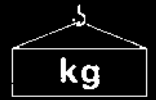



CONTENTS

10 STRUCTURE AND FUNCTION	10-1
20 TESTING AND ADJUSTING.....	20-1
30 REMOVAL AND INSTALLATION	30-1
40 MAINTENANCE STANDARD	40-1

HOISTING INSTRUCTIONS



! Heavy parts (25 kg or more) must be lifted with a hoist etc. In the **Disassembly and Assembly** section, every part weighing 25 kg or more is clearly indicated with the symbol .

1. If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:
 - Check for removal of all bolts fastening the part to the relative parts.
 - Check for any part causing interference with the part to be removed.

2. Wire ropes

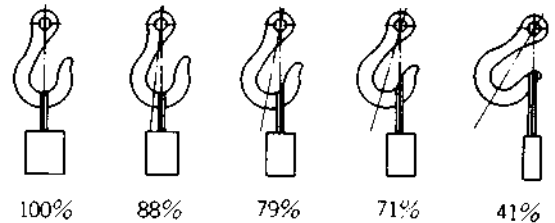
- 1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

WIRE ROPES (Standard «S» or «Z» twist ropes without galvanizing)	
Rope diameter (mm)	Allowable load (tons)
10	1.0
11.2	1.4
12.5	1.6
14	2.2
16	2.8
18	3.6
20	4.4
22.4	5.6
30	10.0
40	18.0
50	28.0
60	40.0

The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

- 2) Sling wire ropes from the middle portion of the hook. Slinging near the edge of the hook may cause the rope to slip off the hook during hoist-

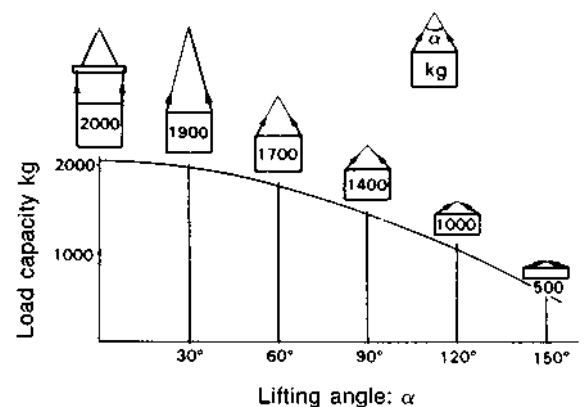
ing, and a serious accident can result. Hooks have maximum strength at the middle portion.



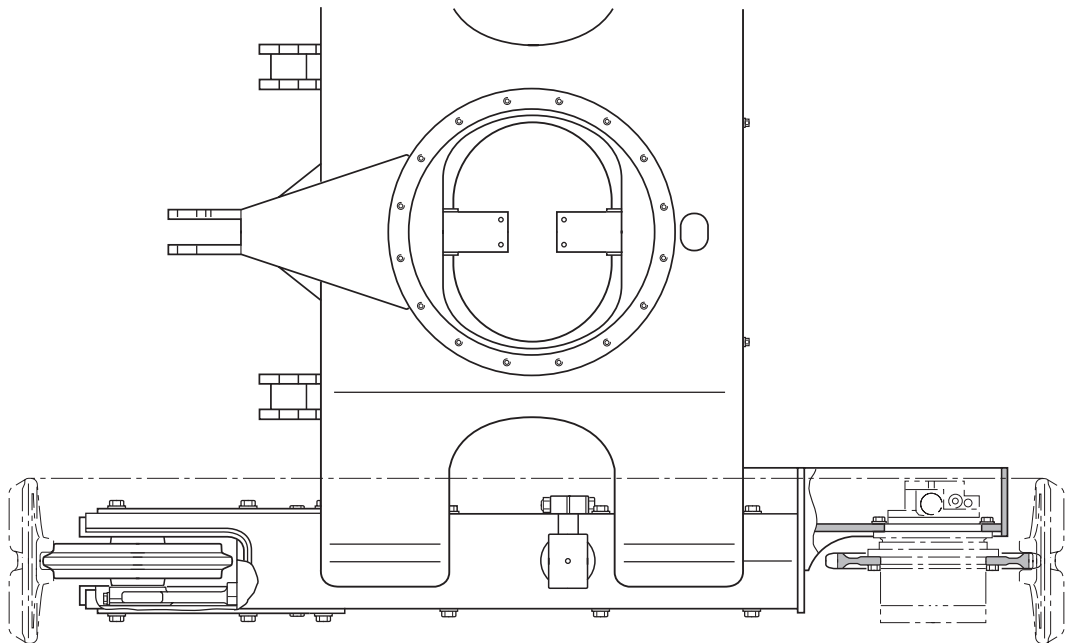
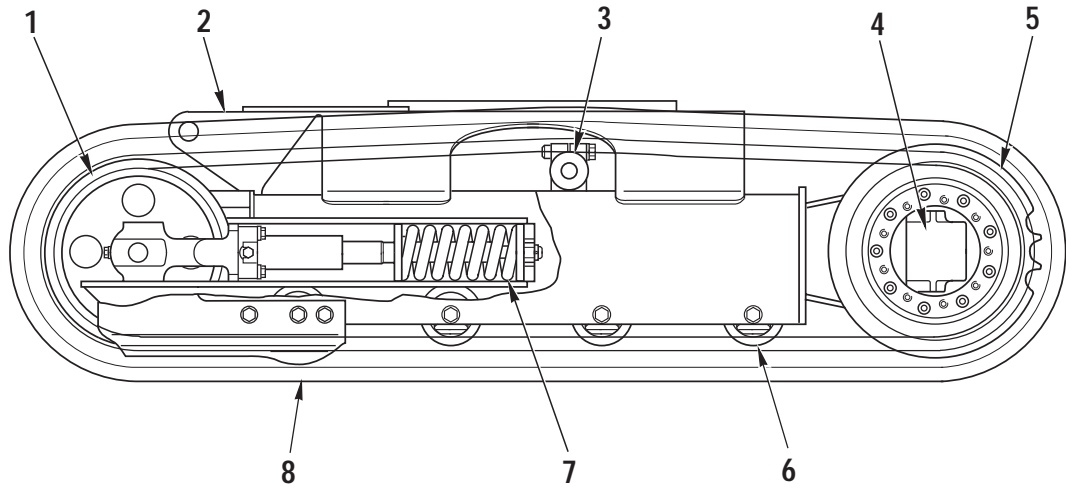
- 3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound on to the load.

! Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can cause dangerous accidents.

- 4) Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load (kg) when hoisting is made with two ropes, each of which is allowed to sling up to 1000 kg vertically, at various hanging angles. When two ropes sling a load vertically, up to 2000 kg of total weight can be suspended. This weight becomes 1000 kg when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 4000 kg if they sling a 2000 kg load at a lifting angle of 150°.



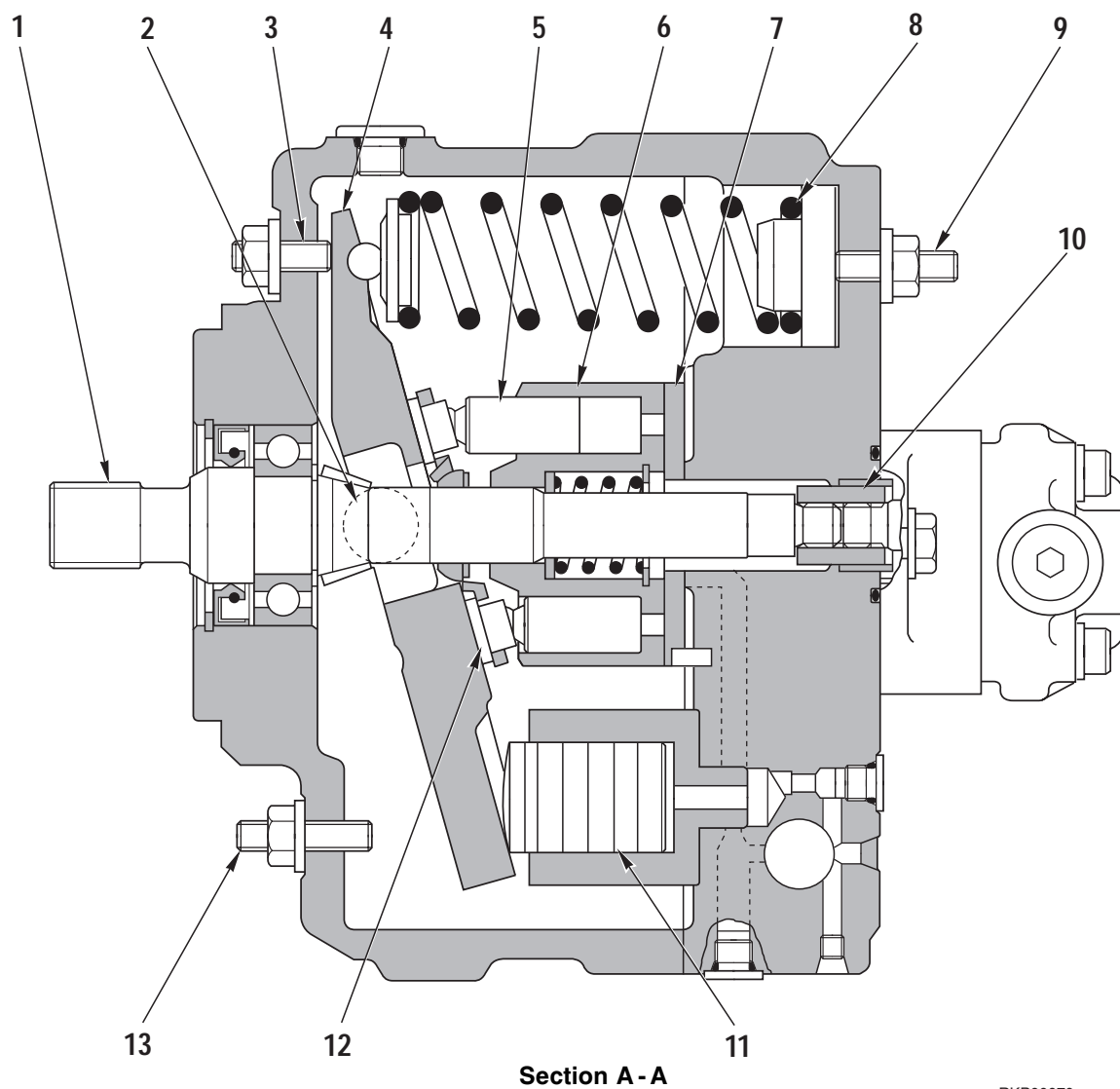
PC27R-8



RKP01670

1. Idler
2. Track frame
3. Sliding plate
4. Travel motor

5. Sprocket
6. Track roller
7. Recoil spring
8. Track shoe

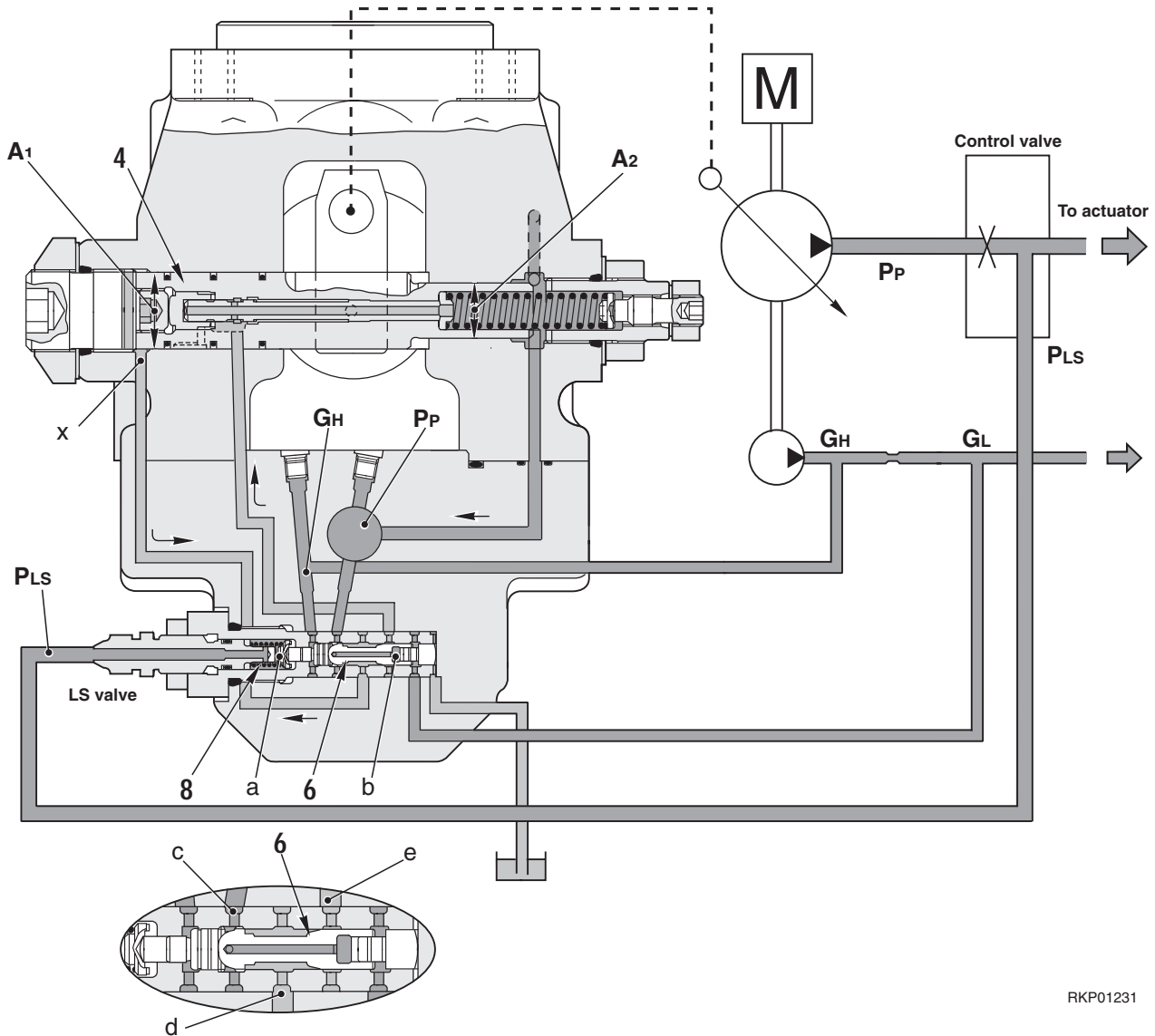


RKP00070

- 1. Input shaft
- 2. Ball
- 3. Adjustment screw
- 4. Swash plate
- 5. Piston
- 6. Cylinder block
- 7. Valve plate

- 8. Spring
- 9. Adjustment screw
- 10. Joint
- 11. Control piston
- 12. Sliding shoe
- 13. Adjustment screw

4. When pump flow is amount demanded by control valve



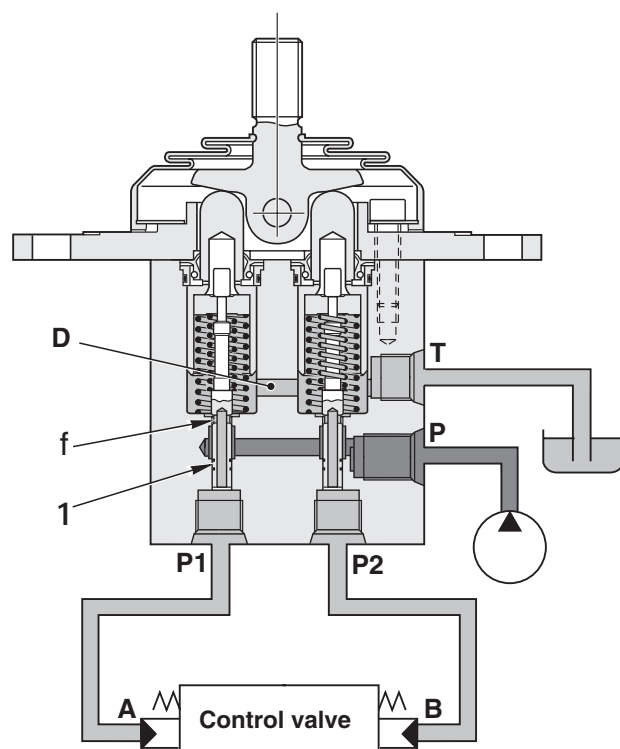
RKP01231

- Let us take the area receiving the pressure at the large diameter end of servo piston (4) as A_1 , the area receiving the pressure at the small diameter end as A_2 , the pressure acting on the large piston diameter end as P_{EN} and the pressure acting on the small piston diameter end as P_P .
- When the flow of oil from the pump reaches the flow demanded by the control valve, pump pressure P_P acting on port b of the **LS** valve and the combined force of **LS** pressure P_{LS} + force of spring (8) acting on spring chamber a are balanced, so piston (6) stops at almost the central position.
- As a result, port c , port d and port e open approximately the same amount, so the pump pressure flows from port c to port d . Part flows from port e to the tank case and is drained, so the pressure is reduced by approx. 1/2 and flows to chamber X at the large diameter end of servo piston (4).
- At this point, the relationship between the area receiving the pressure at both ends of servo piston (4) is $A_2 : A_1 = 1 : 2$, so the pressure applied to both ends of servo piston (4) becomes $P_P : P_{EN} = 2 : 1$. This makes the force acting on both ends of servo piston (4) $1 : 1$, so servo piston (4) stops in that position and the pump discharge amount is balanced with the oil flow demanded by the control valve.

FUNCTION

1. At neutral

Ports **A** and **B** of the control valve and ports **P1** and **P2** of the PPC valve are connected to drain chamber **D** through fine control hole **f** in spool (1). (Fig. 1)



RKP00971

FIG. 1

2. During fine control (NEUTRAL → fine control)

When piston (4) starts to be pushed by lever (5), retainer (7) is pushed; spool (1) is also pushed by metering spring (2), and moves down.

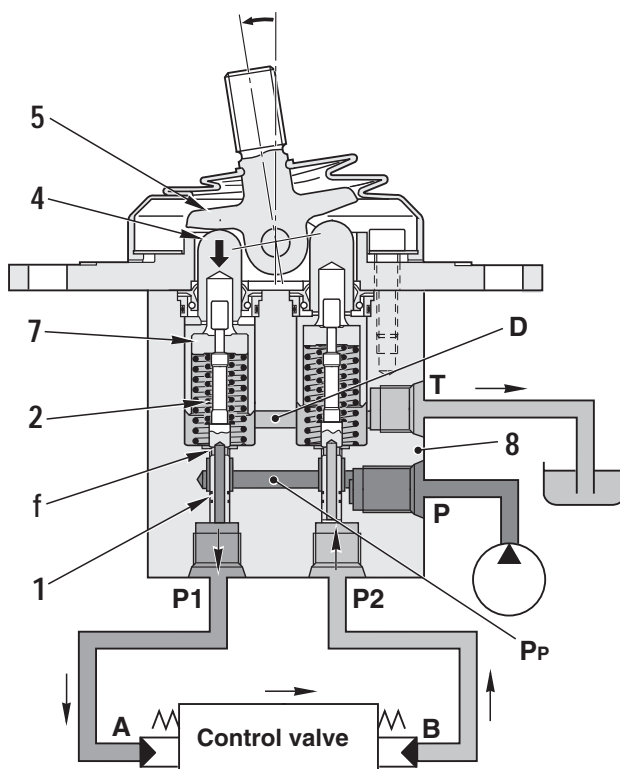
When this happens, fine control hole **f** is shut off from drain chamber **D**, and at almost the same time, it is connected to pump pressure chamber **Pp**, so pilot pressure oil from the control pump passes through fine control hole **f** and goes from port **P1** to port **A**.

When the pressure at port **P1** becomes higher, spool (1) is pushed back and fine control hole **f** is shut off from pump pressure chamber **Pp**.

At almost the same time, it is connected to drain chamber **D** to release the pressure at port **P1**.

When this happens, spool (1) moves up or down so that the force of metering spring (2) is balanced with the pressure at port **P1**. The relationship in the position of spool (1) and body (8) (fine control hole **f** is at a point midway between drain hole **D** and pump pressure chamber **Pp**) does not change until retainer (7) contacts spool (1).

Therefore, metering spring (2) is compressed proportionally to the amount of movement of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever. In this way, the control valve spool moves to a position where the pressure in chamber **A** (the same as pressure at port **P1**) and the force of the control valve spool return spring are balanced. (Fig. 2)



RKP00981

FIG. 2

● FOR THE MACHINE

PC27R-8																	
Standard value			Permissible value														
2650			2600 – 2700														
2625			2575 – 2675														
ℓ	a	b	ℓ	a	b												
30	6	6	30	6	6												
20	6	6	20	6	6												
70			60 – 80														
70			60 – 80														
70			60 – 80														
70			60 – 80														
50			40 – 60														
20			17 – 23														
100			90 – 110														
180			160 – 200														
Max. 5			Max. 8														
Max. 10			Max. 15														

MEASUREMENT OF THE COMPRESSION PRESSURE

- ⚠ • While measuring the compression, take care not to get entangled in the cooling fan, the alternator belt, or in other rotating parts.
- Check all cylinders.

★ Test conditions:

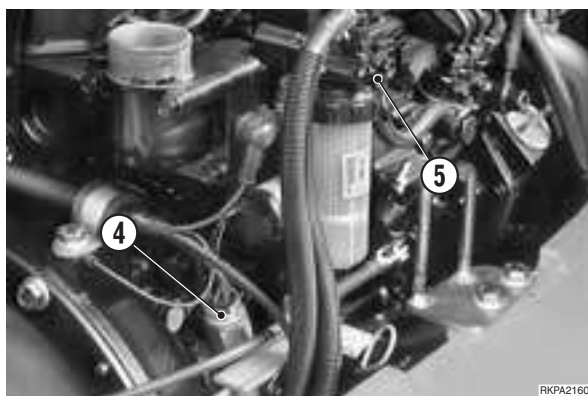
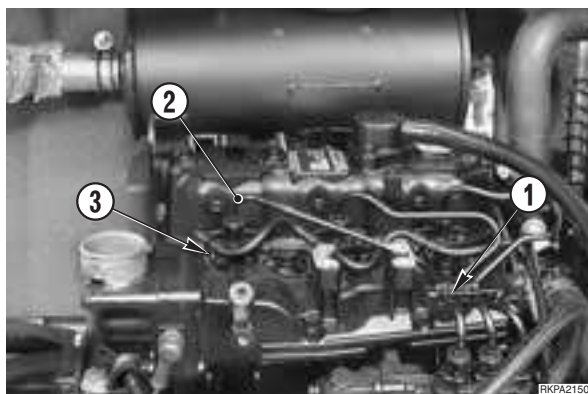
- Engine: at working temperature.
- Hydraulic oil: 45 – 55 °C.
- Battery: fully charged.
- Valve clearance: adjusted (See «ADJUSTMENT OF VALVE CLEARANCE»).
- Air filter functioning properly.

1 - Remove the clamp (1) and disconnect the high-pressure tube (2).

2 - Remove the nozzle holder (3) of the cylinder to be checked.

3 - Disconnect the connector (4) of the engine-stopping solenoid and close the fuel cock (5).

4 - Turn the engine over a few times, using the starting motor.



5 - Mount the adapter **B2** and connect the test pressure gauge **B1**.

- ★ Check that the seal is mounted in the adapter, and that it is undamaged.

6 - Turn the engine using the starting motor and read the compression value.

- ★ Read the compression value when the pressure gauge has stabilised.
- ★ While reading the compression, also check the engine rpm using the tachometer **C1** or **C2**. If the speed does not correspond with the control value, check it against the diagram.

- ★ Compression value:

Normal: PC20R-8: 32 ± 1 kg/cm² at 250 rpm

PC27R-8: 31 ± 1 kg/cm² at 250 rpm


Minimum permissible:

PC20R-8: 26 ± 1 kg/cm² at 250 rpm

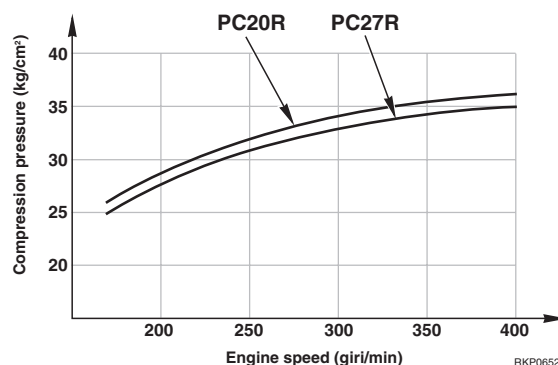
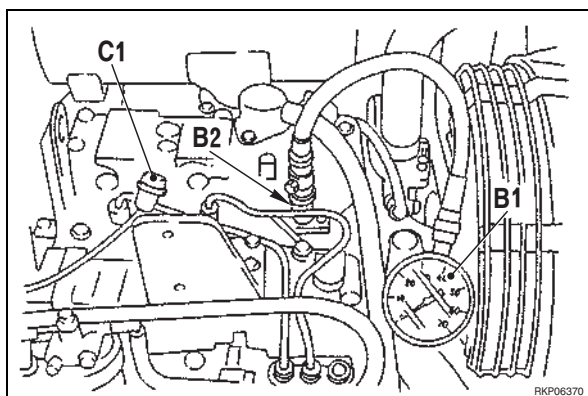
PC27R-8: 25 ± 1 kg/cm² at 250 rpm

- ★ Maximum difference between the cylinders:
2 – 3 kg/cm²

7 - After the reading, re-assemble the nozzle holder (3), and reconnect the high- pressure tube (2) and the connector (4).

 Nut that secures the nozzle: 7.84 ± 0.98 Nm

 High-pressure coupling: 31.85 ± 2.45 Nm



BLEEDING AIR FROM THE HYDRAULIC CIRCUITS

Sequence of operations or procedures for bleeding the air

	Procedures for bleeding air						
	1	2	3	4	5	6	7
	Bleeding air from pumps	Starting engine	Bleeding air from cylinders	Bleeding air from swing motor	Bleeding air from travel motor	Pressurising tank	Starting tasks
<ul style="list-style-type: none"> • Substitution of hydraulic oil • Cleaning tank filter 	○ —→	○ —→	○ —→	○ —→ ★1	○ —→ ★1	○ —→	○ —→
• Substitution filter		○ —→				○ —→	○ —→
<ul style="list-style-type: none"> • Repair - substitution pump • Removal of suction tube 	○ —→	○ —→	○ —→			○ —→	○ —→
• Substitution - repair control valve		○ —→	○ —→			○ —→	○ —→
<ul style="list-style-type: none"> • Repair-Substitution cylinders • Removal of cylinders tube 		○ —→	○ —→			○ —→	○ —→
<ul style="list-style-type: none"> • Repair - substitution swing motor • Removal of tubes from swing motor 		○ —→		○ —→		○ —→	○ —→
<ul style="list-style-type: none"> • Repair - substitution travel motor - joint • Removal of tubes from travel motor - joint 		○ —→			○ —→	○ —→	○ —→

★1: Only bleed air from the swing and travel motors if the engine oil (casing) is to be drained.

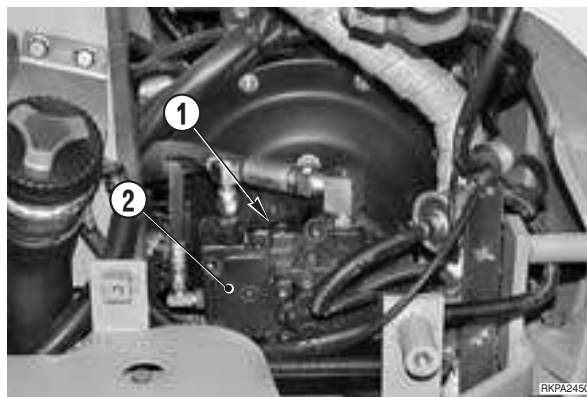
1. Bleeding air from the pump

- 1 - Loosen and remove the cap (1) from the pump body (2).
- 2 - Pour hydraulic oil through the hole until the entire casing is full.
- 3 - Replace the cap (1).

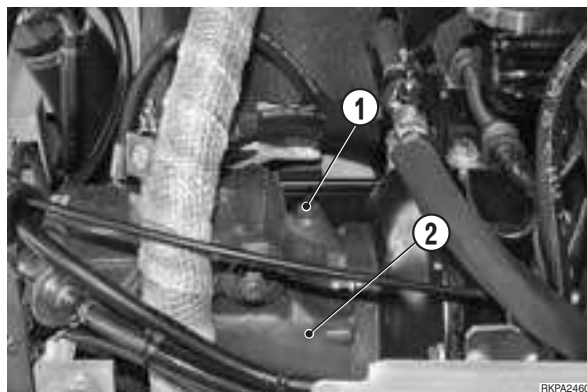
⌘ Nm Cap: PC20R-8: 16.7 ± 2.5 Nm
PC27R-8: 63.7 ± 4.9 Nm

- ★ After filling the casing, start the engine and allow it to run at low idling for about 10 minutes before proceeding to bleed the air from the circuits.

PC20R-8



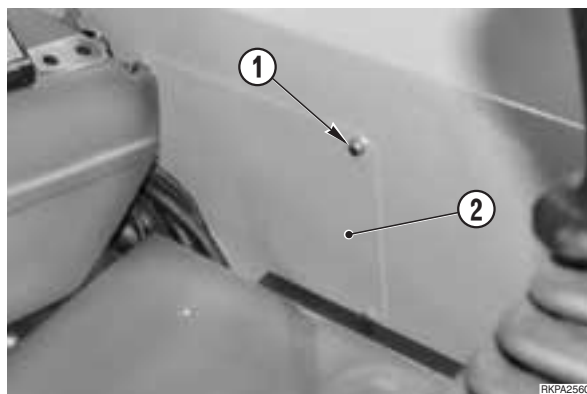
PC27R-8



REMOVAL OF THE ALTERNATOR

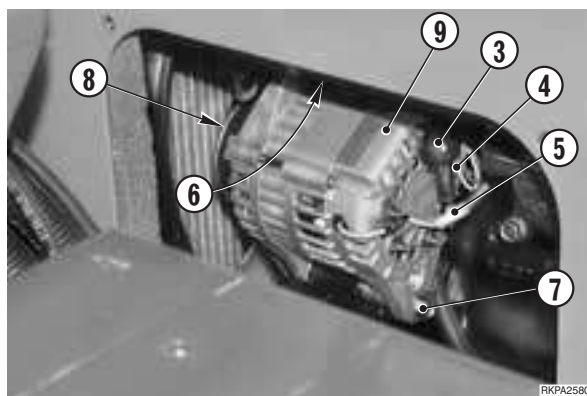
! Disconnect the negative terminal cable (–) from the battery.

- 1 - Remove cabin.
(For details, see «REMOVAL OF CABIN»).
- 2 - Move the operator's cab forwards complete.
- 3 - Loosen bolts (1) and remove the cover (2).



- 4 - Disconnect cable (3) and connectors (4) and (5).
- 5 - Loosen bolts (6) and (7) sufficiently to allow the alternator to be rotate.
- 6 - Free the pulley (8) from the fan-belt and remove alternator (9).

※ 1



INSTALLATION OF THE ALTERNATOR

- To install, reverse the removal procedure.

※ 1

- ★ Adjust the tension of the fan belt. (For details, see «20. CONTROLS AND ADJUSTMENTS»).


REMOVAL OF ENGINE-PUMP GROUP

⚠ Completely lower the working equipment until it is resting on the ground and stop the engine.

⚠ Release all residual pressures from the circuits and the tank. (For details, see «20. CONTROLS AND ADJUSTMENTS»).

⚠ Disconnect the negative terminal cable (-) from the battery.

★ Drain out the hydraulic oil.

 Hydraulic oil: approx. 29 ℓ

★ Drain the engine coolant.

 Engine coolant: approx. 4 ℓ

1 - Remove the engine hood, the lateral counterweights, the counterweight, the oil-cooler - radiator group. (For details, see the single removal).

2 - Remove the expansion chamber (1).

3 - Disconnect the tubes (2) and remove the clip (3).

★ Plug the tubes to prevent entry of impurities.

4 - Disconnect from the pumps the Load Sensing tube (5) the delivery tube (4) and the suction tube (6) .

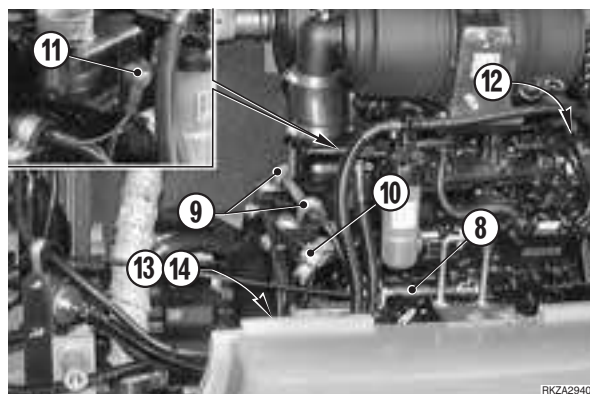
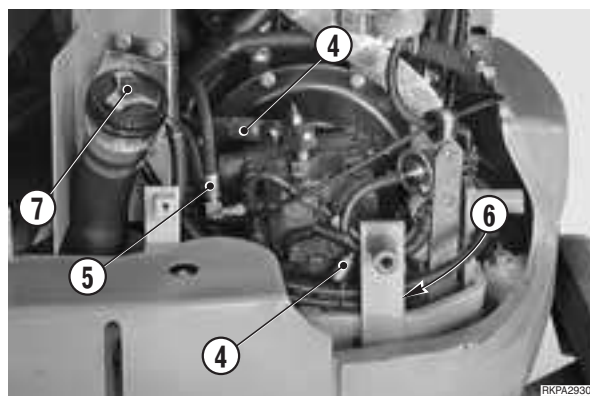
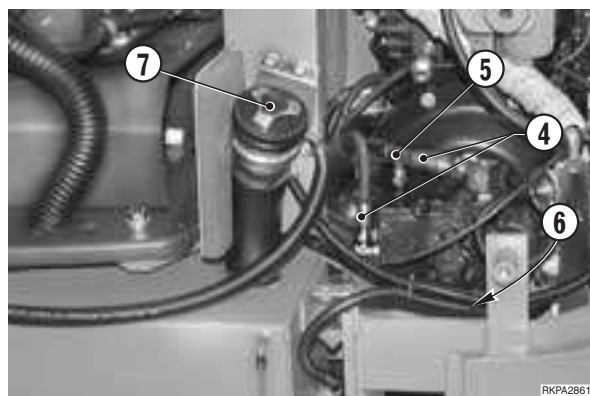
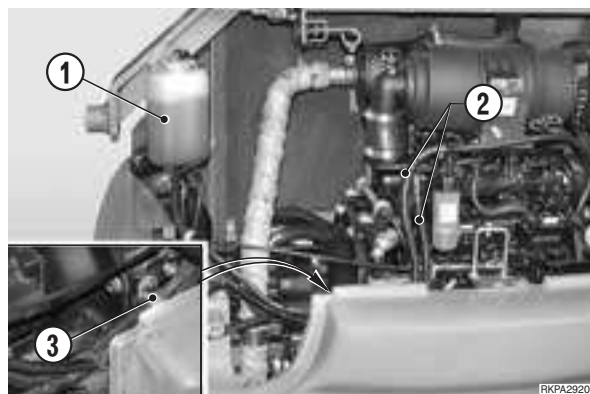
★ Plug the tubes and the unions to prevent entry of impurities.

5 - Disconnect the fuel filling (7).

6 - Disconnect the accelerator cable (16) and its sleeve.

※ 1

7 - Disconnect the clips (9), the connector (10), the pre-heating cable (11), the temperature sensor cables (12), the oil pressure indicator (13) and the grounding plait (14).




REMOVAL OF REVOLVING FRAME

! Fully extend the arm and open completely the bucket, lower the equipment until it rests on the ground; stop the engine.


! Release all residual pressures from all circuits and from the tank. (For details, see «20. CONTROLS AND ADJUSTMENTS»).

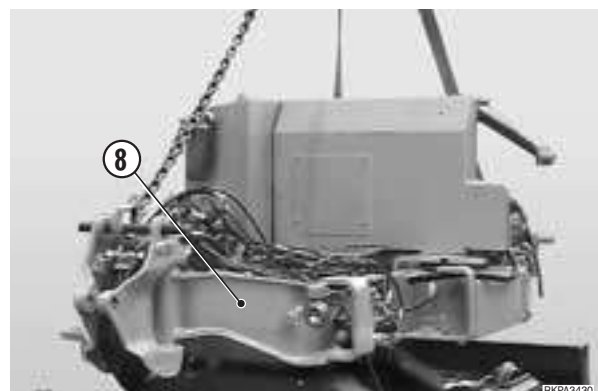
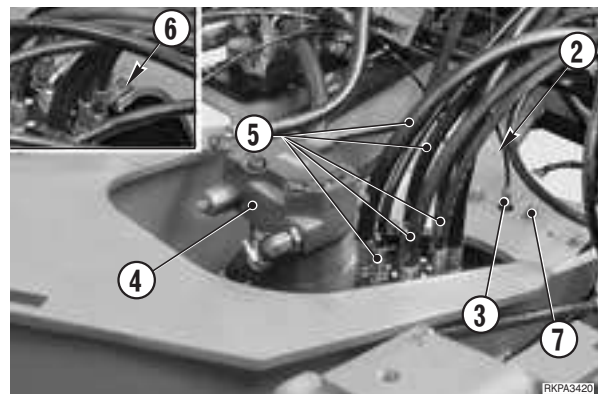
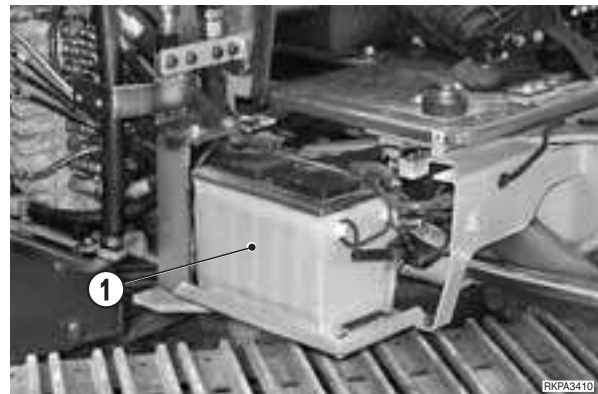
★ Drain the hydraulic oil and the fuel.

 Hydraulic oil: approx. 29 ℓ

 Fuel: max. 35 ℓ

- 1 - Remove the work equipment.
(For details, see «REMOVAL OF THE WORK EQUIPMENT»).
- 2 - Removal the boom cylinder. (For details, see «REMOVAL OF BOOM CYLINDER»).
- 3 - Remove the side lower panels.
(For details, see «REMOVAL OF THE SIDE LOWER PANELS»).
- 4 - Remove the accumulator (1).
★ Disconnect first the negative terminal (–) and then the positive terminal (+).
- 5 - Remove the rear counterweight. (For details, see «REMOVAL OF THE REAR COUNTERWEIGHT»).
- 6 - Remove the platform. (For details, see «REMOVAL OF THE PLATFORM»).
- 7 - Disconnect the swing circle lubrication tube (2) and remove the coupling (3).
- 8 - Remove the swing machinery (4). (For details, see «REMOVAL OF SWING MACHINERY»).
- 9 - Disconnect the upper tubes (5) (No. 8) from the swivel joint.
★ Mark the tubes to avoid exchanging them during re-assembly.
- 10 - Remove the bracket (6) of the joint.
- 11 - Loosen and remove the screws (7) that secure the revolving frame. ※ 1
★ Leave two opposite screws in position for safety.
- 12 - Attach the revolving frame (8) to some hoisting tackle and apply a slight tension to the cables.
★ Adjust the length of the cables to balance the group.
- 13 - Loosen and remove the two turret screws (7) left in position for safety.
- 14 - Remove the revolving frame (8). ※ 2

 Revolving frame: PC20R-8: 1000 kg
PC27R-8: 1400 kg

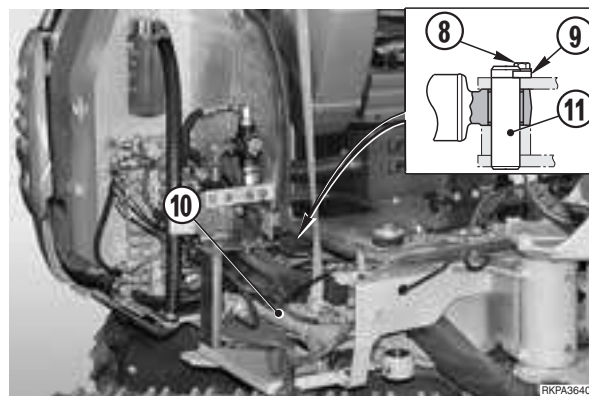


- 8 - Loosen the screws (8) and remove the plate (9).
- 9 - Put a sling round the cylinder (10) and apply a slight tension to the cables.
- 10 - Take out the pin (11) and remove the cylinder (10).

※2 ※3 ※4



Boom swing cylinder: PC20R-8: 17 kg
PC27R-8: 22 kg



INSTALLATION OF THE BOOM SWING CYLINDER

- To install, reverse the removal procedure.

※1

- ★ Adjust the shim thickness so that the clearance between cylinder (10) and swing bracket (2) is below 1 mm.

※2

- ⚠ When aligning the positions between the hole and the pin, turn the engine over at low idling. Do not insert fingers in the holes to check alignment.

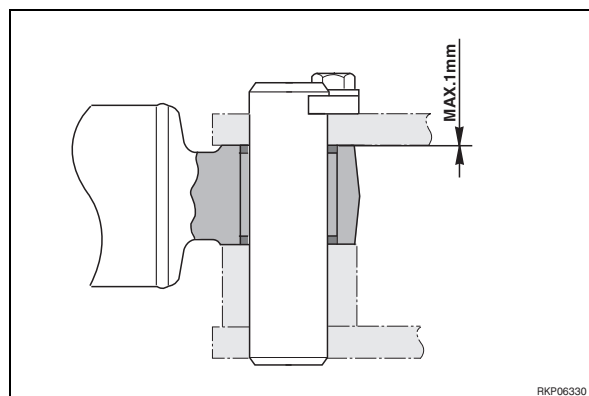
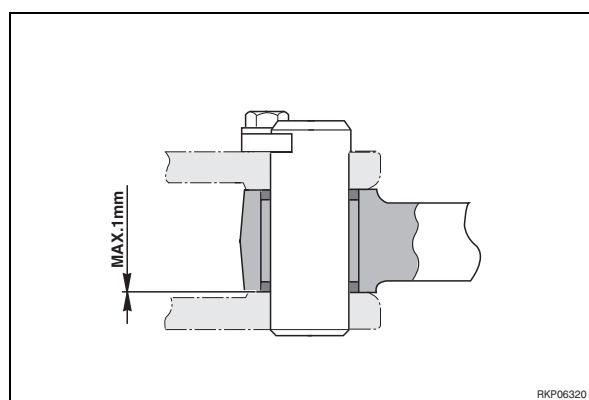
※3

Internal bushings: ASL800050

- 1 - Start the engine and bleed the air from the cylinder. (For details, see «20. CONTROLS AND ADJUSTMENTS»).

※4

- ★ Adjust the shim thickness so that the clearance between cylinder (10) and revolving frame is below 1 mm.



REMOVAL OF THE BLADE

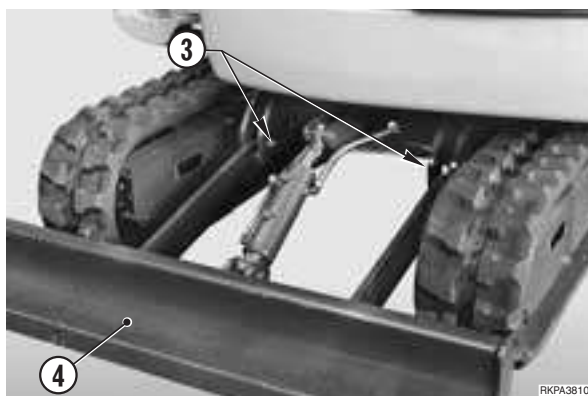
- 1 - Rotate the turret 90° and rest the working equipment on the ground.
- 2 - Disconnect the cylinder from the blade. (For details, see «REMOVAL OF THE BLADE CYLINDER»).
- 3 - Attach the blade to some hoisting tackle, using the lateral holes provided (1) and the cylinder attachment (2).
 - ★ Adjust the length of the cables to balance the group.
- 4 - Take out the pin (3).

※ 1 ※ 2

- 5 - Remove the blade (4).



Blade: PC20R-8: 100 kg
PC27R-8: 137 kg



INSTALLATION OF THE BLADE

- To install, reverse the removal procedure.

※ 1



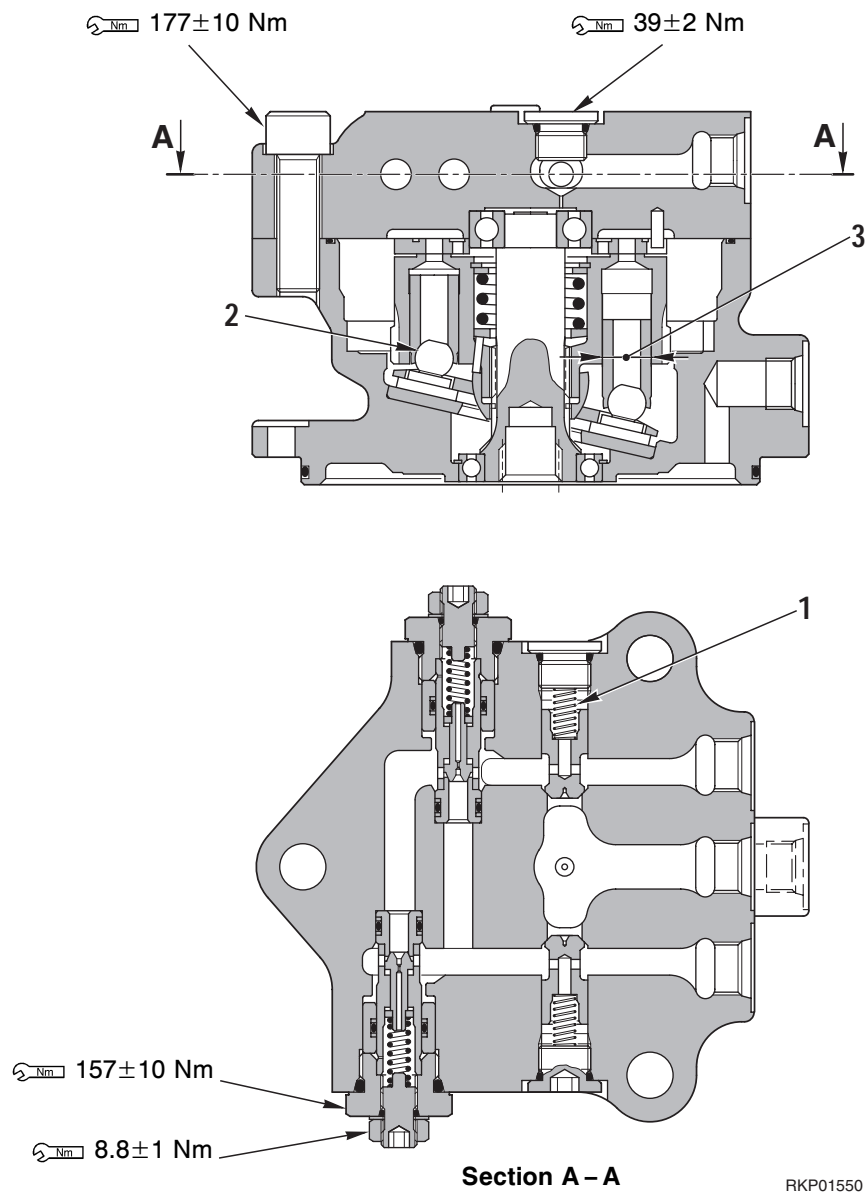
Internal bushings: ASL800050

※ 2



When aligning the positions between the hole and the pin, turn the engine over at low idling.
Do not insert fingers in the holes to check alignment.

PC27R-8



Unit: mm							
No.	Check item	Criteria					Remedy
1	Check valve spring	Standard size			Repair limit		When damage or deformation is found, replace the spring
		Free length	Installed length	Installed load	Free length	Installed load	
		30.1	15.7	2.3 N	25.5	1.6 N	
2	Clearance between piston and cylinder	Standard clearance		Clearance limit		Replace	
		0.03 – 0.15		0.4			
3	Clearance between shoe and piston	0.01 – 0.02		0.4			