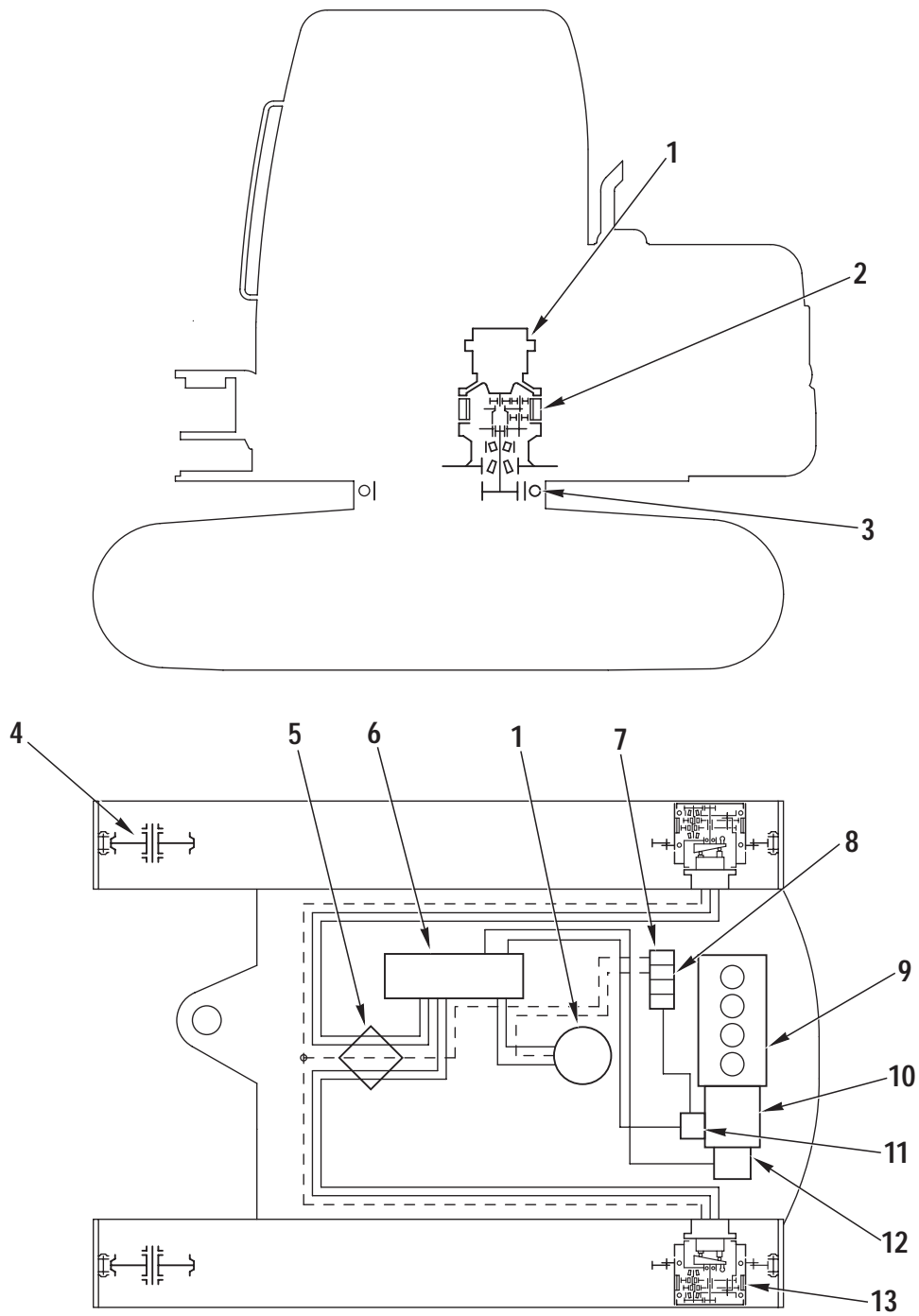


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10 STRUCTURE AND FUNCTION	10-1
20 TESTING AND ADJUSTING.....	20-1
30 REMOVAL AND INSTALLATION	30-1
40 MAINTENANCE STANDARD	40-1

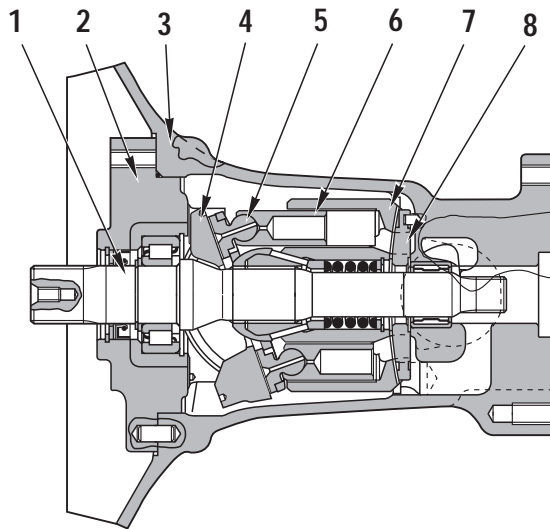
POWER TRAIN



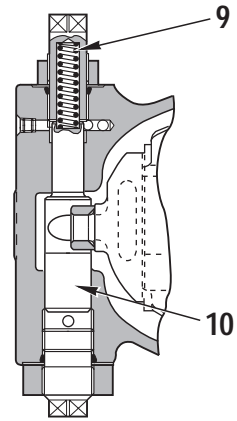
RKP08110

- 1. Swing motor
- 2. Swing machinery
- 3. Swing circle
- 4. Idler
- 5. Center swivel joint
- 6. Control valve
- 7. Travel acceleration solenoid valve

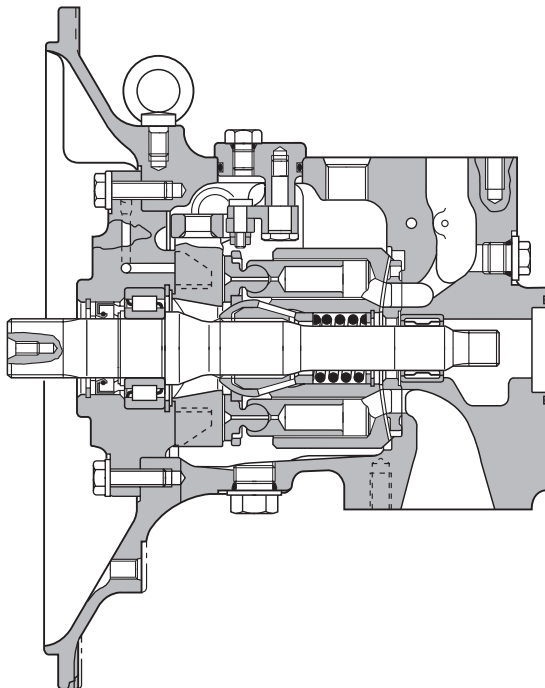
- 8. Brake swing solenoid valve
- 9. Engine
- 10. Main hydraulic pump
- 11. Servocontrol feed unit
- 12. Gear pump
- 13. Travel motor



Section A-A



Section C-C



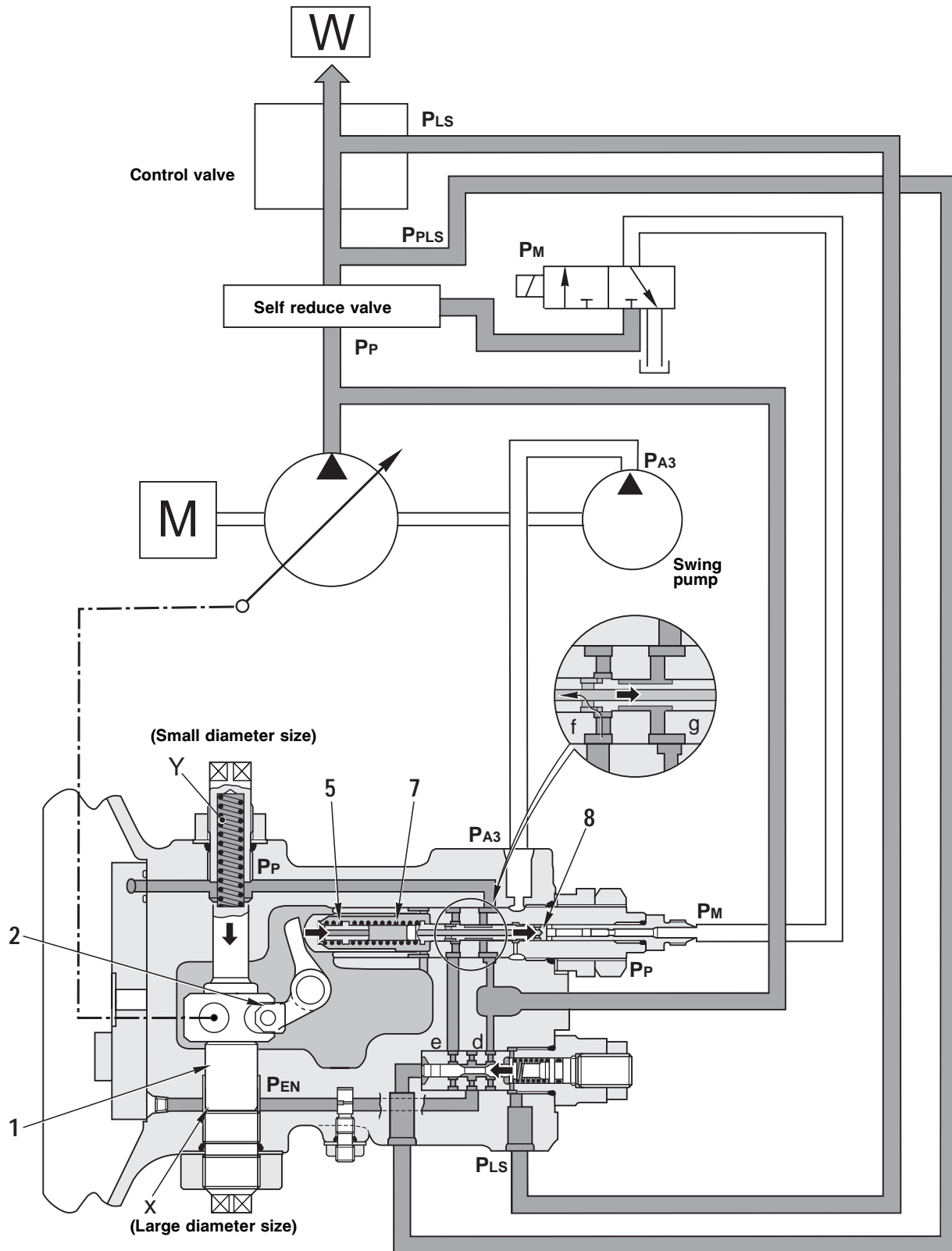
Section B-B

RKP08230

- 1. Shaft
- 2. Cradle
- 3. Case
- 4. Rocker cam
- 5. Shoe

- 6. Piston
- 7. Cylinder block
- 8. Valve plate
- 9. Spring
- 10. Servo piston

10-34



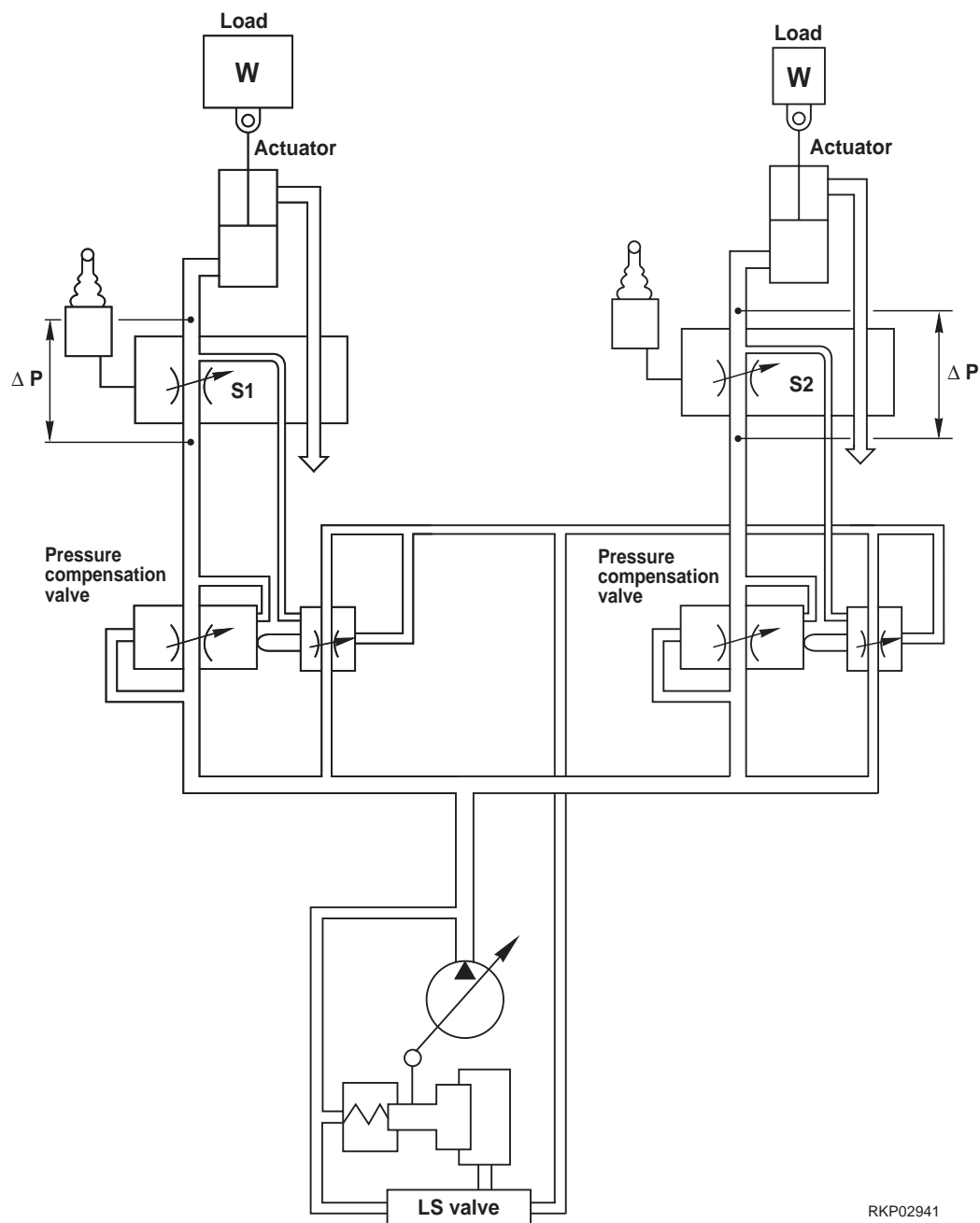
RKP08420

2. Pressure compensation control

- Valves (pressure compensation valves) are installed at the inlet Port side of the spools of the control valves to balance the loads.

When the actuators are complex-operated, the pressure differences ΔP at the upstream (inlet) and downstream (outlet) are made equal by these valves.

In this way, the flow from the pump are distributed in proportion to the opening areas **S1** and **S2** of each valve.



RKP02941

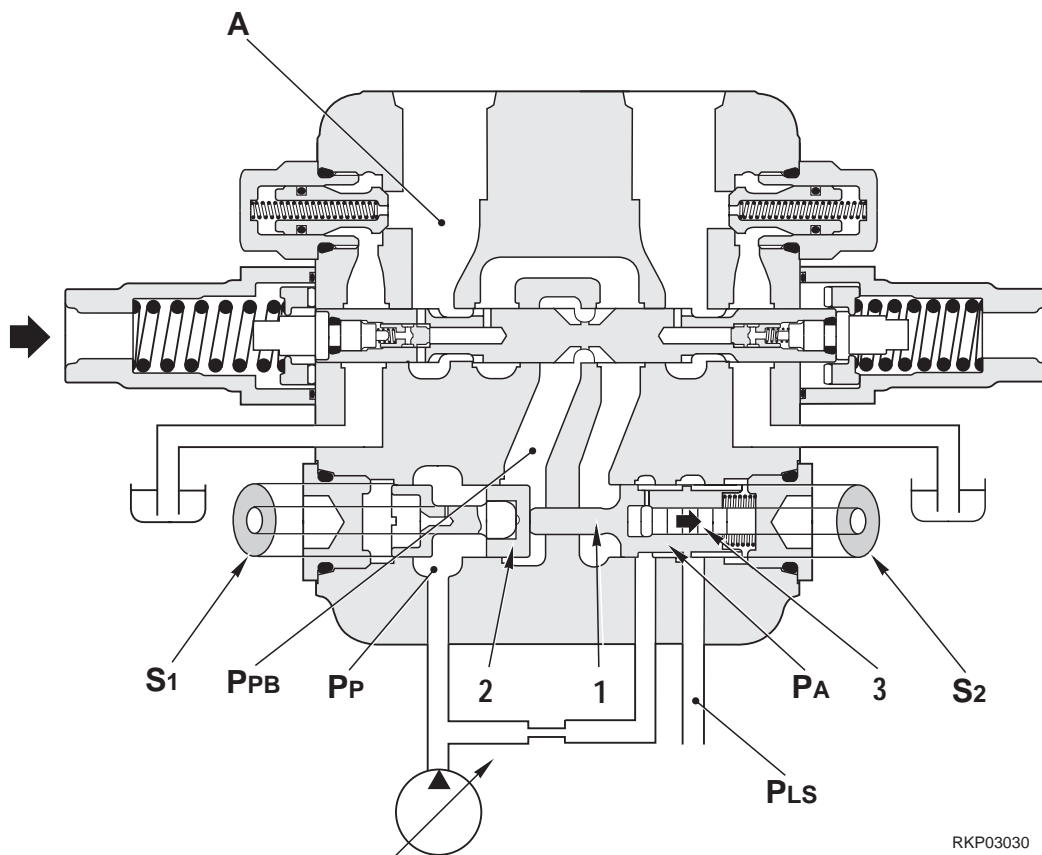
5. Area ratio of pressure compensation valve

FUNCTION

- The pressure compensation valve determines the compensation characteristics by carrying out fine adjustment of the area ratio (S_1/S_2) between the area S_1 of the flow control valve (2) side and the area S_2 of the pressure reducing valve (1) side to match the characteristics of each actuator.

S_1 = Area of the flow control valve (2) – Area of the piston (3)

S_2 = Area of the pressure reducing valve (1) – Area of the piston (3)



RKP03030

Area ratio (S_1/S_2) and compensation characteristics

- When the ratio is 1.00:
[Pump pressure P_P - Upstream pressure of the spool notch P_{PB}] = [LS circuit pressure P_{LS} - Actuator circuit pressure P_A (= A)].
Thus, the flow is distributed in proportion of opening areas of the spool.
- When the ratio is larger than 1.00 : $P_P - P_{PB} > P_{LS} - P_A$ (= A)
Thus, the flow is divided less than the proportion of opening areas of the spool.
- When the ratio is smaller than 1.00 : $P_P - P_{PB} < P_{LS} - P_A$
Thus, the flow is divided more than the proportion of opening areas of the spool.

REDUCTION GEAR

FUNCTION

This reduction gear is composed of spur reduction gears (First Reduction) and differential reduction gears (Second Reduction).

OPERATING PRINCIPLE

1. First Reduction

Function

At the below and left figure, the rotating motion on hydraulic motor is transmitted to the input gear (2) of First Reduction. Then three spur gears (3) engaged with the input gear (2) rotate with reducing the rotating speed. Gear ratio of First Reduction is described as the following.

$$i_1 = - Z_i / Z_s$$

Z_i = No. of teeth of input gear

Z_s = No. of teeth of spur gear

2. Second reduction

Three spur gears are connected severally to the three crank shaft (4). These crank shafts are input of Second Reduction..

RV gear (5) (6) are fitted up the eccentric crank shaft through bearings. According to rotating of the crank shaft, RV gears revolve (eccentric motion) along pin-gears (7) within hub. As these crank shafts are supported by spindle, hub rotates with reducing the speed. Gear ratio of Second Reduction is described as the following.

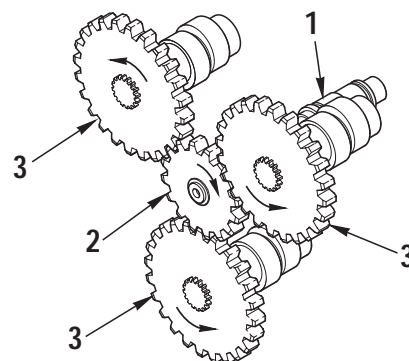
$$i_2 = (Z_P - Z_R) / Z_P$$

Z_P = No. of pin

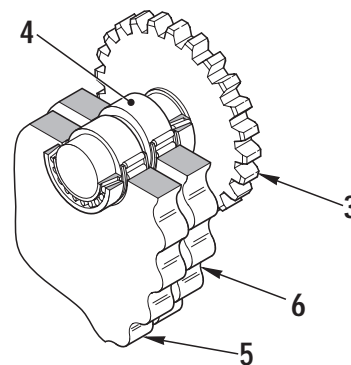
Z_R = No. of teeth of RV gear

Total gear ratio of this reduction gear is described as the following.

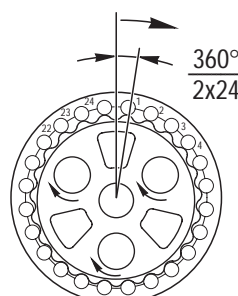
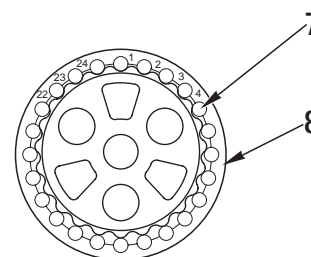
$$i = i_1 \times i_2 = - Z_i / Z_s \times (Z_P - Z_R) / Z_P$$



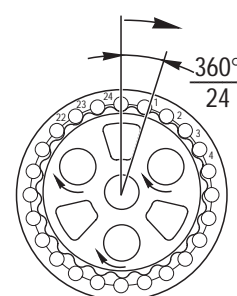
RKP08630



RKP08840



Crank shaft rotation
of 180°



Crank shaft rotation
of 360°

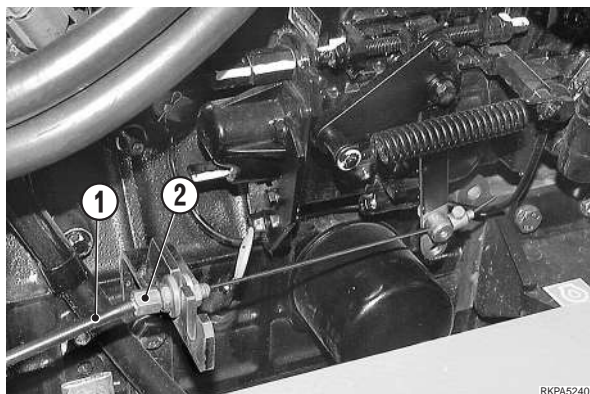
RKP08650

ADJUSTING THE STROKE OF THE ACCELERATOR LEVER

★ Test conditions:

- Engine: Switched off, but at working temperature.
- Low idling: within correct range.
- Hydraulic oil: 45 – 55°C (113 – 131°F)
- Accelerator lever at the mid-point of its stroke.

1 - Use the stretcher (2) to eliminate clearance in the jacket (1).



2 - Raise the right-hand cover in order to reach the screws (3) and (4).

3 - Unscrew the nuts (5) and (6) and tighten the screws (3) and (4) in the support.

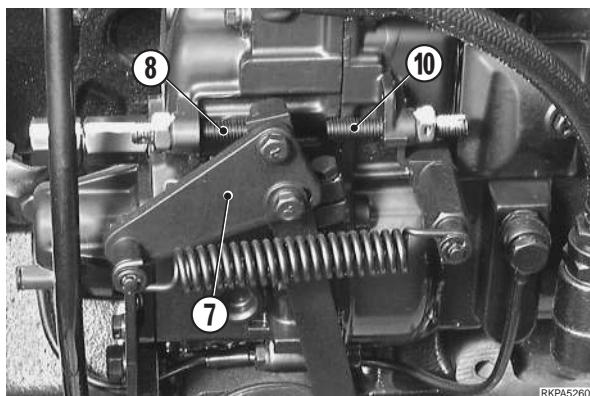
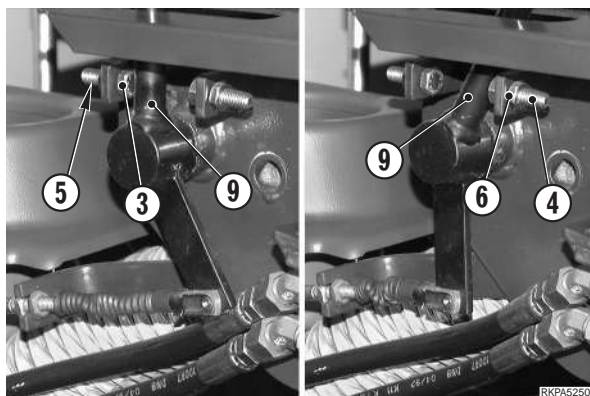
4 - Move the accelerator lever (9) slowly towards low idling position. Stop this movement when the lever (7) on the cover of the injection pump comes into contact with the low idling adjustment screw (8).

5 - Adjust the screw (3) until it is 0.1 mm (0.004 in.) from the lever (9) and lock it in this position with the nut (5).

6 - Move the lever (9) towards the high idling position. Stop this movement when the lever (7) on the cover of the injection pump rests against the lead-sealed high idling adjustment screw (10).

7 - Adjust the screw (4) to 0.1 mm (0.004 in.) from the lever (9) and lock it in this position with the nut (6).

- ★ After adjustment, replace the right-hand cover and check that the aperture does not impede the movement of the lever (9) towards its extreme positions.



MEASURING INNER OIL LEAKAGE OF TRAVEL MOTOR

⚠ When measuring oil leakage from the travel motor, mistaken operation of the levers can lead to accidents.

Make this works using two persons and always follow agreed signals when measuring.

★ Check condition:

- Hydraulic oil: 45 – 55°C (113 – 131°F)
- WORKING MODE selector: position P
- Tracks tension: within the permissible values
- Upper structure: turned of 180°.

1 - Remove the covers (1).

2 - Disconnect drain hose (2) from the travel motor to check and fit a blind plug at the hose end.

3 - Connect to travel motor a temporary hose «A» to catch possible oil leakages.

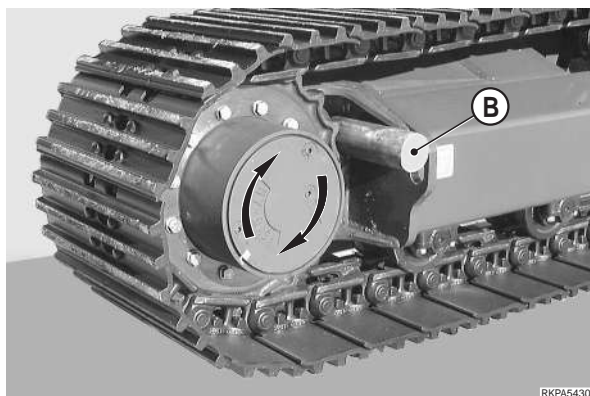
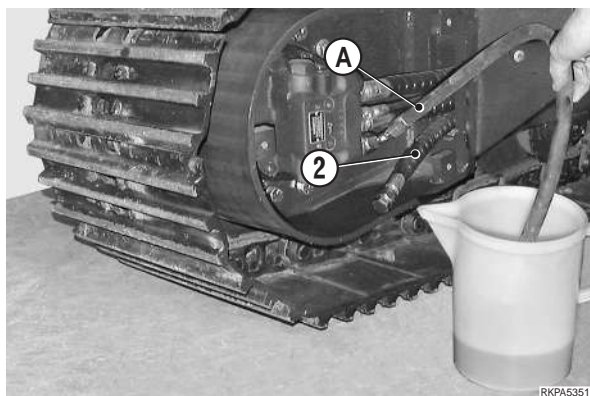
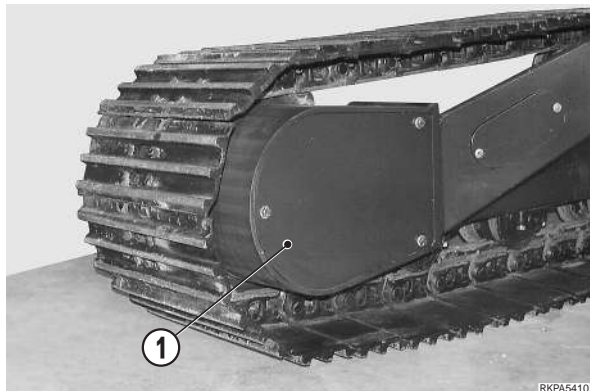
4 - Put a steel bar «B» of 70 mm (2.758 in.) diameter between sprocket and frame.

5 - Run the engine and start to rotate the blocked sprocket; bring gradually the engine at full throttle and bring the travel lever control to the end of its stroke.

6 - Relieve the circuit for 30 seconds and then measure the leakage for the next minute.

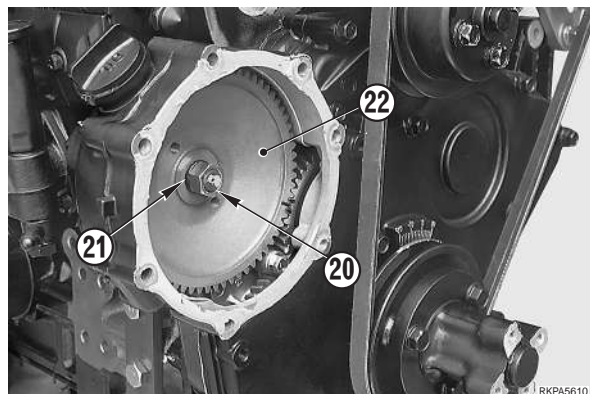
- ★ When measuring, move the motor slightly (move the position of the valve plate and cylinder, and piston and cylinder), and measure several times.

7 - Stop the engine and, with the same procedure, make the measuring for the other travel motor.



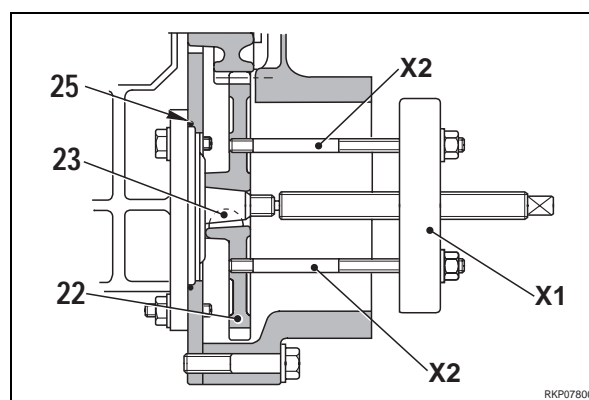
12 - Loosen and remove nut (20) and lock washer (21) of pump driving gear (22). ※ 6

- ★ Be careful not to let lock washer drop in the housing.

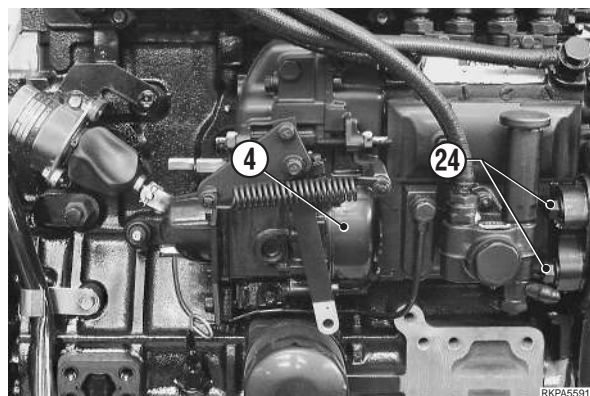


13 - Remove pump (4) driving gear (22).

- ★ Before removing pump driving gear, mark position compared to idling gear.
- ★ For removal, use a puller (X1) and tighten its screws (X2) directly in the gear (22).
- ★ Be careful not to damage pump shaft thread.
- ★ During removal be careful not to let key drop (23) in the housing.



14 - Remove nuts (24) (No. 4) and injection pump (4) with relative OR rings (25). ※ 7



REMOVAL OF HYDRAULIC OIL TANK


! Lower the work equipment until it is resting on the ground and switch off the engine.

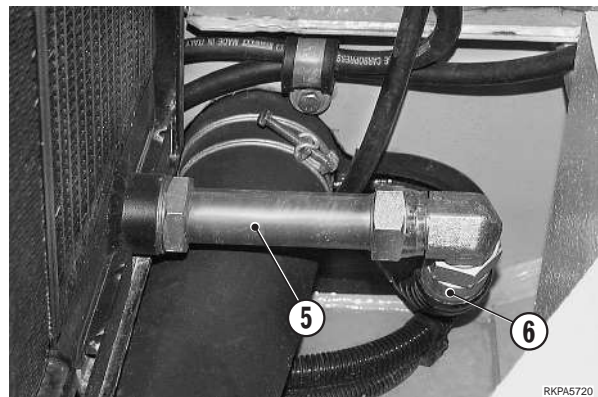
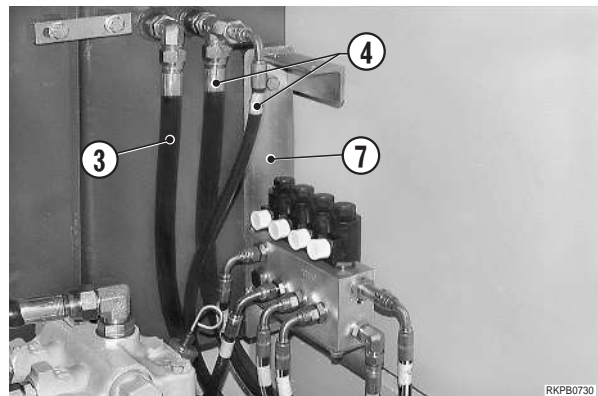
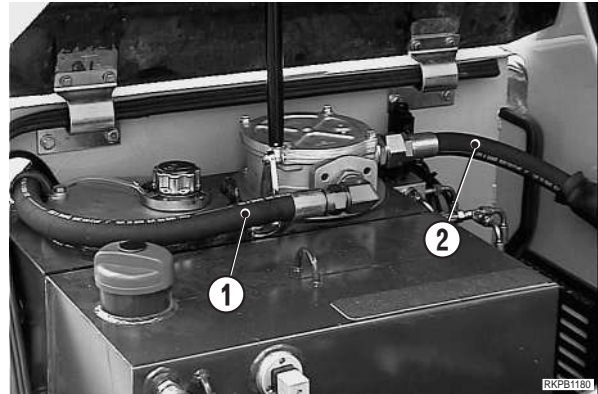
! Release residual pressures from all circuits. (For details, see «20. TESTING AND ADJUSTMENTS»).

- Drain the hydraulic oil.

 Quantity of oil: approx. 70 ℓ (18.5 US.gall)

- 1 - Remove the fuel tank. (For details, see «REMOVAL OF FUEL TANK»).
- 2 - Disconnect the exhaust pipes (1) and (2).
- 3 - Disconnect the drain pipes (3) and (4).
- 4 - Disconnect the coupling of the pump suction pipe (5) and the pipe (6).
- 5 - Remove the bracket (7) of the solenoid valves.
- 6 - Hook the tank to the hoisting equipment and slightly put the rope under tension.
- 7 - Remove the bolts and the oil tank (8).

 Oil tank: 60 kg (132.2 lb.)




INSTALLATION OF HYDRAULIC OIL TANK

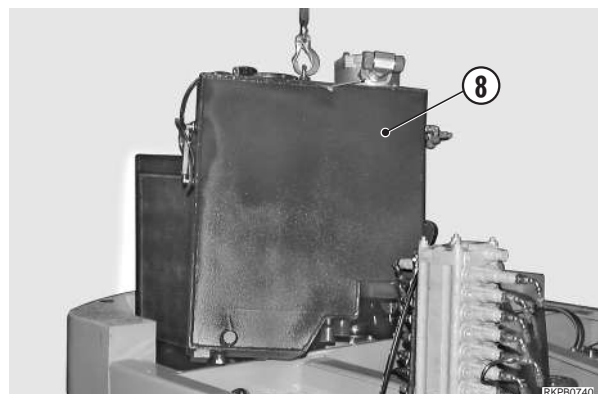
- To install, reverse the removal procedure.

- 1 - Fill the hydraulic oil tank to maximum level.

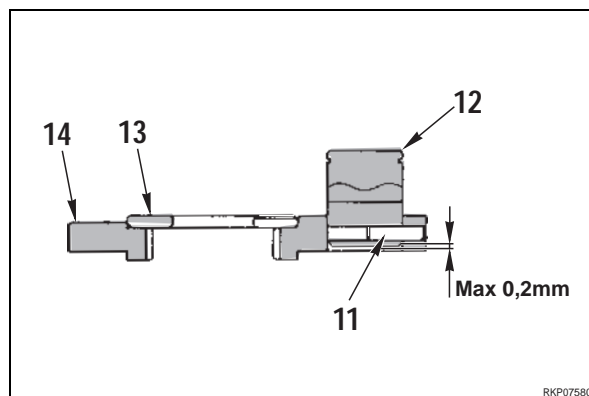
! While filling, bleed air from the main pump piston. (For details, see «20. TESTING AND ADJUSTMENTS»).

 Hydraulic oil needed: approx. 70 ℓ (18.5 US.gall)

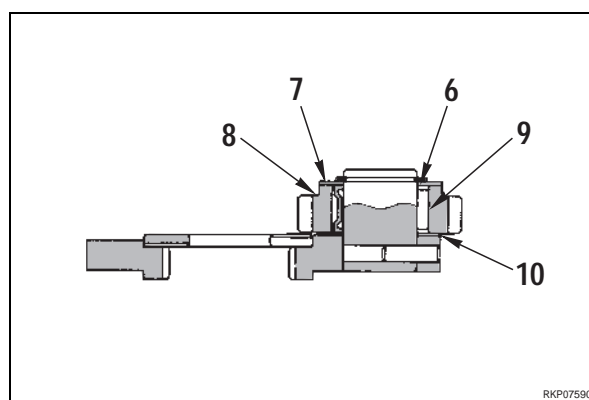
- 2 - Start the engine to circulate the oil and check that there are no leakages.
- 3 - Switch off the engine, check the level and, if necessary, top it up.



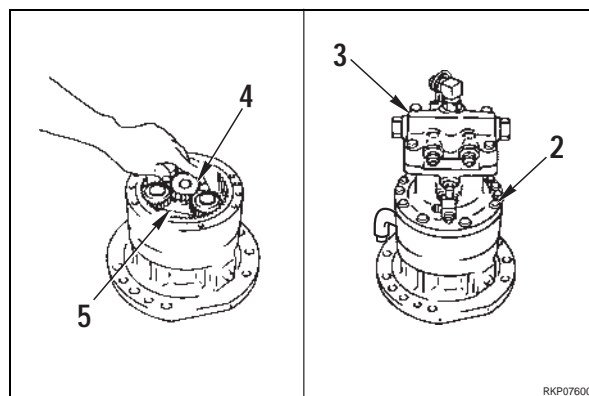
- 8 - Install thrust washer (13) to carrier (14).
Align position of pin holes of shaft (12) and carrier (14), then tap with a plastic hammer to install shaft (12).
Insert pin (11).
★ After inserting the pin (11) caulk the pin portion of the carrier.
★ Check that the stepped difference between the shaft (14) and carrier (12) is less than 0.2 mm (0.0079 in.).



- 9 - Assemble thrust washer (7), bearing (9), gear (8) and thrust washer (10), then install snap ring (6).



- 10 - Install No. 1 carrier assembly (5).
Install No. 1 sun gear (4).
Install swing motor assembly (3) and tighten screws (2) (No. 12).
Tighten drain plug and add oil through oil filter.
⚙️ Mounting bolt: 66.2 ± 7.4 Nm (48.8 ± 5.45 lb.ft.)
🔧 Motor mating surface: Loctite 510
🚰 Swing machinery case: approx. 1.5 ℓ (0.4 US.gall.)
🚰 Swing machinery case: ASL800050 (approx. 110 cc)



18. Removing flange

45 - Remove the flange (61) from the reduction gear support (60).

- ★ Make match marks across hold flange (61) and reduction gear support (60) by using a paint marker. This to ensure that the parts are in their correct position when re-assembled.

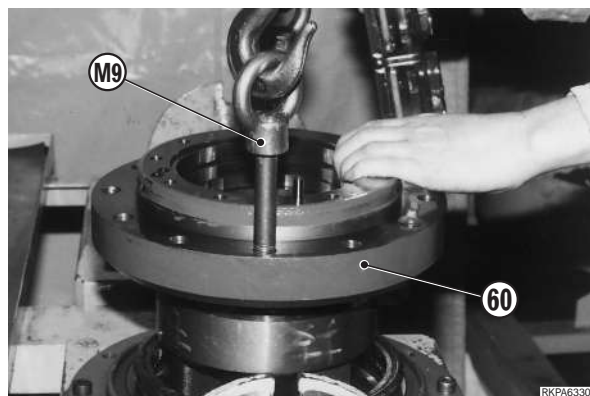
⚠ The holes for reamer bolts (63) in the flange (61) are machined with the hold flange attached to the reduction gear support; if one of the parts is damaged, replace the entire assembly at the same time.



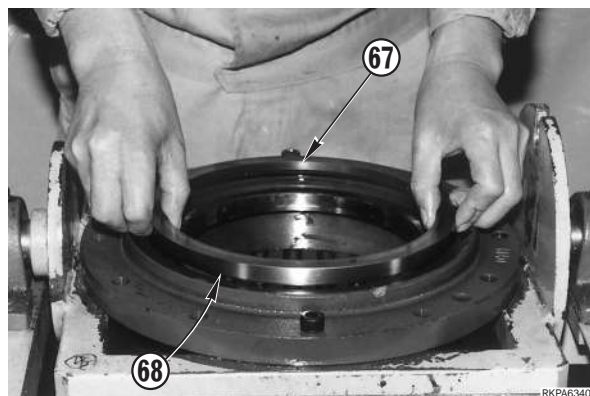
19. Removing reduction gear support

46 - Remove the two clamps **M2** applied at point (42) and after screwing two eye-bolts **M9** into two opposing screw-holes, remove the reduction gear support (60) and the floating seal (64), the outer race of bearing (65) and the seal (66).

- ★ The removed floating seal must be disposed of.



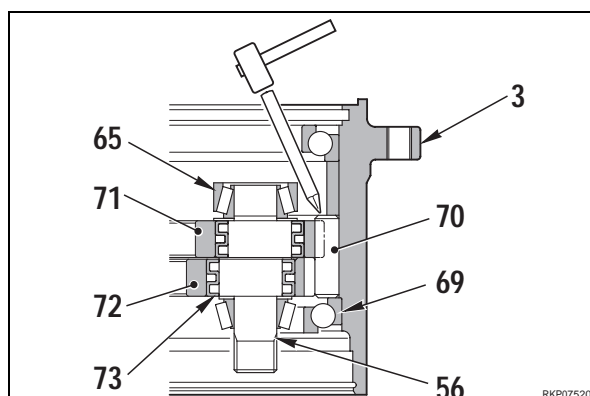
47 - Remove the distance piece (67) and the O-ring (68).



20. Removing ball bearings, gears and pins

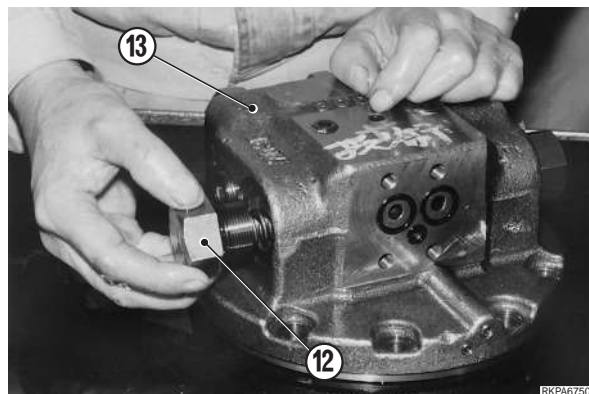
48 - Remove the ball bearing (69) from the hub (3) by simultaneously taking out the pins (70) using a pin punch and a hammer.

Through this process, the RV gear assembly is also removed. The RV gear assembly consists of gear A (71), gear B (72), crankshafts (56), tapered-roller bearings (65) and needle-roller bearings (73).




41 - Grease and fit springs (21) and spring retainers (22) into plugs (12); screw the two assemblies into the rear flange (13).

 Springs and spring retainers: ASL800050



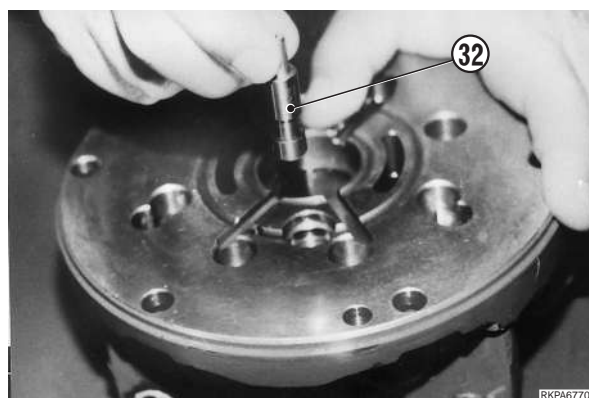
42 - Tighten valve plugs (12).

 Plugs: 36 kgm (260.4 lb.ft.)



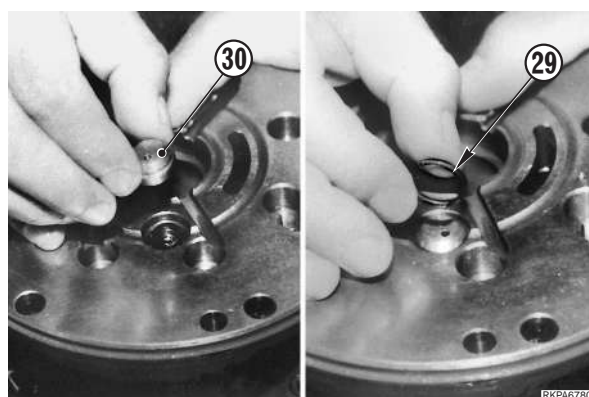
13. Rear flange

43 - Lubricate the valve (32) with hydraulic oil and insert it into the rear flange (13).



44 - Fit the spring (31) and the stopper (30) into valve (32) and finally install the ring (29) that holds the subassembly together.

★ The ring (29) must be a new one.



REMOVAL OF BLADE PPC VALVE

! Lower the work equipment until it is resting on the ground and switch off the engine.

⚠ Release residual pressures from all circuits. (For details, see «20. TESTING AND ADJUSTMENTS»).

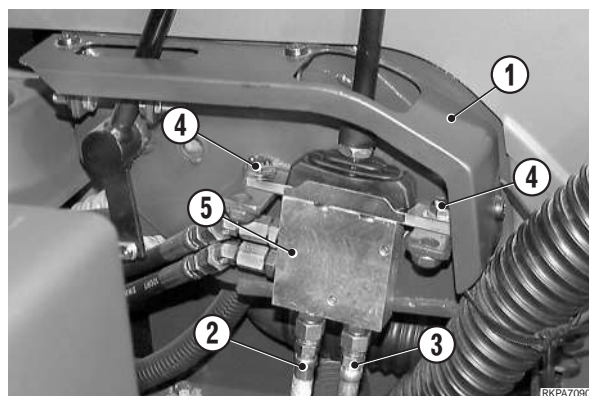
1 - Remove the cabin (For details, see «REMOVAL OF CABIN»).

2 - Remove the casing (1) from right-hand manual control support.

3 - Disconnect the tubes (2) and (3) and plug them.

★ Make an identifying mark on the pipes to avoid mixing them up during installation.

4 - Remove the screw (4) and the PPC valve (5).



INSTALLATION OF BLADE PPC VALVE

• To install, reverse the removal procedure.

1 - Start the engine to circulate the oil.

2 - Bleed air from the blade cylinder. (For details, see «20. TESTING AND ADJUSTMENTS»).