31. DISASSEMBLING AND ASSEMBLING

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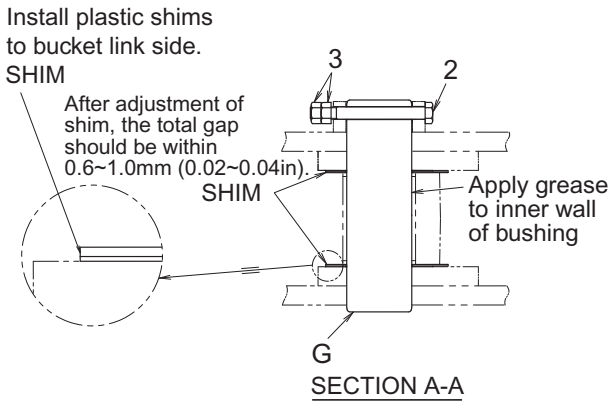
Book Code No. **S5YN3129E01**

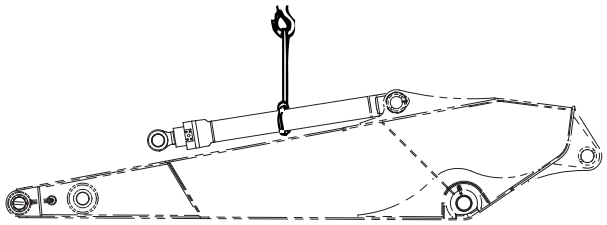
(4) Removing cylinder head pin (G)
Loosen nut (3), remove capscrew M16X150 (2), and push out pin (G).

Tools: Spanner: 24mm



Detail of bucket cylinder head pin (G)

(5) Removing bucket cylinder
Sling tube of bucket cylinder with nylon sling, and remove it.
Bucket cylinder weight: 140 kg (310 lbs)

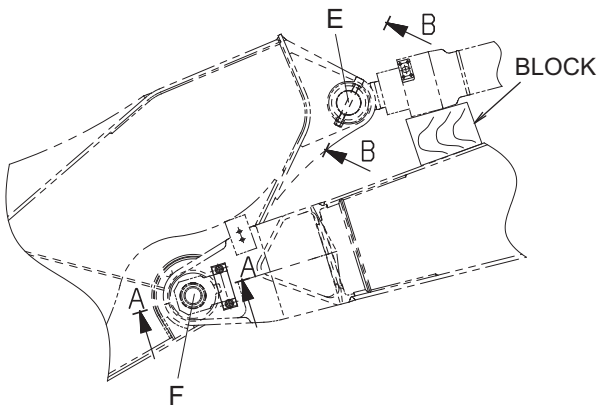


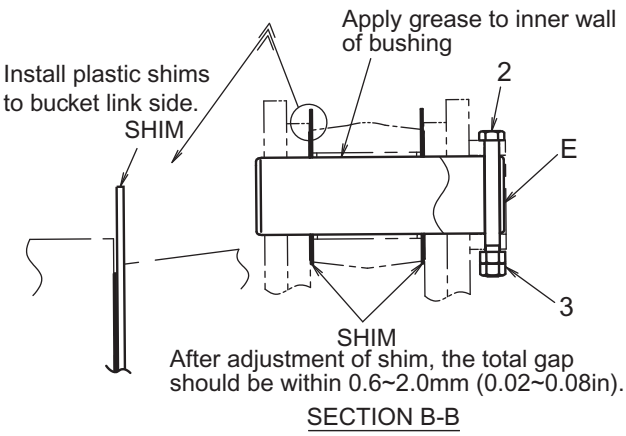
Slinging bucket cylinder

(6) Removing arm cylinder rod pin (E)
Put a wooden block between the arm cylinder and the boom.
Loosen nut (3), remove capscrew M16X150 (4), and push out arm cylinder rod pin (E).

Tools: Spanner: 24 mm

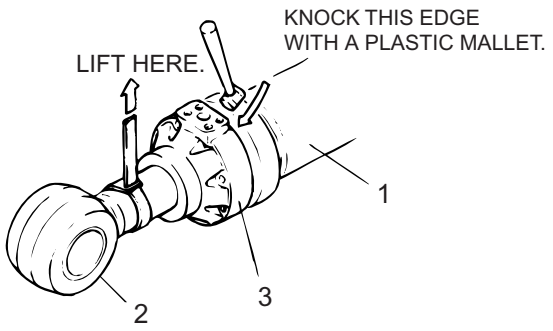
Retract arm cylinder rod, and return pin (E) to the original position (hole).





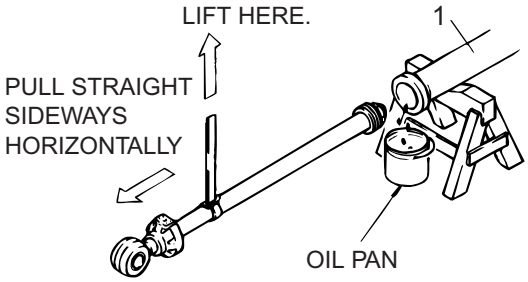
Detail of arm cylinder rod pin (E)

- At this time, the weight of piston rod (2) is loaded on rod cover (3). Therefore, lift the top end of the piston rod with a hoist to the extent that only the rod weight may be held.



Drawing out piston rod assy (2).

(5)
Draw out the piston rod assy from cylinder tube (1).



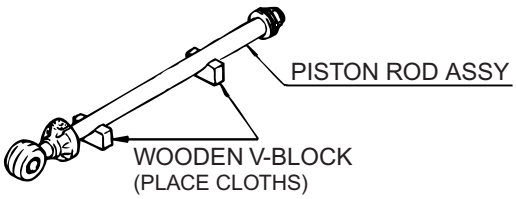
Method of drawing out the piston rod assy

CAUTION

Since the piston rod assy is heavy in this case, lift the tip of the piston rod (2) with a hoist and draw it out. However, when piston rod (2) has been drawing out to approximately two thirds of its length, lift it in its center to draw it completely. However, since the plated surface of piston rod (2) is lifted, do not use a wire rope which may score the surface, but use a strong cloth belt or a rope.

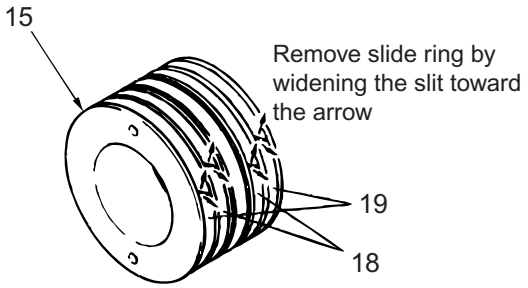
(6)
Place the removed piston rod on a horaizontal wooden V-block.

-Cover a V-block with cloths.



Method of placing the piston rod

(7)
Remove slide ring (18) and (19) from piston (15).



Remove slide ring (18) and (19)

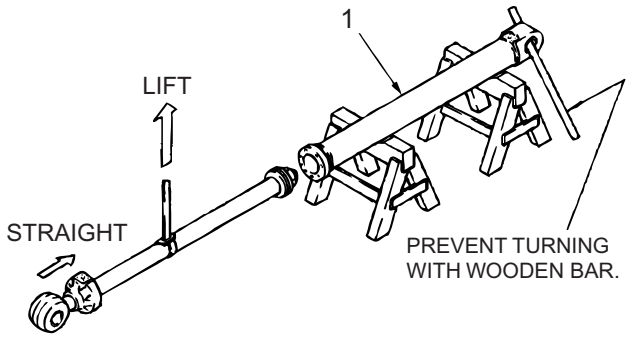
32.2.1.5.6 OVERALL ASSEMBLY

(1) Place a V-block on a work bench (A wooden V-block is preferable.). Place the cylinder tube assy (1) on it and fix the assy by passing a wooden bar through the clevis pin hole to lock the assy.

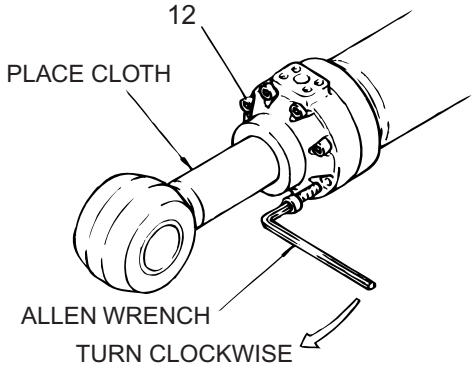
(2) Insert the piston rod assy into the cylinder tube assy, while lifting and moving the piston rod assy with a hoist. In this operation, apply hydraulic oil (or vaseline) to the inner surface of the tube mouth and the circumference of the piston. Align the center of the piston rod assy with the center of the cylinder tube assy and put it in straight forward. When inserting, make sure that slide rings (18), (19) on the perimeter of the piston is not out of the groove.

(3) Tighten socket bolt (12). Match the bolt holes of the rod cover flange to the threaded holes in the cylinder assy, and screw in socket bolts (12) one by one. Tighten the bolts to a specified torque, taking care so the bolts may not be tightened unevenly. See para. 32.2.1.7.3 for torque.

Tools: Allen wrench: 14 mm



Inserting piston rod assy

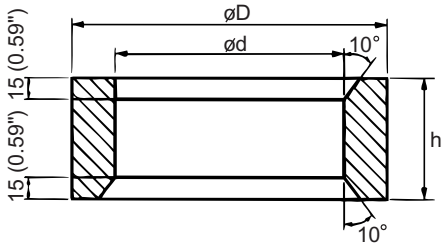


Tightening socket bolts (12)

CAUTION

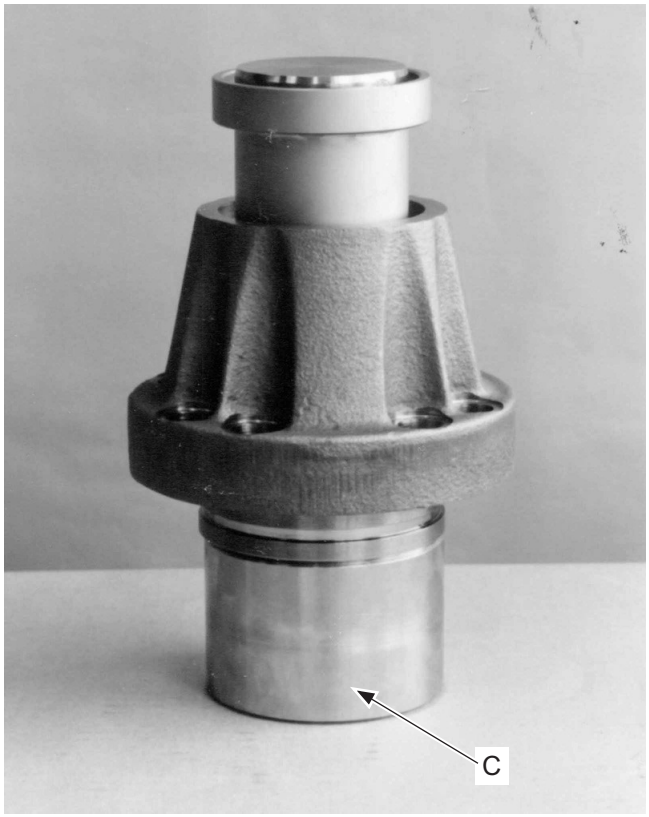
Take care so as not to damage the rod surface by accidentally slip a wrench. Covering the rod surface with cloth is recommended to prevent damage to it.

5. Setting of tools for block
Prepare block (C), and put rod cover (3) on it aligning them.
Select corresponding block (C) in shape, dimensions, etc. from the table shown below.



Unit : mm (inch)

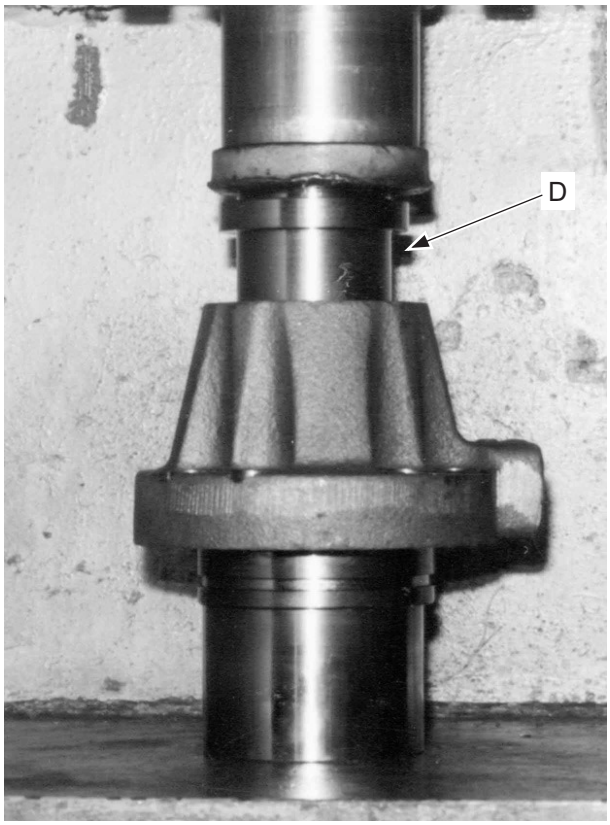
Class (Nominal size)	d	D	h
ø55 (2.17)	62 (2.44)	88 (3.46)	80 (3.15)
ø60 (2.36)	67 (2.64)	96 (3.78)	80 (3.15)
ø65 (2.56)	72 (2.83)	96 (3.78)	80 (3.15)
ø70 (2.76)	77 (3.03)	100 (3.94)	80 (3.15)
ø75 (2.95)	82 (3.23)	110 (4.33)	80 (3.15)
ø80 (3.15)	87 (3.43)	112 (4.41)	80 (3.15)
ø85 (3.35)	92 (3.62)	124 (4.88)	90 (3.54)
ø90 (3.54)	97 (3.82)	135 (5.31)	90 (3.54)
ø95 (3.74)	102 (4.02)	145 (5.71)	90 (3.54)
ø100 (3.94)	107 (4.21)	145 (5.71)	90 (3.54)
ø105 (4.13)	112 (4.41)	150 (5.91)	90 (3.54)
ø110 (4.33)	117 (4.61)	165 (6.50)	90 (3.54)
ø115 (4.53)	122 (4.80)	170 (6.69)	90 (3.54)
ø130 (5.12)	137 (5.39)	190 (7.48)	90 (3.54)



6. Removing of bushing
a.
Move block (C) and rod cover (3) with tool under the press.
b.
Press the upper part of retainer tool (D) slowly until bushing (4) is take out from rod cover (3) (until there is a sound that the chuck tool (A) drops on the work bench)
-The force of 3 tons (6615 lbs or less) is necessary to press it out.
The stroke of press ram is about 32 to 52 mm (1.26 in to 2.04 in). (But it varies according to the difference of dimension of cylinder head.)

-Press it with retainer tool (D).

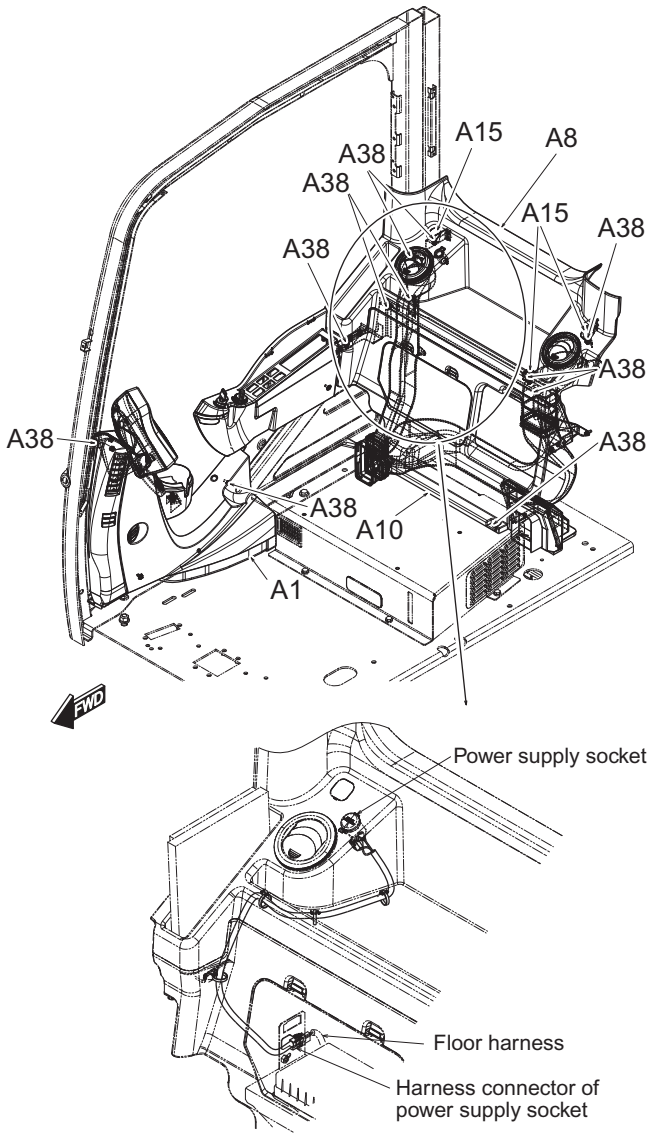
When the block and rod cover assy are not aligned, interrupt the work and align the block and rod cover assy.



33.1.2 CAB

33.1.2.1 REMOVAL

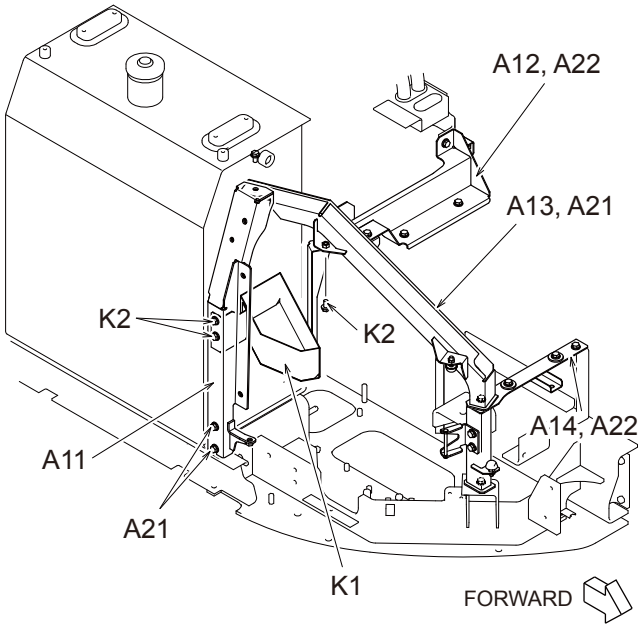
(1) Remove floor mat.
(2) Remove cover assy (A8).
1.
Remove 5 caps (A15) and loosen 7 sems bolts (A38) M6X20.
Tools: Phillips screwdrive
2.
Disconnect harness connector of power socket and remove cover assy (A8).
(3) Removal of cover assy (A10).
1.
Loosen 2 sems bolts (A38) M6X20.
Tools: Phillips screwdriver
2.
Remove cover assy (A10).
(4) Removal of harness connector.
(See Chapter 23 "Electric System")
1.
Disconnect connectors of cab harness at rear right of cab.
2.
Disconnect antenna cable for tuner located at rear left of cab.
3.
Disconnect harness for cab light located at rear left of cab.
(5) Removal of cover assy (A1).
1.
Loosen 2 sems bolts (A38) M6X20.
Tools: Phillips screwdriver
2.
Disconnect harness connector of hour-meter and remove cover assy (A1).
(6) Remove plastic tube for window washer located at right front of cab.



Disassembly and assembly of right panels (A1), (A8) and (A10)

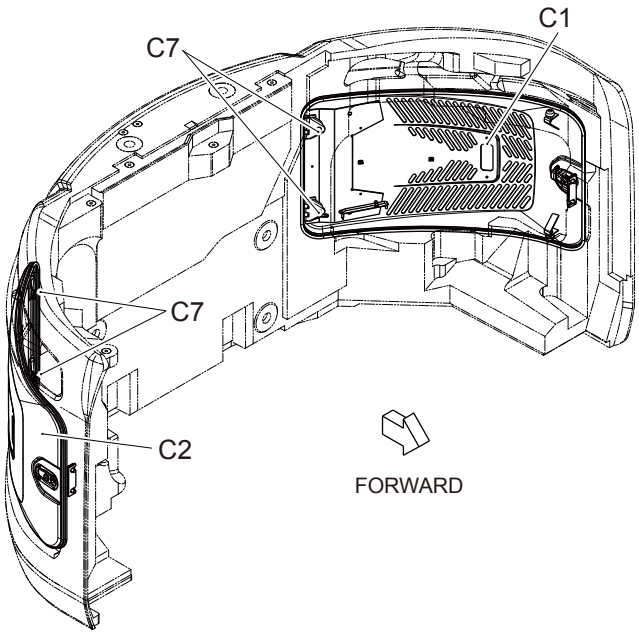
(12)Remove panel assy (A2)
1. Remove 2 nuts (A26) M12.
2. Remove panel assy (A2).
Weight : 14kg (31 lbs)
Tools: Socket: 19mm

(13)Remove bracket (A11),(A12),(A13),(A14) and box (K1).
1. Remove 3 sems bolts (K2) M12X25.
2. Remove box (K1).
3. Remove 2 sems bolts (A22) M12X30.
4. Remove bracket (A12).
5. Remove 2 sems bolts (A21) M12X25.
6. Remove bracket (A13).
7. Remove 2 sems bolts (A21) M12X25.
8. Remove bracket (A11).
9. Remove 2 sems bolts (A22) M12X30.
10. Remove bracket (A14).
Tools: Socket: 19mm



Removing bracket (A11),(A12),(A13),(A14)

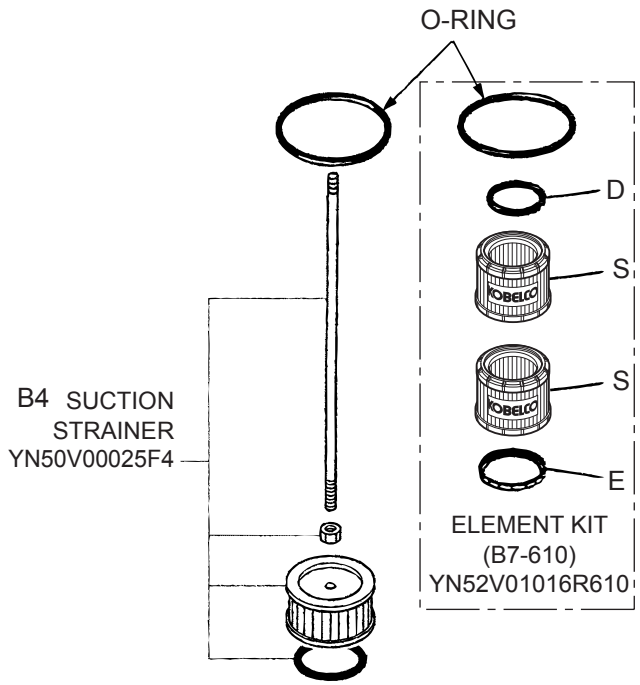
(14)Remove cover assy (C1),(C2)
Remove 4 sems bolts (C7) M12X25.
Remove cover assy (C1),(C2).
Cover assy (C1)
Weight : 14kg (31 lbs)
Cover assy (C2)
Weight : 15kg (33 lbs)
Tools: Socket: 19mm



Removing cover assy (C1),(C2)

33.1.7.3 INSTALLATION

(1) Cleaning hydraulic oil tank.
(2) Cleaning suction hose.
(3) Cleaning mount of tank.
Installing is done in the reverse order of removing.
(4) Install 4 mounting capscrews (A1) M16X45. (See Fig. "Removing hydraulic tank".)
Tools: Socket: 24mm, Apply Loctite # 262
Tightening torque: 191 N-m (40 lbf-ft)
(5) Connection of suction hose (A4).(See Fig."Removing the suction hose".)
1. Apply PERMATEX on pipe side of hose connection and insert it.
2. Put the hose with clip (A19).
Tightening torque: 5.39 N-m (4.0 lbf-ft)
(6) Assembling return element.
Assemble filter element by the use of element kit (B7-610). (See Fig."Remove cover", Right Fig.)
(7) Install return element. (B7)(See Fig. "Remove cover")
(8) Installing suction strainer (B4).
(9) Tighten sems bolts (B9) M10X25 that attach tank covers (B2), (B3).
M10 Tightening torque : 46.5 N-m (34 lbf-ft)



Return element & suction strainer

Note

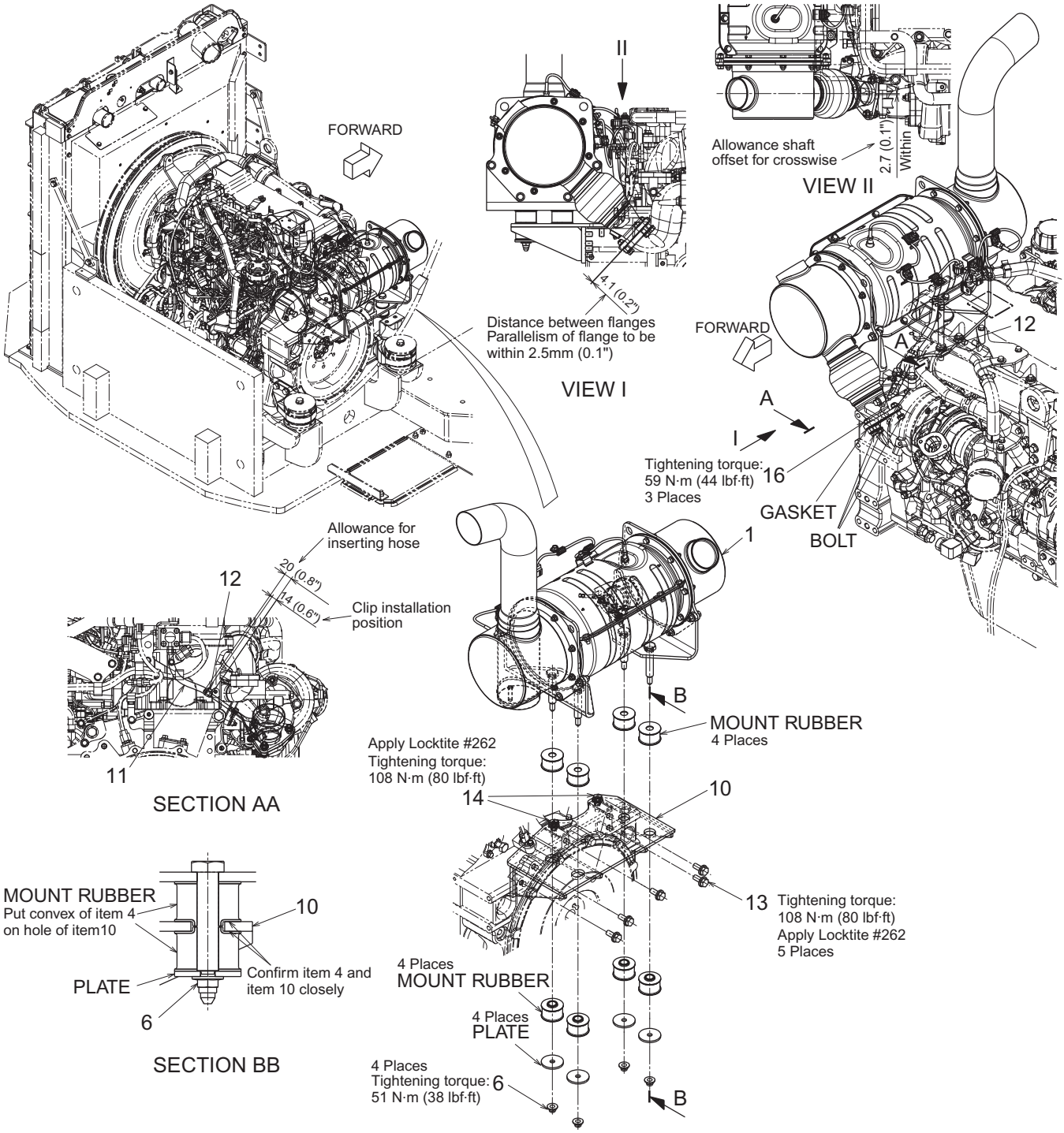
Replace O-ring (D) and packing (E) with new ones respectively.

CAUTION

Replace O-ring fitted on the back side of tank cover with new one.

33.1.10.2 REMOVAL

Remove muffler assy.
1. Loosen a clip (12) on hose (11).
2. Loosen 3 nuts (16).
3. Loosen 4 nuts (6).
4. Remove filter assy (1).
5. Loosen 5 sems bolts (13) and 2 sems bolts (14).
6. Remove bracket (10).



Removing muffler assy

8.
Lift and remove inter-cooler using lifting eyes and hoist on the inter-cooler.
Weight : 16kg (35 lbs)
Confirm the missing of rubber bushing under the inter-cooler.
9.
Disconnection of oil cooler hose
Disconnect hose (C1), (C2) from upper and lower of cooler, and drain hydraulic oil. (See Fig. "Removing hydraulic oil hose")
10.
Lift cooler temporally using cooler head flange for slinging.
11.
Loosen 4 bolts (19) M8X25 attaching oil cooler.
12.
Lift the oil cooler.

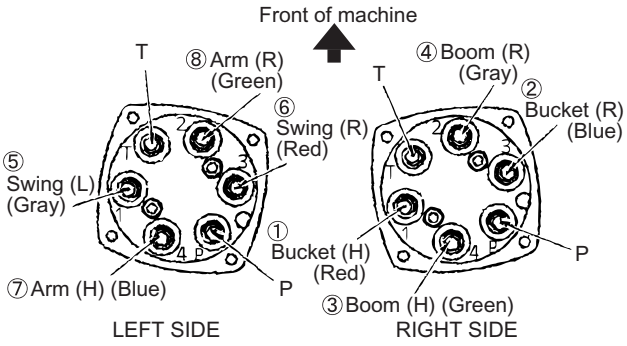
Note

There is no predetermined sequential order in removing radiator core, inter-cooler core and oil cooler. Removing these components can be done as necessary.

(3) Installing
Installing is done in the reverse order of removing.

33.1.16.3 INSTALLATION

Install it in the reverse order of removal and tighten it.
Tools: Allen wrench: 5 mm T = 11.8 N-m (11 lbf-ft) capscrew (A14)



Pilot valve port position (from upper side)

Note

Make sure the tightening torque for capscrews, because pilot valve is made of aluminum.

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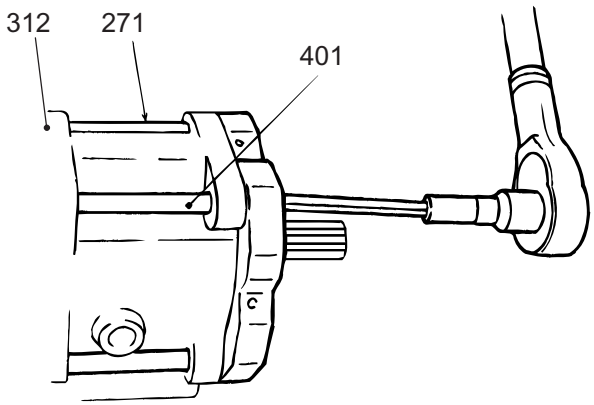
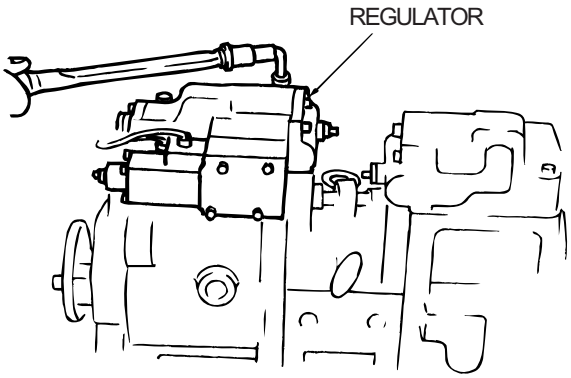
8. Installing valve block
   Install valve block (312) to pump casing (271) and fasten them together with socket bolts (401).
   Tools: Allen wrench: 17mm
   Tightening torque ; 430N-m (320 lbf-ft)
   -Work will be promoted if assembly is started from the rear pump.
   -Exercise care so as not to mistake the direction of the valve block (312). (Install it so the regulator comes up as seen from the front side and the suction flange comes on the right.)
   -Insert the 1st gear into the valve block beforehand and connect it with the spline of the shaft.



Installing valve block (312)

9. Installing gear pump
   Install gear pump (04) and fasten them together with socket bolts (435).
   Tools: Allen wrench: 6mm,
   Tightening torque; 17N-m (12.5 lbf-ft)
10. Installing regulator and PTO cover
    Pinch feedback pin of tilting pin in feedback lever of the regulator and PTO cover (326), install the regulator and fasten socket bolt.
    (415) (See Fig."Regulator exploded view")
    Socket bolt (415): For regulator
    Tools: Allen wrench: 6mm,
    Tightening torque; 29N-m (21 lbf-ft)
    Socket bolt (414): PTO Cover (326)
    Tools: Allen wrench: 8mm,
    Tightening torque; 57N-m (42 lbf-ft)
    -Do not mistake the front regulator for the rear regulator.



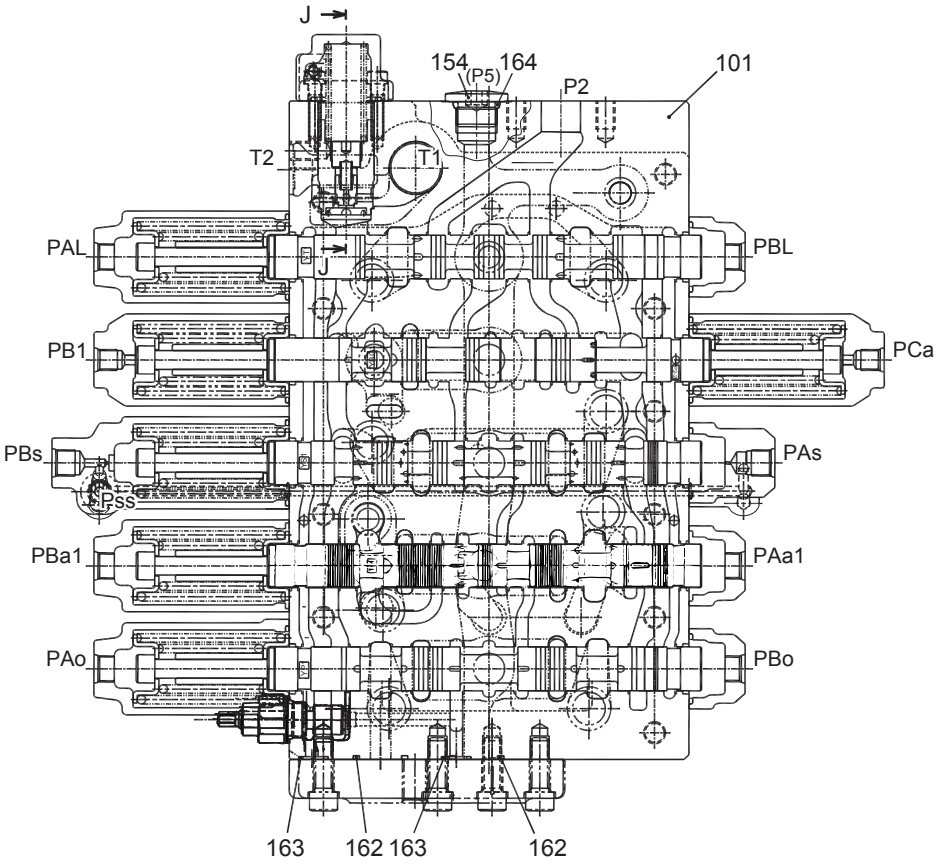
Installing regulator and PTO cover

11. Installing drain port plug
    The work is complete when drain port VP plugs (466), (468) have been set.
    Tools: Allen wrench: 19mm, 36mm
    Tightening torque; 36N-m (27 lbf-ft), 170N-m (125 lbf-ft)

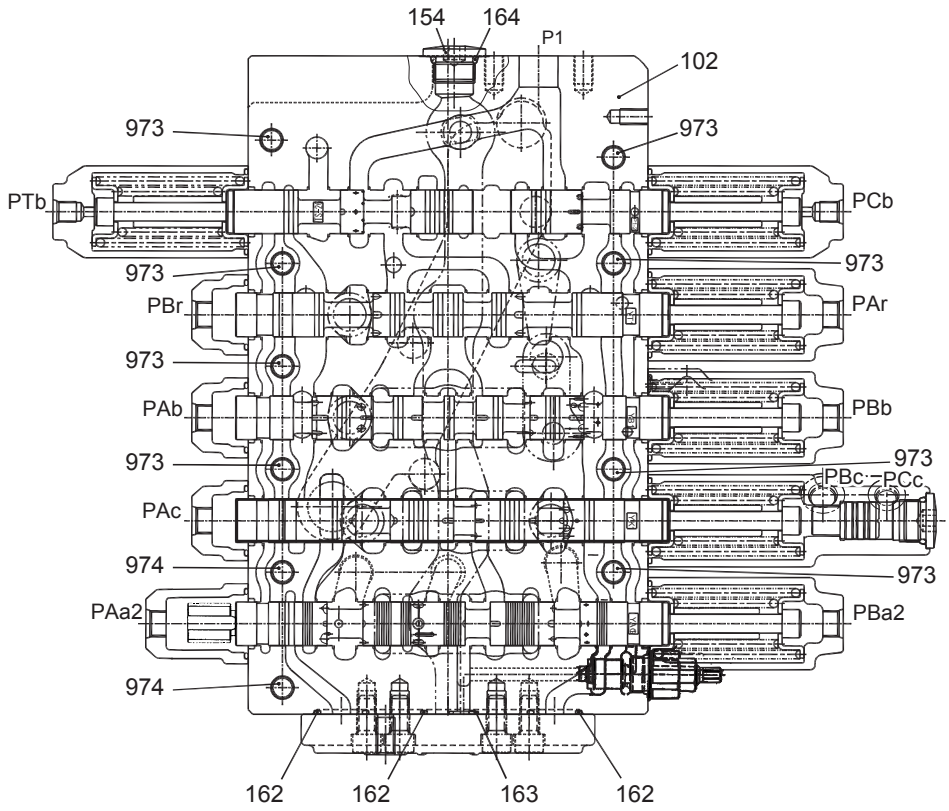
33.2.2 CONTROL VALVE

33.2.2.1 SECTIONAL VIEW

1. Outside view



SECTION A-A



SECTION B-B

Section (1/6)

33.2.2.3.3 Disassembling the boom conflux spool

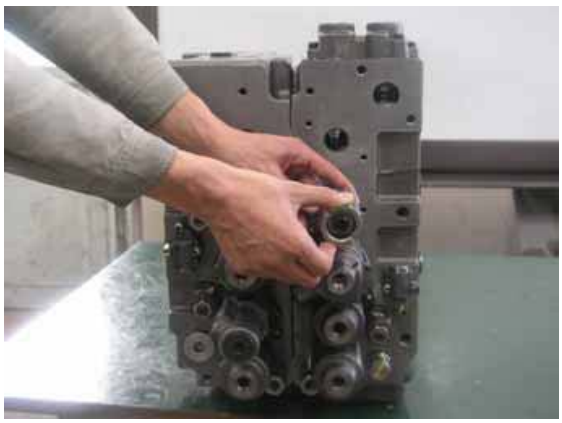
(1) Loosen socket bolts (273) and remove spring cover (201) for boom conflux and O-ring (261).
(2) Draw out the assy of boom conflux spool (305), spring seat (331), springs (325), (326), stopper (339) and bolt (333) from casing A (101).

Removing spring cover (202)

Note

When drawing out the spool assy, use care so as not to score casing A (101).

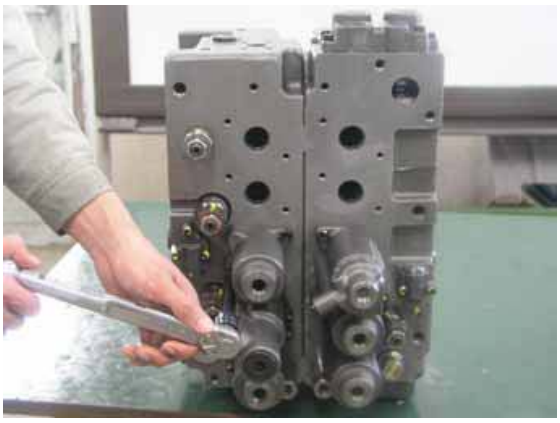
(3) Fix the boom conflux spool with vise via a protective plate (aluminum plate, etc.) and remove bolt (333). Then separate spring seat (331), springs (325), (326) and stopper (339) from boom conflux spool (305).



Drawing out boom conflux spool (305) assy

33.2.2.3.4 Disassembling the boom spool

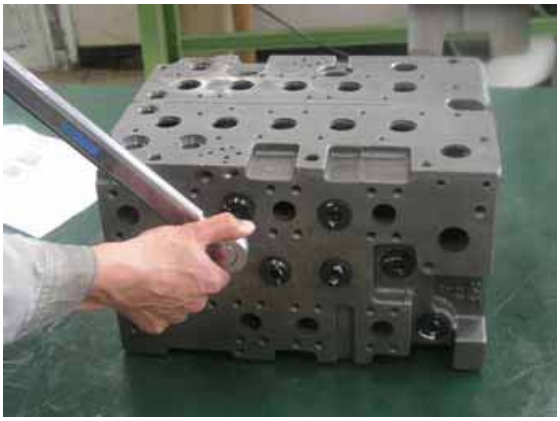
(1) Loosen socket bolts (273) and remove spring cover (203) for boom spool and O-ring (261), (266).
(2) Draw out the assy of boom spool (301), spring seat (331), springs (321), (322), stopper (336) and bolt (333) from casing B (102).



Removing spring cover (203)

33.2.2.3.18 Removing check valve

(1) Remove plugs of load check valve, conflux check valve, etc. and then remove poppet (511) and spring (521).
(2) Load check valve on the swing section
Remove plug (556) and then remove poppet (511) and spring (523).
(3) Load check valve on arm 2 section
Remove plug (551) and then remove poppet (515) and spring (521).

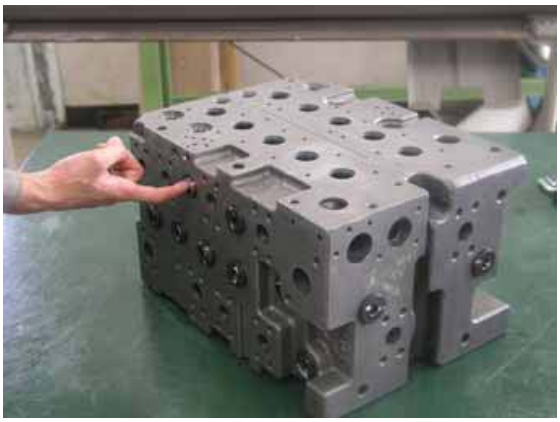


Removing plug (551),(556),(552)

CAUTION

-The plug and spring in use differ from the above (1). Do not mix the parts when assembling parts again.
-The poppet in use differs from the above (1). Do not mix the parts when assembling parts again.

(4) Lock valve
Remove plug (556) and then remove poppet (514) and spring (524).
(5) Main relief valve
Remove plug (552) and then remove poppet (512) and spring (522).



Removing poppet (511),(512),(514),(515)

CAUTION

-The plug, poppet and spring in use differ from the above (4)(5). Do not mix the parts when assembling parts again.

The plugs in which the procedure for disassembly is not included in the above procedure are usually used to block auxiliary holes and holes caused by casting. Do not disassemble further if unnecessary.

33.2.2.3.19 Disassembling casing

Further disassembly of the casing is not allowed.

33.2.2.6 TROUBLESHOOTING

(1) If an abnormal condition is noticed, check to see if the problem is with the control valve itself, one of the main pumps, the gear pump, or a circuit. To this end, you will need to measure pilot pressure, pump delivery pressure, load pressure, etc. If any part of the system is to be disassembled for inspection, follow the disassembly and reassembly procedures in this manual.
(2) Dust is the enemy of hydraulic components. Pay strict attention to protection from dust. If any part of the system is to be disassembled, take dust protection measures beforehand.
(3) Moving parts must be handled with care. If they are damaged, smooth the damage using an oil stone or the like.
(4) Take care not to damage the contact face of O-rings. A damaged contact face will certainly cause oil leaks.

33.2.2.6.1 Control valve

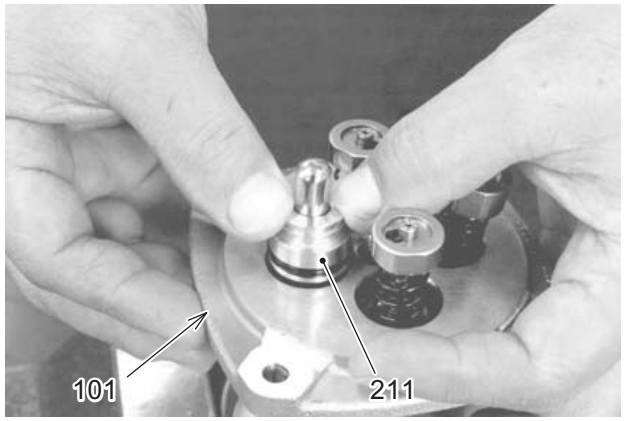
Trouble	Cause	Remedy
1. Travel does not occur. Slow to start up (or poor power). Slow response.	1) Malfunctioning main relief valve. -Foreign matter between main poppet and seat. -Foreign matter between poppet and seat. -Sticking main poppet. -Broken or deformed spring. -Clogged main poppet throttle. -Loosened adjusting screw	1) Check travel relief valve pressure -Disassemble and clean. If damaged heavily, replace the assy as a unit. -Same as above. -Correct sticking part with oil stone. -Replace spring. -Remove foreign matter. -Readjust, and tighten lock nut to specified torque.
2. Machine does not move straight during simultaneous operation of travel and attachment.	1) Malfunctioning travel straight valve. -Sticking spool. -Broken or deformed spring. -Clogged small hole in spool.	1) Check pilot pressure. -Correct sticking part with oil stone. -Replace spring. -Remove foreign matter.
	2) Malfunctioning main relief valve.	2) Remove main relief valve.
3. Excessive natural falls of attachment under its own weight when spool is in neutral.	1) Excessive clearance between casing and spool.	1) Replace spool.
	2) Spool is not completely in neutral position. -Foreign matter between casing and spool, or sticking spool. -Broken or deformed spring. -Clogged pilot circuit.	2) Check secondary pilot pressure. -Disassemble, clean and smooth sticking part with oil stone. -Replace spring. -Remove foreign matter.
	3) Malfunctioning overload relief valve. Refer to item 1. 1) above. (See 33.2.2.3.20 (2)) -Foreign matter between valve seat and casing.	3) Check overload relief valve pressure. (See 33.2.2.3.20 (2)) -Clean and check damage on seat surface.
	4) Lock valve function is faulty. (Arm, boom) -Foreign matter between poppet seat and casing. -Poppet is stuck. -Broken or deformed spring. -Selector spool is stuck.	4) Replace -Disassemble, clean. -Correct stuck part with oil stone or replace. -Replace spring. -Replace lock valve selector assy.

CAUTION

The parts marked * might not be equipped depending on valve type.

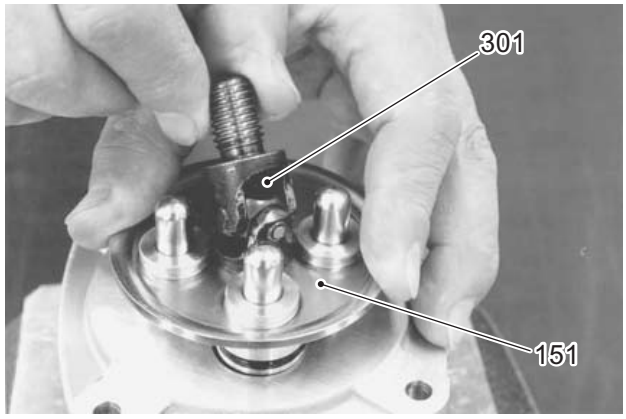
(6) Fit plug (211) assy to casing (101).

1. When the force of spring (211) is weak, it stops at the position where it is pushed in by the sliding resistance of O-ring (214).



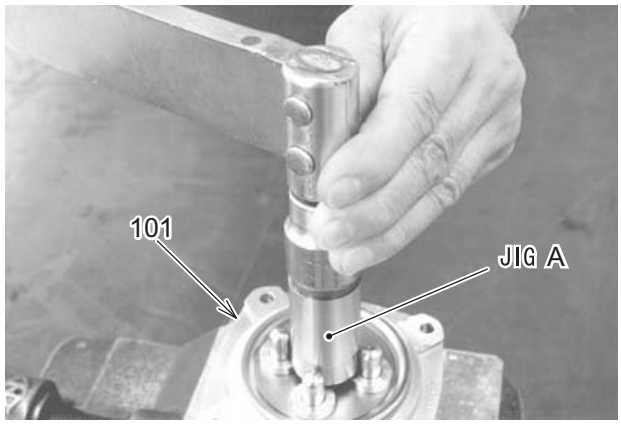
Installing plug assy

2. When the force of spring (221) is strong, attach plate (151) and press 4 push rods by hand at the same time, and tighten joint (301) temporarily.
   -Install spool (201) straight and evenly into the hole of casing (101).
   -Take care so that plug (211) and plate (151) do not jump out of casing (101).



Installing plug assy and plate (151)

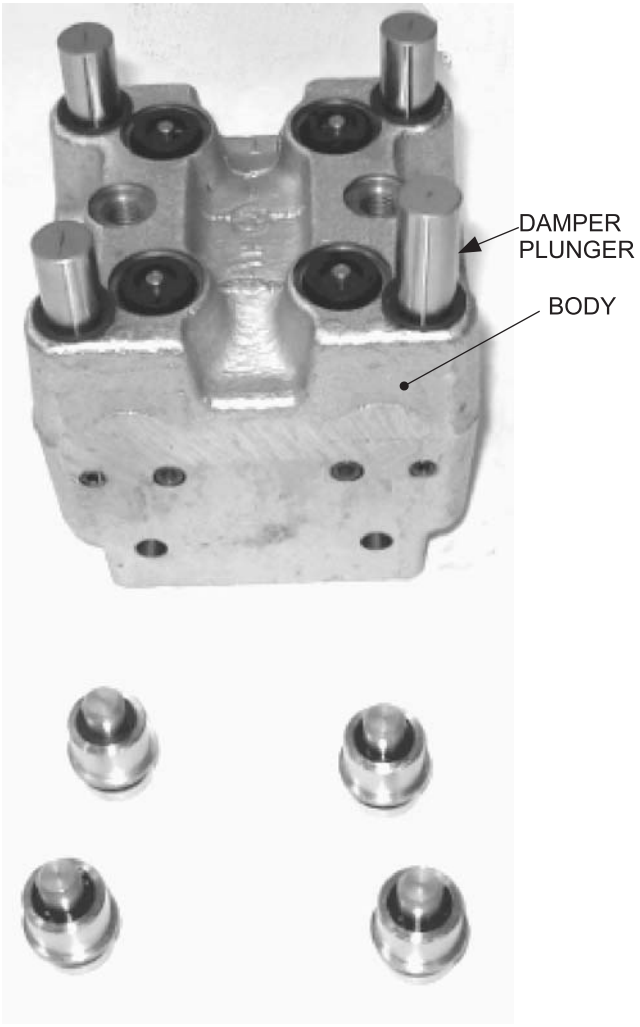
(7) Install joint (301) on casing (101) with jig A securely.
   Jig A : See 33.2.3.7 JIG.
   Tightening torque : 47.1N-m (32.8 to 37.2 lbf-ft)



Installing joint (301)

(6) Guide/plunger and regulation unit replacement

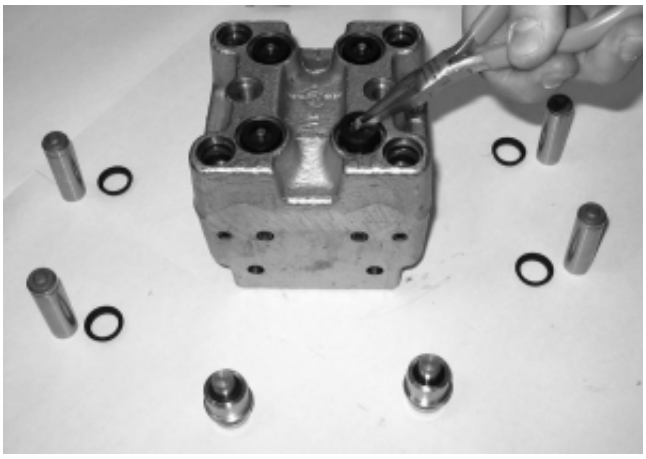
1. Remove
   -The pilot control unit from the machine.
   -Both rubber boots (See 33.2.4.2 (1))
   -Both switch plates (See 33.2.4.2 (2))
   -The retaining plate (See 33.2.4.2 (4))
2. Guide/plunger replacement:
   -Insert the end of a thin screwdriver between the guide and the body, carefully lift the guide to remove it from the body.
3. Remove the guide / plunger assembly.
4. Repeat the operation for the other 3 sub-assemblies.
5. Visually check that the guides / plungers are in good condition. If defects are present, replace the 4 sub-assemblies.



Note

Hold the guides with the other hand during the extraction operation to limit the effect of the return spring.

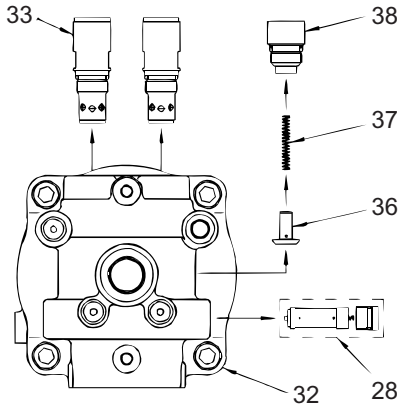
6. Guide/plunger and relulation unit replacement
   -Extract the regulation units from the body (using flat nose pliers).
   -Inspect the regulation units. If defects are detected on the parts, replace the 4 units.
7. Return spring replacement :
   -Extract the return springs from the body (using flat nose pliers).



33.2.5.2 DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

(1) Disassembly

1. Removal of relief valve assembly etc.
   Remove relief valve assembly (33), cap (38), spring (37) and check (36) from cover (32).
   Tools: Allen wrench: 14mm,10mm

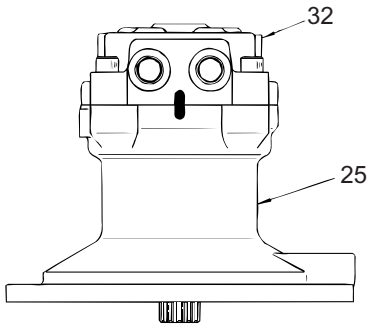


Removing relief valve, bypass valve

CAUTION

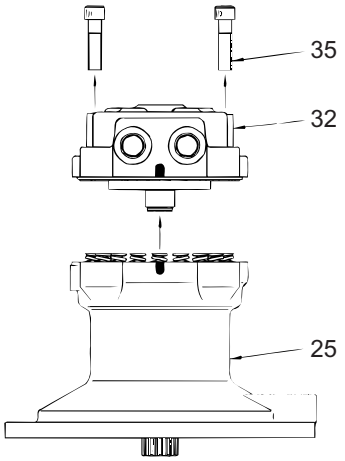
Assemble removed parts to original state when reassembling.

2. Marking at swing motor
   Before disassembling motor, make a matching mark between cover (32) and housing (25). This precaution will assist in reassembly.



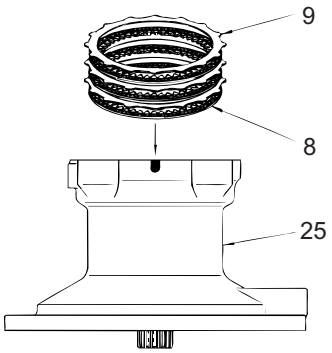
Making a matching mark

3. Removal of cover assembly
   Loosen hexagon socket bolt (35) and place shaft of motor assembly to downward and take cover (32) out.
   Tools: Allen wrench: 14mm



Removing cover

6. Assembly friction plate and lining plate
   Assemble friction plate (8) and lining plate (9).

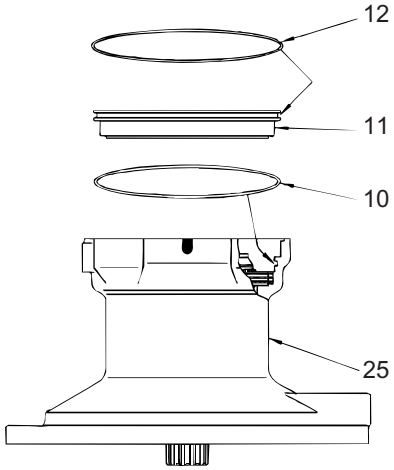


Assembling friction plate & lining

Note

Apply hydraulic oil to each side.

7. Insert O-rings
   Insert O-rings (10) into housing (25). Insert O-ring (12) into piston (11).

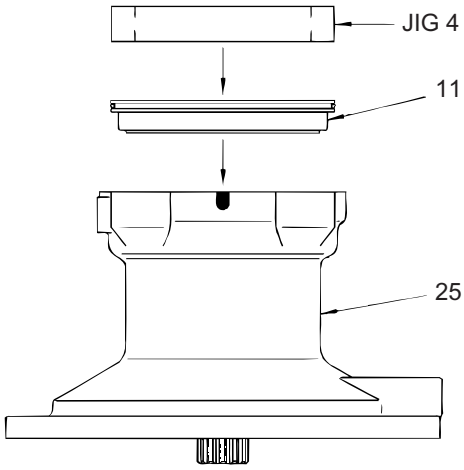


Inserting O-rings

Note

Lubricate O-rings (10), (12) with grease.

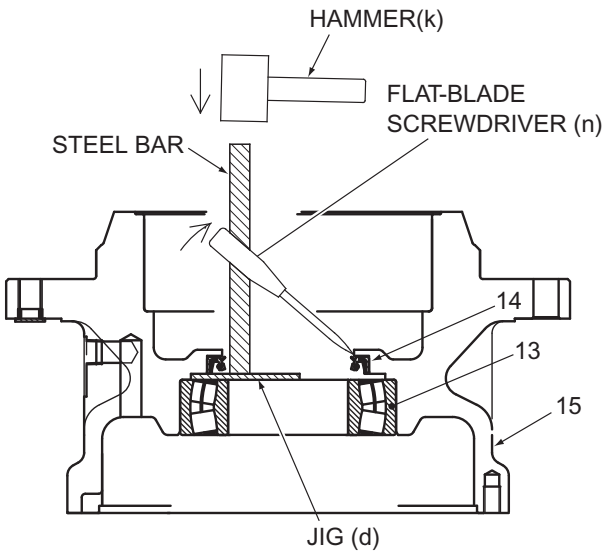
8. Assembly of brake piston
   Lubricate specified hydraulic oil on outer sliding face of piston (11) and assemble brake piston to housing (25).



Assembling brake piston

8. Removing spherical bearing (upper)
   Set housing (15) as shown in the figure, insert jig (d) between bearing (13) and oil seal (14) and remove bearing (13) by striking from the upper side.
9. Remove oil seal (14) from housing (15).

   -Do not use the removed oil seal and bearing.



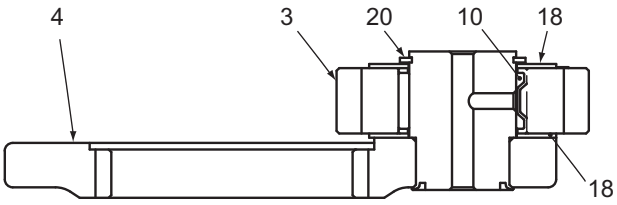
Removing spherical bearing (upper) (13) and oil seal (14)

(4) Disassembling spider assy

1. Disassembling #1 spider assy

a. Remove retaining ring (20) with a plier (i).

b. Remove thrust washers (18), pinion (3) needle bearing (10).



Disassembling #1 spider assy

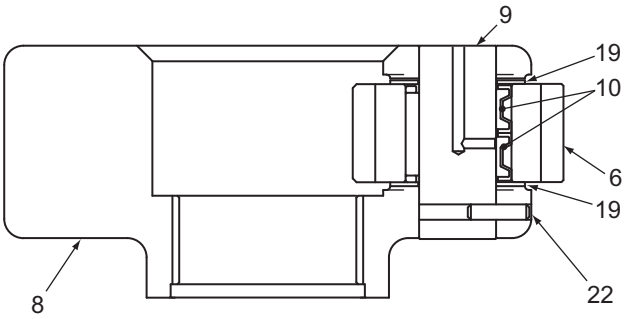
CAUTION

-The shaft attached to spider assy (4) is caulked. When replacing parts, replace the spider assy as a set.
-Pinions (3) can not be replaced singly. Replace them it in a set of four.

2. Disassembling #2 spider assy

a. Draw out spring pin (22).

b. Draw out shaft (9) from spider (8) and remove thrust washer (19), pinion (6) and needle bearing (10).



Disassembling #2 spider assy

CAUTION

Pinions (6) can not be replaced singly. Replace them it in a set of four.

33.2.5.5 TROUBLESHOOTING

33.2.5.5.1 Swing motor

Table A

Symp-tom	Cause	External Inspection	Action	Repair
Does not turn	Breakage of internal parts	Measure the drain volume	Where the motor supply volume largely equals the drain volume it is highly likely that a sliding part is broken so disassemble the motor to investigate.	See table B.
	Breakage of internal parts	Open the motor inlet and outlet ports and apply a pilot pressure of 3.2~4.9MPa (464~711psi) to the brake release port then check that the output shaft can be turned through at by a torque of approximately 30~40N-m (22~30lbf-ft).	If the output shaft does not turn smoothly at a torque of 30~40 Nom (22~30lbf-ft) it is highlylikely that an internal parts in broken so disassemble the motor to investigate.	Replace the broken parts or the whole motor assembly.
	Miss-setting of the relief valve in the circuit	Use a pressure gauge to measure loaded pressure.	Reset to the regulation pressure setting.	
Excessive slippage	Wear or breakage of motor sliding parts or high-pressure seals	Measure the drain volume.	If the drain volume is 2.5L/min (0.66gal/min) or more the leakage volume is excessive.Disassembly and investigation is required.	See table B.
	Excessively high oil temperature with high internal oil leakage	Measure the oil temperature.	Reduce the oil temperature.	

33.2.6.3 MAINTENANCE STANDARDS

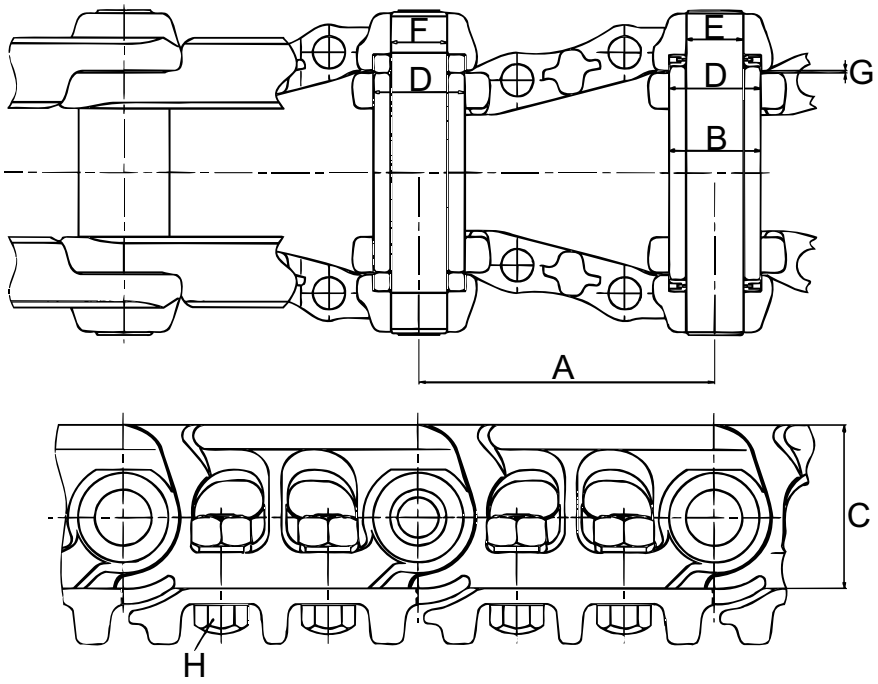
33.2.6.3.1 Inspection procedure and remedy

Interval	Check Item	Checking Procedure	Remedy
2,000hr	Seal for oil leakage outside	Check oil leakage outside	Replace O-ring or dust seal , if any oil leakage can be found.
4,000hr In principle, disassemble and check regardless of oil leakage or not.	All sealing parts		Replace all sealing parts such as slipper seal with back-up ring and O-ring.
	All sliding parts	Check abnormal wear, scoringor corrosion caused by foreignmatters or seizure.	Repair or replace referring to their limit of service.
When disassembled for repair	All parts	Check them for seizure, foreignmatters, abnormal wear, anddefect of seals.	Repair or replace referring to their limit of service. O-rings and dust seal should be replaced.

33.2.6.3.2 Service limit of the parts

Parts		Maintenance Standards	Remedy
Body, Stem	Sliding surface with sealing sections	Plating worn or peeled due to seizure or contamination.	Replace
	Sliding surface between body and stem other than sealing sections	1. Worn abnormally or damaged more than 0.1 mm (0.004 in) in depth due to seizure or contamination.	Replace
		2. Damaged less than 0.1 mm (0.004 in) in depth.	Smooth with oilstone.
	Sliding surface with thrust plate	1. Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		2. Worn less than 0.5 mm (0.02 in).	Smooth
		3. Damage due to seizure or contamination repairable within wear limit 0.5 mm (0.02 in).	Smooth
Cover	Sliding surface with thrust plate	1. Worn more than 0.5 mm (0.02 in) or abnormality.	Replace
		2. Worn less than 0.5 mm (0.02 in).	Smooth
		3. Damage due to seizure or contamination repairable within wear limit 0.5 mm (0.02 in).	Smooth

34.1.2.4 MAINTENANCE STANDARDS



Unit : mm (in)

No.	ITEM	STANDARD VALUE			REPAIRABLE LEVEL	SERVICE LIMIT	REMEDY
A	Link pitch	190 ± 0.1 (7.4803 ± 0.0039)			194 (7.64)	198 (7.80)	Replace the link assy if the service limit is exceeded
B	O.D. of bushing	ø 58.78 $^{+0.11}_{-0.05}$ (2.3142 $^{+0.0043}_{-0.0020}$)			ø 55 (2.17)	ø 54 (2.13)	
C	Height of link	106 ± 0.3 (4.1732 ± 0.0118)			100 (3.94)	98 (3.86)	
D	Interference between bushing and link	Basic dimension	Tolerance		Fit	Fit	Replace
		ø 58.78 (2.3142)	Shaft	+ 0.11 (+0.0043) - 0.05 (-0.0020)	Interference 0.05 (0.0020)	Interference 0	
E	Interference between track pin and link	ø 36.63 (1.4421)	Shaft	+ 0.1 (+0.0039) - 0.05 (-0.0020)	Interference 0.05 (0.0020)	Interference 0	
F	Interference between master pin and link	ø 36.50 (1.43701)	Shaft	- 0.03 (-0.00118) - 0.088 (-0.00315)	Interference 0.05 (0.0020)	Interference 0	Replace Link
G	Clearance between links	1.5 (0.06) (both side)			8 (0.32) (both side)	10 (0.39) (both side)	Replace
H	Tightening torque of shoe bolt	853 N•m (629 lbf•ft)					Reassembly

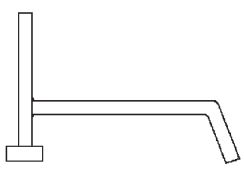
34.1.2.5 TOOLS AND JIGS

(1) Tightening tools

Unit : mm (in)

NAME	OPPOSING FLATS
Socket	30 (1.2)

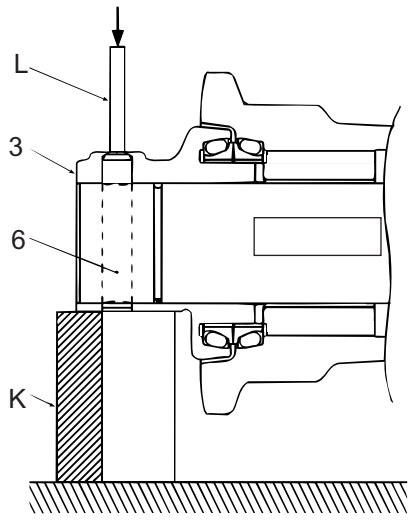
(2) Jig

NAME	SHAPE
Master pin fixing jig for iron crawler	

34.1.4.5 DISASSEMBLY AND ASSEMBLY

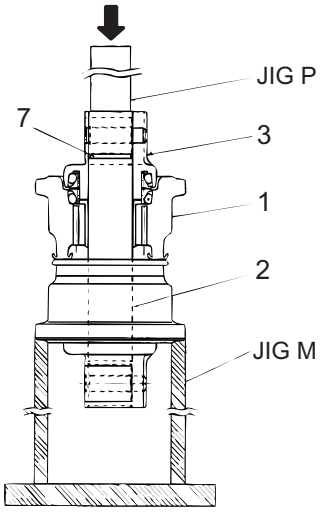
(1) Disassembly

1. Drain oil
   Remove plug (8) and drain out oil.
   Tools: Allen wrench: 6mm
2. Removing pin (6)
   Put both ends of lower roller assy on the V-shaped blocks (K), apply push-out bar (L) on upper end face of pin (6), and push pin (6) out striking with mallet.



Pushing out collar fixing pin (6)

3. Removing collar (3), O-ring (7)
   Put lower roller on jig (M) for repair stand so that the shaft (2) is perpendicularly located, apply push-out jig (P) on shaft end on upper side, and push shaft (2) until the O-ring (7) separate from collar (3) with press or mallet, and take out collar (3) and O-ring (7).
4. Removing shaft (2)
   In addition, push out and remove shaft (2) together with the lower collar (3) and O-ring (7).

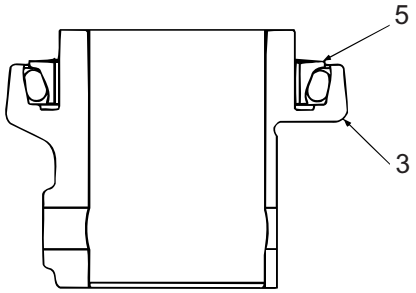


Removing shaft (2), collar (3), O-ring (7)

Note

The shaft (2) extrusion operation may cause the remaining lube oil to flow out. Prepare an oil container beforehand.

5. Removing collar (3), O-ring (7)
   Remove O-ring (7) from shaft (2) that was drawn out in the previous paragraph.
6. Removing floating seal (5)
   Remove floating seal (5) from collar (3).



Removing floating seal (6)

34.1.5.3.4 TOOLS AND JIGS

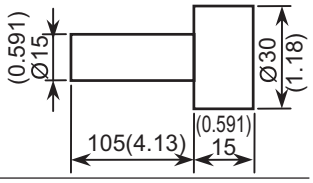
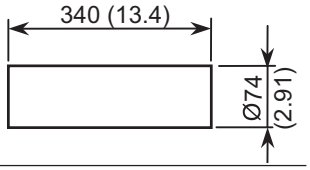
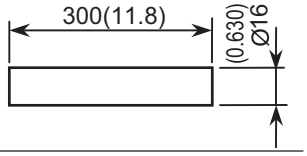
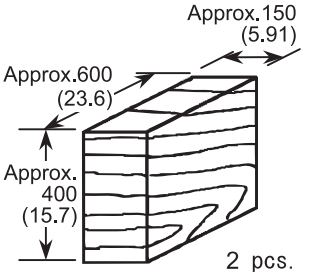
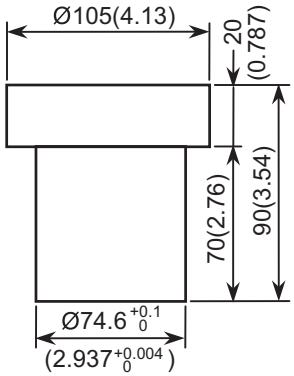
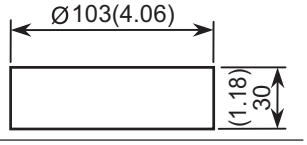
(1) Tightening tools

Unit : mm

NAME	OPPOSING FLATS
Socket	24
Allen wrench	5

(2) Jigs

Unit : mm (in)

No.	NAME	SHAPE
R	Pin striking jig	
S	Shaft push out jig	
T	Bushing drawing rod	
U	Stand	
V	Bushing press fitting jig	
W	Collar press fitting jig	

34.1.7.3 INSTALLING

Installing of the travel motor piping is performed in the reverse order of removal.

1. Cleaning
   Check that contact surface of travel motor and crawler frame is free from burr and stain.
2. Tightening torque
   Tighten capscrew and hydraulic pipes to the torque specified in "Tightening Torque".
3. Fill inside from motor drain port to casing with hydraulic oil before piping for drain. When starting operation, operate motor in low idling and at low speed for several minutes, and check it for possible oil leakage and noise.

NAME	SIZE	TOOLS HEX	NO.	TIGHTEING TORQUE N·m(lbf·ft)	REMARKS
SEMS BOLT	M12	19	6	83.4 (61)	APPLY LOCTITE #262
CAPSCREW	M16	24	2 3	279 (206)	
FLARELESS NUT FOR PIPES, SLEEVE	ϕ10X1.5	19	—	49(36)	
	ϕ18X2.5	32	—	147(110)	
	ϕ28	41	—	275(200)	
HOSE CAP	PF1/4	19	—	29.4(21.7)	
	PF1/2	27	—	78.5(57.9)	
CONNECTOR	PF1/4	19	—	36.3(27)	
	PF1/2	27	—	108(80)	
	PF1	41	—	255(190)	

(3) Special tools

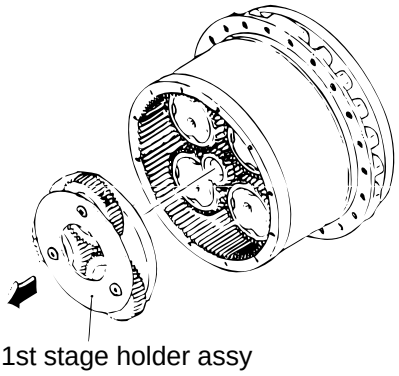
Special tools name	Description	Application Item (No.)	Special tools name	Description	Application Item (No.)
Pulley puller		40, 41	Shim thickness adjusting jig		64
Bearing fixing jig		40	Rod		3
Bearing fixing jig		41	Thrust plate selecting jig		87
Floating seal fixing jig		61	Oil seal fixing jig		44
Rod		62	Brake piston positioning jig		47
Angular bearing fixing jig		62	Snap ring removing/fixing jig		32

(4) Measuring instrument name

Measuring instrument name	Description	Application Item (No.)
Dial gauge	JIS B7503	64, 87
Micro meter	JIS B7502	64, 87

(20)Removing the 1st stage holder assy

Remove the 1st stage holder assy that consists of holder B (76), planetary gear B(80), needle bearing (79), inner race (78), thrust plate (77), thrust plate (81), thrust plate (82) and screw (83).



Removing the 1st stage holder assy

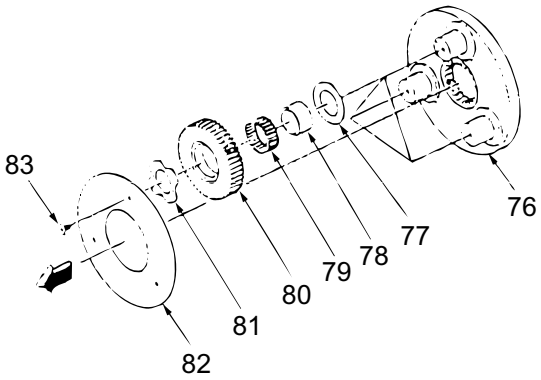
CAUTION

Use care of the following when removing the 1st stage holder assy :
-Take care so you do not pinch your fingers at removing.

(21)Removing the 1st stage holder assy

Fix the 1st stage holder assy in a vise and heat screw (83) with a hair dryer and loosen it. Separate screw (83), thrust plate (82), thrust plate (81), planetary gear B (80), needle bearing (79), inner race (78) and thrust plate (77), from the holder B, in that order.

Tools: Allen wrench: 8 mm



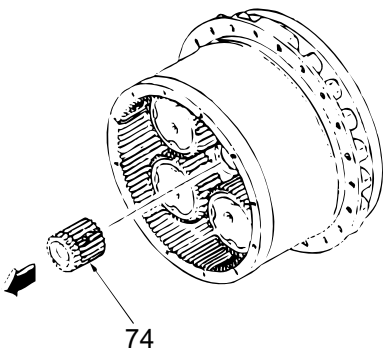
Disassembling the 1st stage holder assy

CAUTION

When loosening screw (83), exercise care of the following :
-Screw (83) is coated with Loctite and hard to get slack. If you loosen it by force, it is scored and can not be reused. Heat the screw with a hair dryer before loosening it.

(22)Removing sun gear C (74)

Remove sun gear C (74).



Removing sun gear C (74)

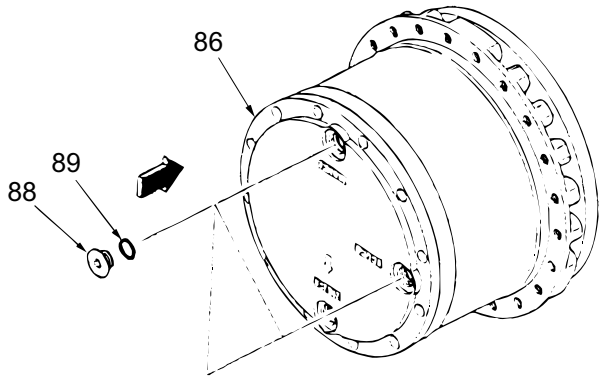
(15)Fitting plugs (88)

Take off O-ring (89) from plug (88), replace it with a new one and place it in plug (88).

Then, attach plugs (88) to the oil inlet / outlet and the level ports (3 in all) of cover (86), and tighten them to specified torque.

Tools: Allen wrench: 12 mm,
Tightening torque :157N-m (120 lbf-ft)

This completes the assy of the reduction unit. Next comes the assemble of the motor. Assemble it, referring to "Assembling the Motor".



Fixing plugs (88)

34.2.1.4 MAINTENANCE STANDARD

(1) Motor parts

Parts	Check point	Tolerance	Remedy
Piston assy (29)	1. Sliding surface of shoe	The roughness is 0.8a or the surface is roughened or the scratch is deeper than 0.02mm (0.0008in).	Lap the moving surface of shoe (#1000). If the scratch does not disappear, replace cylinder block assy.
	2. O.D. of piston	The roughness is 1.2a or the surface is roughened or the scratch is deeper than 0.02mm (0.0008in).	Replace cylinder block assy.
	3. O.D. of piston and bore diameter of cylinder block	Clearance : 0.060mm (0.00236in)	
	4. Gap on shoe ball	Gap 0.4mm (0.016in)	
Cylinder block (28)	1. Sliding surface of valve plate	The roughness is 0.8a or the surface is roughened or the scratch is deeper than 0.02mm (0.0008in).	Lap the sliding surface (#1000). If the scratch does not disappear, replace cylinder block assy.
	2. Bore diameter	The roughness is 1.6a or the surface is roughened or the scratch is deeper than 0.02mm (0.0008in).	Replace cylinder block assy.
	3. Bore diameter and the O.D. of piston assy	Clearance : 0.060mm (0.00236in)	
	4. Spline at the joint of shaft (33)	The pin that measures the between dia. 38.749mm (1.52732in) measures 3.333 dia.mm (0.13122in) (V1=2.80) or is broken.	Replace cylinder block assy.
Valve plate (53)	1. Sliding surface	A scratch deeper than 0.02mm (0.0008in) is there on the 0.8a roughness moving surface or a seizure is seen on the surface. The moving surface shows abnormal wear.	Lap the moving surface. (#1000) If the scratch does not disappear, replace the valve plate.
Retainer plate (30) Retainer holder (31)	1. Sliding surface	The sliding surface of 0.8a roughness shows a scratch deeper than 0.02mm (0.0008in) or shows a seizure.	Replace retainer plate and retainer holder.

(4) Counterbalance valve

Trouble	Probable cause	Remedy
If motor makes pumping action as external load acts on it, motor revolution changes.	Plunger does not operate smoothly as foreign matter is included in plunger.	Disassemble and remove the contamination. Then clean the plunger and reassemble it.
	Wrong orifice size is used in pilot oil passage.	Replace with a correct orifice.
	No orifice is fixed in pilot oil passage.	Fix orifice in a correct position.
If motor makes pumping action as external load acts on motor , motor develops cavitation and makes an abnormal sound.	Foreign matter is included in plunger. Plunger movement is bad and motor does not display counterbalance functions.	Disassemble and eliminate foreign matter. Check the extent of damage according to the shop manual and reassemble if it is still serviceable. In case plunger is not serviceable, replace base plate kit.
	Since spring of plunger is broken, counterbalance action does not work.	Disassemble and remove foreign matter. Then replace spring and reassemble.
	Since spring is not placed in plunger, counterbalance valve does not work.	Assemble a regular spring.
	Since spring is not placed in check valve, counterbalance function does not work.	Disassemble, eliminate foreign matter and replace spring.
	Since spring is not placed in check valve, counterbalance function does not work.	Assemble a regular spring.
	Since orifice in pilot oil passage is clogged with foreign matter, counterbalance function does not work.	Disassemble, clean foreign matter and reassemble.

Error Code	Trouble	Described page
B162	Incorrect output of P1 optional side pressure sensor	46-29
B163	Disconnection of P1 side optional pressure sensor	46-30
B164	Short-circuit of P1 side optional pressure sensor	46-31
B172	Incorrect output of P2 optional side pressure sensor	46-32
B173	Disconnection of P2 side optional pressure sensor	46-33
B174	Short-circuit of P2 side optional pressure sensor	46-34
C012	Incorrect output of P1 pump pressure sensor	46-34
C013	Disconnection of P1 pump pressure sensor	46-35
C014	Short-circuit of P1 pump pressure sensor	46-35
C022	Incorrect output of P2 pump pressure sensor	46-36
C023	Disconnection of P2 pump pressure sensor	46-36
C024	Short-circuit of P2 pump pressure sensor	46-37
C033	Disconnection of boom head pressure sensor	46-37
C034	Short-circuit of boom head pressure sensor	46-38
C043	Disconnection of boom rod pressure sensor	46-38
C044	Short-circuit of boom rod pressure sensor	46-39
D012	Failure of output transistor ON at P1 unload proportional valve	46-39
D013	Disconnection of P1 unload proportional valve	46-40
D022	Failure of output transistor ON at P2 unload proportional valve	46-40
D023	Disconnection of P2 unload proportional valve	46-41
D032	Failure of output transistor ON at travel straight proportional valve	46-41
D033	Disconnection of travel straight proportional valve	46-42
D062	Failure of output transistor ON at arm in high speed proportional valve	46-42
D063	Disconnection of arm in high speed proportional valve	46-43
E012	Failure of output transistor ON at P1 pump proportional valve	46-43
E013	Disconnection of P1pump proportional valve	46-44
E022	Failure of output transistor ON at P2 pump proportional valve	46-45
E023	Disconnection of P2 pump proportional valve	46-46
E032	Optional relief adjusting proportional valve 1 and output transistor ON are failure	46-47
E033	Optional relief adjusting proportional valve1's wiring is disconnected	46-47
E042	Optional relief adjusting proportional valve 2 and output transistor ON are failure	46-48
E043	Optional relief adjusting proportional valve2's wiring is disconnected	46-48
F011	Failure of output transistor OFF and GND short of attachment boost SOL valve	46-49
F013	Failure of output transistor ON and disconnection of attachment boost SOL valve	46-49
F021	Failure of output transistor OFF and GND short of swing parking SOL valve	46-50
F023	Failure of output transistor ON and disconnection of swing parking SOL valve	46-50
F031	Failure of output transistor OFF and GND short of travel 1-2 speed SOL valve	46-51
F033	Failure of output transistor ON and disconnection of travel 1-2 speed SOL valve	46-51
F041	Failure of output transistor OFF and GND short of optional selector SOL valve	46-52
F043	Failure of output transistor ON and disconnection of optional selector SOL valve	46-52
G032	Overrun of speed sensor of direct input Mechatro-controller	46-53

Table 46-17

Error code	B042		
Trouble	Arm-in pressure sensor outputs error		
Judging condition	After starter switch ON and engine does not start yet. And the input voltage from the arm-in pressure sensor after starter switch ON is in the range of 1.4V or more to less than 4.7V.		
Symptom	The arm-in operability becomes poor.		
Control in the event of failure	Normal control		
Returned in normal condition	Not returned automatically under normal condition. Switch the power OFF once and turns on it again.		
Service diagnosis checking screen	Screen No.	5	B-4 ARM IN
	Screen No.		
	Screen No.		

	Checking object	Checking contents and remedy
1	-Arm-in pressure sensor SE-7	When B042 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between arm-in pressure sensor and controller CN-130F CN-101F	When B042 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller	Check that the error is corrected after replacement of controller.

Table 46-34

Error code	B104		
Trouble	Travel left pressure sensor's power source is shortcut.		
Judging condition	The input voltage from Travel left pressure sensor is 4.7V or more.		
Symptom	The Travel left operability becomes poor.		
Control in the event of failure	Set proportional valve output rate of P1 and P2 pumps to 0mA. (Hydraulic pump emergency mode) P1, Set output of P2 unload proportional valve to 0mA. (Valve emergency mode)		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	5	B-10 TRAVEL (L)
	Screen No.		
	Screen No.		

	Checking object	Checking contents and remedy
1	-Travel left pressure sensor SE-10	When B104 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between travel left pressure sensor and controller CN-302F CN-102F	When B104 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller	Check that the error is corrected after replacement of controller.

Table 46-35

Error code	B113		
Trouble	Option selector position detect pressure sensor's wiring is disconnected.		
Judging condition	The input voltage from option selector position detect pressure sensor is 0.1V or less.		
Symptom	When B mode is selected, option selector valve error is indicated.		
Control in the event of failure	Normal control		
Returned in normal condition	It returns automatically in normal condition.		
Service diagnosis checking screen	Screen No.	13	B-11
	Screen No.		
	Screen No.		

	Checking object	Checking contents and remedy
1	-Option selector position detect pressure sensor SE-29	When B113 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between option selector position detect pressure sensor and controller CN-162F CN-104F	When B113 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller	Check that the error is corrected after replacement of controller.

Table 46-48

Error code		C024		
Trouble		P2 pump pressure sensor's power source is shortcut.		
Judging condition		The input voltage from P2 pump pressure sensor is 4.7V or more.		
Symptom		The delicate operability of P2 pump related attachment becomes poor.		
Control in the event of failure		Set proportional valve output rate of P1 and P2 pumps to 0mA. (Hydraulic pump emergency mode)		
Returned in normal condition		It returns automatically in normal condition.		
Service diagnosis checking screen		Screen No.	6	C-2 PUMP P2
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-P2 pump pressure sensor SE-23			When C024 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between P2 pump pressure sensor and controller CN-140F CN-103F			When C024 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table 46-49

Error code		C033		
Trouble		Boom head pressure sensor's wiring is disconnected.		
Judging condition		The input voltage from boom head pressure sensor is 0.1V or less.		
Symptom		Indication load value of High-reach crane becomes abnormal.		
Control in the event of failure		Normal control		
Returned in normal condition		It returns automatically in normal condition.		
Service diagnosis checking screen		Screen No.	6	C-3 BOOM-HEAD
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-Boom head pressure sensor SE-24			When C033 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between boom head pressure sensor and controller CN-706F CN-104F			When C033 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table 46-65

Error code		E032		
Trouble		Optional relief adjusting proportional valve 1 and output transistor ON are failure.		
Judging condition		The feed-back value from proportional valve is 1000mA or more.		
Symptom		Does not relieve at setting pressure.		
Control in the event of failure		Normal control		
Returned in normal condition		Normal control		
Service diagnosis checking screen		Screen No.	7	E-3 Optional relief 1
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-Optional relief adjusting proportional valve 1 PSV-E			When E032 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between Optional relief adjusting proportional valve 1 and controller CN-148F CN-105F			When E032 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table 46-66

Error code		E033		
Trouble		Optional relief adjusting proportional valve 1 wiring is disconnected.		
Judging condition		The feed-back value from proportional valve is 100mA or less. (If output is 100mA or less, judging is not done.)		
Symptom		Does not relieve at setting pressure.		
Control in the event of failure		Normal control		
Returned in normal condition		Normal control		
Service diagnosis checking screen		Screen No.	7	E-3 Optional relief 1
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-Optional relief adjusting proportional valve 1 PSV-E			When E033 is cancelled and other error occurs by turning starter switch on after exchanging the connector with other sensor. Check sensor unit for possible failure. If failure found, replace it.
2	-Wiring between Optional relief adjusting proportional valve 1 and controller CN-148F CN-105F			When E033 is displayed after turning the starter switch on after the connector is exchanged with other sensor. Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table 46-83

Error code		H023		
Trouble		Boom angle potentiometer's wiring is disconnected.		
Judging condition		The input voltage from boom angle potentiometer is 0.1V or less.		
Symptom		Indications of rating load and working radius of High-reach crane become abnormal.		
Control in the event of failure		Normal control		
Returned in normal condition		It returns automatically in normal condition.		
Service diagnosis checking screen		Screen No.	10	H-2 BOOM
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-Boom angle potentiometer SE-17			Measure the resistance between terminals of boom angle potentiometer. 4.0 to 6.0 kilo-ohms Turn the potentiometer and measure resistance between signal and GND. Normal value: 0 to all resistance (4.0 to 6.0) kilo-ohms
2	-Wiring between accel potentiometer and controller CN-702F CN-103F			Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table 46-84

Error code		H024		
Trouble		Boom angle potentiometer's power source is shortcut.		
Judging condition		The input voltage from boom angle potentiometer is 0.1V or less.		
Symptom		Indications of rating load and working radius of High-reach crane become abnormal.		
Control in the event of failure		Normal control		
Returned in normal condition		It returns automatically in normal condition.		
Service diagnosis checking screen		Screen No.	10	H-2 BOOM
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	-Boom angle potentiometer SE-17			Measure the resistance between terminals of boom angle potentiometer. 4.0 to 6.0 kilo-ohms Turn the potentiometer and measure resistance between signal and GND. Normal value: 0 to all resistance (4.0 to 6.0) kilo-ohms
2	- Wiring between boom angle potentiometer and controller CN-702F CN-103F			Check wiring for possible failure according to the wiring checking procedure and repair it if necessary.
3	-Mechatro controller			Check that the error is corrected after replacement of controller.

Table46-101

Error code		R134		
Trouble		Swing flasher right relay error		
Judging condition		The mechatro controller output line to swing flasher right relay is short-circuited with the power source.		
Symptom		Right swing flasher does not light.		
Control in the event of failure		Relay output is stopped.		
Returned in normal condition		When the power is OFF		
Service diagnosis checking screen		Screen No.	16	D13
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	□Swing flasher relay R-19			When error is cancelled after removing connector (CN-74F) of swing flasher relay, check relay unit for failure, replace it with new one if failed. When resistance between relays (HB) and (HC) is 0 Ω, it is in abnormal condition. 
2	□Wiring between swing flasher relay and controller CN-74F, CN-109F			When R134 is left displayed with the relay removed Check that no power 24V is produced on relay (-) line (as shown right upper figure C) according to the wiring checking procedure and replace it if necessary.
3	□Mechatro controller			Check that the error is corrected after replacement of controller.

Table46-102

Error code		R144		
Trouble		Swing flasher left relay error		
Judging condition		The mechatro controller output line to swing flasher left relay is short-circuited with the power source.		
Symptom		Left swing flasher does not light.		
Control in the event of failure		Relay output is stopped.		
Returned in normal condition		When the power is OFF		
Service diagnosis checking screen		Screen No.	17	D14
		Screen No.		
		Screen No.		
Checking object				Checking contents and remedy
1	□Swing flasher relay R-19			When error is cancelled after removing connector (CN-74F) of swing flasher relay, check relay unit for failure, replace it with new one if failed. When resistance between relays (HB) and (HC) is 0 Ω, it is in abnormal condition. 
2	□Wiring between swing flasher relay and controller CN-74F, CN-109F			When R144 is left displayed with the relay removed Check that no power 24V is produced on relay (-) line (as shown right upper figure B) according to the wiring checking procedure and replace it if necessary.
3	□Mechatro controller			Check that the error is corrected after replacement of controller.

No.	Sections	Contents/normal value		Corrective action, others
12	Actual measuring current value of P1/ P2 pump proportional valve	Carry out service diagnosis.	-No.9 E-1 P1 pump E-2 P2 pump -See Service Diagnosis Data List Operation No.18 Travel right full lever & idling Operation No.19 Travel left full lever & idling	In case where the reading is largely differed from the actually measured value, check proportional valve and controller for possible failure.
13	Secondary pressure of pump proportional valve	Measure the pump proportional valve secondary pressure directly in idling operation. (Ports a3, a4)	Check that pump proportional valve secondary pressure is 2.7MPa or more in right (left) travel full lever and high idling operation Right travel: P1 pump proportional valve Left travel: P2 pump proportional valve	Replace proportional valve
14	Main relief pressure	Carry out service diagnosis	-See Service Diagnosis Data List Operation No.3 Boom up full lever & relief	Measure the relief pressure actually
15	Check set pressure	Check that P1 and P2 pump pressures are 32MPa in boom up full lever, high idling and H mode operation.	Reset or replace	
16	Pump regulator	Visual check	When removing, free from abnormal resistance against sliding. Free from abnormal damage, etc on outside surface Spring free from breakage, damage, etc.	Replace
17	Pump	Visual check	When removing, inside parts (cylinder block, piston, valve plate, shaft, etc.) are free from abnormal resistance against sliding, abnormal damage, etc.	Replace

No.	Sections	Contents/normal value		Corrective action, others
17	Arm 2 spool <Trouble> P1, P2 pressure is high or low.	Visual check	When removing, free from abnormal resistance against sliding Free from abnormal damage, etc on outside surface Spring is free from breakage.	Replace (Check on the casing side for damage)
18	Check arm 2 spool and recirculation <Trouble> Arm in power is poor.	Disassembly and investigation	Free from abnormal resistance against sliding Spring is free from breakage.	Replace spool assembly
19	Check lock valve poppet <Trouble> Both P1, P2 pressures are high.	Visual check	Free from abnormal resistance against sliding Free from abnormal damage, etc on outside surface	Replace (Check on the casing side for damage)

(13)Swing drifts on a slope while swing control lever is in neutral position

No.	Sections	Contents/normal value		Corrective action, others
1	Swing pressure sensor	Carry out service diagnosis	-Engine stop & starter key ON All pilot low pressure sensors are within range of 0 to 0.1MPa.	Check and replace pressure sensor
2	Remote control valve	Check targeted remote control valve	Check that spool is free from abnormal damage and spring is free from breakage	Replace
3	Swing parking brake solenoid	Carry out service diagnosis	No.3 F-2 SWING-BRAKE Lever neutral: COMP ON, MEAS ON Swing: COMP OFF, MEAS OFF	Check swing pressure sensor Check harness Check parking brake release switch
4	Measurement of solenoid valve A2 port	Lever neutral: 0MPa In operation: 4MPa or more	Replace solenoid valve	
5	Swing motor (Brake valve/friction plate)	Visual check	Disassemble and inspect abnormal wear and scuffing	Replace
6	Parking brake	Visual check	Piston and friction plate do not have abnormal resistance against sliding Free from spring damage	Replace

(14)Swing drifts at stopping

No.	Sections	Contents/normal value		Corrective action, others
1	Shuttle valve <Trouble> Pilot pressure is low	Visual check	No contamination on spool cover (short side) and orifice. No damage on spool cover (long side) and shuttle.	Clean or replace
2	Swing pressure sensor	Carry out service diagnosis	-Engine stop & starter key ON All pilot low pressure sensors are within range of 0 to 0.1MPa.	Replace pressure sensor
3	Swing relief valve <Trouble> Relief pressure is low.	Check set pressure	-See Service Diagnosis Data List Operation No.10 Swing full lever and relief	Reset or replace
4	Anti-reaction valve	Visual check	Free from dirt entering Sliding part should be free from foreign matter entering, abnormal damage and wear.	Clean or replace
5	Remote control valve	Check targeted remote control valve	Check that spool is free from abnormal damage and spring is free from breakage	Replace
6	Swing motor	Visual check	Inner parts (cylinder block, piston, valve brake etc) are to be free from abnormal resistance against sliding. Free from abnormal damage, etc on outside surface (brake plate etc)	Replace

Action of optional selector solenoid valve

No.	Engine condition	Safety lock lever SW's input	Safety lock lever relay's output	Work mode	Optional selector valve COMP. MEAS.	Spool position	Selector valve detecting pressure sensor	Warning display	Failure diagnosis display
1	Running	ON	OFF	Nibbler	OFF	Nibbler	Normal	-	-
2	Running	ON	OFF	Nibbler	ON	Breaker	Normal	"SELECTOR VALVE FAILURE"	[F042] displayed simultaneously
3	Running	ON	OFF	Nibbler	OFF	Breaker	Normal	"SELECTOR VALVE FAILURE"	-
4	Running	ON	OFF	Nibbler	ON	Nibbler	Normal	-	[F042] displayed
5	Running	ON	OFF	Breaker	ON	Breaker	Normal	-	-
6	Running	ON	OFF	Breaker	OFF	Nibbler	Normal	"SELECTOR VALVE FAILURE"	[F043] displayed simultaneously
7	Running	ON	OFF	Breaker	ON	N&B	Normal	"SELECTOR VALVE FAILURE"	-
8	Running	ON	OFF	Breaker	OFF	Breaker	Normal	-	[F043] displayed
9	Running	ON	OFF	-	-	-	Failure	"SELECTOR VALVE FAILURE"	[B113] displayed
10	Stopping	-	-	-	-	-	-	-	-
11	-	OFF	-	-	-	-	-	-	-
12	-	-	ON	-	-	-	-	-	-