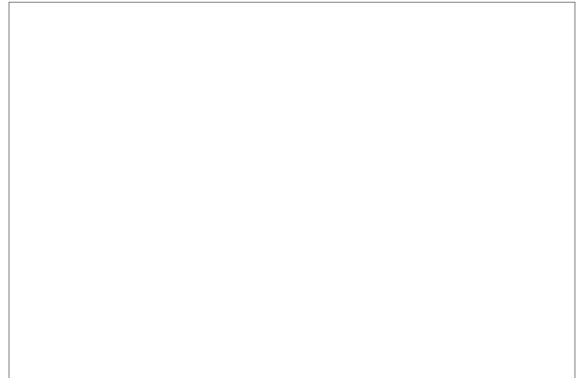


SECTION 1 GENERAL

GROUP 1 SAFETY HINTS

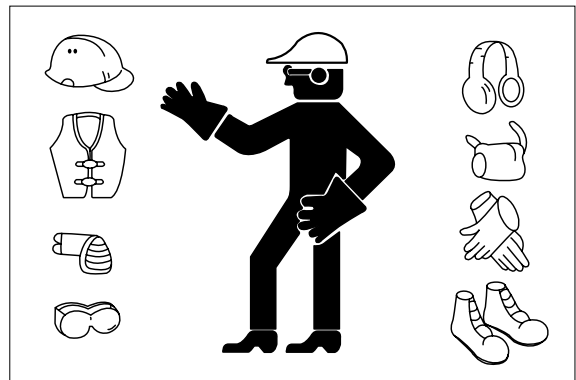
FOLLOW SAFE PROCEDURE

Unsafe work practices are dangerous. Understand service procedure before doing work; Do not attempt shortcuts.



WEAR PROTECTIVE CLOTHING

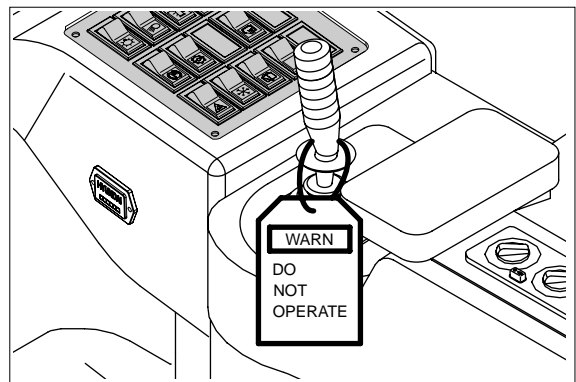
Wear close fitting clothing and safety equipment appropriate to the job.



WARN OTHERS OF SERVICE WORK

Unexpected machine movement can cause serious injury.

Before performing any work on the wheel loader, attach a 'Do Not Operate' tag on the right side controller lever.

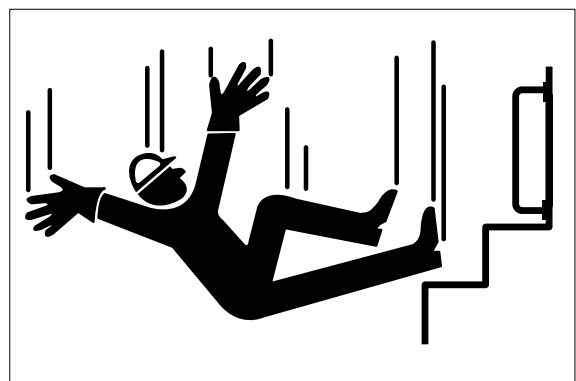


USE HANDHOLDS AND STEPS

Falling is one of the major causes of personal injury. When you get on and off the machine, always maintain a three point contact with the steps and handrails and face the machine. Do not use any controls as handholds.

Never jump on or off the machine. Never mount or dismount a moving machine.

Be careful of slippery conditions on platforms, steps, and handrails when leaving the machine.



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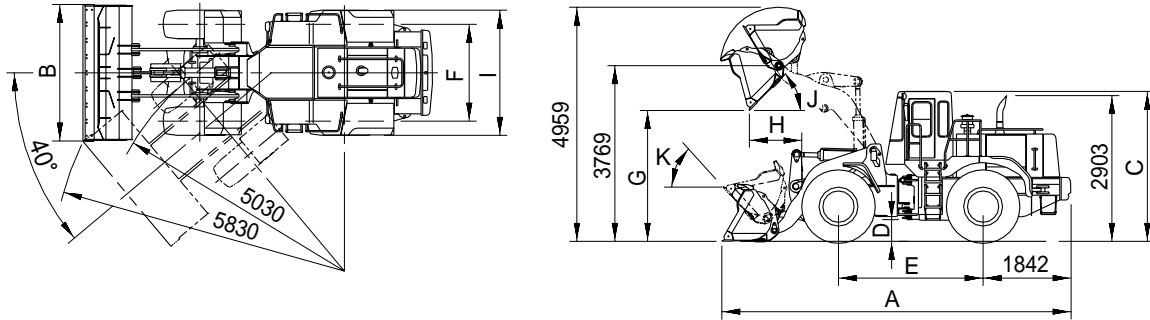


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2. SPECIFICATIONS

1) WITHOUT TOOTH AND CUTTING EDGE TYPE BUCKET



Description		Unit	Specification
Operating weight		kg(lb)	10940(24119)
Bucket capacity	Struck	m ³ (yd ³)	1.6(2.1)
	Heaped		1.9(2.5)
Overall length	A	mm(ft-in)	7025(23' 1")
Overall width	B		2550(8' 4")
Overall height	C		3237(10' 7")
Ground clearance	D		417(1' 4")
Wheelbase	E		2900(9' 6")
Tread	F		1900(6' 3")
Dump clearance at 45°	G		2871(9' 5")
Dump reach	H		850(2' 9")
Width over tires	I		2430(8' 0")
Dump angle	J		Degree (°)
Roll back angle(Carry position)	K	47	
Cycle time	Lift(With load)	sec	5.9
	Dump(With load)		1.1
	Lower(Empty)		2.6
Maximum travel speed		km/hr(mph)	42(26.2)
Braking distance		m(ft-in)	14.5(47' 7")
Minimum turning radius(Center of outside tire)			5.03(16' 6")
Gradability		Degree (°)	30
Travel speed	Forward	First gear	6.4(4.0)
		Second gear	13.5(8.4)
		Third gear	27.2(17.0)
	Reverse	First gear	6.4(4.0)
		Second gear	13.5(8.4)
		Third gear	27.2(17.0)

7. RECOMMENDED LUBRICANTS

Use only oils listed below or equivalent.

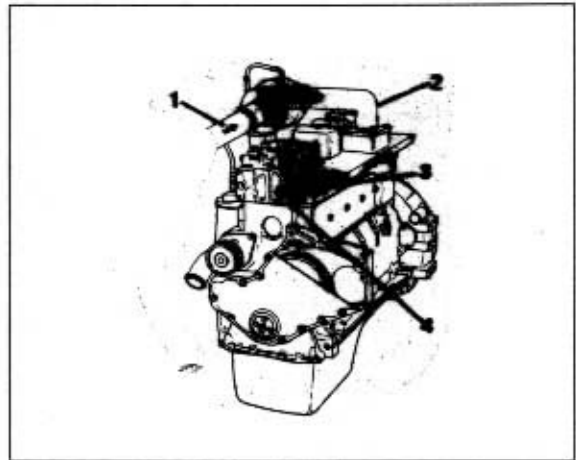
Do not mix different brand oil.

Service point	Kind of fluid	Capacity l (U.S. gal)	Ambient temperature °C (°F)								
			-20 (-4)	-10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)		
Engine oil pan	Engine oil	16.4(4.3)					SAE 30				
			SAE 10W								
			SAE 10W-30								
						SAE 15W-40					
Torque converter Transmission	Oil	25(6.6)	DEXRON II								
Axle	Gear oil	Front : 40(10.6) Rear : 40(10.6)	SAE 80W-90LSD/API GL-5								
Hydraulic tank	Hydraulic oil	Tank: 75(19.8) System: 120(31.7)	ISO VG 32								
						ISO VG 46					
						ISO VG 68					
Fuel tank	Diesel fuel	200(52.8)	ASTM D975 NO. 1								
						ASTM D975 NO. 2					
Fitting (Grease nipple)	Grease	As required	NLGI NO. 1								
						NLGI NO. 2					
Radiator	Mixture of antifreeze and water 50 : 50	35(9.2)	Ethylene glycol base permanent type								

5. INTAKE AND EXHAUST SYSTEM

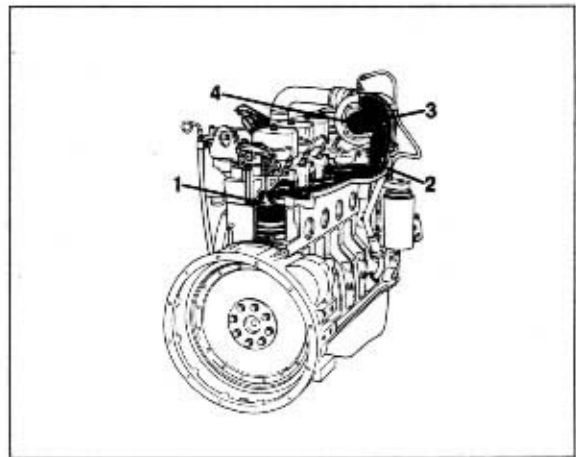
Intake system

- 1 Intake air inlet to turbocharger
- 2 Air to intake manifold
- 3 Intake manifold
- 4 Intake valve



Exhaust system

- 1 Exhaust valve
- 2 Exhaust manifold
- 3 Turbocharger inlet
- 4 Turbocharger exhaust outlet



The engine is available in turbocharged.

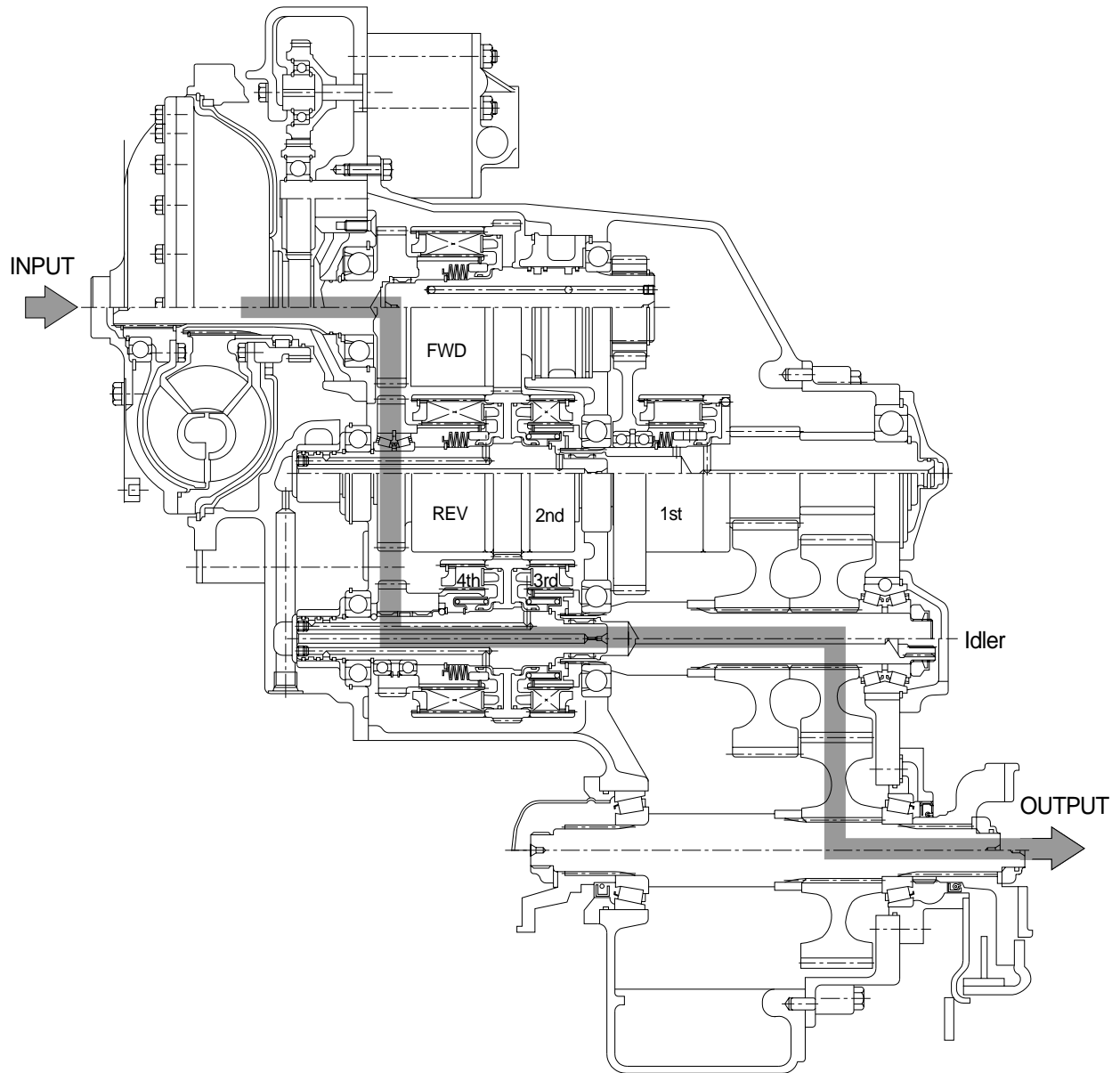
Air is pulled into the engine from an air filter. Clean air is very important to the life of the engine. Ingested dust and dirt can damage the cylinders very quickly.

The air flow is from the filter to the turbocharger, and then through the crossover tube to the manifold. From the intake manifold, air is forced into the cylinder and used for combustion. The exhaust gases flow through the turbocharger to rotate the turbine and impeller, thereby utilizing exhaust energy to force more air into the cylinders. The additional air provided by the turbocharger allows more fuel to be injected to increase the power output from the engine. Thus, the power-to-weight ratio for the engine is increased significantly with the addition of the turbocharger.

④ Forward 4th

In 4th forward, 4th clutch and 3rd clutch are engaged.

4th clutch and 3rd clutch are actuated by the hydraulic pressure applied to the clutch piston.



5) SELFTEST FUNCTIONS

The EGS has special circuitry to help verifying its operation.

Three selftest modes are built into the EGS control programs :

Input test

Speed sensor test + Lamptest

Output test

The EGS furthermore has the ability to check for possible problems while driving(**On line** diagnostics).

As described in clause(2), Display layout at page 3-18, the **T** LED is used for identifying different troubleshooting modes. This is done in combination with the status of the **N** LED.

(1) Operation of the N and T LED's

① Overview

Situation	LED
In normal situations(Driving, no problems)	T LED is always OFF
When error is detected	T LED is ON or BLINKING
In selftest mode	T LED is always ON

② Detailed operation

Situation	N LED	T LED
Normal operation	On when transmission neutral	OFF
Internal fault	ON	Blinking SLOWLY
Input test	Blinking SLOWLY	ON
Output test	Blinking FAST	ON
Speed sensor test	OFF	ON

(2) Selftest operation

Selftest modes can only be started **while powering up** the EGS.

Invocation of a certain mode is done by moving the shift lever to a specific position while switching on the power of the EGS.

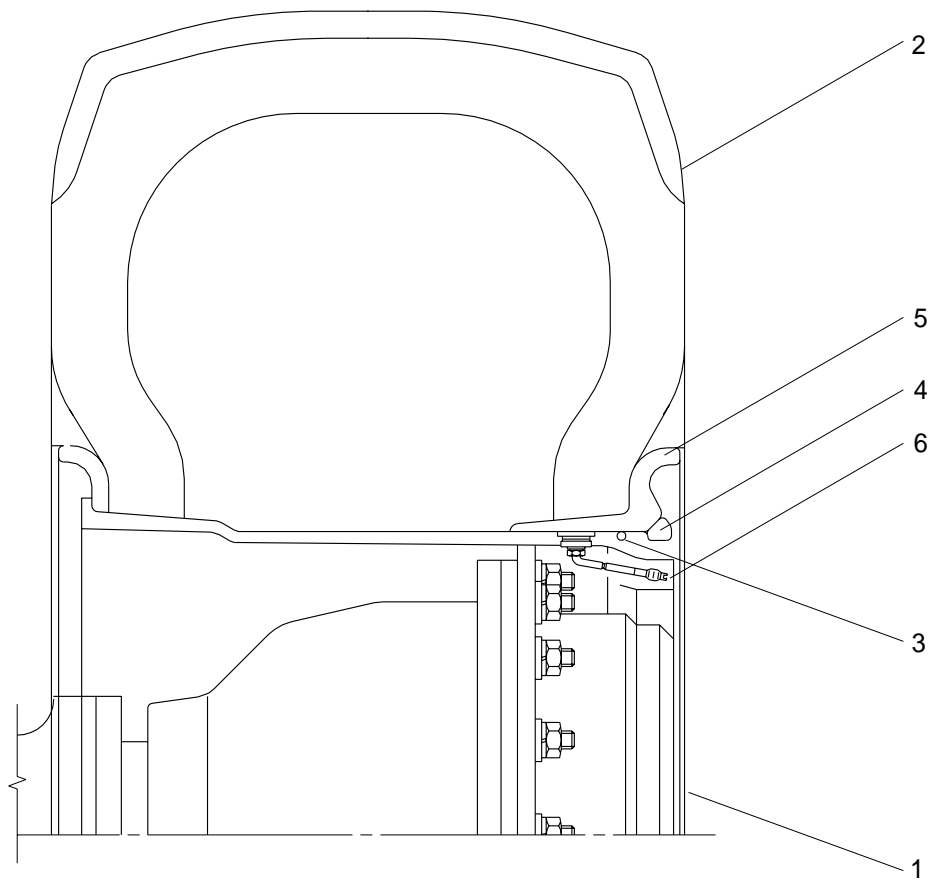
Leaving the selftest mode is done by switching OFF the power of the EGS.

① Selftest mode invocation

Below table lists what conditions must be satisfied during **powerup** to get into a specific selftest mode :

Selftest mode	To enter mode
Input test	FWD & UP
Speed sensor test	REV & UP
Output test	FWD & DOWN

6. TIRE AND WHEEL

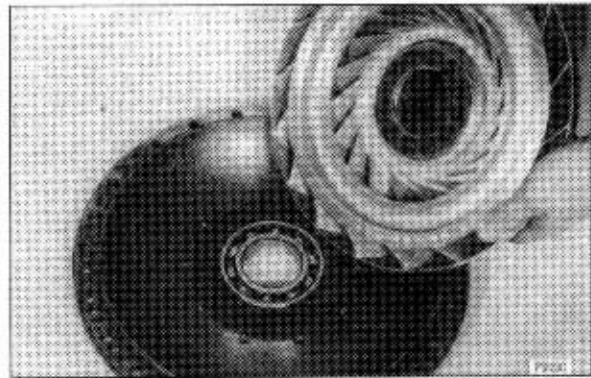


- | | | | | | |
|---|-----------|---|-----------|---|----------------|
| 1 | Wheel rim | 3 | O-ring | 5 | Side ring |
| 2 | Tire | 4 | Lock ring | 6 | Valve assembly |

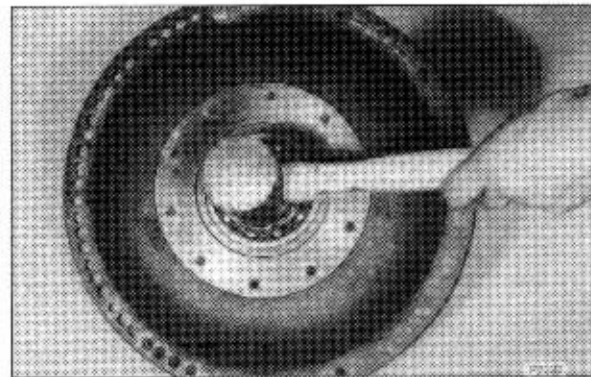
- 1) The tire acts to absorb the shock from the ground surface to the machine, and at the same time they must rotate in contact with the ground to gain the power which drives the machine.
- 2) Various types of tires are available to suit the purpose. Therefore it is very important to select the correct tires for the type of work and bucket capacity.

Problem	Cause	Remedy
Excessive transmission noise (Under load or no load)	Too low engine low idle. Worn parts or damaged in transmission. Warped drive line between engine and torque converter. Low or no lube.	Check engine low idle speed. Remove transmission suction screen. Inspect for metal particles. Repair as necessary. Inspect drive line. Do converter-out and lube pressure test. Do transmission pump flow test.
Foaming oil	Incorrect type of oil. High oil level. Low oil level. Air leak on suction side of pump.	Change oil. Transmission overfilled or hydraulic pump seal leaking. Add oil. Check oil pickup tube on side of transmission.
Oil ejected from dipstick	Plugged breather.	Inspect breather on top of transmission. Replace.
Machine vibrates	Aerated oil. Low engine speed. Failed universal joints on transmission drive shaft or differential drive shafts.	Add oil. Check engine speed. Check universal joints.
Machine lacks power and acceleration	Engine high idle speed set too low. Incorrect transmission oil. Aerated oil. Low transmission pressure. Warped transmission clutch. Torn transmission control valve gasket. Brake drag. Failed torque converter. Low engine power.	Check high idle adjustment. Change oil. Add oil. Do transmission system pressure test. Do transmission clutch drag checks. Inspect gasket. Do brake drag check. Do torque converter stall speed test. Do engine power test.
Torque converter stall RPM too high	Aerated oil. Stuck open converter relief valve. Leakage in torque converter seal. Torque converter not transferring power(Bent fins, broken starter).	Put clear hose on thermal bypass outlet port. Run machine to check for bubbles in oil. Do converter-out pressure test. Do converter-out pressure test. Replace torque converter.

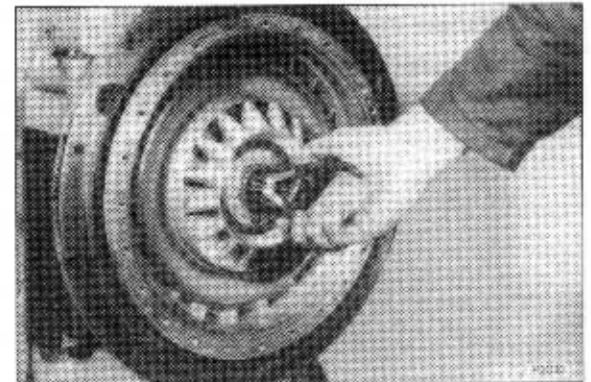
(13) Tap the turbine and hub from the impeller cover.



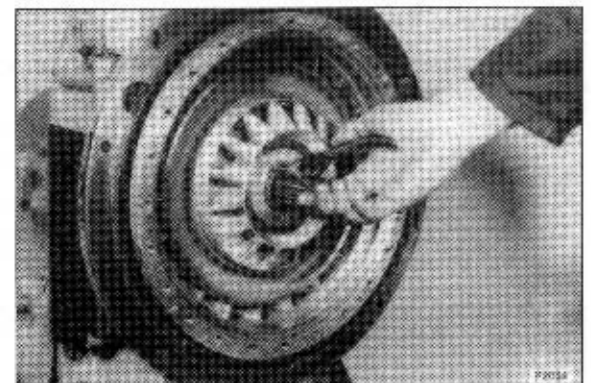
(14) Remove the cover bearing retaining circlip and tap the bearing out of the cover.



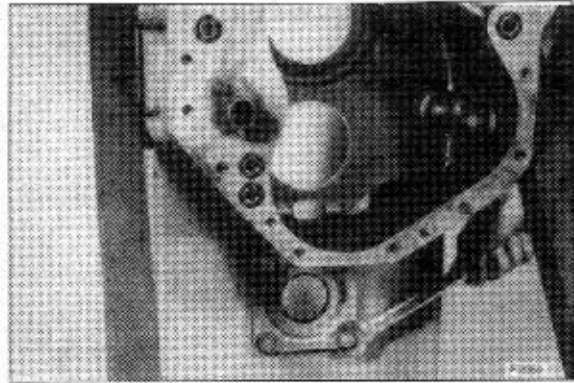
(15) Remove the turbine bearing circlip.



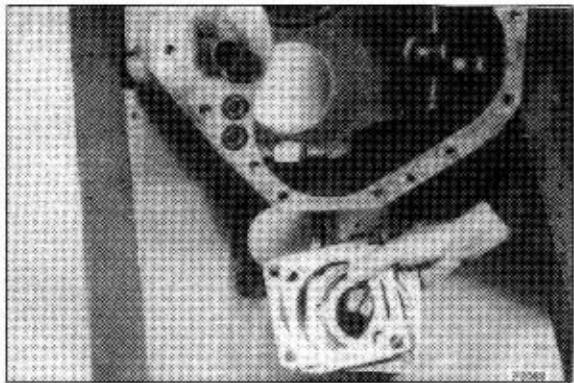
(16) Remove the reaction member retaining circlip.



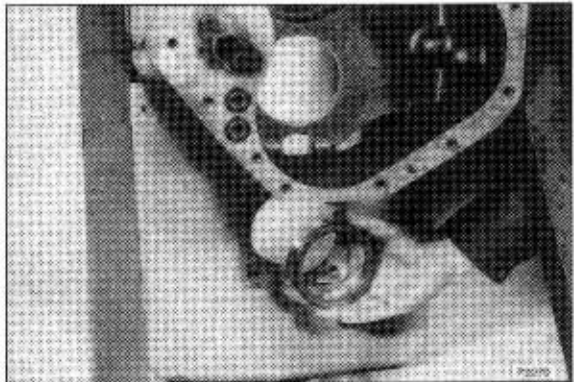
(52) Remove the bolts and washers from the output shaft front bearing cap.



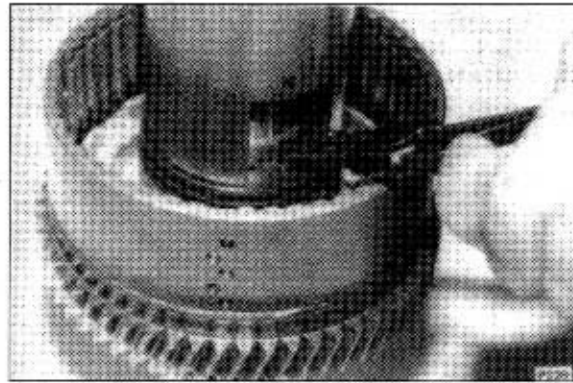
(53) Remove the bearing cap, O-ring and shims.



(54) Remove the taper bearing cup.

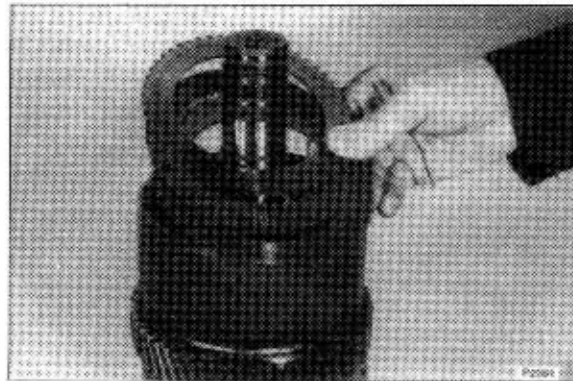


- (5) Using a sleeve with a cut-out as shown, compress the spring/belleville washers to fit circlip.

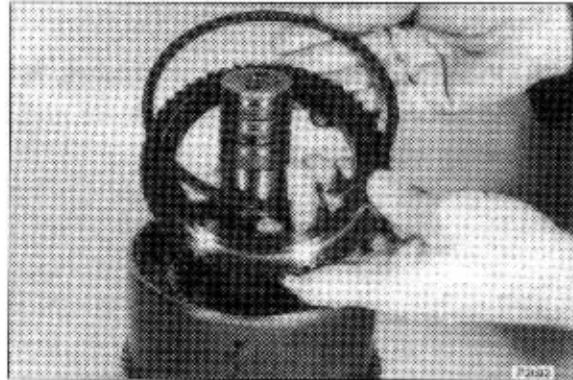


- (6) Fit a steel disc first followed by alternate friction and steel discs. The last disc should be friction.

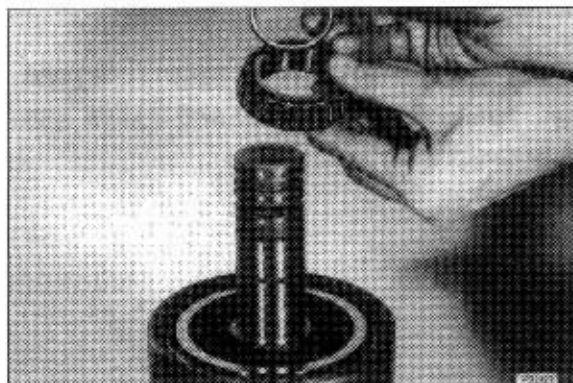
- * The friction discs in the low clutch (identified by a yellow mark) have a higher co-efficient rating than those fitted to other clutches.



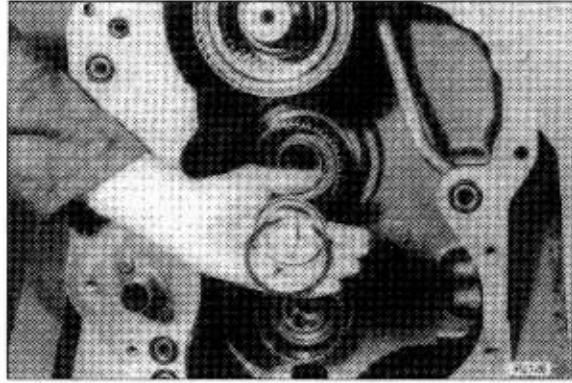
- (7) Fit the end plate and retaining ring.



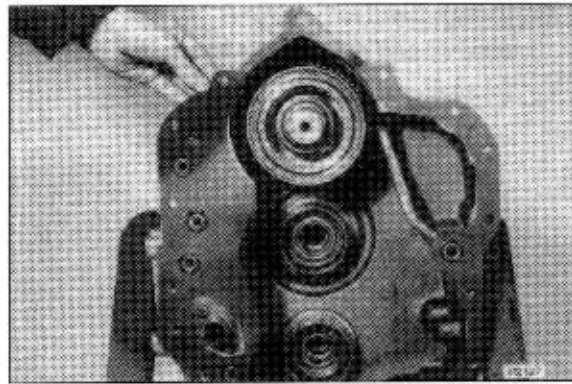
- (8) Fit the inner bearing, spacer and circlip.



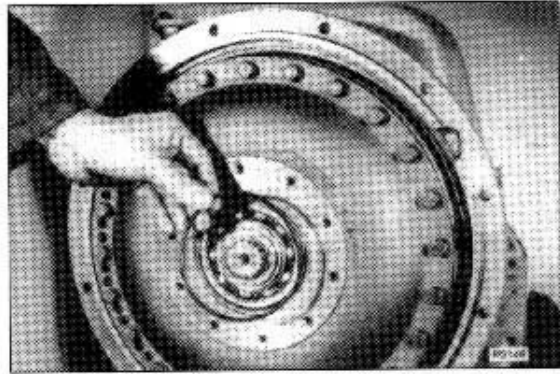
(29) Install the 2nd gear hub retaining washer and fit the retaining washer circlip.



(30) Position new O-rings and gasket on the front of the housing. A light coat of grease will hold them in place.

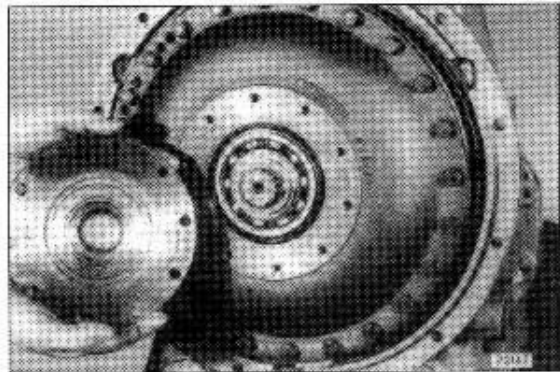


- (65) Position a new O-ring over the impeller cover bearing.

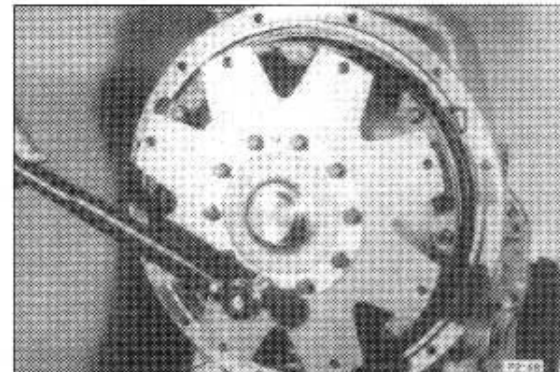


- (66) Thoroughly clean tapped holes and studs (if fitted) with solvent. Apply loctite 262 to the holes and stud ends. Position the impeller cover bearing cap and install studs.

※ Allow the loctite to cure fully before fitting transmission to engine.

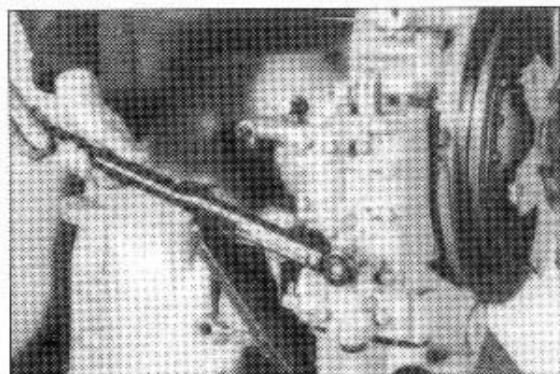


- (67) Assemble the drive plate group and backing ring onto studs (if fitted), with the dimples on the backing ring out. Install washers and stud nuts and tighten to 3.6-4.0kgf · m (26-29 lbf · ft). If bolts are fitted, apply solvent and loctite in a similar way and tighten to 3.6-4.0kgf · m (26-29 lbf · ft).



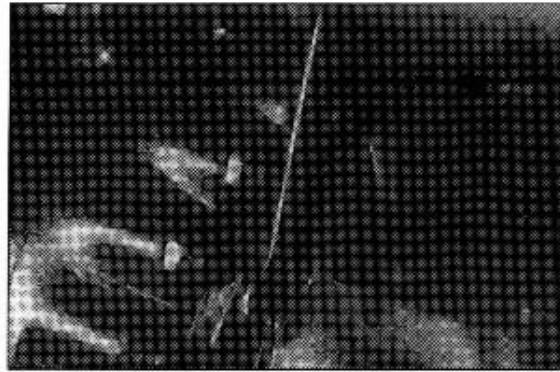
- (68) Fit the control valve block using a new O-ring and gasket and tighten bolts to 3.2-3.5kgf · m (23-25 lbf · ft).

※ See control valve disassembly and assembly for torque tightening sequence.
※ Connect the shuttle valve solenoid wires K. Apply loctite 262 on upper right-hand bolt.

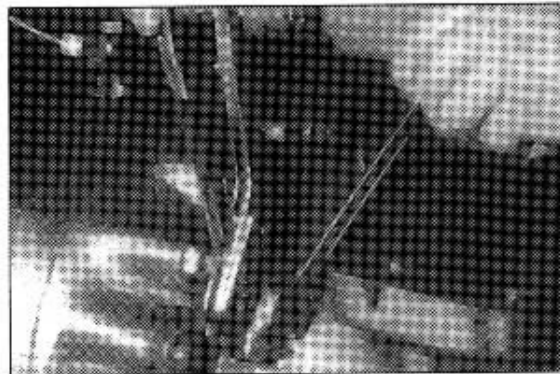


ADJUSTMENT

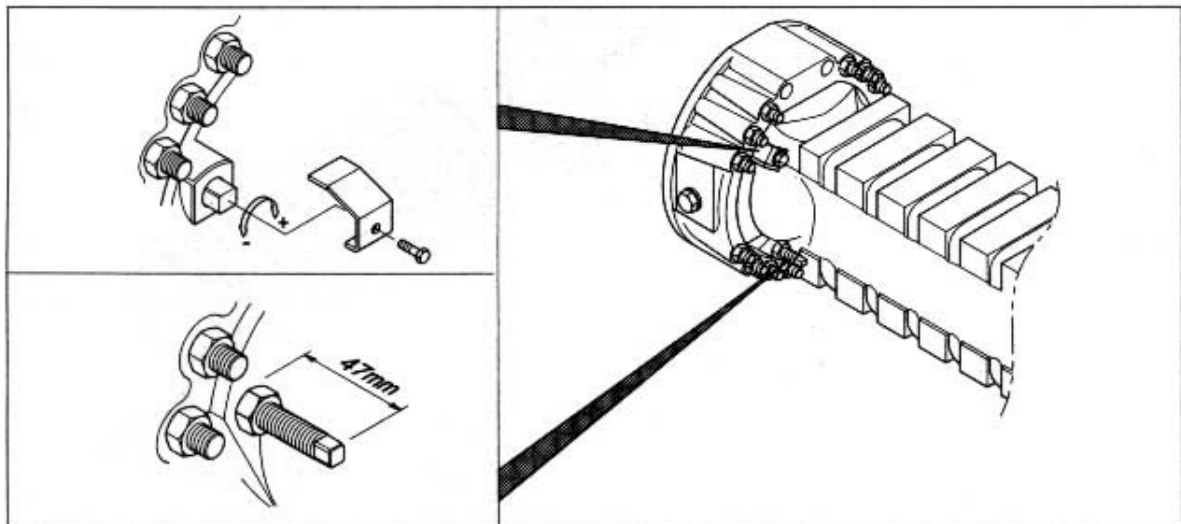
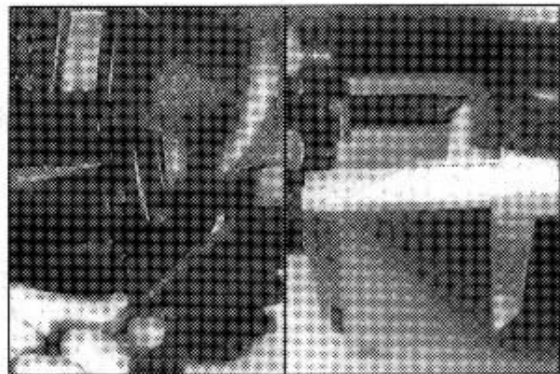
- (1) Introduce pressure in the hydraulic circuit with 25~35 bar.
Remove bolt and locking plate.



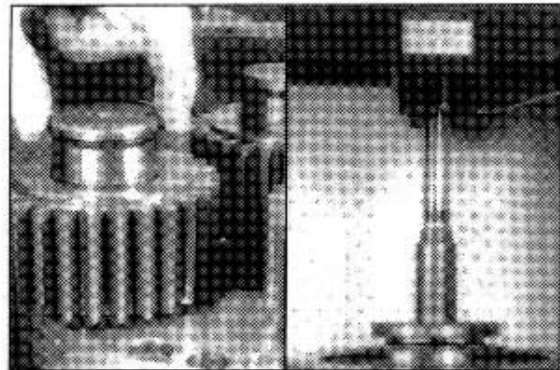
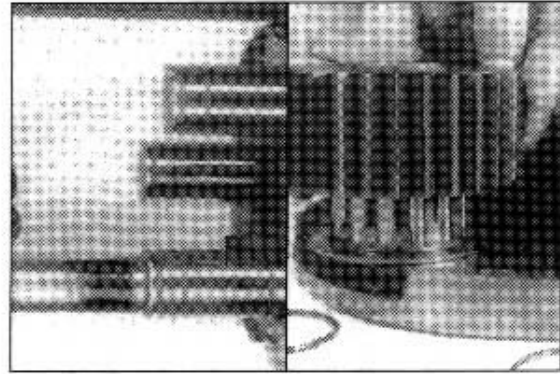
- (2) Turn the pinion with 0.82kgf · m(5.9lf · ft) torque counterclockwise till it stops. Adjust the gap between the brake discs by turning 3 complete revolutions clockwise.



- (3) Adjust the bolts to unlock the safety brake at 47mm and lock the counter nut.

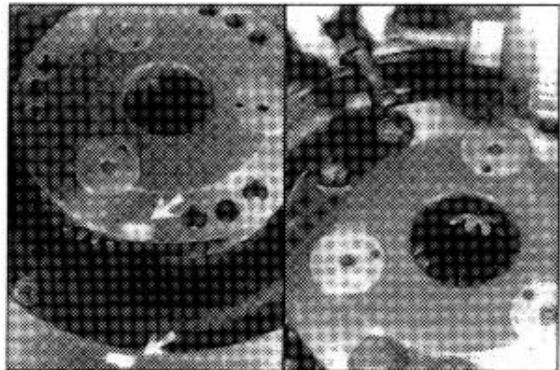


(2) Reassembly



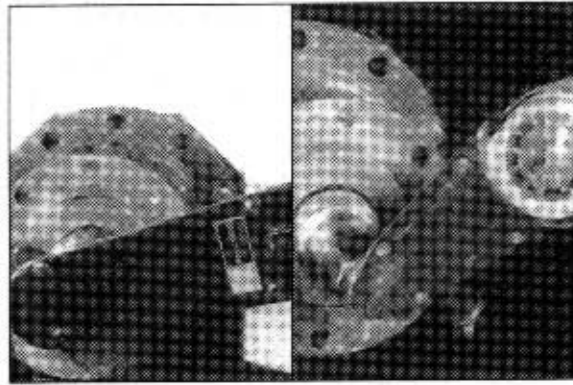
(3) Check the reference numbers.

Torque the screws at $32.1\sim 32.6\text{kgf}\cdot\text{m}$
($232\sim 236\text{lbf}\cdot\text{ft}$).

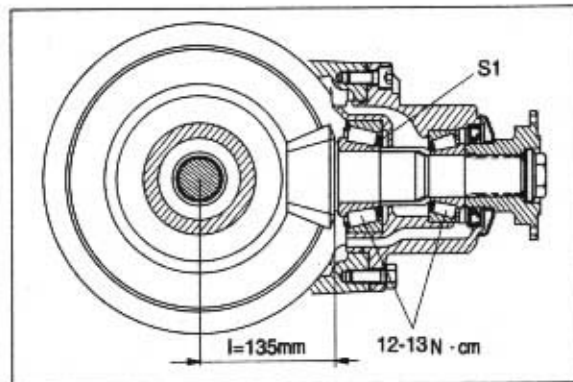


FLANGE INPUT VERSION

(1) Tighten the nut with a torque wrench.

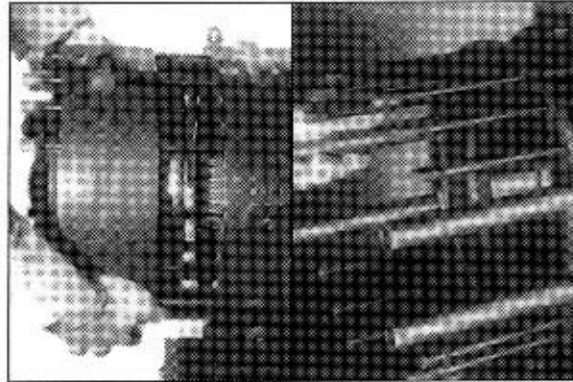


(2) Check rotation torque : See figure

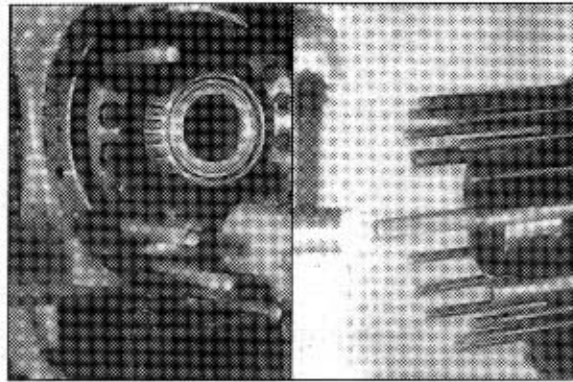


**12) CENTRAL PART OF FRONT AXLE
DISASSEMBLY**

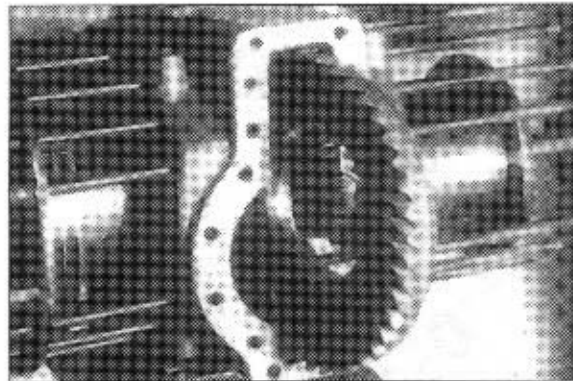
- (1) Demount the intermediate cover on the opposite side to the gear rim and insert tool.



- (2) Slacken the screws. Insert tool and pull out the differential housing. Remove the gear rim from the pinion bearing side.

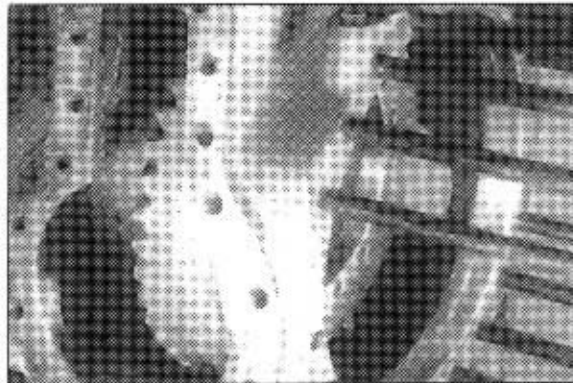


T24
P64



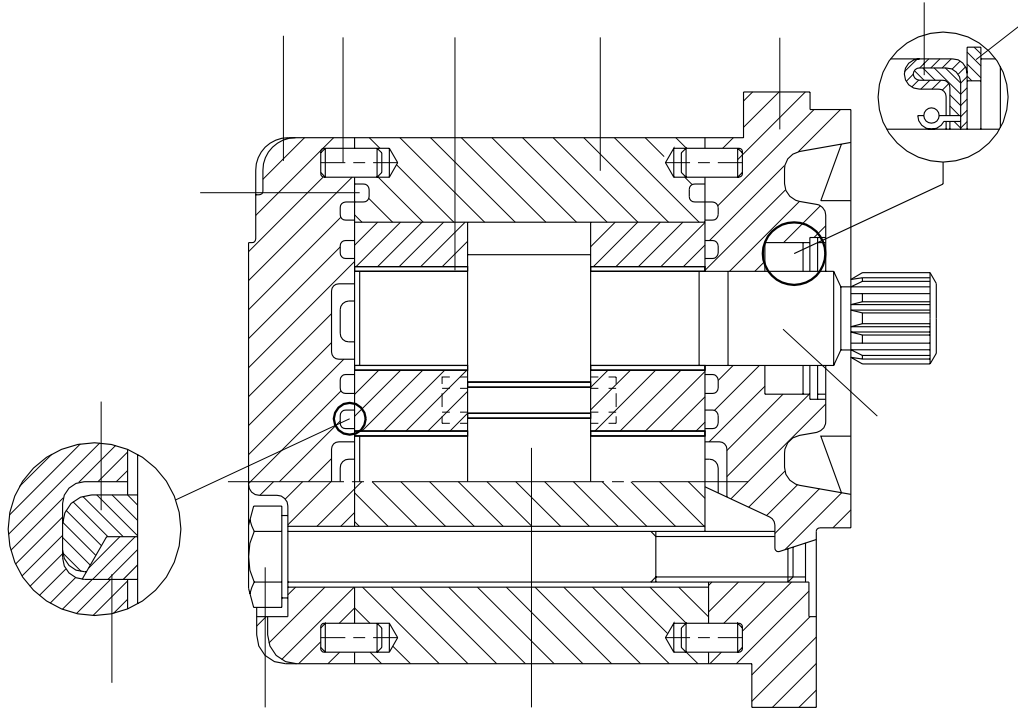
ASSEMBLY

- (1) Center the gear rim on tool.



3. BRAKE PUMP

1) STRUCTURE(SERIAL NO. : ~#0052)

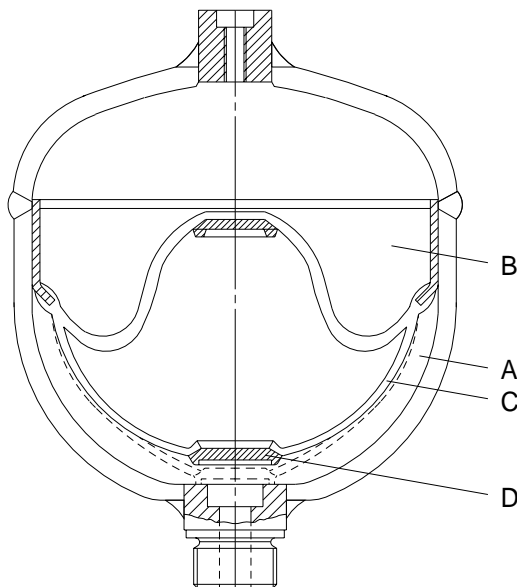


- | | | | | | |
|---|---------------------|----|--------------------|----|------------|
| 1 | Bearing and bushing | 6 | Idler gear | 13 | Dowel pin |
| 2 | Housing | 7 | Antiextrusion ring | 14 | Seal |
| 3 | Flange | 8 | Seal | 15 | Shaft seal |
| 4 | Cover | 11 | Screw | | |
| 5 | Drive gear | 12 | Snap ring | | |

Hydraulic pumps used for the work equipment hydraulic units on construction machinery are pressure loaded type gear pumps. This gear pump have a maximum delivery pressure of 150kgf/cm²(2130psi). The pressure loaded type gear pump is designed so that the clearance between the gear and the side plate can be automatically adjusted according to the delivery pressure. Therefore, the oil leakage from the side plate is less than that in the case of the fixed side plate type under a high discharge pressure. Consequently, no significant reduction of the pump delivery occurs, even when the pump is operated under pressure.

5. BRAKE ACCUMULATOR

1) STRUCTURE



Item	31EC-0219 (Item16)	81L1-0004 (Item15)
Diameter	121mm	121mm
Mounting height	145mm	151mm
Norminal volume	0.75m ³	0.75m ³
Priming pressure	7kgf/cm ²	50kgf/cm ²
Operating medium	Oil	Oil
Operating pressure	Max 56kgf/cm ²	Max 180kgf/cm ²
Thread	M18 × 1.5	M18 × 1.5
Operating temperature range	-30 ~ 80°C	-30 ~ 80°C
Priming gas	Nitrogen	Nitrogen

A Fluid portion C Diaphragm
 B Gas portion D Valve disk

2) OPERATION

(1) Purpose

Fluids are practically incompressible and are thus incapable of accumulating pressure energy. In hydropneumatic accumulators, the compressibility of a gas is utilized to accumulate fluid. The compressible medium used in the accumulators is nitrogen.

In braking systems, the purpose of the accumulators is to store the energy supplied by the hydraulic pump. They are also used as an energy reserve when the pump is not working, as a compensator for any losses through leakage, and as oscillation dampers.

(2) Operation

The accumulator consists of a fluid portion(A) and a gas portion(B) with a diaphragm(C) as a gas-tight dividing element. The fluid portion(A) is connected to the hydraulic circuit, causing the diaphragm accumulator to be filled and the gas volume to be compressed as the pressure rises.

When the pressure falls, the compressed gas volume will expand, thus displacing the accumulated pressure fluid into the circuit.

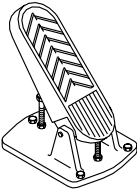
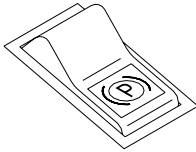
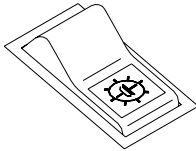
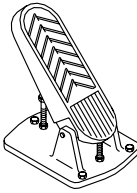
The diaphragm bottom contains a valve disk(D) which, if the diaphragm accumulator is completely empty, closes the hydraulic outlet, thus preventing damage to the diaphragm.

(3) Installation requirements

The accumulators can be fitted in the hydraulic circuit, directly on a component or in blocks on suitable consoles.

They should be fitted in as cool a location as possible.

Installation can be in any position.

Item	Description	Service action
Service brake pedal check	 <p>Slowly depress brake pedal.</p> <p>Listen for a hissing noise that indicates oil is flowing to brake pistons.</p> <p>LISTEN/FEEL : A hissing noise must be heard when pedal is depressed.</p>	<p>O K Check completed.</p> <p>NOT OK Inspect for debris under brake pedal. Inspect clutch cut off linkage.</p>
Service and parking brake system drag checks Engine running	 <p>Position machine on gradual slope.</p> <p>Lower bucket approximately 50m m(2in) from ground.</p> <p>Release parking and service brakes.</p> <p>LOOK : Machine must move or coast.</p> <p>NOTE : If machine does not move, check brake pedals to be sure they fully release when feet are removed from pedals.</p> <p>Drive machine at high speed for about 5 minutes.</p> <p>Brake drag is indicated if brake areas in differential case are hot.</p> <p>NOTE : Observe parking brake.</p> <p>If disk is hot, parking brake drag is indicated.</p>	<p>O K Check completed.</p> <p>NOT OK Adjust park brake.</p> <p>NOT OK Check floor mat interference to pedal or debris build-up.</p> <p>IF OK Check for brake pressure when brake is released.</p> <p>Go to brake pressure.</p>
Clutch cut off check	  <p>Place clutch cut off switch in ON position.</p> <p>Release parking brake.</p> <p>Run engine at half speed in 1st forward.</p> <p>Firmly depress brake pedal.</p> <p>FEEL : Transmission must disengage when brake pedal is depressed at 30% of pedal stroke.</p> <p>NOTE : Clutch cut off pressure switch can be adjusted to operator preference to match your loading needs.</p>	<p>O K Check completed.</p> <p>NOT OK Adjust clutch cut off switch.</p>

(8) Pressure seals removal (SNM/SEM 2 motors)

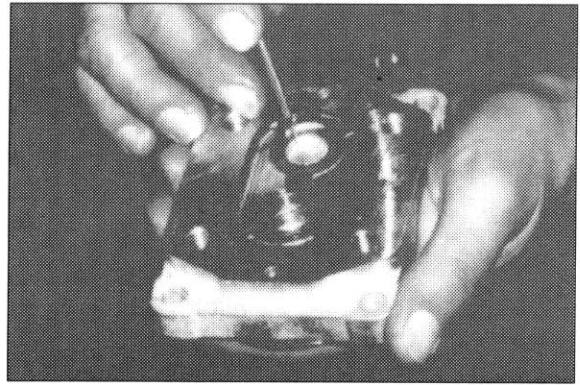
Follow the same recommendations as given for the previous item.

If it is necessary to remove the seals, pay a particular care in this operation.

- ※ Do not force at the removal of the antiextrusion ring, but remove it gradually, to avoid damaging on the edge of the groove.

The rubber seal is very delicate : handle it with care, too.

After removal, carefully dry up seal and antiextrusion rings.

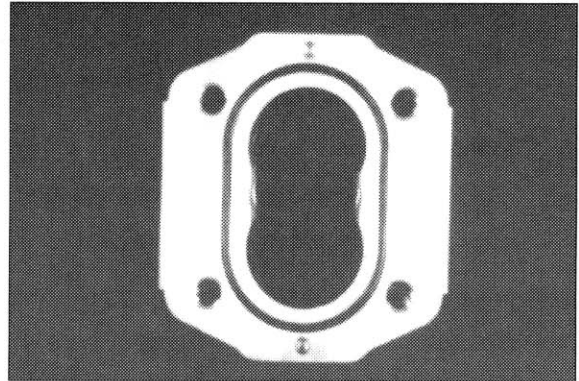


(9) Outer seal removal

Check for the status of this seal and if necessary, replace it.

Follow the same recommendations given for clause(7).

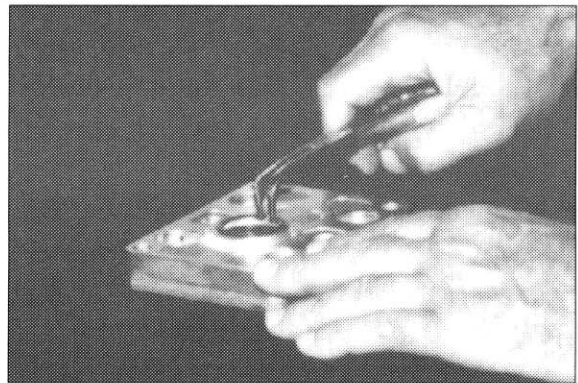
Use a proper tool, clean and dry up.



(10) Circlips removal

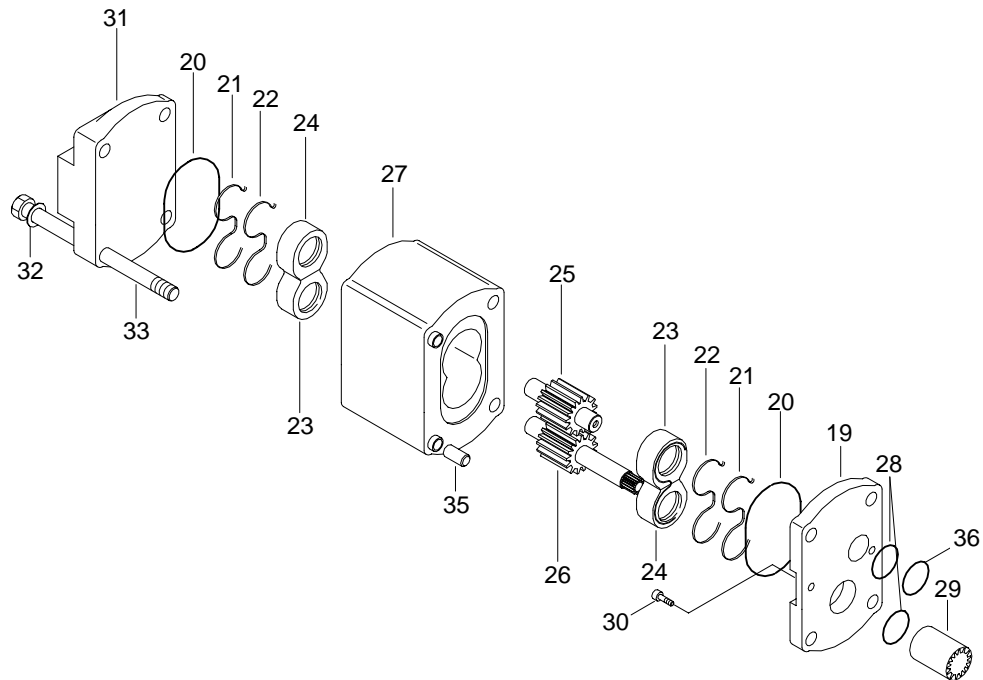
Place the flange on the desk.

Using the proper pies, insert them in the circlips eyes and then remove it.



2. BRAKE PUMP(#0053~)

1) STRUCTURE



19	Spacer plate	25	Drive gear	31	Cover
20	O-ring	26	Drive gear	32	Spring washer
21	Back up seal	27	Rear body	33	Bolt
22	Seal element	28	O-ring	35	Dowel pin
23	Bushing	29	Splined coupling	36	O-ring
24	Bushing	30	Cap screw		

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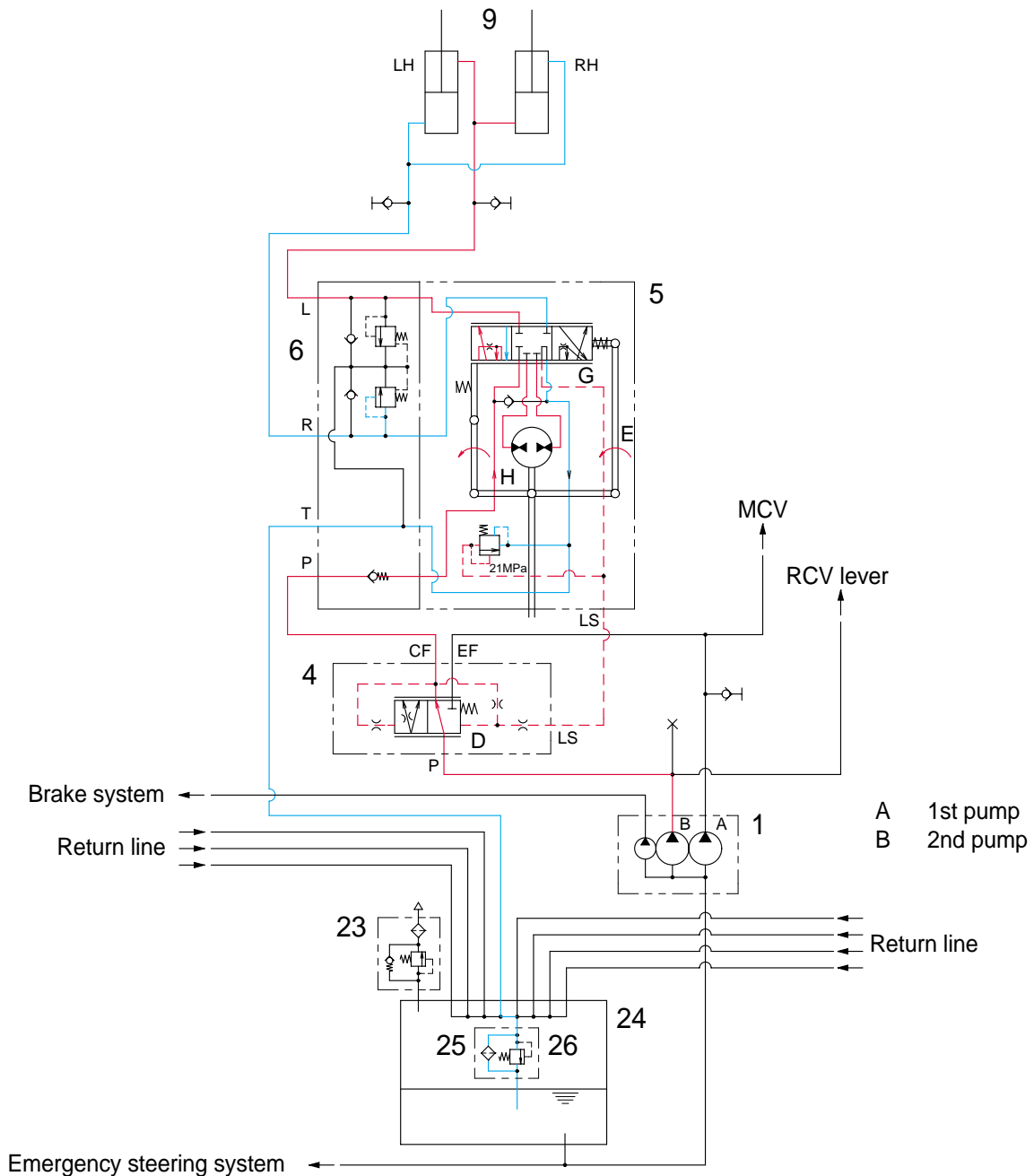
- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

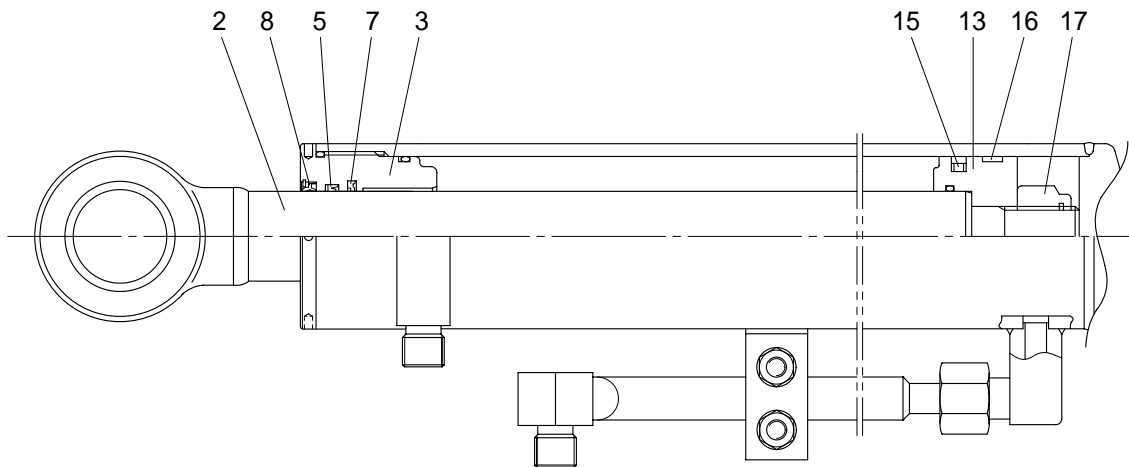
CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

2) LEFT TURN



- When the steering wheel(E) is turned to the left, the spool(G) within the steering unit(5) connected with steering column turns in left hand direction.
- At this time, the oil discharged from the steering pump flows into the spool(G) of the steering unit(5) through the spool(D) of priority valve and flows into the gerotor(H).
- Oil flow from the gerotor flows back into the spool(G) where it is directed out the left work port(L) to the respective chamber of the steering cylinders(9).
- Oil returned from left and right cylinder returns to hydraulic tank through the spool of the steering unit.
- When the above operation is completed, the machine turns to the left.

2) OPERATION



This machine use to cross connected cylinder for steering operation.

The steering cylinder use a gland(3) to remove piston and sealed seals. Dust wiper(8) located on the in side of the gland protects cylinder inner parts from dust. The piston(13) is fastened to the rod(2) by a nut(17).

The piston uses a single wear ring(16) with a piston seal(15) to seal between the piston and tube. The gland seals against the tube with two O-rings. The rod is sealed against the gland with a rod seal(5).

2. TEST TOOLS

1) CLAMP-ON ELECTRONIC TACHOMETER INSTALLATION

- Service equipment and tools
Tachometer

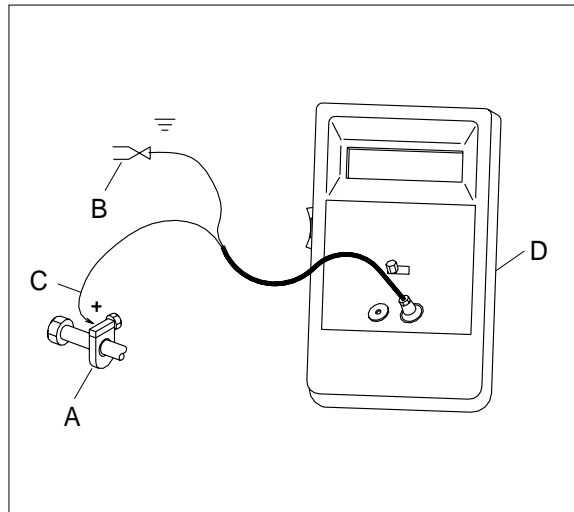
A : Clamp on tachometer

Remove paint using emery cloth and connect to a straight section of injection line within 100mm(4in) of pump. Finger tighten only-do not over tighten.

B : Black clip(-). Connect to main frame.

C : Red clip(+). Connect to transducer.

D : Tachometer readout. Install cable.



2) DIGITAL THERMOMETER INSTALLATION

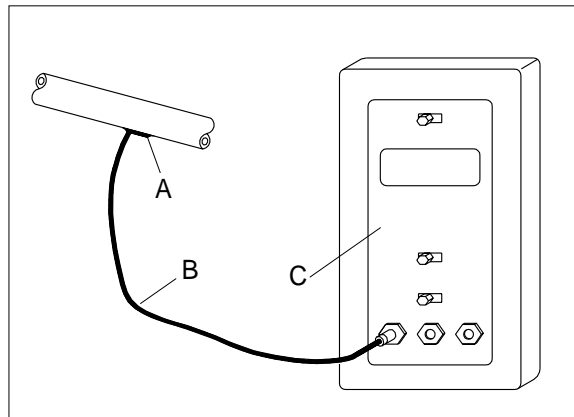
- Service equipment and tools
Digital thermometer

A : Temperature probe

Fasten to a bare metal line using a tie band. Wrap with shop towel.

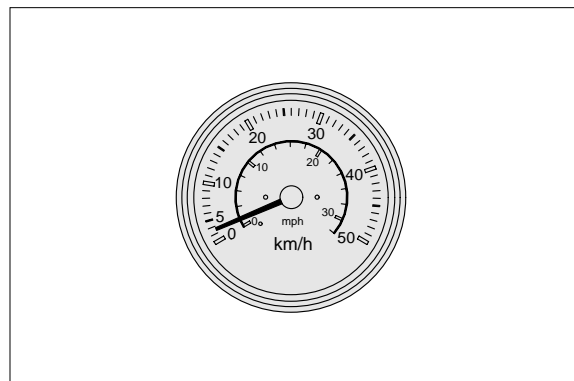
B : Cable

C : Digital thermometer



3) DISPLAY MONITOR TACHOMETER

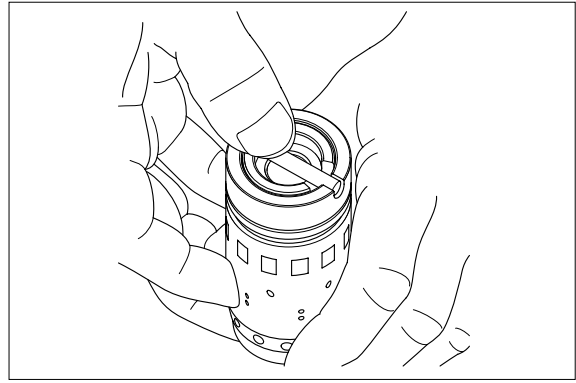
The display monitor tachometer is accurate enough for test work.



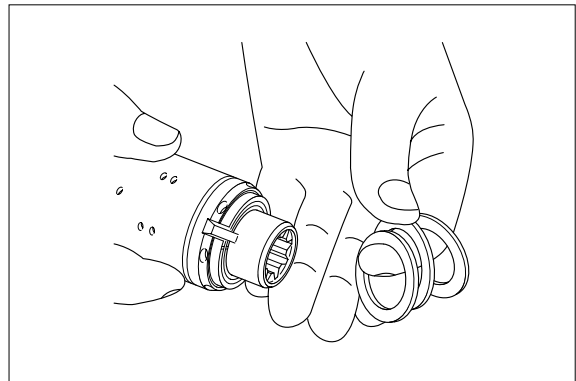
5) TROUBLESHOOTING

Problem	Cause	Remedy
Steering wheel is heavy (Steering wheel is heavy at engine low idle) (Steering speed is not high at engine high idle)	<ol style="list-style-type: none"> 1. Relief valve of steering unit is clogged with dirt. 2. Spool is stuck. 3. Orifice of plug and spool is clogged. <ol style="list-style-type: none"> a. Pump is faulty. b. Control pressure is low. c. Piping is faulty. d. Pump is faulty. 	<p>Disassembly, clean and reassembly.</p> <p>Disassembly, clean and reassembly or replace.</p> <p>Disassembly, clean and reassembly.</p> <p>Check pump.</p> <p>Reset control pressure.</p> <p>Replace piping.</p> <p>Check pump.</p>
Abnormal noise	<ol style="list-style-type: none"> 1. Relief valve of steering unit is clogged with dirt. 2. Spool is stuck. 	<p>Disassembly, clean and reassembly.</p> <p>Disassembly, clean and reassembly or replace.</p>
Leakage	<ol style="list-style-type: none"> 1. Loosen the plug. 2. O-ring is damaged. 	<p>Retighten the specified torque.</p> <p>Replace.</p>

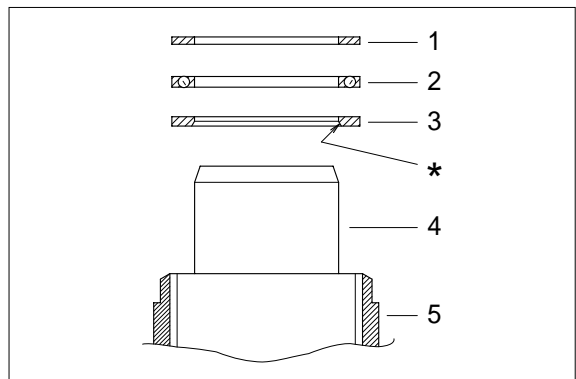
(9) Fit the cross pin into the spool/sleeve.



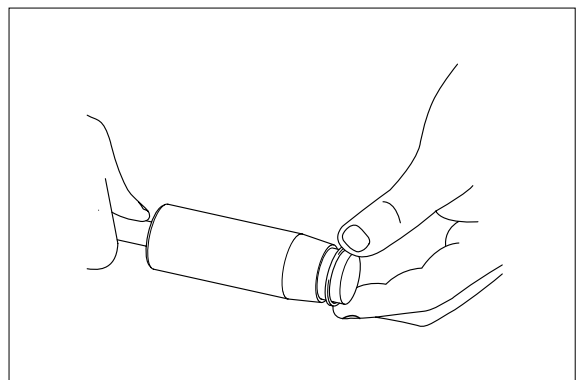
(10) Fit bearing races and needle bearing as shown on below drawing.



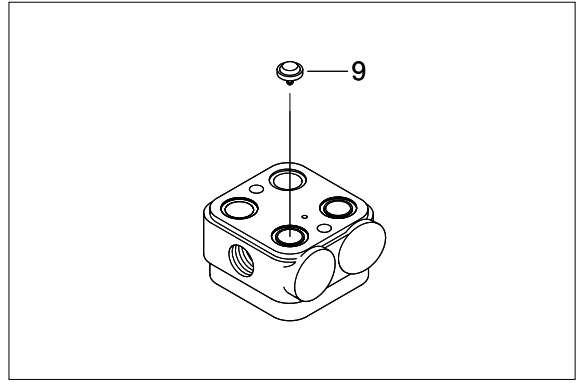
- 1 Outer bearing race
- 2 Needle bearing
- 3 Inner bearing race
- 4 Spool
- 5 Sleeve
- * Inside chamfer on inner bearing race must face inner spool.



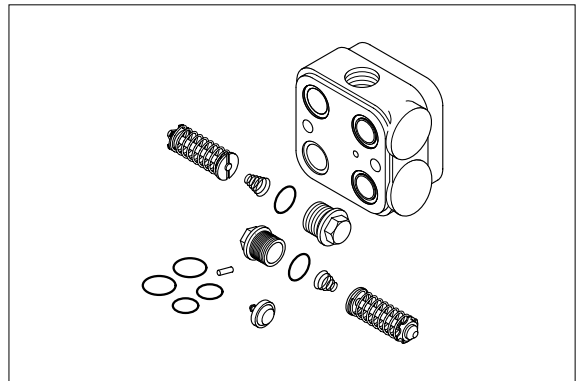
(11) Grease O-ring and kin-ring with hydraulic oil and place them on the tool. See next page.



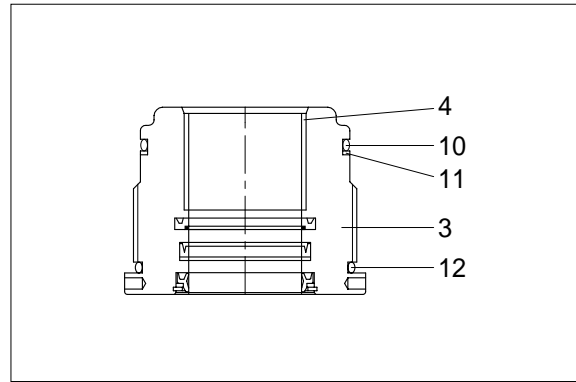
(5) Remove the check valve(9).



(6) The overload valve is now disassembled.

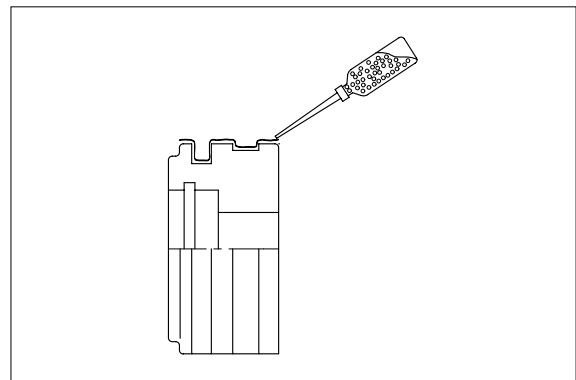


- ⑥ Fit back up ring(11) to gland (3).
- ※ Put the backup ring in the warm water of 30~50°C.
- ⑦ Fit O-ring(10) to gland(3).
- ⑧ Fit O-ring(12) to gland(3).

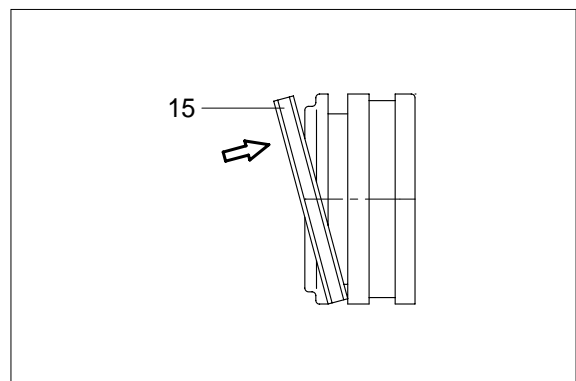


(2) Assemble piston assembly

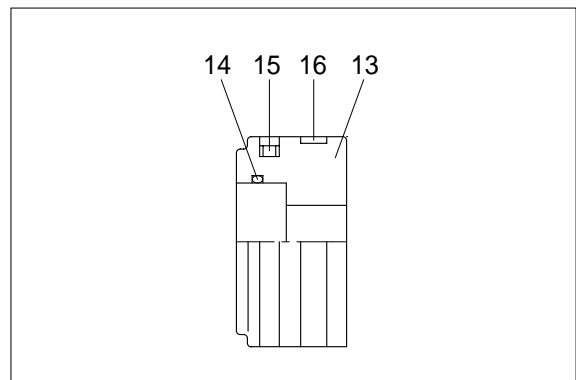
- ※ Check for scratches or rough surfaces. If found smooth with an oil stone.
- ① Coat the outer face of piston(13) with hydraulic oil.



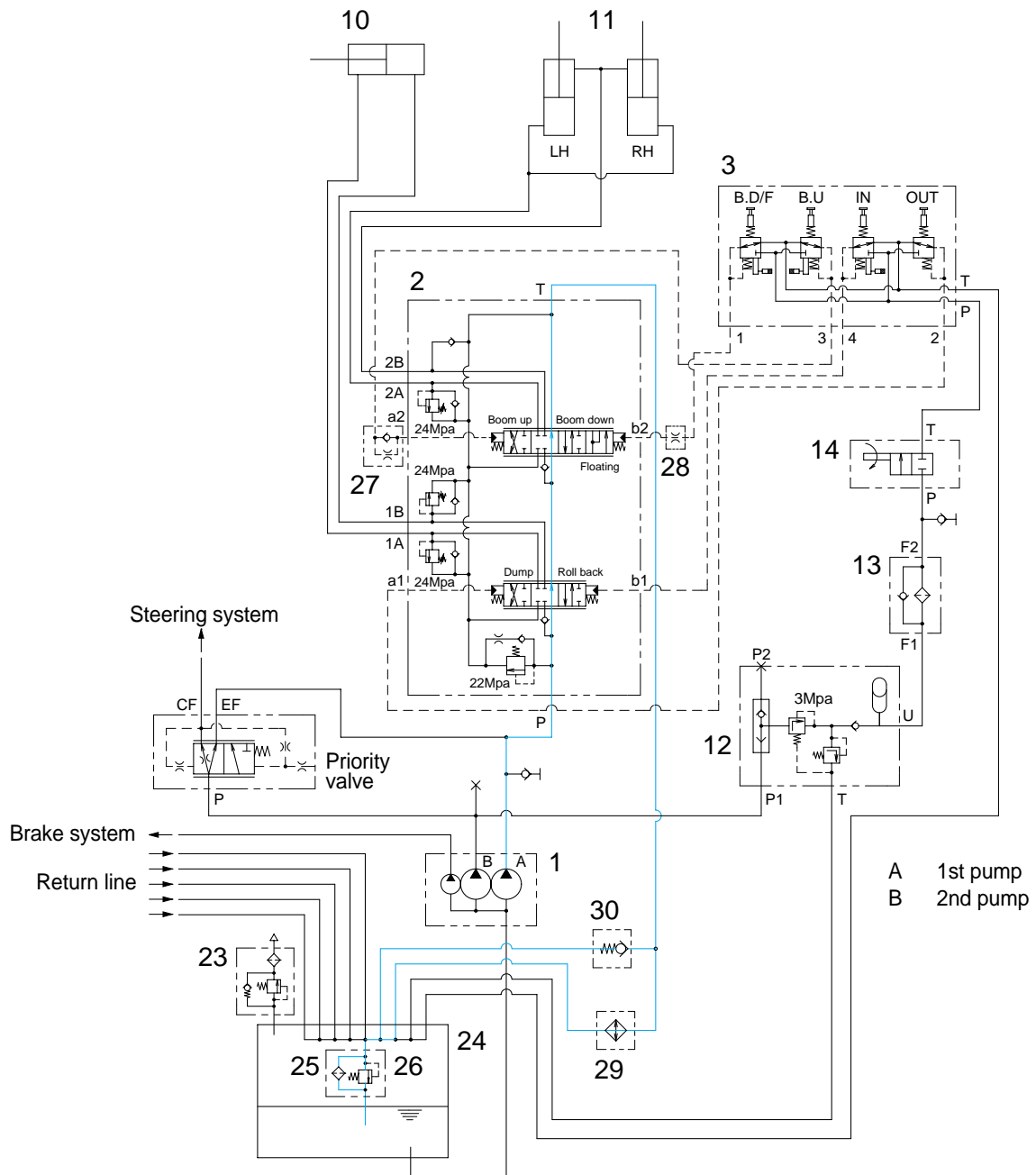
- ② Fit piston seal(15) to piston
- ※ Put the piston seal in the warm water of 60~100°C for more than 5 minutes.
- ※ After assembling the piston seal, press its outer diameter to fit in.



- ③ Fit wear ring(16) to piston(13).
- ④ Fit O-ring(14) to piston(13).

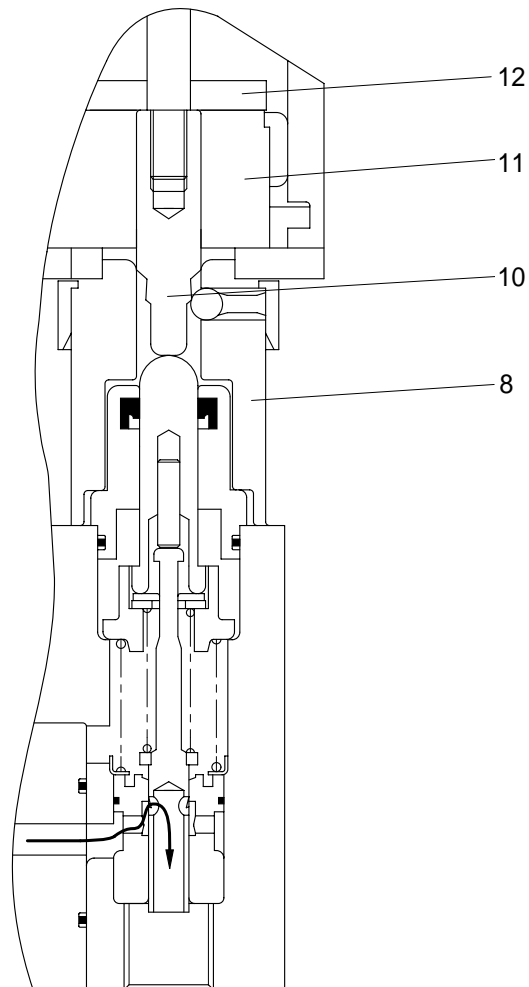


6) WHEN THE RCV LEVER IS IN THE HOLD POSITION



- The oil from main pump(1) flows into main control valve(2).
- In this time, the bucket spool and the boom spool are in neutral position, then the oil supplied to main control valve(2) returns into hydraulic tank(24) through center bypass circuit of each spool.
- In this condition, each cylinder keeps the neutral position, so the boom and the bucket is held.

(4) Fully selected



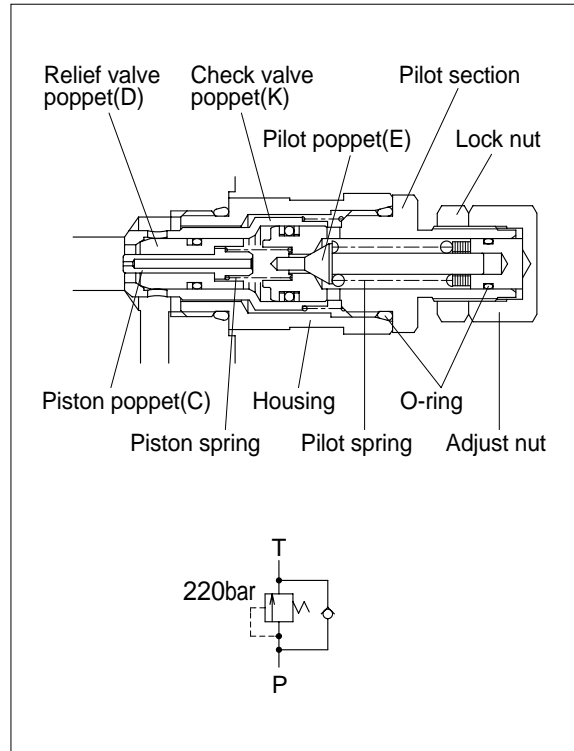
Selecting the control lever(13) now will maintain the service port pressure at inlet until the armature plate(12) contacts on the hold coil(11). However, just prior to this, the ramp on the prefeel spindle(10) reacts against the three springs in the prefeel ball carrier(8). This produces a sharp increase in operator load(Prefeel), ensuring that the service is not accidentally selected through to detent.

4) PRESSURE SETTING

A good pressure gage must be installed in the line which is in communication with the work port relief. A load must be applied in a manner to reach the set pressure of the relief unit.

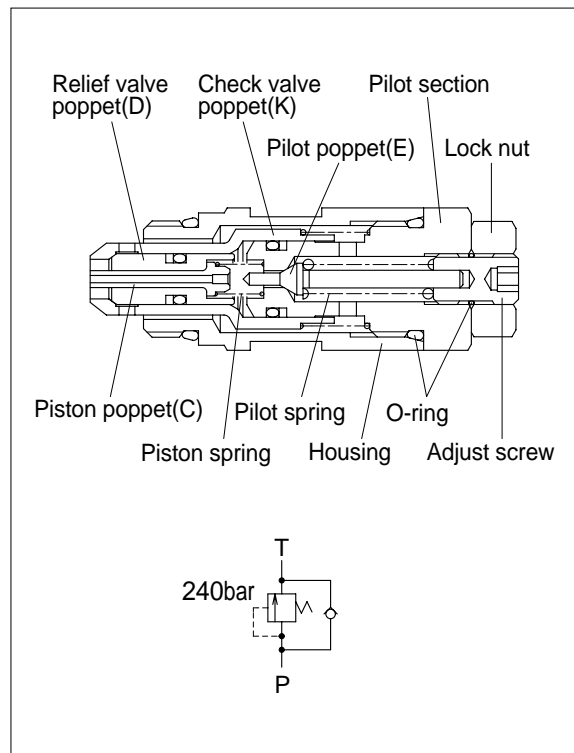
(1) Main relief valve

- ① Loosen lock nut.
- ② Set adjusting nut to desired pressure setting.
- ③ If desired pressure setting cannot be achieved, add or remove shims as required.
- ④ Tighten lock nut.
- ⑤ Retest in similar manner as above.



(2) Port relief valve

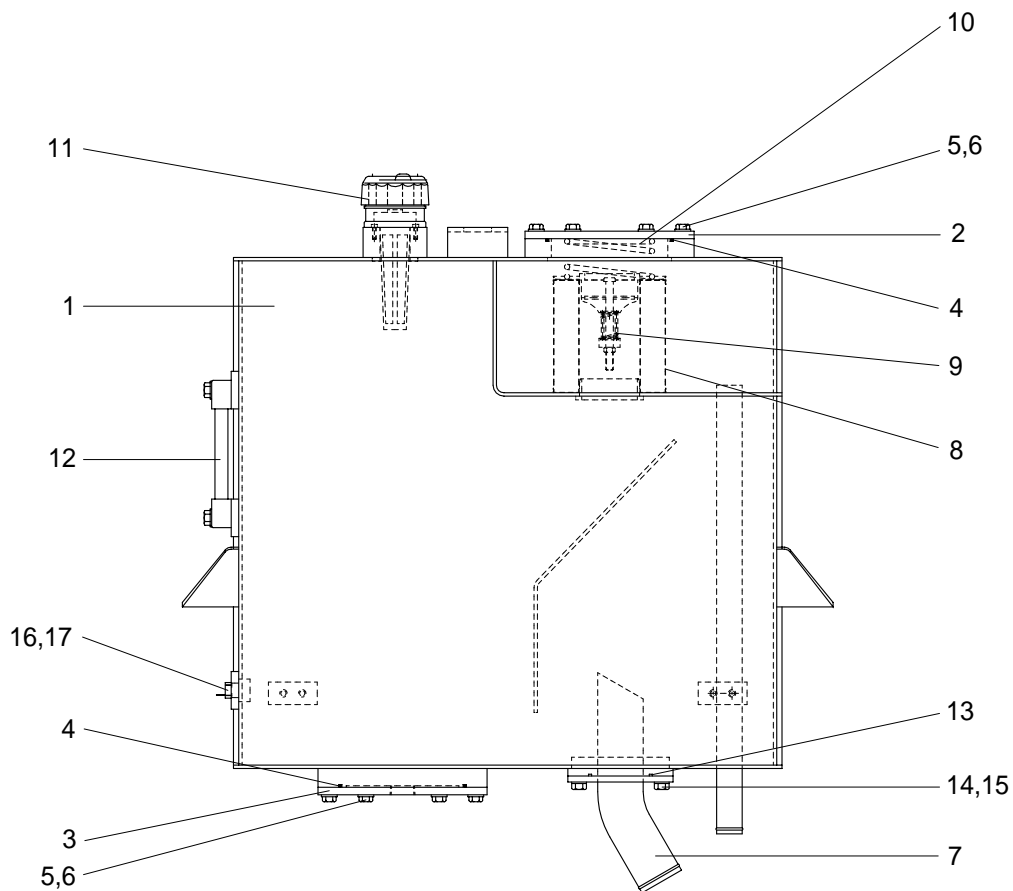
- ① Loosen lock nut.
- ② Set adjusting screw to desired pressure setting.
- ③ Tighten lock nut.
- ④ Retest in similar manner as above.



9. HYDRAULIC OIL TANK

1) STRUCTURE

- The oil from the hydraulic tank is sent from the pump through control valve to the cylinders. In the return circuit, the oil from various parts merges.
- A part of oil is cooled in the oil cooler (if equipped), passes through the hydraulic filter and returns to the hydraulic tank(1).
- If the hydraulic return oil filter becomes clogged, return filter bypass valve(9) acts to allow the oil to return directly to the hydraulic tank(1). This prevents damage to the hydraulic filter(8). The bypass valve(9) is also actuated when negative pressure is generated in the circuit.



1	Hydraulic tank	7	Pipe	13	O-ring
2	Cover	8	Element	14	Bolt
3	Cover	9	Bypass valve	15	Hardened washer
4	O-ring	10	Spring	16	Overheat switch
5	Bolt	11	Air breather	17	O-ring
6	Hardened washer	12	Level gauge		

2. TROUBLESHOOTING

※ Diagnose malfunction charts are arranged from most probable and simplest to verify, to least likely, more difficult to verify. Remember the following steps when troubleshooting a problem :

Step 1. Operational check out procedure(See section 1)

Step 2. Operational checks(In this group)

Step 3. Troubleshooting

Step 4. Tests and adjustments(See group 3)

Problem	Cause	Remedy
Noisy hydraulic pump	<p>Low oil supply or wrong viscosity.</p> <p>Plugged or pinched suction line.</p> <p>Air in oil.</p> <p>Plugged suction strainer.</p> <p>Loose or missing hydraulic line clamps.</p> <p>Hydraulic lines in contact with frame.</p> <p>Worn or damaged pump.</p>	<p>Fill reservoir with recommended oil.</p> <p>Clean or replace line.</p> <p>Check for foamy oil. Tighten connections.</p> <p>Replace O-rings and or lines.</p> <p>Inspect and clean strainer in reservoir.</p> <p>Tighten or replace clamps.</p> <p>Inspect and repair.</p> <p>Do hydraulic pump performance check in group 2. Do hydraulic pump flow test in group 3.</p>
No or Slow hydraulic functions	<p>Failed or worn hydraulic pump.</p> <p>Cold oil.</p> <p>Slow engine speed.</p> <p>Suction line air leak.</p> <p>Low oil supply.</p> <p>Wrong oil viscosity.</p> <p>Oil leaking past cylinders or control valve.</p> <p>Blocked or damaged line.</p> <p>Faulty or misadjusted pilot oil supply unit.</p> <p>Faulty pilot control valve(RCV).</p> <p>Binding main control valve spool.</p> <p>Faulty priority valve.</p>	<p>Do performance check.</p> <p>Warm oil up.</p> <p>Adjust engine speed control linkage.</p> <p>Check high idle speed.</p> <p>Check for foamy oil.</p> <p>Add recommended oil.</p> <p>Use recommended oil.</p> <p>Check cylinder drift in group 2.</p> <p>Inspect lines.</p> <p>Do pilot oil supply unit pressure test in group 3.</p> <p>Do pilot control valve(RCV) pressure test in group 3.</p> <p>Inspect valve.</p> <p>Check priority valve specification.</p>

5. MAIN HYDRAULIC PUMP FLOW TEST

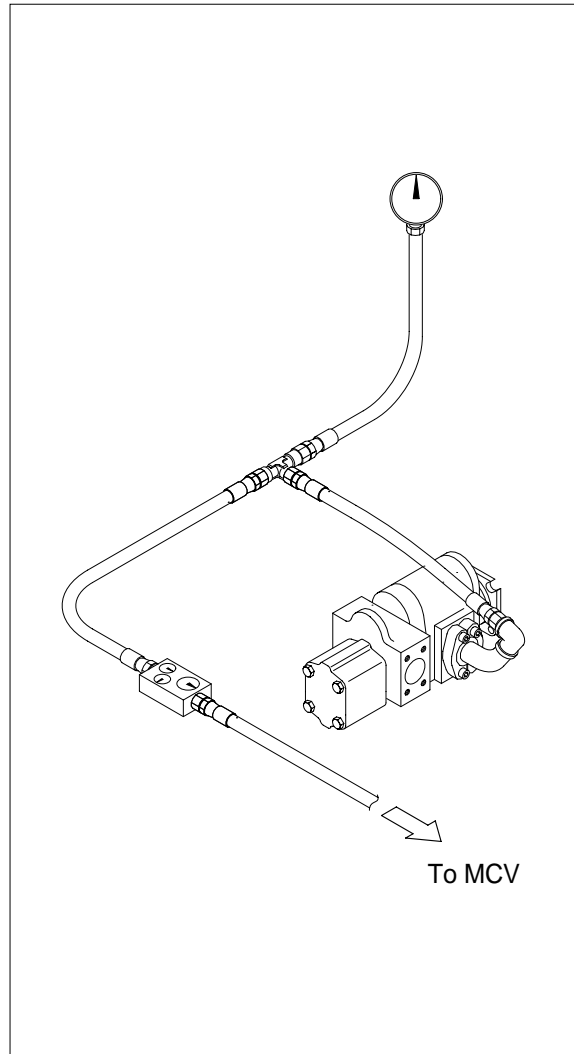
· SPECIFICATION

Oil temperature	$65 \pm 6^{\circ}\text{C}$ ($150 \pm 10^{\circ}\text{F}$)
Engine speed	$2200 \pm 25\text{rpm}$
Test pressure	$220 \pm 10\text{bar}$ (3190psi)
Maximum pump flow	86 l / min (22.7gpm)

· FLOW METER GAUGE AND TOOL

Gauge 0~35MPa(0~350bar, 0~5000psi)
Temperature reader

- 1) Make test connections.
- 2) Install temperature reader. (See temperature reader installation procedure in this group.)
- 3) Heat hydraulic oil to specifications. (See hydraulic oil warm up procedure in this group.)
- 4) Run engine at test specifications.
- 5) Close flow meter loading valve to increase pressure to test specifications.
- 6) Read flow meter.
- 7) If flow is below specifications, check suction line and suction pressure for abnormality before removing pump.

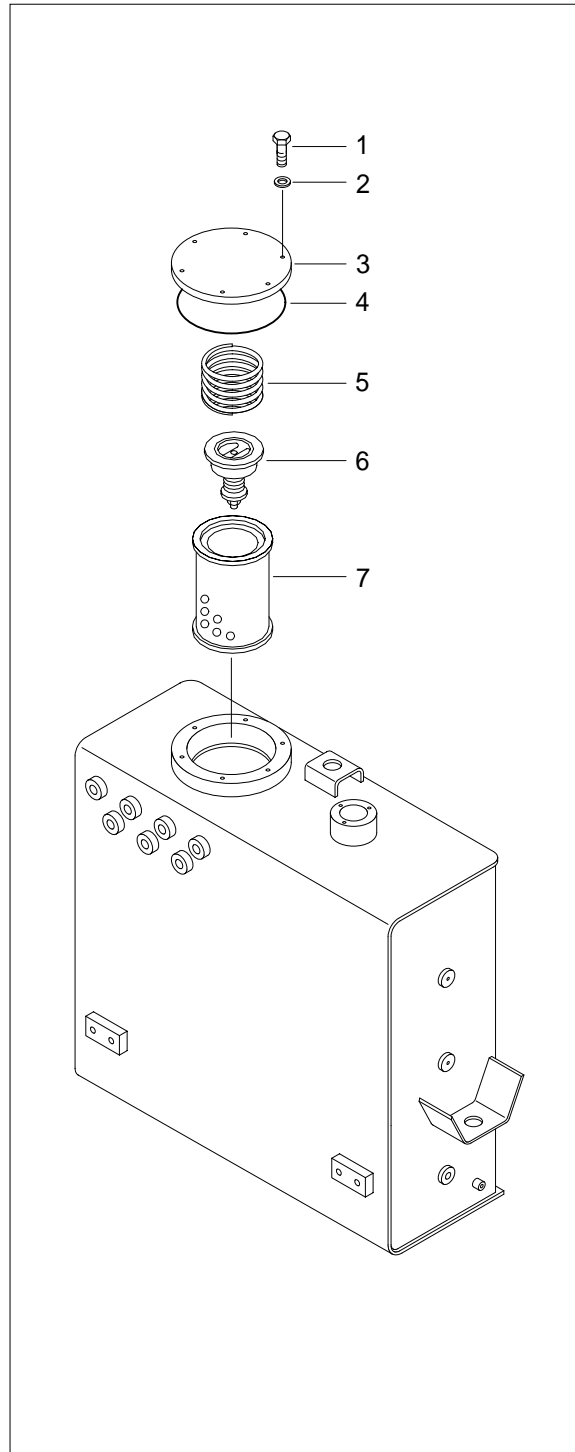


13. HYDRAULIC OIL FILTER INSPECTION PROCEDURE

- 1) Lower the bucket to the ground, stop the engine, move the control lever back and forth several times, and clean all over the upper surface of the hydraulic oil tank.
- 2) Remove the bolts(1) and take out the filter case cover(3) and O-ring(4).
- 3) Remove the spring(5) and bypass valve(6).
- 4) Remove the filter element(7) from the tank.
- 5) Check the element and the filter case bottom for debris. Excessive amounts of brass and steel particles can indicate a failed hydraulic pump or a pump failure in process. A rubber type of material can indicate cylinder packing or other packing failure.

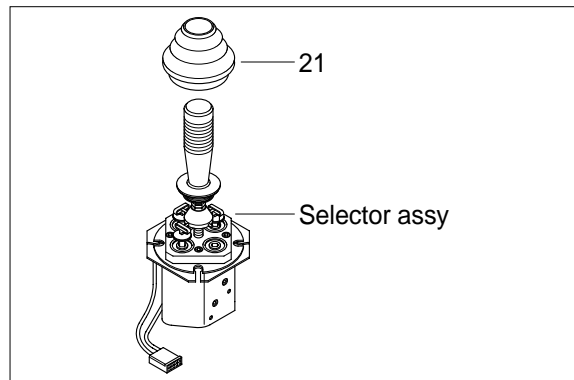
※ **The hydraulic oil filter in the filter case of the hydraulic oil tank should be replaced every 250 operating hours(For the first replacement, at 50 hours) or more often. When the filter element is replaced, please keep as follows.**

- (1) Clean the inside of the filter case.
- (2) Place new element in the proper positions inside the filter case.
- (3) Install the bypass valve and spring. Make sure the element stand upright, and check for complete contact of the element bottom with the filter case bottom.
- (4) Install the O-ring and filter case covers. Tighten them with bolt. Replace the O-ring with new one if damaged.

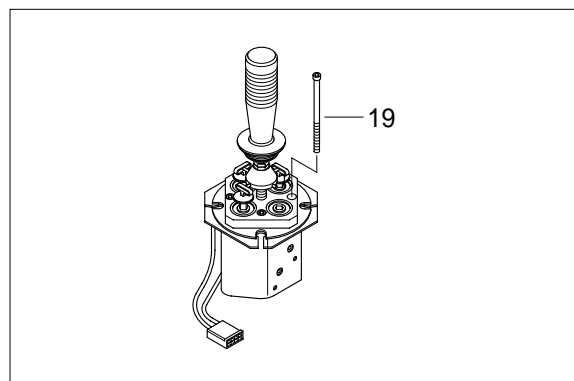


2) DISASSEMBLY AND ASSEMBLY

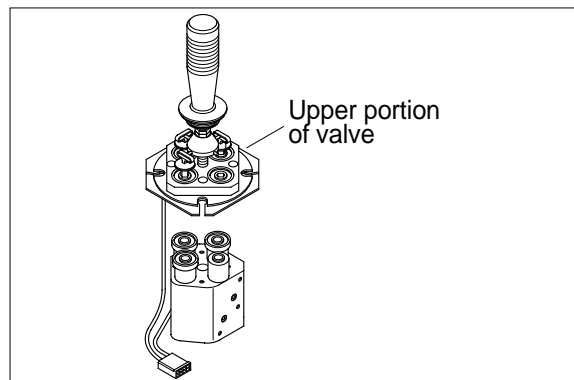
- (1) Detach the rubber boot(21) from the retainer collar and lift the boot clear from the selector assembly.
The capscrew(19) can now be easily accessed.



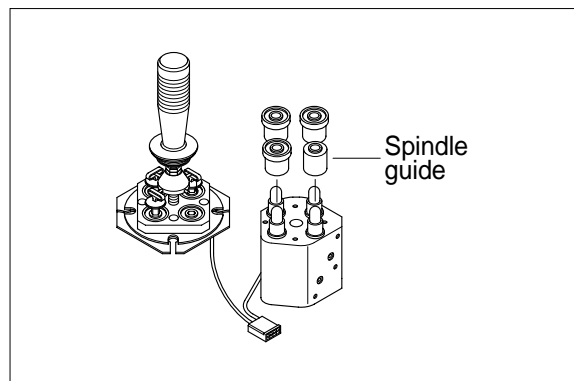
- (2) Loosen and remove all four M6 capscrews(19).
· Tightening torque : 1.0kgf · m(7.2lbf · ft)



- (3) The upper portion of the valve, from the mounting plate upwards, can now be detached and placed to one side.
※ The magnets will still be connected to the connector.



- (4) Remove the ball carriers off of the spindle guide-Carefully detach the spindle guides, being careful to ensure that no contamination enters the valve.
※ The spindle guide are retained by interference between the body and the guide O-ring.

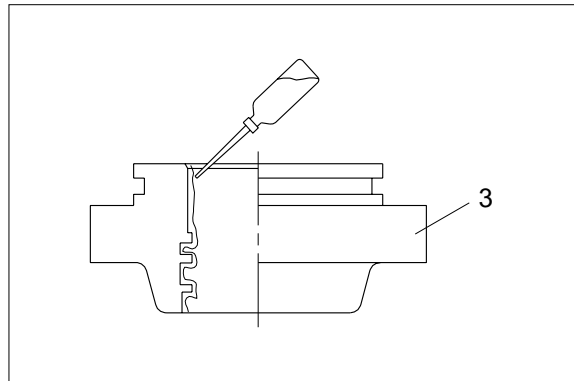


5) ASSEMBLY

(1) Assemble gland assembly

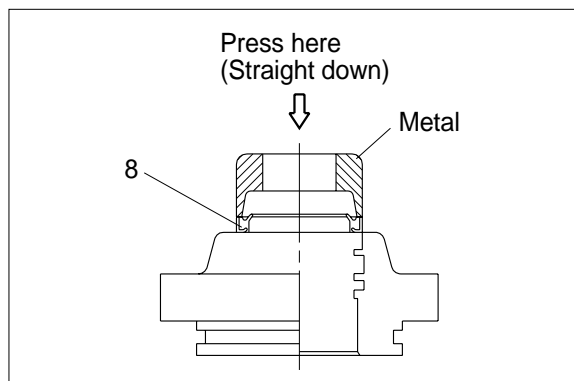
※ Check for scratches or rough surfaces if found smooth with an oil stone.

- ① Coat the inner face of gland(3) with hydraulic oil.



- ② Coat dust wiper(8) with grease and fit dust wiper(8) to the bottom of the hole of dust wiper.

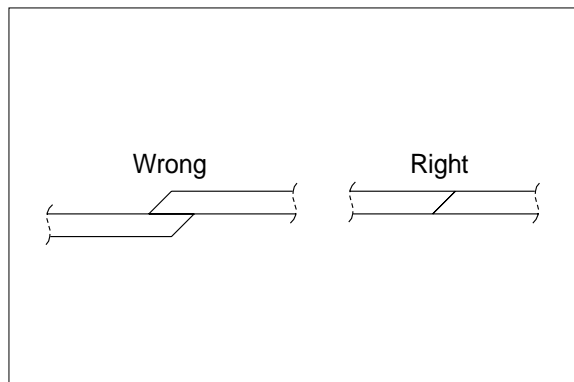
- ③ At this time, press a pad metal to the metal ring of dust seal.
Fit snap ring(9) to the stop face.



- ④ Fit back up ring(6), rod seal(5) and buffer ring(7) to corresponding grooves, in that order.

※ Coat each packing with hydraulic oil before fitting it.

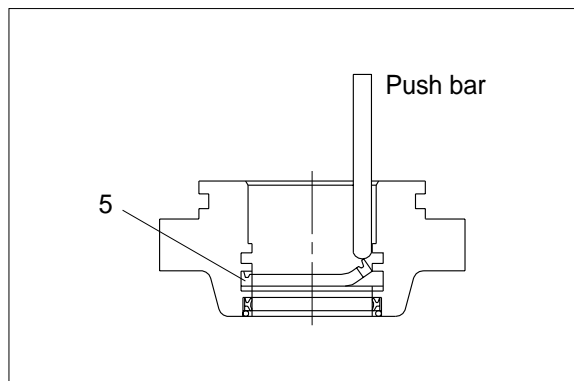
※ Insert the backup ring until outside of it is inserted into groove.



※ Rod seal(5) has its own fitting direction.

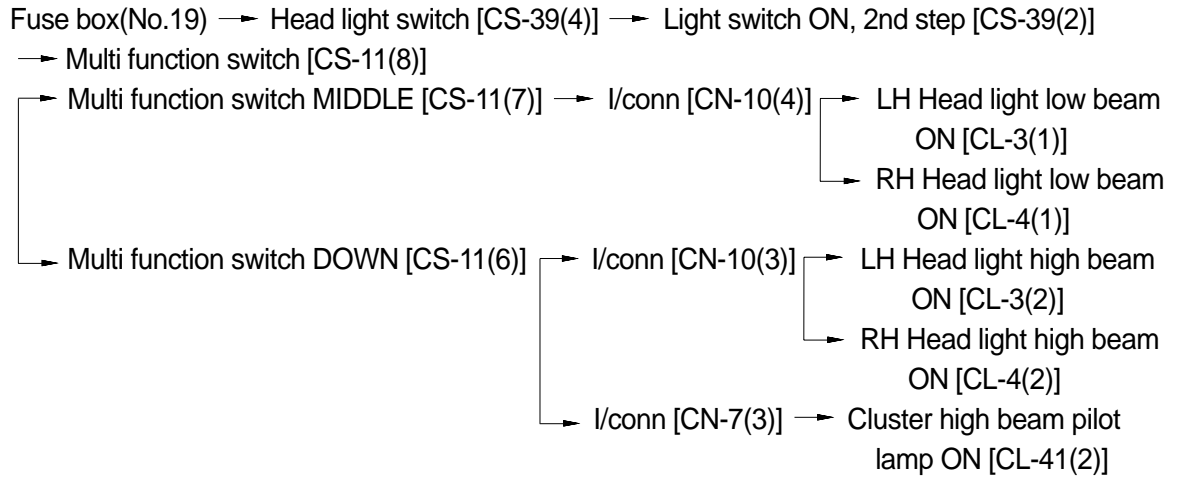
Therefore, confirm it before fitting them.

※ Fitting rod seal(5) up side down may damage its lip. Therefore check the correct direction that is shown in fig.



2. HEAD LIGHT CIRCUIT

1) OPERATING FLOW

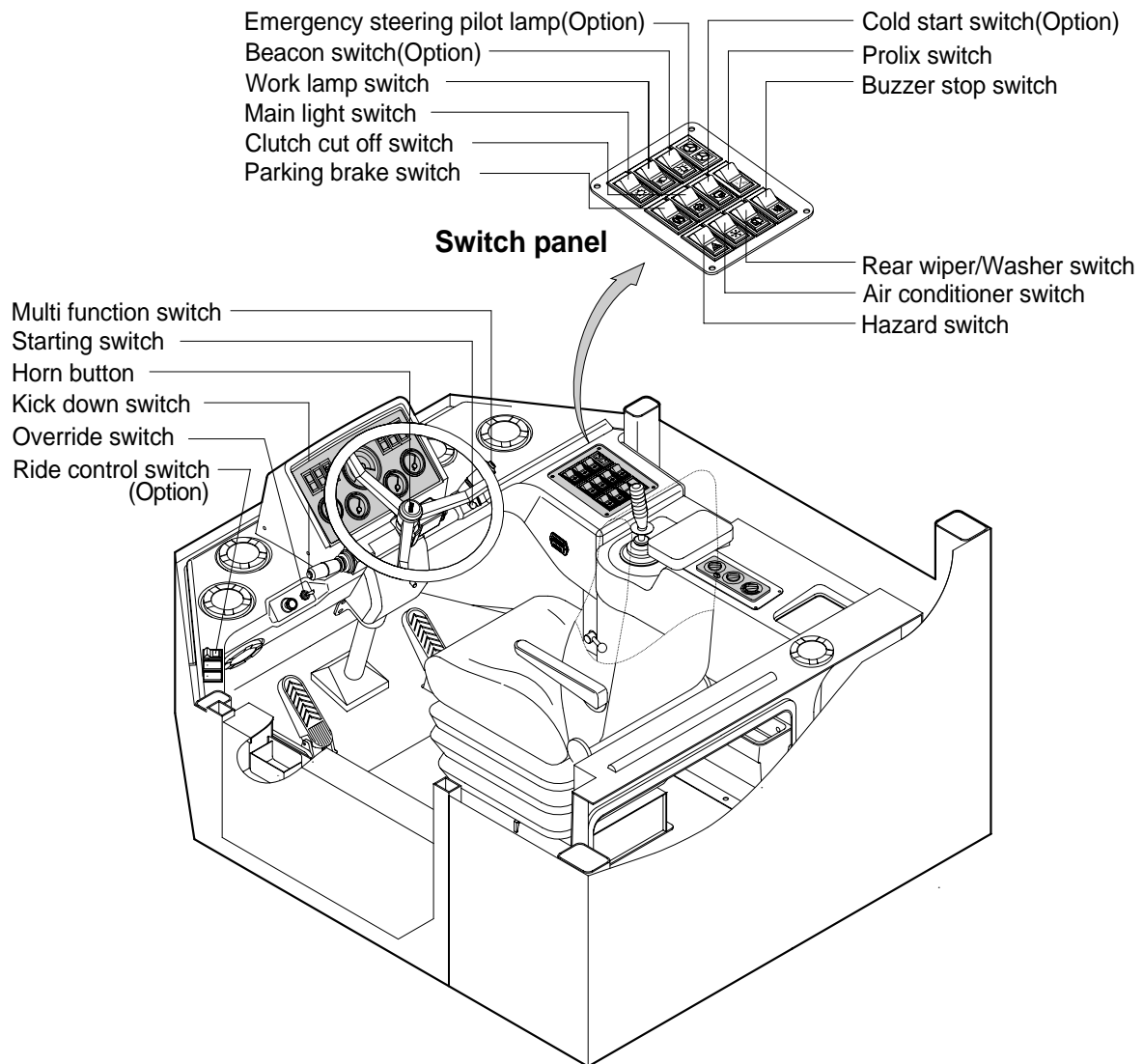


2) CHECK POINT

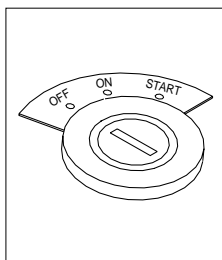
Engine	Key switch	Check point	Voltage
OFF	ON	① - GND (Switch input) ② - GND (Switch output) ③ - GND (Multi function input) ④ - GND (Multi function output) ⑤ - GND (Multi function output) ⑥ - GND (Low beam) ⑦ - GND (High beam) ⑧ - GND (Passing B+)	20~25V

※ GND : Ground

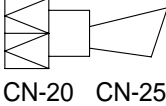
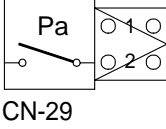
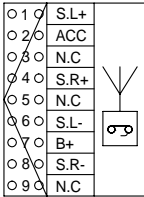
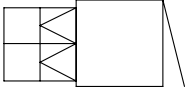
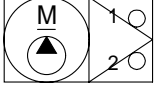
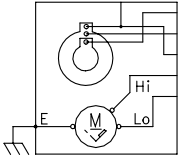
3. SWITCHES



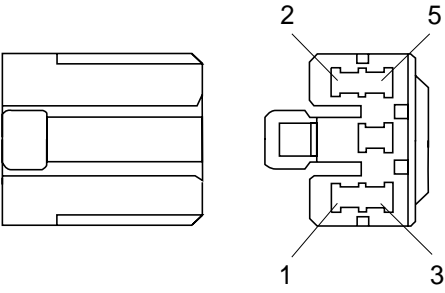
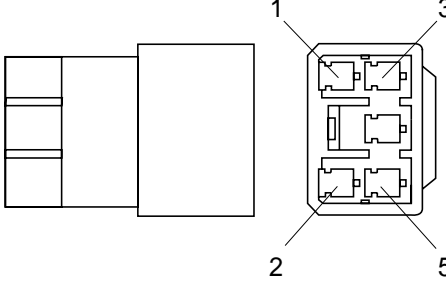
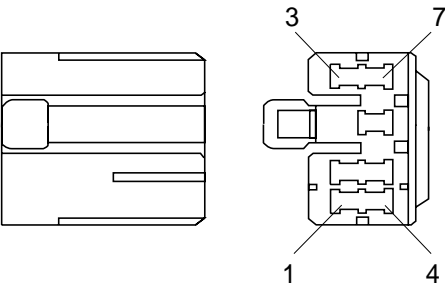
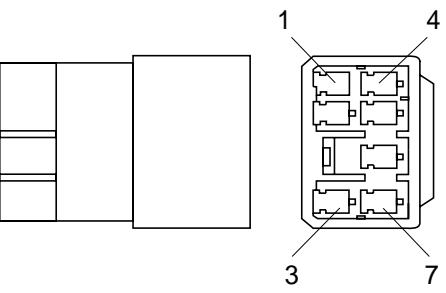
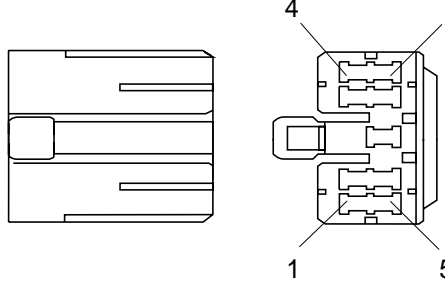
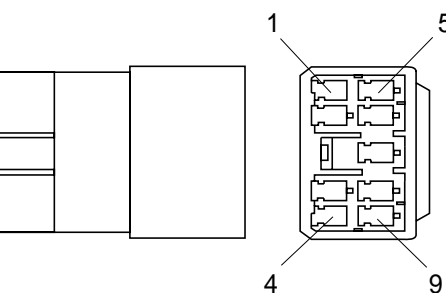
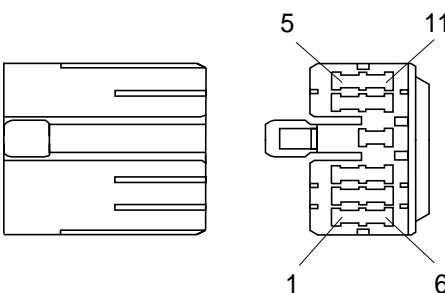
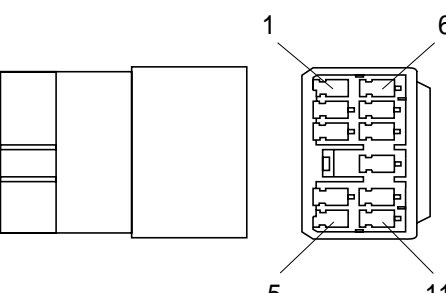
1) STARTING SWITCH

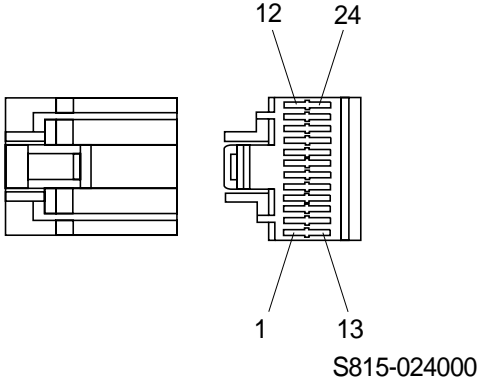


- (1) There are three positions, OFF, ON and START.
- (2) OFF : None of electrical circuits activate.
- (3) ON : All the systems of machine operate.
- (4) START : Use when operating the engine.
Release key immediately after starting.

Part name	Symbol	Specifications	Check
Horn	 <p>CN-20 CN-25</p>	22-28V 2A 110dB	※ Check operation Supply power(24V) to each terminal and connect ground
Receiver dryer	 <p>CN-29</p>	24V 2.5A	※ Check contact Normal : $\infty \Omega$
Cassette radio	 <p>CN-27</p>	24V 20W+20W	※ Check resistance Power ON : $4 \Omega + 4 \Omega$ (For terminal 1-6, 4-8)
Back up buzzer	 <p>CN-65</p>	24V 0.5A 110dB	-
Washer pump	 <p>CN-103 CN-22</p>	24V 2.5A	※ Check contact Normal : 26.4Ω (For terminal 1-2)
Wiper motor	 <p>CN-102, CN-21</p>	24V 1.5A 2-speed Auto parking	-

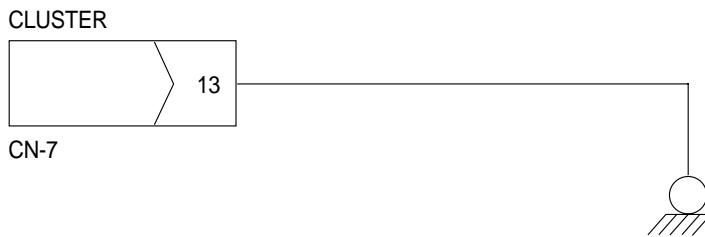
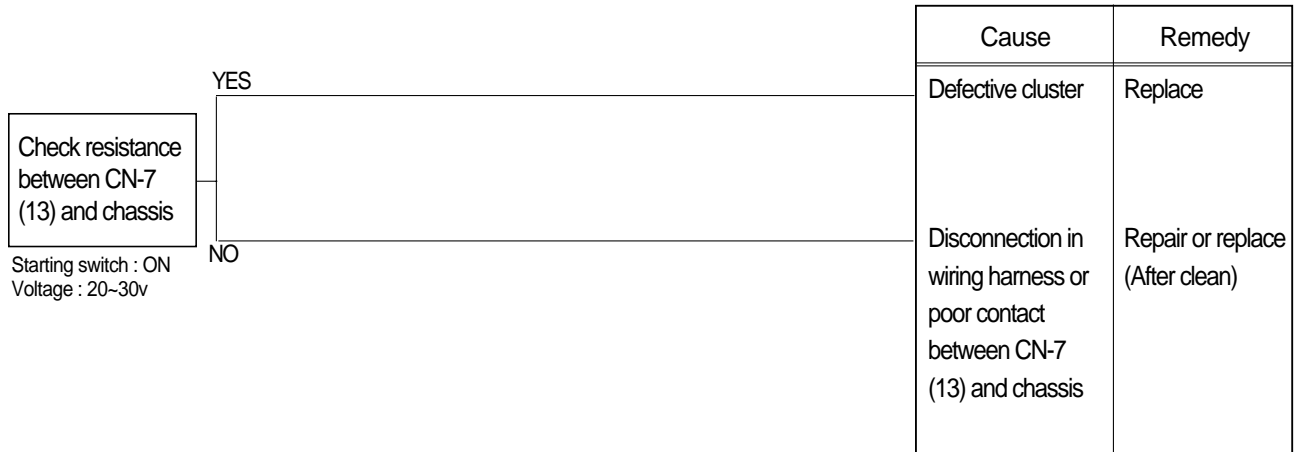
2) PA TYPE CONNECTOR

No. of pin	Receptacle connector(Female)	Plug connector(Male)
5	 <p data-bbox="699 674 847 703">S811-005002</p>	 <p data-bbox="1273 674 1422 703">S811-105002</p>
7	 <p data-bbox="699 1077 847 1106">S811-007002</p>	 <p data-bbox="1273 1077 1422 1106">S811-107002</p>
9	 <p data-bbox="699 1480 847 1509">S811-009002</p>	 <p data-bbox="1273 1480 1422 1509">S811-109002</p>
11	 <p data-bbox="699 1883 847 1912">S811-011002</p>	 <p data-bbox="1273 1883 1422 1912">S811-111002</p>

No. of pin	Receptacle connector(Female)	Plug connector(Male)
24	 <p style="text-align: center;">S815-024000</p>	

9. WHEN GAUGES OF FUEL, HYDRAULIC OIL AND COOLANT INDICATE HIGH OR FULL

- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, connect the disconnected connectors again immediately unless otherwise specified.



Check resistance

YES	MAX 1 Ω
NO	MIN 1M Ω

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