KOBELCO

SERVICE MANUAL

WHEEL LOADER

LK300A

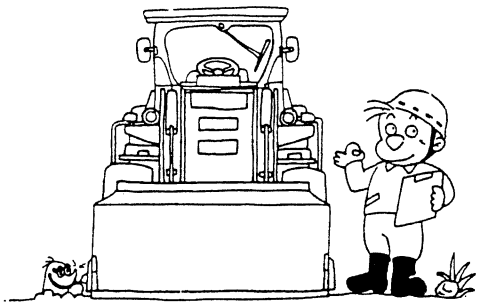
Applicable: S5RL0002E-03 RL-2002~

S5RL0002E-03 02/87

2.2 SPECIFICATIONS

(1) Performance

Bucket capacity		m^3	1.2 (1.6 cu·yd)	
Operating weight		t	6.5 (14,330 lb) (with canopy)	
Operating capacity		t	1.9 (4,189 lb)	
Breakout force		t	5.59 (12,324 lb)	
Bucket raising time		sec	6.3 (with load) 5.8 (no load)	
Bucket lowering time		sec	2.4	
Dumping time		sec	1.6 (no load)	
Traveling speed			F3 · R1	F3 · R3
	Forward km/h (MPH)	1st	0~7.8 (0~4.8)	0~7.2 (0~4.5)
		2nd	0~16.0 (0~9.9)	0~15.4 (0~9.6)
		3rd	0~34.5 (0~21.4)	0~38.0 (0~23.6)
	Backward km/h (MPH)	1st	0~10.0 (0~6.2)	0~8.1 (0~5.0)
		2nd	–	0~17.0 (0~10.6)
		3rd	–	0~41.0 (0~25.5)
Max. tractive force		t	6.05 (13,338 lb)	
Gradeability		degree	30°	
Minimum turning radius	Outer wheel center	mm	4,220 (166.1")	
	Bucket outermost part	mm	4,885 (192.3")	



Model	Applicable Machine No.	Remarks
LK300A	RL-2001 ~	

Revision	Issue Date	Remarks/Book Code No.
First Edition	Oct. 1984	S5RL0201E ®

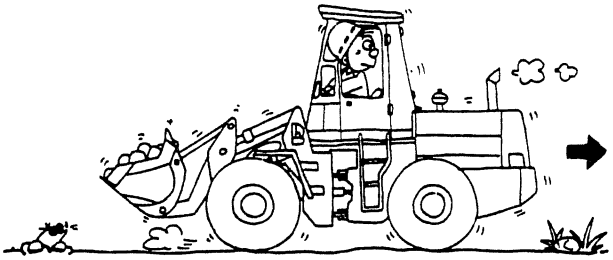


Fig. 3-9 Backing Up

8) If you are experienced in scooping, after step 2), you might try putting the boom lever to "RAISE," moving the loader forward while raising the boom, then rolling back the bucket.

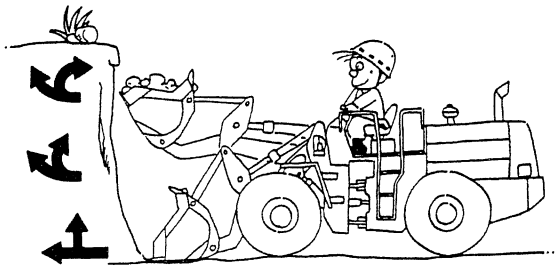


Fig. 3-10

b. Backing Up

Step on the brake pedal, shift the transmission lever into reverse and release the brake pedal; the loader will move backward. Drive only short distances in reverse.

c. Unloading (dumping)

1) Step on the brake pedal, shift into 1st speed forward and release the brake pedal; the loader will go forward. Depress the accelerator pedal to go faster.

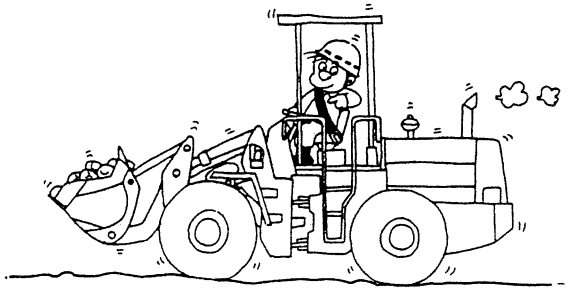


Fig. 3-11

2) Stop the loader in front of the dumping position; raise the bucket by putting the lever into "RAISE."
3) Release the brake after determining the desired dumping position, then slowly move the machine.

WARNING

Any sudden start or stop may cause the fall of load or fall down. Always try to move smoothly.

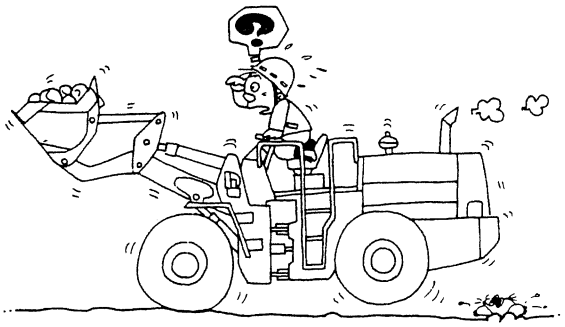


Fig. 3-12

4) Step on the brake pedal and depress slowly near the dumping position to stop the loader.

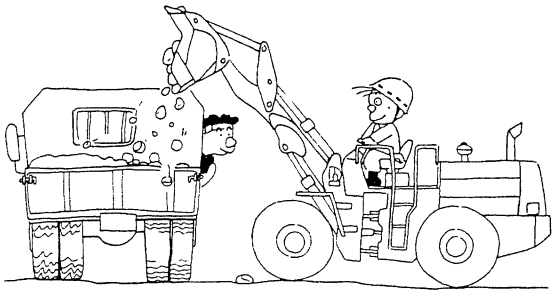


Fig. 3-13 Unloading (Dumping)

5) Shift the dump lever to "DUMP." After dumping, return the lever to "NEUTRAL" (or "ROLL-BACK". If any load is left in the bucket, dump again.

CAUTION

When dumping sand, pebbles or rocks into hoppers or dump trucks, always try to do so slowly and carefully to avoid damaging the equipment or facilities.

NOTE

The separate manual in the frame remarked with book code number is alredy furnished.

HYDRALIC SYSTEM
S5RL1201E①

BOOM CYLINDER

BUCKET CYLINDER

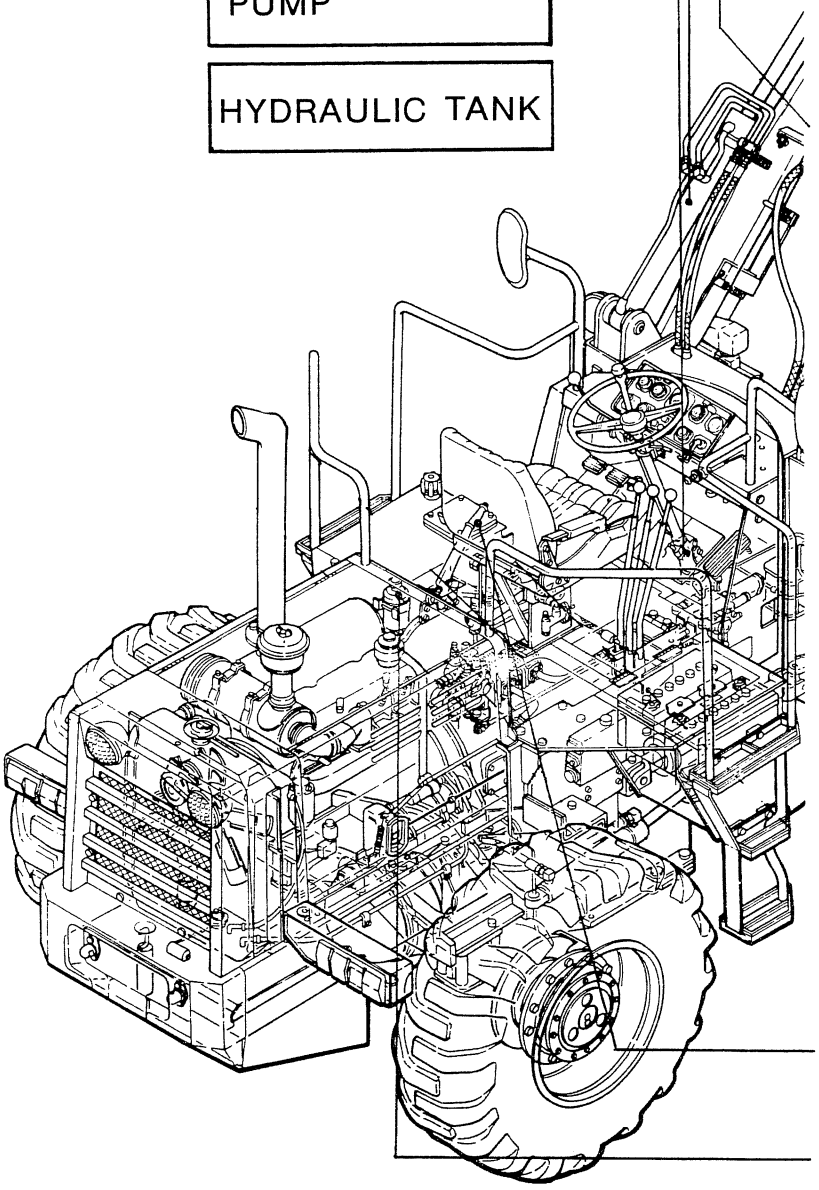
CONTROL VALVE

PUMP

HYDRAULIC TANK

DRAIVE SYSTEM
S5RL1101E

BOOMLINKAGE &
PIVOTPIN
S5RL1601E



(6) Remove the drive shafts connected to the transmission.

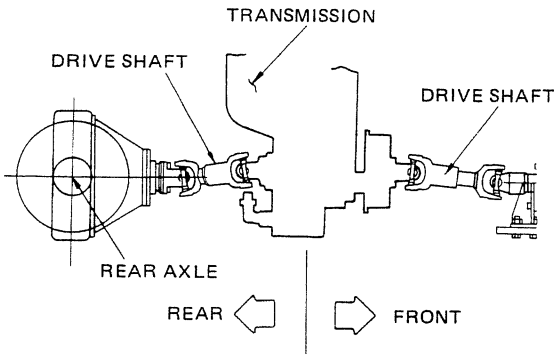


Fig. 3-2 Removing Drive Shafts

(7) Hold the engine/transmission with a crane or hoist.

NOTE

Pass the wire under 2 places on the engine and 2 places on the transmission.

(8) Remove the nut of cap screw (3), fixing the engine's fan side; then remove from the bracket side (11 & 15).

(9) Lift the engine and transmission out of the rear frame.

NOTE

Put match marks on the spacer and rubber found between the engine and the bracket.

(10) After removal, place a support bench beneath torque convertor (9) and the pulley.

(11) Remove cap screw (4), fixing the bracket, from the flywheel cover; then remove brackets (11 & 15) from the transmission.

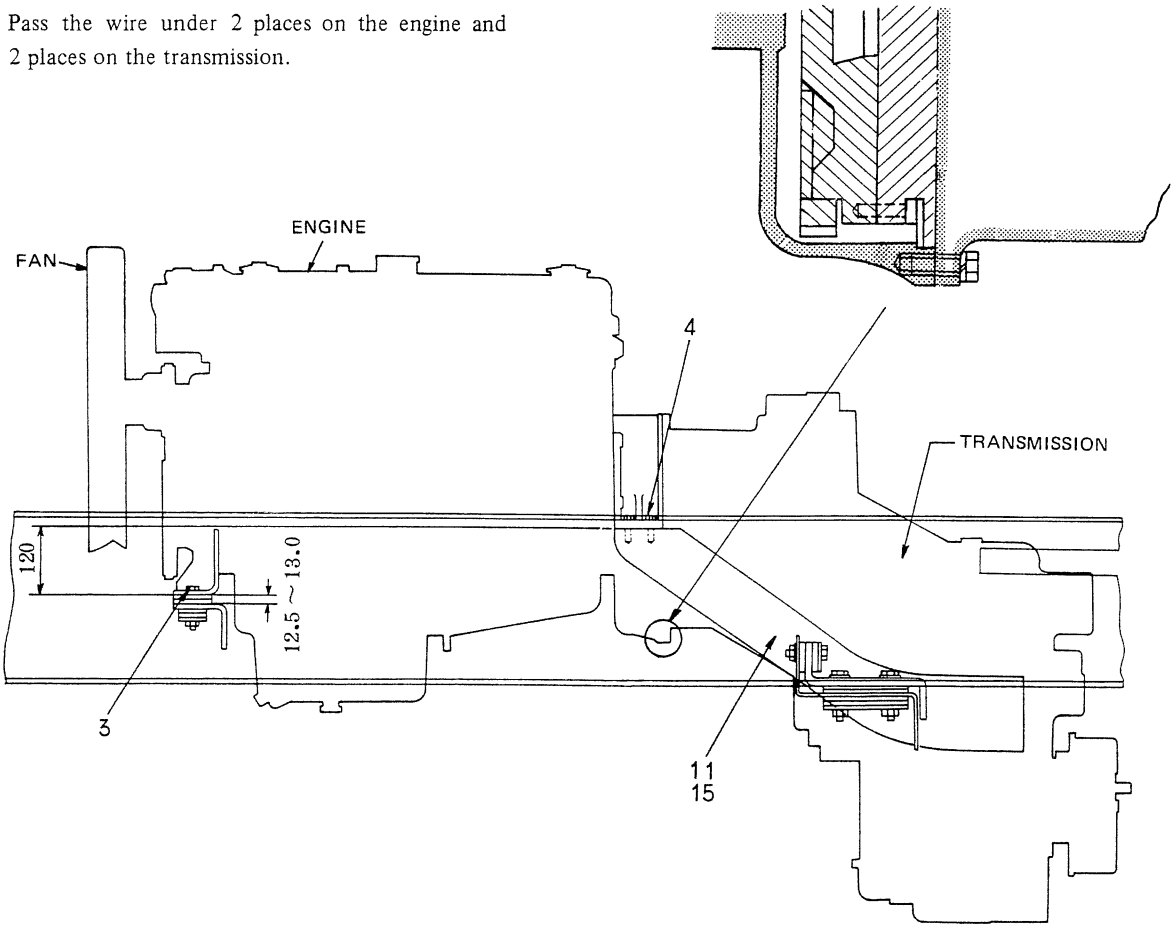


Fig. 3-3

Model	Applicable Machine No.	Remarks
LK300A	RL-2001 ~	

Revision	Issue Date	Remarks/Book Code No.
First Edition	Nov., 1982	S5RL1201E ®
Revised Edition	Dec., 1984	S5RL1201E ① ®

2.2 HYDRAULIC PUMP

2.2.1 REMOVAL

(1) After stopping the engine, stroke the lever several times to purge the remaining pressure.

(2) Remove the floor plate; purge hydraulic oil from the tank until it is below the hydraulic pump supply pipe level.

NOTE

Purge oil through the drain plug of the tank.

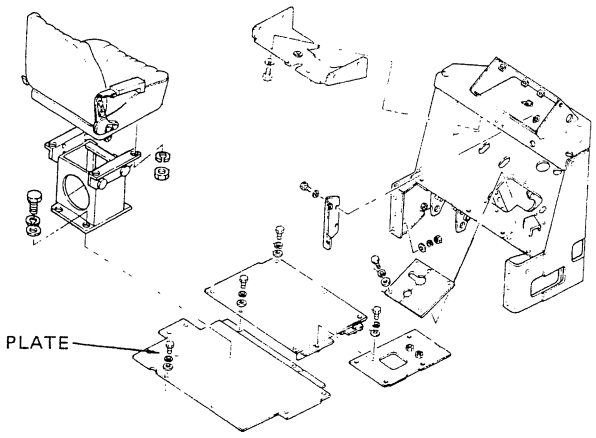


Fig. 2-3 Removing the Plate

(3) Remove all pipes connected to the hydraulic tank.

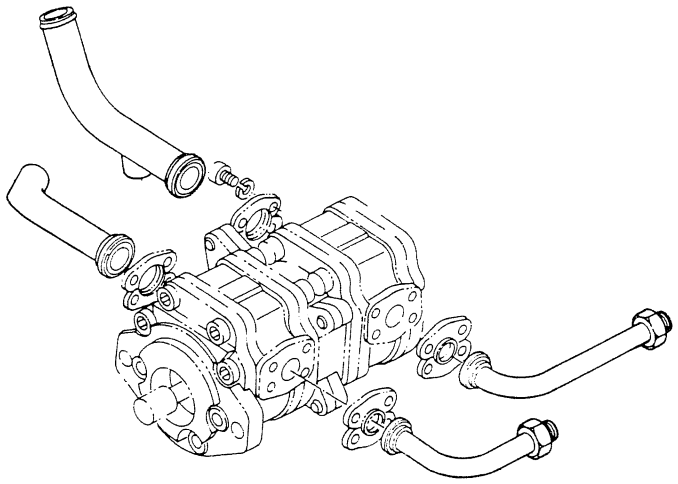


Fig. 2-4 Removing the Pipes

(4) Remove the cap screws fixing the hydraulic pump; then remove the pump from the transmission.

(5) For disassembly/reassembly of the inside of the pump, refer to the separate shop manual.

2.2.2 REINSTALLATION

(1) To reinstall, reverse the order of removal.

(2) Tighten the cap screw fixing the pump to 11.1 to 13.5 kg.m.

(3) Tighten the piping connected to the pump to 4 kg.m.

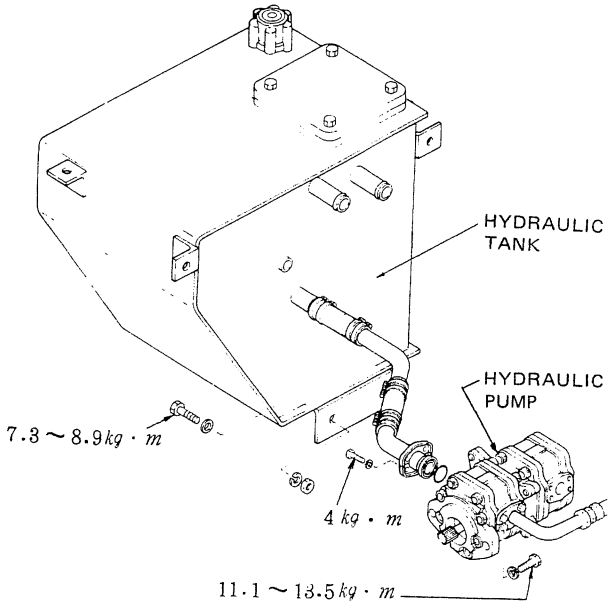


Fig. 2-5 Cap Screw Tightening Torque

(4) Add hydraulic oil to the specified level.

(5) Start by inching the engine with just the cell motor; then keep running at low speed for 5 minutes or so.

(6) If no oil leakage is found, increase the pressure level and check for oil leakage at the final specified pressure level.

NOTE

Increase pressure level in gradual steps.

1.4 ASSEMBLY

Assemble by reversing the order of disassembly.

NOTE

Insert the pins by using a metal punch; remove the grease nipple beforehand.

(1) Alighn the bottom side of the boom cylinders to the front frame, and pass the pins through the shims; then lock the pins.

(2) Alighn the pin holes of the boom and the front frame, and install pins (4).

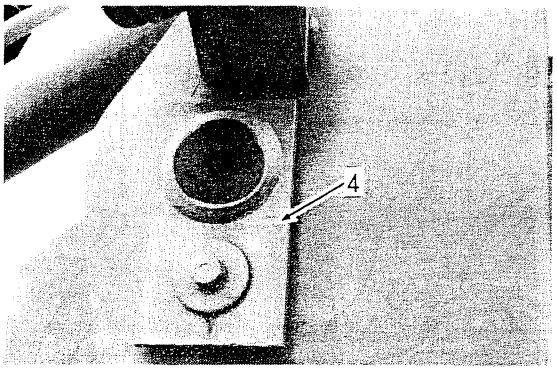


Fig. 1-12 Installing the Boom

(3) Install the boom cylinders to the front frame.

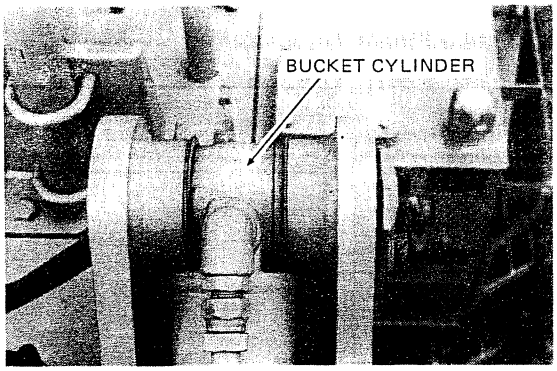


Fig. 1-13

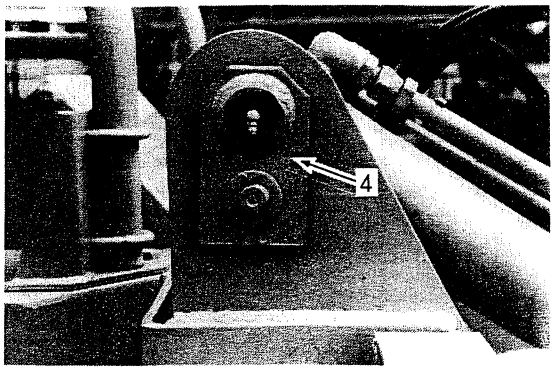


Fig. 1-14

(4) After installing cross links (37 and 38) to the boom, connect the pipings to each cylinder. Extend the bucket cylinders and install them to the cross links, while holding the cross links with the hoist.

Fig. 1-15

(5) Lift the boom by the cross links and extend the boom cylinders in order to install rod-side pins (7) on the boom and the cylinders.

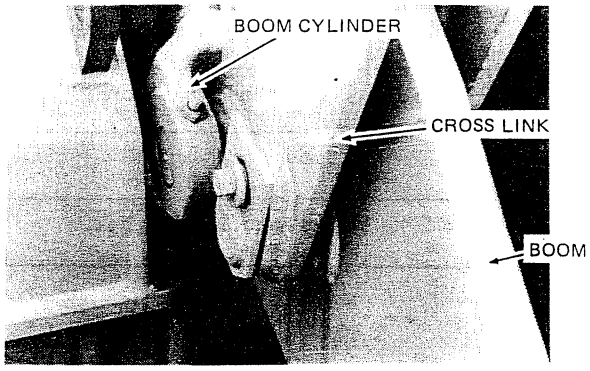


Fig. 1-16

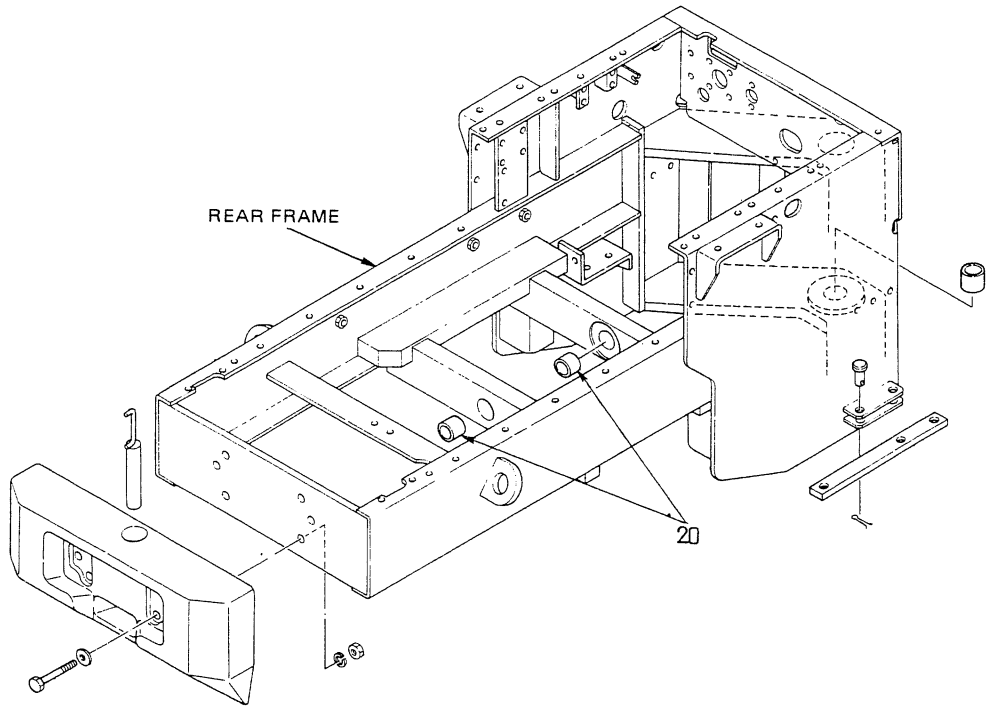


Fig. 3-7

3.2 INSPECTION & MAINTENANCE STANDARDS

(1) Check pins (2) for abnormal wear or scorching; if wear or scorching is within the serviceable limit as shown in Table 3-1, it may be reused. Correct any small dents with an oilstone.

(2) Check to see if the shims are deformed or bent; replace any faulty ones.

Table 3-1

(unit in mm)

Item No. on Fig. 3-4	Name	Standard dimensions	Serviceable limits			Remedy	Remarks
			Pin dia.	Bushing dia.	Clearances		
2	Pin	55.0	54.6		1.0	Replace.	Nick, scorch – Replace.
20	Bushing			56.2			
18	Nut	61 to 75 kg.m	Tightening torque when lubricated.			Retighten.	Using a torque wrench.
19							
3	Dust seal	When removed.				Replace.	

2.2 OPERATION

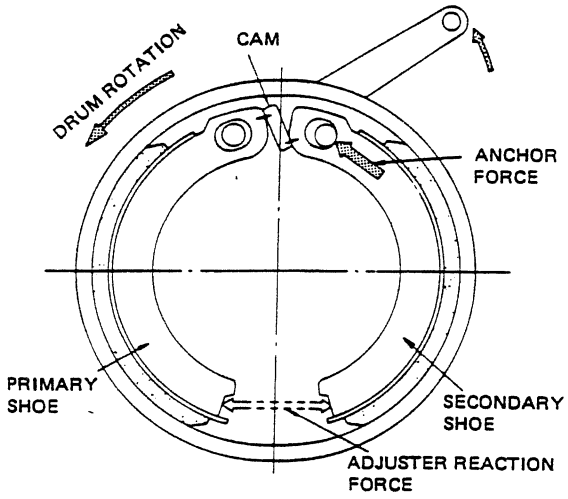


Fig. 2-2

When the brake lever is moved in the direction of the arrow, the cam rotates, pushing the shoes open to the right and left;

2.3 DISASSEMBLY (REFER TO FIGURE 2-1.)

(1) Remove the brake cable yoke from brake cam lever (11).
(2) Remove the front drive shaft along with the yoke.
(3) Remove capscrew (9), and remove brake drum (3).
(4) Remove nut (4), washer (5), O-ring (6), then the front output flange.
(5) Remove capscrew (7) which holds support plate (16) to the transmission, and remove the brake assembly from the transmission.

2.4 DISASSEMBLY AND ASSEMBLY

2.4.1 DISASSEMBLY (REFER TO FIGURE 2-1.)

(1) Remove adjusting spring (20).
(2) Remove adj··· ter from shoe.
(3) Re··· ·turn springs (14).
··· ¹) from the anchor pin.
··· (15).
··· ew which holds down brake
··· aft (12); then remove the
··· spring.
(7) Remove cam shaft (12) from support plate (16).

2.4.2 INSPECTION

(1) SHOES AND LINING

If there is any wear in the lining or deterioration due to excessive heat, then the lining must be replaced.

To what limit a lining may be used can be judged by how much the tip of the head has worn from the outer surface of the lining or whether there are any cuts or chips on the lining shoulder.

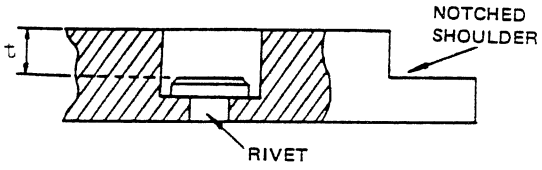


Fig. 2-3 Lining Use Limitations

Use limitations

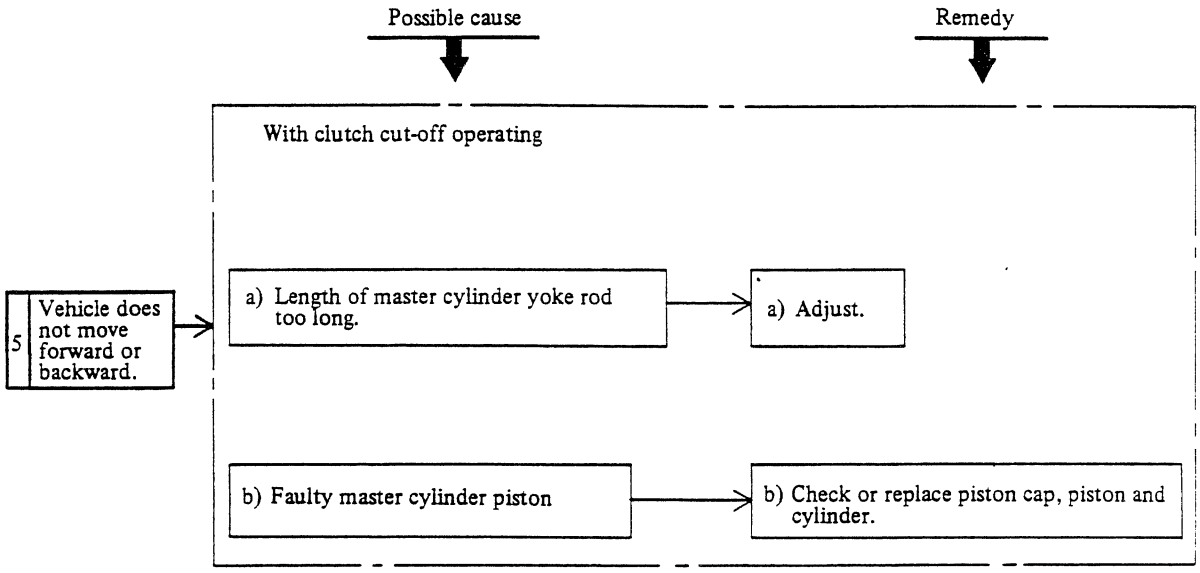
Lining Head Wear (t) . . . . . 0.2 mm
Lining Shoulder Notch Depth 0

(2) DRUM

Inspect the drum surface for damage; cracks, scratches, etc. Scratches can be corrected by sanding and planing. Also, the drum should be out of round by less than 0.05 mm.

(3) RETURN SPRING AND ADJUSTING SPRING

If the two return springs are not the same length (primary and secondary sides) or if the springs' force has weakened or started to rust, they must be replaced.


Possible cause
Remedy
With clutch cut-off operating
5
Vehicle does not move forward or backward.
a) Length of master cylinder yoke rod too long.
a) Adjust.
b) Faulty master cylinder piston
b) Check or replace piston cap, piston and cylinder.

The casing consists of a body and covers (each, the front and the rear). The casing incorporates a pair of gears (the drive gear and the driven gear), 4 bearing housings including special bushing type bearings that support these gears and a pair of wear plates that seal against oil leaking through the side of the gears (see Figure 2-2).

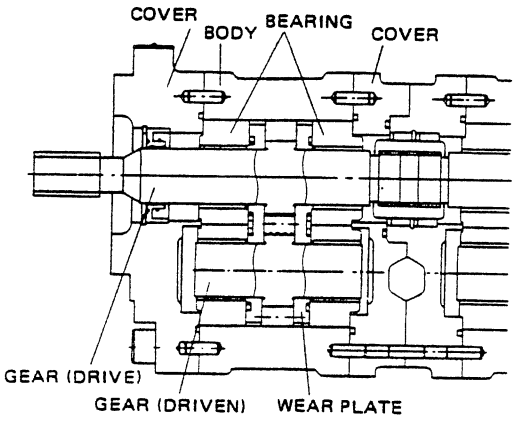


Fig. 2-2

The construction including the main parts in the casing as shown in Figure 2-2 makes the pump free from troubles to be caused by either of the pin and the cover, providing the pump with the high efficiency of the performance stable in long use.

The wear plate is installed with a back-up ring and a seal which form the pressure compensation chamber to be described later. To prevent oil from leaking out, the rear cover is installed with an O-ring, while the front cover is installed with an O-ring and an oil seal as shown in Fig. 2-3.

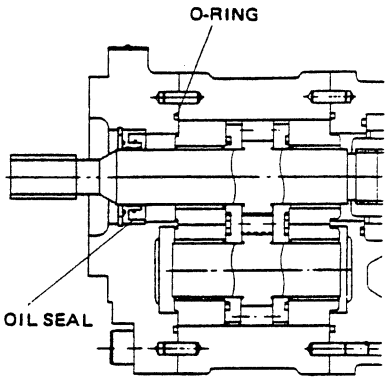


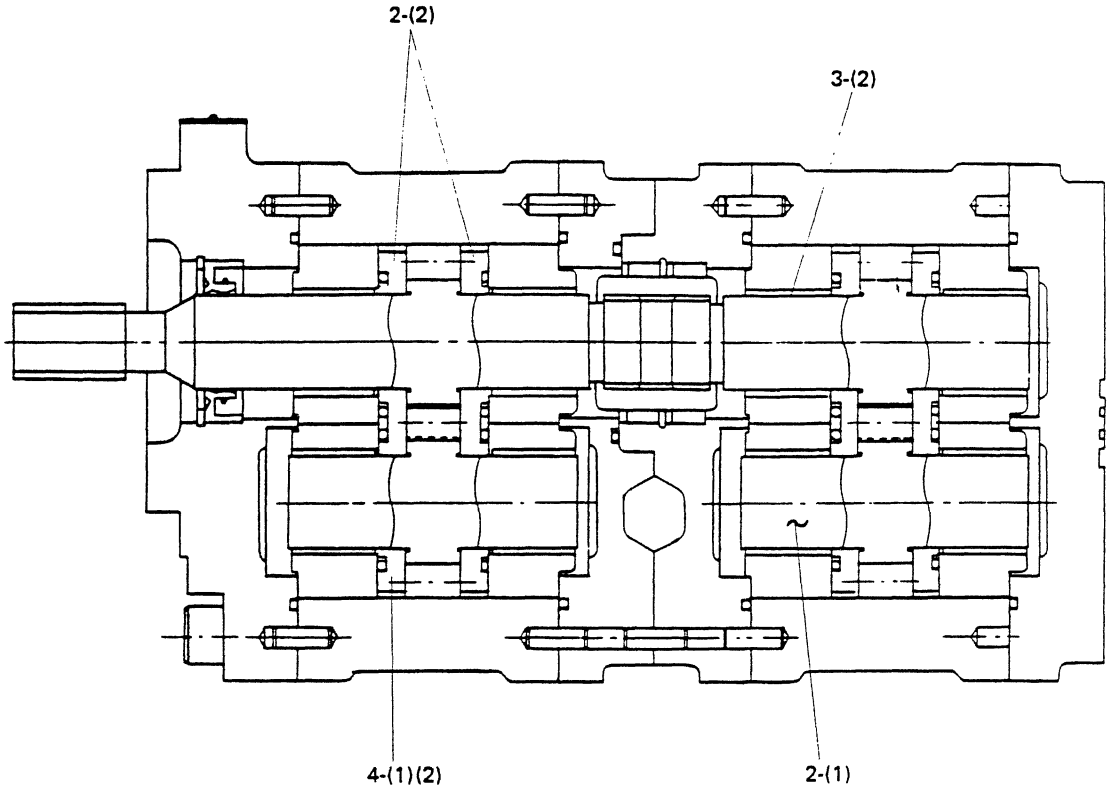
Fig. 2-3

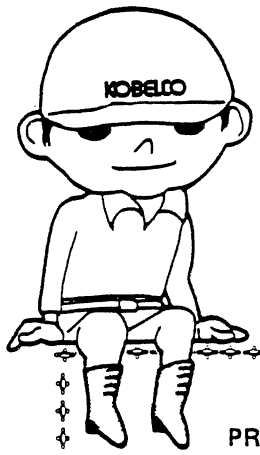
The oil seal 'A' shown in Figure 2-3 is strong enough to stand against wearing and high vacuume, and it prevents the dust from coming in from the outside, the oil from leaking to the outside and suction of the air.

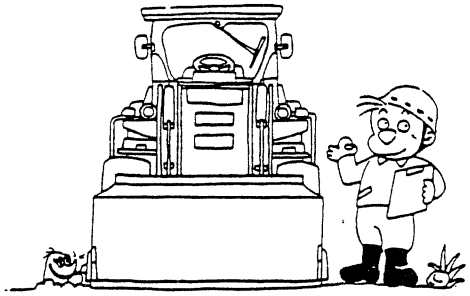
The bearings are of special bushing type having sufficient ability to withstand bearing loads. In addition, the employment of a special lubricating system ensures extended service life of the bearings even in applications under high pressure.

5-2 Maintenance standards

ITEM	PART NAME	REPLACEMENT STANDARD
1	SEALS	All the seals should be replaced with new ones each time the pump is disassembled.
2	GEARS	(1) If the jurnal part of the shaft or the gear part get damages, seizing, exfoliation or pitting, replace the side defective for an assembly. (2) If the gear is worn, in the side, to minimum of 0.01 mm in the difference between the thickness of the gears, replace the side of defective section for an assembly.
3	BEARING (with Bushing)	(1) If the bushing gets damaged with foreign materials entered, replace the damaged section for an assembly. (2) If the inner periphery of the bearing is eccentrically worn to minimum of 0.02 mm or the layer of tefron on the inner periphery of the bushing is exfoliated, replace the side of defective section for an assembly.
4	WEAR PLATE	(1) If the wear plate gets seized or abnormally worn, replace it for an assembly. (2) If the contact surface is with concave and convex respectively minimum of 0.02 mm, replace it.
When parts in Item 2, 3 and 4 are replaced, preliminary running is necessary, using the pump test device. Therefore it is normally recommended that the section in which the inner parts are defective should be replaced for an assembly not for the part single.		







PREFACE

The control valve, located between the hydraulic pump (the source of hydraulic pressure) and the actuator (hydraulic cylinder), controls actuator's functioning and stopping. In wheel loaders, one control valve provided with two plungers controls both bucket and boom section. This valve also houses a relief valve, load check valve and anti-cavitation valve.

Applicable Models	Applicable Machines	Notes
LK300A	RL-2001~	
LK500	RM-1001~	

Revision Number	Date of Issue	Book code No..
1st Edition	Sept., 1983	S5130141E

4.2 Function

(1) Neutral Position (Fig. 4-5)

When the control lever is not operated, the plunger in each section is retained in the neutral position by means of a spring. Each cylinder port is closed by a plunger; pressurized oil from the inlet port passes through the neutral passage, flows into the low-pressure passage and then returns to the hydraulic oil tank.

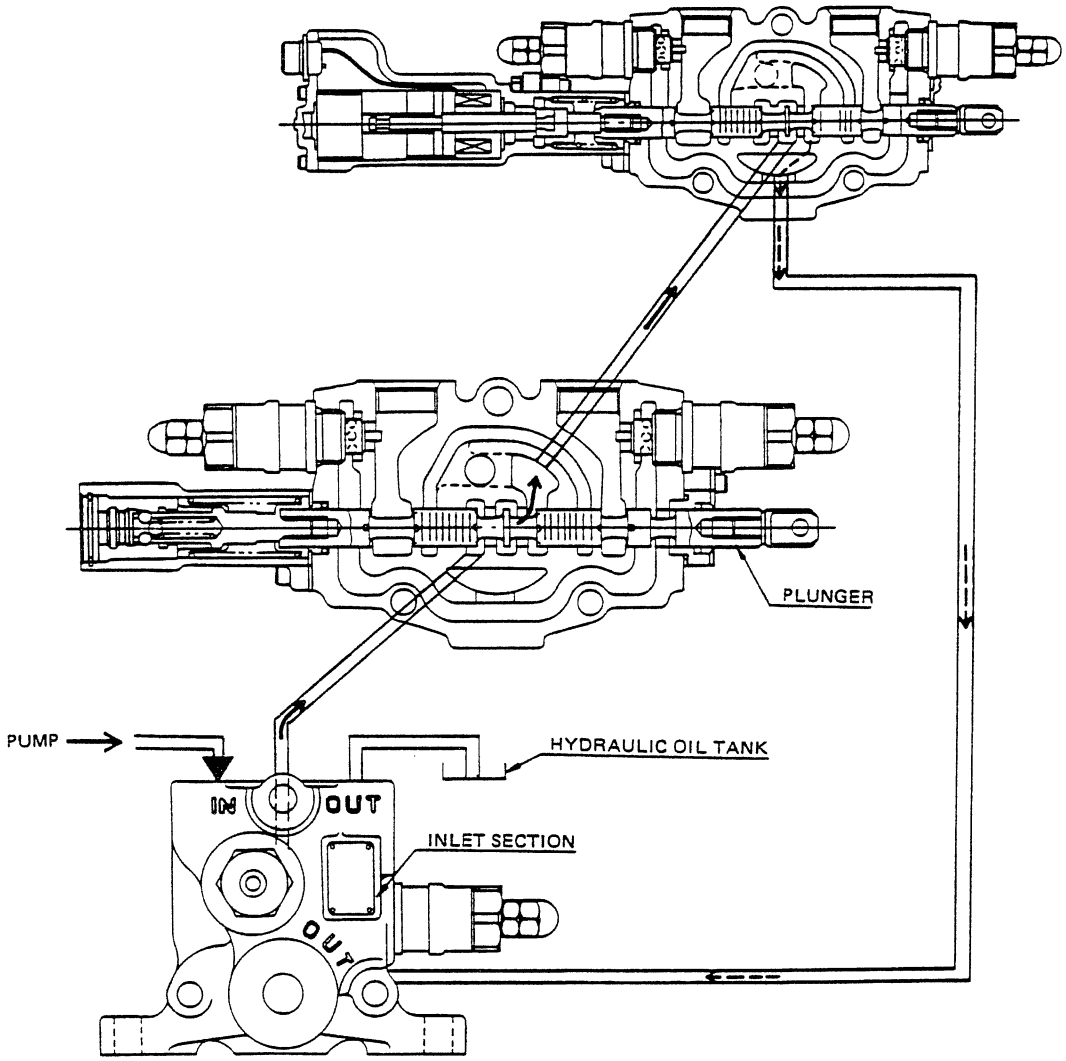


Fig. 4-5

(8) Remove O-ring (16), wiper (17) and the seal plate from the plunger. (Do not disassemble plunger head (11).)

(9) Do not disassemble the detent unit, unless a specific abnormality is observed. Remove the cover by loosening the capscrew as shown in Fig. 5-16.

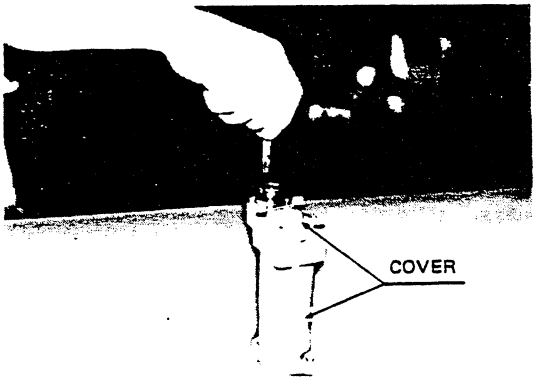


Fig. 5-16

Next, remove the guide and the magnet from inside cover (25) as shown in Fig. 5-17.

Fig. 5-17. Disassembling Detent Unit

(10) Remove port relief valves (32) and (33) by turning them as shown in Fig. 5-18 after attaching an identification label (mating mark), since their set pressures are different.

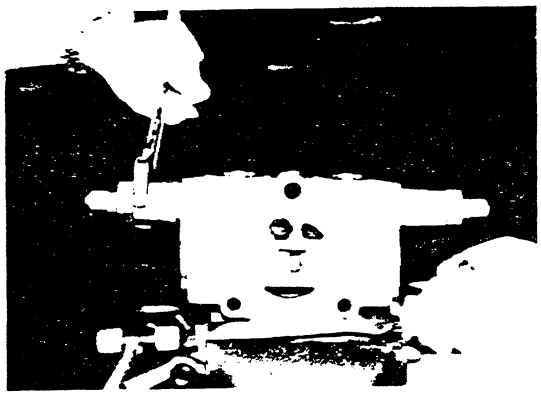


Fig. 5-18. Removing Relief Valve

(11) The port relief valve may be disassembled only with suitable hydraulic test equipment. For its disassembly, see "5.2.4 Disassembling Relief Valve."

5.2.3 Disassembling Boom Section

(1) For removing plunger (37) and port relief valve (51) from valve housing (36), proceed in the same procedure as for the bucket section.

(2) Fix valve housing (36) with a vise using a support plate. Next, take out capscrew (50) and remove the detent unit and plunger (37) as one single body from the housing.

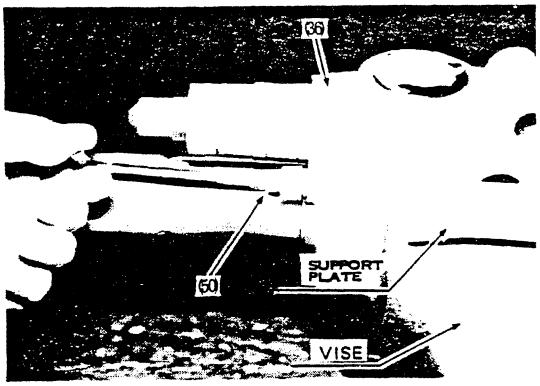


Fig. 5-19

(3) Fix the plunger and remove snap ring (49) using an eyeleteer and spatula, then remove spacer (48).

8.2 Adjustment by Test Equipment

(1) The test equipment required should be able to control the pump supply flow rate between 20ℓ/min and 120ℓ/min, in addition to measuring the flow rate, pressure and temperature.
For details of pressure adjustment, see 8.1 (3)~(6).

(2) The set pressure for each relief valve is as follows. Fig. 8-2 shows the positions for attaching each relief valve.

Valve	Set Pressure (kg/cm²)	Flow Rate Required (ℓ/min)
Main Relief	210	80
Port Relief (A1)	260	30
Port Relief (B1)	120	30
Port Relief (A2)	280	30
Port Relief (B2)	280	30

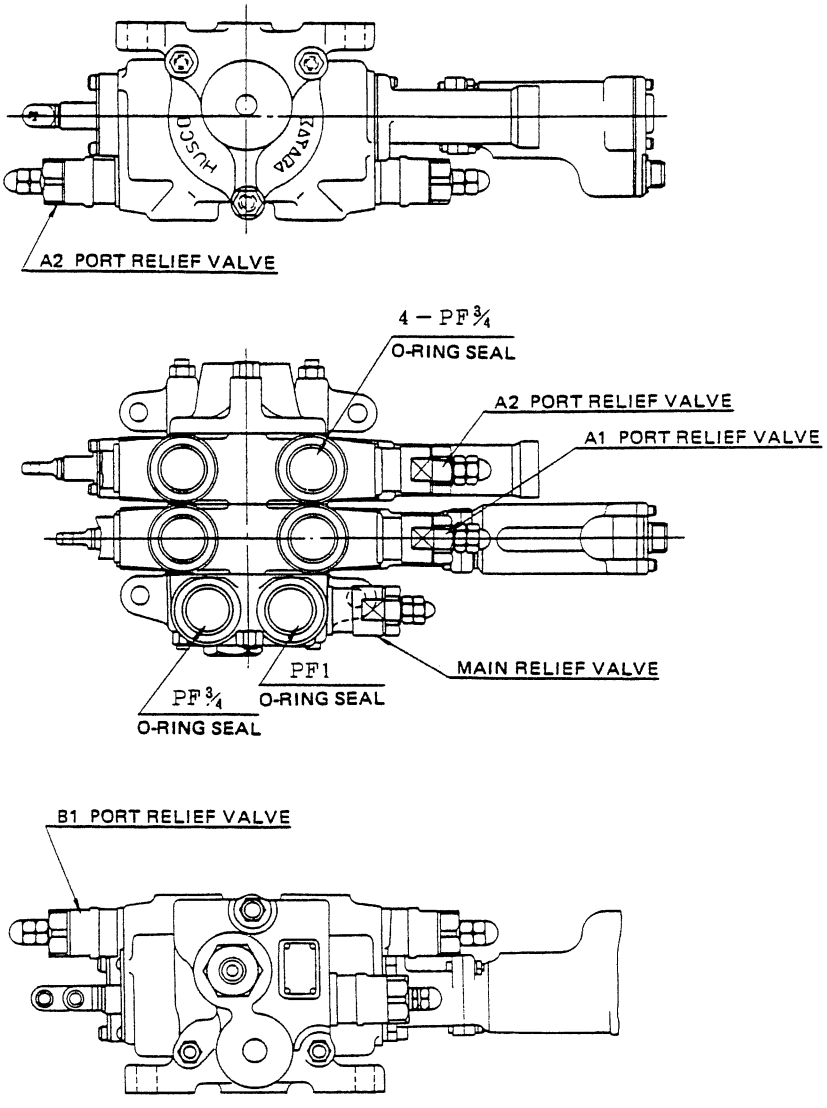


Fig. 8-2

9.4 Leak Tests

(1) Leak Test for Plunger

To check plunger leaks, attach an accurate pressure gauge to the cylinder port to be checked (Fig. 9-16). Operate the plunger to attain the relief set pressure level, then return it to neutral. Any pressure drop may mean plunger leak. It should be noted that these results include internal "leakage" from the cylinder too.

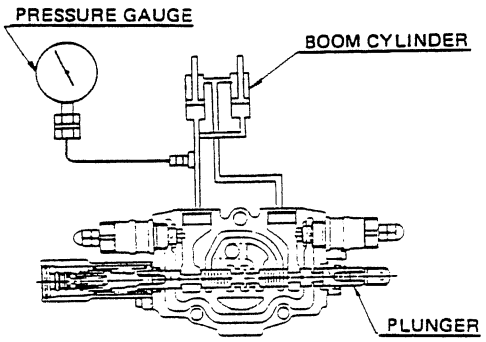


Fig. 9-16

(2) Leak Test for Load Check Valve

Carry out this test in the same manner as (1). Bring the cylinder to top relief pressure level and put the plunger in the functioning position (so that pressure works on the check valve), then stop the hydraulic pump rotation.

Pressure drop of the cylinder port indicates the "amount of leakage" from the load check valve. These results also include that from the plunger.

Leak tests, if carried out with suitable testing equipment, may turn out to be very accurate. (1) and (2) above may be taken as an example of tests with the actual machine.

5. CLEANING AND INSPECTION

5-1. Cleaning

All internal and external parts of the steering gear assembly should be cleaned in a suitable solvent and dried with compressed air. All parts that are to be reused should be coated with a light film of oil.

5-2. Inspection

5-2-1. Inspect the spool and valve housing for signs of damage. If these parts are damaged, the valve body and spool must be replaced as an assembly.

5-2-2. Inspect the centering springs for damage or distorsion. Replace if necessary.

5-2-3. Inspect the plungers for nicks or scratches. Replace if necessary.

5-2-4. Inspect the bearings for smooth turning. Replace if necessary.

5-2-5. Inspect the small and large washers for nicks, scratches and out-of-roundness. Replace if any of these defects are found.

5-2-6. Discard all O-rings. Replace with new ones.

5-2-7. Inspect all needle bearings. The rollers should be smooth, polished and free to turn in their retainer. If bearings show any signs of wear, or damage, replace them.

5-2-8. Examine the steering gear housing for cracks or stripped threads in the cover mounting surfaces. If a column is damaged, replace the housing and column as an assembly.

5-2-9. Check the condition of the upper bearing in the housing. If rollers are damaged or worn, replace them.

5-2-10. Check the upper bearing assembly for wear or distorsion. If necessary, replace.

5-2-11. Examine the side cover for cracks and damage.

5-2-12. Inspect the sector gear for damage, serration or threads. Examine the sector teeth for signs of scuffing or scoring. Check the outside diameter of the shaft. If excessive wear is shown at any of these points, replace the shaft. The grease seal should be removed and replaced if cracked or damaged.

5-2-13. Inspect the bearing areas and thread groove on the worm. If worn or galled, replace the steering shaft and ball nut assembly complete.

5-2-14. Examine the worm ball nut rack teeth for scuffing and scoring. Check the holes and passages for obstructions. Check all worm balls for flat spots, checking wear or damage.

5-2-15. Examine ball guides for distorsion and bent pick up fingers.

6. ASSEMBLY

6-1. Assembly of gear section

6-1-1. Install shaft (3) into ball nut (32), and move the ball nut to the center of the worm as shown in Figure 14.

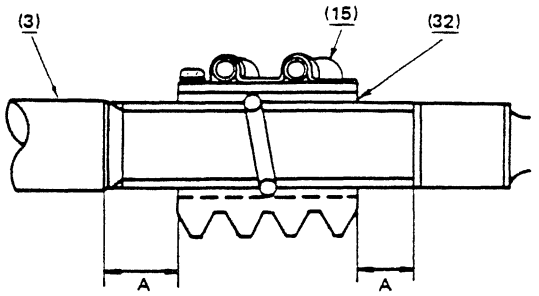


Figure 14.

6-1-2. Coat balls (17) with grease.

6-1-3. Take half of balls (17) and put them into the hole until no more can go in, while turning shaft (3)

NOTE

The procedure above is an important one that determines the machine's valve timing.

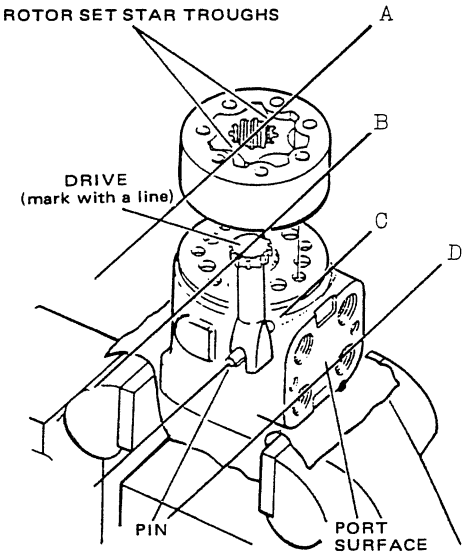


Fig. 3-31

(7) Install the spacer into the rotor set.

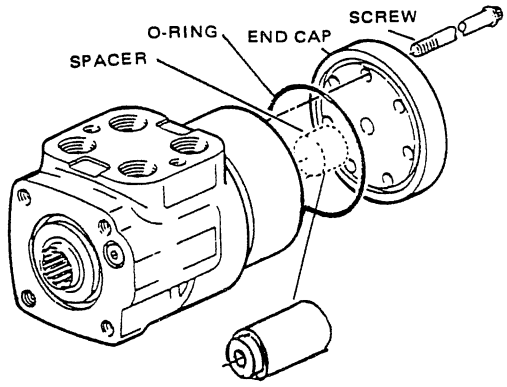


Fig. 3-32

(8) Install the O-ring into the end cap.

(9) Install the end cap onto the rotor set and align the bolt holes of both.

(10) Oil screw threads and install the screws into the end cap bolt holes. First tighten the seven screws to approx. 1.5kgf·m, and then tighten them to 2.6~2.9kgf·m in the order shown in Fig. 3-33.

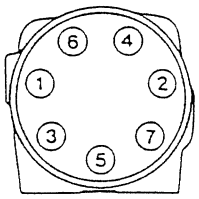
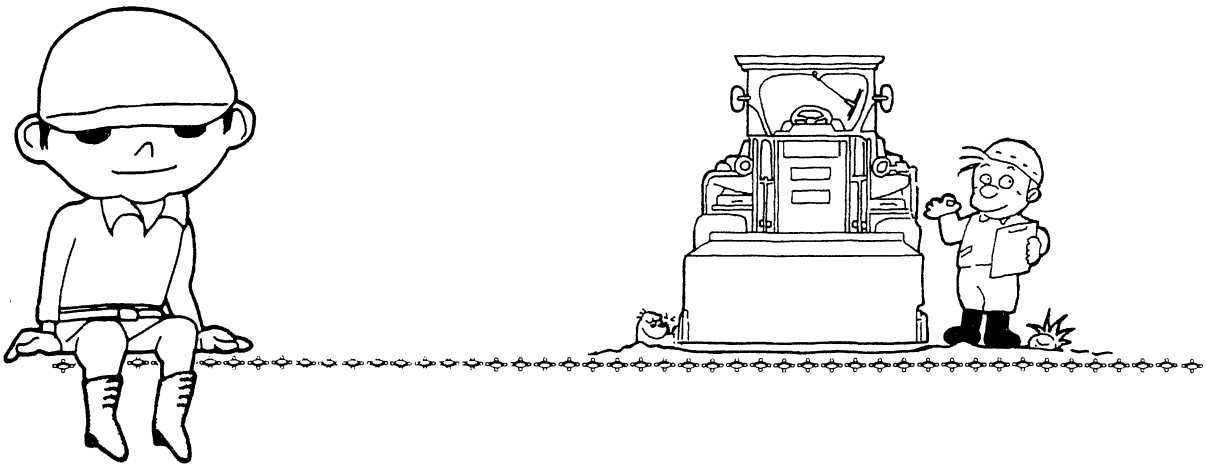


Fig. 3-33

Last, install the steering wheel onto the spool, and check that the spool turns smoothly. Tighten cross-over relief unit with screw (48) to 4kg.m; this completes the reassembly.



Model	Applied Machine No.	Remarks
LK300	RL−1001～	
LK300A	RL−2001～	

Revision	Issue Date	Remarks/Book Code No
First edition	1981	S5RL0800
Revised edition	May, 1983	S5380011E Ⓕ
Revised edition	Feb., 1987	S5380011E① Ⓡ

4-2. Disassembly

After draining brake fluid from the master cylinder section and hydraulic oil from the booster section, remove capscrews (58) and nut (61), and remove the master cylinder section from the booster section.

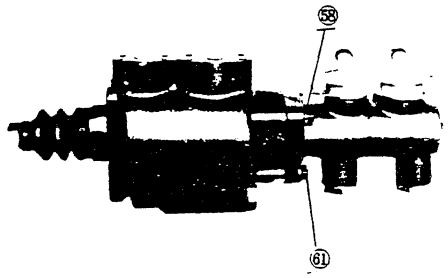


Fig. 4-2. Hydraulic Servo Master Assembly

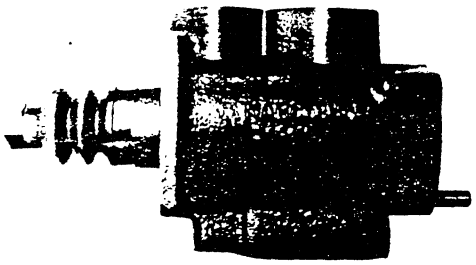


Fig. 4-3. Booster Section

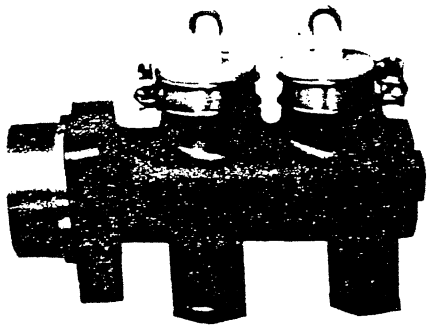


Fig. 4-4. Master Cylinder Section

(1) Booster section

a) Place the booster in a flat place with push rod (5) facing upward.
While pressing push rod (5), remove snap ring (4), and then remove the internal parts from body (1).

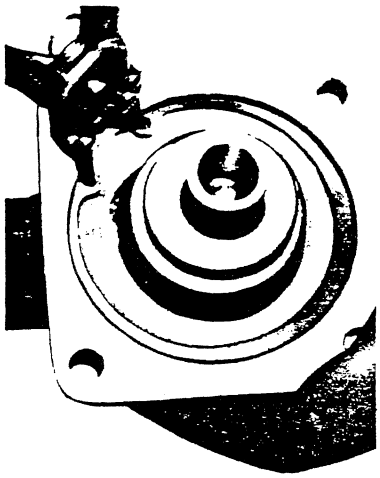


Fig. 4-5. Removal of Snap Ring

Fig. 4-6. Internal Parts

b) Remove piston cup (12) and back-up ring (13) with a spatula or screwdriver taking care not to damage them, and remove assist pin (7) from servo piston (9).

4-6. Installation

(1) Install the rod, nut and yoke to the hydraulic servo master.
(2) Install the hydraulic servo master to the machine.
(3) Adjust the rod so that the length of the rod is shorter by about 0.5mm and connect the yoke to the brake pedal lever with a pin.

If the length of the rod is too long, the flow will be throttled at the cut-out part as explained in section 3-2-1, the master cylinder will be activated and it will cause wear in the brake pads at an early stage.

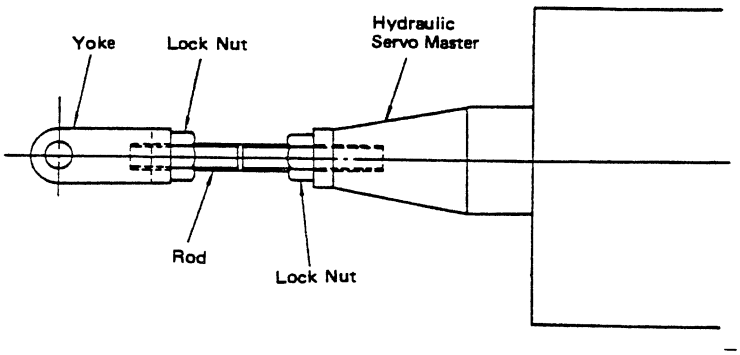


Fig. 4-48. Installation of Yoke and Rod

8203210R

3.5 ASSEMBLY

(1) ASSEMBLY OF THE STEM TO BODY

Lightly coat the outer circumference of the stem and the inner surface of the body with grease, vaseline and slowly push the stem into the body.

CAUTION

Insert the stem slowly. Inserting the stem in vigorously may damage the seal parts. Also, as the clearance between the stem and body is about 0.1mm, assemble this upright in line with the axial center as shown in Fig. 3-10.

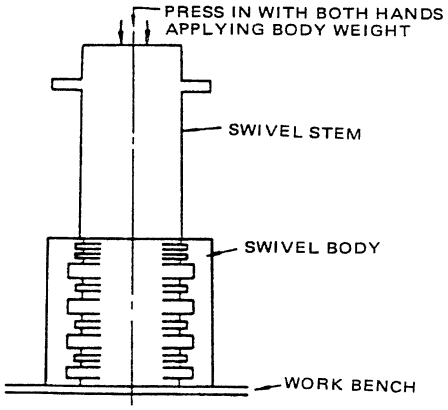


Fig. 3-10 Insertion of the Swivel Stem

(2) ASSEMBLY OF THE THRUST PLATE

As shown in Fig. 3-11, hold the stem and body and match the plate and stem hole by each mating mark. Next, after wiping off oil from the thread part of the bolt, apply Loctite #277 and tighten this to the stem.

Tightening Torque (M8X45) 3.1kg·m

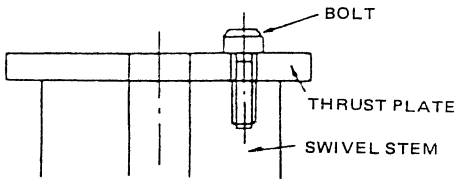


Fig. 3-11

(3) ASSEMBLY OF THE COVER

After installing the O-ring to the cover, match the mating mark of the cover and body and complete assembly by tightening the bolt as shown in Fig. 3-12.

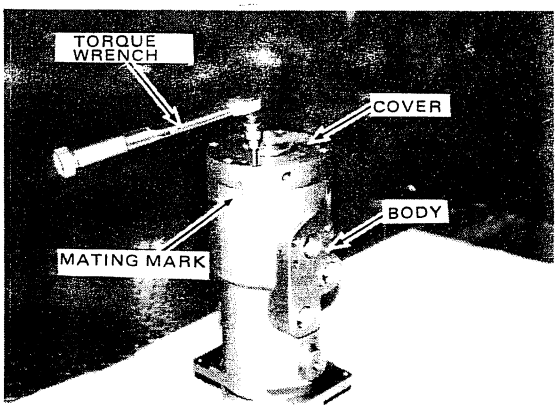


Fig. 3-12

4. WORKING LIMITS

The working limit shown below shows the limit of wear when there are no flaws on the sliding surface of the cylinder body and rod.

4-1 WEAR LIMIT OF OUTER DIAMETER OF PISTON ROD

(A) Cylinders made by Kayaba

Nominal Diameter(mm)	Wear Limit (mm)		Remedy
25–40	Nominal Diameter	–0.12	Replace or Re-plate
45–70		–0.14	
80–120		–0.18	

(B) Cylinders made by NABCO

Nominal Diameter(mm)	Wear Limit (mm)		Remedy
30–50	Nominal Diameter	–0.09	Replace or Re-plate
51–80		–0.10	
81–120		–0.12	
121–180		–0.13	
181–250		–0.15	
For hydraulic shovel, wheel loader	Below 60	–0.06	
	Over 65	±0	

However, regardless of whether the wear is within the above limit, it is not usable if the layer of the hard chrome plated surface has worn out.

4-2 LIMIT OF CLEARANCE OF THE PISTON ROD AND ROD BUSH

(A) Cylinders made by Kayaba

Nominal Diameter (mm)	Standard Clearance (mm)	Maximum Clearance (mm)	Remedy
25–40	0.060–0.234	0.4	Replace
45–70	0.072–0.288	0.5	
80–120	0.153–0.422	0.6	

(B) Cylinders made by NABCO

Nominal Diameter(mm)	DU Bush (mm)	Gun-metal Bush(mm)	Remedy
Below 60	0.30	0.20	Replace
Below 61–120	0.35	0.25	
Over 121	0.40	0.30	
For hydraulic shovel wheel loader	0.25	0.25	

*Since the cylinder construction of NABCO and Kayaba differs, the wear limit for both are different.

4-3 INNER DIAMETERS OF THE CYLINDER BODY AND PISTON RING

(A) Cylinders made by Kayaba

Nominal Diameter (mm)	Standard Clearance (mm)	Maximum Clearance (mm)	Remedy
Below 60	0.05–0.30	0.6	Replace piston ring
65–115	0.05–0.35	0.7	
Over 120	0.05–0.40	0.8	

4-3-1 INNER DIAMETER OF CYLINDER BODY

(A) Cylinders made by NABCO

Nominal Diameter(mm)	Wear Limit (mm)		Remedy
Below 100	Nominal Diameter	+0.2	Replace
Over 101		+0.3	

A cylinder gauge is used to measure the inner diameter of the cylinder body, but to determine only if it is usable or not can be measured by using a brass or copper round bar finished to a nominal diameter +0.2 or nominal diameter +0.3 length and see if it will pass through the body or not.

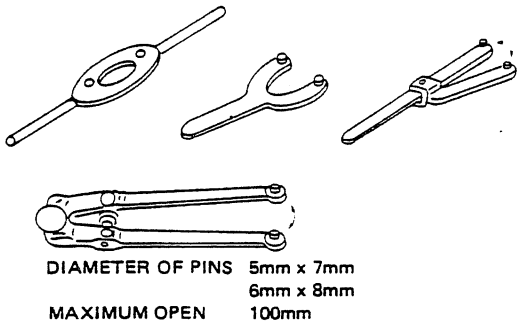


Fig. 5-28

For actual disassembly procedure, this shall be described for the type in Fig. 5-27a, b.

5-2-6 Type (a)

(1) Remove O-rings (23) (25), by pushing A and B with fingers and removing the pried out part with the other hand. Remove back-up ring (24) at this time. (See Fig. 5-29)

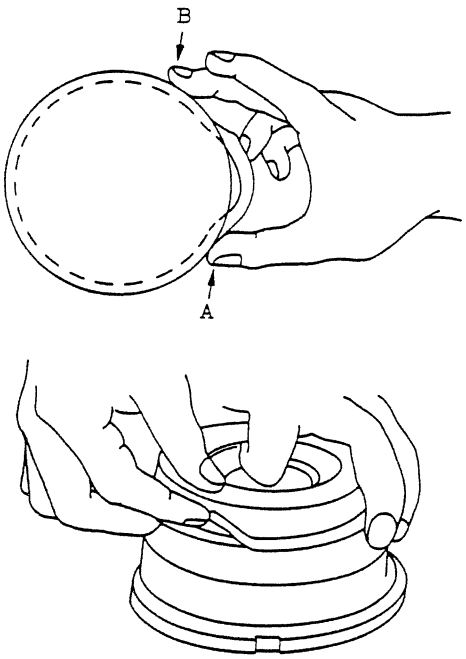


Fig. 5-29

(2) Buffer ring (9) is installed in cylinder head (3) as shown in Fig. 5-30.

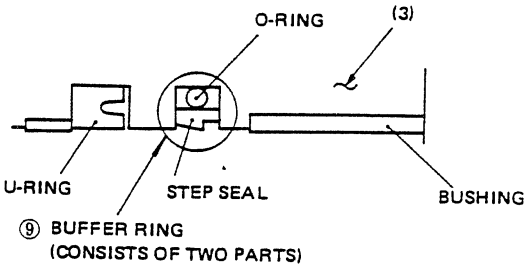


Fig. 5-30

(3) Remove the step seal out of the inside of the cylinder head by hooking up with a gimlet. (See Fig. 5-31)

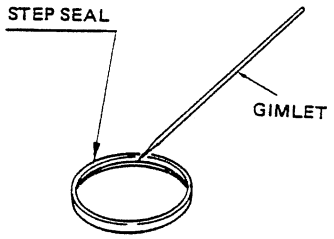


Fig. 5-31

(4) Remove U-ring (5) with the end of the spatula contacted the lip of the U-ring, deforming it inside of the cylinder head. (See Fig. 5-32)

(5) Remove the nylon ring in the same manner as for the step seal.

(6) Remove snap ring (8) with a metal spatula. (See Fig. 5-32).

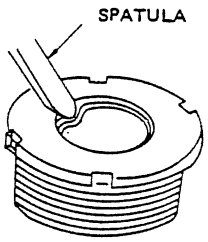


Fig. 5-32 Snap Ring Type

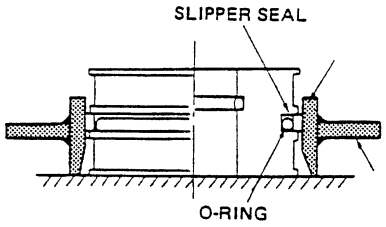


Fig. 8-12

First, install O-ring coated with vasoline or hydraulic oil. As the slipper seal is hard, soak this for about 5 minutes in hydraulic oil heated to 150°–180°C and install it after it becomes soft. This should be performed quickly as it will harden if left for some time. Also, after installation, as the slipper seal is expanded by heat, use a jig to press this while warm as shown in Fig. 8-12.

NOTE

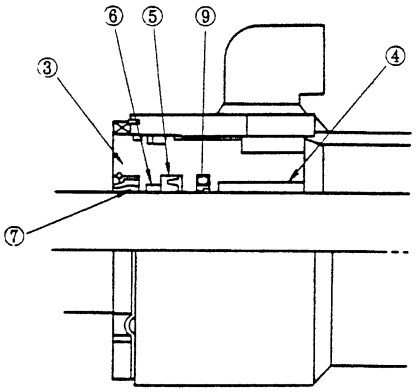
- o Use hydraulic oil with a high flash point for heating and also avoid heating the oil directly with an open flame.
- o After the jig has been removed, wind vinyl tape 2 or 3 times around the outside of the slipper seal to protect the sealed part and to prevent dirt from entering. Do not remove this vinyl tape until the piston is installed into the cylinder body.

(13) Install wear ring (A) by hand. But this is performed when general assembly is performed and so you do not have to install this now.

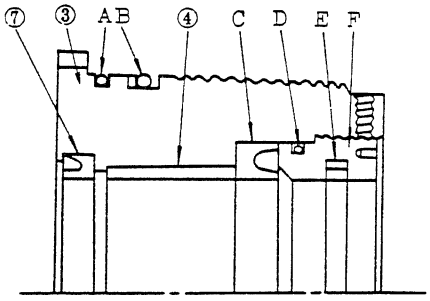
8-4 ASSEMBLY OF THE CYLINDER HEAD

As explained previously, there are various types of cylinder head assemblies and here the description is given for the same type as explained in disassembly. (Fig. 8-13 is the same illustration as Fig. 5-27.)

The actual assembly procedure for the type shown in Fig. 8-13 (a) and (b) is given below.



(a)



(b)

Fig. 8-13

8-4-1 ASSEMBLY OF TYPE (a)

(1) Force press bush (4) into cylinder head (3) with a press.

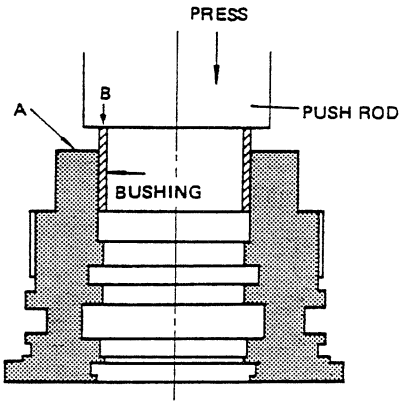


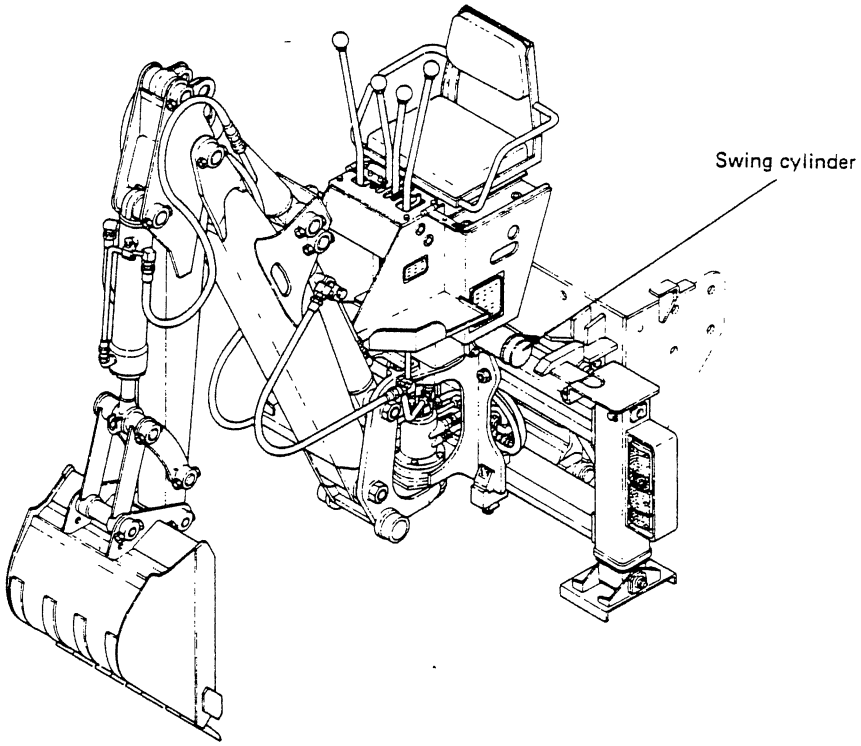
Fig. 8-14

(2) Install buffer ring (9) to cylinder head (3) and then install O-ring into the groove.

INTRODUCTION

This Swing Cylinder Manual has been compiled in addition to the standard Hydraulic Cylinder Manual because the construction of a swing cylinder is different from that of a boom or bucket cylinder.

The Swing cylinder is installed as shown in the illustration below.



Back hoe attachment

6. INSPECTION AFTER ASSEMBLING

6-1 Inspection after assembling

The swing cylinder differs from ordinary cylinders.
When inspecting it, follow the procedures below.

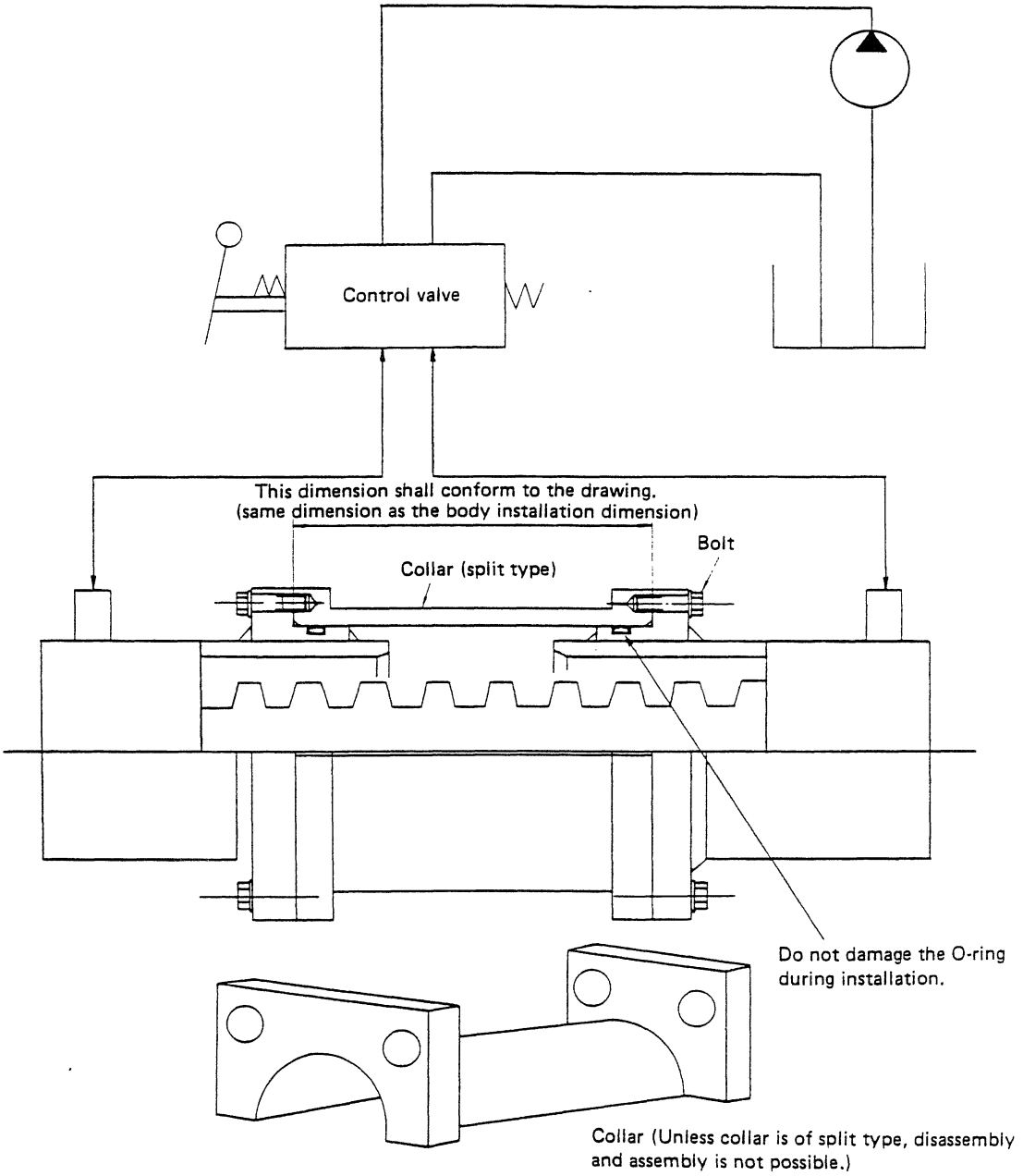


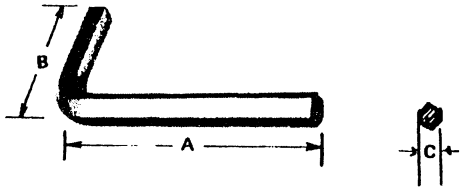
Fig. 6-1

TABLE 2 HYDRAULIC PRESSURE OF CYLINDER (Continued)

CYLINDER DIA. / INSTALLING ANGLE / PUSHING FORCE (kg)	65mm (38.18cm²)					80mm (50.27cm²)					100mm (78.54cm²)					115mm (103.87cm²)					120mm (113.1cm²)				
	90°	75°	70°	65°	60°	90°	75°	70°	65°	60°	90°	75°	70°	65°	60°	90°	75°	70°	65°	60°	90°	75°	70°	65°	60°
30	1·00	1·04	1·07	1·11	1·16																				
40	1·34	1·39	1·42	1·48	1·55																				
50	1·67	1·73	1·78	1·85	1·93	1·11	1·14	1·18	1·22	1·28															
60	2·01	2·08	2·14	2·22	2·32	1·33	1·37	1·41	1·46	1·53															
70	2·34	2·43	2·49	2·59	2·71	1·55	1·60	1·65	1·71	1·79															
80	2·68	2·77	2·85	2·96	3·09	1·77	1·83	1·88	1·95	2·04	1·13	1·17	1·20	1·25	1·31										
90	3·01	3·12	3·20	3·33	3·48	1·99	2·06	2·12	2·20	2·30	1·27	1·32	1·36	1·41	1·47										
100	3·35	3·47	3·56	3·69	3·87	2·21	2·29	2·35	2·44	2·55	1·42	1·46	1·51	1·56	1·63	1·07	1·11	1·14	1·18	1·24	0·982	1·02	1·05	1·08	1·13
120	4·02	4·16	4·28	4·44	4·64	2·66	2·74	2·82	2·92	3·06	1·70	1·76	1·81	1·87	1·96	1·28	1·33	1·37	1·42	1·48	1·18	1·22	1·25	1·30	1·36
150	5·02	5·20	5·35	5·54	5·80	3·32	3·43	3·53	3·66	3·83	2·12	2·20	2·26	2·34	2·45	1·61	1·66	1·71	1·77	1·85	1·47	1·53	1·57	1·63	1·70
200	6·70	6·93	7·13	7·39	7·73	4·42	4·58	4·70	4·88	5·11	2·83	2·93	3·01	3·12	3·27	2·14	2·21	2·28	2·36	2·47	1·97	2·03	2·09	2·17	2·27
250	8·37	8·67	8·91	9·23	9·67	4·53	5·72	5·88	6·10	6·38	3·54	3·66	3·77	3·90	4·08	2·68	2·77	2·85	2·95	3·08	2·45	2·55	2·62	2·71	2·83
300	10·0	10·4	10·7	11·1	11·6	6·63	6·87	7·06	7·32	7·66	4·24	4·39	4·52	4·68	4·90	3·21	3·32	3·41	3·54	3·71	2·95	3·05	3·14	3·25	3·40
350	11·7	12·1	12·5	12·9	13·5	7·74	8·01	8·23	8·54	8·94	4·94	5·13	5·27	5·46	5·72	2·75	3·87	3·99	4·13	4·32	3·44	3·56	3·66	3·80	3·97
400	13·4	13·9	14·2	14·8	15·5	8·84	9·15	9·41	9·76	10·2	5·66	5·86	6·02	6·24	6·53	4·28	4·43	4·55	4·72	4·94	3·93	4·07	4·18	4·34	4·54
500	16·7	17·3	17·8	18·5	19·3	11·1	11·4	11·7	12·2	12·8	7·07	7·32	7·53	7·81	8·17	5·35	5·55	5·69	5·90	6·18	4·91	5·09	5·23	5·42	5·67
600	20·1	20·8	21·4	22·2	23·2	13·3	13·7	14·1	14·6	15·3	8·49	8·79	9·03	9·37	9·86	6·42	6·64	6·83	7·08	7·42	5·89	6·10	6·27	6·50	6·81
700	23·4	24·3	24·9	25·9	27·1	15·5	16·0	16·5	17·1	17·9	9·90	10·3	10·5	10·9	11·4	5·49	7·75	7·96	8·26	8·65	6·88	7·12	7·32	7·59	7·94
800	26·8	27·7	28·5	29·6	30·9	17·7	18·3	18·8	19·5	20·4	11·3	11·7	12·1	12·5	13·1	8·56	8·86	9·11	9·44	9·88	7·86	8·14	8·36	8·67	9·08
1000	33·5	34·7	35·6	36·9	38·7	22·1	22·9	23·5	24·4	25·5	14·2	14·6	15·1	15·6	16·3	10·7	11·1	11·4	11·8	12·4	9·82	10·2	10·5	10·8	11·3
1200	40·2	41·6	42·8	44·4	46·4	26·6	27·4	28·2	29·2	30·6	17·0	17·6	18·1	18·7	19·6	12·8	13·3	13·7	14·2	14·8	11·8	12·2	12·5	13·0	13·6
1600	53·6	55·4	57·0	59·2	61·8	35·4	36·6	37·6	39·0	40·8	22·6	23·4	24·2	25·0	26·2	17·1	17·7	18·2	18·9	19·8	15·7	16·3	16·7	17·3	18·2
1800	60·3	62·4	64·1	66·5	69·6	39·8	41·2	42·3	43·9	45·9	25·5	26·3	27·2	28·1	29·4	19·3	20·0	20·5	21·2	22·3	17·7	18·3	18·9	19·5	20·4
2000	67·0	69·3	71·3	73·9	77·3	44·2	45·8	47·0	48·8	51·1	28·3	29·3	30·1	31·2	32·7	21·4	22·1	22·8	23·6	24·7	19·7	20·3	20·9	21·7	22·7
2300	77·0	79·7	82·4	85·0	88·9	50·8	52·7	54·1	56·1	58·8	32·5	33·7	34·6	35·9	37·6	24·6	25·4	26·2	27·1	28·4	22·7	23·4	24·0	25·0	26·1
2500	83·7	86·7	89·1	92·3	96·7	55·3	57·2	58·8	61·0	63·8	35·4	36·6	37·7	39·0	40·8	26·8	27·7	28·5	29·5	30·8	24·5	25·5	26·2	27·1	28·3
2700	90·2	93·4	96·1	99·9	104	59·9	61·6	63·7	65·9	69·1	38·2	39·5	40·7	42·2	44·1	28·9	29·9	30·7	31·9	33·4	26·5	27·5	28·2	29·3	30·6
3000	100	104	107	111	116	66·3	68·7	70·6	73·2	76·6	42·4	43·9	45·2	46·8	49·0	32·1	33·2	34·1	35·4	37·1	29·5	30·5	31·4	32·5	34·0
4000	134	139	143	148	155	88·4	91·5	94·1	97·6	102	56·6	58·6	60·2	62·4	65·3	42·8	44·3	45·5	47·2	49·2	39·3	40·7	41·8	43·4	45·4
5000	167	173	178	185	193	111	114	118	122	128	70·7	73·2	75·3	78·1	81·7	53·5	55·3	56·9	59·0	61·8	49·1	50·9	52·3	54·2	56·7

2. TOOL LIST (Continued)

2.10 ALLEN WRENCH [AW]



MATERIAL: ALLOY STEEL PARKERIZED
(CHROMIUM-MOLYBDENUM STEEL OR NICKEL-CHROMIUM-MOLYBDENUM STEEL)

TOOL NO.	C	A	B	FOR HEXAGON SOCKET BOLT	FOR HEXAGON SOCKET SCREW
AW－1.4～1.5	1.4 ～ 1.5	52	8		3
AW － 2	2	58	12		4
AW－2.4～2.5	2.4 ～ 2.5	60	15	3	5
AW － 3	3	65	20	4	6
AW － 4	4	72	25	5	8
AW － 5	5	80	28	6	10
AW － 6	6	90	32	8	12·14
AW － 7	7				
AW － 8	8	100	36	10	16·18
AW － 9	9				
AW － 10	10	112	40	12	20
AW － 12	12	125	45	14	
AW － 14	14	140	55	16·18	
AW － 17	17	160	60	22·24	
AW － 16	16(5/8)	〃	〃		
AW － 19	19(3/4)	175	70	27·30	
AW － 21	21	200	80	22·24	
AW － 22	22	205	〃	30	
AW － 24	24	230	90	33	
AW － 26	26	250	100	39·42·45	
AW － 27	27	260	110	36·39	
AW － 32	32	315	125	48	
AW － 36	36	320	130	48·52	

NOTE: This Allen Wrench is a purchase tool.

3. SPECIFICATIONS TABLE

3.5 LK1500.A WHEEL LOADER

MODEL	LOCATION	PART NUMBER	OUTSIDE DIMENSION (mm)			WEIGHT (kg)	TIGHTENING TORQUE (kg.m)				LIMIT OF SERVICE OF MOUNTING HOLE (BUSHING) (mm)		TOOL				SPECIAL TOOL				
			Width	Length	Height		Cylinder Head		Piston Nut	Piston			For Cylinder Head	For Piston Nut	For Piston	For Holder Ring Stopper	For Mounting Hole Bushing	For Piston Rod Ass'y	For Slipper Seal		For Dust Seal
							Body	Seal Holder			Rod End	Cylinder End							Insert	Hold	
LK1500 LK1500A	BOOM	W38K0001	440	1720	380	520	50 ~ 73	15 ~ 20	1050 ~ 1500	–	151.5	159.4	P –26 SS–32	SS–120	–	U–13	A–17	–	–	–	E–22
		2438U266	440	1720	380	520	50 ~ 73	15 ~ 20	200	100	151.5	159.4	P –26 SS–32	SS–145	P–29	U–13	A–17	–	–	–	E–20
	BACKET	W38K0002	250	1660	310	225	12 ~ 18	15 ~ 20	500	–	96.0	96.0	P –18 SS–24	SS– 90	–	U–12	A–13	–	–	–	E–14
		2438U267	250	1660	310	225	12 ~ 18	15 ~ 20	100	70	96.0	96.0	P –18 SS–24	SS–100	P–24	U–12	A–13	–	–	–	–
		2438U418	265	1680	310	260	22.5 ~ 32.9	15 ~ 20	100	70	96.0	96.0	AW–17	SS–100	P–24	U–12	A–13				–
	STEERING	W38K0003	180	1438	275	110	43.9 ~ 59.4	8 ~ 10	295 ~ 431	–	NO BURN (Spherical Bushing)		SS–135 FS–54 P –12	SS– 70	–	U–10	S–9	B–48	–	–	E–11

2. PROCEDURES FOR ADDING AND REMOVING LIQUID BALLAST

2.1 ADDING AND REMOVING LIQUID BALLAST

a) To facilitate filling, raise the liquid to a height of 3m or above. (If a calcium chloride solution is not required, city water can be used as it is.)

b) To remove completely load on the tire, jack up the body.

c) Rotate the tire to bring the valve stem to the top, and remove all the air.

d) Remove the valve cap and core housing, then pump the liquid under pressure using the filler.

e) When the liquid reaches the valve level, stop pumping and install the valve core housing.

f) Inflate the tire with air to the standard air pressure.

(2) Removing

a) Thoroughly remove all the load on the tire by jacking the body up to a level where the tire is free to rotate.

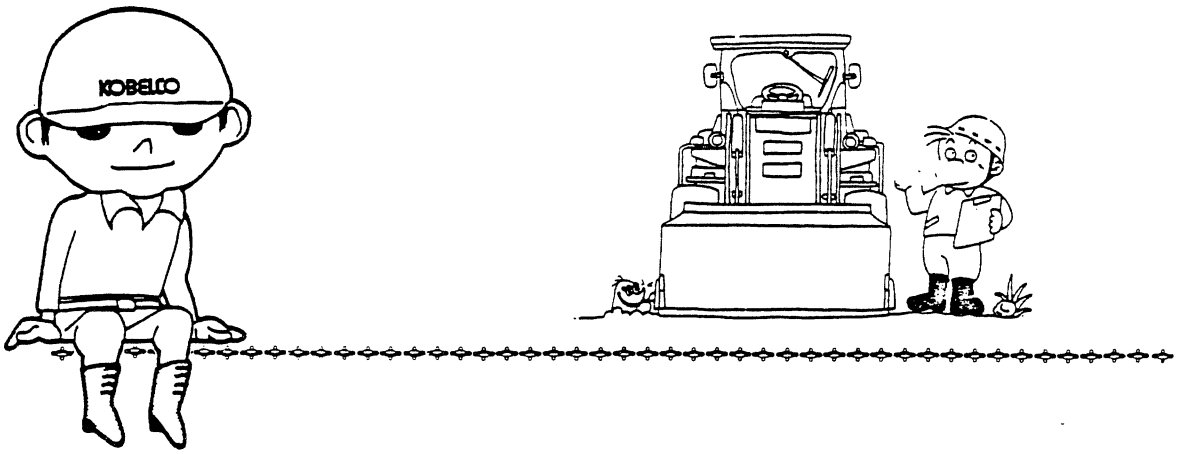
b) Position the valve stem at the top and remove the valve core.

c) Turn the tire so that the valve stem is at the bottom, and remove the valve core housing to remove the liquid.

d) After draining is completed, install the valve core housing and fill the tire with air.

2.2 ADDING LIQUID THROUGH AIR VALVE

For tubes that have only an air valve, and are not equipped with an air-water valve, liquid may still be injected into the tire by using a separately prepared water adapter.



Model	Applied Machine No.	Remarks
LK300	RL-1001 through 1999	
LK300A	RL-2001 through	

Revision	Issue Date	Remarks/Book Code No.
First edition	1981·2	S5RL0101E
Revised edition	1983·2	S5220301E

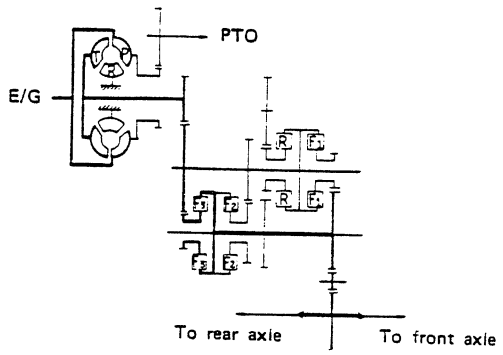
2-3-3. 3rd Forward Speed (F3) Clutch

Fig. 2-6 shows the torque transmission diagram in the 3rd forward speed.

By positioning the selector lever in the 3rd forward speed, the hydraulic system applies pressure on the right side of the piston of the 3rd forward speed clutch through the oil hole bored in the counter shaft.

The piston overcomes the return-spring force and moves left to engage the clutch.

By engaging the clutch, the torque from the turbine driven gear is transmitted to the transfer drive gear through the 3rd forward speed driven gear, clutch, counter shaft clutch hub and counter shaft.



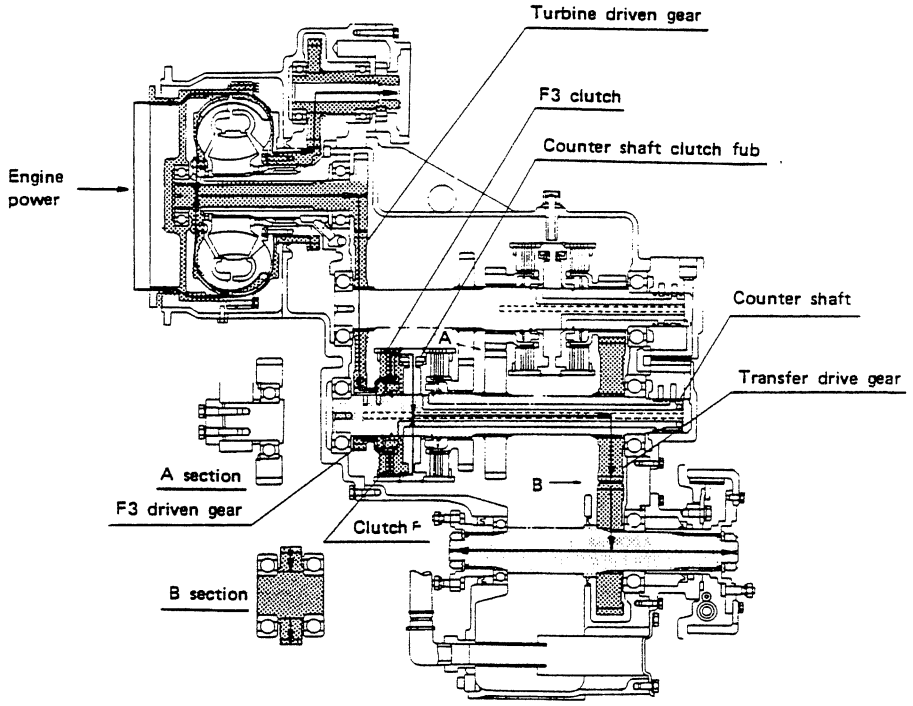


Fig. 2-6.

provided at the right rear of the transmission. (Refer to Fig. 3-1.)

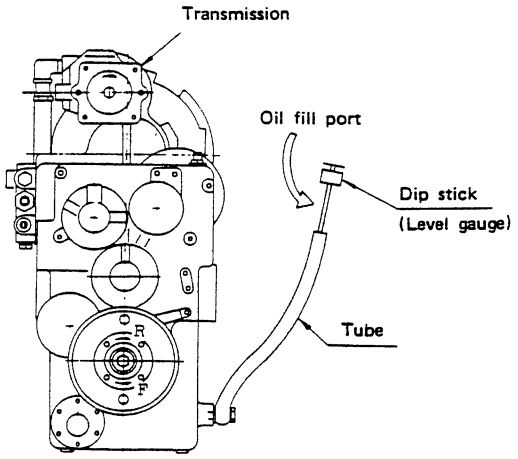


Fig. 3-1.

(1) Check while the engine is cold. (Refer to Fig. 3-2)

a) Do not fail to check the oil level before starting the engine. If the level reaches the upper line of the dip stick, the engine may be started. If the level is below the upper line, add oil until the level reaches the upper line.

b) Run the engine for two minutes with the transmission in neutral at an idling speed (approx. 700rpm), allowing oil to circulate throughout the hydraulic system. Check the oil level again to make sure it is not below the lower line of the dip stick.

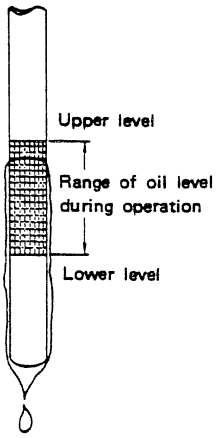


Fig. 3-2. Dip Stick

(2) Check during warming up (Refer to Fig. 3-2)
Ensure that the oil level is at the upper line of the dip stick when the torque converter outlet oil temperature is about 90°C with the transmission in neutral and the engine idling.

3-3-2. Changing the Oil and Filter

(1) Draining oil
To change the oil, raise the transmission oil temperature to about 80°C and remove the drain plug at the front bottom of the transmission. Take sufficient time to thoroughly drain the oil.

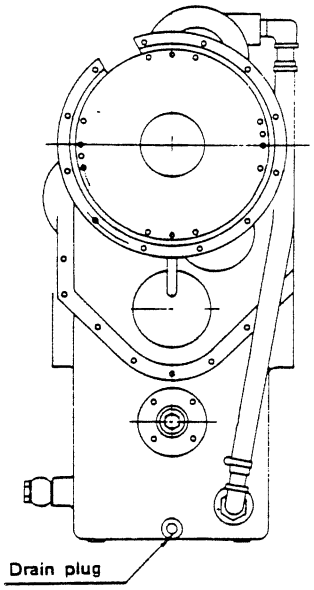


Fig. 3-3.

(2) Intervals of oil and filter change
Change the oil filter element every 500 operation hours and the oil every 1,000 operation hours. Clean the strainer every 1,000 operation hours. Where the operating conditions are severe, examine for oil contamination and reduce the change intervals.

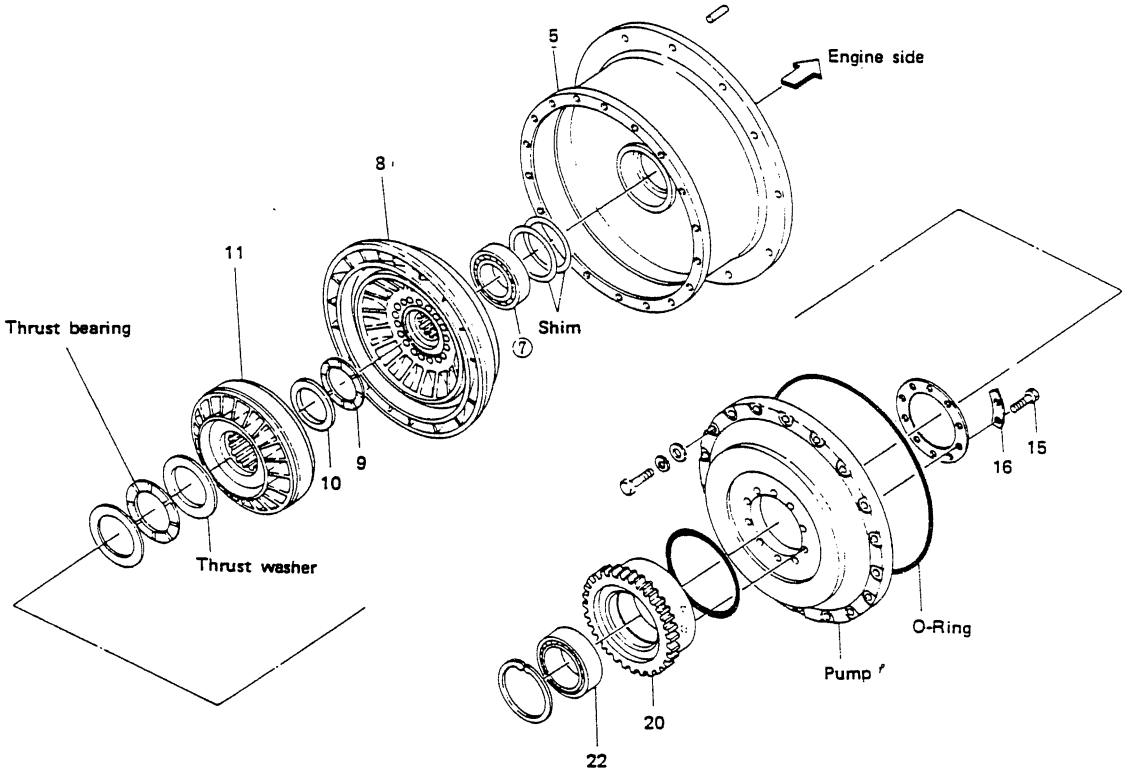
(3) Replacement of filter
Replace the element of the oil filter installed separately from the transmission every 500 operation hours.

(9) Remove thrust washer, thrust bearing, and spacer (14) that order.

(10) Straighten locking strips (16) and remove the 10 capscrews (15) temperature pump (18) from PTO drive gear (20). Remove pump (18). (Fig. 5-1.)

(11) Remove oil seal (19) from the converter housing.

(12) Screw two removed capscrews (15) into the two tapped holes of PTO drive gear apart 180° to remove gear (20) with bearing (22). The inner bearing race remains on the shaft.



5. Front cover	10. Thrust washer	16. Locking strip
7. Bearing	11. Reactor	19. Oil seal
8. Turbine assembly	14. Spacer	20. P.T.O. gear
9. Thrust bearing	15. Capscrew	22. Bearing

Fig. 5-3. Disassembly of Torque Converter

5-5. Control Valve

(Refer to Fig. 5-20).

5-5-1. Removal of Main Pressure Regulator Valve and Trimmer Plug

(1) Remove plug (93) with seal washer (94).

(2) Remove regulator valve (95).

(3) Remove plug (96) together with O-ring (97).

(4) Remove trimmer plug (98), piston (99), trimmer spring (100), regulator spring (119) and spring retainer (101) in order.

5-5-2. Removal of Clutch Cut-off Valve

(1) Remove plug (103) together with the seal washer, including piston (102) and cup (121) housed by the plug.

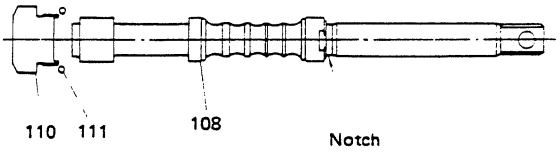
(2) Remove clutch cut-off valve (104).

(3) Remove spring (105).

5-5-3. Removal of Selector Valve

(1) Remove two screws (106) and remove seal retainer (105).

(2) Align stopper (109) with the selector valve notch and remove the stopper from below the valve.



(3) Remove plug (110) with O-ring (111).

(4) Remove detent plug (112) together with seal washer (113).

(5) Take out spring (114) and ball (115).

(6) Remove selector valve (108) in the direction of the arrow shown in Fig. 5-20 by tapping lightly taking care not to damage the valve.
Since the valve is loaded with an internal detent spring, lift it lightly and pull out slowly.

(7) Take out ball (116) and spring (117).

(8) Remove oil seal (118).

7-3. Wear Limits

7-3-1. General

Uniform wear of gears and splines is generally negligible because the wear is very small in comparison with the backlash. In the event of abnormal wear such as pitting and tooth face damage, replace with a new part. The service life of ball bearings, roller bearings and needle bearings is generally affected by flaking or damage due to foreign objects such as dust rather than wear. Replace bearings flaked or not running smoothly with new ones. The sliding portion of oil seals should be in uniform contact. Exercise care as even a small flaw in the sliding face may cause oil leakage.

7-3-2. Torque Converter Assembly

(Refer to Fig. 7-1.)

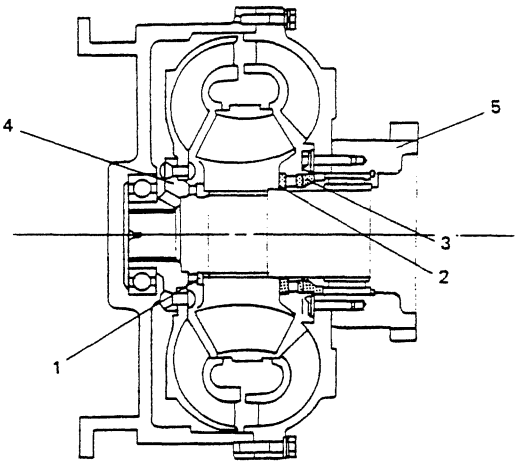
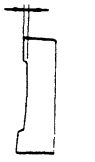


Fig. 7-1. Torque Converter Assembly

(Unit: mm)

No.	Item	Maintenance standards	Usable limits	Remarks
1 2	Wear of thrust washer contacting bearing	—	0.1	
3	Wear of spacer contacting bearing	—	0.1	
4	Wear of turbine hub contacting bearing	—	0.1	
5	Diameter of PTO drive gear where it contacts seal	139.6~139.7	139.4	

8203210R

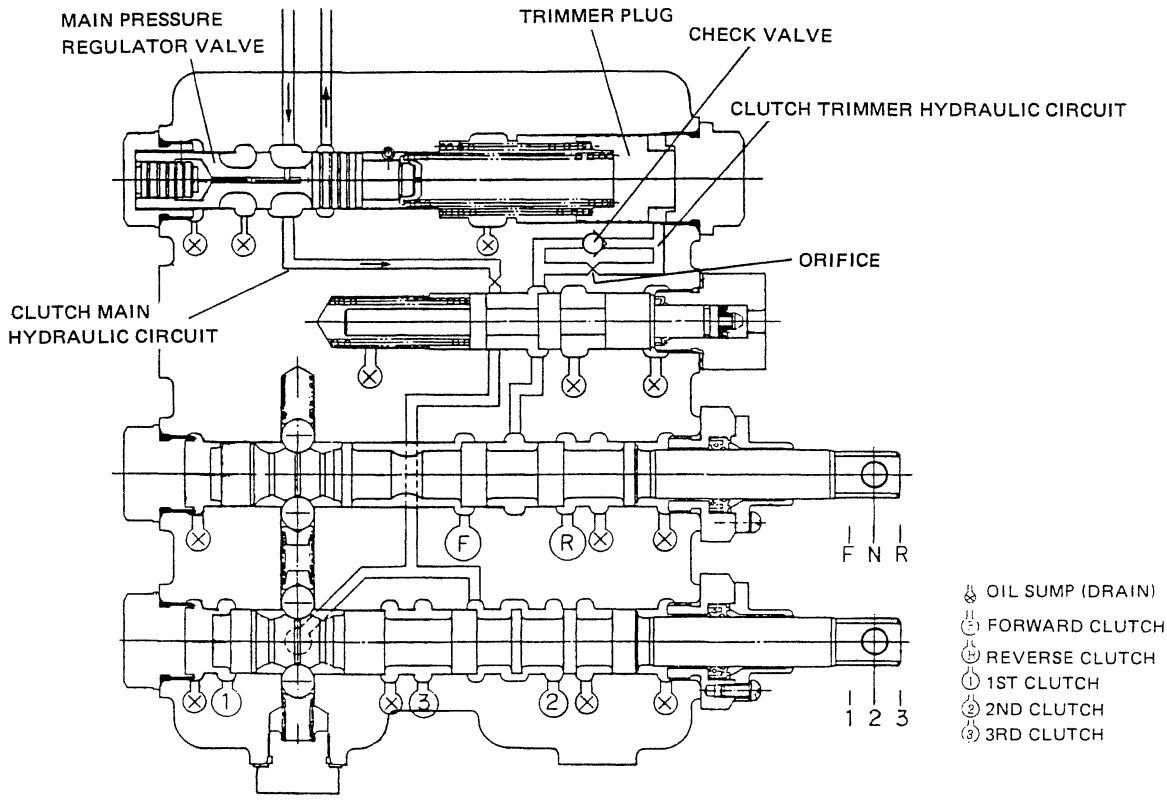


Fig. 2-8 Main Pressure Regulator Valve Trimmer Circuit

(2) Shifting a clutch introduces oil into the clutch circuit. This reduces the pressure in the cavity at the right side of the trimmer plug, so the plug is pushed into its rightmost position by the spring force. At this time, the main pressure is about 2 kg/cm^2 (28 psi). When the clutch engaging piston chamber is filled with oil and as the piston starts to push the clutch up, the pressure is increased, and the regulator valve and trimmer plug are restored to their original positions. When the pressure is being increased, the check valve is closed. For this reason, oil passes through the orifice and the oil flow is restricted, raising the pressure slowly. Conversely, when the pressure is decreased, the check valve is opened. This causes the oil in the cavity adjacent to the trimmer plug to flow out rapidly, and hence lowers the pressure likewise.

Fig. 2-9 is a graph of oil pressure at the time of clutch shift. When the clutch is shifted at time ①, oil pressure is reduced sharply. Between time ① and ②, oil is fed in. At time ②, the piston starts to push the clutch. Between time ② and ③, the pressure is increased slowly under the action of the trimmer circuit, and the power is transmitted while the clutch is caused to slip a little.

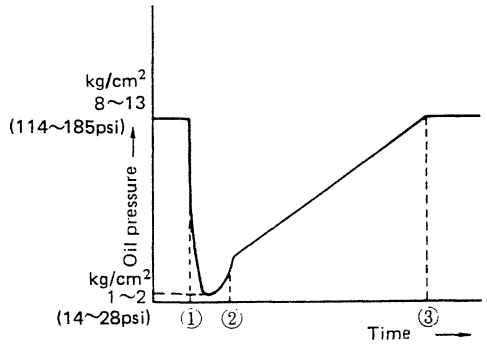


Fig. 2-9 Characteristics of Clutch Engaging Oil Pressure

2. Do not remove the grease on a new bearing.
3. Place the bearing on a clean paper, not directly on a soiled workbench.
4. If assembly is not completed shortly on the area where the bearing is installed, do not keep it exposed but wrap or cover with clean paper or cloth to protect against dirt.

(4) CHECKING BEARINGS

1. Rotate the bearing and check for smooth rotation without roughness or noise. If neither cleaning nor oiling can remove the trouble, replace it.
2. Check the bearing for scratches, cracks, nicks, and excessive wear. If any of these is present, replace with a new one.
3. Check the housing and shaft to which any bearing found faulty is installed for defects. If sandpaper, etc. cannot remove the defect, replace.
4. To insert the bearing onto the shaft, heat the bearing to about 93°C (199°F), then coat the area of engagement with white lead primer, and use an appropriate jig and press.
5. When removing and inserting the bearing without using a sleeve, carefully press the race adjacent to the surface of engagement.

(5) CHECKING CAST PARTS AND FINISHED SURFACES

1. Check the bore for excessive wear, scratches, and contaminants. Remove scratches, etc. using sandpaper or an oil stone. If cut deeply, replace it.
2. Check the oil passages for any foreign particles. If there are any, remove by flushing with cleaning solvent using compressed air.
3. Check the installation surface for notches and dents and also for attached foreign matter.
   If any exist, remove with sandpaper or oil stone. If cut deeply, replace it.
4. Check the thread for damage. If damaged, thread the damaged portion again using the correct tap.
5. If housings and cast parts are found cracked, replace.
6. If a finished surface is so damaged that it may cause leaks or impairment to machine functions, refinish or replace it.

(6) CHECKING BUSHINGS AND THRUST WAHSERS

1. Check bushings for the kind of distortions and notches that may cause overheating, and for sharp edges. Remove notches and sharp edges with a scraper or knife. If distorted, deeply notched or excessively worn, replace with proper size.

NOTE

Bushings sometimes need to be cut to remove them. In this case, be careful not to damage the bore into which the bushing is inserted.

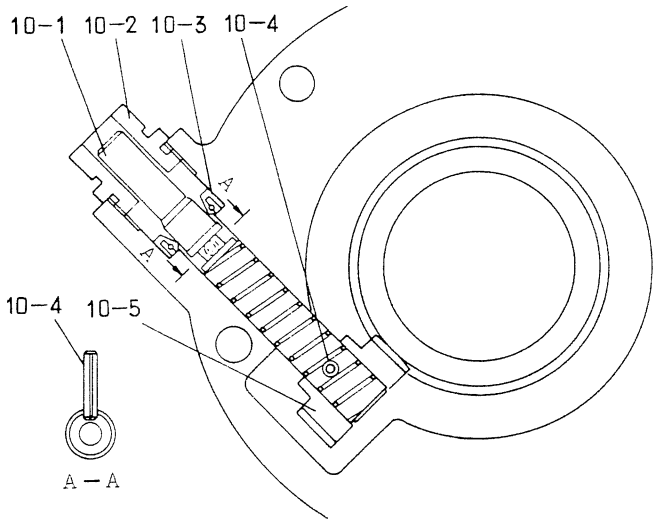
2. Check thrust washers for distortion, notches, excessive wear. If damaged or worn, replace. If bearings, bushings, thrust washers, etc. that are damaged are allowed to remain, this will damage the component elements of the converter, transmission gears, etc. Therefore, be sure to replace such parts promptly.

(7) CHECKING OIL SEALS AND GASKETS

1. Check seal rings to see if cut or hardened. If damaged in such a way, replace.
2. Before replacing a lip-type seal ring, check that the sealing fits enough to maintain oil tightness.
3. Replace all gaskets and the like with new ones.
4. As for hook-type seal rings, check for wear, distortion or a damaged hook.
5. When hook-type seal rings are installed, if wear is such that there is no gap between hooks, replace.
6. Seal ring sides must be smoothe (Max. allowable wear is 0.13 mm (0.005")). The sides of the groove into which a seal ring is placed must be smooth (see JIS 5S).
   The runout of a groove perpendicular to a shaft must be 0.05 mm (0.002") or less. If the groove sides are refinished (Max. allowable wear = 0.05 mm (0.002")), install a new seal ring.

(8) CHECKING GEARS

1. Check gears for excessively worn tooth surfaces, nicks, and notched teeth. If an oil stone, etc. cannot remove the damage, replace the gear.
2. Check the gear for damage such as notches to the surface to which thrust pressure is applied. If an oil stone, etc. cannot remove the damage, replace the gear.



10-1 SHAFT
10-2 UNION
10-3 OIL SEAL
10-4 PIN
10-5 DRIVEN GEAR

Fig. 5-1 (J) Gear (for Speedometer)

5.3 DISASSEMBLING MAIN SUBASSEMBLIES

Before proceeding with the disassembly, remove the hose band, shown in Fig. 5-2, and remove hose (7-17).

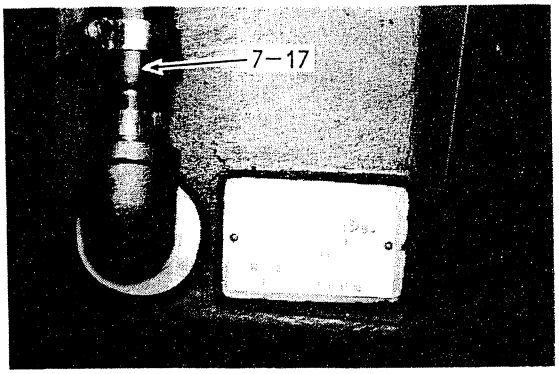


Fig. 5-2 Removing Hose

Next, remove all cap screws (7-10) (see Fig. 5-3). Together with washer (7-2) and gasket (7-11), remove screen (7-12).

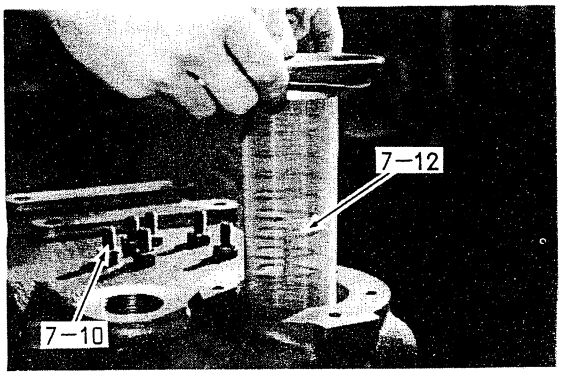


Fig. 5-3 Disassembling Screen

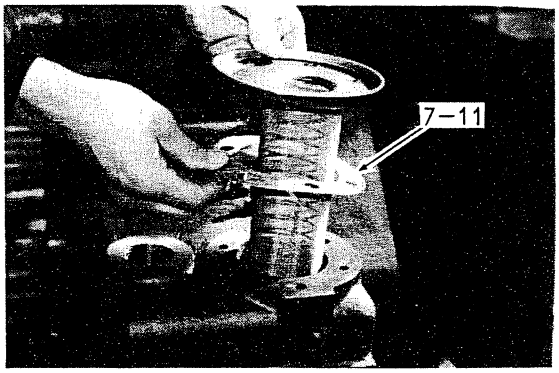


Fig. 5-4 Removal of Screen

(6) Remove pump installing capscrews (1-15) together with washer (1-13) and lock washers (1-14).

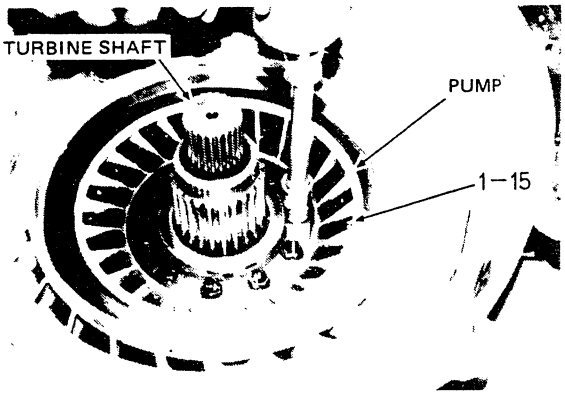


Fig. 5-48 Removing Pump

Next, remove the pump in an upward direction. Remove O-rings (1-6, 1-19), too.

(7) Remove oil seal (2-4).

CAUTION

Once an oil seal is removed, be sure to replace it with a new one.

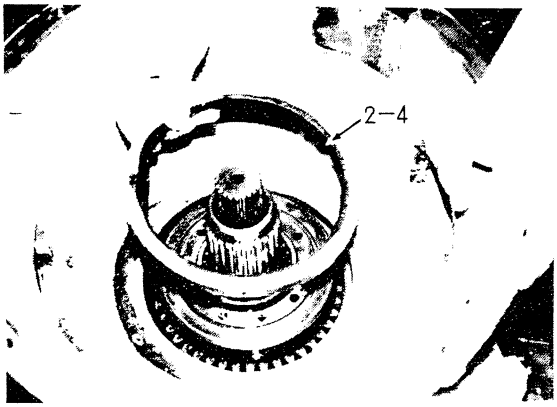


Fig. 5-49 Removing Oil Seal

(8) Remove input gear (1-7) in the manner depicted in Fig. 5-50, and remove roller bearing (1-9) from inside the gear.

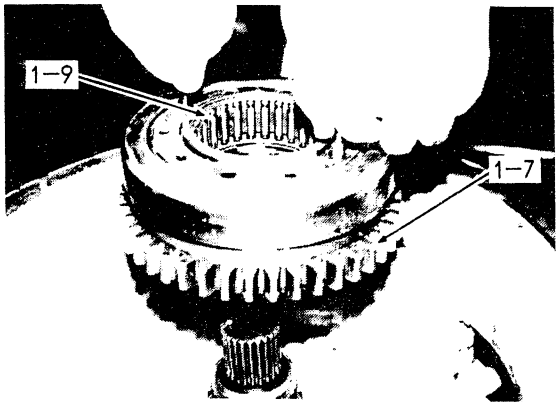


Fig. 5-50 Removing Input Gear

(9) Remove stopper ring (1-8). This completes the disassembly of the torque converter.

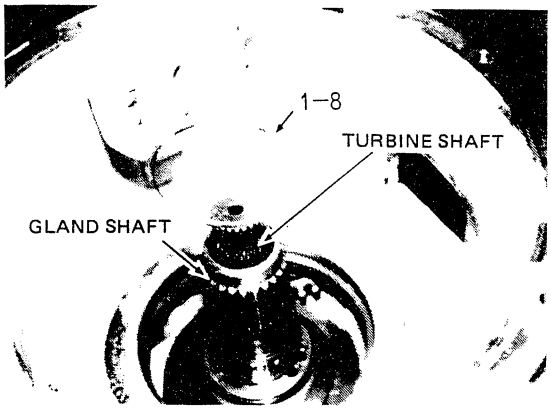


Fig. 5-51 Removing Seal Ring

5.3.10 DISASSEMBLING TRANSMISSION GEAR [2]

(1) Remove the socket screw that secures the gland shaft and remove the gland shaft by turning it a little.

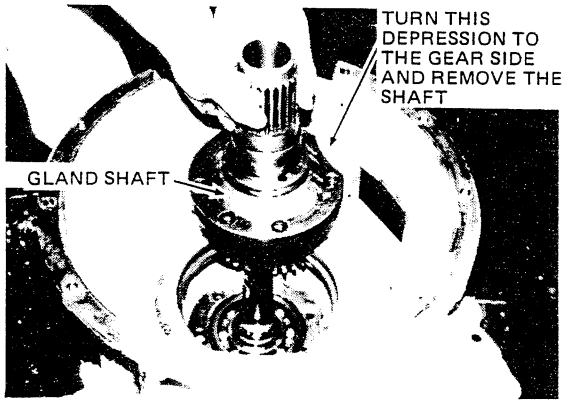


Fig. 5-52 Removing Shaft

(6) Set the end plate, 4 friction plates and 4 separator plates into the gear; set the ring and then slip locks at two places on the outer circumference.

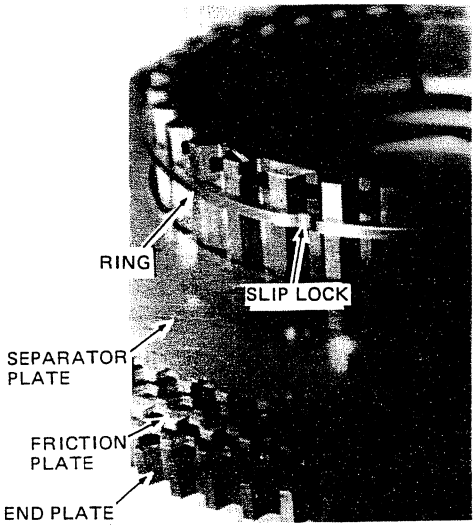


Fig. 7-8 Assembling Plate

(7) Set one friction plate and install the circle clip.

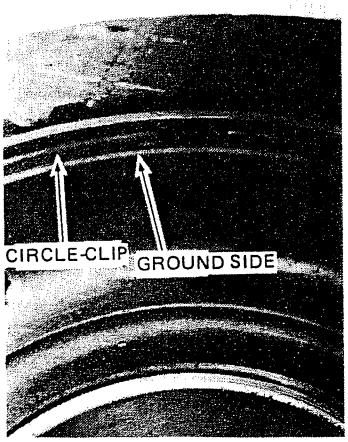


Fig. 7-9

NOTE

1. Put the ground surface of the circle clip onto the friction plate spline.
2. On replacing the bushing for the gear, set slip locks at three positions on the inner circumference.

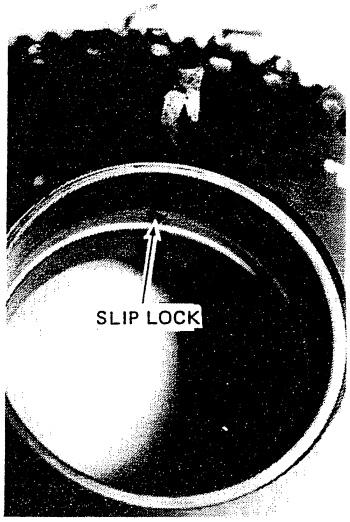


Fig. 7-10 Inserting Bushing

(8) Install the gear assembly.

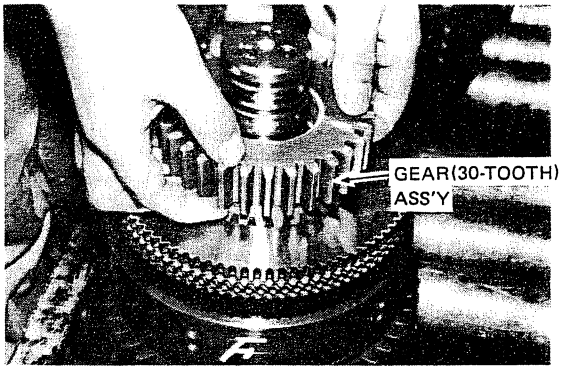


Fig. 7-11 Installing Gear Assembly

NOTE

Apply torque converter oil to the sliding surface of bushing (3-4).

(9) Set snap ring (3-20).

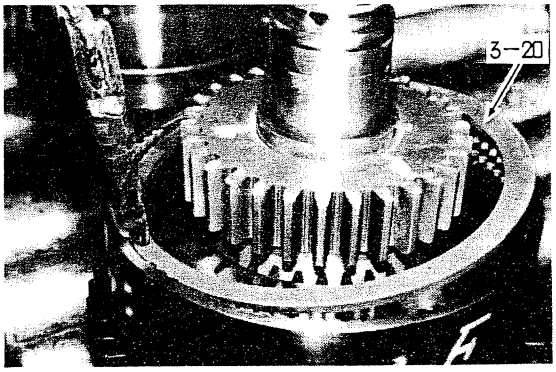


Fig. 7-12 Inserting Snap Ring

(3) Assemble the spring and the cutoff valve.

(4) Insert the spring and the steel ball; assemble the F/R selector valve while pressing down the spring; put on the O-ring and tighten the plug.

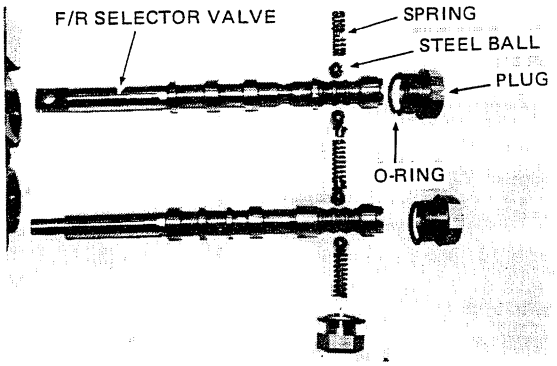


Fig. 7-44 Assembling Spool

(5) Assemble in the order of steel ball, spring retainer, spring, spring retainer and steel ball; and assemble the L/H selector valve.
Then insert the O-ring and tighten the plug.
Insert the steel ball and spring, and put the diestud and tighten the plug.

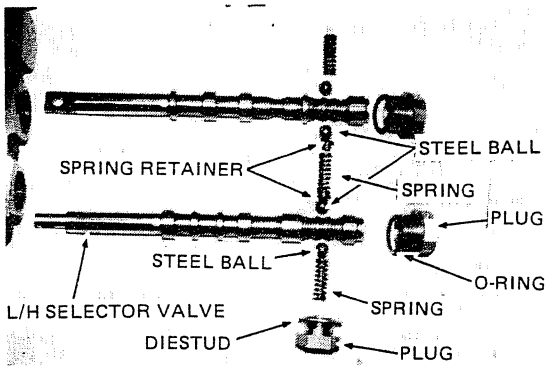


Fig. 7-45

(6) Put the oil seal into the seal retainer, set the O-ring and tighten.
Tighten the dust cover with washers and screws. (2 positions, F/R selector valve, L/H selector valve)

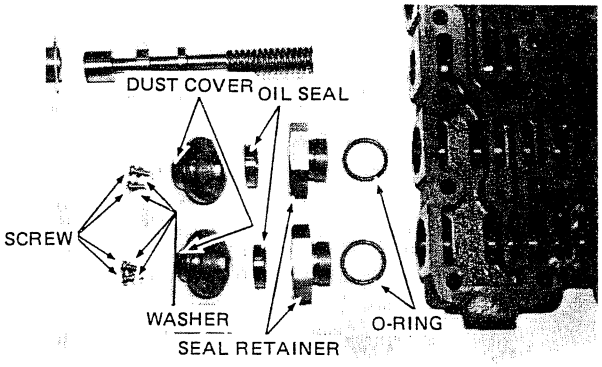


Fig. 7-46

NOTE

1. Apply Three-bond to outer circumference of the oil seal.

(7) Set the neutral safety switch.

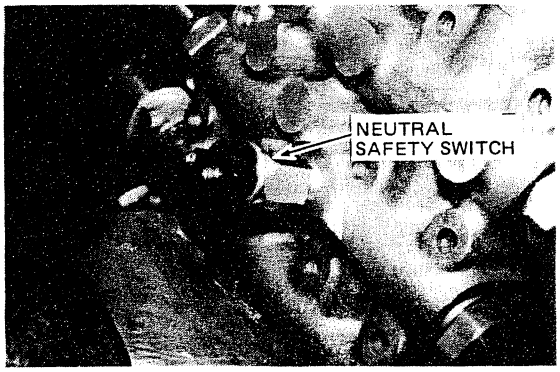


Fig. 7-47

(3) Warm-set drive gear (6-14).

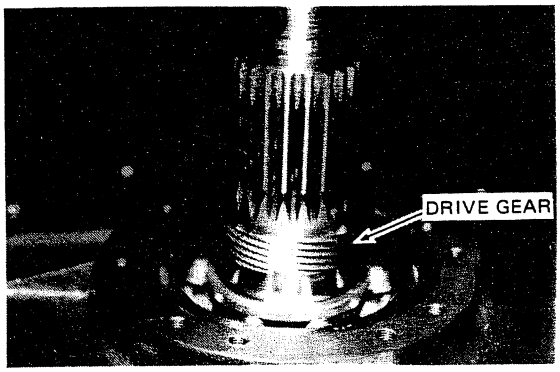


Fig. 7-98

(4) Check that bearing has proper thrust clearance; set gasket (6-15) and the speedometer housing ass'y.

Fig. 7-99

(5) Tighten with washers (6-16) and capscrews (6-17).

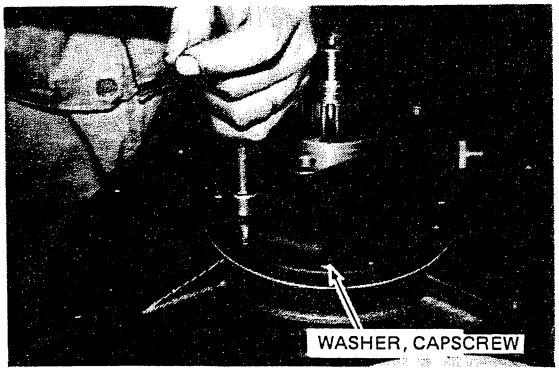


Fig. 7-100

(6) Set brake assembly (6-22).

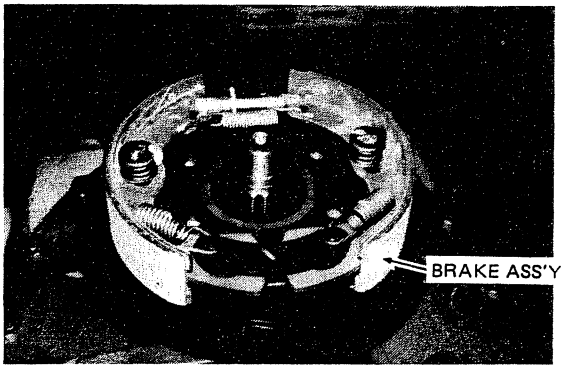


Fig. 7-101

(7) Tighten with capscrews (6-21).
Apply Locktite to the capscrews.

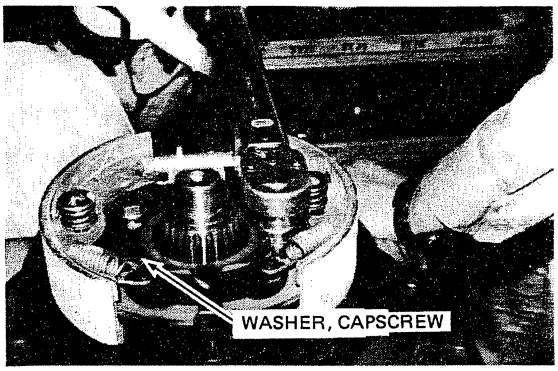


Fig. 7-102

(8) Set front yoke (6-25).

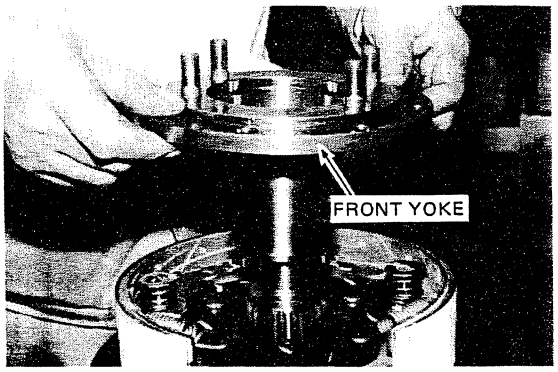


Fig. 7-103

NOTE

1. Check that the oil seal contact surface is not damaged.

LK300A List of Shop Manual GENERAL Section

Title	Book Code No. / Distribution Year-Month		
SPECIFICATION	S5**RL01**01E / 1983−2		
OPERATION	S5**RL02**01E / 1985−1		
WORKING STANDARD	S5**RO07**01E / 1985−1		

(3) Modification Drawing (24100 X 1066F1)

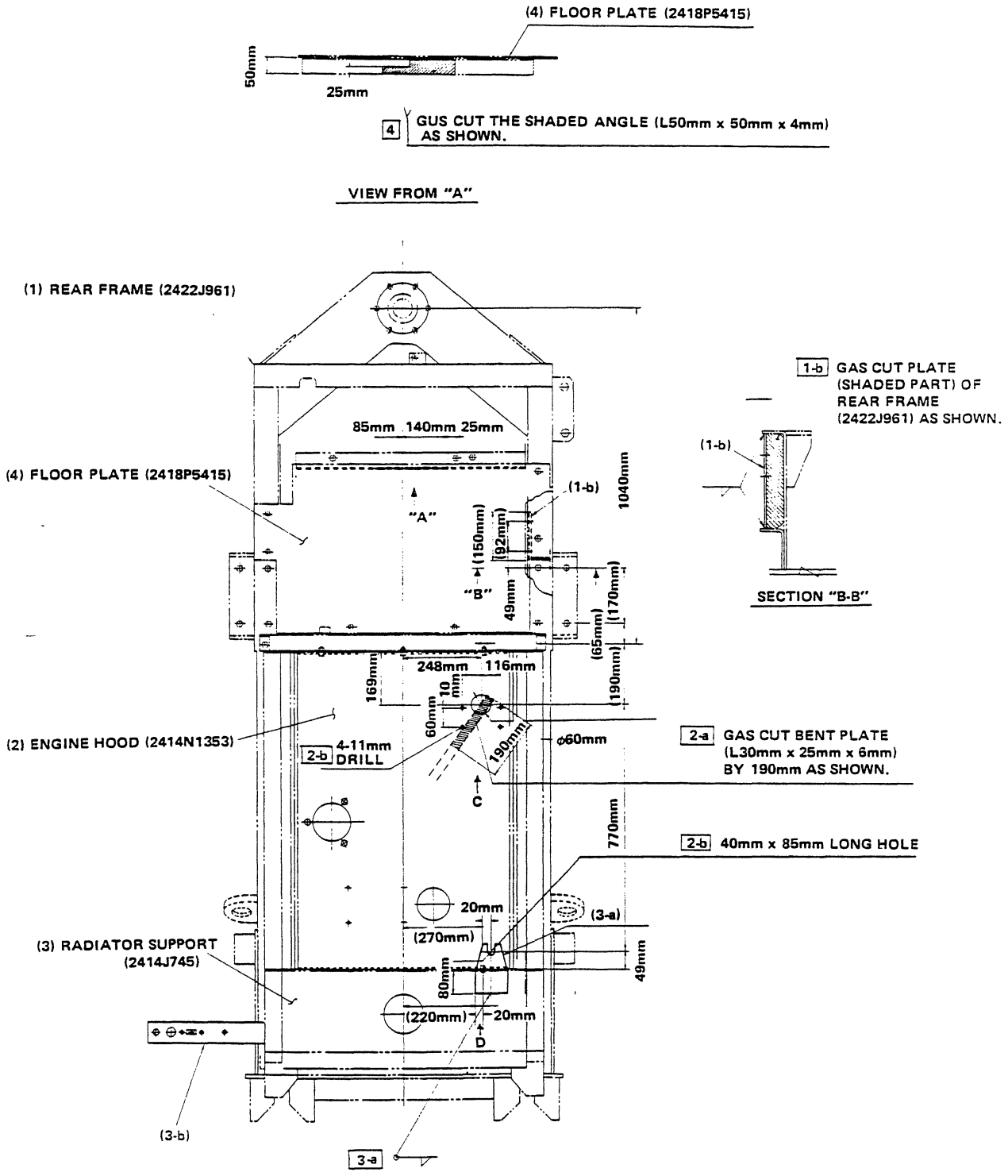


Fig. 3-1

PREFACE

The bucket cutting edge of wheel loader is made of special steel to satisfy the requirements of high resistance against wear and impact.

Since the special steel is generally sensitive to heat, and hard to weld, and also it may crack when replacing or repairing the cutting edge or welding the tooth holder, it should be handled with the greatest care by preheating before welding, interlayer heating during welding, and post-heating after welding.

Below are explained the welding processes to prevent cracking, necessary precautions for welding, the method of repairing cracks and the method of repairing the bucket main body.

Concerning terms and symbols used in this manual, refer to 1 Terminology of Bucket and 7 Terms and Symbols.

2-3-1 WELD LENGTH OF EACH PART

(1) BUCKETS FOR LK300 THROUGH LK700

(a) Cutting edge and side edge

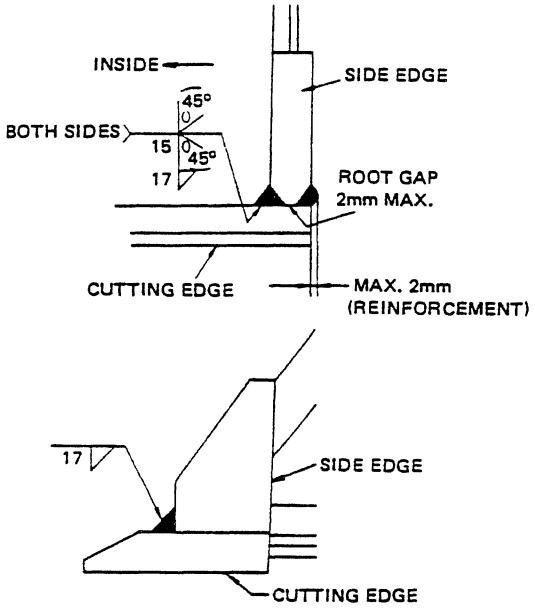


Figure 2-16. Weld Build-up Cutting Edge and Side Edge

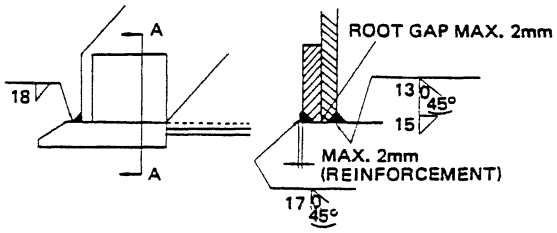


Figure 2-17. Weld Build-up in Case of Figure 2-6.

(b) Cutting edge and bottom plate

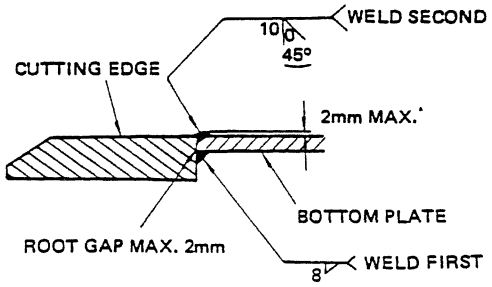
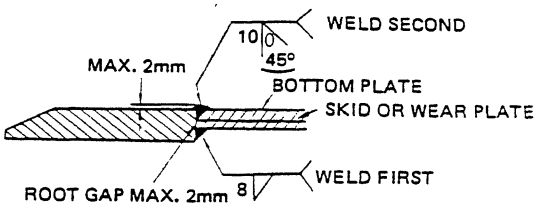


Figure 2-18. Weld Build-up on Cutting Edge and Bottom Plate (Skidless Part)



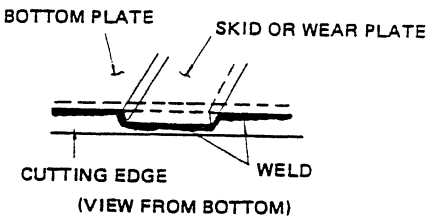
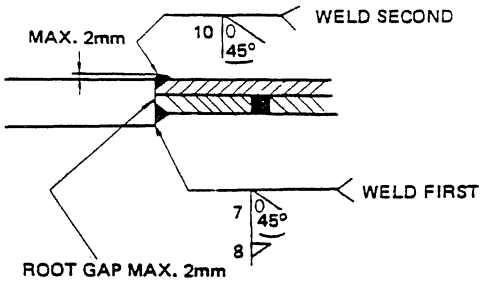


Figure 2-19. Weld Build-up on Cutting Edge and Skid



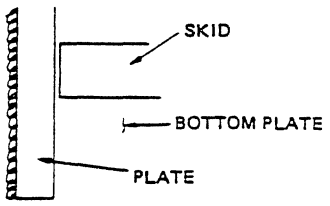


Figure 2-20. Weld Build-up in Case of Figure 2-2.

CAUTION

The weld length should be longer than the length shown. Be careful not to cause undercut.

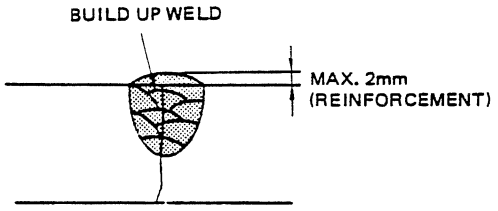


Figure 4-4. Melt-thru into Crack

(c) As shown in Figure 4-5, remove the opposite side of crack by more than a half of the wall thickness.

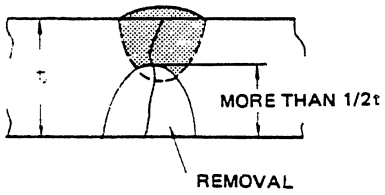


Figure 4-5. Removal of Crack

(d) Build up weld to height of approx. 2mm as shown in Figure 4-6.

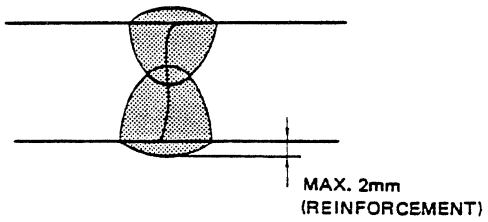


Figure 4-6. Melt-thru into Crack

4-2 REPAIR WITH PATCH

As the wear of cutting edge progresses, it may lead to cracking. Such cracks can be repaired with a patch. Or, a patch also may be used to extend the service life beforehand. In either case, weld the patch in the following way.

4-2-1 REPAIR OF CRACK WITH PATCH

(1) Repair the crack according to paragraph 4-1.

(2) Smooth out the reinforcement bead by grinding.

(3) Preheat the area of 150mm ranges inside and outside of each side of the patch as shown in Figure 4-7 to 250 to 300°C, and start welding.

(4) Continue welding while applying interlayer heating to the shaded area in Figure 4-7.

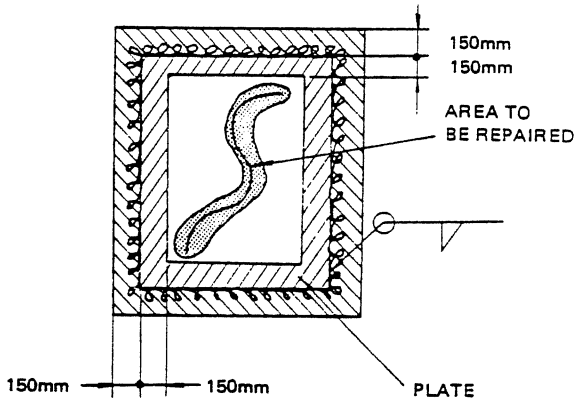


Figure 4-7. Area of Preheating, Interlayer Heating and Post-heating.

(5) After welding, apply post-heating over the same area, and cover the area with asbestos to allow to cool down gradually.

If the required patch is large, it is recommended to drill holes in the patch and join by plug welding.

4-2-2 WELDING OF WEAR PLATE

A wear plate is to be welded to the bottom of cutting edge in order to extend the service life. The procedure conforms to steps (3) through (5) of par. 4-2-1.

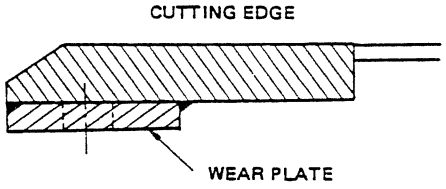


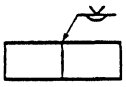
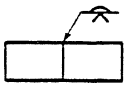
Figure 4-8. Welding of Wear Plate

CAUTION

After welding, inspect for defects. Concerning inspection, refer to 6. Inspection.

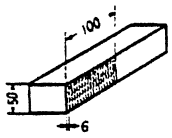
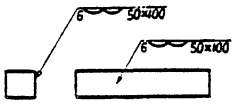
Example 7

Bead	Symbol		The height of circular arc shall be ½ of radius.

Welding Position	Desired Weld	Symbol on drawing
Arrow side or Near side		
Opposite side of arrow or Other side		

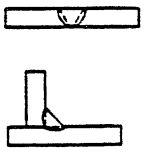
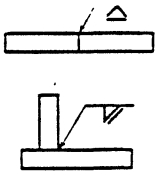
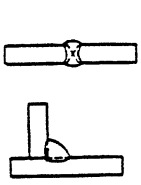
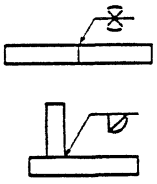
Example 8

Surfacing Welds	Symbol		Two circular arcs shall be shown. The height of arc is ½ of radius.

Welding Position	Desired Weld	Symbols on drawing
In case of height of 6mm, width of 50mm and length of 100mm.		

Example 9

Surface Contour	Flush	Symbols		
	Convex			
	Concave			

	Desired Weld	Symbols on drawing
When surface contour of groove-welds or fillet welds is made to be flush.		
When surface contour of groove welds or fillet welds is made to be convex.		

2-1-2 HYDRAULIC LINES

CAUTION

If cutting or welding is done without taking the part off the machine, be careful not to damage or heat the surroundings. When there is any fear of such trouble, protect with insulating materials or remove the part from the machine and then do the work.

(1) REAR FRAME

(a) Make two 13mm holes. (See Fig. 2-4)

(b) Install bracket (22) (2416T5715) in the 13mm holes. (Fig. 2-8)

(c) Weld tapped block (27) (2416T5721). (Fig. 2-4)

(d) Fit the bracket (23) (2416T5716) to the welded tapped block (27) (Fig. 2-8)

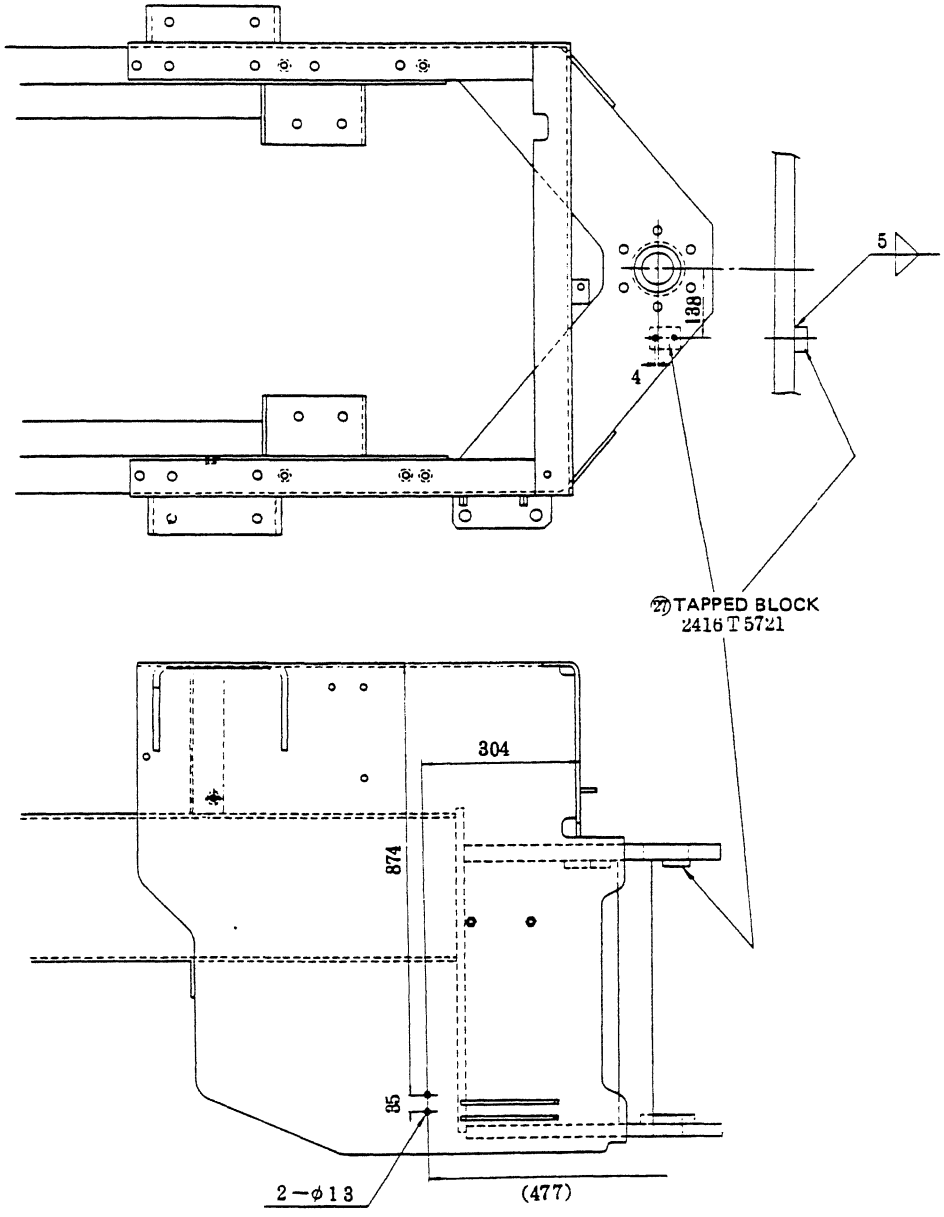


Fig. 2-4