Workshop Manual

EX20UR-2
EX30UR-2
EX40UR-2

Excavator

KM-584E-00
W584E-00

HITACHI

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EX20UR-2 · EX30UR-2 · EX40UR-2 EXCAVATOR
WORKSHOP MANUAL

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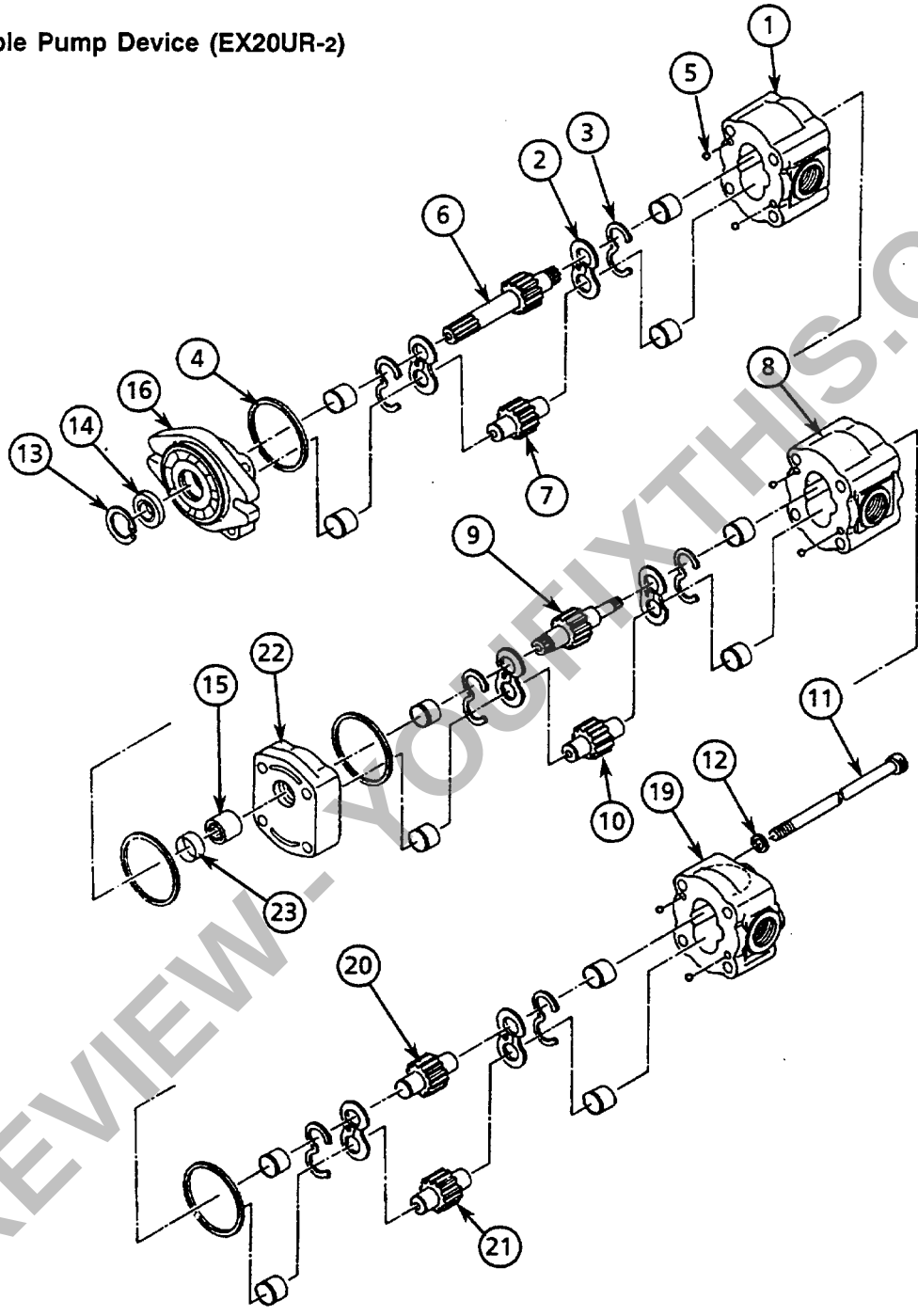
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DISASSEMBLE AND ASSEMBLE PUMP DEVICE

Disassemble Pump Device (EX20UR-2)



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1— Body 1
2— Side Plate
3— Gasket
4— Gasket
5— Steel Ball
6— Drive Gear 1
7— Driven Gear 1
8— Body 2
9— Drive Gear 2
10— Driven Gear 2
11— Socket Bolt
12— Washer
13— Retaining Ring
14— Oil Seal
15— Coupling
16— Front Cover
19— Body 3
20— Drive Gear 3
21— Driven Gear 3
22— Adapter Plate
23— Collar

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TIGHTENING TORQUE SPECIFICATIONS

EX20UR-2

No.	Descriptions	Bolt Dia mm	Qty	Wrench Size mm	Torque		
					N·m	kgf·m	lbf·ft
1	Engine cushion rubber mounting bolt	12	8	19	88	9	65
2	Engine bracket mounting bolt	10	7	17	49	5	36
3	Hydraulic oil tank mounting bolt	10	4	17	49	5	36
4	Hydraulic hoses and Union Joints	PF1/4"		19	29.5	3	22
		PF3/8"		22	39	4	29
		PF1/2"		27	64	6.5	47
		PF3/4"		32	137	14	101
		PF3/4"		36	176.5	18	130
		PT1"		41	206	21	152
5	Pump mounting bolt	10	2	17	49	5	36
	Pump cover mounting bolt	10	6	17	49	5	36
	Pump cover mounting nut	10	2	17	49	5	36
6	Control valve mounting bolt	10	4	17	49	5	36
	Control valve bracket mounting bolt	10	6	17	49	5	36
7	Swing device mounting bolt	12	4	19	88	9	65
8	Swing motor mounting socket bolt	8	6	6	32	3.3	24
9	Battery mounting nut	6	4	10	4.9	0.5	3.6
10	Canopy mounting bolt	10	7	17	49	5	36
11	Swing bearing mounting bolt to upperstructure	12	14	19	109	11	80
	Swing bearing mounting bolt to undercarriage	12	16	19	109	11	80
12	Travel device mounting bolt	12	18	19	109	11	80
13	Sprocket mounting socket bolt	12	18	10 (Hexagon socket head)	109	11	80
14	Lower roller mounting bolt	14	16	22	176.5	18	130
15	Cover mounting bolt	10		17	49	5	36
		12		19	88	9	65
16	Counterweight mounting bolt	16	2	24	206	21	152

NOTE: (1) Apply lubricant (i.e. white zinc B dissolved into spindle oil) to bolts and nuts to stabilize their friction coefficients.

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

(3) Apply Loctite to threads of engine cushion rubber mounting bolts, lower roller mounting bolts, and swing-post vertical-pin mounting bolts before installing them.

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PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING

Preparations for Disassembling

- Clean the Machine

  Thoroughly wash the machine before bringing it into the shop. Bringing a dirty machine into the shop may cause machine components to be contaminated during disassembling/assembling, resulting in damage to machine components, as well as decreased efficiency in service work.

- Inspect the Machine

  Be sure to thoroughly understand disassembling procedures beforehand, to help avoid incorrect disassembling of components as well as the purchase of unnecessary service parts.
  Check and record the items listed below to help prevent problems from occurring in the future.

  · The machine model, machine serial number, and hour meter reading,
  · Reason for disassembly (symptoms, failed parts, and causes).
  · Clogging of filters and oil or air leakages, if any,
  · Capacities and dirtiness of lubricants,
  · Loose or damaged parts.

- Prepare and Clean Tools and Disassembly Area

  Prepare tools to be used and areas for disassembling as well as for disassembled parts. Clean the tools and areas.

Precautions for Disassembling and Assembling

- Precautions for Disassembling

  · Be sure to provide appropriate containers for draining fluids.
  · Use matching marks for easier reassembling.
  · Be sure to use specified special tools, when so instructed.
  · If a part or component cannot be removed after removing its securing nuts and bolts, do not attempt to remove it forcibly. Find the cause(s), then take appropriate measures to remove it.
  · Orderly arrange disassembled parts. Put marks and tags on them as necessary.
  · Store common parts, such as and bolts with reference to where they are to be used and in a manner that will prevent loss.
  · Inspect contact or sliding surfaces of disassembled parts for abnormal wear, sticking, or other damage.
  · Measure and record degrees of wear and clearances.

- Precautions for Assembling

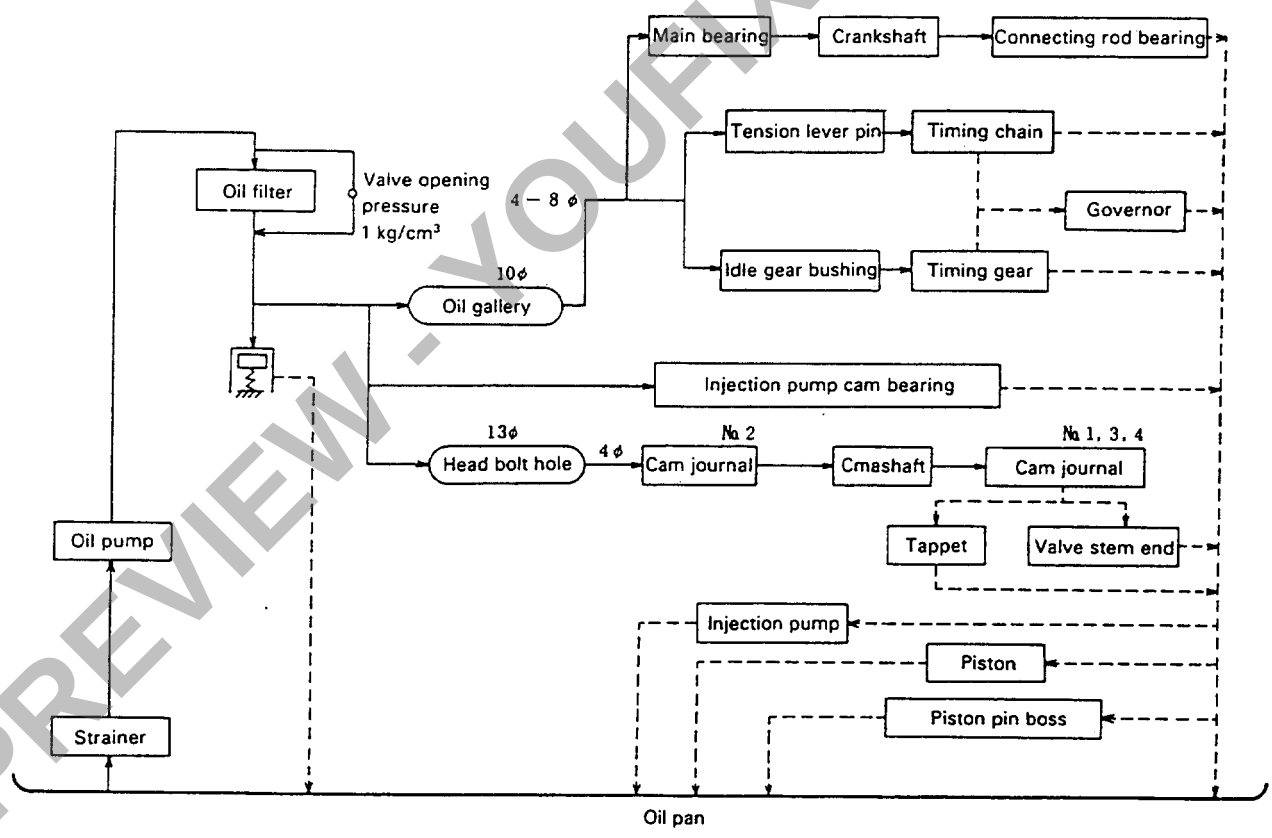
  · Be sure to clean all parts and inspect them for any damage. If any damage is found on a part, repair or replace it with a new one.
  · Dirt or debris on contact or sliding surfaces may shorten the service life of the machine. Take care not to contaminate any contact or sliding surfaces of the parts to be assembled.
  · Be sure that liquid-gasket-applied surfaces are clean and dry.
  · If an anti-corrosive agent has been used on a new part, be sure to thoroughly clean the part so as to remove the agent.
  · Utilize matching marks when assembling.
  · Be sure to use designated tools to assemble bearings, bushings and oil seals.
  · Keep a record of the number of tools used for disassembling/assembling. After assembling is complete, count the number of tools, so as to make sure that no tools are left in the assembled components.

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LUBRICATING SYSTEM

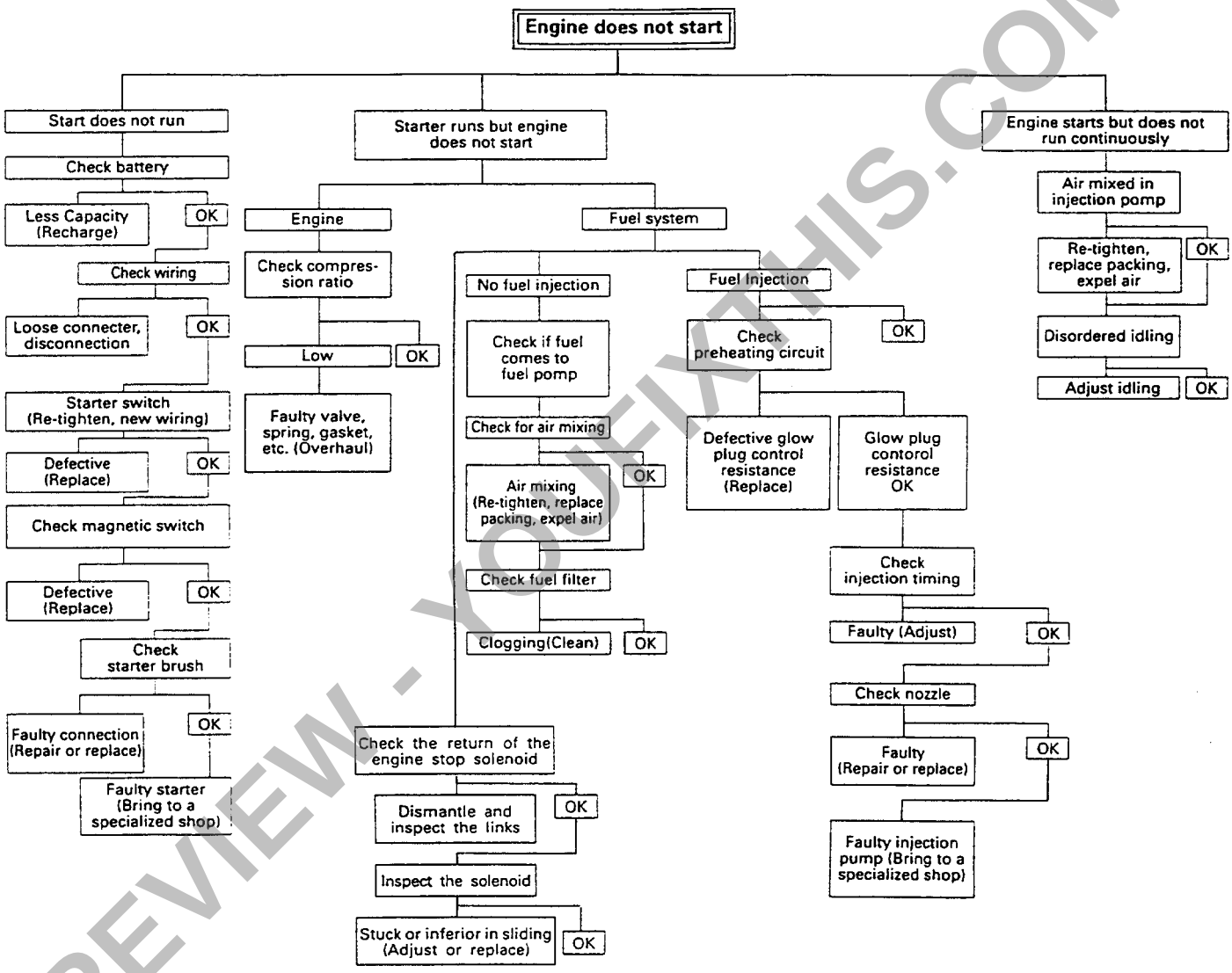
LUBRICATING OIL FLOW DIAGRAM



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TROUBLESHOOTING



Note: "Bring to a specialized shop" means that faulty parts must be brought to a specialized shop for repair.

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MAIN DATA AND SPECIFICATIONS

1. 3KC1 model

Items \ Engine model(s)			3KC1 (EX20UR-2,EX30UR-2)
Type			In-line water-cooled 4-cycle OHC diesel engine
Timing drive system			Gear and chain system
Number of piston rings			Compression rings 2, oil ring 1
No. of cylinders – bore X stroke (mm)			3 – 74 X 76
Piston displacement (cc)			980
Compression ratio			23 : 1
Combustion chamber type			In line swirl chamber type
Overall length X width X height (mm)			560 X 458 X 585
Dry weight (kg)			128
Fuel injection timing (BTDC)			12°
Firing order			1 – 3 – 2
Fuel			Diesel fuel oil (JIS K-2204)
Idling speed (r.p.m.)			1150 (EX20UR-2), 1250 (EX30UR-2)
Compression pressure (kg/cm^2)			31 or more / 250 r.p.m.
Valve clearance (cold) (mm)		Intake	0.25
		Exhaust	0.25
Valve operating timing	Intake valve	Open (BTDC)	12°
		Close (ABDC)	48°
	Exhaust valve	Open (BBDC)	51°
		Close (ATDC)	9°
Injection pump			Bosch type
Governor			Mechanical type
Nozzle			Throttle type
Injection pressure (kg/cm^2)			120
Oil pump			Trochoid type
Oil filter			Cartridge type
Lubricant capacity: Oil pan capacity (ℓ)			Approx. 4.5
Generator (V–A)			12-20 (EX20UR-2), 12-35 (EX30UR-2)
Starter (V–KW)			12–1.4

Note: Specifications are subject to change without notice.

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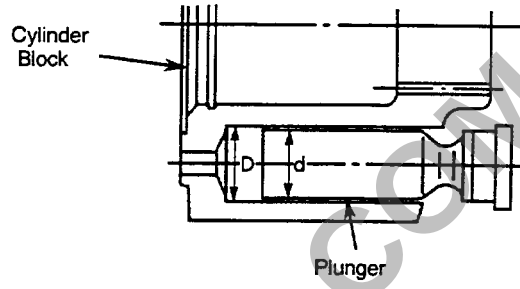
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MAINTENANCE STANDARDS
(EX30UR-2, EX40UR-2)

Main Pump

1. Clearance between cylinder block bore and plunger:

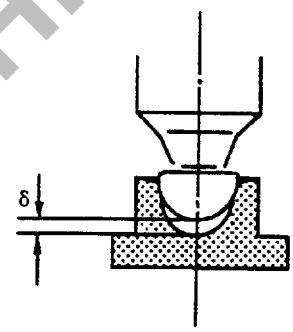
   (D-d) must be 0.5 mm or less.



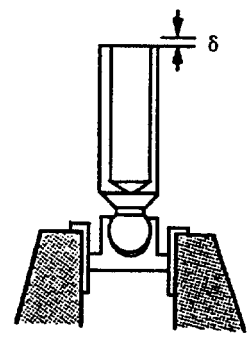
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2. Clearance between plunger tip and shoe bottom:

   Delta must be 0.2 mm or less.



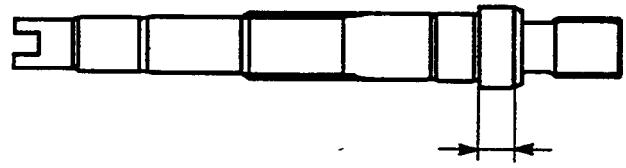
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W107-02-06-141

3. Wear amount of the shaft oil seal mount surface:
   The surface must be free from scratches or abnormal wear.

   Wear amount must be 0.025 mm or less.



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Service Recommendations for Split Flange

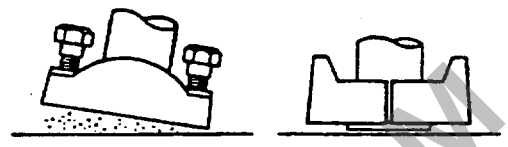
IMPORTANT: (1) Be sure to clean and inspect sealing surfaces. Scratches / roughness cause leaks and seal wear. Unevenness causes seal extrusion. If defects cannot be polished out, replace the component.

(2) Be sure to use only specified O-rings. Inspect O-rings for any damage. Take care not to file O-ring surfaces. When installing an O-ring into a groove, use grease to hold it in place.

(3) Loosely assemble split flange halves. Make sure that split is centrally located and perpendicular to the port. Hand-tighten bolts to hold parts in place. Take care not to pinch the O-ring.

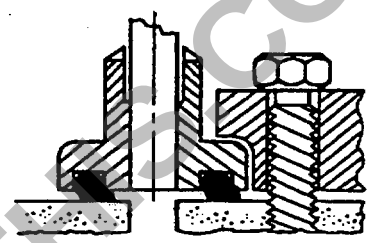
(4) Tighten bolts alternately and diagonally, as shown, to ensure even tightening.

(5) Do not use air wrenches. Using an air wrench often causes tightening of one bolt fully before tightening of the others, resulting in damage to O-rings or uneven tightening of bolts.

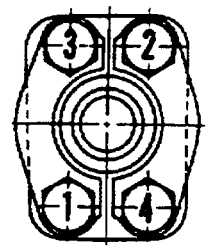


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WRONG

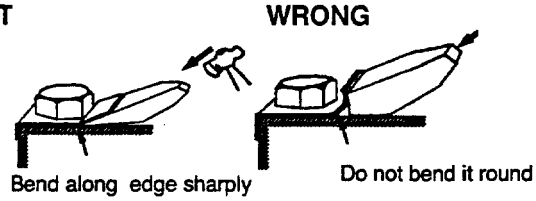


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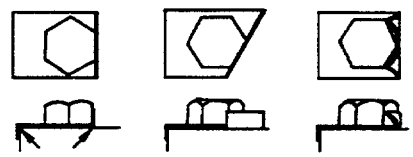


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RIGHT WRONG



RIGHT RIGHT WRONG



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Nut and Bolt Lockings

- Lock Plate

IMPORTANT: Do not reuse lock plates. Do not try to bend the same point twice.

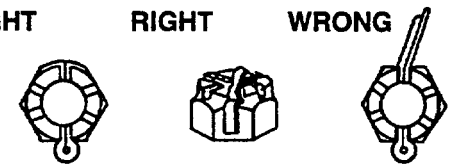
- Split Pin

IMPORTANT: Do not reuse split pins. Match the holes in the bolt and nut while tightening, not while loosening.

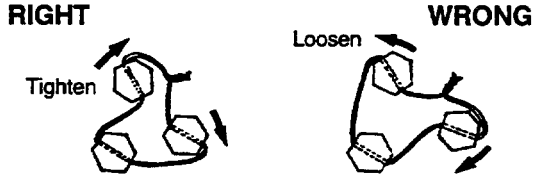
- Lock Wire

IMPORTANT: Apply wire to bolts in the bolt-tightening direction, not in the bolt-loosening direction.

RIGHT RIGHT WRONG



RIGHT WRONG



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16. Install gasket (4), gasket (3), side plate (2), and steel ball (5) to body 2 (8).

NOTE: Apply a film of grease to gasket (4), gasket (3), and steel ball (5).

NOTE: Apply a film of hydraulic oil to side plate (2).

17. Install side plate (2) with the gasket groove side facing downward, checking that the aligning mark of the suction and delivery is positioned correctly.

18. Install drive gear 3 (20) and driven gear 3 (21) into body 2 (8).

NOTE: Apply a film of hydraulic oil to the sides of both drive gear 3 (20) and driven gear 3 (21) with which side plate (2) will come into contact.

19. Install side plate (2) together with gasket (3) into body 3 (19).

NOTE: Apply a film of hydraulic oil to side plate (2). Install side plate (2) with the gasket groove side facing downward, checking that the aligning mark of the suction and delivery is positioned correctly.

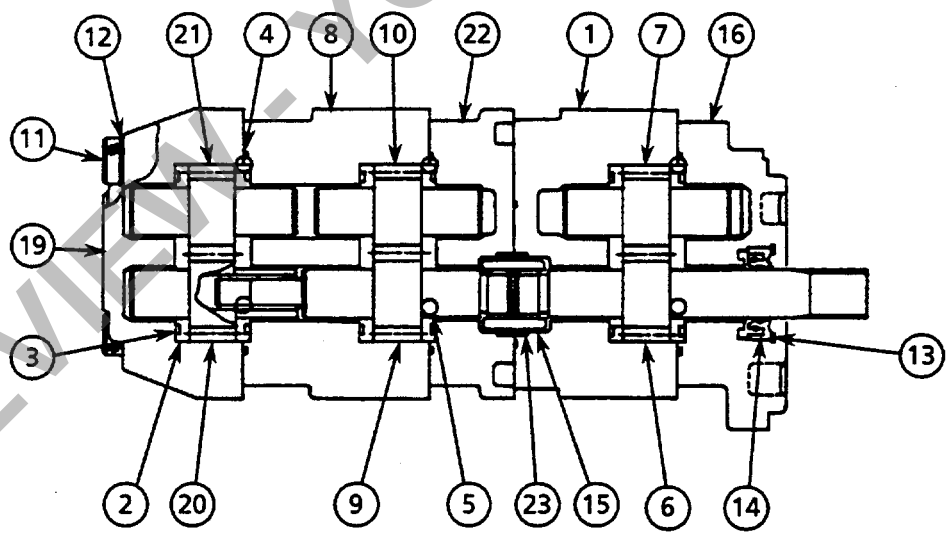
20. Install body 3 (19) to the assembly of body 2 (8), drive gear 3 (20), and driven gear 3 (21).

NOTE: Align the marks when installing.

21. Unite each body section into the pump assembly with socket bolt (11) and washer (12).

: 8 mm

: 38 to 43 N·m
(3.9 to 4.4 kgf·m, 28 to 32 lbf·ft)



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1— Body 1
2— Side Plate
3— Gasket
4— Gasket
5— Steel Ball
6— Drive Gear 1
7— Driven Gear 1
8— Body 2
9— Drive Gear 2
10— Driven Gear 2
11— Socket Bolt
12— Washer
13— Retaining Ring
14— Oil Seal
15— Coupling
16— Front Cover
19— Body 3
20— Drive Gear 3
21— Driven Gear 3
22— Adapter Plate
23— Collar

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4. Remove holder (3) and gear (4) from housing (7).

5. Clamp holder (15) in a vise.
   Remove flat head bolts (19) (3 used) and thrust plate (20).
   Remove planetary gear (18), needle bearing (17), and inner race (16), in that order. (Three places)

6. Remove retaining ring (5) and shims (9, 10, 11) from pinion shaft (14).



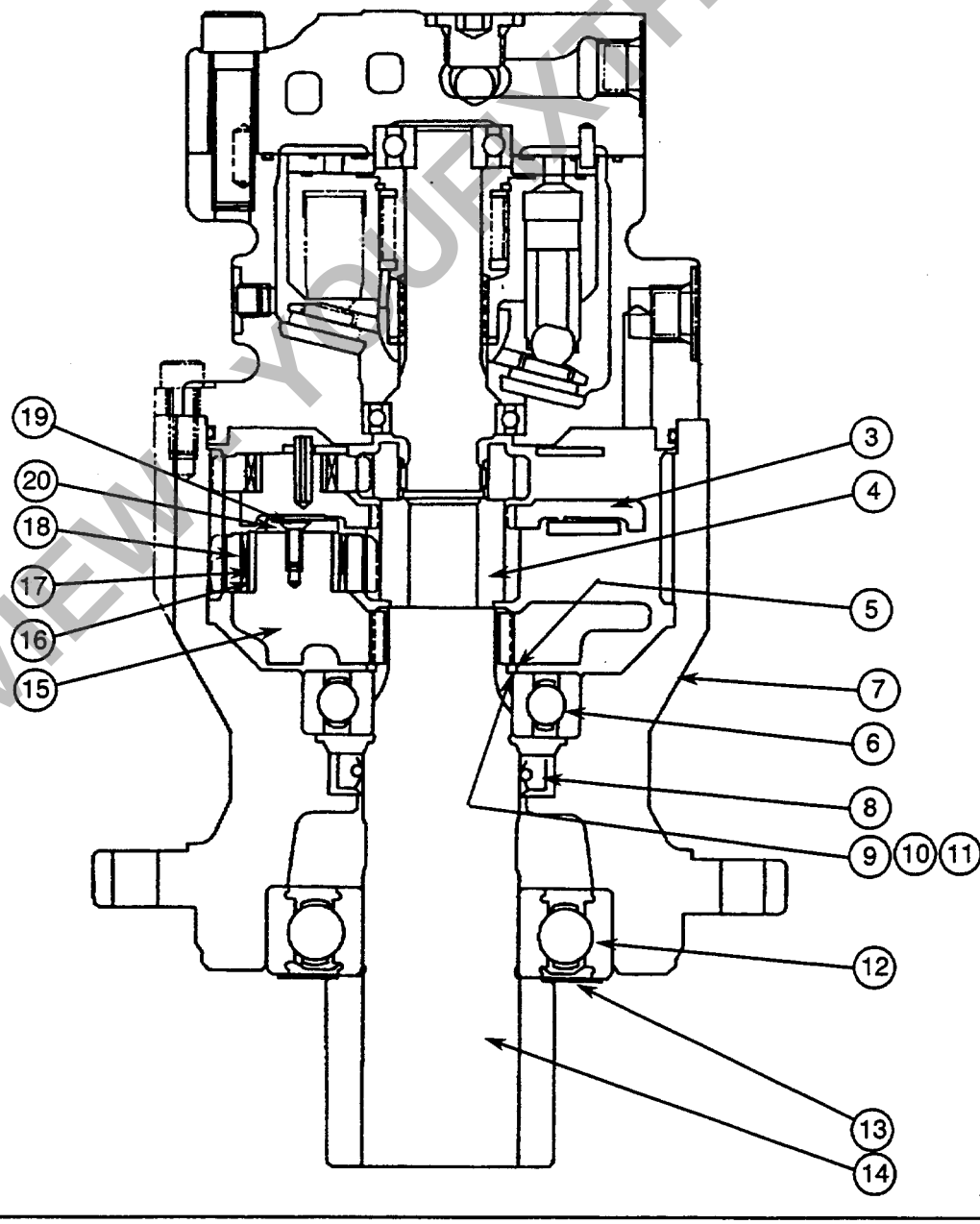
7. Push the end of pinion shaft (14), using a press, to remove it from housing (7).

8. Push the end of pinion shaft (14), using a press, to remove ball bearing (12) and plate (13).

9. Place a punch on ball bearing (6), and tap on the punch using a hammer to remove ball bearing (6) from housing (7).



10. Remove oil seal (8) from housing (7).



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9. Attach eye bolt (ST 0018) to the plug hole on cover (27). Insert an iron bar the eye bolt hole.


: ST 0018

10. Insert the screwdriver into the plug hole on ring gear (9) to pull out wire (30) while rotating cover (27) using iron bar.



11. Remove cover (27) from ring gear (9).

12. Remove O-ring (29) from cover (27).

13. Remove thrust plate (22), drive gear (23), first carrier assembly and sun gear (24) from ring gear (9).

14. Remove three first gears (19), three needle bearings (21) and three collars (20) from first carrier (17).

15. Remove four screws (31), thrust plate (28), four second planetary gears (16), four needle bearings (25), four inner races (26) and four thrust washers (15) from housing (7).


: 4 mm

16. Remove shaft assembly (45) from housing (7).

NOTE: Remove shaft assembly (45) using an iron bar and a hummer.
Never disassemble ball bearing (13) except when replacing it.



17. Remove plug (12) from ring gear (9).


: 5 mm

18. Remove 132 steel ball (37) from the plug hole.

19. Insert two or three 10 to 15 mm-thick iron plates in clearance A so that the plates surround the travel device evenly and are positioned just under sprocket mounting bolt holes.

20. Insert two or three bolts (M12×P1.75×ℓ45) into the sprocket mounting bolt holes so that each bolt will contact a different plate. Tighten the bolts evenly to remove housing (7) from ring gear (9).

Bolt: M12×P1.75×ℓ45


: 18 mm

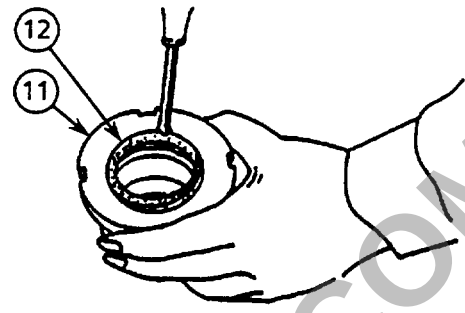
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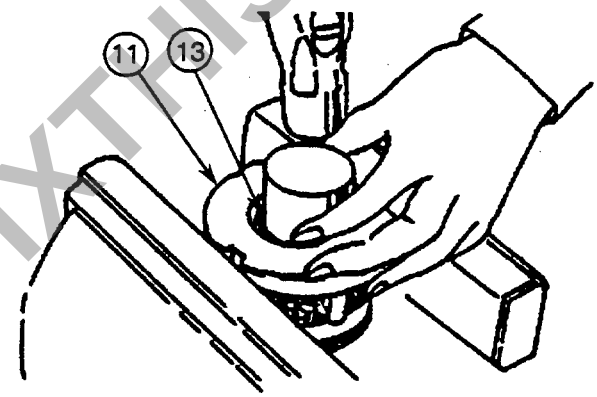
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8. Remove wiper ring (12) from cylinder head (11).



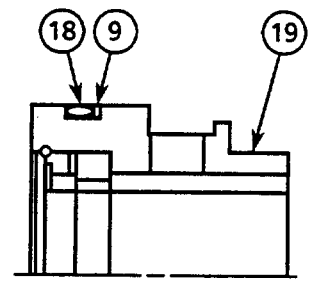
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9. Remove bushing (13) from cylinder head (11).



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10. Remove O-ring (18), backup ring (9) from retainer (19).

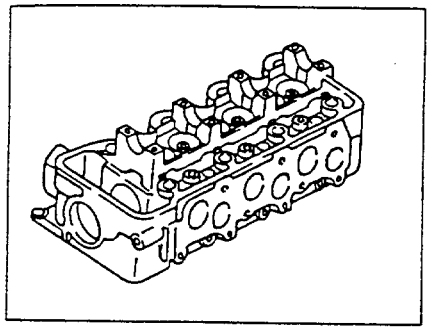


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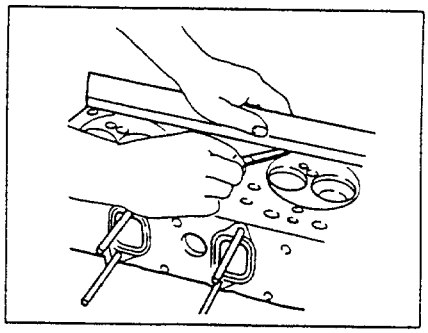
CYLINDER HEAD



Cylinder head

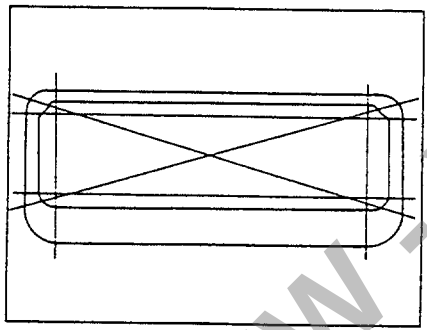
Remove carbon deposit on bottom surface of head with a care not to damage the valve seat. Also, check each part for presence of damage using a flaw detective agent.

Leakage: Water pressure test 5 kg/cm² (3 minutes)



Distortion of bottom surface

Measure distortion in diagonal directions using a straight edge and thickness gauge.



(mm)

Standard	Value requiring repair	Repair method
0.075 or less	0.15 or more	Repair with a grinder within a total ground amount 0.3 of cylinder head and body. In this case, the gasket must be replaced.

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