INTRODUCTION

TO THE READER

- This manual is written for an experienced technician to provide technical information needed to maintain and repair this machine.

  · Be sure to thoroughly read this manual for correct product information and service procedures.
  · If you have any questions or comments regarding the contents of this manual.

please contact:

Technical Document Center
Hitachi Construction Machinery Co. Ltd.
TEL: 81-298-32-7173
FAX: 81-298-31-1162

ADDITIONAL REFERENCES

- Please refer to the materials listed below in addition to this manual.

  · The Operator's Manual
  · The Parts Catalog
  · Operation Manual of the Engine
  · Parts Catalog of the Engine
  · Hitachi Training Material

MANUAL COMPOSITION

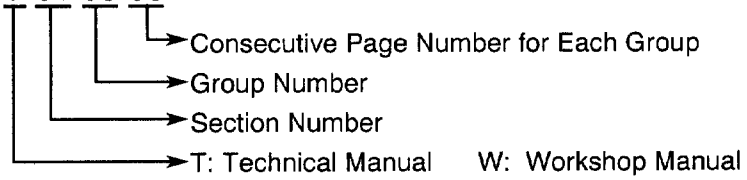
- This manual consists of two portions: the T/M (Technical Manual) portion and the W/M (Workshop Manual) portion.
  At the beginning of each section, a tab fixed separator is inserted to help in opening sections needed. Green tabs are used for the sections in the T/M portion and yellow tabs for those in the W/M portion.
  · Information included in the T/M portion:
  technical information needed for redelivery and delivery, operation and activation of all devices and systems, operational performance tests, and troubleshooting procedures.

  · Information included in the W/M portion:
  technical information needed for maintenance and repair of the machine, tools and devices needed for maintenance and repair, maintenance standards, and removal/installation and assemble/disassemble procedures.

PAGE NUMBER

- Each page has a number, located on the center lower part of the page, and each number contains the following information:

Example: T 01-03-05

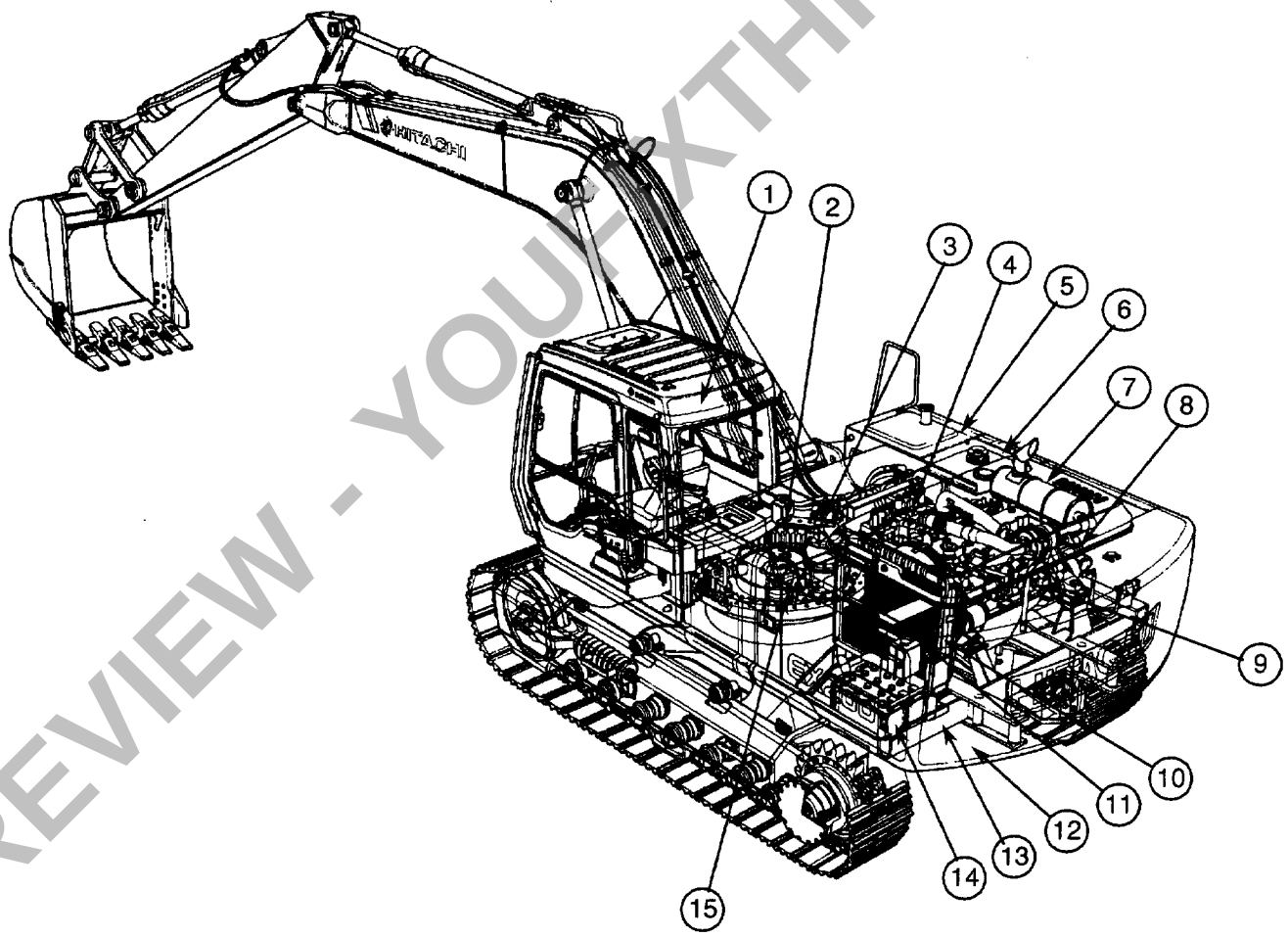


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LAYOUT OF THE UPPERSTRUCTURE

The upperstructure consists of main frame (13), engine (9), fuel tank (5), hydraulic oil tank (6), hydraulic components [pump device (8), control valve (4), swing device (3),etc.], operator's cab (1), and counterweight (12).

Counterweight (12) is bolted to the rear end of main frame (13) and balances the machine.
The front attachment is attached to main frame (13).



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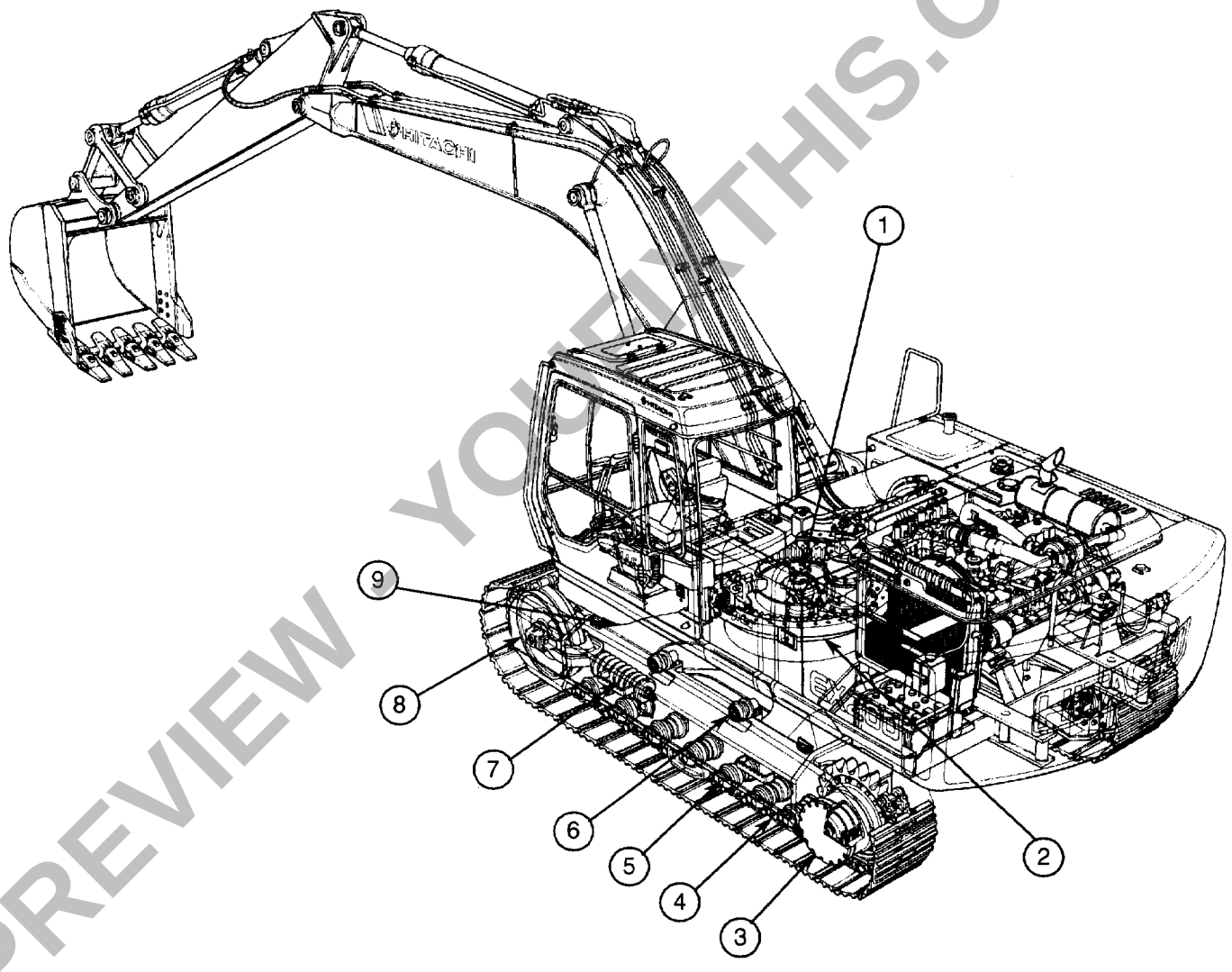
1— Operator's Cab
2— Swing Bearing
3— Swing Device
4— Control Valve
5— Fuel Tank
6— Hydraulic Oil Tank
7— Muffler
8— Pump Devices
9— Engine
10— Radiator
11— Oil Cooler
12— Counterweight
13— Main frame
14— Battery
15— Air Cleaner

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COMPONENT LOCATION

The undercarriage consists of track frame (9), center joint (1), swing bearing (2), front idler (8), track adjuster (7), upper roller (6), lower roller (5), track link (4) and travel device (3).

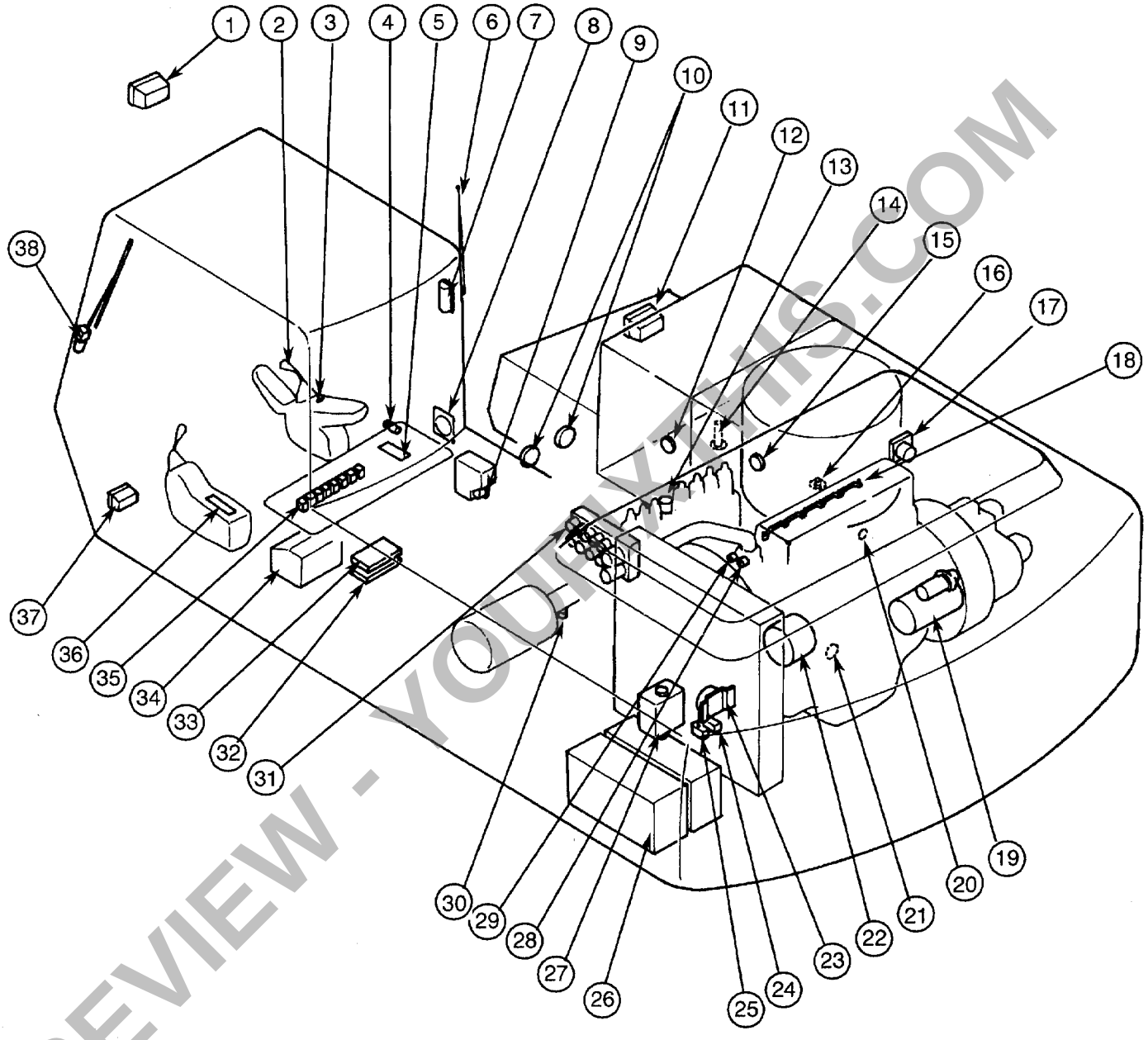


T107-01-01-004

1— Center Joint
2— Swing Bearing
3— Travel Device
4— Track Link Assembly
5— Lower Rollers
6— Upper Roller
7— Track Adjuster
8— Front Idler
9— Track Frame

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COMPONENT LOCATION-1



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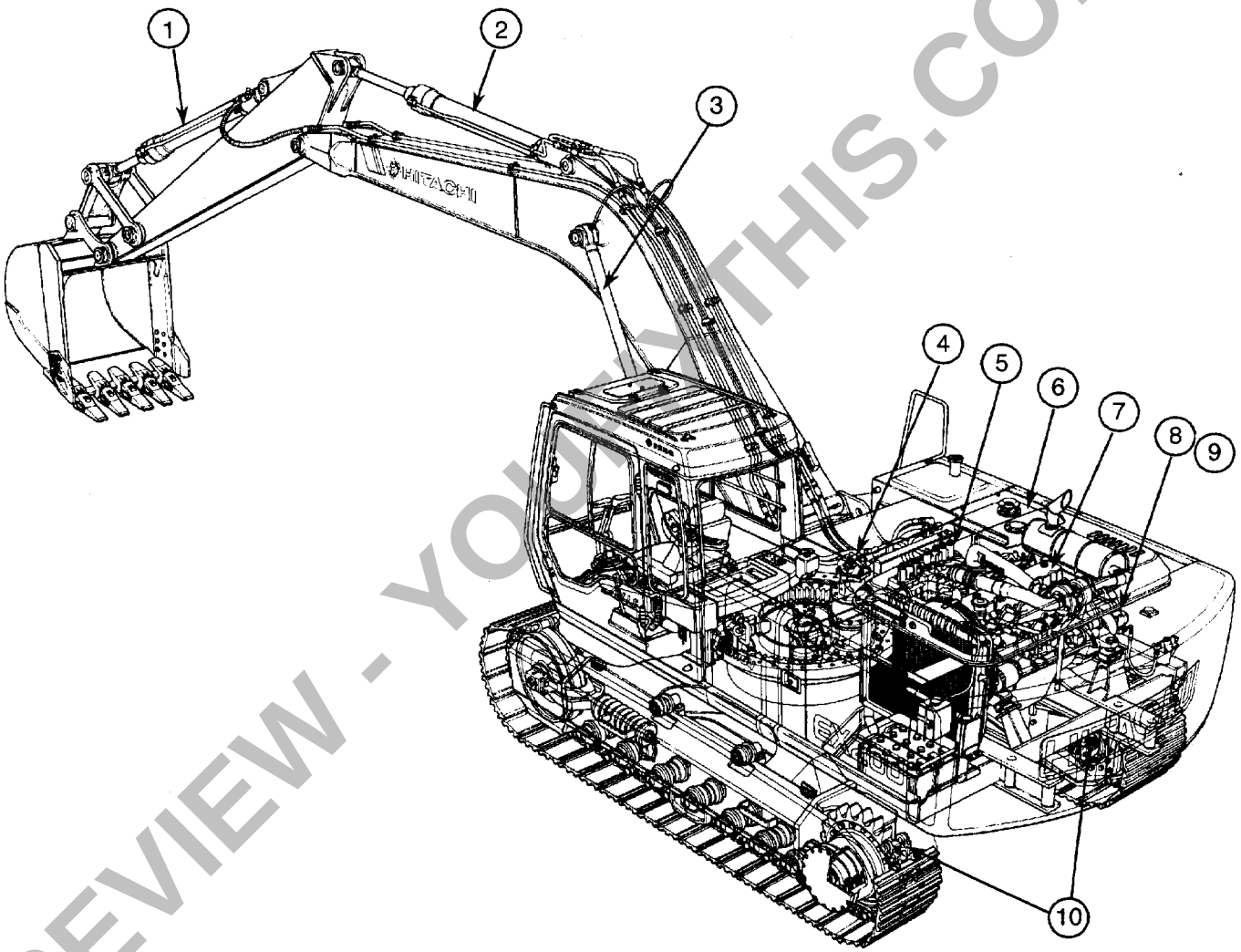
1— Work light (Boom)
2— Power boost switch
3— Key switch
4— Cigar lighter
5— Fuse box
6— Antenna
7— Dome light
8— Speaker (Radio)
9— Washer
10— Horn
11— Work light (Base)
12— Fuel sending unit
13— Differential pressure sensor
14— Low fuel level switch
15— Hydraulic oil level switch
16— Hydraulic temperature sensor
17— EC motor (EC sensor)
18— Glow plugs
19— Starter
20— Engine oil pressure switch
21— Engine oil level switch
22— Alternator
23— Battery relay
24— Glow plug relay
25— Fusible link
26— Batteries
27— Coolant level switch
28— Overheat switch
29— Coolant temperature sensor
30— Air filter restriction switch
31— Solenoid valve assembly
32— Pump and valve controller (PVC)
33— Engine controller (EC)
34— Heater
35— Relays
36— Radio
37— Work light (Base)
38— Wiper

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GENERAL

The hydraulic system consists of main pump (8), pilot pump (9), control valve (5), bucket cylinder (1), arm cylinder (2), two boom cylinders (3), swing motor (4), two travel motors (10), hydraulic oil tank (6), and pipings.



T107-01-01-001

1— Bucket Cylinder
2— Arm Cylinder
3— Boom Cylinder
4— Swing Motor
5— Control Valve
6— Hydraulic Oil Tank
7— Engine
8— Main Pump
9— Pilot Pump
10— Travel Motor

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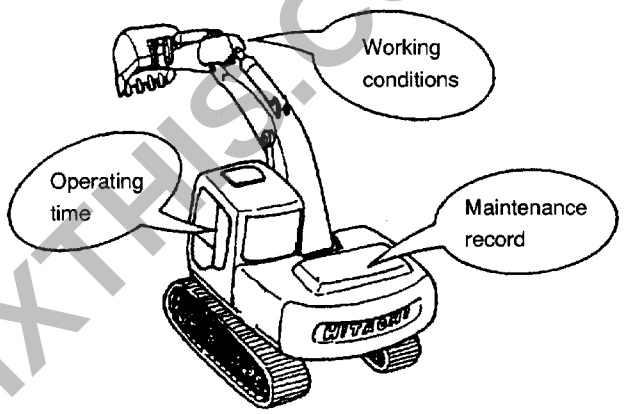
PURPOSE

Performance tests are used to check:

1. OPERATIONAL PERFORMANCE OF A NEW MACHINE
   When ever a new machine is delivered in parts and reassembled at a customer's site, it must be tested to confirm that the operational performance (Excavator Test) of the machine meets HITACHI STANDARDS.

2. OPERATIONAL PERFORMANCE OF A WORKING MACHINE
   With the passage of time, the machine's operational performance deteriorates, so that the machine needs to be serviced periodically to restore it to its original performance level.
   Before servicing the machine, conduct performance tests to check the extent of deterioration, and to decide what kind of service needs to be done (by referring to the "Allowable Limits" in this manual).

3. OPERATIONAL PERFORMANCE OF A REPAIRED MACHINE
   After the machine is repaired or serviced, it must be tested to confirm that its operational performance was restored by the repair and/or service work done.

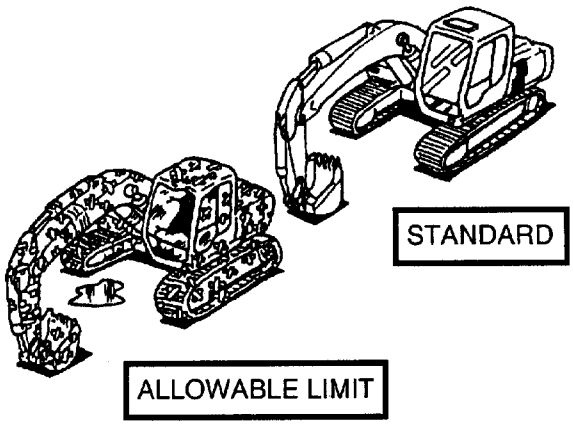


T105-06-01-001

TERMINOLOGY

1. "STANDARD"
   Specifications applied to the brand-new machine, components and parts.

2. "ALLOWABLE LIMIT"
   The lowest acceptable performance level. When the performance level of the machine falls below this level, the machine must be removed from work and repaired.
   Necessary parts and components must be replaced.



T105-06-01-002

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DIAGNOSING PROCEDURE

These six basic steps are essential for efficient troubleshooting:

1. Study the system.
2. Ask the operator.
3. Inspect the machine.
4. Operate the machine yourself.
5. Perform troubleshooting.
6. Trace possible causes.

1. Study the system

Study the machine's technical manuals. Know the system and how it works, and what the construction, functions and specifications of the system components are.



T107-07-01-001

2. Ask the operator

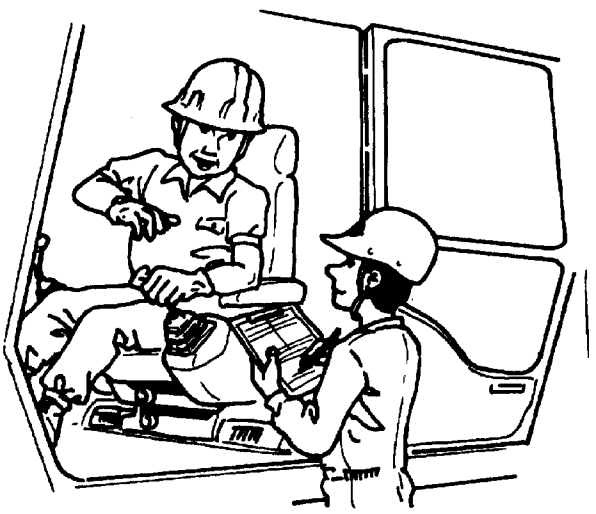
Before inspecting, get the full story of malfunctions from your star witness --- the operator.

(a) How is the machine being used? (Find out if the machine is being operated correctly)

(b) When was the trouble noticed, and what types of work the machine doing at that time?

(c) What are the details of the trouble? Is the trouble getting worse, or did it appear suddenly for the first time?

(d) Did the machine have any other troubles previously? If so, which parts were repaired before?

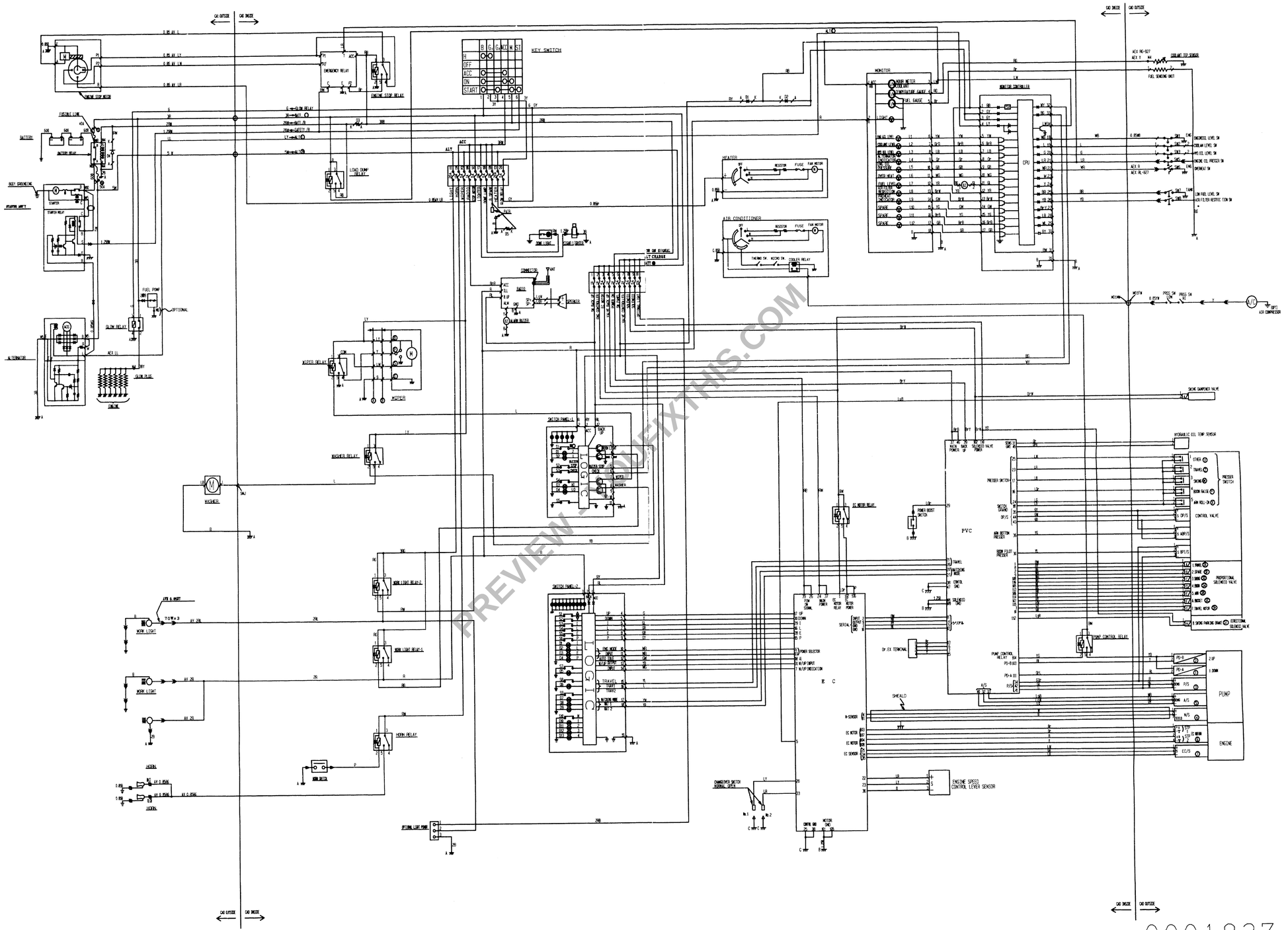


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EX200-3 Electric wiring diagram



0001837-E 1

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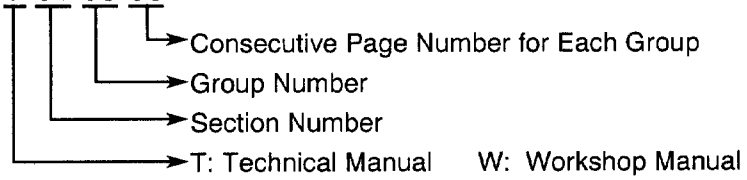
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REMOVE AND INSTALL PUMP DEVICE

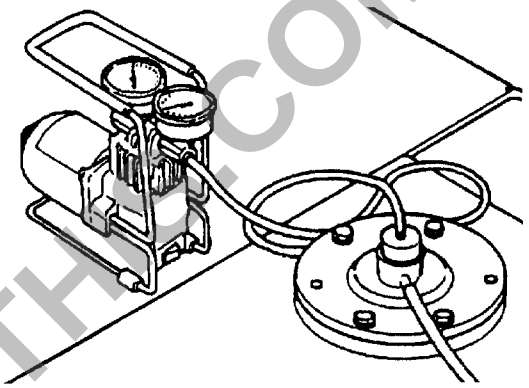
CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.

Hydraulic oil may be hot just after operation. Hot hydraulic oil may spout, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

Removal

1. Stop the engine. Move all control levers to release pressure remaining in the system. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.
2. Remove hydraulic oil tank cap. Connect a vacuum pump to maintain negative pressure in the hydraulic oil tank.

NOTE: Be sure to keep the vacuum pump activated while working.



W107-02-05-001

3. Disconnect connectors.

CAUTION: Pump device weight: 140 kg (308 lb)

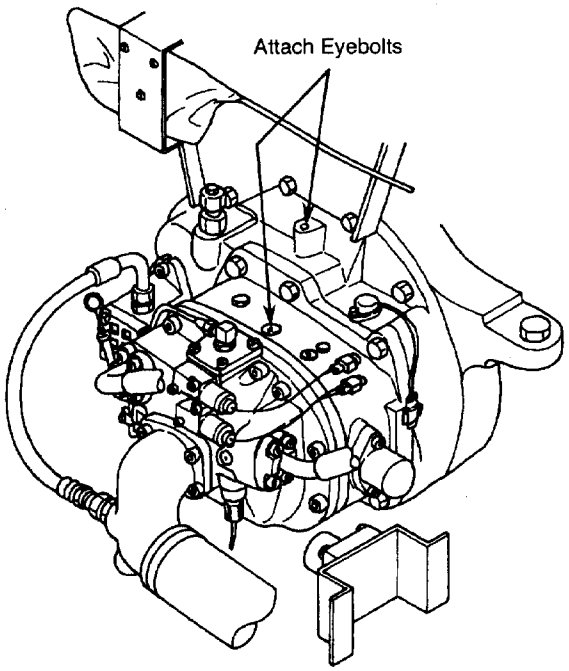
4. Disconnect all hoses and pipes from the pump device.

: 27 mm, 36 mm

: 10 mm

5. Attach eyebolts (M12×1.75×22) to the pump device, then fasten a hoist.
6. Remove pump device mounting bolts to remove pump device.

: 17 mm



T137-04-01-001

Installation

1. Install the pump device with pump device mounting bolts.
2. Connect all hoses and pipes.
3. Connect connectors.

IMPORTANT: Be sure to check hydraulic oil level and oil leakage, after assembling.

Wrench Size (mm)	Tightening Torque			Remark
	N·m	kgf·m	lbf·ft	
: 27	93	9.5	69	Hose
: 36	69	7	51	
: 18	108	11	80	Bolt
: 17	49	5	36	

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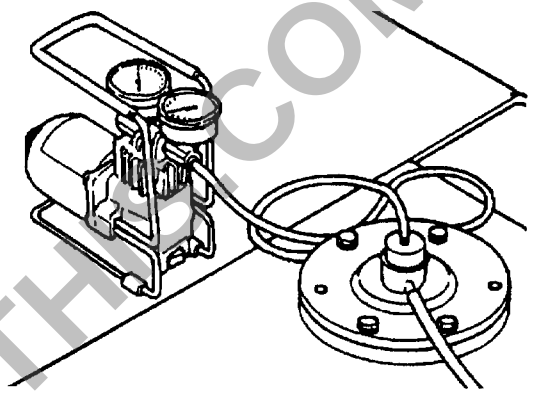
REMOVE AND INSTALL CONTROL VALVE

CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

Hydraulic oil may be hot just after operation. Hot hydraulic oil may spout, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

Removal

1. Stop the engine. Move all control levers to release pressure remaining in the system. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.
2. Remove the cap and install vacuum pump (ST 6908) to be negative-pressurize the hydraulic oil tank.



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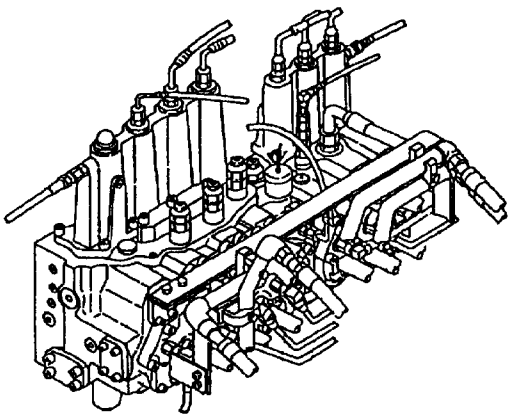
NOTE: Be sure to run the vacuum pump continuously while working.

3. Disconnect all hoses and pipes from the control valve.

: 36 mm

: 6 mm, 8 mm, 10 mm

NOTE: Attach caps to hoses and pipes. Attach labels or tags to hoses and pipes, to aid in assembly.



4. Remove control valve mounting bolts.

CAUTION: Control valve assembly weight: 180 kg (395 lb)

: 22 mm

Installation

1. Install control valve to frame and tighten the bolts.
2. Connect all hoses and pipes to the control valve.

IMPORTANT: Be sure to check hydraulic oil level and oil leakage, after assembling.

W107-02-05-002

Wrench Size (mm)	Tightening Torque			Remark
	N·m	kgf·m	lbf·ft	
: 36	175	18	130	Hose
: 22	137	14	101	Bolt
: 6	44	4.5	32.5	
: 8	49	5	36	
: 10	108	11	80	

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REMOVE AND INSTALL SWING DEVICE

CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

Hydraulic oil may be hot just after operation. Hot hydraulic oil may spout, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

Removal

1. Stop the engine. Move all control levers to release pressure remaining in the system. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.
2. Disconnect hoses (1, 3, 5 to 7).

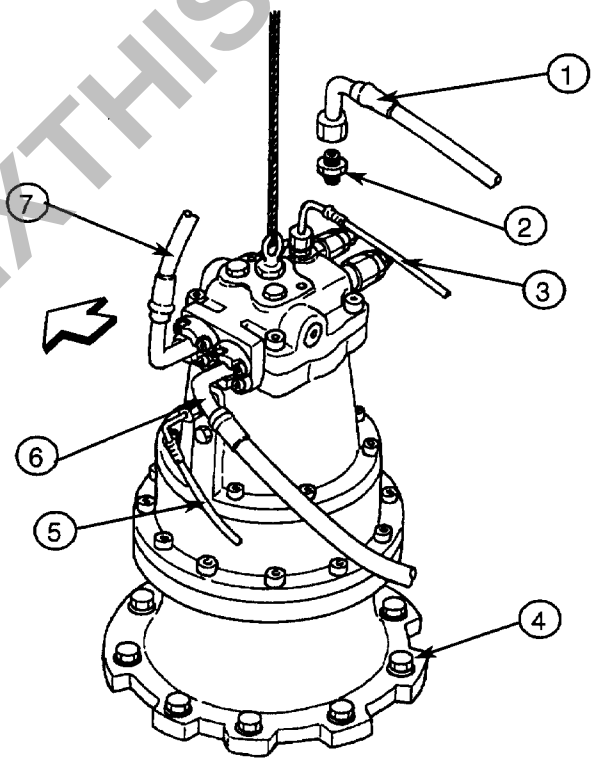
CAUTION: Swing device assembly weight: 230 kg (507 lb)
Swing motor assembly weight: 50 kg (110 lb)
Swing reduction gear weight: 180 kg (397 lb)

3. Remove adapter (2) and install an eyebolt to the swing device assembly to sling it with a wire rope.
4. Remove swing device mounting bolts (4).
5. Sling the swing device assembly with a crane or hoist.

Installation

IMPORTANT: Before installing the swing device assembly, apply liquid packing to both mounting surfaces on the swing reduction gears and frame.

1. Install the swing device assembly to frame and tighten bolts (4).
2. Install adapter (2).
3. Connect hoses (1, 3, 5 to 7).



W107-02-06-001

Torque Specifications

Hose (1)	175 N·m (18 kgf·m, 130 lbf·ft)
Hose (3)	39 N·m (4 kgf·m, 29 lbf·ft)
Hose (6, 7)	24.5 N·m (2.5 kgf·m, 18 lbf·ft)
Hose (5)	29.5 N·m (3 kgf·m, 22 lbf·ft)
Bolt (4)	540 N·m (55 kgf·m, 400 lbf·ft)

1- Make-up Hose: (To control valve)
2- Adapter
3- Drain Hose: (To hydraulic oil tank)
4- Bolt
5- Hose PG: (To solenoid valve)
6- Hose A: (To right swing side control valve)
7- Hose B: (To left swing side control valve)

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REMOVE AND INSTALL LEFT PILOT VALVE

CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

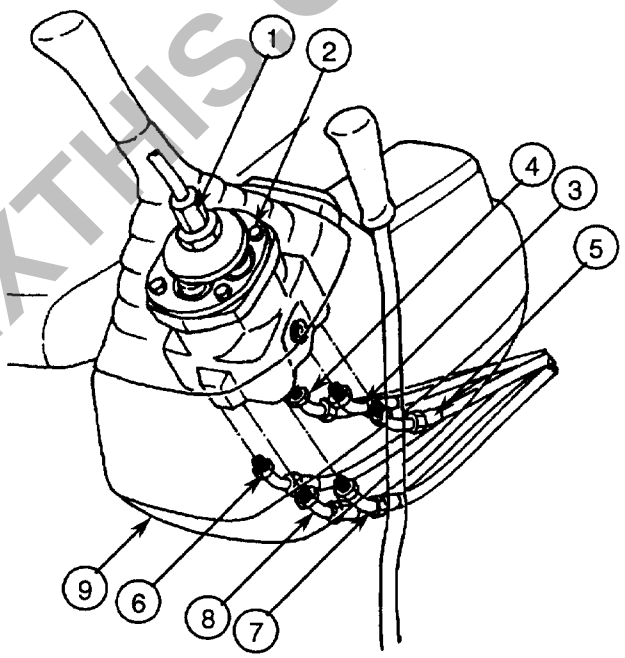
Hydraulic oil may be hot just after operation. Hot hydraulic oil may spout, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

Removal

1. Stop the engine. Move all control levers to release pressure remaining in the system. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.
2. Loosen screw joint (1) and remove the control lever.
3. Loosen screw and remove cover (9) of the control box.
4. Disconnect hoses (3 to 8).
5. Remove bolts (2) to remove the pilot valve assembly.

Installation

1. Install the pilot valve assembly using bolts (2).
2. Connect hoses (3 to 8).
3. Install the control lever it with screw joint (1), then install the cover with bolts.
4. Install the cover (9) of the control box.



W105-02-07-001

Torque Specifications

Bolt (2)	9.8 N·m (1.0 kgf·m, 7.2 lbf·ft)
Hose (3 to 8)	39 N·m (4.0 kgf·m, 29 lbf·ft)

1- Screw Joint
2- Bolt
3- Hose H : (To bucket roll-in control valve)
4- Hose P3 : (From pilot shut-off valve)
5- Hose A : (To boom raise control valve)
6- Hose B : (To boom lower control valve)
7- Hose G : (To bucket roll-out control valve)
8- Hose T6 : (To hydraulic oil tank)
9- Cover

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REMOVE AND INSTALL SOLENOID VALVE UNIT

CAUTION: Escaping fluid under pressure can penetrate the skin, causing serious injury. Avoid the hazard by relieving pressure before disconnecting hydraulic or other lines.

Hydraulic oil may be hot just after operation. Hot hydraulic oil may spout, possibly causing severe burns. Be sure to wait for oil to cool before starting work.

Removal

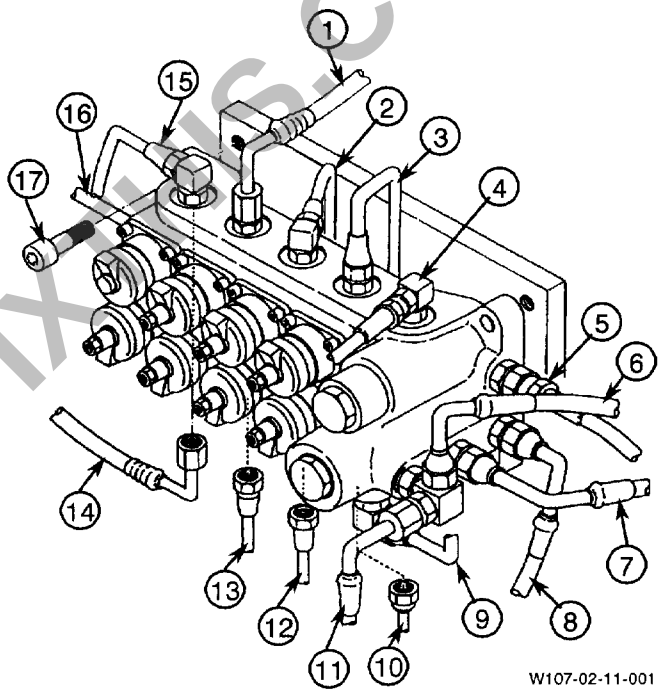
1. Stop the engine. Move all control levers to release pressure remaining in the system. Push the air release valve on top of the hydraulic oil tank to release any remaining pressure.
2. Remove all wire harnesses for solenoid valves from connectors.
3. Disconnect pilot lines (1 to 16).
4. Remove bolts (17) to remove solenoid valve unit.

Installation

1. Install solenoid valve unit with bolts (17).
2. Connect pilot lines (1 to16).
3. Connect all wire harnesses for solenoid valves to connectors.

Torque Specifications

Bolt (17)	49 N·m (5 kgf·m, 36 lbf·ft)
Pilot hoses (1 to 3, 5 to 16) . .	29.5 N·m (3 kgf·m , 21.5 lbf·ft)
Pilot hose (4)	39 N·m (4 kgf·m, 29 lbf·ft)



W107-02-11-001

1- **Hose SI : (Power boost)**
2- **Hose SE : (Travel Pc pressure)**
3- **Hose SD : (Swing Pc pressure)**
4- **Hose SG : (PI pressure)**
5- **Hose T3: (To hydraulic oil tank)**
6- **Hose D1 : (To hydraulic oil tank)**
7- **Hose PB : (From pilot filter)**
8- **Hose PC : (To pilot shut-off valve)**
9- **Hose PH : (To accumlator)**
10- **Pipe SC : (Bucket Pc pressure)**
11- **Hose D14 : (To shockless valve)**
12- **Pipe SA : (Boom Pc pressure)**
13- **Pipe SB : (Arm Pc pressure)**
14- **Pipe SH : (Travel speed change)**
15- **Hose SI : (Swing parking brake)**
16- **Hose SL : (To swing dampener valve)**
17- **Bolt**

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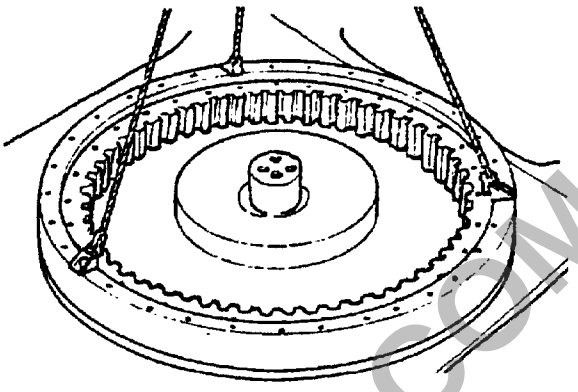
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Install Swing Bearing

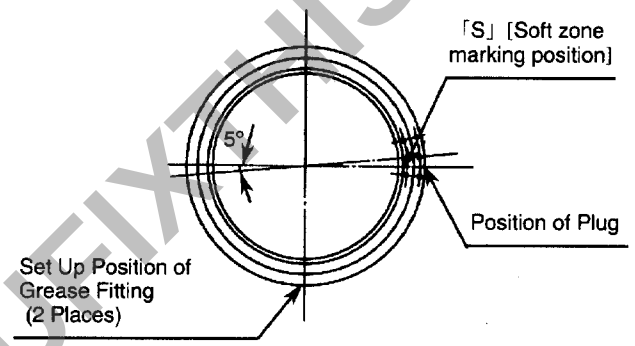
Clean the matching surfaces of swing bearing and the frame.
Apply THREE BOND #1102 to the matching surfaces of swing bearing and the frame.

1. Hoist the swing bearing.
   Align the swing bearing with the alignment mark on the track frame and install the swing bearing.

IMPORTANT: Inner race soft zone (S) and the ball filler port should be placed on the same position.



W105-03-01-003

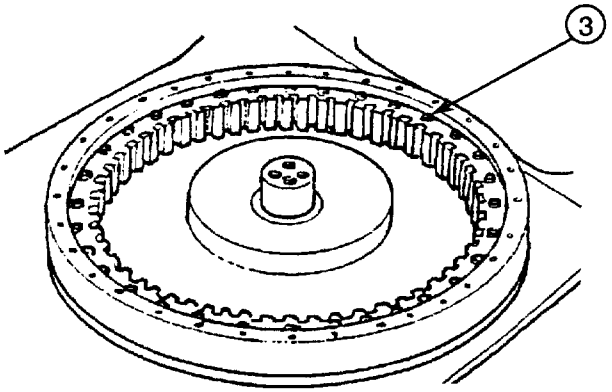


W105-03-01-005

2. Install bolts (3) and tighten to specification.

: 30 mm

: 540 N·m (55 kgf·m, 400 lbf·ft)



W105-03-01-002

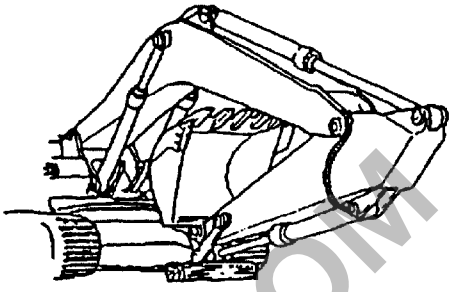
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REMOVE AND INSTALL FRONT ATTACHMENT

Front Attachment Removal

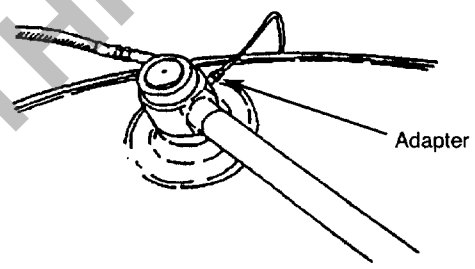
1. Park the machine on a level surface.
   Lower the bucket to the ground.
   Stop the engine.



W105-04-01-001

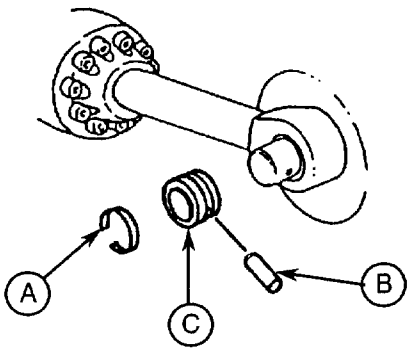
2. Disconnect lubrication hoses from both boom cylinder rod ends.

: 19 mm



W105-04-01-002

3. Remove retaining rings (A), stopper pins (B) and stoppers (C) from both boom cylinder rod ends.

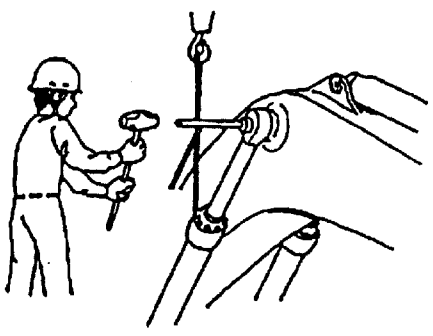


W105-04-01-003

CAUTION: Take care not injury from frying pieces of metal, when hammering.
To avoid injury, grind of hammer and bar.

4. Attach each boom cylinder to hoist.
   Remove cylinder rod end pin using a hammer and bar.

CAUTION:
Boom cylinder weight: 170 kg (375 lb)



W105-04-01-004

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GENERAL REPAIR INSTRUCTIONS

1. Before performing any service operation with the engine mounted, disconnect the grounding cable from the battery.

   This will reduce the chance of cable damage and burning due to short circuiting.
2. Always use the proper tool or tools for the job at hand.

   Where specified, use the specially designed tool or tools.
3. Use genuine ISUZU parts referring ISUZU PARTS CATALOG for the engines surely.
4. Never reuse cotter pins, gaskets, O-rings, lock washers, and self locking nuts. Discard them as you remove them. Replace them with new ones.
5. Always keep disassembled parts neatly in groups. This will ensure a smooth reassembly operation.

   It is especially important to keep fastening parts separate. These parts vary in hardness and design, depending on their installation position.
6. All parts should be carefully cleaned before inspection or reassembly.

   Oil ports and other openings should be cleaned with compressed air to make sure that they are completely free of obstructions.
7. Rotating and sliding part surfaces should be lubricated with oil or grease before reassembly.
8. If necessary, use a sealer on gaskets to prevent leakage.
9. Nut and bolt torque specifications should be carefully followed.
10. Always release the air pressure from any machine-mounted air tank(s) before dismounting the engine or disconnecting pipes and hoses. To not do so is extremely dangerous.
11. Always check and recheck your work. No service operation is complete until you have done this.
12. Information contained in the "Main Data and Specifications" of the Workshop Manual and the Instruction Book may differ. In this case, the information contained in the Instruction Book should be considered applicable.

NOTES ON THE FORMAT OF THIS MANUAL

This Workshop Manual is applicable to the 4BD1, 4BD1T, 6BB1, 6BD1, and 6BD1T family of industrial diesel engines. Unless otherwise specified, these engines have common parts and components as well as data and specifications.

Illustrations used in this Workshop Manual are based on the 6BD1 and 6BD1T engines.

The 4BD1T engine and the 6BD1T engine are turbocharged.

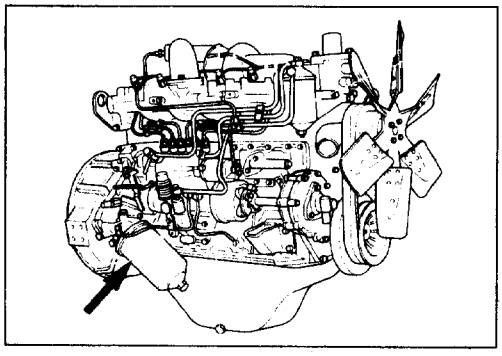
1. Find the applicable section by referring to the Table of Contents at the beginning of the Manual.
2. Common technical data such as general maintenance items, service specifications, and tightening torques are included in the "General Information" section.
3. Each section is divided into sub-sections dealing with disassembly, inspection and repair, and reassembly.

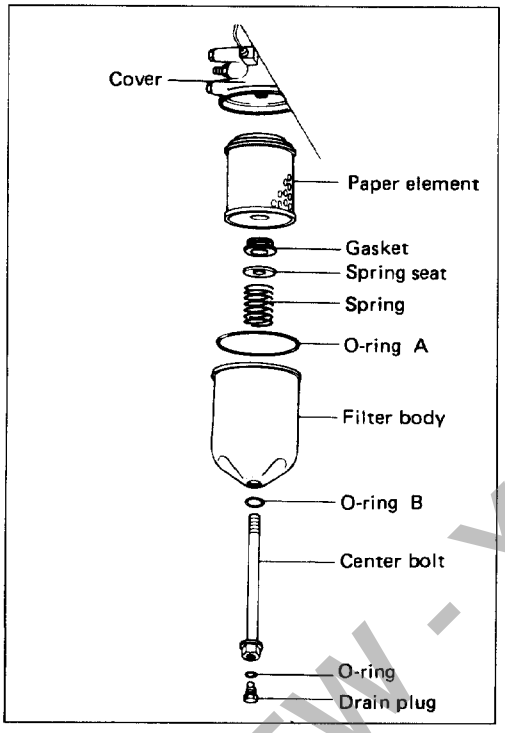
   The section ENGINE ASSEMBLY is an exception. This part is divided into three sections to facilitates quick indexing.
4. When the same servicing operation is applicable to several different units, the manual will direct you to the appropriate page.
5. For the sake of brevity, self-explanatory removal and installation procedures are omitted.

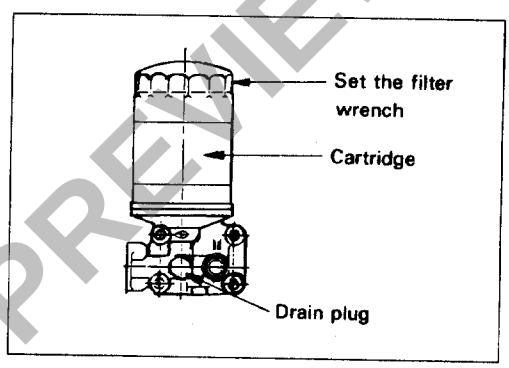
   More complex procedures are covered in detail.

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LUBRICATING SYSTEM

Main Oil Filter Replacement

Center Bolt Type

Removal

1. Loosen the drain plug to drain the engine oil from the oil filter.
2. Remove the center bolt and the filter body from the filter cover along with the filter element.
3. Discard the used filter element.
4. Wipe the oil filter fitting face clean with a rag.
   This will allow the new oil filter to seat properly.

Installation

1. Install the two O-rings A and B and check that they are correctly positioned.
2. Reassemble the filter body with the center bolt.

kg·m(lb.ft)

Center Bolt Torque	5.3 ± 1.0 (38.3 ± 7.23)

3. Check that the gasket is properly seated. This will prevent oil leakage.

kg·m(lb.ft)

Drain Plug Torque	1.8 ± 0.2 (13.01 ± 1.45)

Cartridge (Spin-On) Type

Removal

Remover and Installer: Filter Wrench

1. Loosen the used oil filter by turning it counterclockwise with the filter wrench.
2. Discard the used oil filter.

Installation

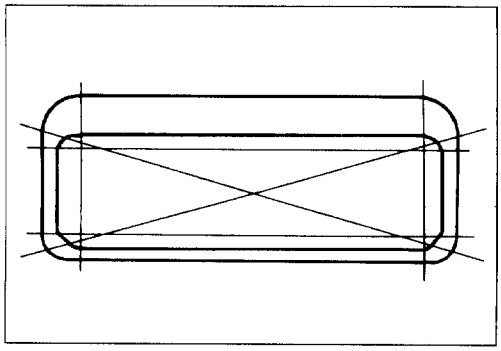
1. Wipe the oil filter mounting face with a clean rag.
   This will allow the new oil filter to seat properly.
2. Lightly oil the O-ring.
3. Turn in the new oil filter until the sealing face is fitted against the O-ring.
4. Use the filter wrench to turn in the oil filter an additional 3/4 of a turn or one turn.
5. Check the engine oil level and replenish to the specified level if required.
6. Start the engine and check for oil leakage from the oil filter.

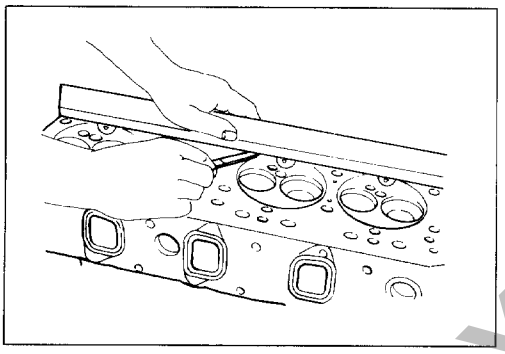
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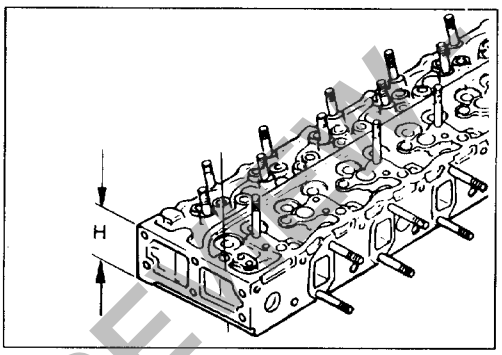
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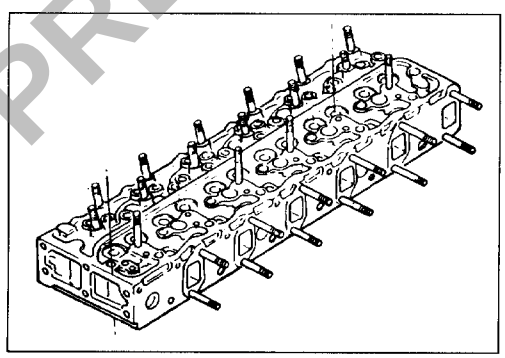
INSPECTION AND REPAIR

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









CYLINDER HEAD

Cylinder Head Lower Face Warpage

1. Use a straight edge and a feeler gauge to measure the four sides and the two diagonals of the cylinder head lower face.
2. Regrind the cylinder head lower face if the measured values are greater than the specified limit but less than the maximum grinding allowance.

   If the measured values exceed the maximum grinding allowance, the cylinder head must be replaced.

Cylinder Head Lower Face Warpage mm(in)

Standard	Limit	Maximum Grinding Allowance
0.05 (0.002) or less	0.2 (0.008)	0.3 (0.012)

Cylinder Head Height (Reference) mm(in)

Standard	Limit
89.95 (3.541 – 90.05 (3.545)	89.65 (3.530)

Note:

If the cylinder head lower face is reground, valve depression must be checked.

Water Jacket Water Pressure Test

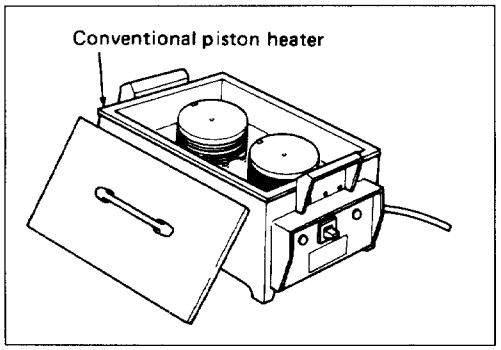
Use the hydraulic gauge to check the water jacket water pressure.

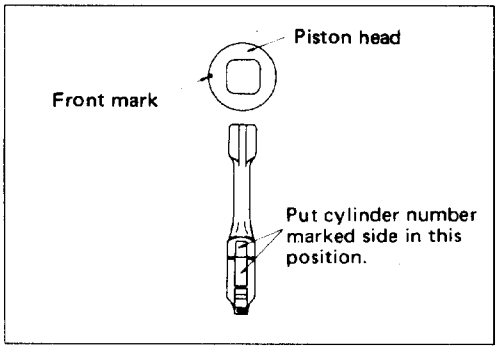
Apply water pressure to the water jacket at 5 kg/cm^2 (71.1 psi) for three minutes.

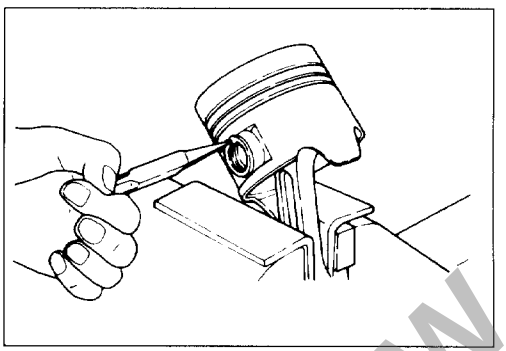
Check the entire cylinder head for water leakage.

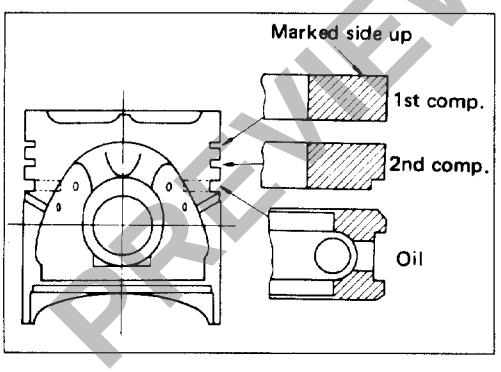
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PISTON AND CONNECTING ROD

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 0.4-16.

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) 2nd compression ring
   (3) 1st compression ring

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

   The undercut side of the second 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

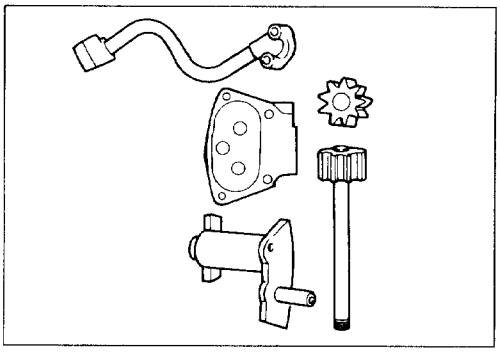
1) Install the connecting rod bearings to the connecting rod large-end and the connecting rod cap.
2) Install the bearing cap to the connecting rod with semi-tightening the cap bolts.
3) Lubricate the bearing with engine oil.

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INSPECTION REPAIR

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

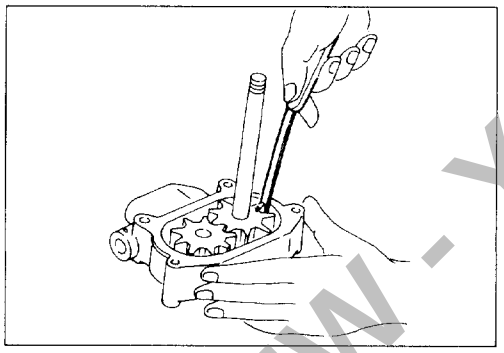


Visually inspect the disassembled parts for excessive wear and damage.

Oil Pump Drive Gear

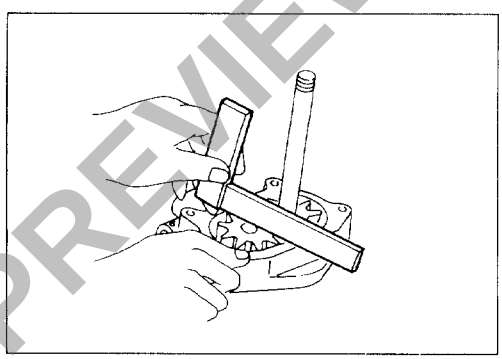
Use a feeler gauge to measure the clearance between the oil pump cover (oil pump case) inside surface and the drive gear.

If the clearance exceeds the specified limit, the drive gear and/or the oil pump cover must be replaced.



mm(in)

	Limit
Oil Pump Cover and Oil Pump Drive Gear Clearance	0.18 (0.0071)



Oil Pump Driven Gear

Use a feeler gauge to measure the clearance between the oil pump case cover inside surface and the driven gear.

If the clearance exceeds the specified limit, the driven gear or the oil pump cover must be replaced.

mm(in)

	Limit
Oil Pump Body and Driven Gear Clearance	0.12 (0.0047)

REASSEMBLY

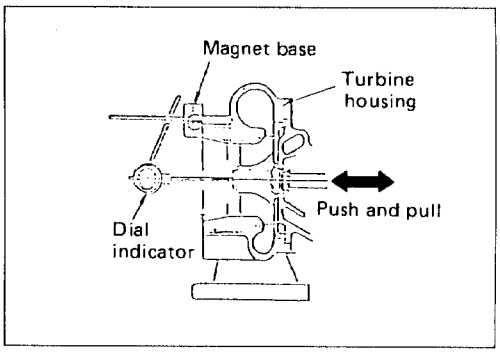
To assemble, follow the disassembly procedures in reverse order.

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ROTOR SHAFT PLAY INSPECTION

Model : TD04H ····· 4BD1TPZ
Model : RHC62C····· 6BD1TPJ



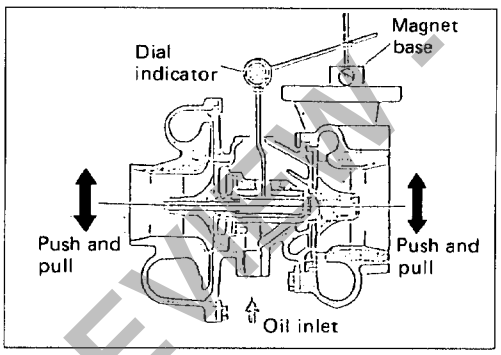
Rotor Shaft Axial Play Measurement

1) Install a dial indicator on the turbine housing as illustrated.
2) Use the dial indicator to measure the rotor shaft axial play with moving the shaft push and pull. Read the total indicator reading (TIR).

mm(in)

	Limit
Rotor Shaft Axial Play TIR Model : TD04H Model : RHC62C	 0.10 (0.0039) 0.11 (0.0043)

3) If the measured value exceeds the specified limit the shaft must be replaced.



Rotor Shaft Radial Play Measurement

1) Turn over the turbocharger with the turbine exhaust inlet flange facing up.
2) Install a dial indicator to measure the rotor shaft radial play.
4) Use the dial indicator to measure the play. Read the TIR.

mm(in)

TD04H	Limit
Rotor Shaft Radial Play TIR	0.60 (0.0236)

mm(in)

RHC62C	Limit
Rotor Shaft Radial Play TIR	0.19 (0.0075)

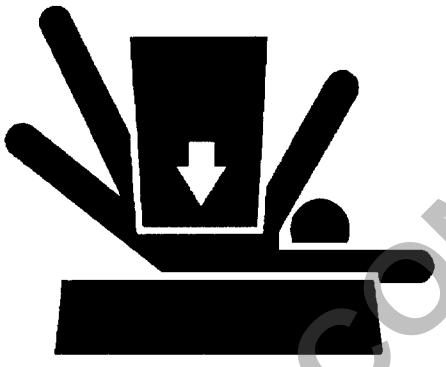
5) If the measured value exceeds the specified limit replace the shaft.

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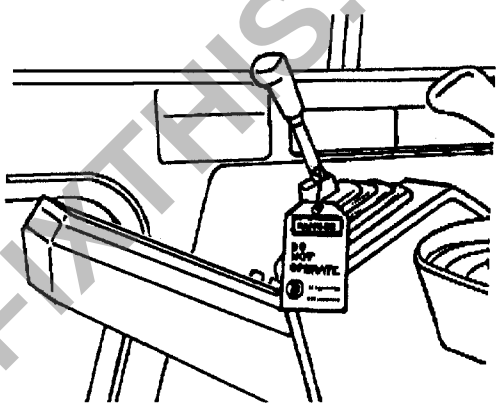
PREPARATIONS FOR SERVICE WORK

- Before working on the machine:
  - Park the machine on a firm, level surface.
  - Lower the bucket to the ground.
  - Run the engine at slow idle without load for 3 minutes.
  - Turn the key switch to the OFF position to stop the engine. Remove the key from the switch.
  - Pull the pilot control shut-off lever to the LOCK position.
  - Allow the engine to cool down.



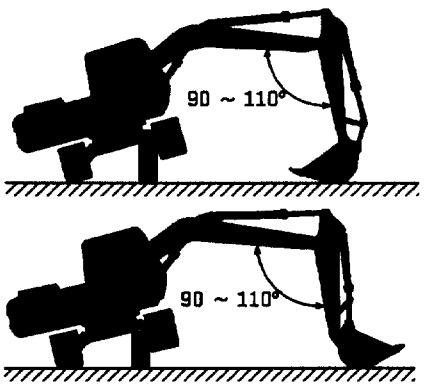
SA-027

- Warn Others of Service Work
  - Unexpected machine movement can result in serious injury.
  - Before performing any work on the excavator, attach a clearly visible "Do Not Operate" tag on the control levers and/or on the cab door.



SA-041

- Support the Machine Properly
  - Always lower the attachment or implement to the ground before you work on the machine.
  - If you must work on a lifted machine or a raised attachment, be sure to securely support the machine or the attachment, using the provided cylinder supports or solid wooden blocks.
  - If the machine must be jack-up, keep a 90 to 110° angle between the boom and arm.
  - If you must park the machine on a slope, take the following measures in addition to the ordinary parking procedure:



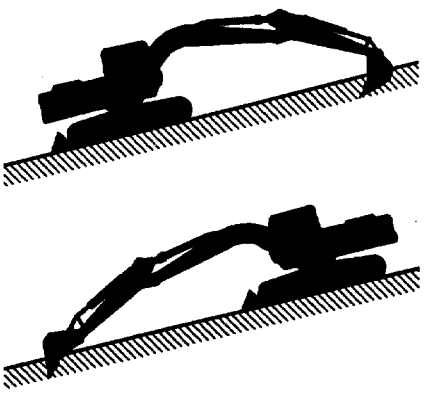
SA-043

Before servicing the travel system

Block both tracks and lower the bucket to the ground, thrusting the bucket teeth into the ground, as shown.

Before servicing the swing system

Position the front attachment down the slope and lower the blade and bucket to the ground, thrusting the bucket teeth and blade into the ground, as shown, so as to prevent the upperstructure from swinging downhill unexpectedly.



SA-311

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EFFECTS OF ELECTRONIC COMPONENT MALFUNCTIONS ON MACHINE OPERATIONS

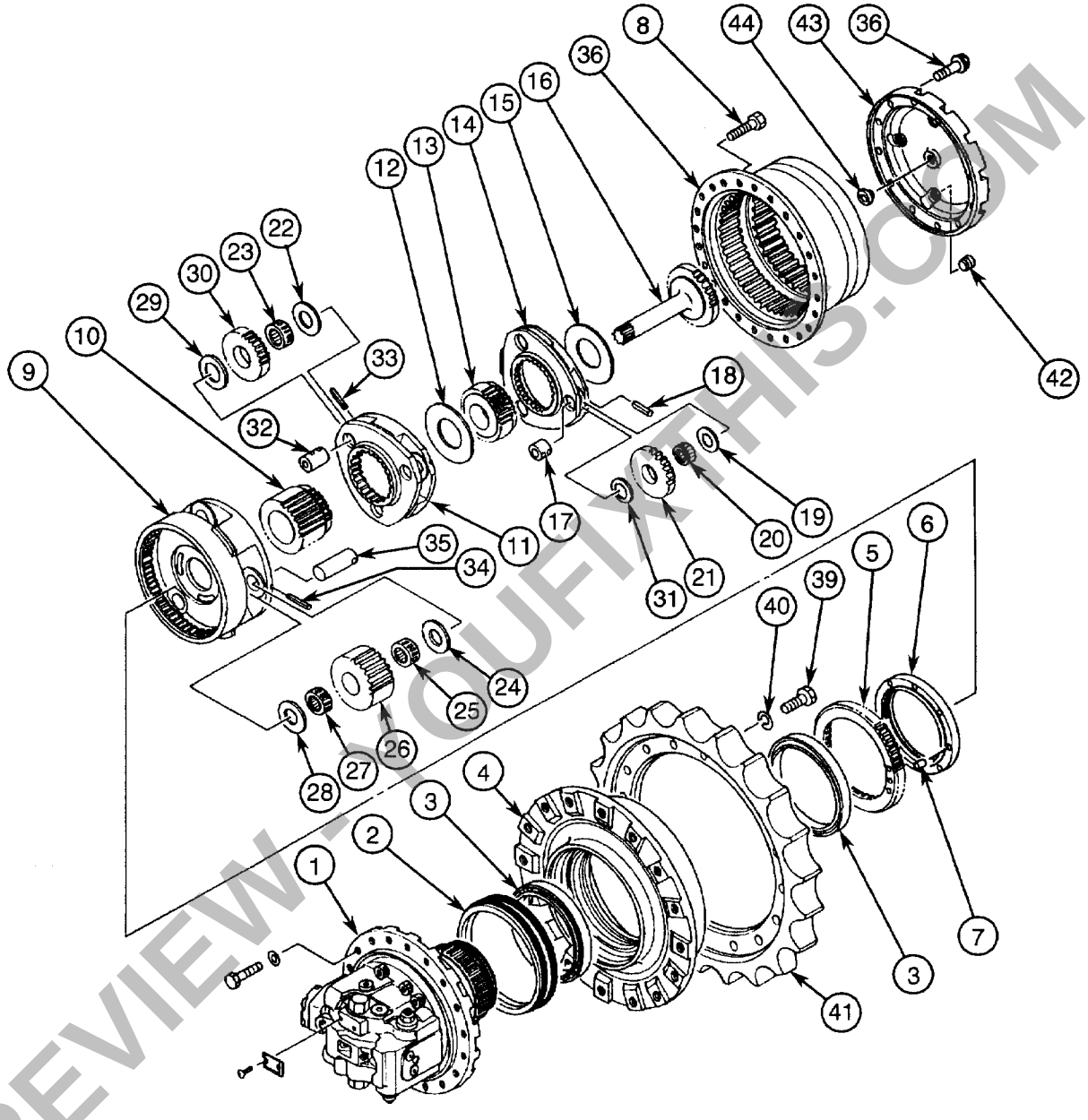
The table below shows typical control/operational problems arising from electrical component or harness failure, along with recommended troubleshooting methods.

	Pump and valve controller (PVC)	Engine controller (EC)	Differential pressure sensor (DP sensor)
Operational function	Control main hydraulic pump and main control valve.	Control engine speed (min^{-1})	Sense differential pressure between main pump outlet pressure and load sense pressure.
Control problems	Loss of control of pump and valve. (more noticeable in pump control)	Loss of engine speed control	Loss of load sensing control that controls main pump displacement.
Machine symptoms	Pump displacement angle at minimum displacement. (Function speed slow) Displacement angle at maximum displacement. (Engine stalls under load).	Engine speed and indicator light do not change with power mode selector (P, E, L, I).	Engine sounds abnormal when running at no load. Combined operation may not be performed satisfactorily due to failure in flow dividing control.
Self-diagnosing function of Dr. EX	Dr. EX may display "Can not communicate with PVC" or one or more of following fault codes may be displayed : 17, 18, 19, 20, 21 and 22.	Dr. EX displays fault codes 01, 02, 03, 04, 05, 06 or 22.	Dr. EX displays fault codes 25 or 26.
Monitoring function of Dr. EX	—	—	—
Harness check	—	—	—
Others	—	—	—
Note	Test No.7 PVC fuse output side. Be sure that the bolt on the PVC connector is tight.	Test No. 2 EC fuse output side. Be sure that the bolt on the EC connector is tight.	—

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ASSEMBLE TRAVEL DEVICE



T137-03-02-001

1— Motor	12— Spacer	23— Needle Bearing	34— Spring Pin
2— Floating Seal	13— Second Stage Sun Gear	24— Thrust Plate	35— Pin
3— Roller Bearing	14— First Stage Carrier	25— Needle Bearing	36— Ring Gear
4— Drum	15— Spacer	26— Third Stage Planetary Gear	38— Bolt
5— Hub	16— Propel Shaft	27— Needle Bearing	39— Bolt
6— Bearing Nut	17— Pin	28— Thrust Plate	40— Spring Washer
7— Knock Pin	18— Spring Pin	29— Thrust Plate	41— Sprocket
8— Bolt	19— Thrust Plate	30— Second Stage Planetary Gear	42— Plug
9— Third Stage Carrier	20— Needle Bearing	31— Thrust Plate	43— Cover
10— Third Stage Sun Gear	21— First Stage Planetary Gear	32— Pin	44— Plug
11— Second Stage Carrier	22— Thrust Plate	33— Spring Pin	

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