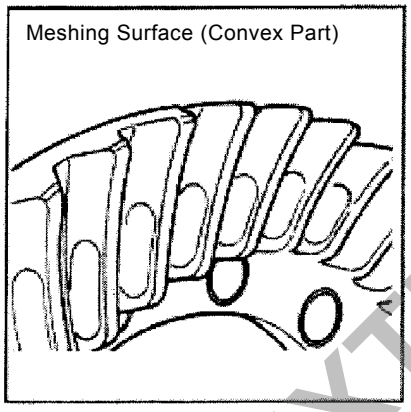
ADJUSTING GEAR CLEARANCE

When assembling the drive pinion, error in adjusting shim may occur due to the big gear clearance.

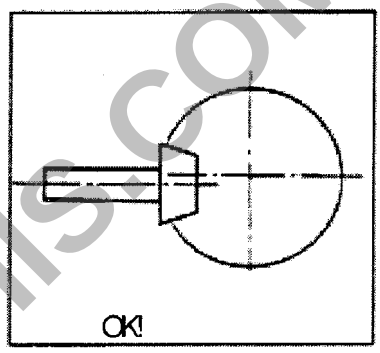
A) Correct clearance between gear and pinion.



W1GL-03-05-019

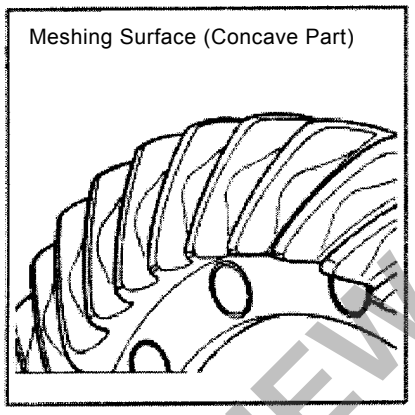


W1GL-03-05-020

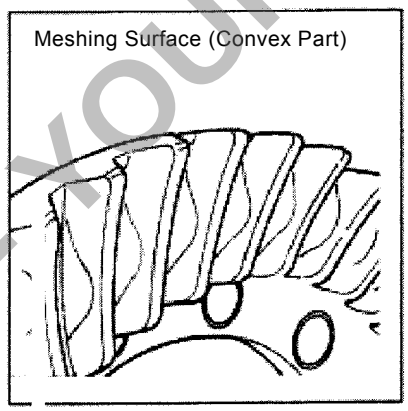


W1GL-03-05-021

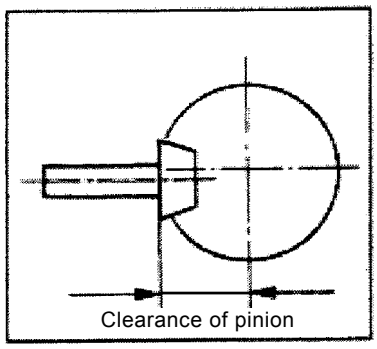
B) Increasing clearance of pinion is necessary.



W1GL-03-05-022



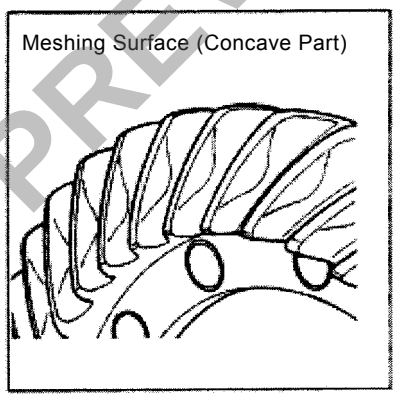
W1GL-03-05-023



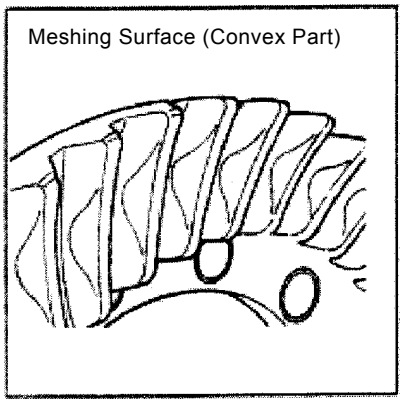
W1GL-03-05-027

Reducing Thickness of Shim for Pinion

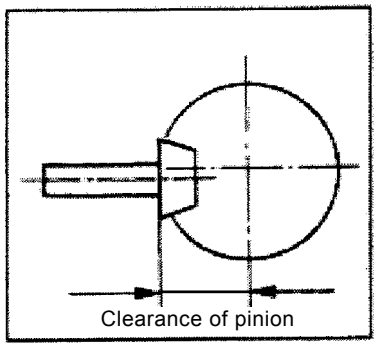
C) Decreasing clearance of pinion is necessary.



W1GL-03-05-025



W1GL-03-05-026



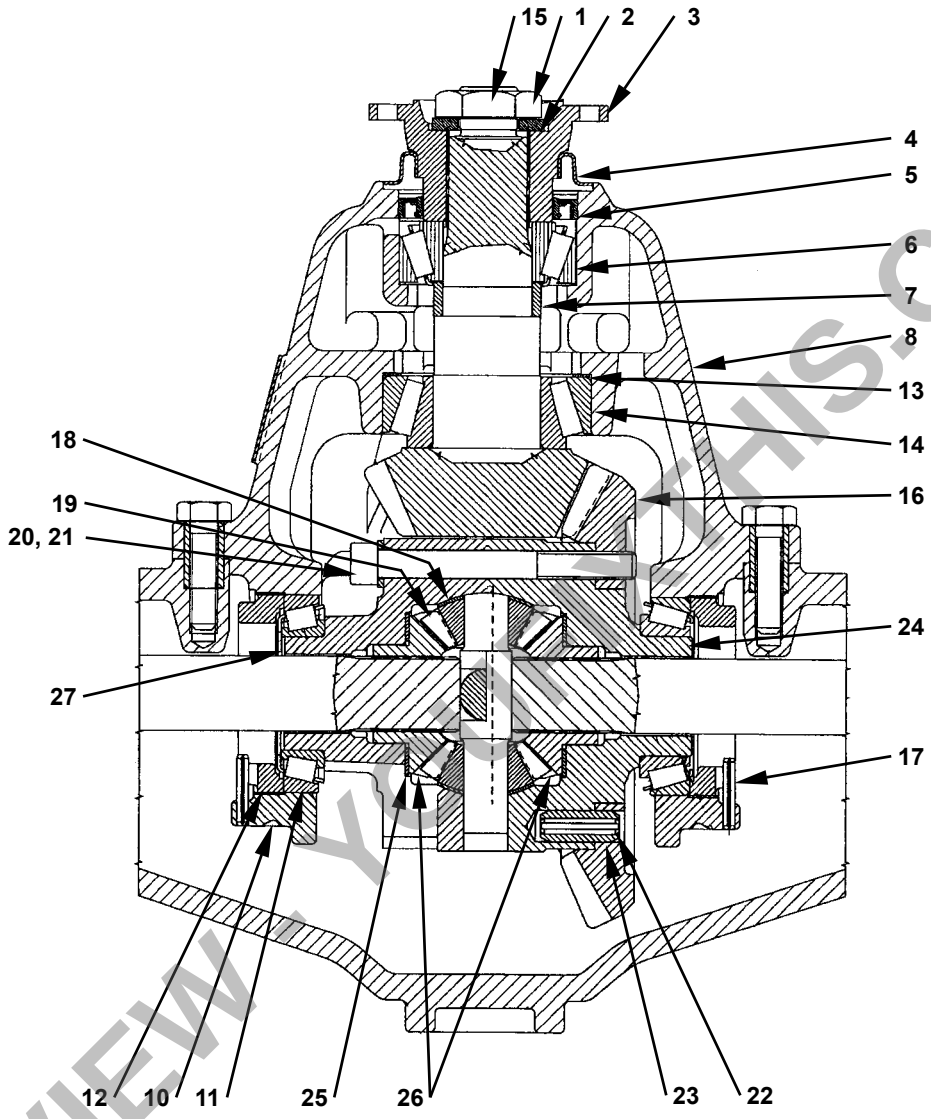
W1GL-03-05-027

Increasing Thickness of Shim for Pinion

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ASSEMBLE DIFFERENTIAL



W1GL-03-05-034

1 -	Nut	8 -	Housing	15 -	Drive Pinion	22 -	Spring Pin (4 Used)
2 -	Washer	9 -	*Bolt (4 Used)	16 -	Bevel Gear	23 -	Spring Pin (4 Used)
3 -	Flange	10 -	Cap (2 Used)	17 -	Roll Pin (2 Used)	24 -	Differential Case
4 -	Guard	11 -	Bearing (2 Used)	18 -	Thrust Washer (4 Used)	25 -	Thrust Washer (2 Used)
5 -	Seal	12 -	Nut (2 Used)	19 -	Pinion Gear (4 Used)	26 -	Side Gear (2 Used)
6 -	Bearing	13 -	Shim	20 -	Socket Bolt (8 Used)	27 -	Spider
7 -	Ring	14 -	Bearing	21 -	Socket Bolt (4 Used)	28 -	Differential Case

*NOTE: As for marked " * ", refer to page W3-5-36.*

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11. Install thrust plates (17) into arm left and right sides. Adjust total clearance of left and right within 1.5 mm or less.

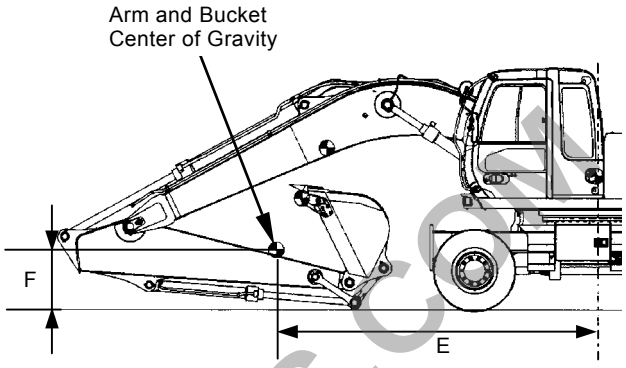
12. After installing arm, add grease to grease fitting (18) on the boom-connecting boss of the arm.

IMPORTANT: For handling of HN bushing for the front attachment, pay attention to following requirements.

Precautions for pressing the bushing in:
If a hammer is used to drive the bushing in, the bushing may be damaged. Use a press.

Precautions when reinforcing the arm:
Welding heat for arm reinforcement may cause oil to leak from the bushing and decrease lubrication performance.
If oil leak occurs because of heated bushing after welding, replace the bushing.

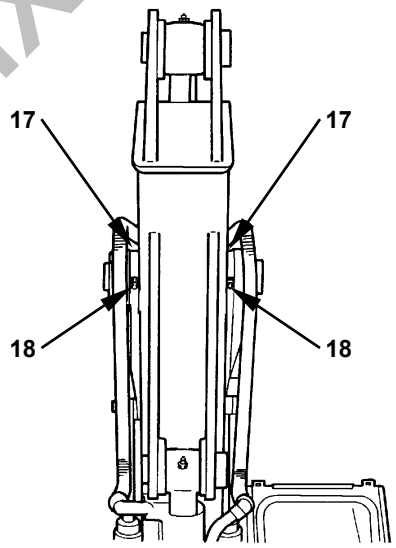
Special tools should be used to pull the bushing out or press it in.
Special Tool: ST 1454



W1GL-04-01-002

Unit: mm (in)

E	4343 (163)
F	765 (30.1)



M157-07-157

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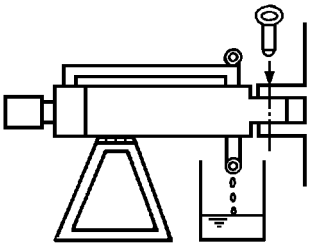
Disassemble Arm Cylinder

- Be sure to read “Precautions for Disassembly and Assembly” thoroughly on page W1-1-1 before starting the repair work.

The disassembly procedure below starts on the premise that the hydraulic lines and the line securing bands have been removed.

CAUTION: Arm cylinder weight: 260 kg (574 lb)

1. Lift and horizontally secure the cylinder on a workbench by crane. Then, drain the hydraulic oil from the cylinder.



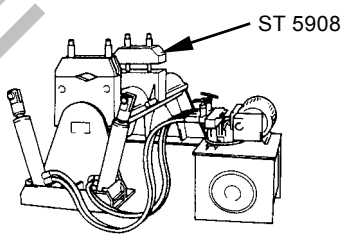
W102-04-02-027

2. Fully extend cylinder rod (11). Lift and hold the rod. Remove socket bolts (8) from cylinder head (7).

IMPORTANT: Be sure to pull out piston rod (11) straight to prevent the sliding surfaces from being damaged.

3. Pull out cylinder head (7) with piston rod still attached from cylinder tube (12) by tapping with a plastic hammer.

4. Secure cylinder rod (11) on special tool (ST 5908). Put mating marks between cylinder rod (11) and nut (24).

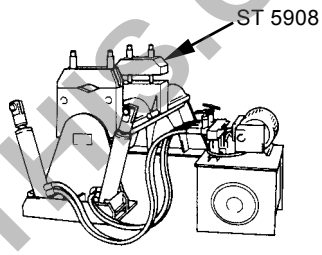


W158-04-02-022

5. Remove set screw (22) and steel ball (23).

NOTE: Set screw (19) was crimped with a punch in two places after it was tightened. Before loosening set screw (19), cut away the crimped portions.

6. Loosen nut (24) using special tool (ST 5908). Remove piston (15), shim (21), cushion bearing (13) and cushion seal (14).
   Tool for tightening nut: 100 mm (ST 3264)



W158-04-02-022

7. Remove seal ring (17), slide rings (19, 20) (2 used for each), O-ring (18), backup rings (16) (2 used) from piston (15).

8. Remove cylinder head (7) from cylinder rod (11).

9. Remove O-ring (10) and backup rings (9, 2) from cylinder head (7). Then remove wiper ring (1), U-ring (3), backup ring (4), snap ring (6) and bushing (5).
   Tool for removing bushing: 95 mm (ST 8021)

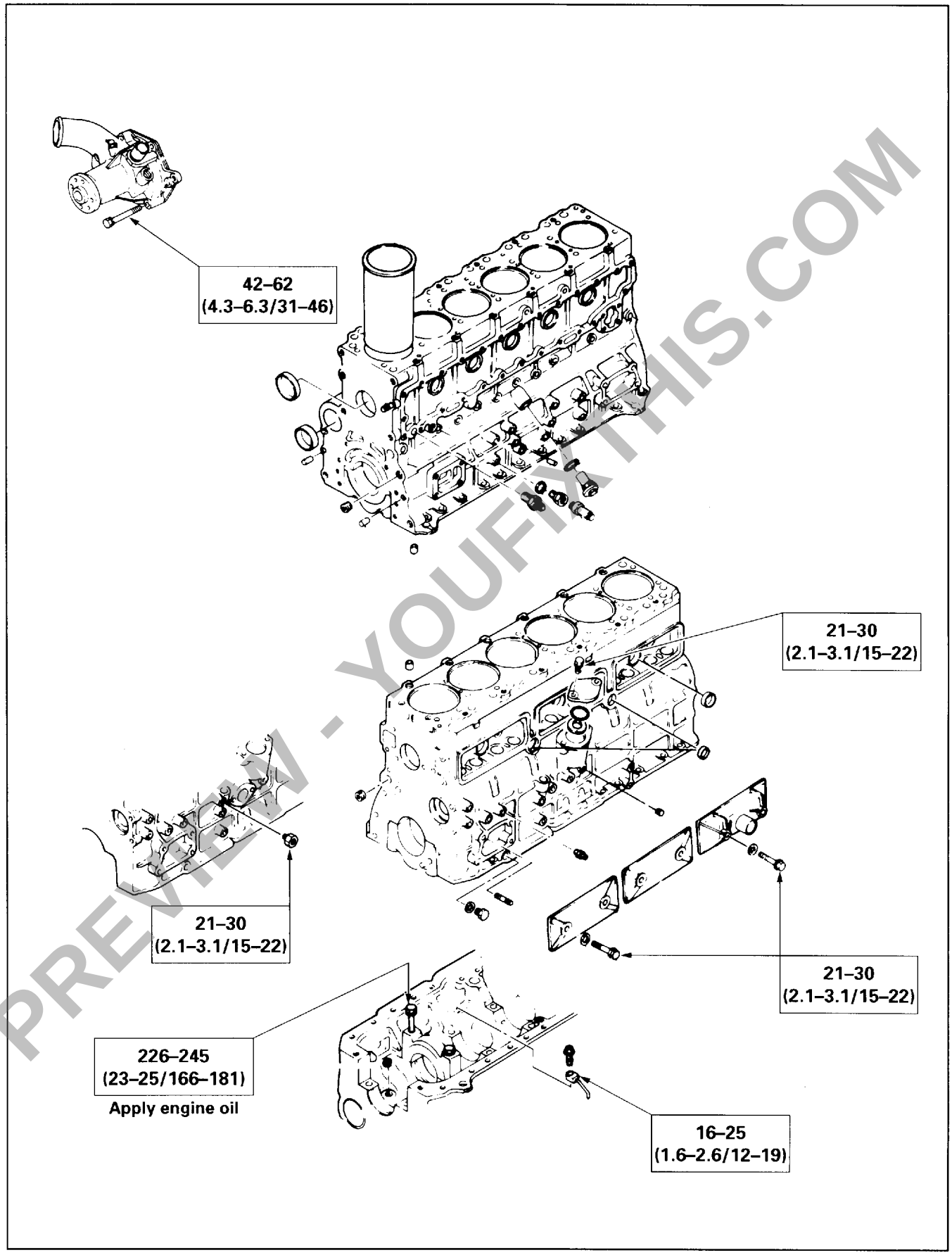
10. Remove stopper (28) from piston rod (11) with a screwdriver. Remove cushion bearing (27), cushion seal (26) and snap ring (25).

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Cylinder Body

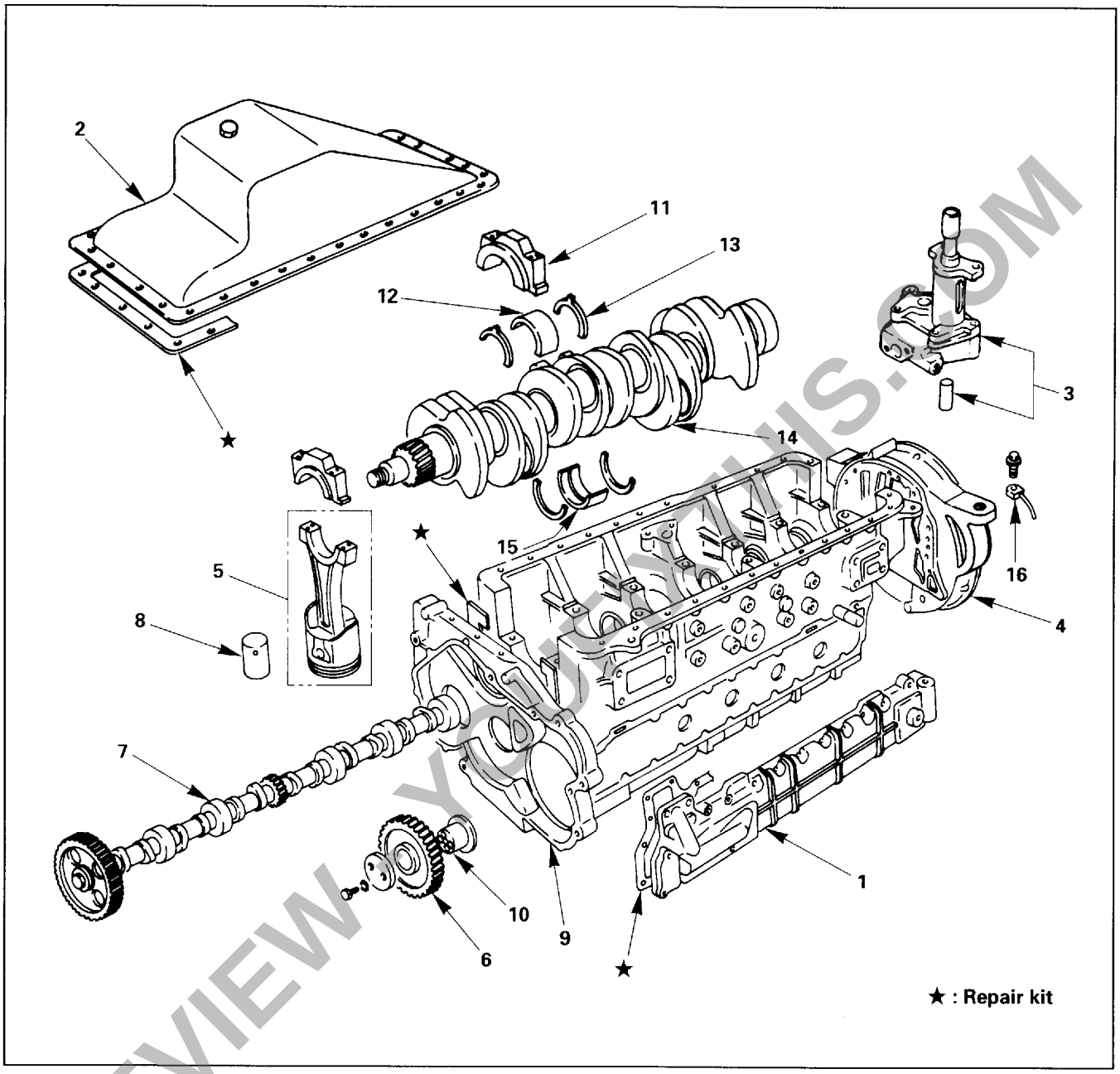
N·m (kgf·m/lb.ft)



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MAJOR COMPONENTS - II

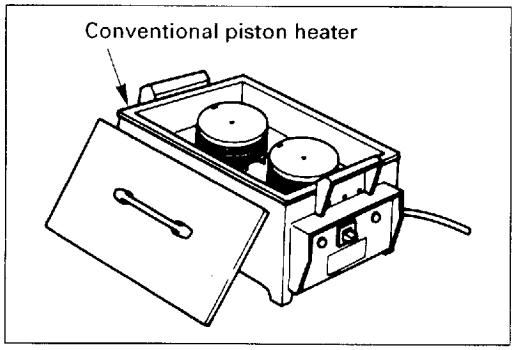


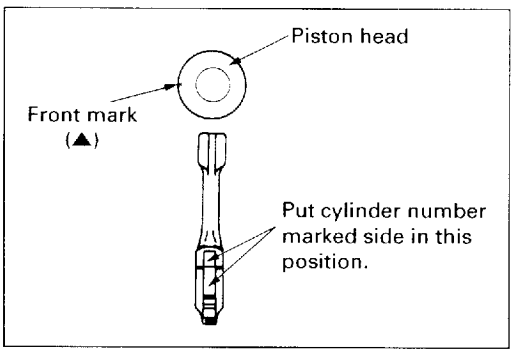
Disassembly Steps

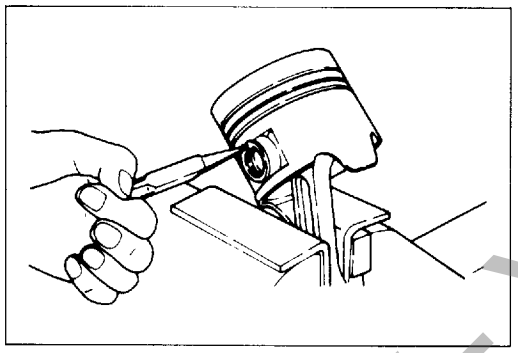
1. Oil cooler
2. Oil pan
3. Oil pump and coupling
4. Flywheel housing
5. Piston and connecting rod
▲ 6. Idler gear
▲ 7. Camshaft
8. Tappet
9. Timing gear case
10. Idler gear shaft
▲ 11. Crankshaft bearing cap
12. Crankshaft bearing (lower half)
13. Thrust bearing
14. Crankshaft
15. Crankshaft bearing (upper half)
16. Oiling jet

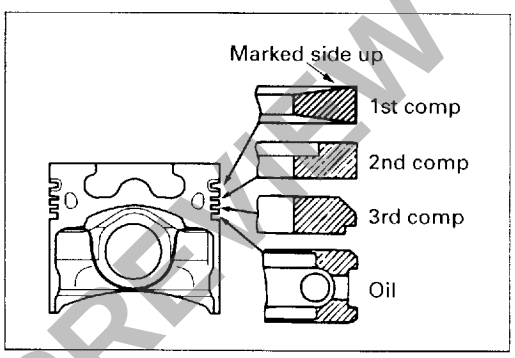
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PISTON AND CONNECTING ROD

Important Operations

1. Piston

Use a piston heater to heat the pistons to approximately 60°C (140°F).

2. Connecting Rod

1) Install the connecting rod to the piston with setting the marks as illustrated.
2) Install the piston pin into the piston and the connecting rod bushing.

   Refer the description of piston pin in page 4-19.

3. Piston Pin, Snap Ring

1) Use a pair of snap ring pliers to install the piston pin snap ring.
2) Check that the piston moves smoothly on the piston pin.

4. Piston Ring

1) Use a piston ring installer to install the three piston rings.

   Piston Ring Installer

   Install the piston rings in the following order.

   (1) Oil ring
   (2) 3rd compression ring
   (3) 2nd compression ring
   (4) 1st compression ring

   The marked side of the three compression rings must be facing up.

   The undercut side of the 3rd compression ring will be facing down.

   As the oil ring has no any facing mark, it may face in either direction.
2) Lubricate the piston ring surfaces with engine oil.
3) Check that the piston rings rotate smoothly in the piston ring grooves.

5. Connecting Rod Bearing

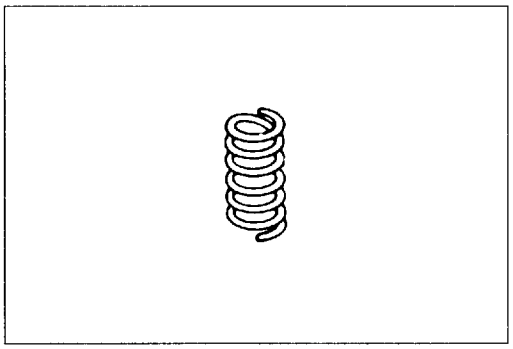
1) Install the connecting rod bearings to the connecting rod large-end and the connecting rod cap.
2) Install the bearing cap to the connecting rod with semi-tightening the cap bolts.
3) Lubricate the bearing with engine oil.

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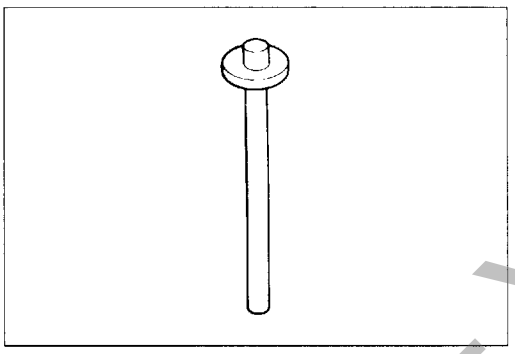
INSPECTION AND REPAIR

Make the necessary adjustments, repairs, and part replacements if excessive wear or damage is discovered during inspection.



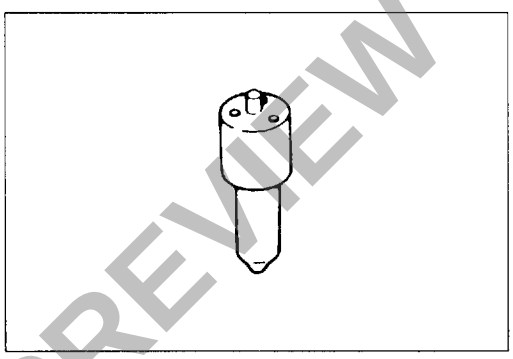
Push Rod Spring

Check the push rod spring for wear, weakness, and corrosion.



Nozzle Holder Push Rod

1. Check the nozzle holder push rod curvature.
2. Check the nozzle holder push rod and needle valve contact surfaces for excessive wear and poor contact.



Injection Nozzle

1. Check the injection nozzle needle valve, the valve seat, and the injection nozzle hole for carbon deposits.

   If carbon deposits are present, the injection nozzle and the needle valve must be replaced.
2. Hold the nozzle body vertically.

   Pull the needle valve about one-third of the way out of the nozzle body.

   Release the needle valve.

   Check that the needle valve falls back into the nozzle body as far as the valve seat.

   If the needle valve does not fall back into the nozzle body as far as the valve seat, the injection nozzle and the needle valve must be replaced.

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REASSEMBLY

To reassemble the alternator, follow the reverse of disassembling procedure, and observe the following precautions:

(1) Lubrication is not required. Both bearing are prelubricated.

Note:

For the rotor bearing with resin bands, grease should not be applied. Remove oils completely to prevent creep of the bearing if found on the bearing box.

(2) High temperature solder (Melting point of 466° F) should be used.

Solder quickly, use a 180–270 watts soldering iron no more than about 5 seconds because the rectifier may be damaged if it is overheated.

(3) Tightening torque.

- Pulley securing nut. : 147 N·m
- Through bolts. : 4.9 N·m
- Bearing retainer screws. : 3.4 N·m
- Coil assembly retaining screws. : 3.4 N·m
- Rectifier retaining screw. : 3.4 N·m
- Regulator retaining screws. : 3.4 N·m
- Nut for stud bolt. : 8.8 N·m

(4) To assemble the rear bracket / starter assembly and front bracket / rotor assembly.

a. Since the rotor bearing and rear bracket fitting is tight, before installing the rotor into the rear bracket assembly, heat the area around the bearing box of the rear bracket to 122 to 144° F.
b. After the alternator has been completely assembled, rotate the pulley slowly by hand to be sure that the rotor turns smooyhly.

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Major Category	Name of Part	Inspection Item	Nominal Dimension	Assembly Standard Value	Limit	Repair Procedure	Comments
Main Operating Parts	Crankshaft	Crankshaft bearing cap bolt torque N·m (kgf-m/lb·ft)		226 – 245 (23 – 25/166 – 181)		Apply engine oil to threads and seating areas of bolts before tightening	Do not catch foreign matter in bolts
		Crankshaft rear oil seal wear				In case of oil leak, replace oil seal	Check for oil seal collapse

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