SEBM05670302

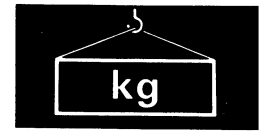
SHOP MANUAL

KOMATSU

HD205-3

MACHINE MODEL	SERIAL NO.
HD205-3	**1003 and up**

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 indicated clearly with the symbol kg

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 existence of another 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:

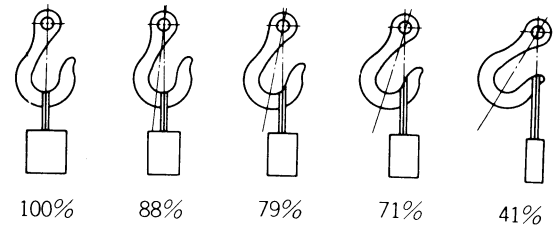
Wire ropes
(Standard "Z" or "S" twist ropes without galvanizing)

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



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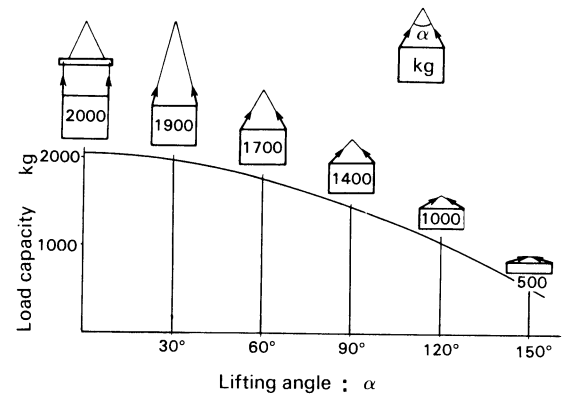
3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound on to the load.

⚠ 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 result in a dangerous accident.

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°.



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MEASURING BLOW-BY PRESSURE

Special tool

	Part number	Part name	Q'ty
A	799-201-1503	Blow-by checker	1

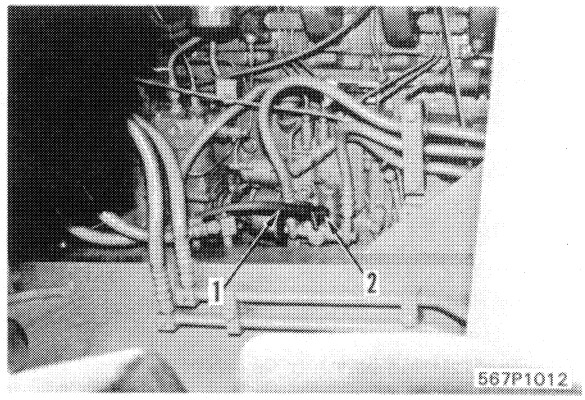
⚠ When measuring blow-by pressure, be careful not to touch the exhaust manifold or muffler, or to get caught in rotating parts.

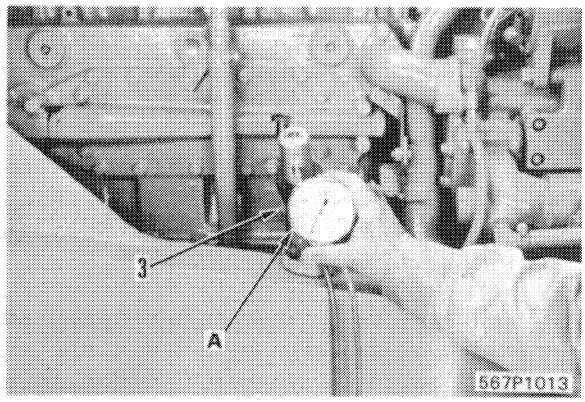
1. Warm engine up until water temperature is inside operating range.
2. Stop engine and install plug (2) on engine breather hose (1).
3. Install adapter of tool A on engine oil filler (3).
4. Connect adapter and tool A (0 to 500 mmH_2O) to hose.
5. Run the engine at high idling and measure the blow-by pressure.

Cautions when measuring blow-by

★ The blow-by should be measured with the engine running at rated output.
- When measuring in the field, a similar value can be obtained at stall speed.
- If it is impossible to check at rated output or stall speed, measure at high idling. In this case, the blow-by value will be about 80% of the value at rated output.

★ Blow-by may vary greatly according to the condition of the engine, so if there is any abnormality in the reading, check for any problem related to defective blow-by, such as excessive oil consumption, defective exhaust gas color, or early deterioration or contamination of the oil.



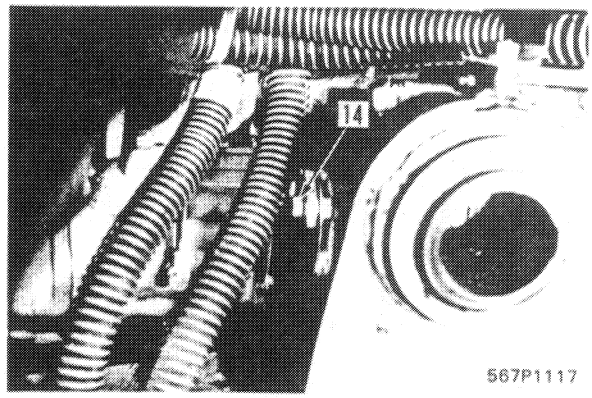


7. Fit gaskets to both sides and connect fuel return hose (9), and hoses (8) and (7) between fuel filter and fuel injection pump.

8. Fit gaskets to both sides and connect fuel supply hose (6).

9. Connect fuel control rods (5) and (4).
   ★ Bend the cotter pin securely.
   ★ Adjust the rods to the specified dimensions.
   For details, see 12 TESTING AND ADJUSTING, adjusting fuel control.

10. Bleed air from fuel injection pump as follows.
   1) Loosen air bleed plug (18) of fuel filter (17), and operate priming pump (19).
   2) When no more bubbles come out with the fuel from plug (18), tighten plug.
   3) Continue to operate priming pump (10 – 15 strokes) and bleed air betwee filter and pump.
      ★ There is no air bleed plug at the pump end.
      When the priming pump is operated, the check ball inside joint ball (20) opens and the air escapes to the tank.



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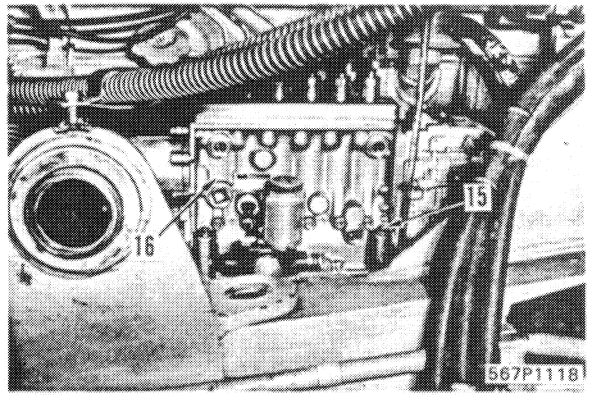

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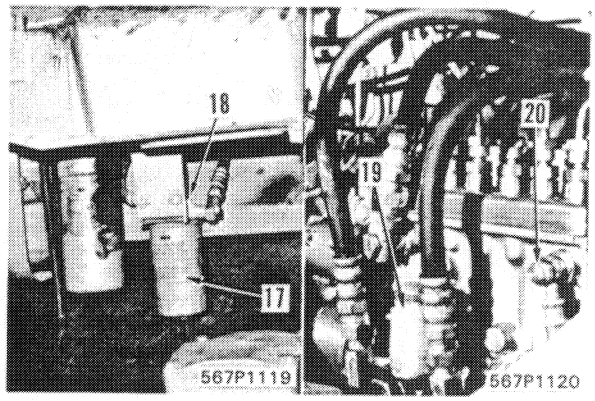

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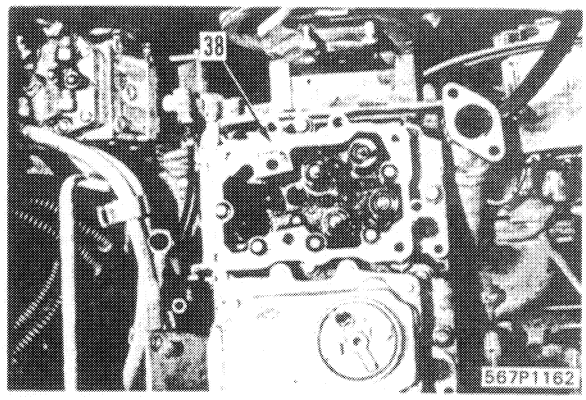
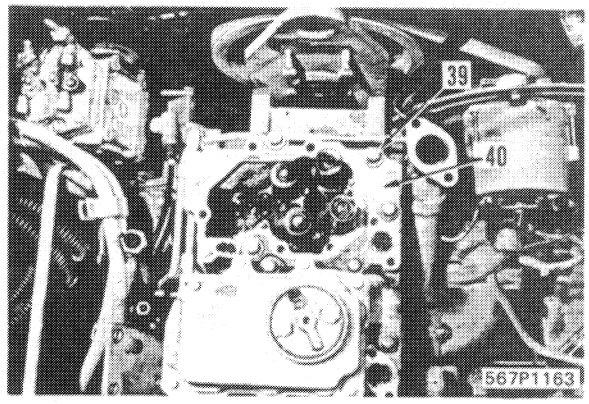
23. **Rocker lever housing**
Remove rocker lever housing (38).

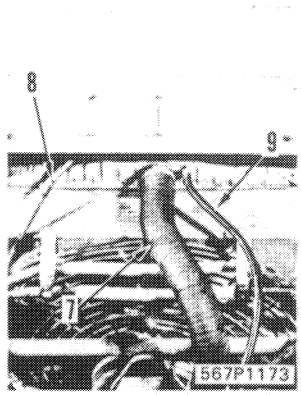


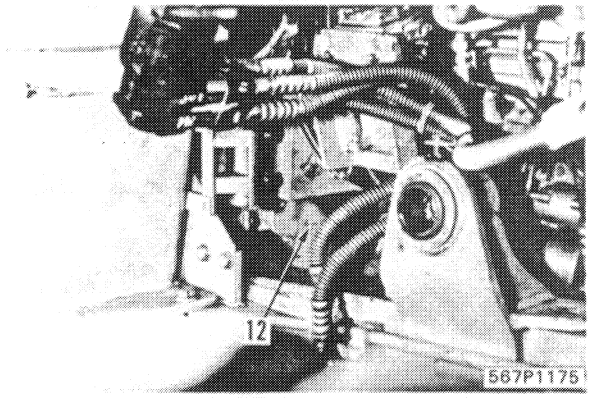
24. **Cylinder head assembly**
Remove mounting bolts (39), then remove cylinder head assembly (40).

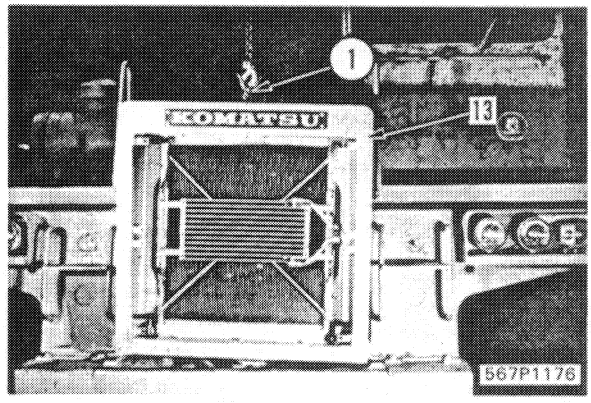


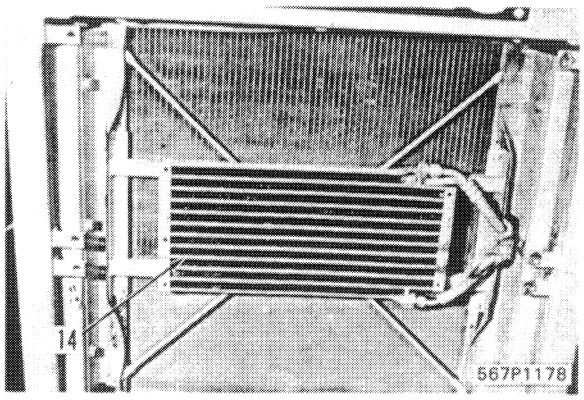
INSTALLATION OF RAIDATOR ASSEMBLY

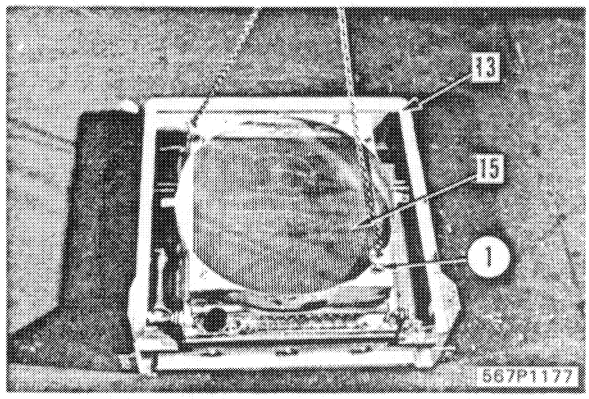
1. Using eyebolts (1) (Thread dia. = 10 mm, Pitch = 1.5 mm), install radiator assembly (15) to radiator guard.
2. Install air conditioner and cooler assembly (if equipped) (14).
3. Using eyebolts (1) (Thread dia. = 10 mm, Pitch = 1.5 mm), raise radiator guard assembly (13) and install.
4. Connect radiator outlet hose (12).
5. Install fan guard assembly (11) and heater hose bracket (10).
   ★ Tighten the heater hose bracket together with the fan guard.
6. Connect aeration hose (9).
7. Connect overflow hose (8).
8. Connect radiator inlet hose (7).
9. Connect horn tube (6).
10. Connect air conditioner hoses (5) and (4). (if equipped)
11. Install 2 radiator grills (3).
12. Raise hood (2) and install.
13. Tighten drain valve (1) and add water through water filler to the specified level.
    ★ Run the engine to circulate the water through the system.
    Then check the water level again.
14. Fill with air conditioner gas. (if equipped)



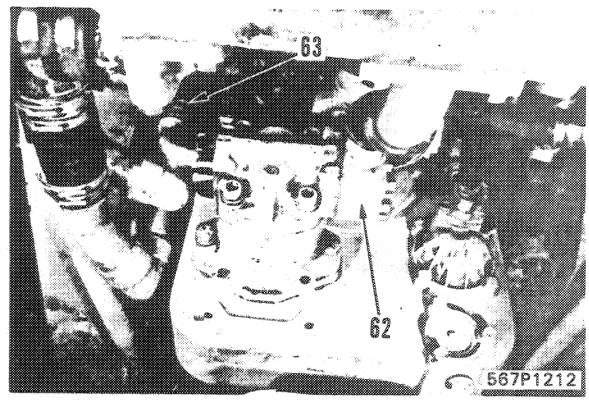




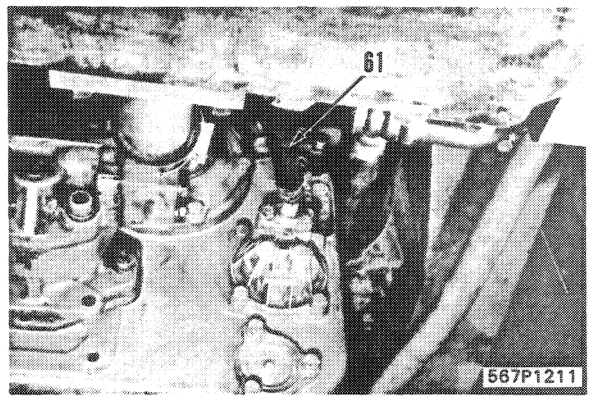




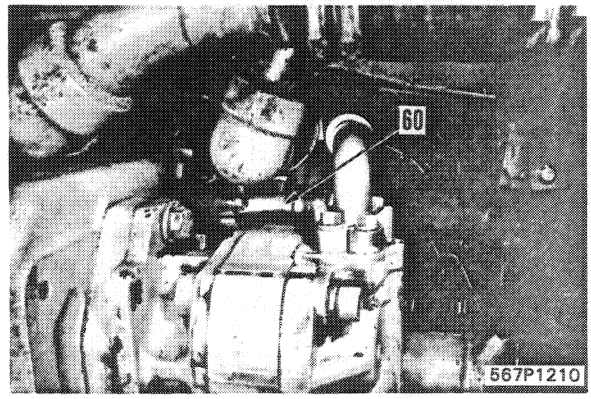
3. **Transmission pump piping**
   1) Fit O-ring and connect transmission pump outlet hose (63).
   2) Fit O-ring and connect transmission pump inlet tube (62).



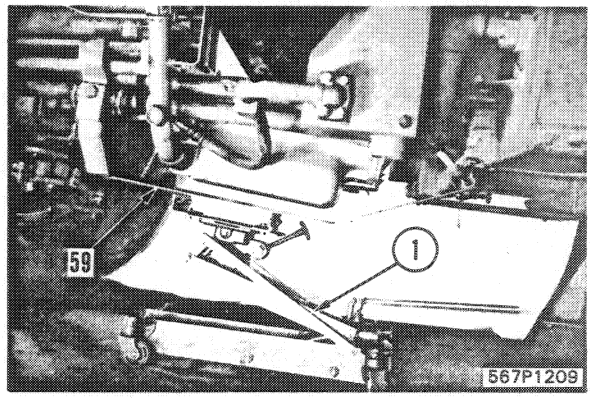
4. **Scavenging pump piping**
   Fit O-ring and connect hose (61) between scavenging pump and transmission.



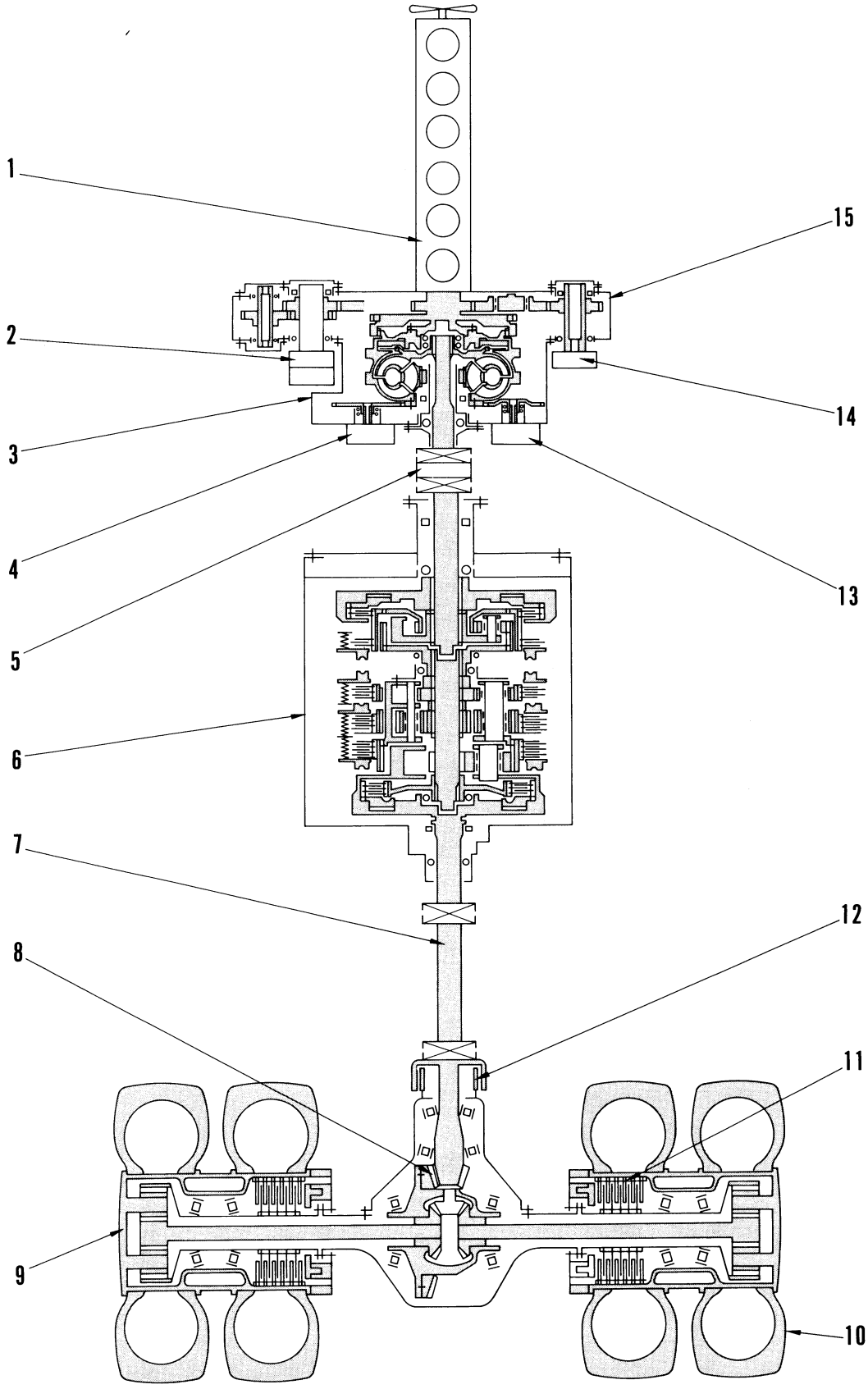
5. **Torque converter outlet hose**
   Fit O-ring and connect torque converter outlet hose (60).



6. **Underguard**
   Using transmission jack (1), install underguard (59).



POWER TRAIN



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PRINCIPLE OF PLANETARY GEAR MECHANISM

Fig. 1 is an example of planetary gear mechanism used for final drive system.
Here, planetary gear shaft and carrier are a single unit, and the ring gear is fixed. Sun gear rotation is transmitted to planetary gear, and as it comes to engage with fixed ring gear, this planetary gear revolves in same direction as sun gear, and carrier rotates. Fig. 2 shows a sectional view of final drive system employing HD205 planetary gear mechanism.

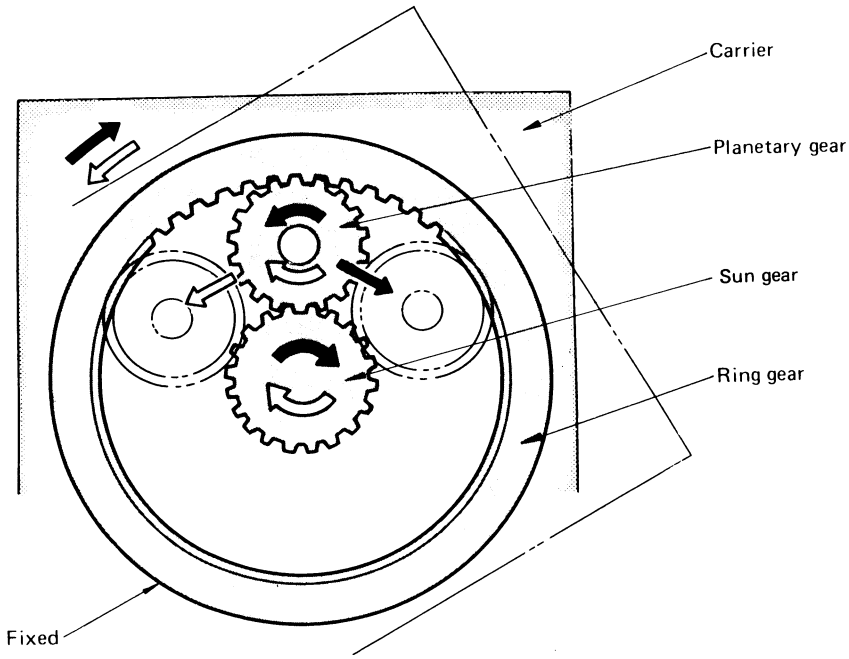

Fig. 1

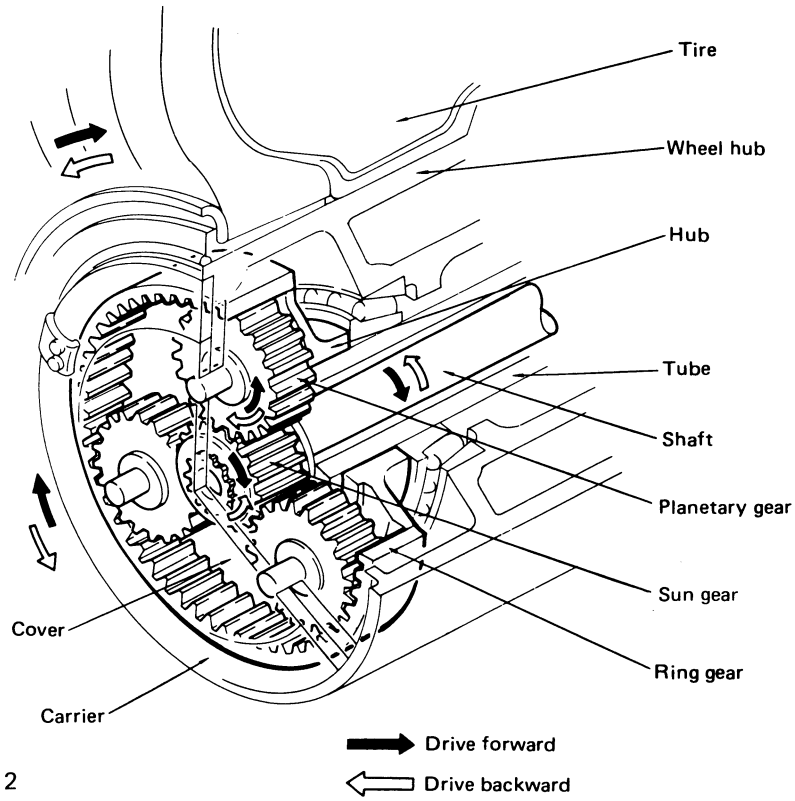

Fig. 2

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On the other hand, when the vehicle turns on a curve, inner wheels receive more resistance than the outer wheels, and a force difference is produced at mesh point of differential pinion and differential side gear. Due to force difference, differential pinion starts rotation. (Fig. 2)

Accordingly, as differential side gears are forced to turn in a reverse direction to each other, outer wheels rotate at a speed (N + n rotations) which is the sum of decelerating bevel gear rotation (N) and differential side gear rotation (n) by differential pinion rotation. Whereas, inner wheels rotate at a speed of above rotation difference (N – n rotation).

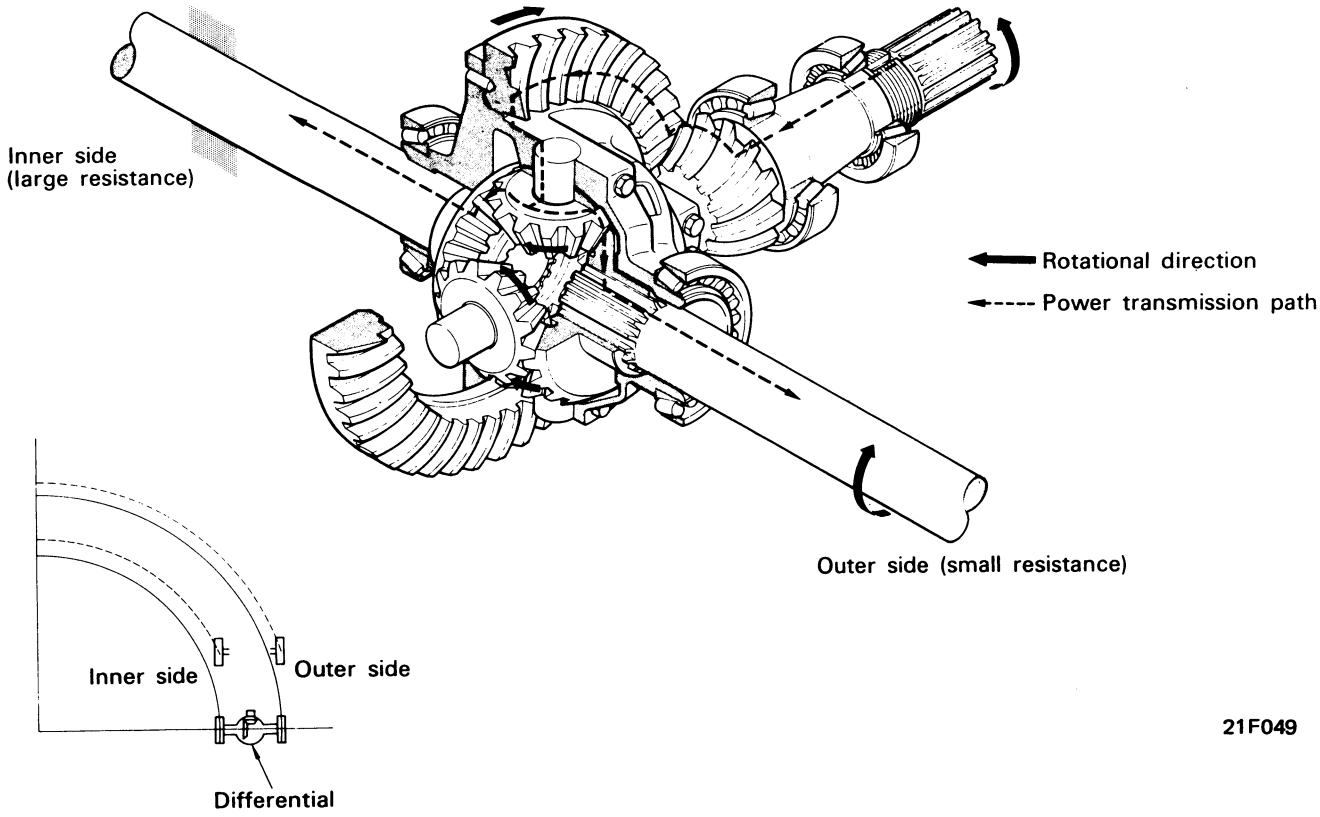


Fig. 2 When turning around
(when operating differential)

Testing and measuring item	Measurement condition	Unit	Standard value	Permissible value
Oil pressure of transmission • Modulating pressure • Reducing pressure • Lubricating pressure	• Oil temperature: 60 – 80°C • Engine speed: High idling	kg/cm²	22 ± 2	22 ± 4
Tire inflation pressure front and rear wheel • Front tire (24 PR) • Rear tire (24 PR)	• Unload	kg/cm²	5.0 ± 0.1 5.0 ± 0.1	5.0 ± 0.4 5.0 ± 0.4
Service braking distance • Loaded 20 tons	• Speed when applying brakes: 32 km/h • Max. air pressure: 7.2 kg/cm² • Max. oil pressure: 46 kg/cm²	m	Max. 14	Max. 14
• Unloaded				
Retarder braking distance • Loaded 20 tons			Max. 20	Max. 20
• Unloaded				
Brake operating pressure • Front brake chamber • Rear service • Rear retarder	• Max. air pressure: 8.3 kg/cm² • When engine stopped • When operating first time	kg/cm²	Min. 180	180
Parking brake performance	• Loaded 20 tons • Max. air pressure: 7.2 kg/cm²		(Sin θ = 0.25)	(Sin θ = 0.25)
Parking brake starting test	• Transmission lever position: F2 • Torque converter stall	rpm		
Braking distance with parking brake	• Loaded 20 tons • Speed when applying brake: 32 km/h	m		

★ The following precautions are necessary when using the STANDARD VALUE TABLE for testing and adjusting, or for troubleshooting.

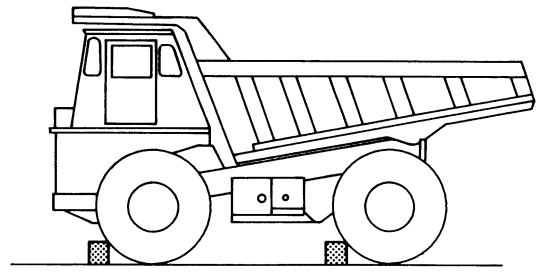
1. The values in the table are for new machines, and are obtained from reference to values for new machines and the values when shipping from the factory. Therefore, they should be used as target values for judging the progress of wear, or when repairing the machine.
2. The values for judging failures are based on standards when shipping the machine from the factory, and on the results of various tests. These values should be used as reference together with the repair condition and operating record of the machine to make judgements on failures.
3. The values in the table should not be used for judging claims.

TESTING SERVICE BRAKE PERFORMANCE

★ Stop the machine on level ground, and raise the air pressure to the specified air pressure.

1. **TEST WHEN OPERATE BRAKE PEDAL**
   1) Depress brake pedal fully.
   2) Shift gear shift lever to F2.
   3) Raise engine speed gradually, then measure engine speed when machine starts to move.
      ★ If the machine starts to move when the engine speed is being raised, release the accelerator pedal immediately.

2. **TEST WHEN OPERATE RETARDER BRAKE**
   1) Operate retarder brake.
   2) Refer to TEST WHEN OPERATE BRAKE PEDAL: Steps 2) and 3), measure engine speed.



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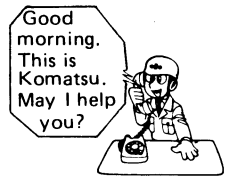
TESTING BRAKING DISTANCE

★ Measure on a level road with a length of over 200 m. The following distance is needed. Distance to gather speed + 50 m for measurement + 50 m to measure braking distance.

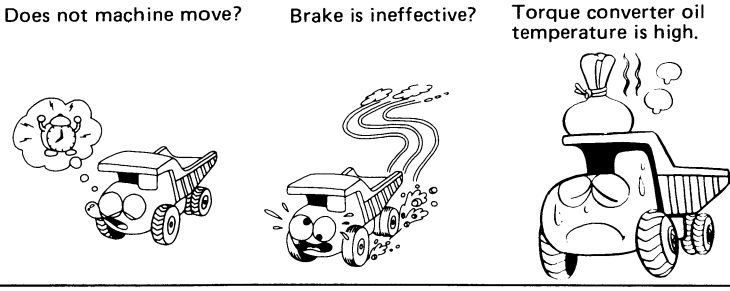
1. **TEST WHEN OPERATE BRAKE PEDAL**
   1) Warm up engine water temperature inside operating range.
   2) Warm up transmission oil temperature (60 — 80°C).
   3) Drive machine with F5 position. When machine is traveling at specified speed, depress brake pedal. Measure distance from braking point to point where machine stops.

2. **TEST WHEN OPERATE RETARDER BRAKE**
   Refer to TEST WHEN OPERATE BRAKE PEDAL; Steps 1), 2) and 3), measure braking distance when operate retarder brake.

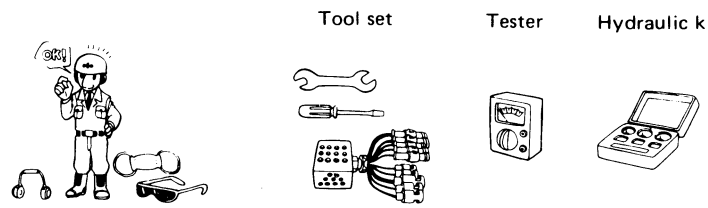
TROUBLESHOOTING PROCEDURE



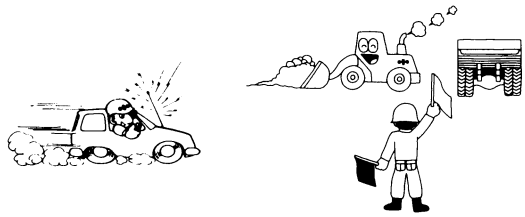
1. When a request comes in for repairs, first ask the following points.
   - Name of customer.
   - Type as Serial No. of machine.
   - Jobsite.



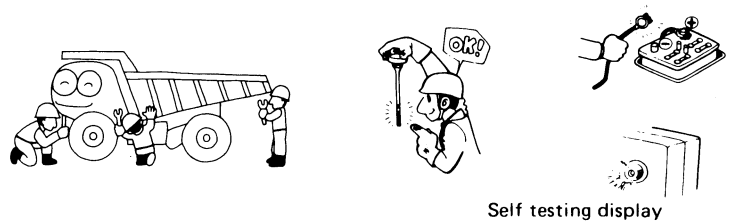
2. Get an outline of the problem. Ask the following points.
   - Symptoms of failure.
   - What was machine doing when it broke down?
   - Operating environment.
   - Details of past repairs and maintenance.



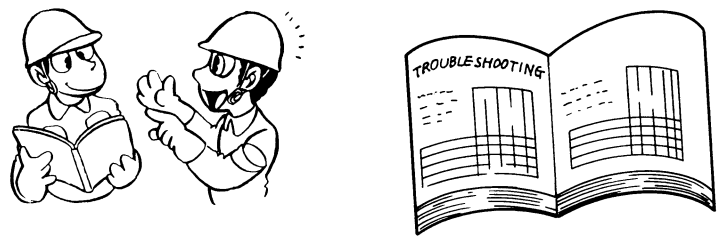
3. Look at the table of troubleshooting tools and decide what tools are needed.
   ★ Do not forget circuit tester and socket for troubleshooting.



4. Re-enact failure.
   - Operate the travel and work equipment, and check the symptoms.



5. Look at the Checks before troubleshooting, locate and repair simple problems first.
   - Checks before starting.
   - Other checks items.



6. Select failure mode to meet symptoms of machine, then troubleshoot.
   - Failure in electrical system
     ----- E-ΔΔ
   - Failure in mechanical, hydraulic
     ----- H-ΔΔ
     ----- A-ΔΔ
     ----- D-ΔΔ

H-6: TORQUE CONVERTER OIL TEMPERATURE IS HIGH.

Ask the operator about the following:

- Does the oil temperature rise when the torque converter stalls and drop when the torque converter does not stall? → Normal (Improper selection of speed range)

Check before troubleshooting

- Is the oil levels in the transmission case correct?

Check the following

- Check that the actual oil temperature is higher than standard value.
  - ★ If the actual oil temperature is normal but the indication of the oil temperature gauge on the machine exceeds the operating range. → The oil temperature gauge is defective.

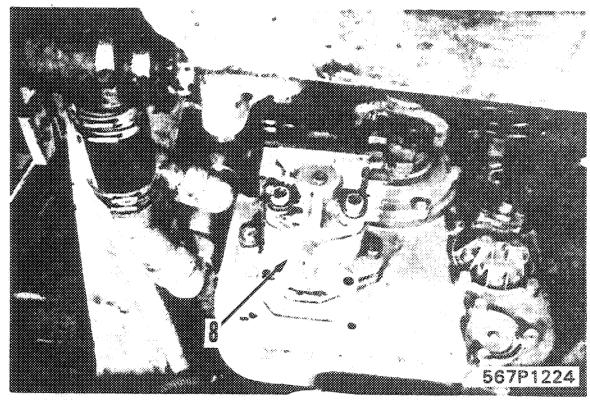
No.	Problem \ Remedy	Cause: Strainer is clogged.	Pump sucks air.	Pump defective.	Filter is clogged.	Torque converter relief valve malfunctioning.	Excessive internal oil leakage from torque converter. (Defective seal ring, loose plug, cracked pump or turbine.)	Torque converter regulator valve malfunctioning.
		From tank to pump				Torque converter		
		a	b	c	d	e	f	g
		C	△ X	X	X	△ X	△ X	△ X
1	Pump makes abnormal noise when oil temperature is low.	○						
2	Both high and low idling speeds are too low.						○	
3	Torque converter outlet oil pressure is too low.						○	○
4	Torque converter inlet oil pressure is too low.					○		
5	Transmission modulation pressure is too low.	○	○					
6	Torque converter internal oil leak is excessive.						○	

If all other items of the problems pass inspection, this is the cause.

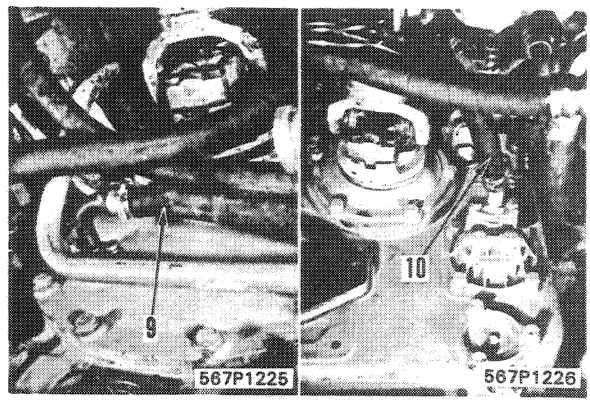
The following symbols are used to indicate the action to be taken when a cause of failure is located.

X : Repalce △ : Repair
A : Adjust C : Clean

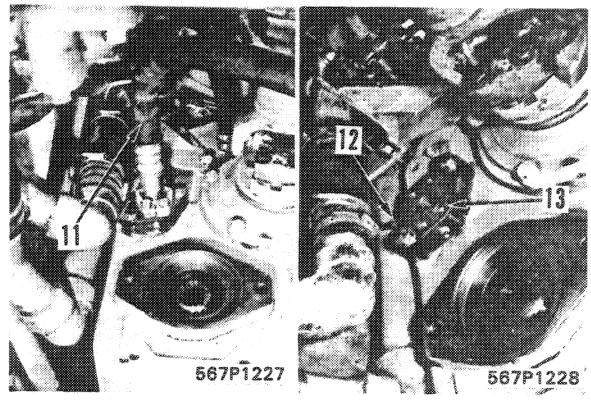
5. **Gear pump assembly**
   Remove mounting bolts, then remove transmission pump assembly (8).



6. **Scavenging pump hose**
   Disconnect transmission tube (9) and pump outlet tube (10).

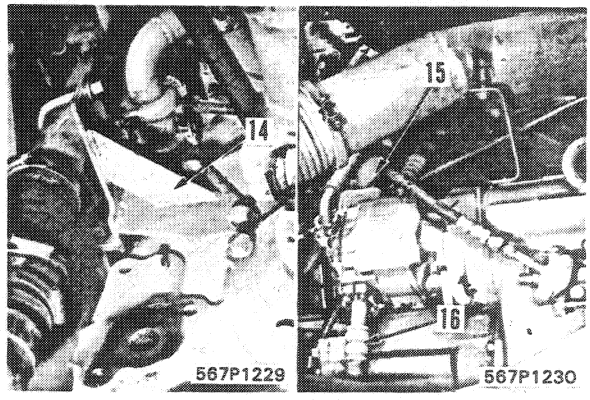


7. **Torque converter outlet hose, seat**
   1) Disconnect torque converter outlet hose (11).
   2) Disconnect oil temperature sensor wiring (12), and remove seat (13).

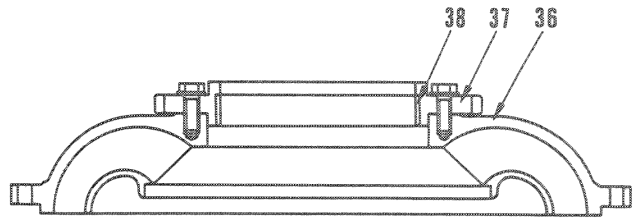


8. **Piping bracket**
   Remove 2 U-bolts, then remove bracket (14).

9. **Gear pump piping**
   Disconnect pump inlet tube (15) and outlet hose (16).

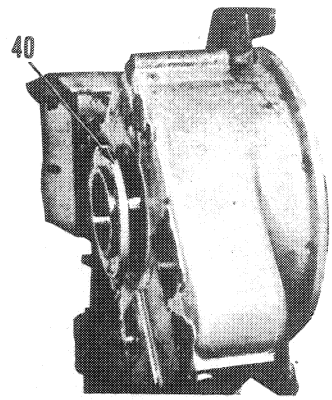


2) Remove gear (37) and bushing (38) from pump (36).



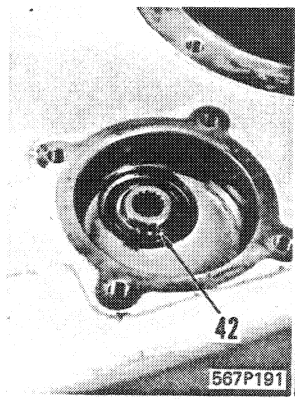
567F204

15. **Stator shaft assembly**
Dismount stator shaft (40).

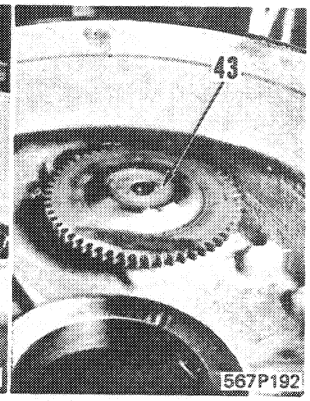


567P190

16. **Scavenging pump drive gear**
1) Remove snap ring (42).
2) Using a push tool, remove drive gear (43) from the scavenging pump.

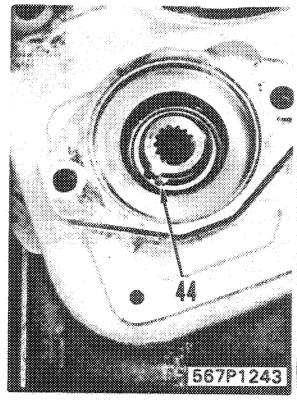


567P191

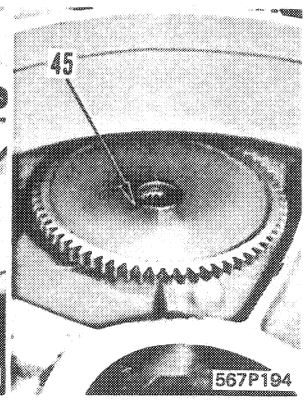


567P192

17. **Transmission pump drive gear**
1) Remove snap ring (44).
2) Using a push tool, remove drive gear (45) from the transmission pump.



567P1243



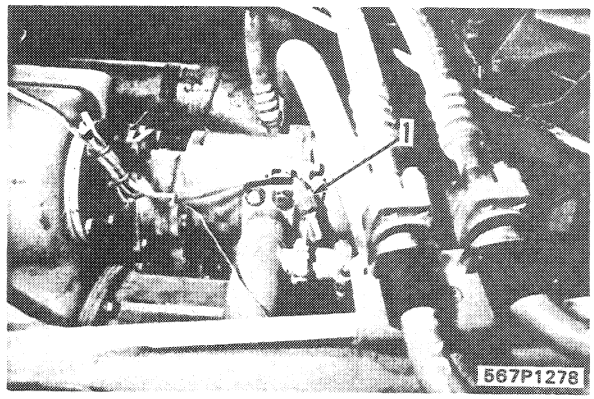
567P194

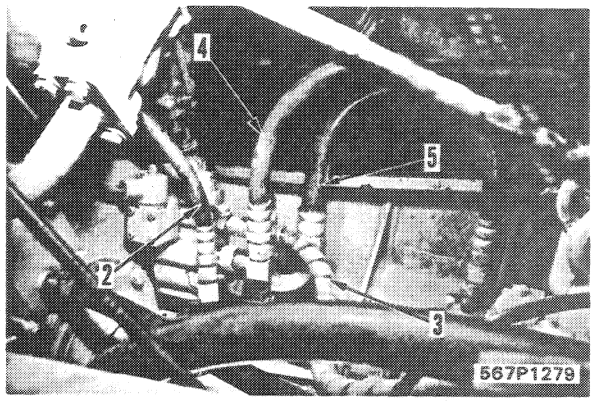
REMOVAL OF TORQUE CONVERTER VALVE ASSEMBLY

1. Disconnect solenoid wiring (1).

2. Piping
   1) Disconnect hose (2) between torque converter valve and PTO lubrication.
   2) Disconnect hose (3) between torque converter valve and transmission.
   3) Disconnect tube (4) between torque converter valve and transmission lubrication valve.
   4) Remove joint, and disconnect tube (5) between torque converter valve and transmission control valve.

3. Remove mounting bolts, then remove torque converter valve assembly (6).





INSTALLATION OF TORQUE CONVERTER ASSEMBLY

★ Install the hoses without twisting or interference.

1. Assemble O-ring and install torque converter valve assembly (6) in case.

   kgm Mounting bolt: 11.5 ± 1 kgm

2. Piping
   1) Assemble gasket and joint, and connect tube (5) between torque converter valve and transmission control valve.
   2) Connect tube (4) between torque converter valve and transmission lubrication valve.
   3) Connect hose (3) between torque converter valve and transmission.
   4) Connect hose (2) between torque converter valve and PTO lubrication.
3. Connect solenoid wiring (1).

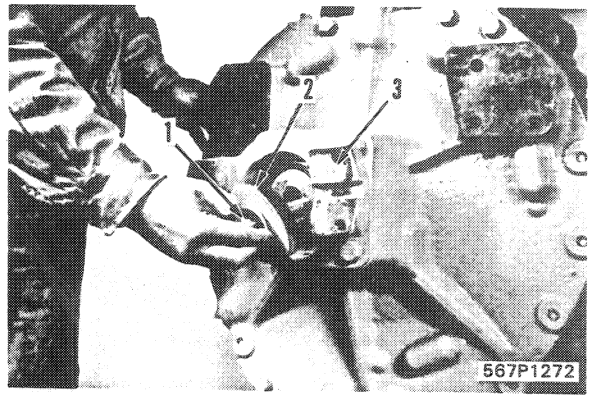
4. After completing the installation, run the engine to circulate the oil through the system.
   Then add engine oil to the specified oil level.

DISASSEMBLY OF TRANSMISSION ASSEMBLY

Special tools required

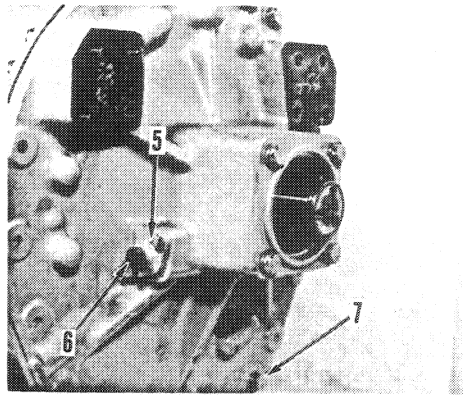
	Part No.	Part Name	Q'ty
A	799-301-1500	Tester (oil leak tester)	1
B	792-103-0301	Push tool	1

1. **Rear coupling**
   Remove bolt (1), then remove holder (2) and coupling (3).

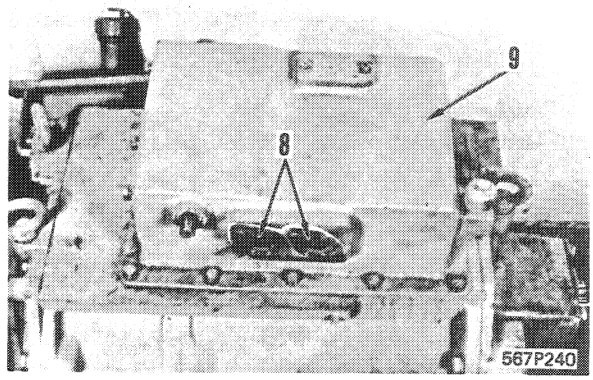


2. **Speedometer gear**
   Remove cover (5), then remove gear assembly (6).

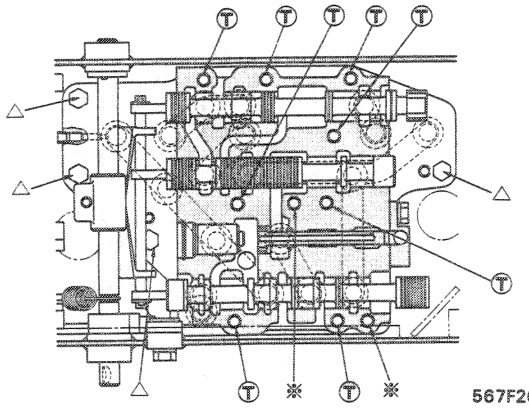
3. **Transmission case mounting bolts**
   Remove 4 transmission case mounting bolts (7).
   ★ The transmission is set with mounting bolts (7) at the bottom, so remove them before setting the transmission.

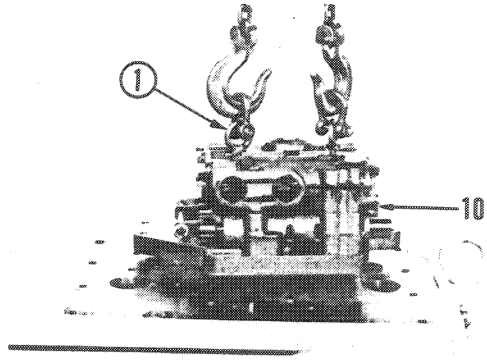


4. **Valve cover**
   1) Remove sleeve (8).
   2) Screw in forcing screw, and remove cover (9).

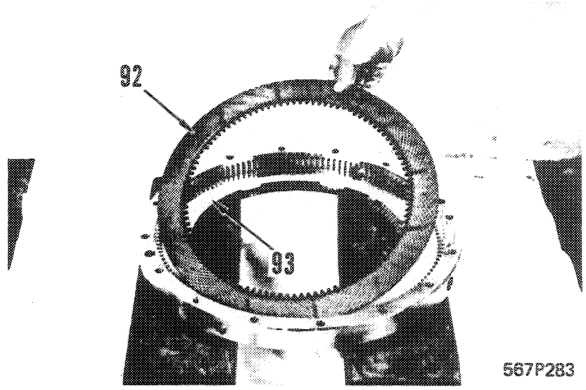


5. **Valve assembly**
   Using eyebolts (1) (Thread dia. = 10 mm, Pitch = 1.5 mm), remove valve assembly (10) together with seat.
   ★ Of the mounting bolts, remove 8 bolts marked (T); remove 4 seat mounting bolts marked (Δ). Do not remove the bolts marked ※.



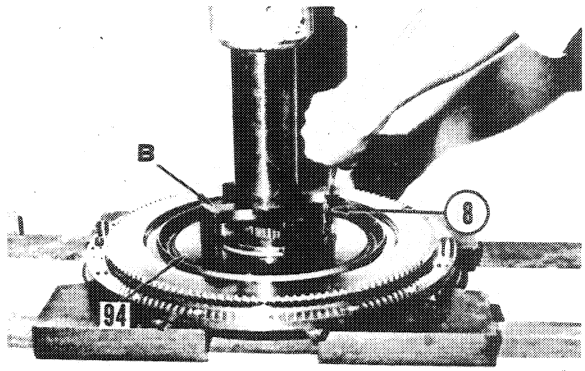


45. **Disc and plate**
Remove discs (92) and plates (93) from drum.



567P283

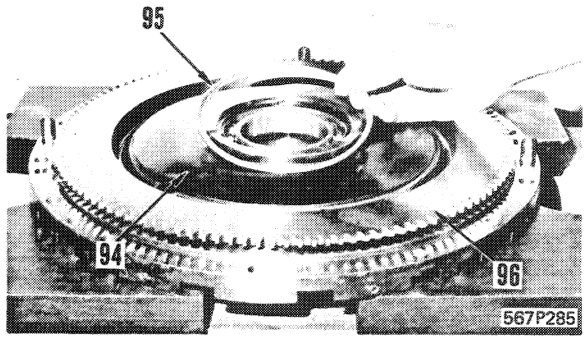
46. **Snap ring**
1) Using tool B, compress spring (94) in a press.
★ Be careful not to press the spring excessively, otherwise the piston will become damaged.
(Push the spring until the snap ring comes out of the groove.)
2) Using snap ring plier (8) (2) and come out of the groove.



567P284A

47. **Ring and spring**
Return the press and remove the snap ring, ring (95) and spring (94).

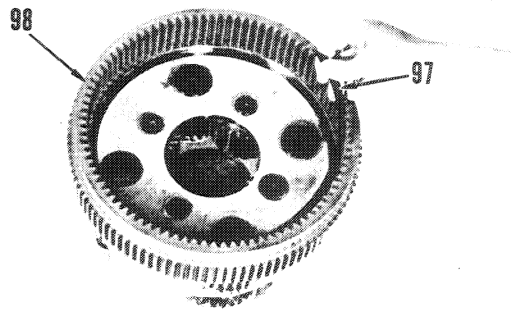
48. **Piston**
Remove piston (96).



567P285

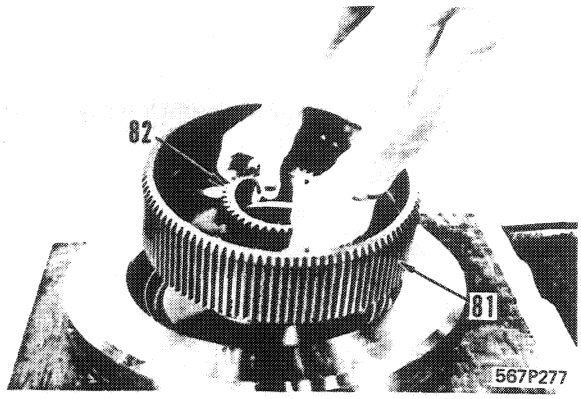
Fine disassembly of Nos. 3 and 4 carrier assembly

49. **No. 4 ring gear**
1) Remove snap ring (97).
2) Remove ring gear (98).

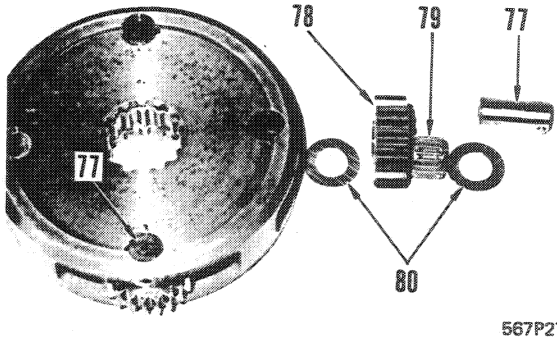


567P286

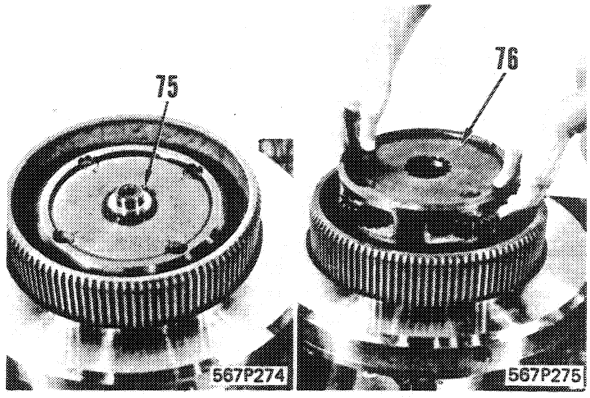
21. **Ring gear and sun gear**
    1) Align the inner teeth of two discs. (See photo of item 20.)
    2) Align the outer teet of ring gear (81) with the inner teeth of the disc, and install the ring gear together with sun gear (82).



22. **No. 2 carrier assembly**
    1) Fit the following parts onto the carrier.
        i) Fit bearing (79) onto gear (78), and set the assembly on the carrier together with thrust (80).
        ii) Install shaft (77).
            ★ Fit the ball at the end of the shaft.



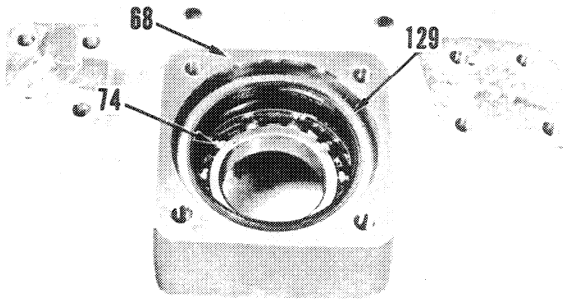
    2) Install carrier assembly (76).
    3) Fit snap ring (75).



Fine assembly of TORQFLOW transmission assembly

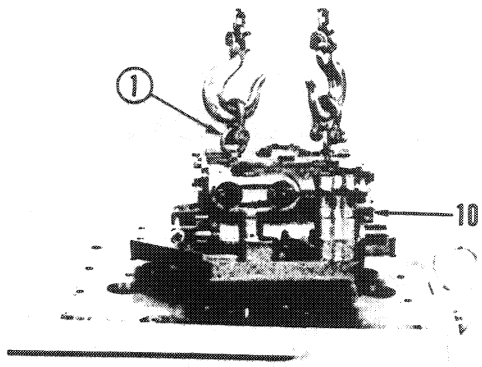
23. **Bearing and oil seal**
    1) Fit bearing (74) on rear case (68) using a push tool (Outside diameter 130 mm) and fit oil seal (129) on the rear case using a push tool (Inside diameter 140 mm).

        Oil seal lip face: Grease (G2-LI)



59. **Valve assembly**
Using eyebolts (1) (Thread dia. = 10 mm, Pitch = 1.5 mm), install valve assembly (10) together with seat.
★ Tighten 8 (T) bolts of the mounting bolts, and 4 seat mounting bolts.

kgm Mounting bolt: 5.0 ± 0.5 kgm

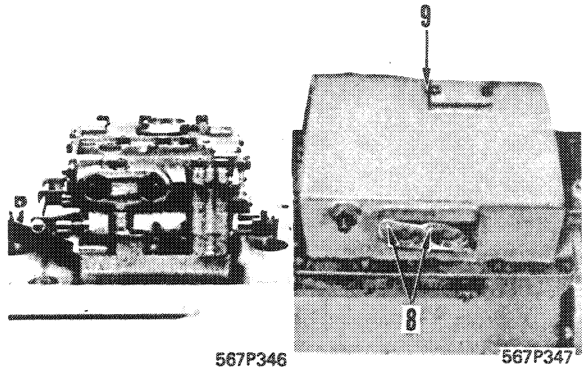


567P241A

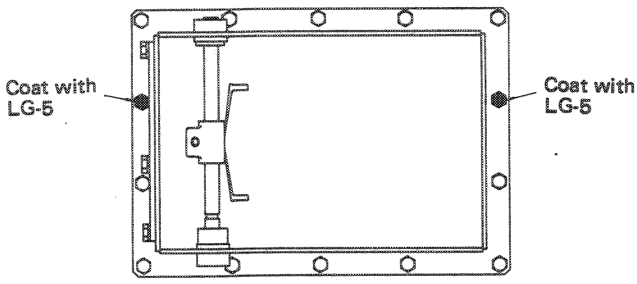
60. **Valve, cover**
1) Install gasket.
2) Align lever to transmission control rod, and install cover (9).

kgm Mounting bolt: 5.0 ± 0.5 kgm

★ Coat the mounting bolts at two places with gasket sealant (LG-5) and tighten.



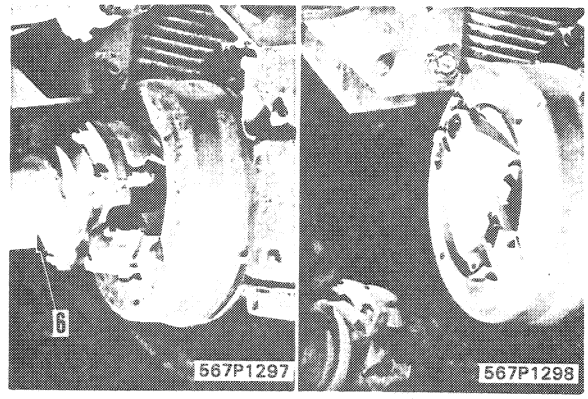
567P346 567P347



567F208-K

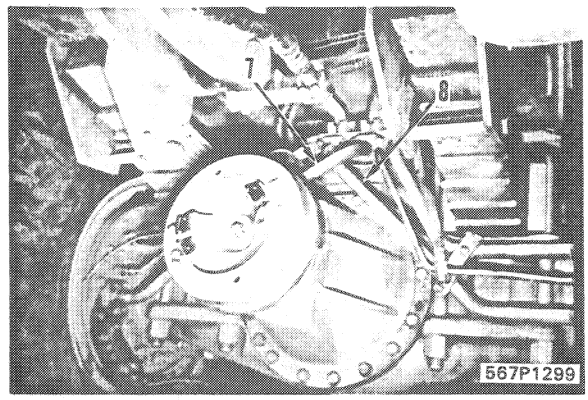
3) Fit O-ring and install sleeve (8).

4. **Drive shaft**
Temporarily suspend drive shaft (6), then remove the mounting bolts at the differential side and dismount the drive shaft.

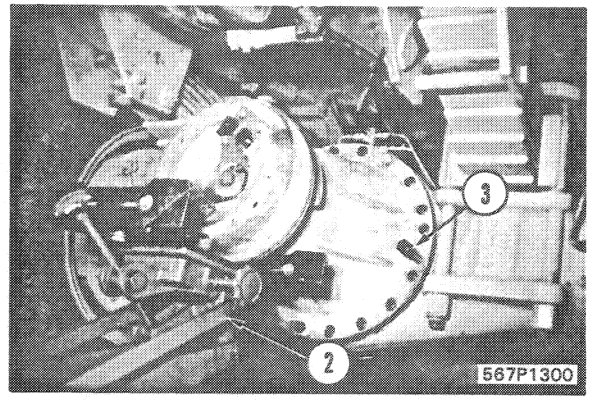


5. **Parking brake spring cylinder assembly**
Remove parking brake spring cylinder assembly.
For details, see 53 REMOVAL OF PARKING BRAKE SPRING CYLINDER ASSEMBLY.

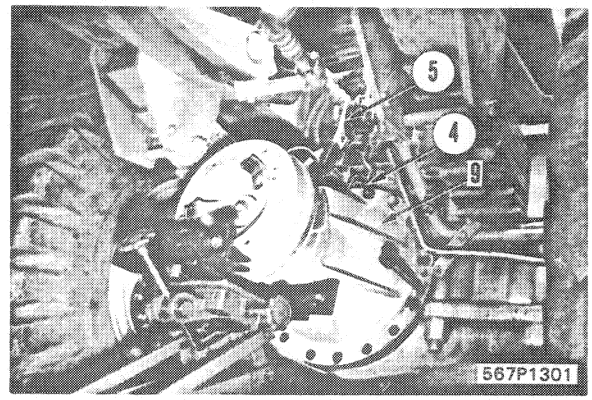
6. **Cooling tubes**
Remove left and right brake cooling tubes (7) and (8).



7. **Differential assembly**
   1) Leave 2 — 3 mounting bolts in position and remove remaining mounting bolts.
   2) Using transmission jack (2), support parking drum end, then loosen remaining mounting bolts approx. 20 mm.
   3) Using forcing screws (3) (Thread dia. = 18 mm, Pitch = 2.5 mm), pull out about 15 mm.

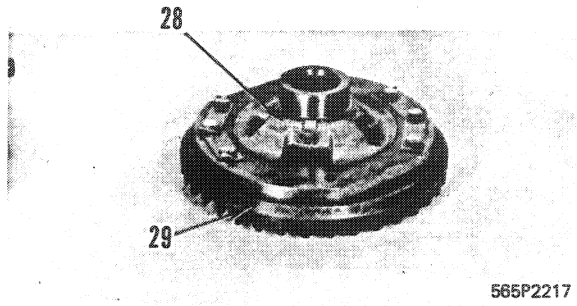


   4) Using shackle (4) and lever block (5), sling differential assembly (9), and remove mounting bolts.
      ★ Fit shackles to two bolt holes at the top of the differential assembly. Pass the lever block chain through the shaft removal hole of the hoist cylinder fitted to the dump body, then fit it to the shackles.



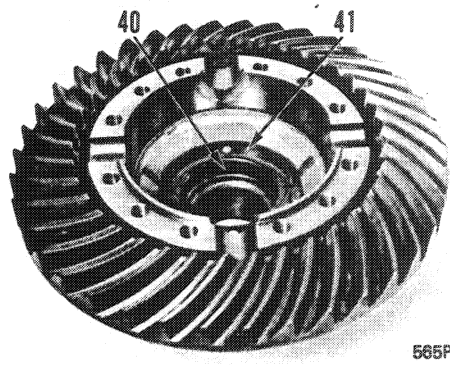
ASSEMBLING GEAR CASE ASSEMBLY

4. **Bevel gear**
   Align the positions of the dowel pins, then fit bevel gear (29) onto case (28), fit lock plates and screw up the bolts.
   ★ Properly peen the dowel pins to prevent them dropping out.
   ★ Properly bend the lock plates.



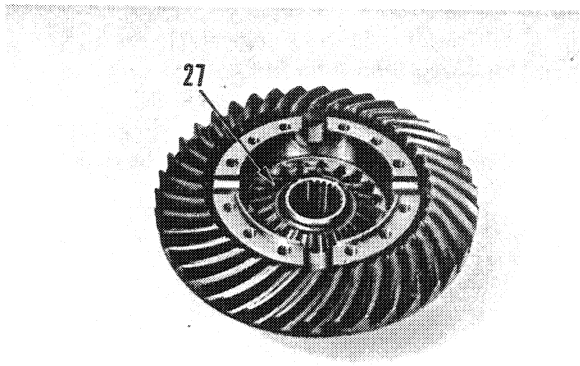
565P2217

5. **Bushing and washer**
   Press-fit bushing (40) and fit washer (41).
   ★ Ensure that the head of the dowel pin is not projecting out from the washer face.



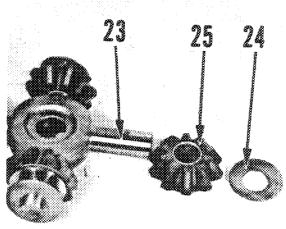
565P2218

6. **Gear (bottom)**
   Fit gear (27).

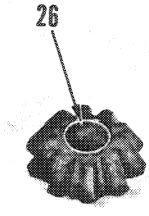


565P2219

7. **Cross shaft assembly**
   1) Using push tool (7) (Outside diameter 33 mm), press-fit push tool (26) onto the differential pinion.

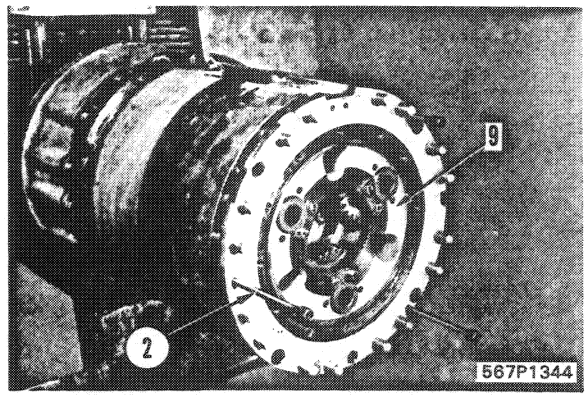


565P2202

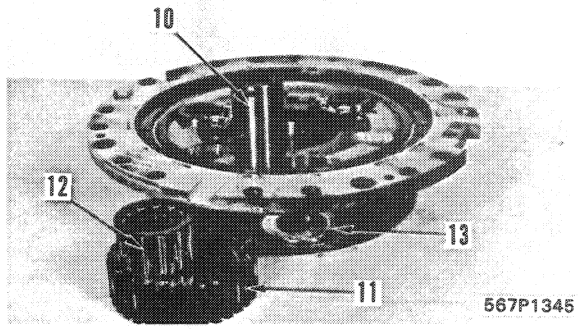


565P2203

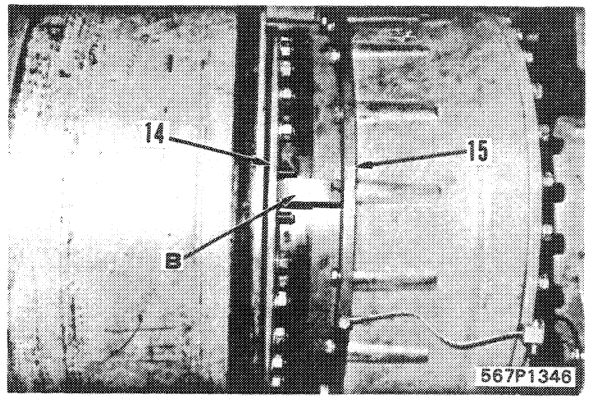
5. **Planetary carrier assembly**
   1) Using forcing screws (2) (Thread dia. = 12 mm, Pitch = 1.75 mm), pull out, then raise and remove planetary carrier assembly (9).



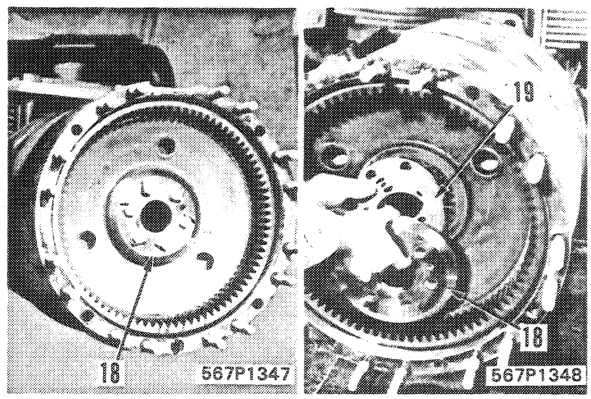
   2) Disassembly of planetary carrier assembly
      i) Remove lock, and pull out shaft (10).
      ii) Remove planetary gear (11), then remove bearing (12) from gear.
      iii) Remove top and bottom thrust washers (13) from carrier.



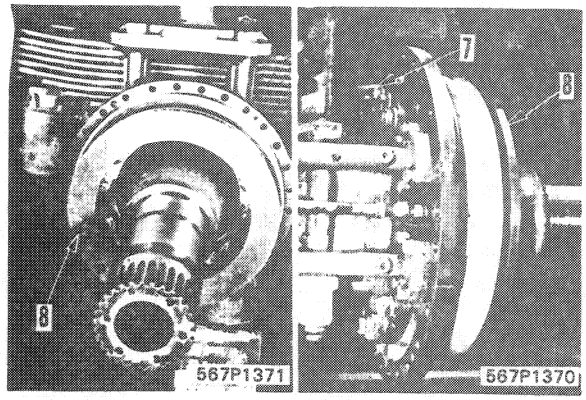
6. **Retainer, shim**
   1) Using tool B, hold outer gear (14) and inner gear (15) in position.
      ★ To install the tool, remove bolt on the outer gear side. There are tap holes on the inner gear at three places for installing the tool. Remove nut on both sides of the hole to install the tool.
      ★ To prevent damage to the floating seal, always install the tool before removing retainer (18).



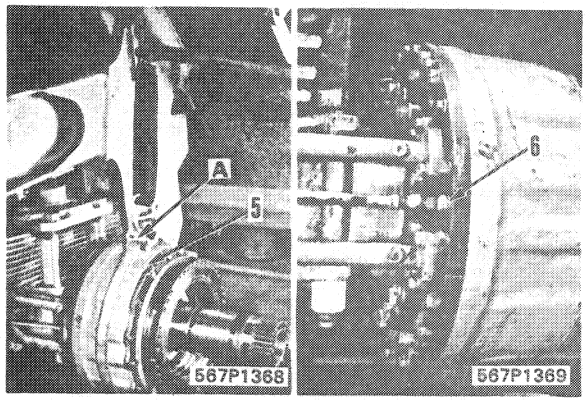
   2) Remove mounting bolts, then remove retainer (18) and shim (19).
      ★ Check the number and thickness of the shims, and keep in a safe place.



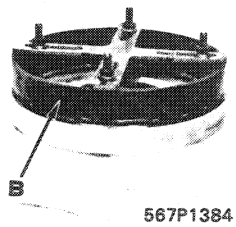
2) Install piston (8) to cylinder, and tighten air bleed plug (7).



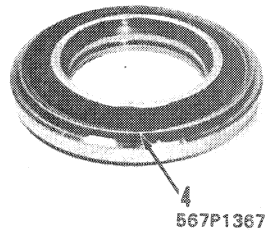
3. **Brake assembly**
   1) Fit O-ring, and using tool A, set brake assembly (5) in mounting position.
      ★ Insert the floating seal slowly and be careful not to damage it.
   2) Tighten mounting bolts (6).
      ★ Be careful not to tilt the rear brake assembly. The discs and plates will fall out.



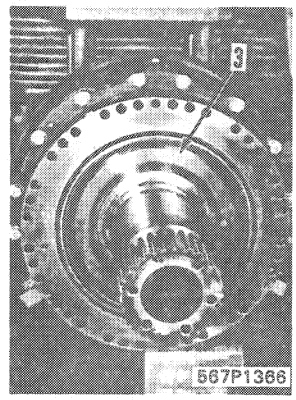
4. **Retainer**
   1) Using tool B, install floating seal (4) to retainer (3).
   2) Fit O-ring and install retainer (3).



567P1384

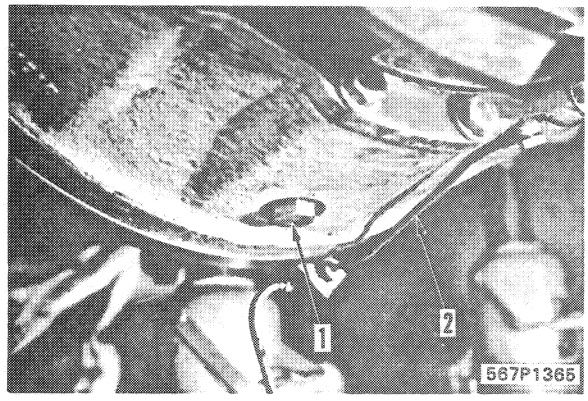


567P1367



5. **Drain tube**
   Fit gaskets to both sides and install drain tube (2). Remove oil filler plug and fill with engine oil until oil flows out from drain tube.

6. **Drain plug**
   Tighten drain plug (1).



INSTALLATION OF FRONT WHEEL ASSEMBLY

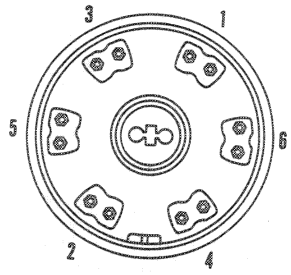
★ Remove all dirt and mud stuck to any parts or to the tapered part of the hub or to the mating part of the outside diameter.

1. Using nylon sling, raise front wheel assembly (3), align air valve with groove in front wheel hub and install.
   ★ Be careful not to damage the air valve.

   ⚠ When installing the wheel, be extremely careful not to let the wheel fall over.

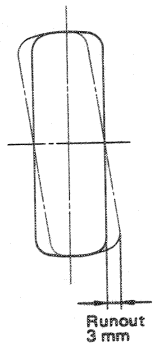
   ★ Keep the assembly raised until the hub nuts have been installed.

2. Set clamps (4) in position, and tighten hub nuts (2) in correct order of tightening.
   ★ Tighten the hub nuts fully after lowering the machine to the ground.



567F228

3. Rotate wheel, and check that runout of tire is within 3 mm.



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4. Lower jack (1) and tighten hub nuts (2).

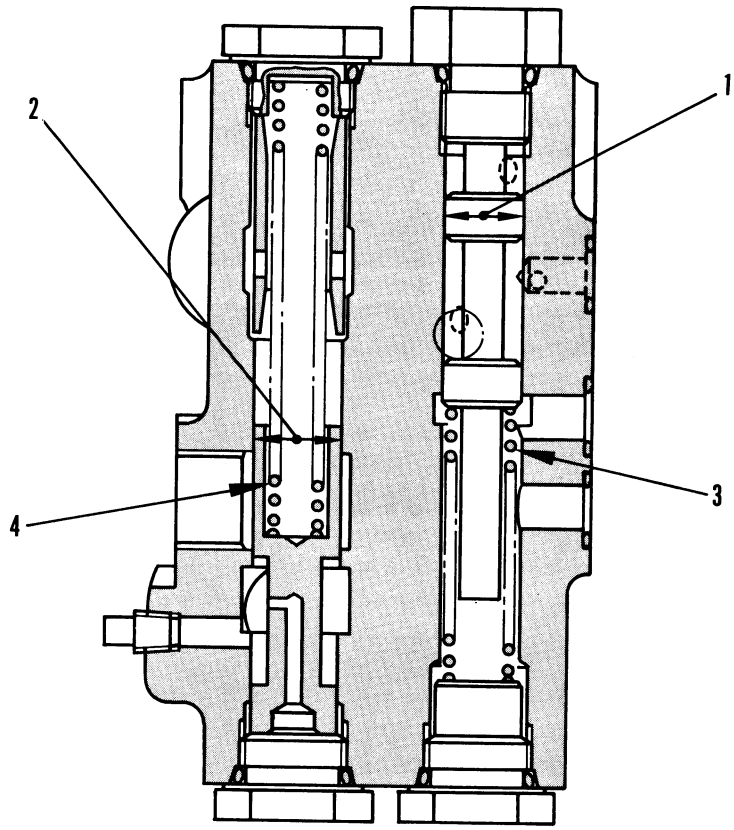
   kgm Hub nut: 58 ± 2 kgm

5. Install catwalk (2).

★ After installing the front wheel assembly, drive the machine for 5 – 6 km to settle all the contacting parts, then check without fail that the nuts are all tightened to the specified tightening torque.

★ Before driving the machine, adjust the tire inflation.
For details, see 22 TESTING AND ADJUSTING, Checking tire inflation pressure.

TORQUE CONVERTER VALVE

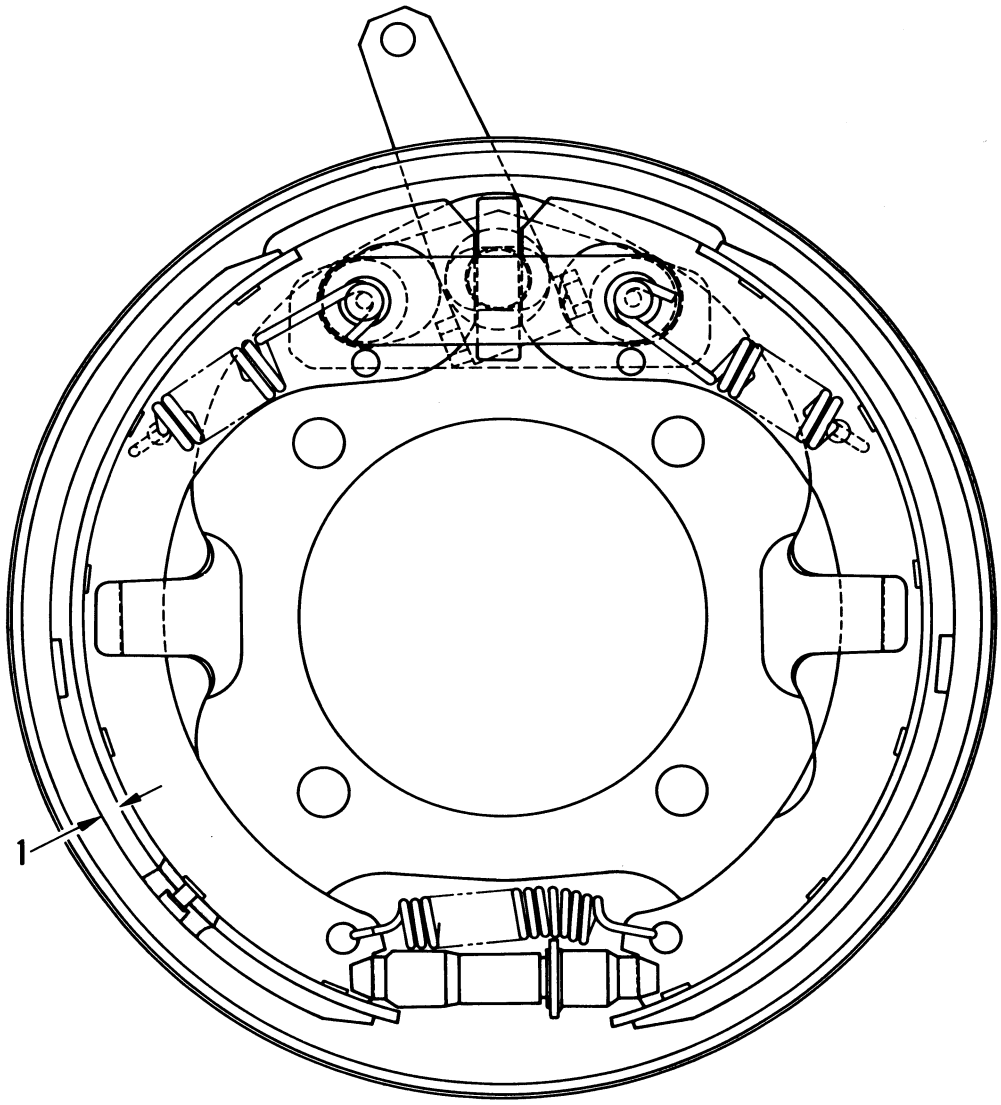


F567CH034

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between lock up valve body and spool	18	−0.016 −0.027	+0.018 0	0.016 – 0.045	0.15	
2	Clearance between torque converter inlet relief valve body and spool	20	−0.040 −0.053	+0.021 0	0.040 – 0.074	0.2	Replace
3	Lock up valve spring	75 x 16.5	62	7.5 kg	72	6 kg	
4	Torque converter inlet relief valve spring	125 x 13.1	125	23.2 kg	123	21 kg	

PARKING BRAKE



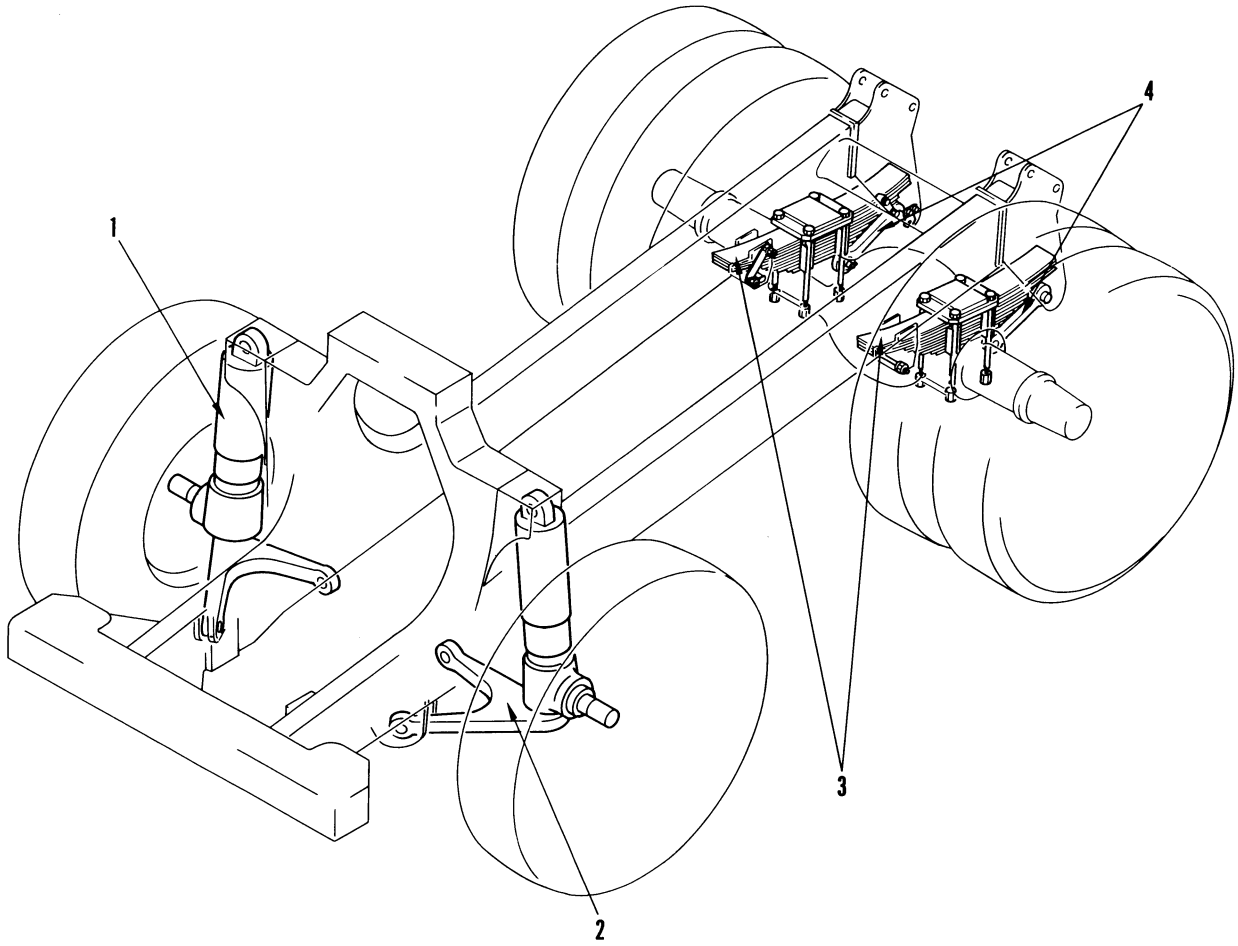
Unit: mm

No.	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Thickness of brake lining	6.1	3.3	Replacement of lining

SUSPENSION SYSTEM

The chassis suspension permits the truck to travel at high speed, without pitching or bouching even on rough terrain, and with high operational safety.
The front suspension on the HD205 is a hydropneumatic suspension system, while the rear suspension is a leaf spring type.

In this hydro-pneumatic suspension system for front suspension, the oil and nitrogen gas are sealed in the suspension cylinders.
When a shock force is imparted to the chassis from the ground when traveling, the oil and nitrogen gas service as the shock absorbing means by their compression and expansion characteristics.



F567CH046

1. Front suspension cylinder
2. Arm (A frame)
3. Leaf spring
4. Rod

ADJUSTING OF INSTALLATION LENGTH OF SUSPENSION CYLINDER

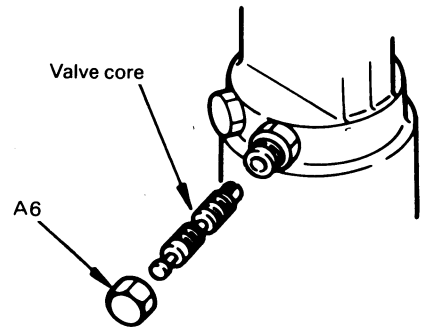
★ When adjusting installation length of suspension cylinder, machine is on level ground and unloaded.

1. Drive machine forward about 15 m then stop machine suddenly. Next, drive in reverse and stop machine suddenly at the original position.
   Repeat this cycle 3 to 4 times, then finally allow the machine to stop without using the brakes, this removes the sliding resistance of the cylinder (catching of packing, bushing, etc.). Then measure installation length "a" of suspension cylinder.
   ★ Standard installation length: "a" = 236^{+20}_{0} mm
   "b" = 342^{+20}_{0} mm
   (Installation length "b" is for reference.)

2. If installation length is too large, adjust by releasing Nitrogen gas.
   ★ When releasing Nitrogen gas, loosen oil level plug slightly. Be careful not to release Nitrogen gas too much.
   ★ When releasing Nitrogen gas, do not depress tip of valve core. Because valve core is broken.

3. Release Nitrogen gas, remove sliding resistance of suspension cylinder, then check installation length of suspension cylinder again. Repeat above procedure 3 to 5 times to adjust to specified installation length.

4. Finally, check that there is no gas leakage from valve core, oil level valve and piston rod ground.
   ★ Use soapy water to check for gas leakage.
   ★ When gas leaks from valve core, using tool A_6, remove valve core.



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ASSEMBLY OF SUSPENSION CYLINDER ASSEMBLY

1. **Wear ring**
   Install wearing (13) of rod (14).

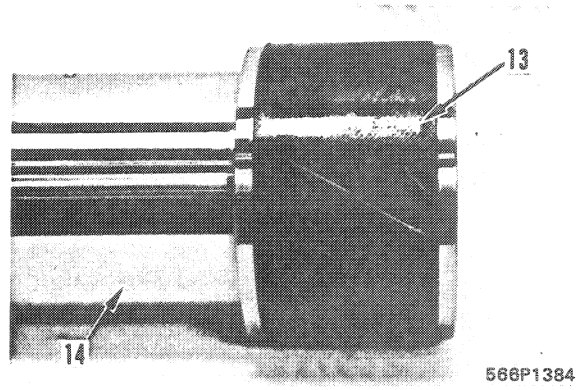
2. **Flange**
   1) Install U-packings (11) and (10) in flange (9).
   2) Install flange (9) on rod (7).
   3) Install seal (12) in plate (8).
   4) Install plate (8) on rod (7).
   5) Install back-up ring and O-ring on flange.

3. **Cylinder rod assembly**
   1) Using block (Height = Approx. 220 mm), set up cylinder (5).
   2) Fill cylinder with engine oil (EO10-CD): 9.6 ℓ
   3) Assemble cylinder rod assembly (7) in cylinder (10).
      ★ When assembling rod assembly in cylinder, insert it until position which oil does not spout out. Because if insert rod assembly so deeply, oil spout out from cylinder.
   4) Install plate (8) and flange with 15 mounting bolts.

4. **Air valve and oil level valve**
   Install air valve (5) and oil level valve (6).
   ★ Air valve and oil level valve can be installed in either hole.

   kgm Air valve, oil level valve: 4.5 ± 0.5 kgm

5. **Covers**
   Install cover (2) and (1).



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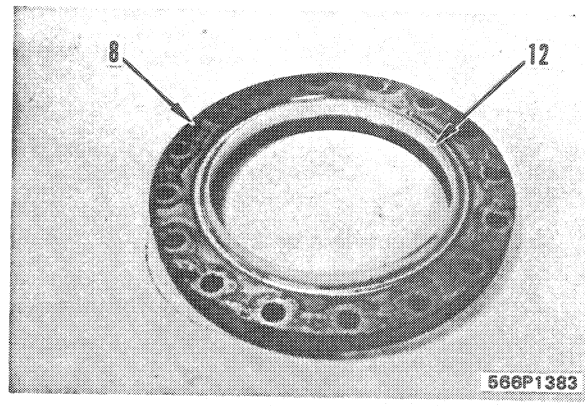

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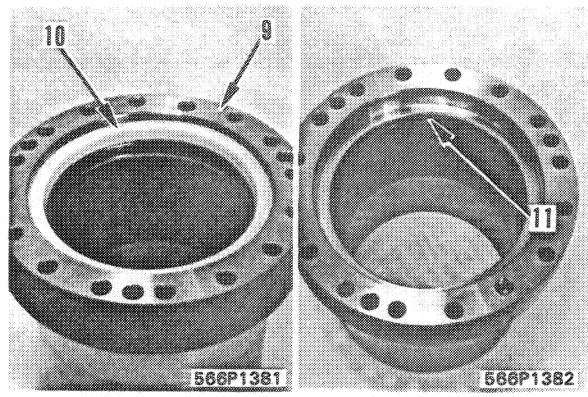

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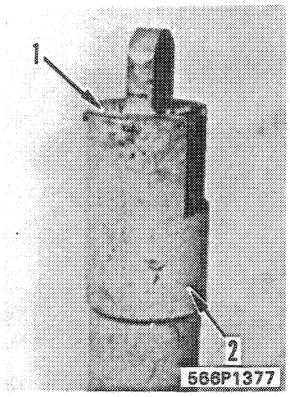
566P1382



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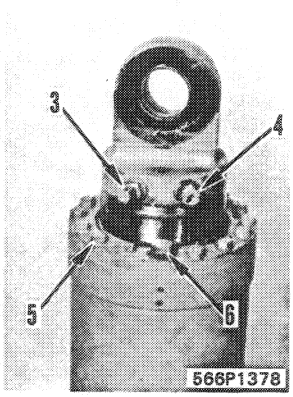

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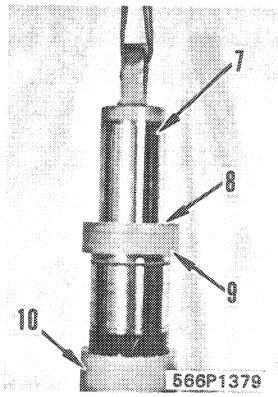

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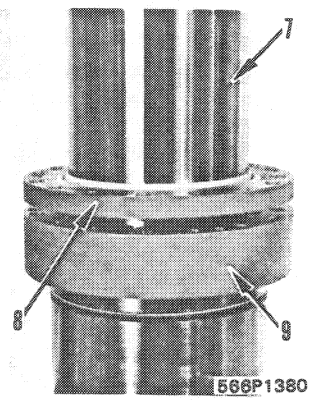

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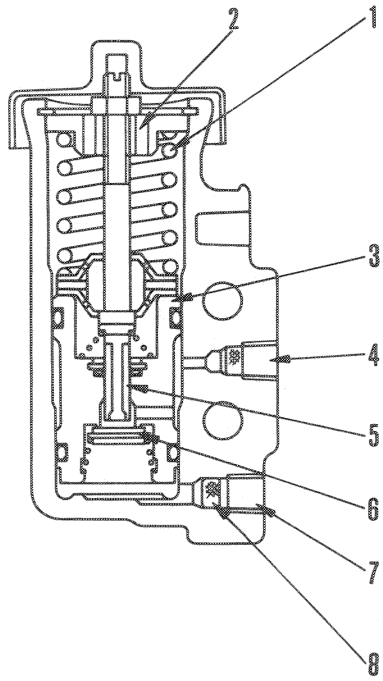
AIR GOVERNOR



423F091A

1. Spring
2. Exhaust port
3. Piston
4. Unloader port
5. Exhaust stem
6. Inlet valve
7. Tank port
8. Filter

Specifications

- Cut-out pressure: 8.3 ± 0.3 kg/cm^2
- Cut-in pressure: 7.0 ± 0.3 kg/cm^2

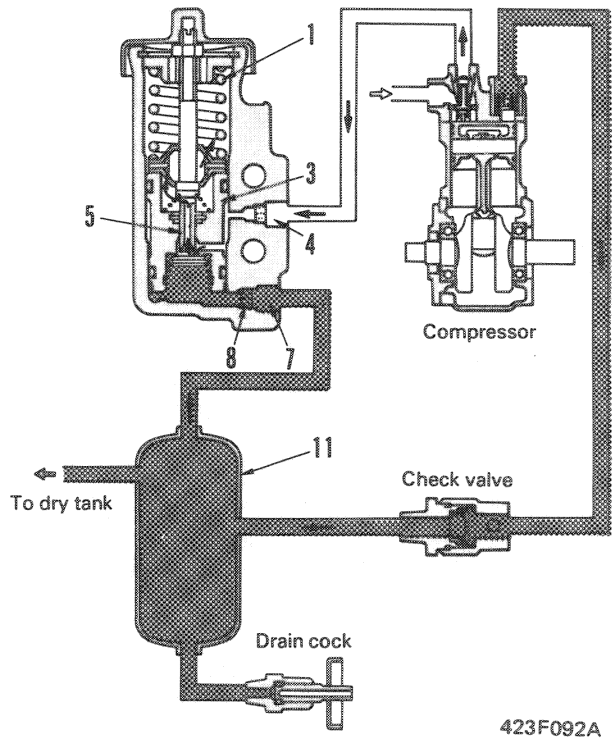
FUNCTION

The air governor maintains the pressure in the air circuit to the specified range.

OPERATION

Compressor working

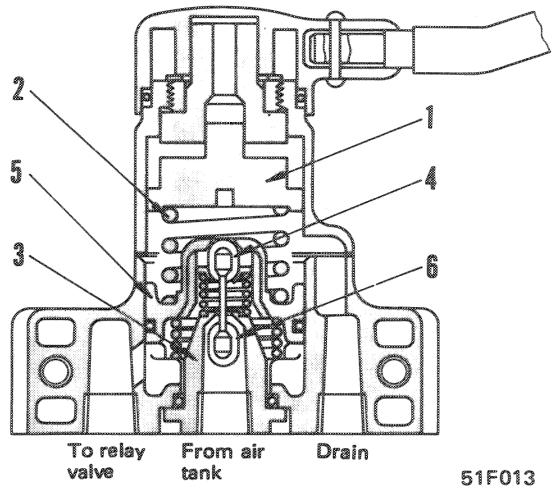
- The air pressure in the wet tank passes from the tank port (7) through the filter (8) and acts on the bottom of the piston (3).
  When the air pressure in the tank is below the specified pressure (cut-out pressure) the piston (3) is pushed down by the spring (1).
- When this happens, the air at the unloader port (4) passes through the exhaust stem (5) to the atmosphere and the compressor is actuated.



423F092A

FUNCTION

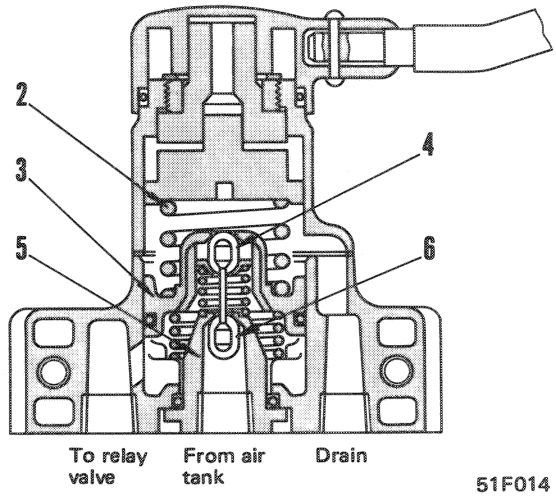
When the handle is placed in BRAKE position, then piston (5) will be pushed down by cam (1) through spring (2).
The exhaust valve seat provided at piston (5) will be pushed against exhaust valve (4) to close the valve. The inlet valve (6) and exhaust valve (4) form one-body.
After the exhaust valve (4) is closed, inlet valve (6) is opened. Compressed air is fed to the relay valve through the inlet valve, actuating the rear brake chamber and applying the retarder brake.



51F013

AIR BALANCING POSITION WITH THE SPRING FORCE

When the air pressure imposed on the underside of piston (5) balances with the force of spring (2), piston (5) will be raised slightly, closing the inlet valve. In this condition, the valve seat remains closed, keeping the air pressure at the relay valve constant.
In this manner, the brake valve is kept in a balanced condition, holding the air pressure constant depending on the position of the handle.

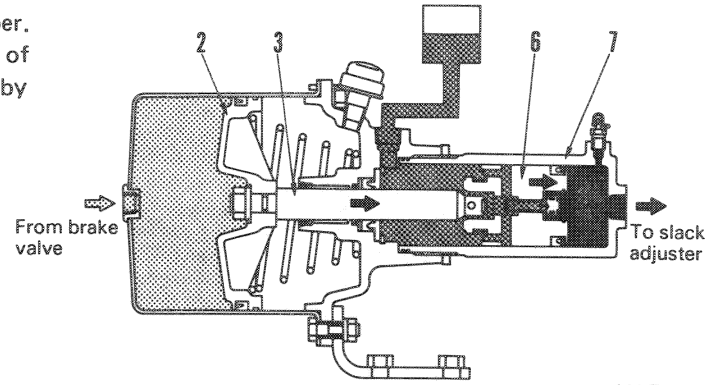


51F014

OPERATION

Brake operated

When the brake pedal is depressed, compressed air is supplied from the brake valve to the brake chamber. Air piston (2) moves rod (3) and pushes piston (6) of master cylinder (7) to the right. Brake oil is sent by piston (6) to the brake piston to actuate the brake.



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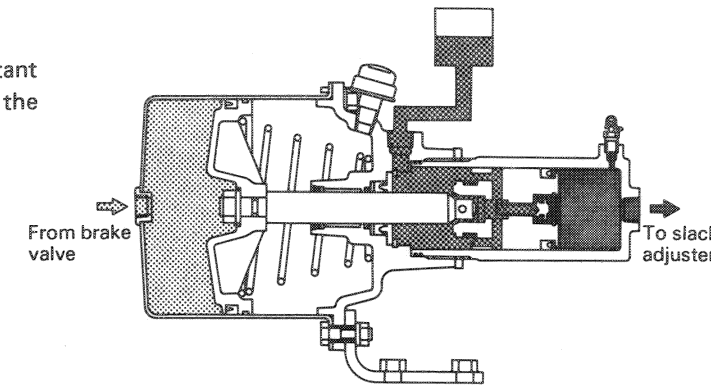
Brake held in position

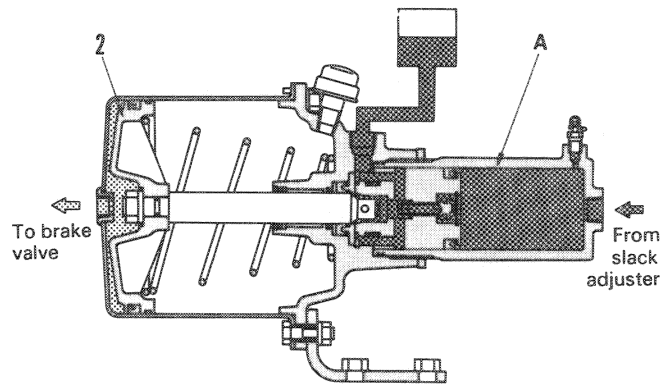
When the brake pedal is kept depressed at a constant force, the hydraulic pressure is kept constant, so the brake is kept applied.



423F107

Brake released

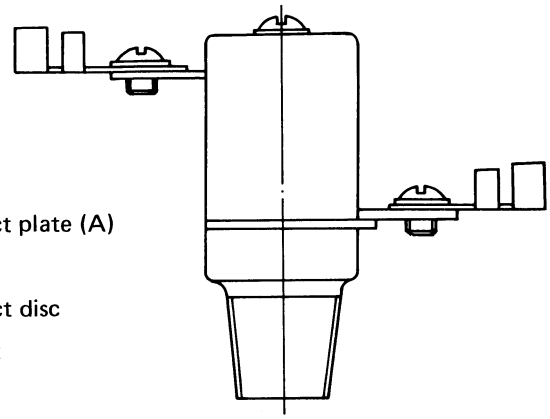
When the operating force on the brake pedal is partly released, the compressed air supplied to the back of piston (2) of the brake chamber is released from the brake valve, and the hydraulic pressure inside master cylinder (7) drops. If the brake pedal is released further, the brake oil sent to the piston of the brake is sent back to the inside of master cylinder (7) by the force of the brake return spring.



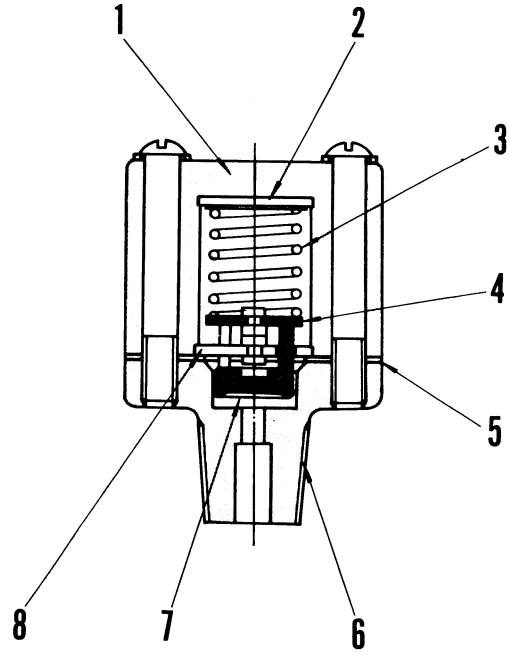
423F108

LOW PRESSURE BUZZER SWITCH

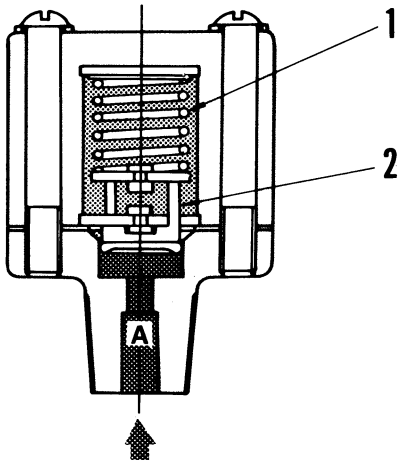
When the pressure in the air circuit becomes lower than the specified pressure, the low pressure buzzer switch sounds the warning buzzer and functions to inform a danger.



1. Cover
2. Contact plate (A)
3. Spring
4. Contact disc
5. Gasket
6. Body
7. Piston cap
8. Contact plate (B)



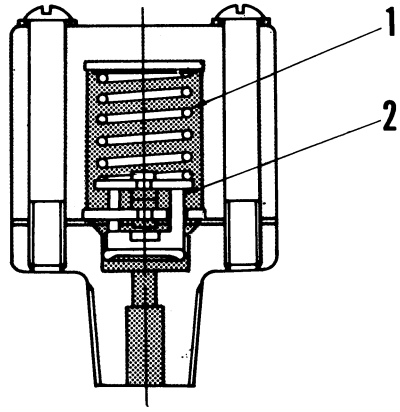
OFF-position of switch



1. When the pressure in the air circuit is over 4.2 kg/cm^2.

The air pressure acting on the piston (2) is higher than the spring force, pushing up the piston (2). Then, the contact will be opened, resulting in the discontinued buzzer circuit. The buzzer will not sound.

ON-position of switch

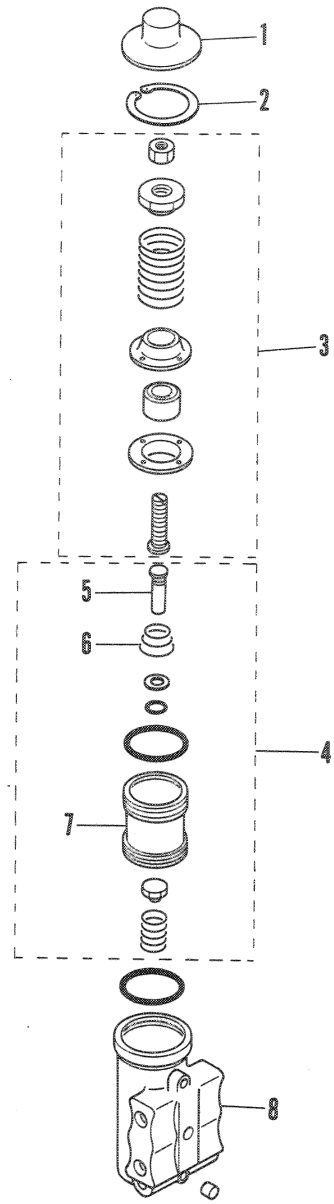


2. When the pressure in the air circuit is less than 4.2 kg/cm^2

The spring force is higher than the air pressure acting on the piston (2), pushing the piston (2) downward. Then, the contact will be closed, allowing the current to flow in the warning buzzer circuit. The buzzer will sound.

DISASSEMBLY OF AIR GOVERNOR ASSEMBLY

1. Remove cover (1).
2. Remove snap ring (2), then remove adjustment screw and spring assembly (3).
3. Pull out piston assembly (4), then remove stem (5) and spring (6).



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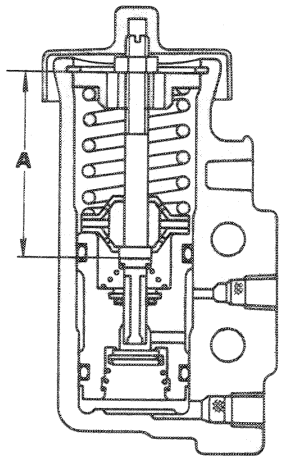
ASSEMBLY OF AIR GOVERNOR ASSEMBLY

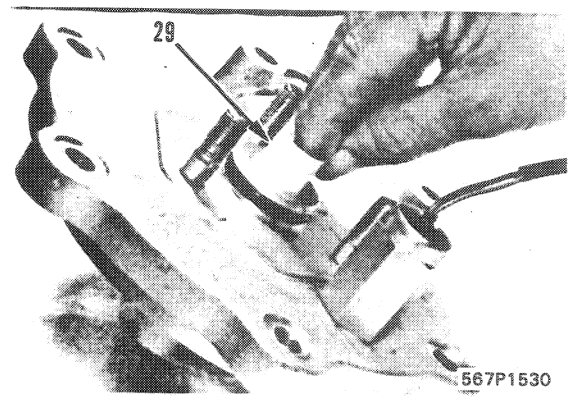
★ Clean all parts and check for dirt or damage. Coat with grease before assembling.

1. Fit O-rings, then install spring (6) and stem (5) on piston (7).
2. Fit O-ring, install piston assembly (4) in body (8).
3. Install adjustment screw and spring assembly (3) in body (8), then install snap ring (2).
   ★ Measure adjustment screw dimension A.
   Standard valve A: Approx. 47.6 mm
4. Install cover
   ★ After installing on machine, referring to TESTING AND ADJUSTING AIR PRESSURE, measure air pressure.



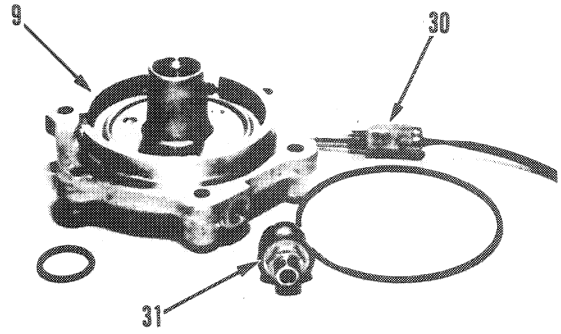
423F091B

6. **Bushing**
   Push bushing (29) to make it tighten, then pull out.
   ★ Do not remove it if there is no abnormality.

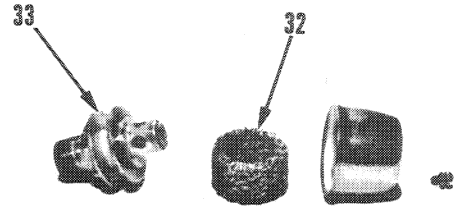


7. **Stroke switch assembly**
   Remove switch assembly (30) from cover (9).
   ★ The assembly cannot be disassembled, so do not remove it if there is no abnormality.

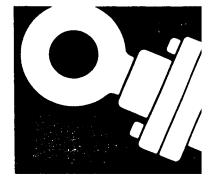
8. **Breather assembly**
   1) Remove breather assembly (31) from cover.



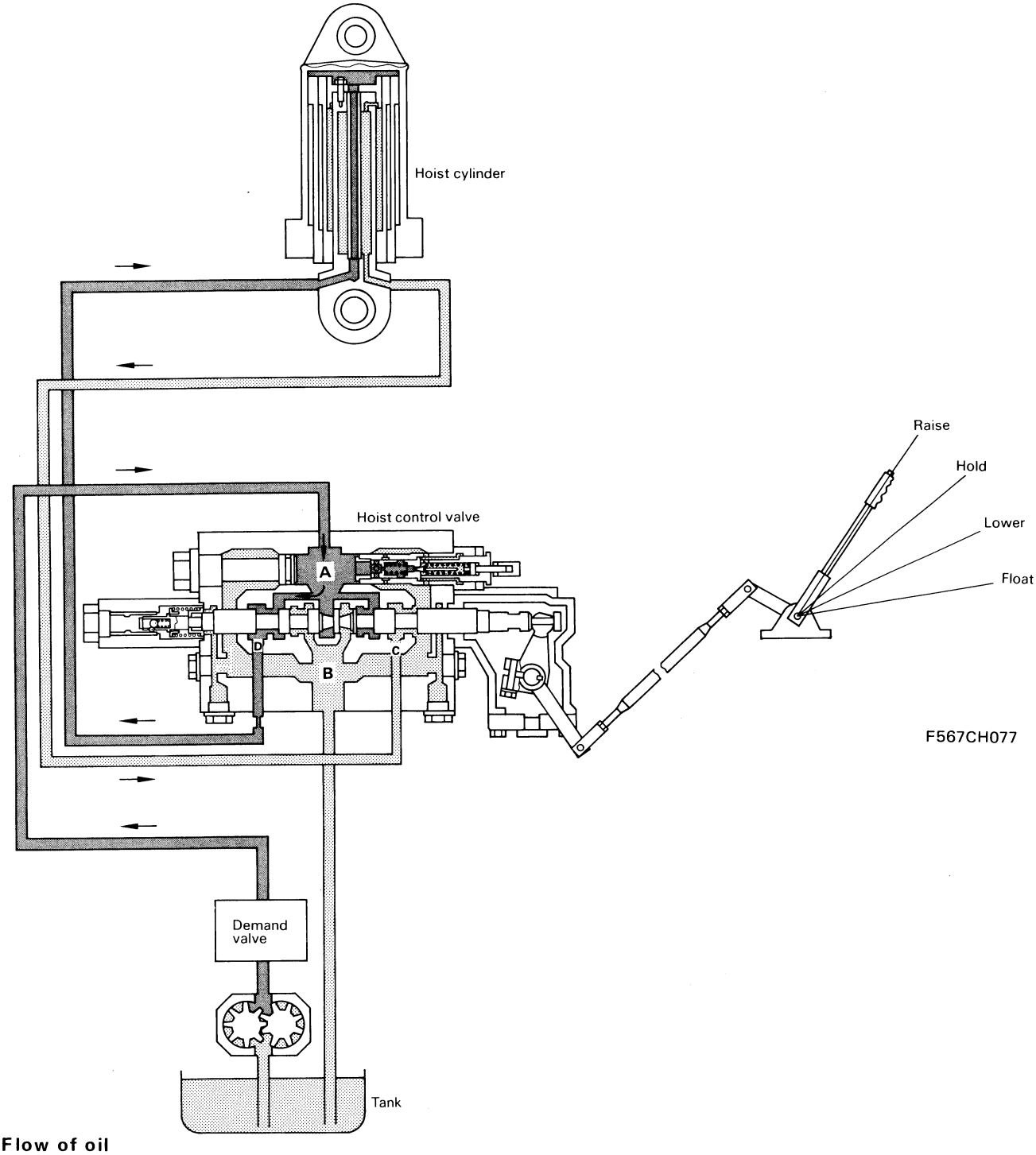
   2) Remove bolt, then remove element (32) from breather (33).
      ★ Clean it thoroughly if it is to be used again.



HYDRAULIC SYSTEM
61 STRUCTURE AND FUNCTION



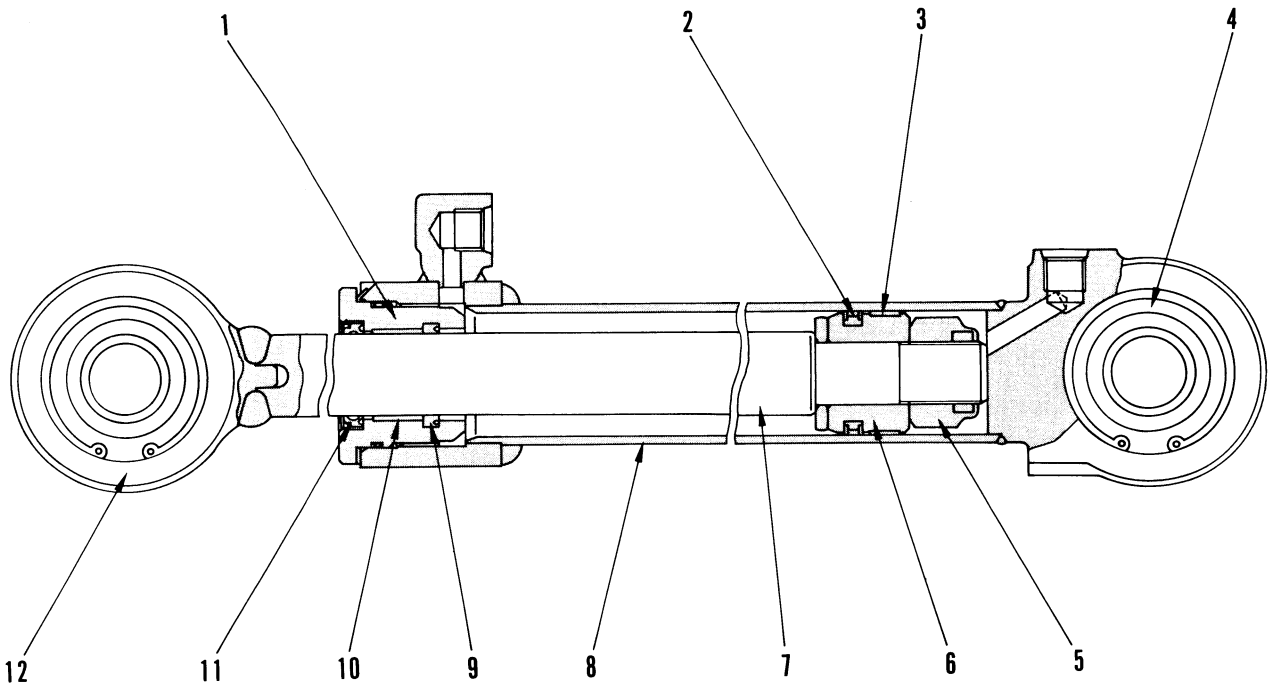
Raise position



Flow of oil

- When the control lever in the operator's compartment is moved to the RAISE position, the spool of the hoist control valve is pulled out.
- When the spool is pulled out, chamber **A** and chamber **C** are connected, and at the same time chamber **D** and chamber **B** are also connected.
- The oil from the demand valve passes thorugh chamber **A** and chamber **C** and enters the bottom end of the hoist cylinder to extend the cylinder.
- The oil at the head end returns, passes thorugh chamber **D** and chamber **B**, and returns to the tank.

STEERING CYLINDER



F567CH087

1. Grand
2. Piston ring
3. Wear ring
4. Cylinder support bushing
5. Nylon nut
6. Piston
7. Piston rod
8. Cylinder
9. Rod packing
10. Bushing
11. Dust seal
12. Rod support bushing

Distance between center of mounting pins		Stroke	Inside diameter of cylinder	Outside diameter of piston rod
Minimum	Maximum			
685	1025	340	60	40

MEASURING RAISING SPEED OF DUMP BODY

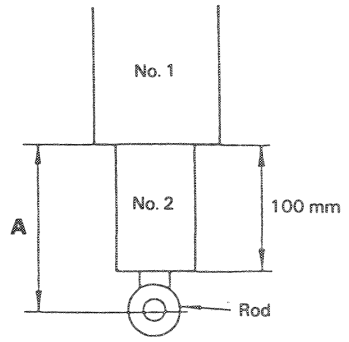
⚠ Stop machine on level ground, apply parking brake, then block wheels.

1. Raise hydraulic oil temperature within 45 to 55°C.
2. Run engine at high idling, move hoist lever quickly from FLOAT to RAISE. Measure time it takes for dump body to reach maximum height.
   ★ Operate hoist lever quickly. Measure several times and take average.

MEASURING HYDRAULIC DRIFT OF HOIST CYLINDER

⚠ Stop machine on level ground, apply parking, then block wheels.

1. Raise hydraulic oil temperature within 45 to 55°C.
2. Extend No.2 cylinder 100 mm, stop engine, lock hoist lever with safety lock.
3. Measure change in distance A during 5 minutes.



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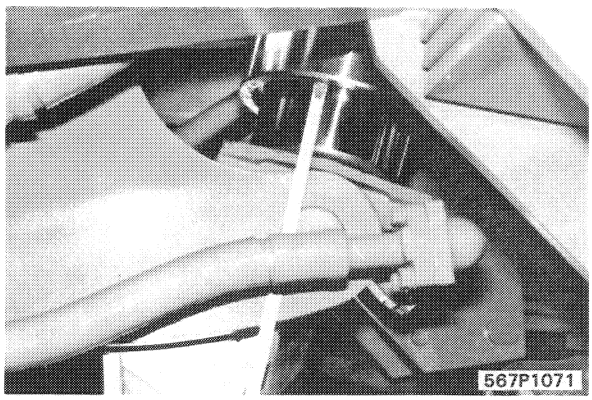
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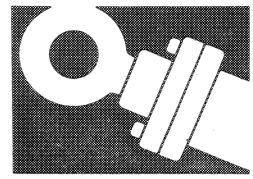
HYDRAULIC SYSTEM
63 DISASSEMBLY AND ASSEMBLY



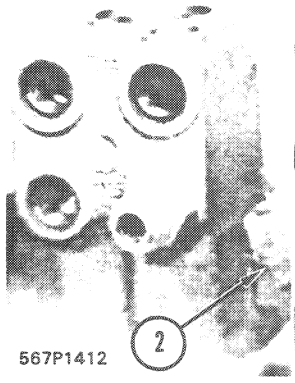
ASSEMBLY OF STEERING CONTROL VALVE ASSEMBLY

★ Check the surface of all parts for damage or wear. Clean all parts, and dry with compressed air.

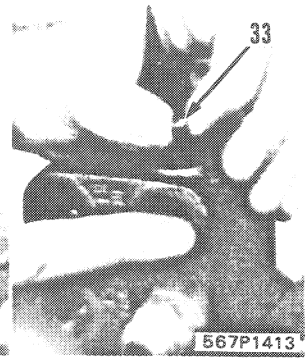
1. Set valve body in vice (2).
   ★ Use a protective brass plate in the vice.

2. Set ball (33) in position, then fit O-ring and install plug (32).
   ★ Check that the ball is fitted securely.

   kgm Plug: 1.65 ± 0.25 kgm



567P1412

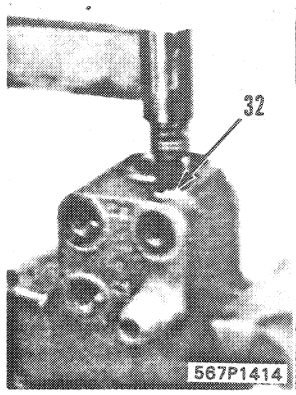


567P1413

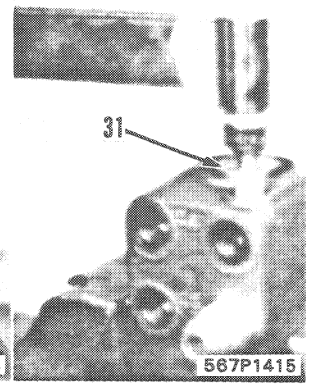
3. Fit O-ring and install plug (31).

   kgm Plug: 7.95 ± 0.35 kgm

   Plug, O-ring: Grease (G2-LI)

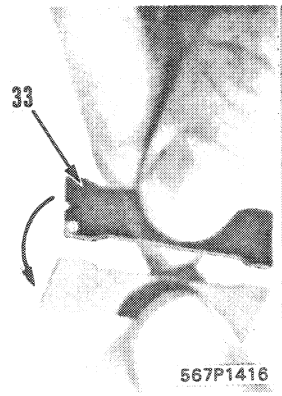


567P1414

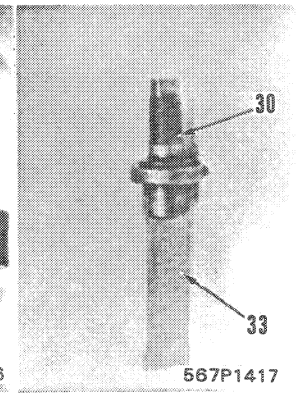


567P1415

4. Align 2 torsion blades (33) so that the "O" mark is on reverse side at outside, then fit in groove of adjustment screw (30).
   ★ If the torsion blade is not correctly aligned, the steering valve will not return to the center.

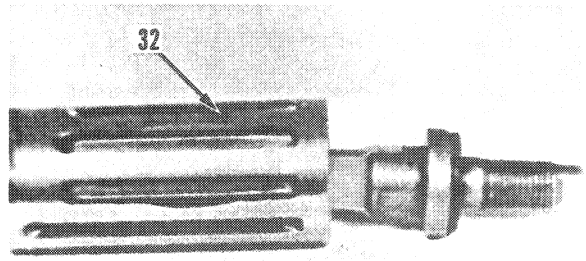


567P1416



567P1417

5. Install adjustment screw and torsion blade to valve spool (32).
   ★ Check that they are securely fitted inside the valve spool.



567P1418

ASSEMBLY OF HOIST CONTROL VALVE ASSEMBLY

★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.

1. Assemble spool assembly as follows.
   1) Assemble retainer (20) and spring (21) to spool (14), then fit O-ring and install plug (19).
   2) Assembel spring (18) and ball (17), and install plug (16).
   3) Fit O-ring and install joint (15) to spool (14).

2. Assemble detent (11) in case (9), then fit O-ring and install plug (10).

3. Fit detent ball (8) to spool assembly (14), and assemble in case assembly (9).
   ★ Coat the ball with grease to prevent it from dropping out.

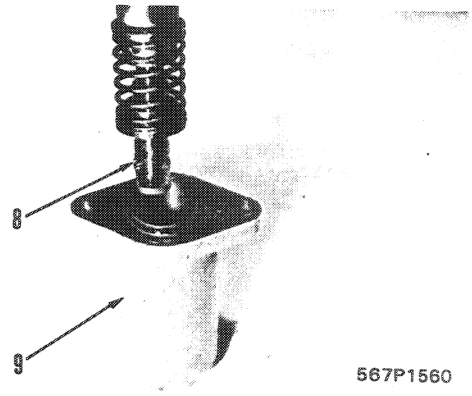
4. Fit O-ring and assemble spool assembly (14) together with case assembly (9) in body (13).

5. Fit O-ring and install rotary seal assembly (6).

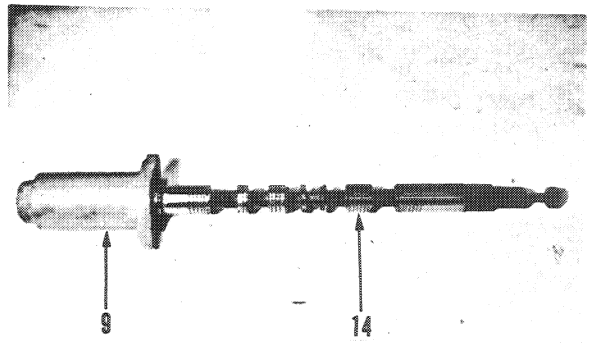
6. Assemble check valve (5) and spring (4), then fit O-ring and install plug (3).

7. Fit O-ring and install main relief valve assembly (2).

8. Install lever (1).

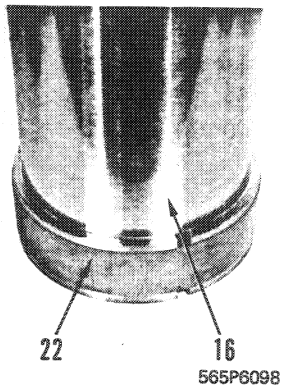


567P1560

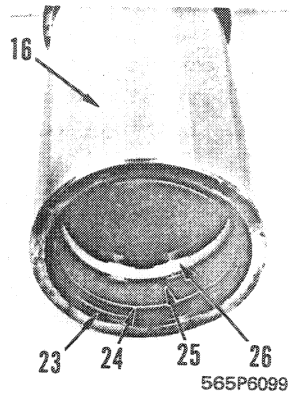


567P1561

4) Remove water ring (22) from cylinder II (16).
5) Remove snap ring (23), then take out dust seal (24), bushing (25) and rod packing (26) from cylinder II (16).



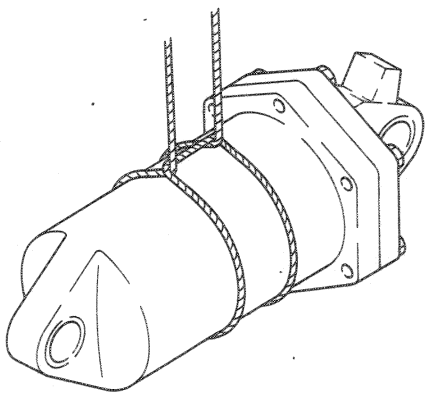
565P6098



565P6099

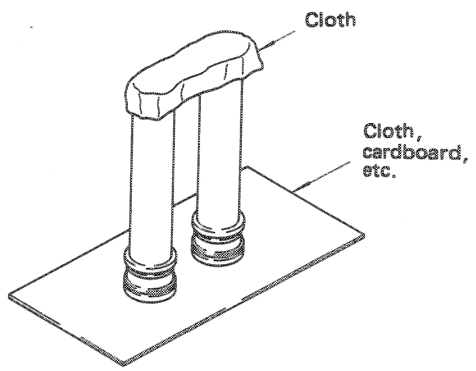
PRECAUTIONS FOR DISASSEMBLY AND ASSEMBLY

1. **Attaching wire**
   The components are heavy, so be particularly careful when handling them.
   Parts such as the No. 2 rod and No. 3 cylinder are plated with chrome, so when raising these parts, use a nylon rope or nylon sling which will not make scratches.



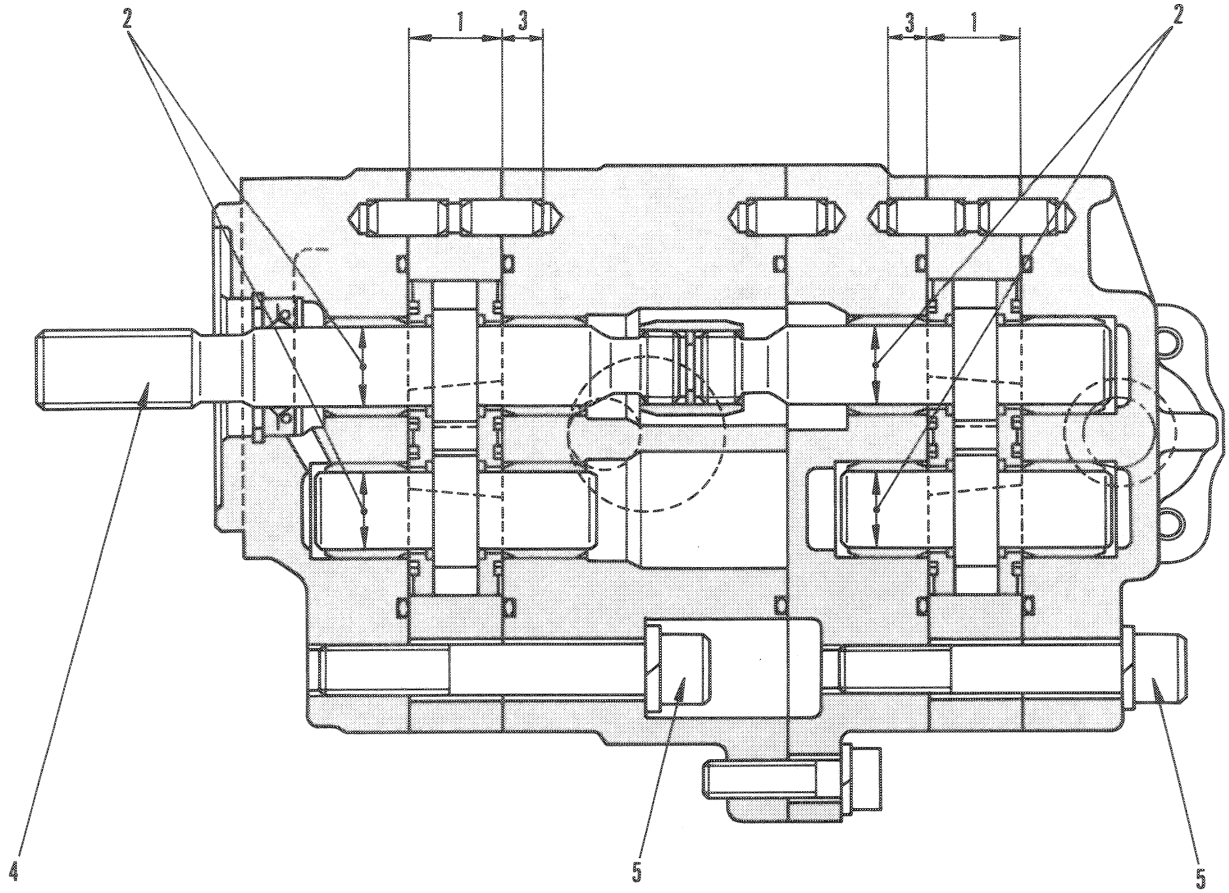
2. During disassembly and after disassembly, be careful not to scratche the sliding surfaces of the cylinders.

3. Spread a clean sheet (or cloth) on the work stand to prevent the sliding surface of the cylinders from being scratched.
   (It is preferable to stand cylinders No. 1, 2 and 3.)



567F241-K

GEAR PUMP (SAR2-050+050)



F567CH091

Unit: mm

No.	Check item	Criteira					Remedy
1	Clearance between gear case and side plate, gear	Model		Standard clearance		Clearance limit	
		SAR2-050		0.10 – 0.15		0.19	
2	Clearance between inside diameter of plain bearing and outside diameter of gear shaft	SAR2-050		0.06 – 0.125		0.20	
3	Depth to knock in pin	$12^{0}_{-0.5}$					
4	Rotating torque of splined shaft	0.3 – 0.7 kgm					
	Delivery amount	Model	Speed (rpm)	Delivery pressure (kg/cm)	Standard delivery amount (ℓ/min.)	Delivery amount limit (ℓ/min.)	
	EO10-CD 45 – 55°C	SAR2-050 (each pump)	3000	210	138	128	
5	Tightenining torque of bolt	10 – 12.5 kgm					

REPAIR OF THE DUMP BODY BY WELDING

WELDING RODS

Use the rods recommended in Table 1. under the drying conditions stated in Table 2.

Table 1. Recommended Welding Rods

Welding Object	Mother plate	Rib	Protector	Other
Welding rods	JIS Z3212 D5816	←	←	JIS Z3211 D4316
	AWS E9016G, B2	←	←	AWS E7016 E7018

Table 2. Drying Conditions

Welding Rods	Drying Conditions		Effective Time in Use
	Temperature	Time	
L-60, LB-52 L-55, S -16 LB-26	150~200°C 300~350°C	120 min. 60 min.	4 hours

1. Effective usable time (allowable length of time after the rods are taken out of the drying furnace) is stated at 70 percent or less of the humidity of the air.
2. Drying should not be repeated four times or more.
3. A welding rod should be discarded if any abnormal condition (cracks, discoloration, etc.) is found on its coating.

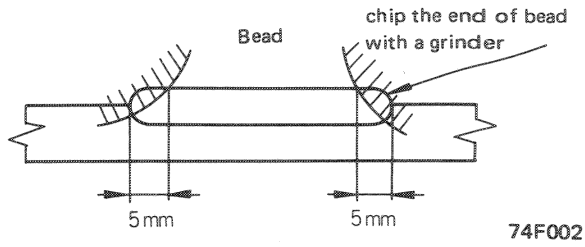
REFERENCE

Mechanical properties of welding rods

	JIS D4316	JIS D5816
Fuse type	Low hydrogen type	Low hydrogen type
Tensile strength kg/mm²	43	58
Yield point kg/mm²	35	50
Expansion %	25	18
Impact value kgm (V-notch Charpy, 0°C)	4.8	4.8 (–5°C)

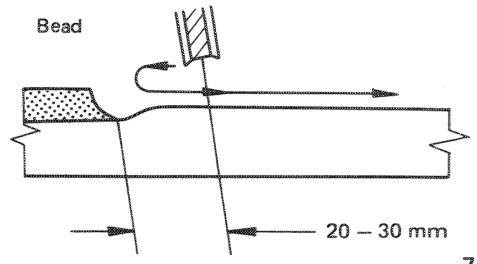
PRECAUTIONS FOR WELDING OPERATIONS

- The desirable ambient conditions for welding are under 80 percent in humidity and over 0°C in temperature.
- Be sure to preheat the mother plate before welding:
  1. The range of preheating should be limited to three times the thickness of the plate for each side from the center of the welding area.
  2. The preheating temperature should be in the range from 150 to 200°C.



74F002

- Each end of the bead should be finished as above.
- When starting the arc, move the rod as shown in the figure below:



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- Before applying arc-gouging, preheat the mother plate at 150 to 200°C in the same way as mentioned before for welding.

Example 1 TROUBLESHOOTING CHART

① E-1: LOCK UP DOES NOT OPERATE.

②

Troubleshooting tools	Tester
	T-adapter or socket adapter (for Econoseal)

③ **a) Abnormality in power source system**

OFF	OFF
○	○
Red	Green

④

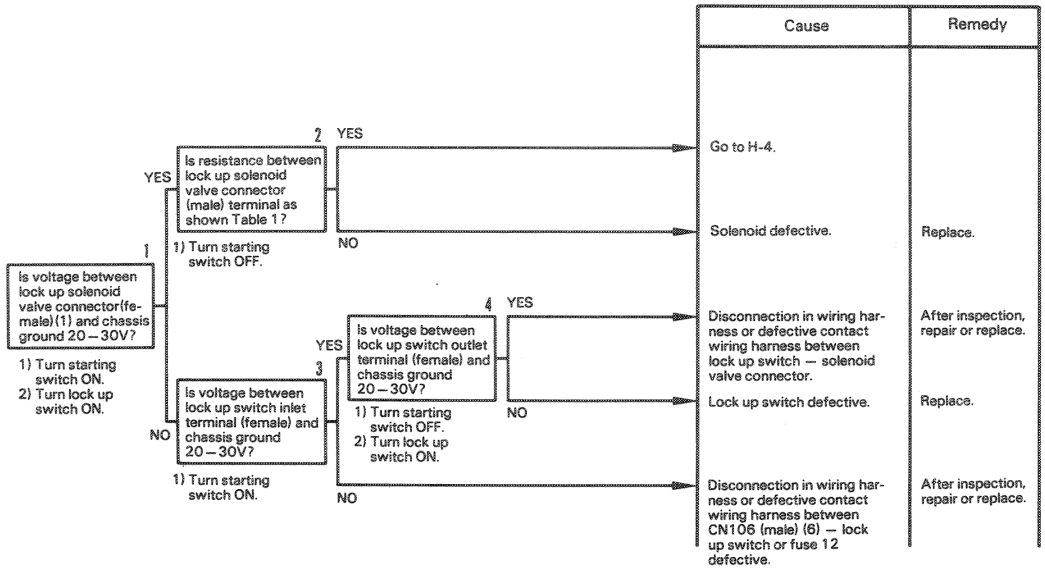


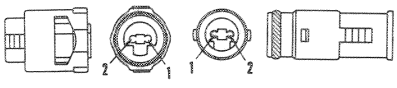
Table 1 Resistance of solenoid

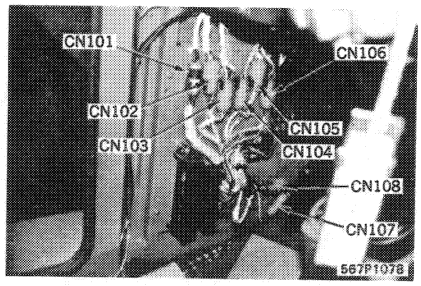
(1) – (2)	Approx.64.5 Ω
(2) – chassis ground	Continuity

⑤
- ★ Turn starting switch off before disconnecting connectors.
- ★ Check connectors so that there is no dust and deflection.
- ★ Connect connector immediately to original position after checking.

Example 2

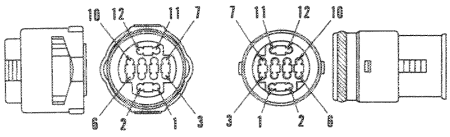
⑥ CN101
Econoseal 2-pin

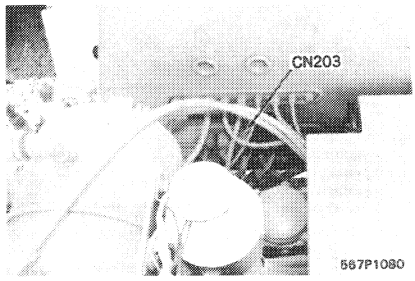




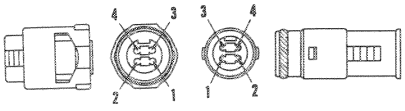
POSITION OF CONNECTOR

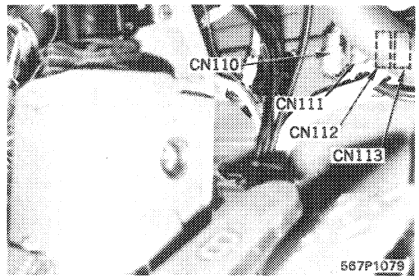
CN203 Econoseal 12-pin



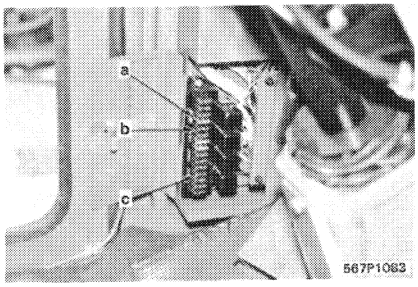


CN111 Econoseal 4-pin





Fuse 4 (a)



CN101 Econoseal 2-pin