SHOP MANUAL

KOMATSU

D41E,P-6

MACHINE MODEL	SERIAL NUMBER
D41E-6	**B40001 and up**
D41P-6	**B40001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- D41E,P-6 mounts the SA6D102E-2 engine. For details of the engine, see the 102 Series Engine Shop Manual.

Printed in Japan 02-12(03)

METHOD OF DISASSEMBLING, CONNECTING PUSH-PULL TYPE COUPLER

⚠ Before carrying out the following work, release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.

⚠ Even if the residual pressure is released from the hydraulic tank, some hydraulic oil flows out when the hose is disconnected. Accordingly, prepare an oil receiving container.

Disconnection

1) Release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.

2) Hold adapter (1) and push hose joint (2) into mating adapter (3). (Fig. 1)
   - ★ The adapter can be pushed in about 3.5 mm.
   - ★ Do not hold rubber cap (4).

3) After hose joint (2) is pushed into adapter (3), press rubber cap (4) against (3) until it clicks. (Fig. 2)

4) Hold hose adapter (1) or hose (5) and pull it out. (Fig. 3)
   - ★ Since some hydraulic oil flows out, prepare an oil receiving container.

Connection

1) Hold hose adapter (1) or hose (5) and insert it in mating adapter (3), aligning them with each other. (Fig. 4)
   - ★ Do not hold rubber cap (4).

2) After inserting the hose in the mating adapter perfectly, pull it back to check its connecting condition. (Fig. 5)
   - ★ When the hose is pulled back, the rubber cap moves toward the hose about 3.5 mm. This does not indicate abnormality, however.

Type 1

Fig. 1

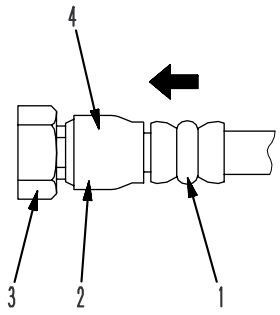


Fig. 2

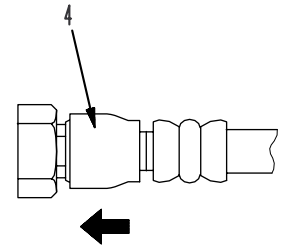


Fig. 3

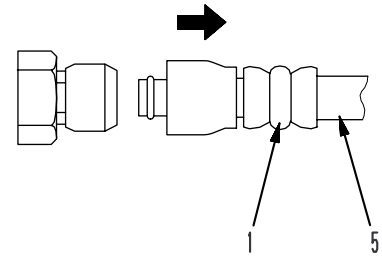


Fig. 4

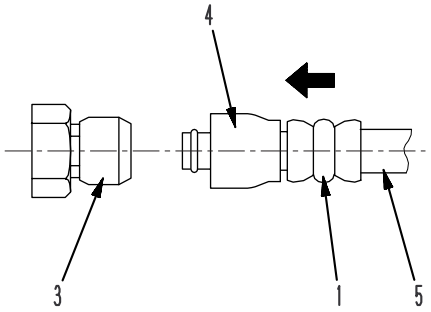
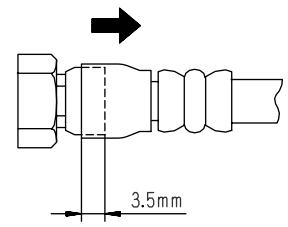


Fig. 5



CWP10701

Liter to U.S. Gallon

1ℓ = 0.2642 U.S. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.361	25.625	25.889	26.153

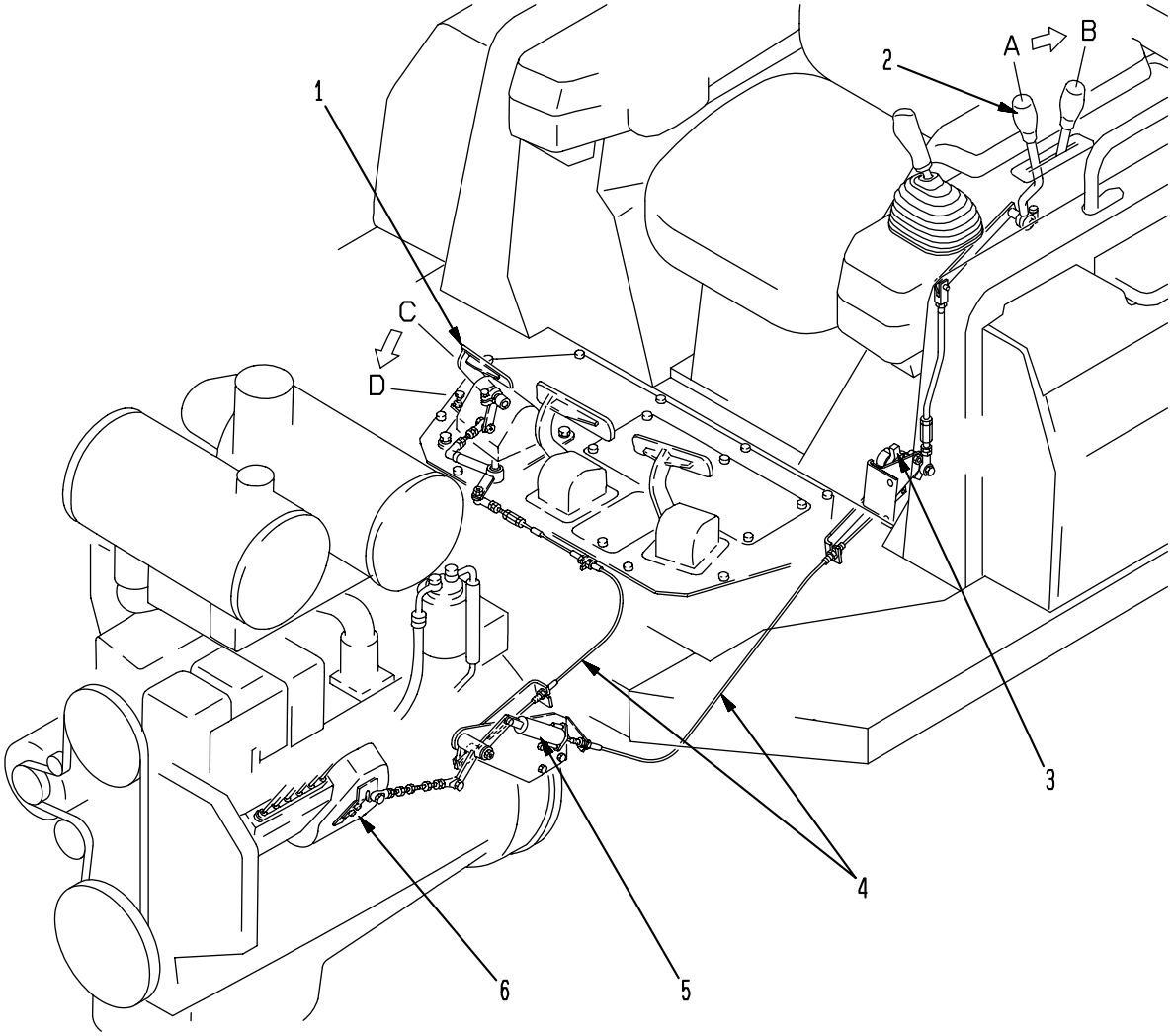
Liter to U.K. Gallon

1ℓ = 0.21997 U.K. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.969	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

Machine model				D41E-6	D41P-6
Serial No.				B40001 and up	B40001 and up
Undercarriage	Suspension			Rigid type	
	Carrier roller			1 on each side	
	Track roller			6 on each side	7 on each side
	Track shoe	510 mm		Assembly type, single grouser, 41 on each side, pitch: 171.5 mm	—
		700 mm		—	Assembly type, single grouser, 44 on each side, pitch: 171.5 mm
Power train pump				Gear type (SAR(2)-28)	
Cooling fan drive pump				Gear type (SAR(1)-20)	
Work equipment hydraulic system	Hydraulic pump			Gear type (SAR(2)-36)	
	Theoretical discharge amount		ℓ/min	90	
	Max. discharge pressure		MPa{kg/cm²}	20.6 {210}	
	Main control valve Type			3-spool type, manually operated (lift + tilt + angle)	
	Hydraulic cylinders	Blade lift cylinder	Type	Double-acting piston type	
			Cylinder bore	105 mm	
			Outside diameter of piston rod	50 mm	
			Pistron stroke	325 mm	
			Max. distance between pins	973 mm	
			Min. distance between pins	648 mm	
		Blade tilt cylinder	Type	Double-acting piston type	
			Cylinder bore	110 mm	
			Outside diameter of piston rod	55 mm	
			Pistron stroke	180 mm	
			Max. distance between pins	749 mm	
			Min. distance between pins	569 mm	
		Blade angle cylinder	Type	Double-acting piston type	
			Cylinder bore	130 mm	
			Outside diameter of piston rod	65 mm	
			Pistron stroke	707 mm	
			Max. distance between pins	1,844 mm	
			Min. distance between pins	1,137 mm	
	Hydraulic tank			Box type (externally installed control valve)	

ENGINE CONTROL

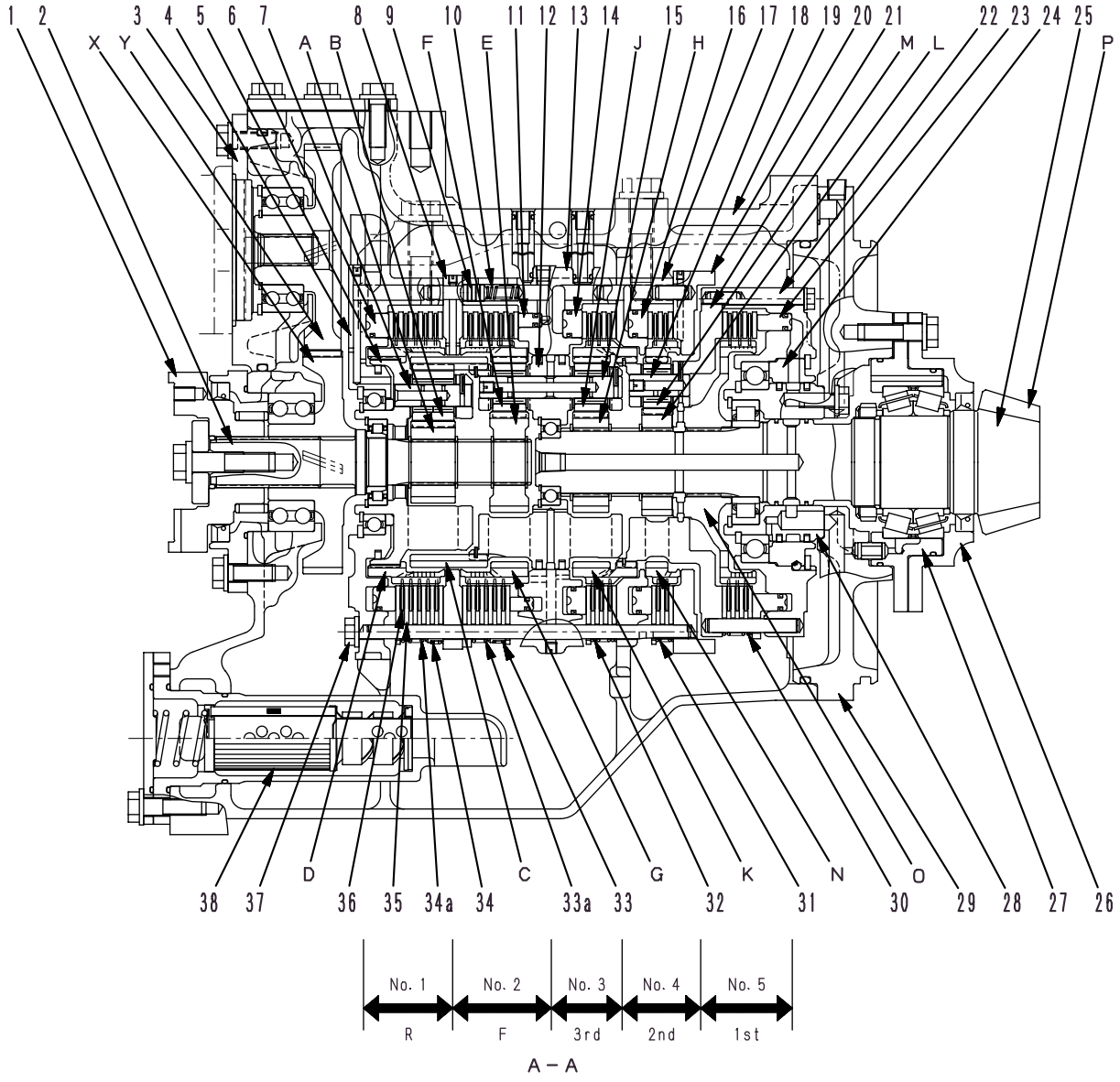


SWD05228

1. Decelerator pedal
2. Throttle lever
3. Clutch
4. Cable
5. Loose spring
6. Fuel injection pump

Lever positions
A: Low idling
B: High idling
C: High idling
D: Low idling

Outline
- The control of the engine speed is carried out with the throttle lever (2) or decelerator pedal (1).



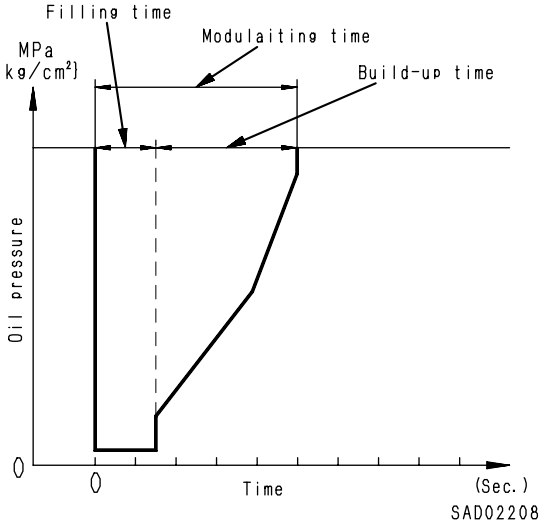
A. No. 1 sun gear
(No. of teeth: 27)
B. No. 1 planetary pinion
(No. of teeth: 20)
C. No. 1 ring gear
(No. of internal teeth: 67)
D. No. 1 ring gear
(No. of internal teeth: 72/
No. of external teeth: 56)
E. No. 2 sun gear
(No. of teeth: 34)
F. No. 2 planetary pinion
(No. of teeth: 19)
G. No. 2 ring gear
(No. of internal teeth: 72/
No. of external teeth: 56)
H. No. 3 sun gear
(No. of teeth: 34)
J. No. 3 planetary pinion
(No. of teeth: 19)
K. No. 3 ring gear
(No. of internal teeth: 72/
No. of external teeth: 56)
L. No. 4 sun gear
(No. of teeth: 36)
M. No. 4 planetary pinion
(No. of teeth: 18)
N. No. 4 ring gear
(No. of internal teeth: 72/
No. of external teeth: 56)
O. No. 5 hub (No. of teeth: 56)
P. Bevel pinion
(No. of teeth: 13)
X. PTO drive gear
(No. of teeth: 75)
Y. PTO driven gear
(No. of teeth: 69)

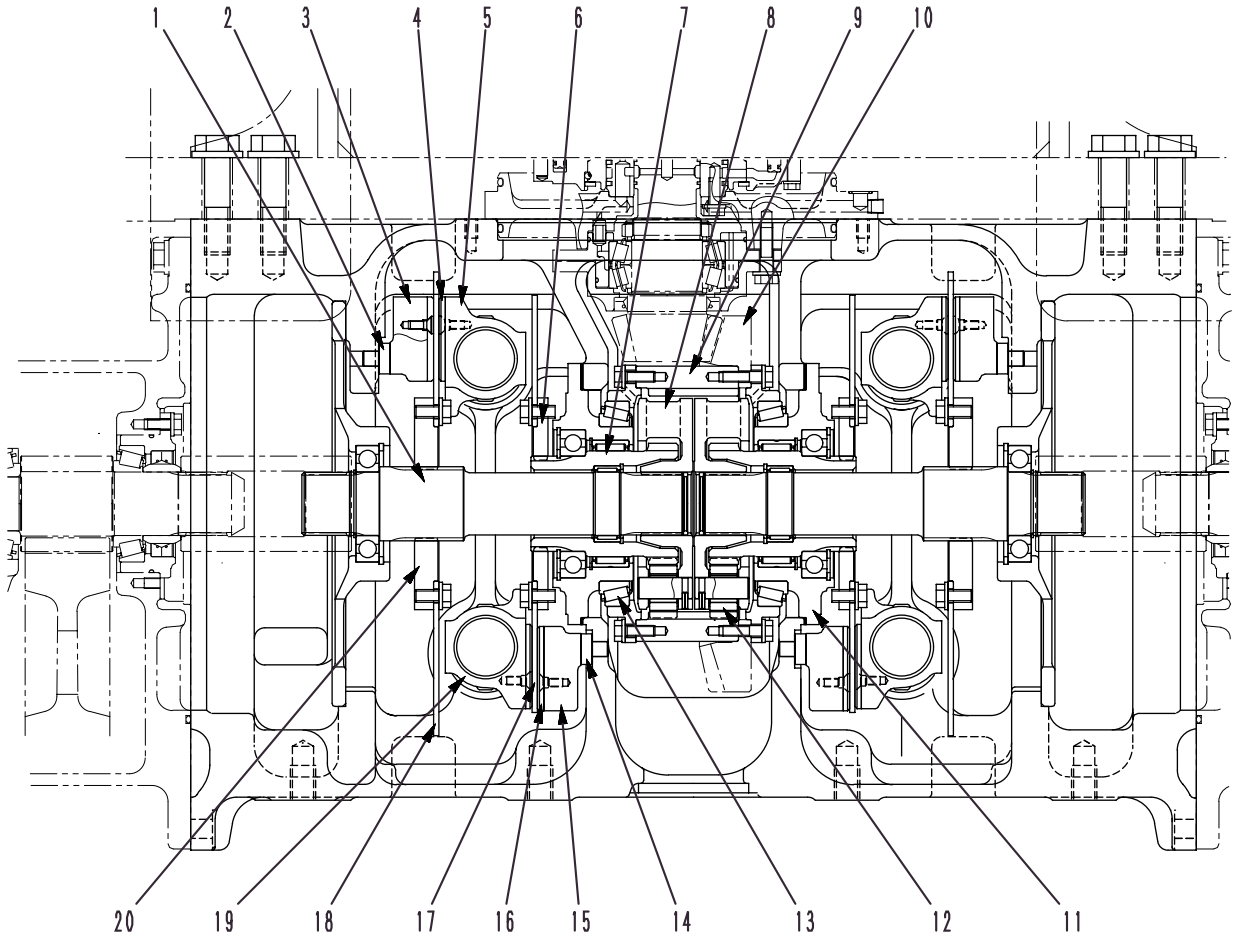
MODULATING VALVE

Outline

- The modulating valve consists of a modulating valve and a quick return valve, and acts to modulates the pressure.
- When the gear shift lever is operated to shift gear, the clutch is pushed into close contact by the piston. However, if high pressure is suddenly applied, the piston will suddenly engage the clutch. This will make the machine start suddenly, and it will cause an excessive shock.
  To prevent this, the modulating valve is installed. When the gear shift lever is operated to shift gear, it gradually raises the pressure on the piston to the set pressure and the clutch is engaged smoothly. This allows the machine to start without any shock, thereby improving the durability of the power train and at the same time providing a comfortable ride for the operator.
- The figure on the right shows the relationship between the time and the increase in the hydraulic pressure of the modulating valve.
  For example, when the gear is shifted from **R1** to **R2**, the oil from the pump passes through the speed valve spool, flows to the 2nd clutch and fills the circuit up to the clutch piston port.
  The time taken for the circuit to be filled up to the clutch piston port is called the “filling time”.
  When the circuit up to the clutch piston port is filled with oil, the oil pressure starts to rise. The time taken for the pressure to rise to the set pressure is called the “build-up time”. The filling time and build-up time together are called the “modulating time”.

- **Modulating graph**





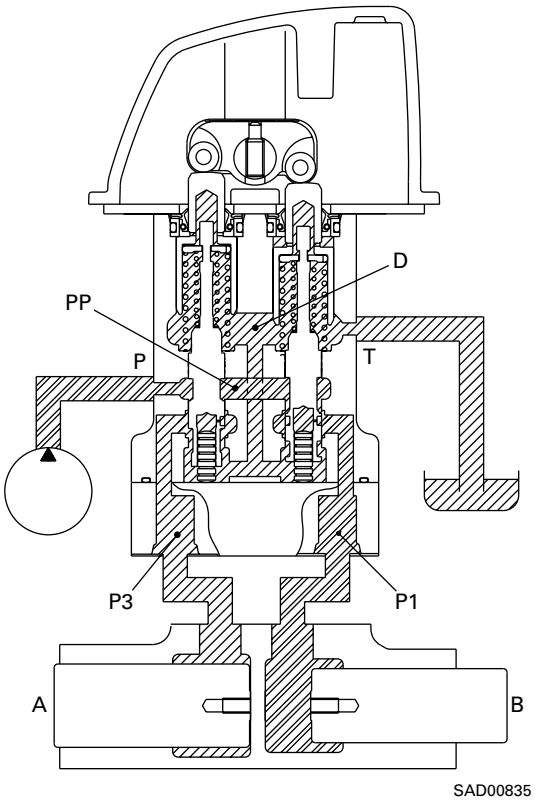
1. Bevel gear shaft
2. Reaction receiving pin
3. Brake backup plate
4. Brake lining
5. Brake cam case
6. Clutch hub
7. Sun gear
8. Carrier
9. Ring gear
10. Bevel gear
11. Bevel gear shaft cage
12. Planet pinion
13. Bevel gear shaft bearing
14. Reaction receiving pin
15. Clutch backup plate
16. Clutch lining
17. Clutch plate
18. Brake plate
19. Clutch cam case
20. Brake hub

OPERATION OF STEERING PPC VALVE

1. At neutral

Brake piston **A** is connected from PPC valve port **P3** to drain chamber **D**.

Clutch piston **B** is connected from PPC valve port **P1** to pump pressure chamber **PP**.



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2. Clutch neutral → clutch disengaged

If the lever is operated to raise portion **"a"** of link (1), piston (2) is pushed by centering spring (3) and moves up. When this happens, valve (4) is also moved up by metering spring (5).

As a result, the notch in valve (4) is shut off from pump pressure chamber **PP**. At almost the same time, it is connected to drain chamber **D** and allows the pressurized oil at port **P1** to escape.

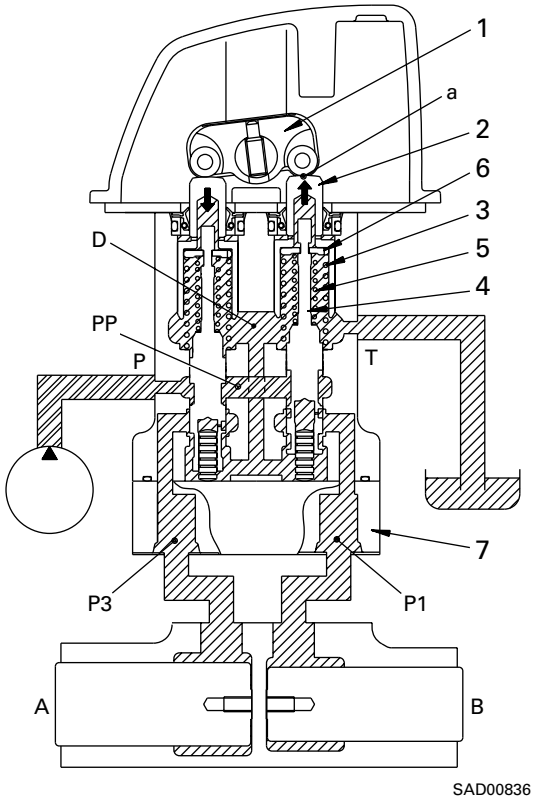
When the pressure at port **P1** goes down, valve (4) is pushed back down by metering spring (5), and the opening of valve (4) is shut off from drain chamber **D**. At almost the same time, it is connected with pump pressure chamber **PP**, so pressure oil is supplied from port **P1** to clutch piston **B**.

In this way, valve (4) moves up and down to balance the force of metering spring (5) and the pressure at port **P1**.

The relationship of the position of valve (4) and body (7) does not change until valve (4) contacts retainer (6).

Therefore, metering spring (5) extends in proportion to the amount that the control lever is moved, so the pressure at port **P1** also goes down in proportion to the amount that the control lever is moved.

As a result, the pressure of clutch piston **B** becomes the same as the pressure at port **P1**. In addition, if retainer (6) pushes valve (4) up, the connection between port **P1** and pump pressure chamber **PP** is cut off, and port **P1** is connected to drain chamber **D**.



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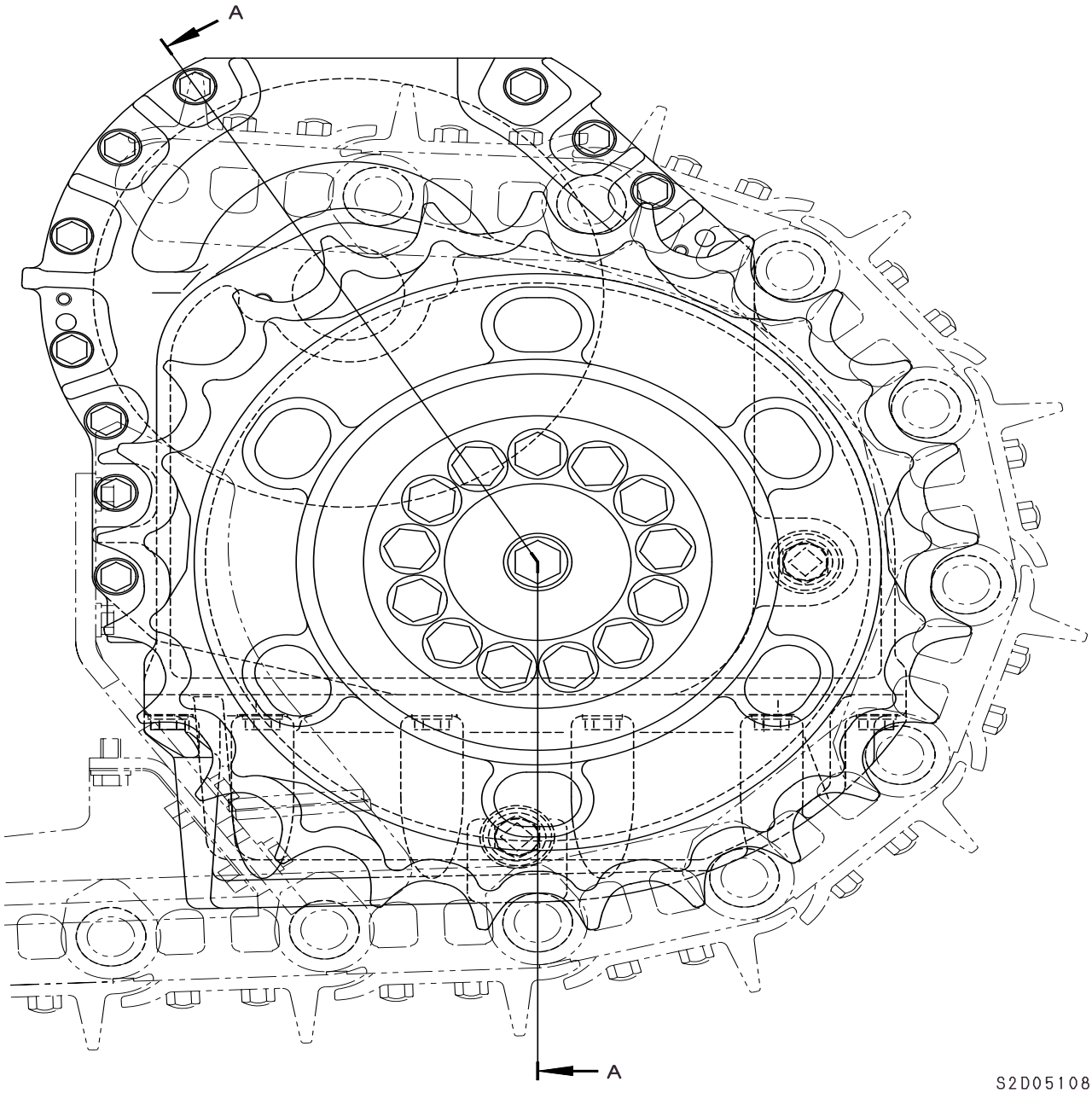
FINAL DRIVE



1. Sprocket
2. Final drive case
3. Pinion (No. of teeth: 11)
4. Gear (No. of teeth: 81)
5. Cover
6. Floating seal
7. Sprocket shaft
8. Hub

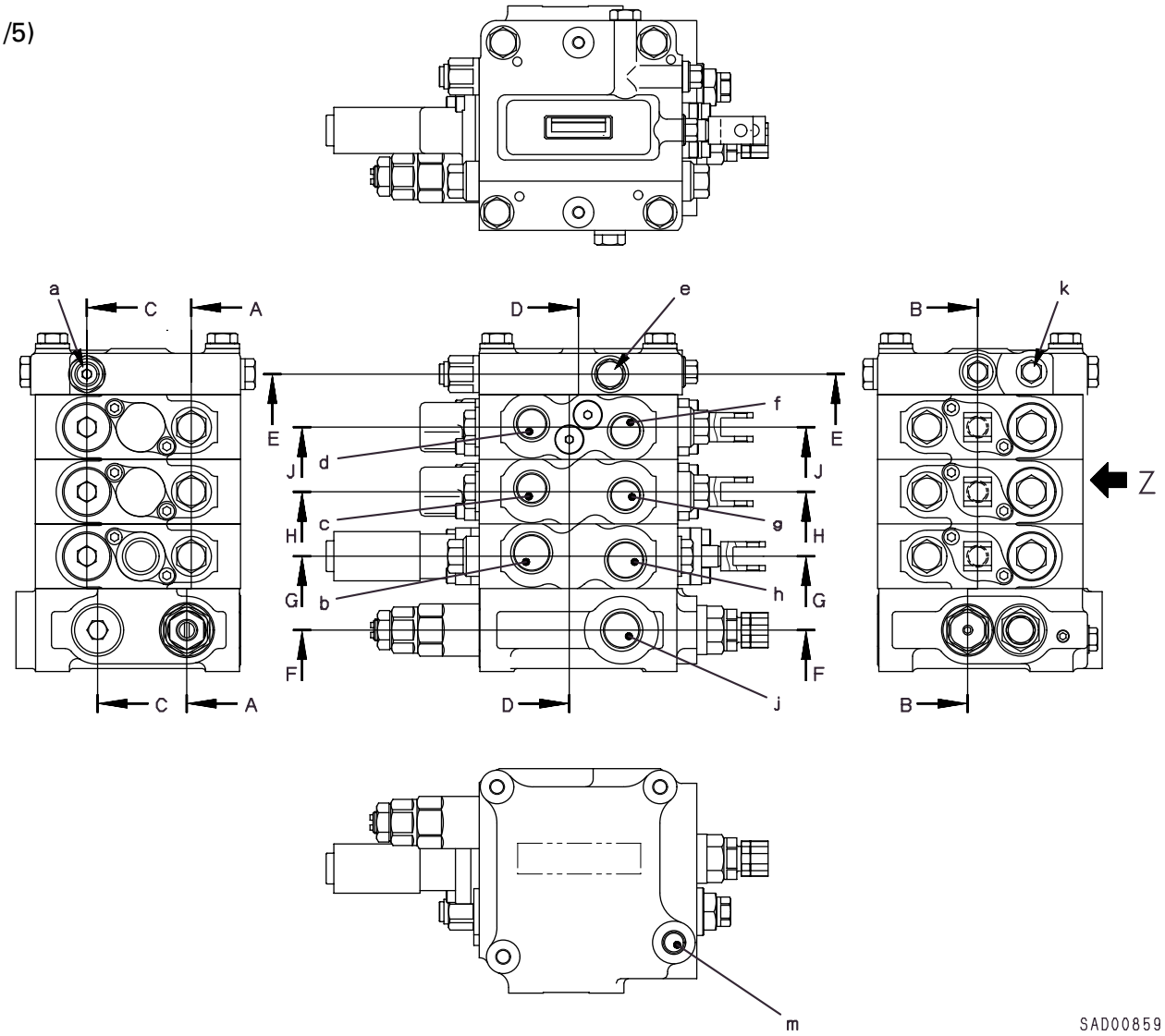
Outline

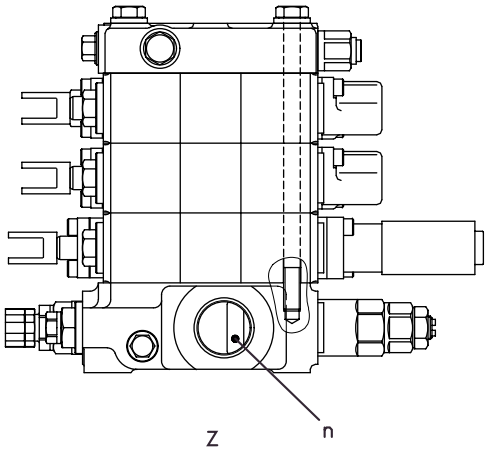
- The final drive uses a single-stage spur gear reduction system. It is lubricated by splash type lubrication using the rotation of the gear.
  The final drive is designed so that it can be removed or installed as a single unit.
- Floating seal (6) is installed to the rotating and sliding portion of the sprocket to prevent entry of soil or sand from outside and to prevent leakage of oil.

MAIN CONTROL VALVE

3-SPOOL VALVE (BLADE LIFT, TILT, ANGLE)

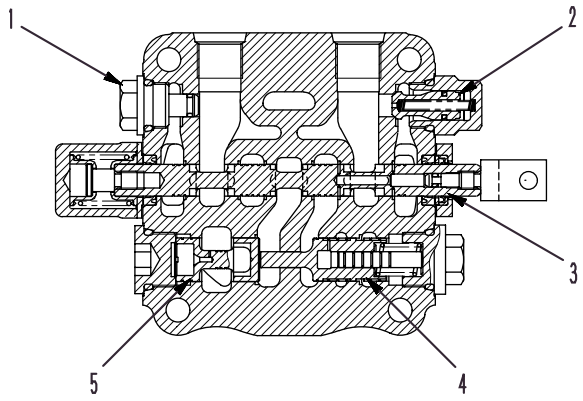
(1/5)



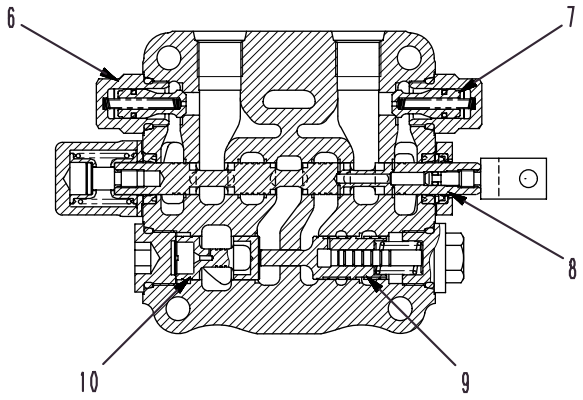


a. Pump pressure pickup plug
b. Port **B1** (to lift cylinder bottom)
c. Port **B2** (to tilt cylinder head)
d. Port **B3** (to angle cylinder bottom)
e. Safety valve circuit pressure release plug
f. Port **A3** (to angle cylinder head)
g. Port **A2** (to tilt cylinder bottom)
h. Port **A1** (to lift cylinder head)
j. Port **P** (from hydraulic pump)
k. LS pressure pickup plug
m. Port **TS** (to hydraulic tank)
n. Port **T** (to hydraulic tank)

(5/5)



J – J



K – K

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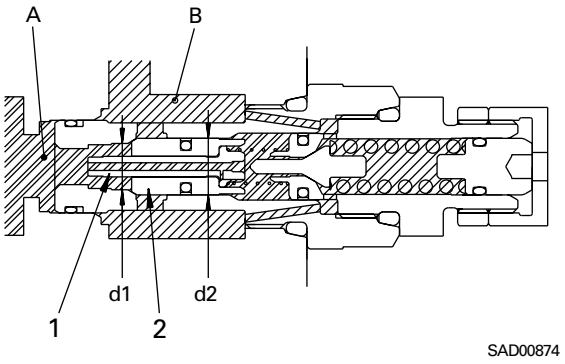
1. Auxiliary valve port plug
2. Suction valve (angle cylinder head end)
3. Angle spool
4. Pressure compensation valve **R**
5. Pressure compensation valve **F**
6. Suction valve (ripper cylinder)
7. Suction valve
8. Ripper spool
9. Pressure compensation valve **R**
10. Pressure compensation valve **F**

2. Main relief valve

Function

- If the oil goes above the specified pressure, the main relief valve acts to set the maximum pressure for the work equipment circuit and to protect the circuit by draining the oil to the tank.



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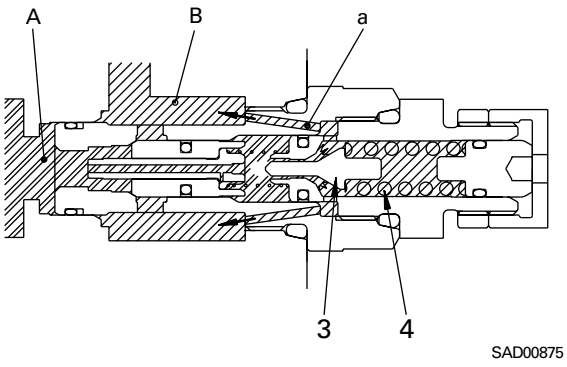
Operation

- Port **A** is connected to the pump circuit and port **B** is connected to the drain circuit. The pressure oil passes through diameter **d1** and the hole in poppet (1), acts on the different area of diameter **d2** "**d1** < **d2**", and main valve (2) is seated.



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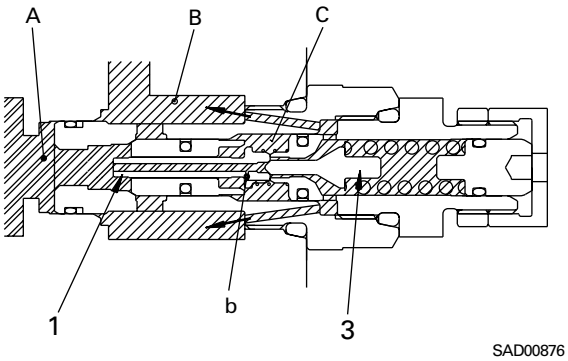
- If the pressure at port **A** reaches the set pressure of spring (4), pilot poppet (3) opens, so the oil flows around pilot poppet (3), passes through drill hole "**a**", and is drained from port **B**.



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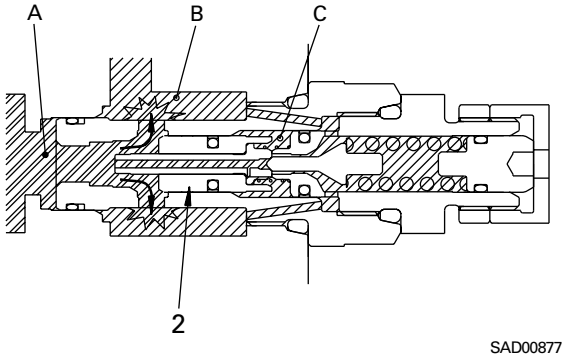
- When pilot poppet (3) is opened, the pressure in spring chamber **C** drops, so poppet (1) moves to the right. Poppet (1) is seated at the tip of pilot poppet (3), and the oil passes through throttle "**b**" and is drained from the drill hole.



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- Compared with the pressure at port **A**, the pressure in spring chamber **C** is low, so main valve (2) opens, and the oil flows from port **A** to port **B** to prevent any abnormal pressure.

4. Flow control valve (Steplessly variable type)

Function

The flow control valve supplies the oil discharged from the pump to the motor by the necessary quantity and returns the excess to the tank.

- As shown in Fig. 1, motor speed N rises in proportion to inflow of oil **Q**. When the inflow of oil is **Q1**, the motor speed is **B** rpm.
- To reduce the noise and loss in the fan motor, the fan speed must be kept constant, regardless of the inflow of the oil.
- The flow control valve is installed internally to keep the fan speed constant for the above purpose.
  Even if the inflow increases from **Q0** to **Q1**, the speed is kept constant from **A** to **C** rpm.

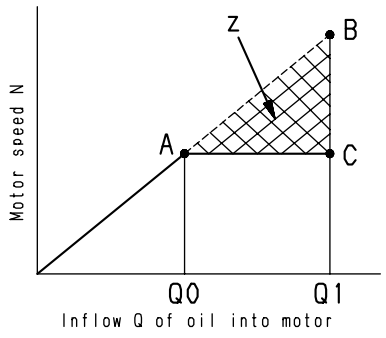

Fig. 1

SJD05218

Operation

- The upstream pressure of the throttle is applied to **X** side of flow control valve spool (15) and the downstream pressure of the throttle is applied to **Y** side. The differential pressure between before and after throttle **E** made by the inflow is applied to flow control valve spring (14).
  In Fig. 1, if the inflow exceeds **Q0**, the differential pressure between before and after flow control valve spool (15) increases above the installed load of flow control valve spring (14) and the path from **P** to **T** in flow control valve spool (15) opens. As a result, the excess oil in part **Z** is discharged through the flow control valve and the motor speed is kept constant from **A** to **C**.
- The flow control valve of this motor is steplessly variable.
  As shown in Fig. 2, this valve can change the motor speed steplessly between **A'** and **C'** by changing the command current between motor speeds **A** and **C**.

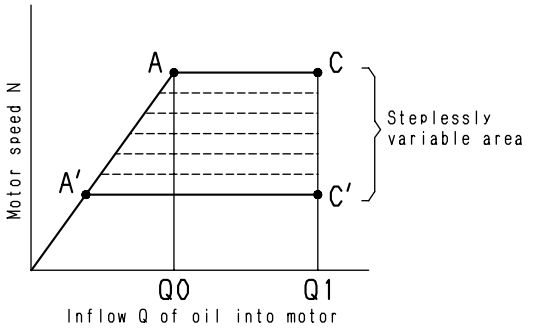

Fig. 2

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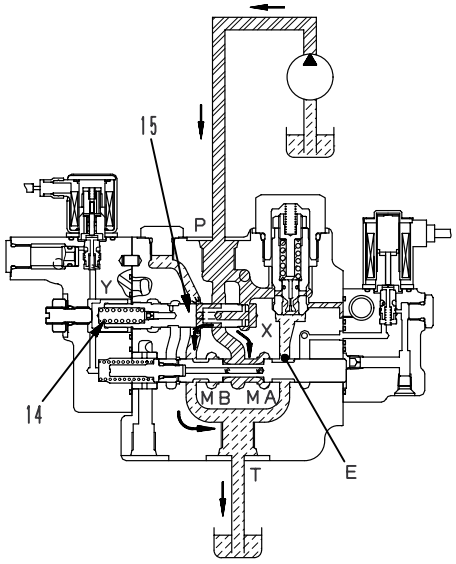
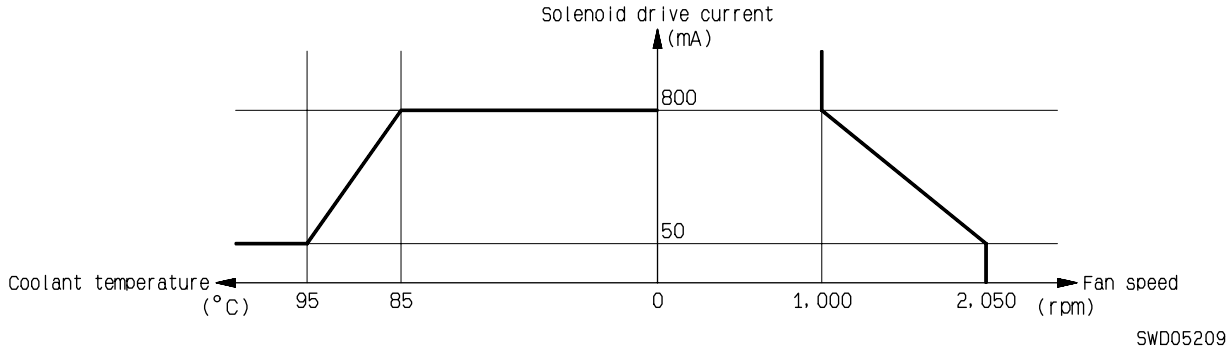


SJD05220

FUNCTION

Fan speed control

- The signal from water temperature sensor (5) is input through fan reverse rotation controller (2) to fan rotation controller (6).
- Fan rotation controller (6) outputs a control current to fan speed solenoid valve (9) according to the signal from water temperature sensor (5) so that the fan speed will be matched to the coolant temperature.



Below 85°C	1,000 rpm
85°C - 95°C	1,000 - 2,050 rpm (Proportional control)
Above 95°C	2,100 rpm

(When oil temperature is 50°C and engine runs at rated speed)

Fan rotation direction control

- When the key switch is at the ON position and the engine is stopped, the forward, reverse, or cleaning mode can be selected with fan rotation direction selector switch (3)
- The signal of fan rotation direction selector switch (3) is output as a fan reverse rotation solenoid control signal to fan reverse rotation solenoid valve (8) by fan reverse rotation controller (2).
- If fan rotation direction selector switch (3) is operated while the engine is running, its input signal is ignored to protect fan motor (7) and fan reverse rotation controller (2) flashes fan operation check lamp (4) to notify the operator that the operation of the switch is ignored.

Forward rotation mode

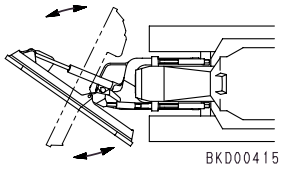
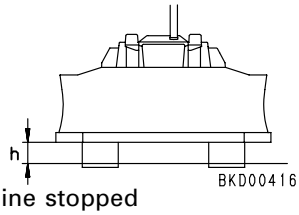
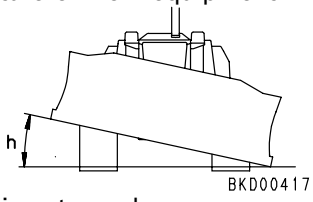
- The fan rotates forward. This mode is selected normally.

Reverse rotation mode

- The fan rotates in reverse. It can be used as a reversible fan. Since the fan efficiency is lowered in this mode, however, the engine can overheat easily. Accordingly, use of this mode is allowed only in cold districts.

Cleaning mode

- The fan rotates at full speed in this mode, regardless of its rotation direction and water temperature. Accordingly, dirt caught in the radiator fins is blown off.
- The cleaning interval of the radiator fins can be lengthened by using this mode periodically.

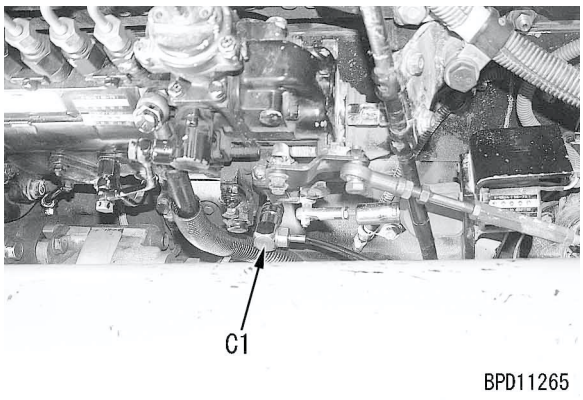
Category	Item		Measurement conditions		Unit	Standard value	Permissible value
Work equipment	Blade angling speed		• Posture of work equipment  BKD00415 • Engine at full throttle • Hydraulic oil temperature: 45 - 55°C • Blade: No load • Time taken to angle blade from max. left angle to max. right angle	LEFT ANGLE	Sec.	6.1 ± 0.3	6.6
				RIGHT ANGLE		4.5 ± 0.3	5.0
	Hydraulic drift (Blade lift)		• Posture of work equipment  BKD00416 • Engine stopped • Hydraulic oil temperature: 45 - 55°C • Raise center cutting edge of blade 300 mm, then measure downward movement for 15 minutes (h)		mm/ 15 min	Max. 50	Max. 100
	Hydraulic drift (Blade tilt)		• Posture of work equipment  BKD00417 • Engine stopped • Hydraulic oil temperature:45 – 55°C • Tilt blade to max. tilt, lower to ground, then measure downward movement for 15 minutes (h)		mm/ 15 min	Max. 100	Max. 200
	Internal oil leakage	Blade lift cylinder	• Engine at full throttle • Hydraulic oil temperature: 45 - 55°C • Fully extend piston rod of cylinder to be measured, then disconnect hose at head end • Measure leakage at relief for 1 minute		cc/min	2.0	8
		Blade tilt cylinder				2.3	9
		Blade angle cylinder				1.9	8
	Fan	Motor speed	• Hydraulic oil temperature: 80°C	STD	rpm	$2{,}000\ ^{+100}_{0}$	$2{,}000\ ^{+200}_{-100}$
		Circuit oil pressure			MPa {kg/cm²}	$18.6\ ^{+2.9}_{-1.0}$ $\{190\ ^{+30}_{-10}\}$	$18.6\ ^{+4.9}_{-2.9}$ $\{190\ ^{+50}_{-30}\}$

MEASURING ENGINE OIL PRESSURE

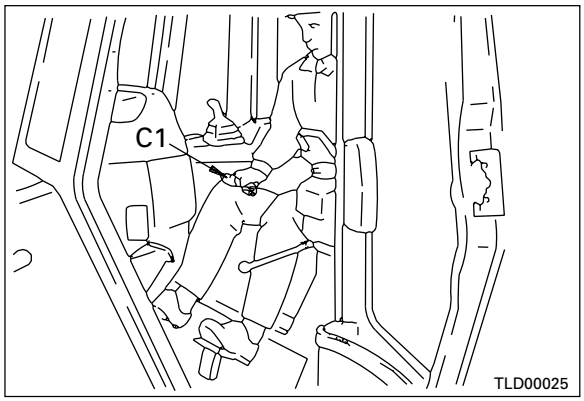
★ Raise the coolant temperature to the operating range before measuring.

1. Remove oil pressure sensor, then install oil pressure gauge **C1** (1.0 MPa {10 kg/cm^2}).

2. Start the engine, and measure the oil pressure at low idling and high idling.



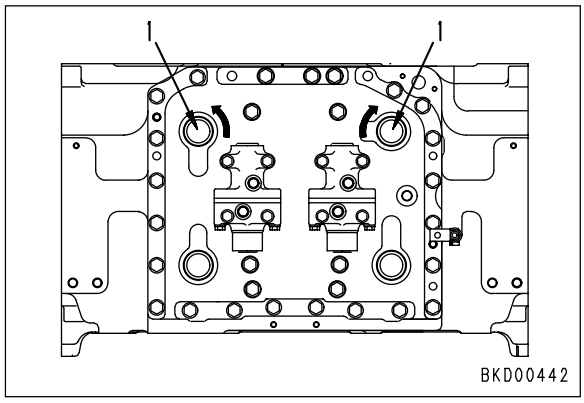
BPD11265



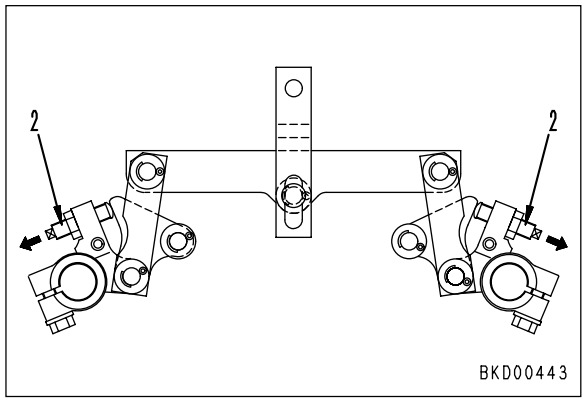
TLD00025

ADJUSTING BRAKE, CLUTCH LEVER ASSEMBLY AND LINING CLEARANCE

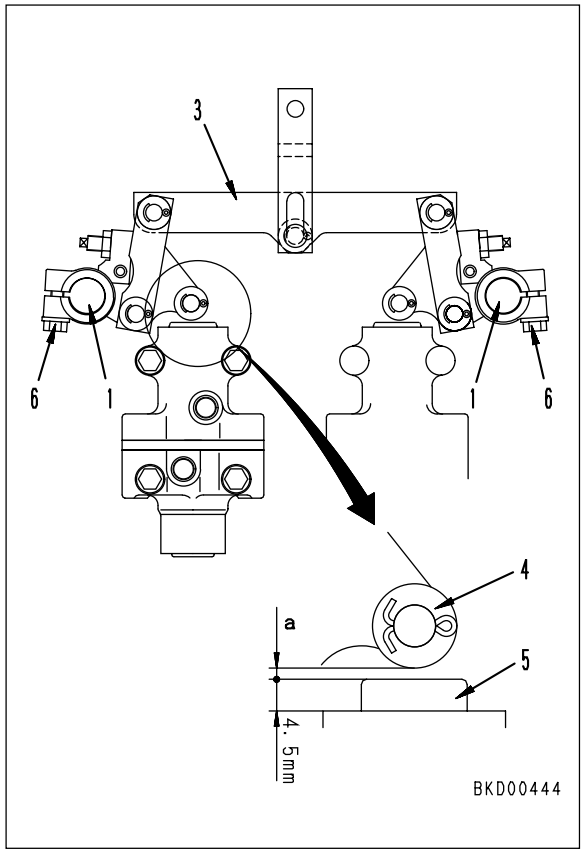
★ If the brake lining or clutch lining have been replaced, adjust the assembly of the lever and the clearance of the lining as follows.



1. Assembly of brake lever
1) Turn brake shaft (1) of the steering case in the direction shown in the diagram on the right until it stops.
   ★ Turn COUNTERCLOCKWISE for left side, and CLOCKWISE for right side.
   ★ Set the punch mark on the end face of the shaft facing the front of the machine.
2) Tighten left and right adjustment screws (2) of the lever assembly fully in the direction of the arrow, then turn back 1.5 turns to adjust temporarily.
   ★ Do not tighten the locknut.



3) Tighten lever assembly (3) to brake shaft (1).
4) Align the serration of the shaft and lever when installing to make clearance a between brake piston (5) and roller (4) of the lever assembly as small as possible.
   ★ Check that the protrusion of brake piston (5) is 4.5 mm (when pulled in fully) before starting adjustment.
   ★ Make the maximum value of clearance **a** less than 14 mm.
   If it is more than 14 mm, turn the meshing of the serration one notch and install again.
5) Push the lever fully into the serration, then tighten lock bolt (6).
   Lock bolt:
   53.9 – 122.5 Nm {5.5 – 12.5 kgm}



2) Measuring clutch circuit pressure (1st, 2nd, 3rd clutch)
   i) Install oil pressure gauge **C1** to the pressure detection plug.
   ii) With the joystick at the 1st, 2nd, or 3rd position, measure the clutch circuit pressure with the engine at low idling and high idling.
3) Measuring clutch circuit pressure (F, R clutch)

   ⚠ The machine will move, so it is best to jack up the machine when measuring. However, if there is no way to jack up the machine, check that the operation is safe and measure while traveling.
   i) Install oil pressure gauge **C1** to the pressure detection plug.
   ii) With the joystick at the F or R position, measure the clutch circuit pressure with the engine at low idling and high idling.

[Reference]
   i) If the oil pressure is defective for all the clutches, the modulating relief valve or power train pump is probably defective.
   ii) If the oil pressure is defective for specific clutches, there is probably oil leakage from that clutch or the control valve (spool) is defective.
      • In this case, when shifting from a normal clutch to a clutch with defective oil pressure, if the oil pressure drops momentarily and then recovers slightly, the control valve is probably normal.
      ★ If it is possible to check the movement of the spool, it is possible to make a more accurate judgement.

Combination of speed ranges and clutches used

Clutch No. 1	No. 1 (R)	No. 2 (F)	No. 3 (3rd)	No. 4 (2nd)	No. 5 (1st)
F1		○			○
F2		○		○	
F3		○	○		
F4	○				○
F5	○			○	
F6	○		○		

TESTING AND ADJUSTING "OPEN" AND "CLOSE" LOCK AND STEADY REST OF OPERATOR'S CAB DOOR

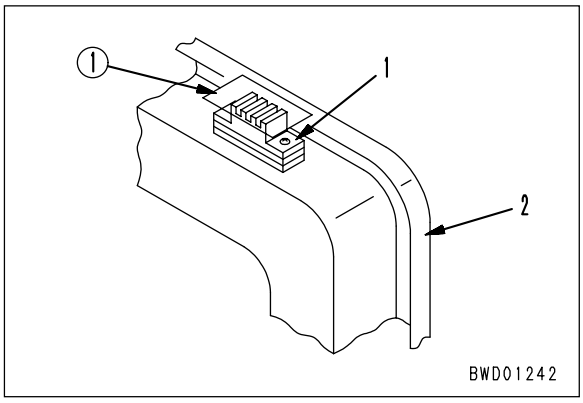
1. Testing door lock

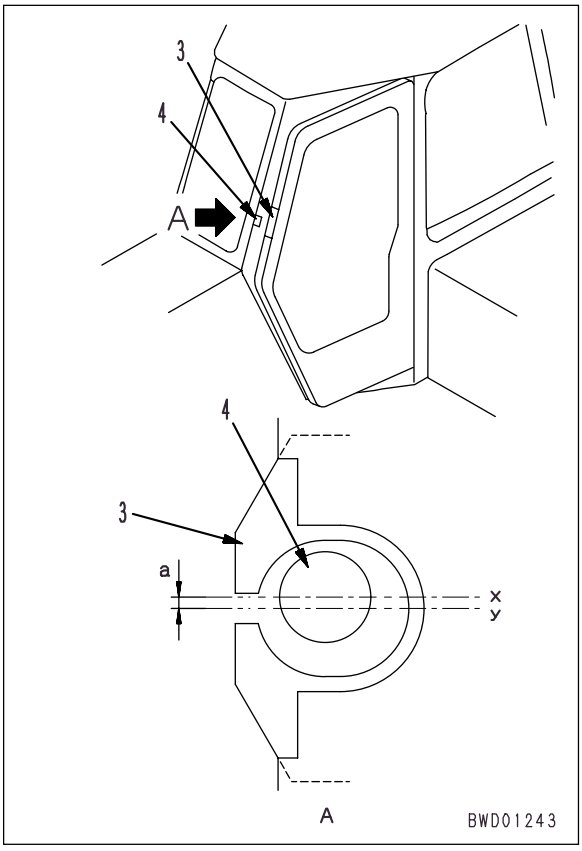
- Close the door and check the relationship between the operator's cab and door. If there is any fault, repair it.

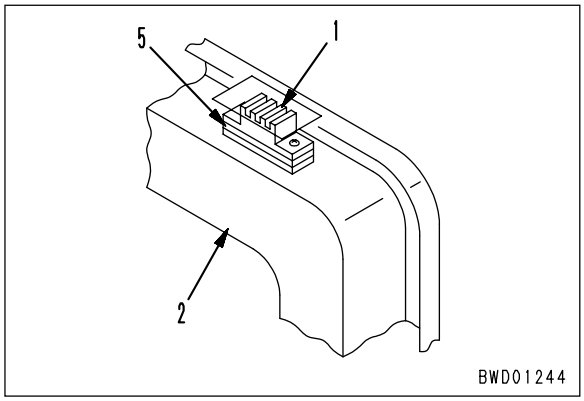
1) Check of condition
   i) Check the installed height of damper rubber (1). (Check both sides, 4 pieces on each.)
      - Stick adhesive tape (1), etc. to the contact face of damper rubber (1) and open and close the door 2 - 3 times. Then, check the contact face of adhesive tape (1) against the operator's cab.

      Normal: When the door is closed, the damper rubber comes in contact lightly.
      Abnormal: When the door is closed, the damper rubber does not come in contact or comes in contact so strongly that the adhesive tape is removed.
   ii) Check the relationship betweeen the door notch and striker (on both sides).
      - Close door (2) and check the engaging condition of latch (3) and striker (4).
        ★ Check deviation **a** of latch center **x** and striker center **y** from each other from the direction of **A**.

2) Adjusting
   i) Adjusting height of damper rubber
      - Increase or decrease of shims (5) under damper rubber (1) to adjust the height of damper rubber (1) properly.
   ii) Adjusting height of latch and striker
      (1) Tighten the mounting bolt of striker (4) temporarily and poen and close the door 2 - 3 times to align latch (3) and striker (4) with each other.
      (2) Check the engaging condition of latch (3) and striker (4).
      (3) Tighten the mounting bolt of striker (4) securely.





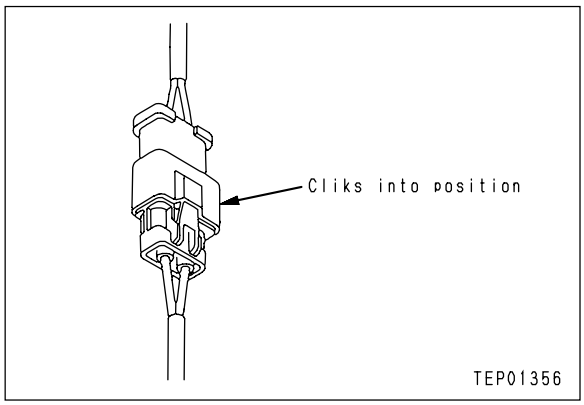


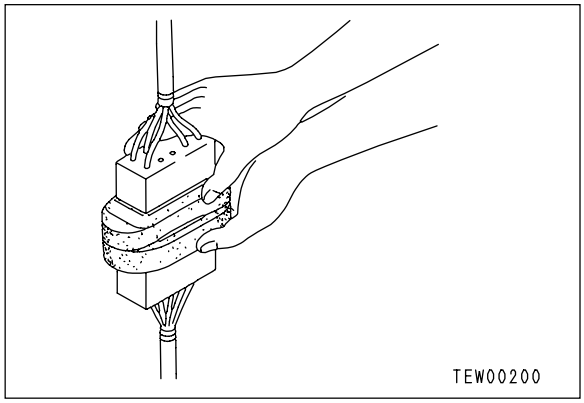
- **Connecting connectors**
  1) Check the connector visually.
     1) Check that there is no oil, dirt, or water stuck to the connector pins (mating portion).
     2) Check that there is no deformation, defective contact, corrosion, or damage to the connector pins.
     3) Check that there is no damage or breakage to the outside of the connector.
     ★ If there is any oil, water, or dirt stuck to the connector, wipe it off with a dry cloth. If any water has got inside the connector, warm the inside of the wiring with a dryer, but be careful not to make it too hot as this will cause short circuits.
     ★ If there is any damage or breakage, replace the connector.

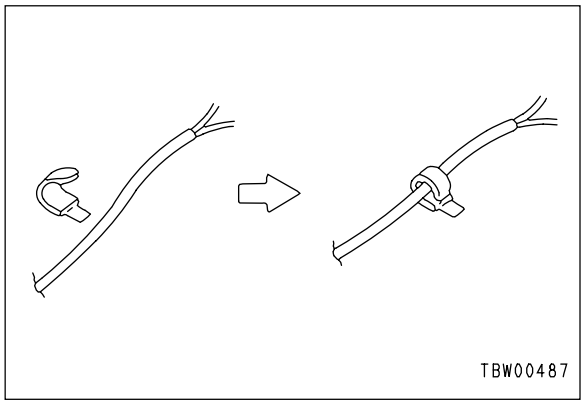
  2) Fix the connector securely.
     Align the position of the connector correctly, then insert it securely.
     For connectors with lock stopper, push in the connector until the stopper clicks into position.

  3) Correct any protrusion of the boot and any misalignment of the wiring harness
     For connectors fitted with boots, correct any protrusion of the boot. In addition, if the wiring harness is misaligned, or the clamp is out of position, adjust it to its correct position.
     ★ If the connector cannot be corrected easily, remove the clamp and adjust the position.

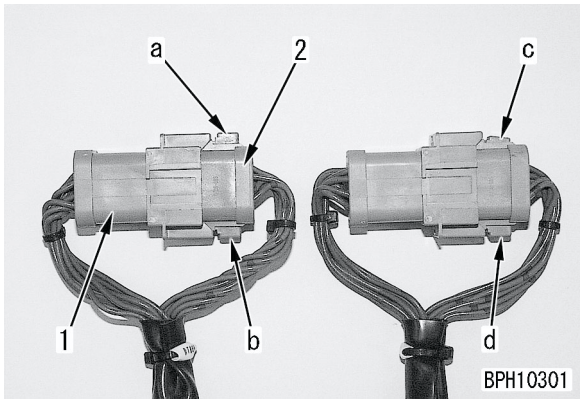
  4) If the connector clamp has been removed, be sure to return it to its original position. Check also that there are no loose clamps.







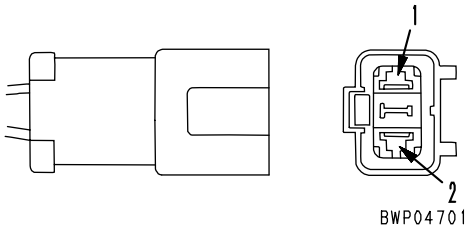
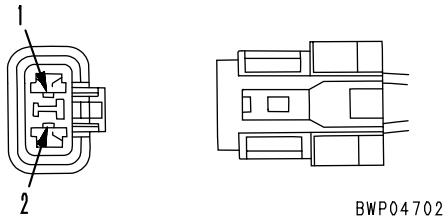
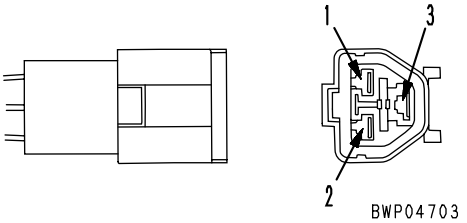
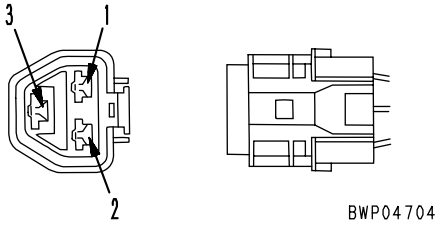
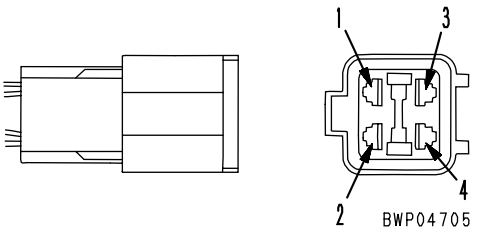
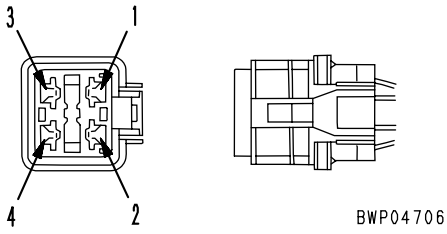
- Connecting connectors (DT type connector)
  Since the DT 8-pole and 12-pole DT type connectors have 2 latches respectively, push them in until they click 2 times.
  1. Male connector, 2. Female connector
  - Normal locking state (Horizontal): **a**, **b**, **d**
  - Incomplete locking state (Diagonal): **c**

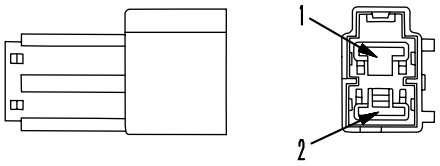
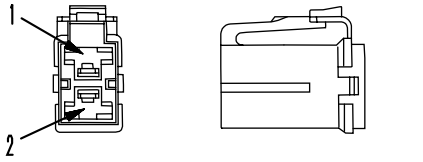


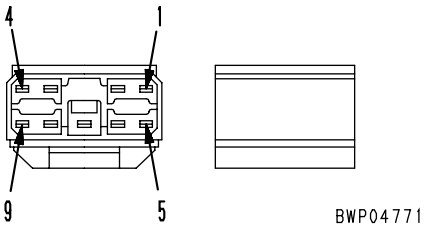
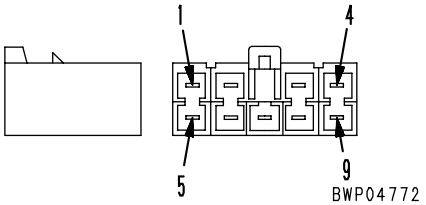
Connector No.	Connector type	No. of pins	Location	Address			
				Arrangement drawing	E mode system diagram	M mode system diagram	Wiper system diagram
CN47	KES	4	Rear lamp switch	L-2	A-8		
CN48	KES	4	Head lamp switch	L-2	A-8	A-8	
CN49	AMP040	16	Monitor panel	L-4	A-6	A-6	
CN50	AMP040	12	Monitor panel	L-3	A-6	A-6	
CN52	Terminal	1	Relay (Engine stop solenoid)	B-9			
CN53	Terminal	1	Relay (Engine stop solenoid)	C-9			
CN54	DT	2	Backup alarm	I-8	R-3		
CN57	KES	2	Blower motor (Cab specification)	K-1	J-2		
CN58	DT	12	Intermediate connector	D-1	N-7	E-7	
CN60	DT	3	Engine stop solenoid	D-6	O-9		
CN61	DT	3	Limit switch (1st gear speed detection)	H-2	E-1		
CN62	DT	3	Limit switch (3rd gear speed detection)	H-2	F-1		
CN63	DT	3	Intermediate connector (Additional light)	I-6	Q-2		
CN64	YAZAKI	2	Diode		M-1	E-1	
CN65	YAZAKI	2	Diode		M-1	E-1	
CN66	DT	4	Timer (For engine stop solenoid)	B-9	M-8		
CN67	KES	2	Fusible link	D-1	N-7		
CN68	SWP	2	Diode		O-7		
CN69	SWP	2	Diode		O-7	E-9	
CN70	SWP	2	Diode	L-2	D-8	B-9	
CN71	KES	4	Fan reverse switch	L-2	D-8		
CN75	DT	8	KOMTRAX		Q-5	E-4	
CN76	DT	8	KOMTRAX	I-3	P-4	E-5	
CN81	Terminal	1	Battery relay (–) terminal	A-6	P-3	E-3	
CN82	Terminal	1	Battery relay (+) terminal	B-7	P-2	F-2	
CN83	Terminal	1	Battery relay input terminal	A-6	P-3	E-3	
CN84	Terminal	1	Battery relay output terminal	A-6	P-2	E-2	
CN85	YAZAKI	2	Fusible link	I-3	O-1		
CN86	DT	2	Switch ineffective lamp	K-5	D-8		
CN87	DT	12	Solenoid relay circuit	J-2 A-9	H-9		
CN88	SHINAGAWA	6	Relay (Additional light)	I-5	P-1		
CN89	J-5	6	Relay (KOMTRAX)	I-5	O-1		
CN90	DT	6	Fan controller	I-5	Q-6		
CN91	Terminal	1	Starting motor	E-1	O-9	E-9	
CN93	DTHD	1	Machine body power supply	G-2			
CN95	DT	2	Fan reverse solenoid	A-2	B-3		
CN97	SWP	2	Diode		Q-6		

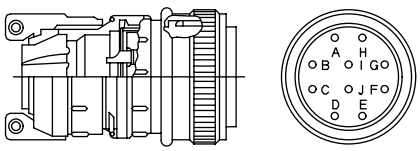
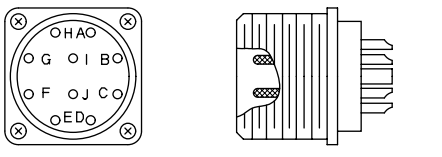
CONNECTION TABLE FOR CONNECTOR PIN NUMBERS

★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

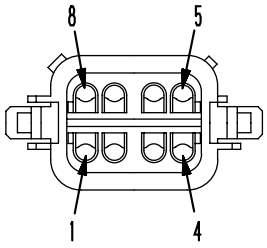
<table>
<tr><th rowspan="2">No. of pins</th><th colspan="2">X type connector</th></tr>
<tr><th>Male (female housing)</th><th>Female (male housing)</th><th>T-adapter Part No.</th></tr>
<tr><td>1</td><td>Part number: 08055-00181</td><td>Part number: 08055-00191</td><td>799-601-7010</td></tr>
<tr><td rowspan="2">2</td><td> 
</td><td> 
</td><td rowspan="2">799-601-7020</td></tr>
<tr><td>Part number: 08055-00282</td><td>Part number: 08055-00292</td></tr>
<tr><td rowspan="2">3</td><td> 
</td><td> 
</td><td rowspan="2">799-601-7030</td></tr>
<tr><td>Part number: 08055-00381</td><td>Part number: 08055-00391</td></tr>
<tr><td rowspan="2">4</td><td> 
</td><td> 
</td><td rowspan="2">799-601-7040</td></tr>
<tr><td>Part number: 08055-00481</td><td>Part number: 08055-00491</td></tr>
<tr><td>—</td><td>Terminal part number: 79A-222-3370
• Electric wire size: 0.85
• Grommet: Black
• Q’ty: 20</td><td>Terminal part number: 79A-222-3390
• Electric wire size: 0.85
• Grommet: Black
• Q’ty: 20</td><td>—</td></tr>
<tr><td>—</td><td>Terminal part number: 79A-222-3380
• Electric wire size: 2.0
• Grommet: Red
• Q’ty: 20</td><td>Terminal part number: 79A-222-3410
• Electric wire size: 2.0
• Grommet: Red
• Q’ty: 20</td><td>—</td></tr>
</table>

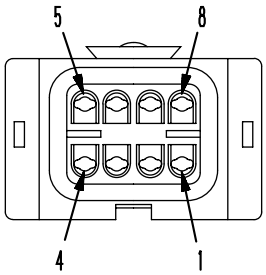
No. of pins	L type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2	 BWP04769	 BWP04770	—
	—	—	

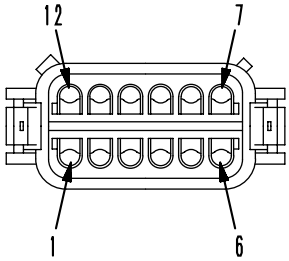
No. of pins	Connector for PA		
	Male (female housing)	Female (male housing)	T-adapter Part No.
9	 BWP04771	 BWP04772	—
	—	—	

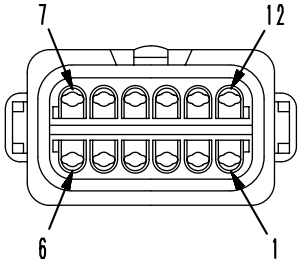
No. of pins	Bendix MS connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10	 BWP04773	 BWP04774	799-601-3460
	—	—	

[The pin No. is also marked on the connector (electric wire insertion end)]

<table>
<tr><th rowspan="2">No. of pins</th><th colspan="3">DT Series connector</th></tr>
<tr><th>Body (plug)</th><th>Body (receptacle)</th><th>T-adapter Part No.</th></tr>
<tr><td rowspan="2">8</td><td> 

BWP05045</td><td> 

BWP05046</td><td rowspan="2">8GR : 799-601-9060
8B : 799-601-9070
8G : 799-601-9080
8BR : 799-601-9080</td></tr>
<tr><td>Part number: 08192-1820 ☐ (normal type)
08192-2820 ☐ (fine wire type)</td><td>Part number: 08192-1810 ☐ (normal type)
08192-2810 ☐ (fine wire type)</td></tr>
<tr><td rowspan="2">10</td><td> 

BWP05047</td><td> 

BWP05048</td><td rowspan="2">12GR : 799-601-9110
12B : 799-601-9120
12G : 799-601-9130
12BR : 799-601-9140</td></tr>
<tr><td>Part number: 08192-1920 ☐ (normal type)
08192-2920 ☐ (fine wire type)</td><td>Part number: 08192-1910 ☐ (normal type)
08192-2910 ☐ (fine wire type)</td></tr>
</table>

2) Exhaust smoke comes out but engine does not start (Fuel is being injected)

General causes why exhaust smoke comes out but engine does not start

- Lack of rotating force due to defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air

Legend
◯: Possible causes (judging from Questions and check items)
◎: Most probable causes (judging from Questions and Check items)
△: Possible causes due to length of use (used for a long period)
●: Items to confirm the cause.

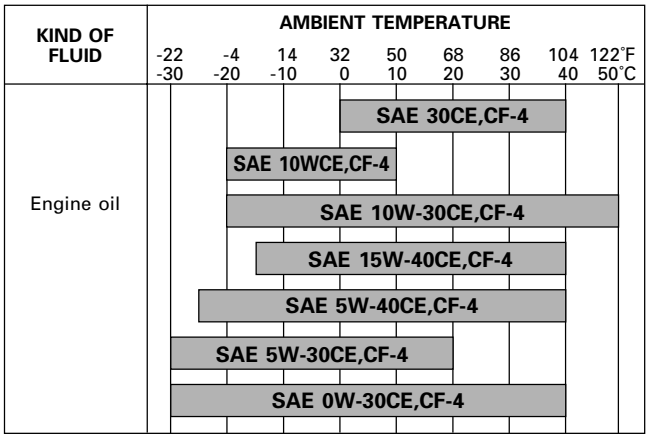
		Causes												
		Defective, broken valve system (valve, rocker lever, etc.)	Defective injection pump (rack, plunger stuck)	Worn piston ring, cylinder liner	Clogged fuel filter, strainer	Clogged feed pump strainer	Clogged air cleaner element	Defective electrical intake air heater	Defective or deteriorated battery	Leakage, clogging, air in fuel system	Clogged injection nozzle, defective spray	Clogged air breather hole in fuel tank cap	Improper fuel used	
Questions	Confirm recent repair history													
	Degree of use of machine: Operated for long period			△	△	△					△			
	Suddenly failed to start	◎	◎											
	When engine is cranked, abnormal noise is heard from around head	◎												
	Engine oil must be added more frequently			◎										
	Non-specified fuel is being used		◯								◯			
	Replacement of filters has not been carried out according to Operation Manual				◎	◎	◎							
	Rust and water are found when fuel tank is drained				◎	◎								
	Dust indicator lamp is red						◎							
	Preheating indicator lamp does not light up							◎						
	Starting motor cranks engine slowly								◎					
	Mud is stuck to fuel tank cap											◯		
Check items	When fuel lever is placed at FULL position, it does not contact stopper		◯											
	When engine is cranked with starting motor, 1) Little fuel comes out even when injection pump sleeve nut is loosened		◎											
	2) No fuel comes out even when fuel filter air bleed plug is loosened				◎	◎								◯
	There is leakage from fuel piping								◎					
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low										◎			
	When fuel filter is drained, no fuel comes out													◎
Troubleshooting	Remove head cover and check directly	●												
	When control rack is pushed, it is found to be heavy, or does not return		●											
	When compression pressure is measured, it is found to be low			●										
	When fuel filter, strainer are inspected directly, they are found to be clogged				●									●
	When feed pump strainer is inspected directly, it is found to be clogged					●								
	When air cleaner element is inspected directly, it is found to be clogged						●							
	Heater mount does not become warm							●						
	Either specific gravity of electrolyte or voltage of battery is low								●					
	When feed pump is operated, there is no response, or operation is too heavy									●				
	Speed does not change when operation of certain cylinders is stopped										●			
	When fuel cap is inspected directly, it is found to be clogged											●		
	Remedy	Replace	Replace	Replace	Clean	Clean	Clean	Correct	Replace	Correct	Clean	Clean		

S-12 Oil pressure caution lamp lights up (Drop in oil pressure)

General causes why oil pressure lamp lights up

- Leakage, clogging, wear of lubricating system
- Defective oil pressure control
- Improper oil used (improper viscosity)
- Deterioration of oil due to overheating

★ Standard for engine oil selection

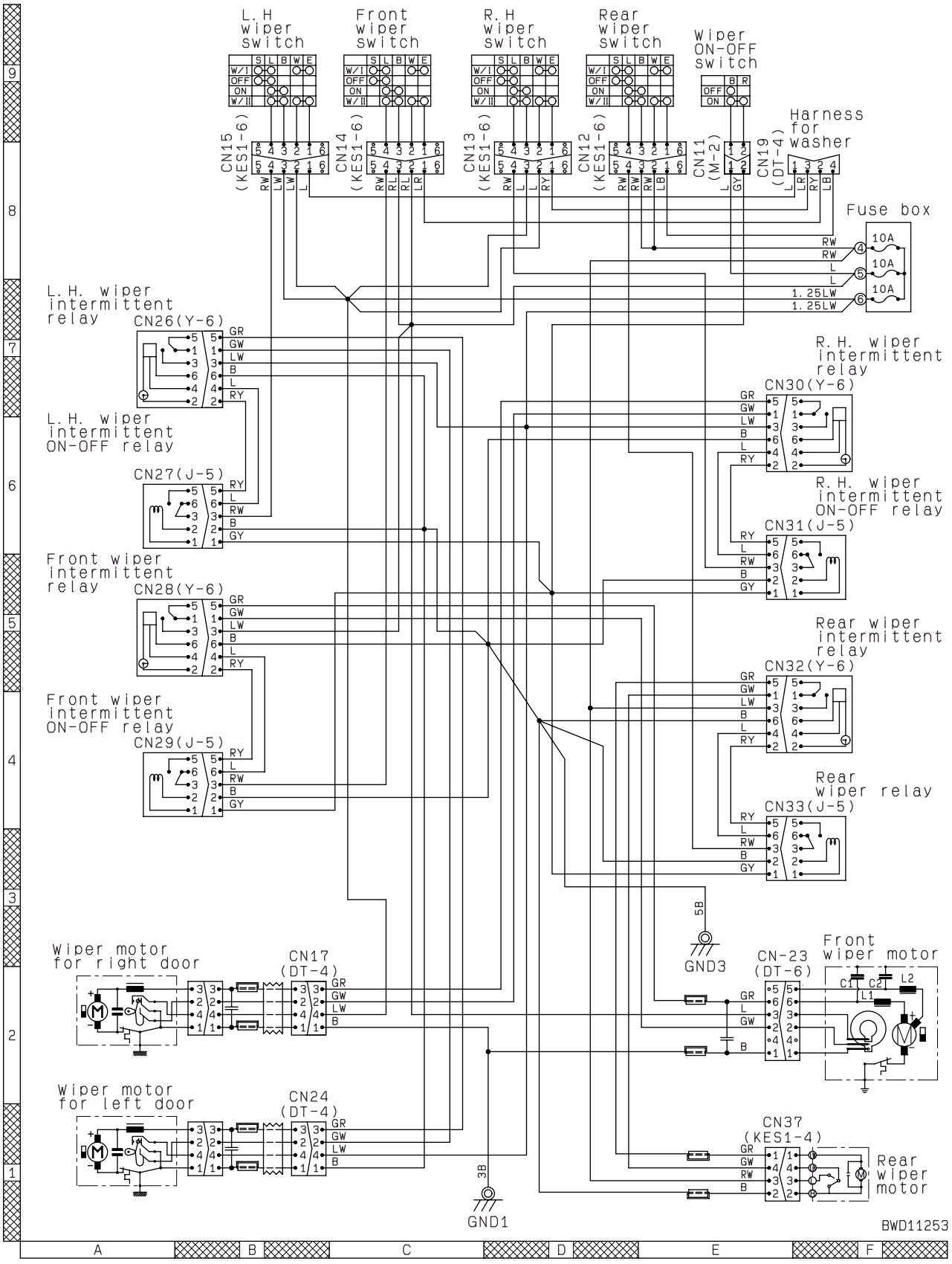


Legend
◯: Possible causes (judging from Questions and check items)
◎: Most probable causes (judging from Questions and Check items)
△: Possible causes due to length of use (used for a long period)
●: Items to confirm the cause.

			Causes: Clogged oil filter	Worn bearing, journal	Clogged strainer inside oil pan	Clogged oil pipe inside oil pan	Broken suction pipe brazing	Defective oil pump	Lack of oil in oil pan	Defective regulator valve	Defective relief valve	Leaking, crushed hydraulic piping	Defective oil pressure sensor	Water, fuel in oil
Questions	Confirm recent repair history													
	Degree of use of machine	Operated for long period	△	△				△						
	Replacement of filters has not been carried out according to Operation Manual		◎											
	Caution lamp lights up		◎							◯				
	Non-specified oil is being used		◯	◯										
Check items	Condition when oil pressure lamp lights up	Lights up at low idling		◎						◯				
		Lights up at low, high idling			◎	◎	◎	◎	◯	◯	◯			
		Lights up on slopes						◎						
		Sometimes lights up							◎	◎		◯		
	There is crushing, leakage from hydraulic piping (external)										◎			
	Oil level sensor lamp lights up							◎						
	When oil level in oil pan is inspected, it is found to be low							◎						
	Metal particles are found when oil is drained			◎										
	Metal particles are stuck to oil filter element			◎				◯						
	Oil is cloudy white or smells of diesel oil													◎
Troubleshooting	When oil filter is inspected, it is found to be clogged		●	●										
	Remove oil pan and inspect directly				●	●	●							
	Oil pump rotation is heavy, there is play							●						
	There is catching of relief valve or regulator valve, spring or valve guide is broken								●	●				
	When oil pressure is measured, it is found to be within standard value											●		
													Carry out troubleshooting for "OIL LEVEL RISES".	◎
	Remedy		Clean	Clean	Clean	Clean	Correct	Replace	Add	Adjust	Adjust	Correct	Replace	–

ELECTRICAL CIRCUIT DIAGRAMS FOR EACH SYSTEM

WIPER RELATED SYSTEM DIAGRAM



E-3. Lamps do not light up

★ Carry out the following troubleshooting when the battery is normal.
★ Before starting the following troubleshooting, check that fuse FB1, No. 1, is normal.

a) Head lamp

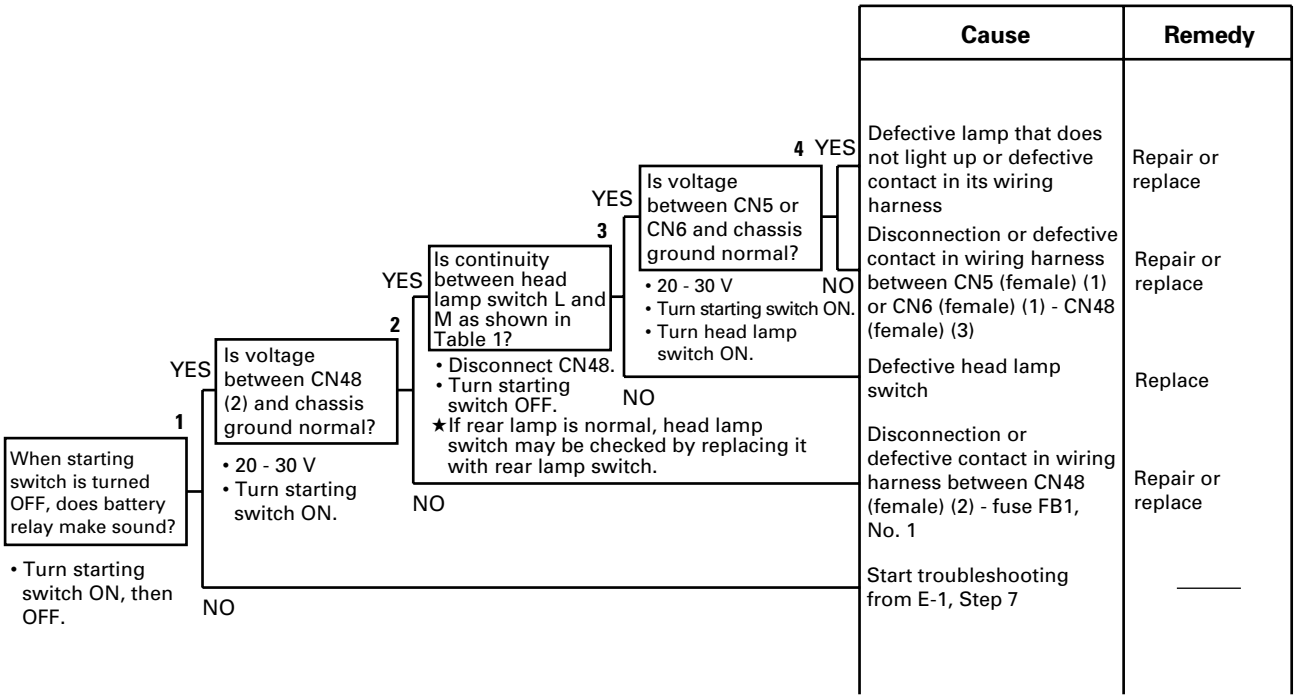
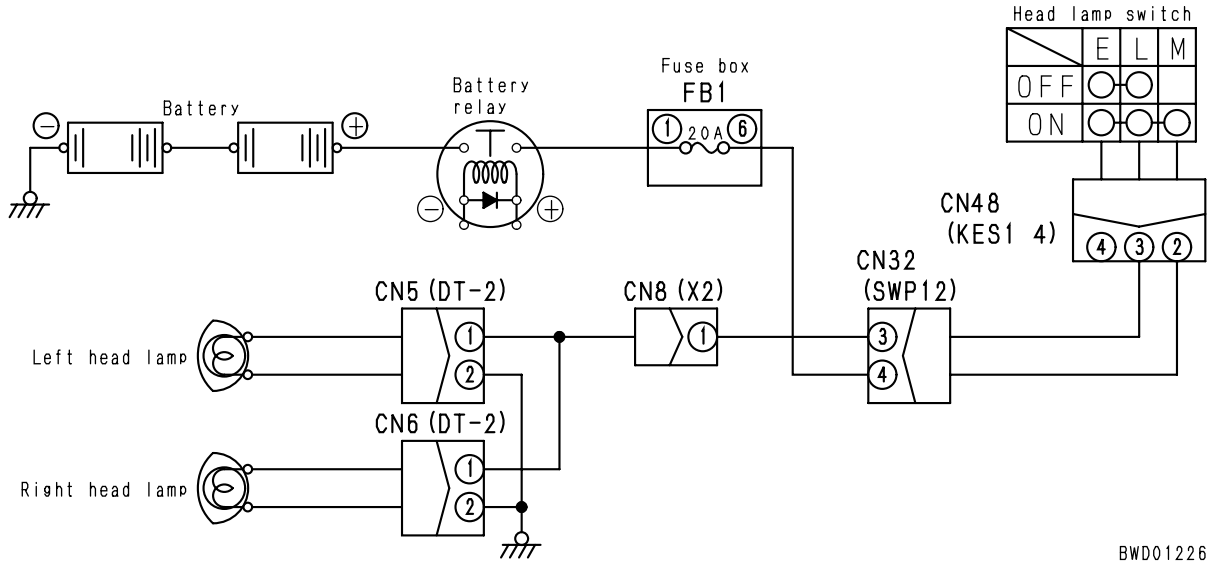
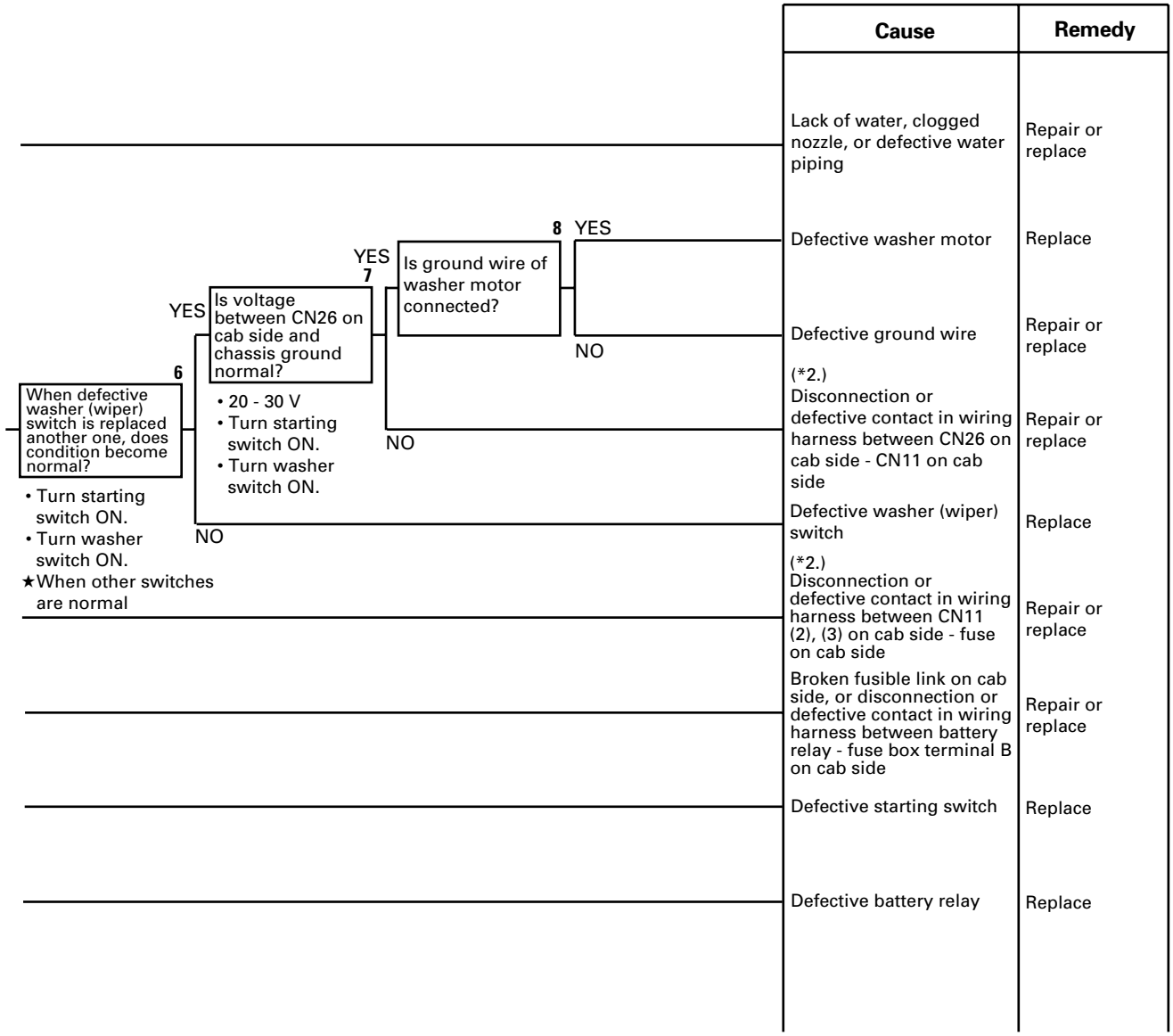


Table 1

	E	L	M	Continuity
OFF	○	○		Made
ON	○	○	○	Broken

E-3. a) Related electrical circuit diagram





*2. The left washer is used as an example in this troubleshooting. For the connector Nos. of other washers corresponding to CN11 on the cab side, see the following.

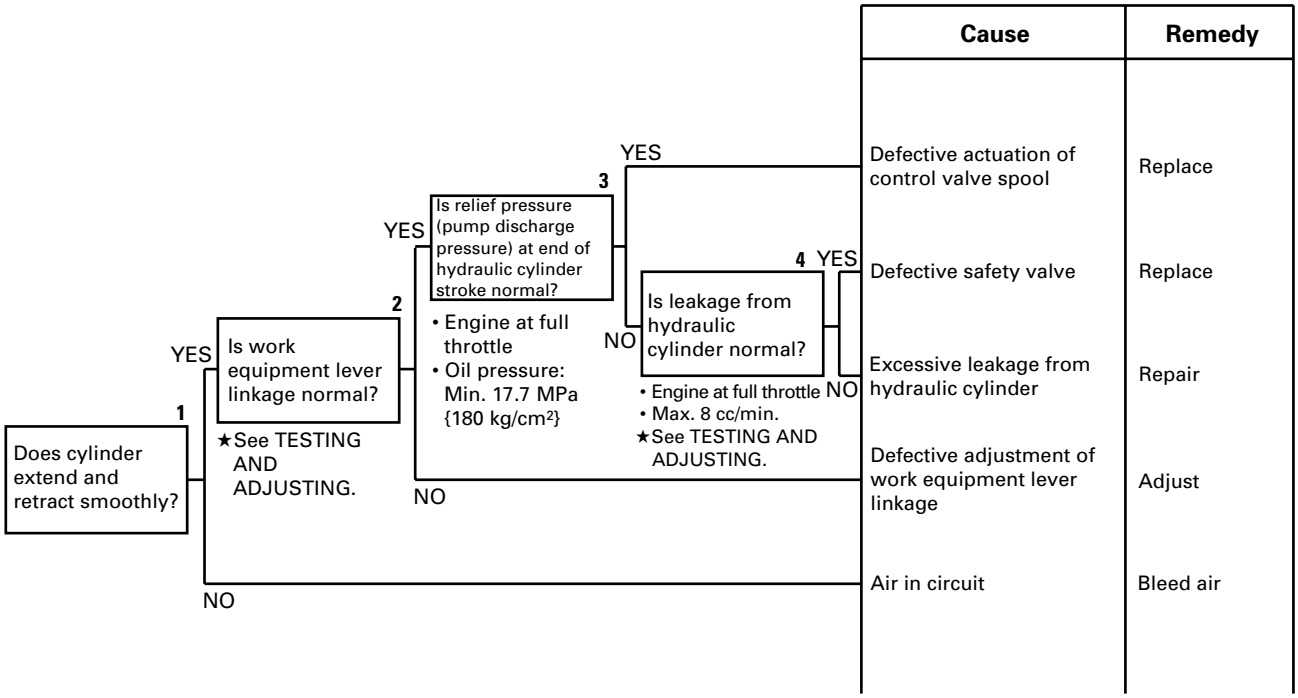
	Left washer	Front washer	Right washer	Rear washer
Connector No.	CN11	CN12	CN13	CN14

H-3. Overruns when turning

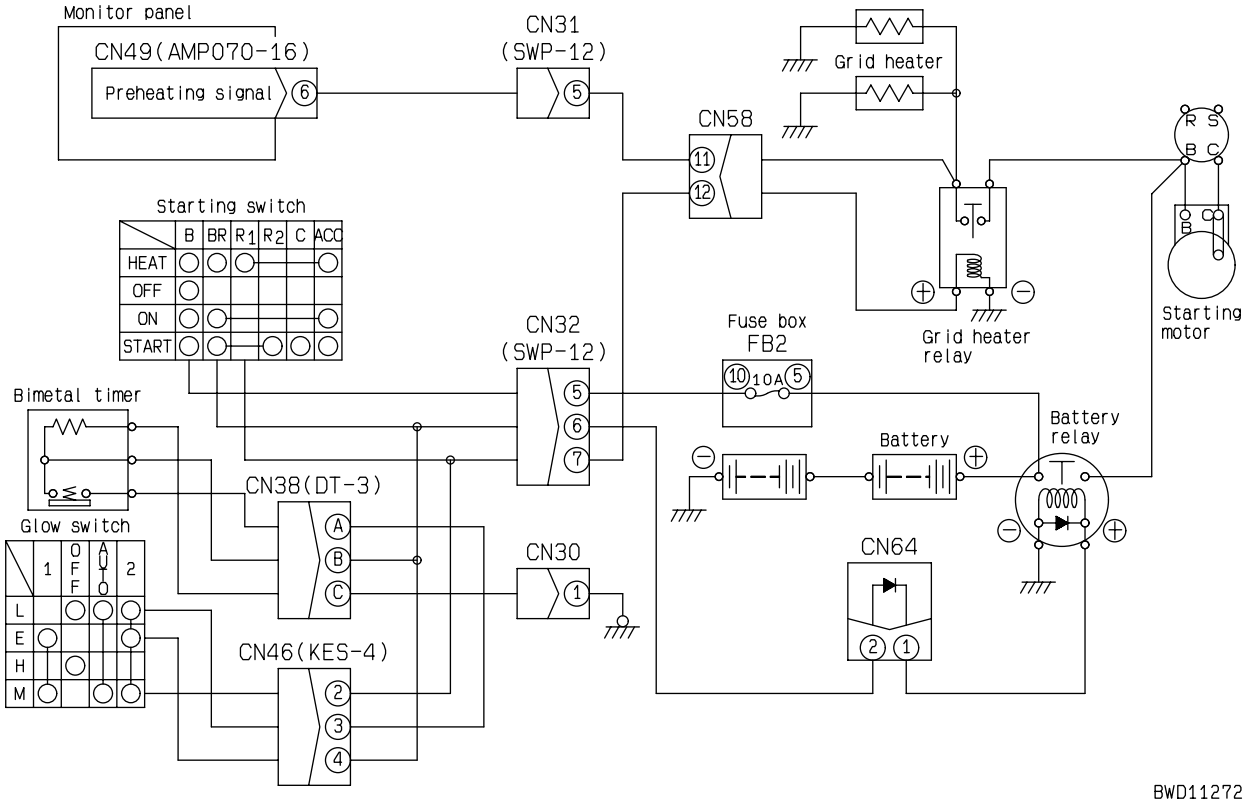
*1. Travel in F1 (R1) with the engine at low idling, and operate the steering joystick slowly to the left or right. The machine must turn slowly.

H-15. Blade angle speed is slow or lacks power

★ Check the oil level in the hydraulic tank before carrying out troubleshooting.
★ Check if the blade has been modified.
★ When the lift and tilt cylinders are normal.



M-3. a), b) Related electrical circuit diagram



M-8. Service meter does not move after engine is started

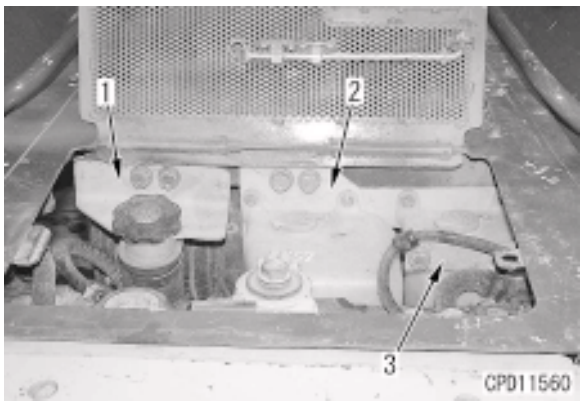
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.

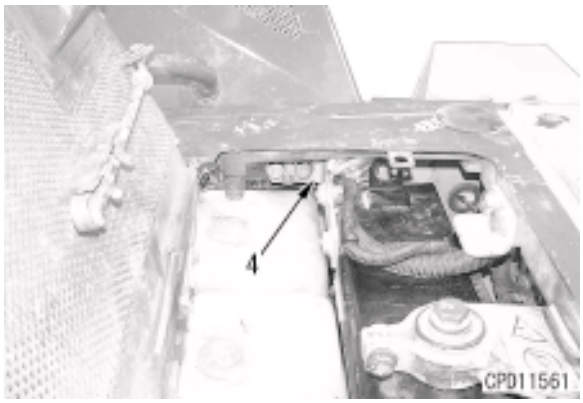
Component	Symbol		Part No.	Part Name	Qty	New/ remodel	Sketch		Nature of work, remarks
Track shoe assembly	R	5	791-646-7523	Bar	1			Disassembly, assembly	For small plug
			791-646-7590	Guide	1				
		6	790-701-3000	Checker	1				Checking air tightness of oil sealed track link
		7	791-646-8002	Lubricator	1				Filling oil sealed track link with oil
		8	790-105-2300	Jack (196kN {20ton})	1				Disconnection of link
			790-101-1102	Pump	1				
		9	791-635-3110	Frame	1				Remover & installer assembly 791-630-3200
			791-635-3160	Extension	1				
			791-635-3170	Nut	4				
			791-635-3180	Screw	2				
			791-635-3190	Screw	1				Removal of bushing
			791-635-3250	Adapter	1				
			791-635-3230	Adapter	4				
			791-630-3230	Extension	2				
			791-630-3280	Spacer	1				
			04530-11018	Eyebolt	1				
			01580-01210	Nut	1				
			790-101-1102	Pump	1				
			790-101-1300	Cylinder (980kN {100ton})	1				
			790-105-2300	Jack (196kN {20ton})	1				
		10	791-630-3310	Adapter	1				Press fitting of bushing
		11	791-630-3220	Adapter	1				
			791-630-3250	Adapter	1				
		12	791-630-3290	Guide	1				Guide when press fitting link
		13	791-635-3110	Frame	1				Remover & installer assembly 791-630-3200
			791-635-3160	Extension	1				
			791-635-3170	Nut	4				Press fitting of link pin
			791-635-3180	Screw	2				
			791-635-3190	Screw	1				
			791-630-3310	Adapter	1				
			791-630-3210	Pin guide	1				
			791-630-3270	Guide	1				
			791-630-3280	Spacer	1				
			04530-11018	Eyebolt	1				
			01580-01210	Nut	1				

REMOVAL OF ENGINE HOOD ASSEMBLY

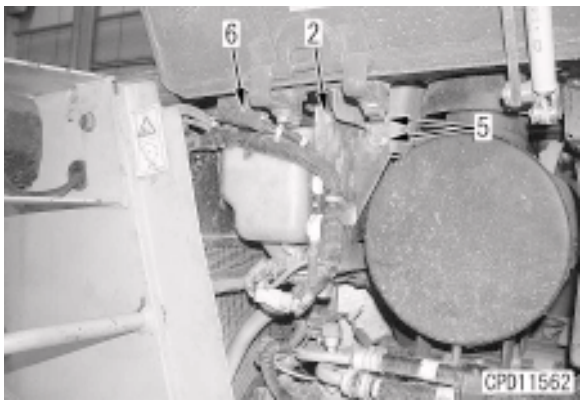
⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Open the engine side cover.
2. Remove 2 each of the mounting bolts of oil filler bracket (1) and washer tank bracket (2).
3. Disconnect clamp stay (3), (4).

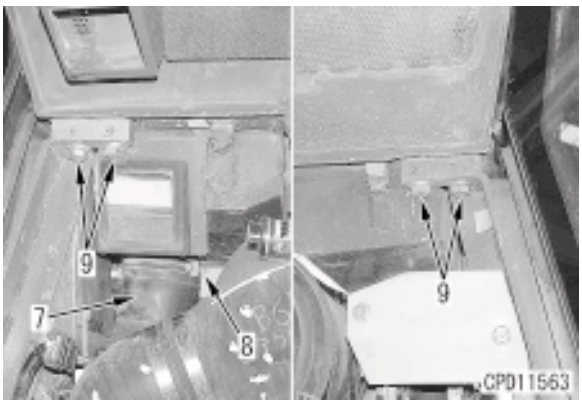




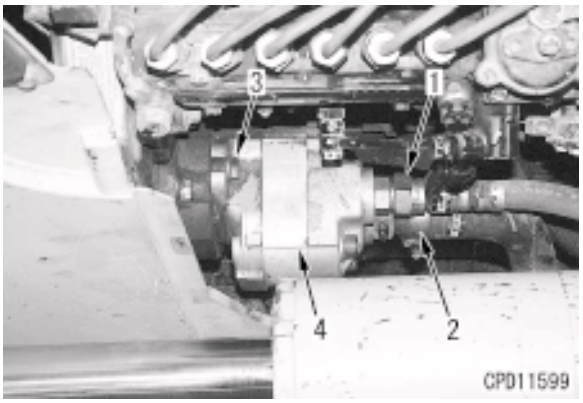
4. Remove mounting bolt (5) on the left side of washer tank bracket (2).
   ★ Lower the tank onto the engine.
5. Disconnect connector (6) and remove the clamp bolt under the connector.
   ★ The clamp bolt is seen if the connector is removed from the holder.



6. Loosen clamp (8) of air duct (7) and disconnect the duct.
7. Remove mounting bolt (9) on the rear side of the engine hood.
8. Remove the 2 mounting bolts on the front side of the engine hood.



REMOVAL OF FAN DRIVE PUMP ASSEMBLY

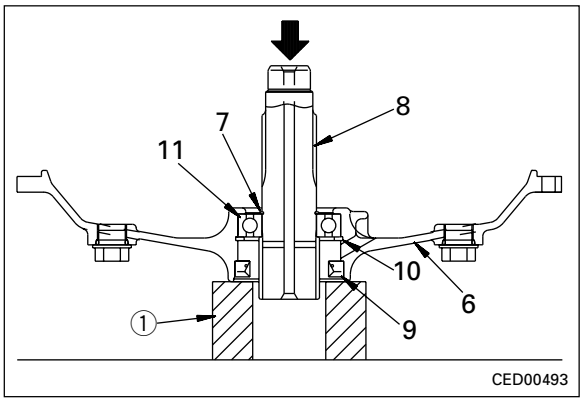


1. Drain the oil from the hydraulic tank.
2. Open the engine side cover and remove the lower side cover.
3. Disconnect pump outlet hose (1) and inlet hose (2).
4. Remove 2 mounting bolts (3) and pump assembly (4).

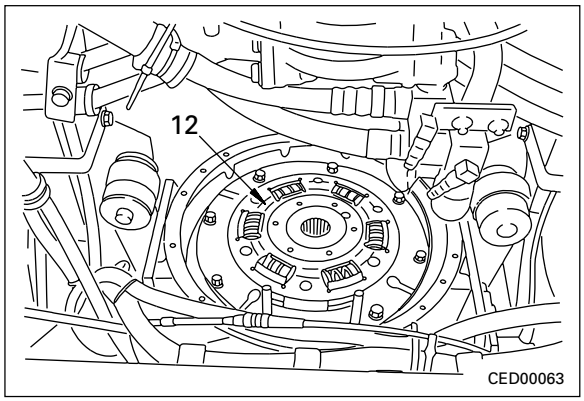
INSTALLATION OF FAN DRIVE PUMP ASSEMBLY

- Carry out installation in the reverse order to removal.
- **Refilling with oil (Hydraulic tank)**
  Add oil through the oil filler to the specified level. Run the engine to circulate the oil through the system. Then, check the oil level again.

9. Disassembly of cover assembly
1) Remove snap ring (7) from cover (6).
2) Support cover with block ① and remove shaft (8).
3) Remove oil seal (9) and snap ring (10) from cover (6), then remove bearing (11).



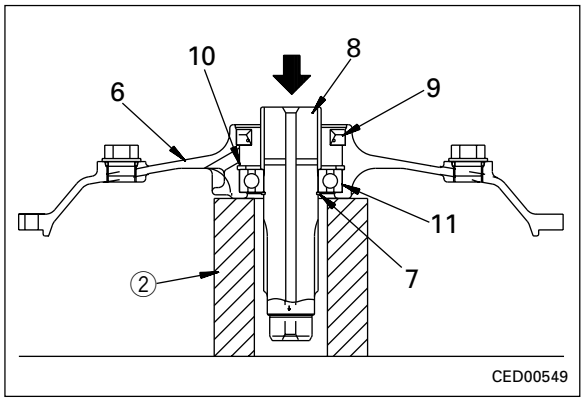
10. Remove damper assembly (12).



INSTALLATION OF DAMPER ASSEMBLY

1. Install damper assembly (12).
Damper assembly:
66.2 ± 7.4 Nm {6.75 ± 0.75 kgm}

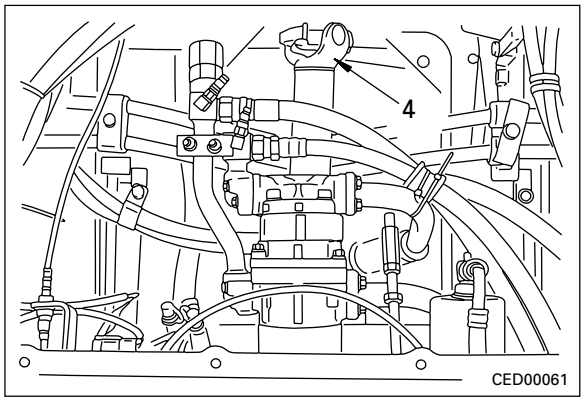
2. Assembly of cover assembly
1) Support cover (6) with block ②, use push tool to install bearing (11), and install snap ring (10).
2) Install oil seal (9).
3) Install shaft (8), then install snap ring (7).



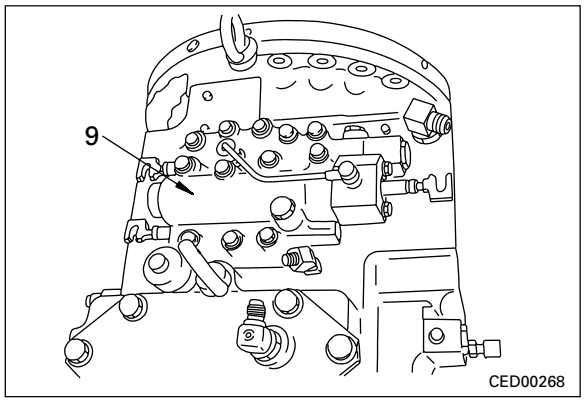
3. Install cover assembly.

4. Install coupling.

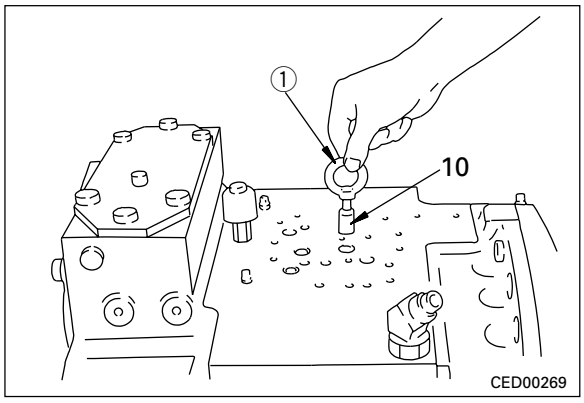
5. Install drive shaft (4).
Drive shaft mounting bolt:
66.2 ± 7.4 Nm {6.75 ± 0.75 kgm}



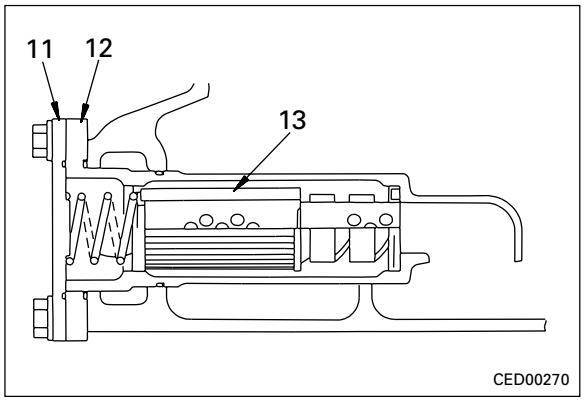
6. Shift valve assembly
Remove shift valve assembly (9).



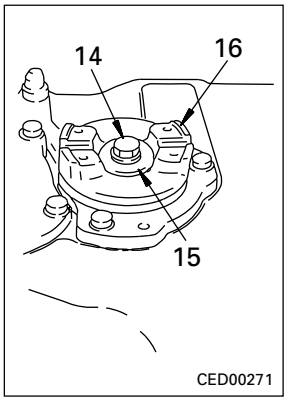
7. Sleeve
Using eyebolts ①, remove sleeve (10).

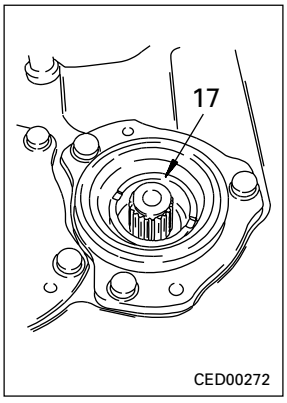


8. Strainer
1) Remove cover (11), then remove spring and strainer assembly (13).
2) Remove strainer case (12).



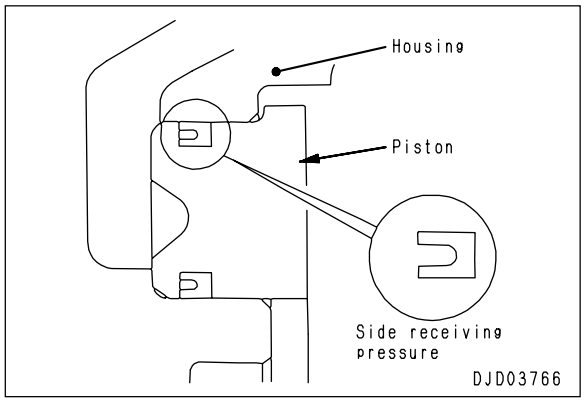
9. Coupling
1) Remove bolt (14), then remove holder (15).
2) Remove coupling (16).
3) Remove spacer (17).





ASSEMBLY OF TRANSMISSION ASSEMBLY

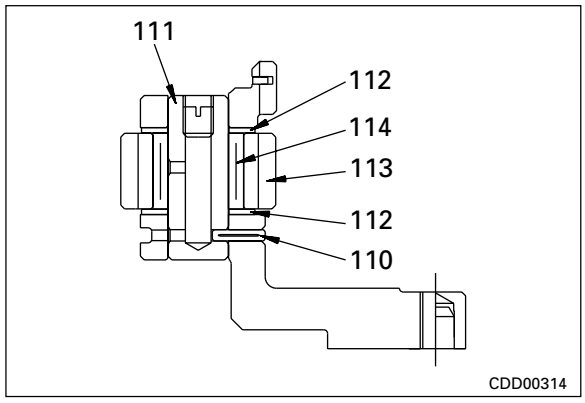
★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.
★ Clean all the oil holes in the housing before assembling.
★ The seal ring must be installed facing in the correct direction, so install with the side receiving the pressure facing the housing as shown in the diagram.



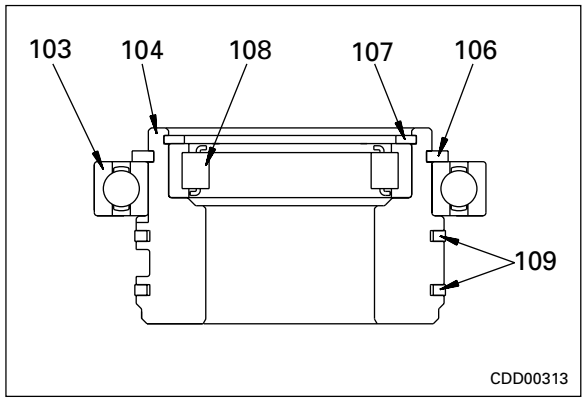
1. No. 5 (1st) clutch assembly

• **Assembly of No. 5 clutch assembly**

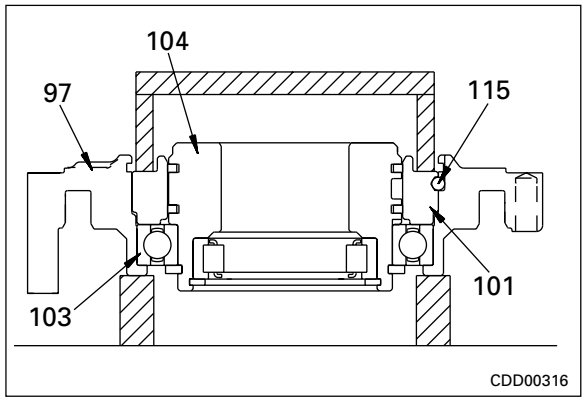
1) No. 4 clutch carrier assembly
   i) Assemble bearing (114) to gear (113), put thrust washers (112) in contact on both sides, and assemble to carrier.
      ★ One side of the thrust washer has an **R**. Install with that side facing the carrier.
   ii) Align pin holes and install shaft (111), then knock in pin (110).
      ★ Check that the planetary gear rotates smoothly.



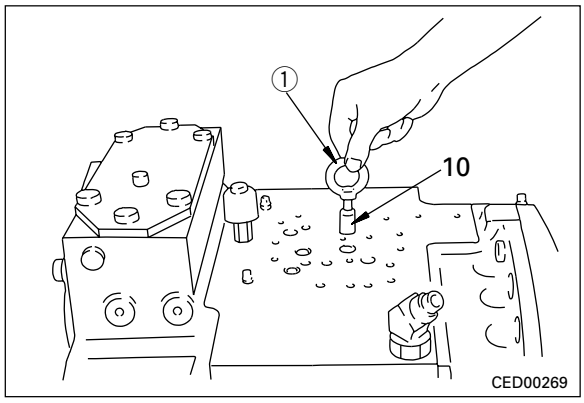
2) Using push tool, press fit bearings (108) and (103) to cage (104), then install snap rings (107) and (106).
3) Install seal rings (109).



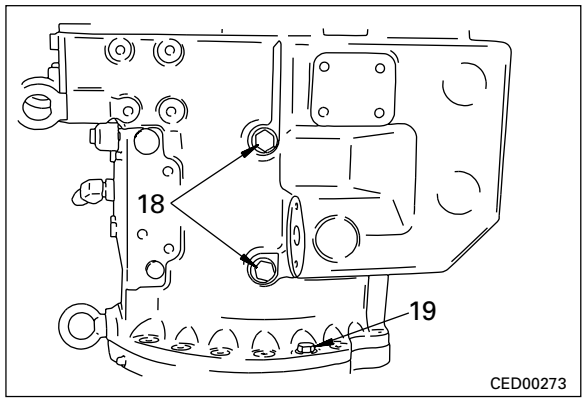
4) Set collar (101) to cage (104), and assemble ball (115) to collar (101).
5) Using push tool, align groove of ball (115), then install bearing (103) and collar (101) to rear housing (97).



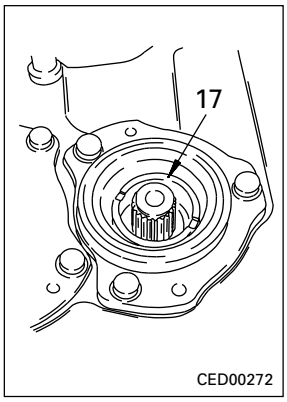
3) Using eyebolts ①, install 5 sleeves (10).

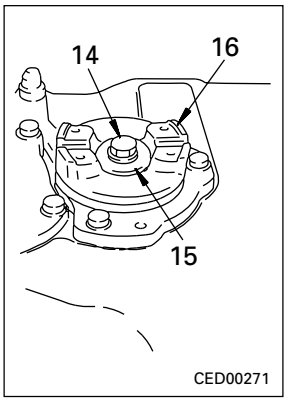


4) Tighten housing lock bolts (18) (left and right: 2 each).
   Housing lock bolt:
   277 ± 32 Nm {28.25 ± 3.25 kgm}
5) Tighten transmission case mounting bolts (19).

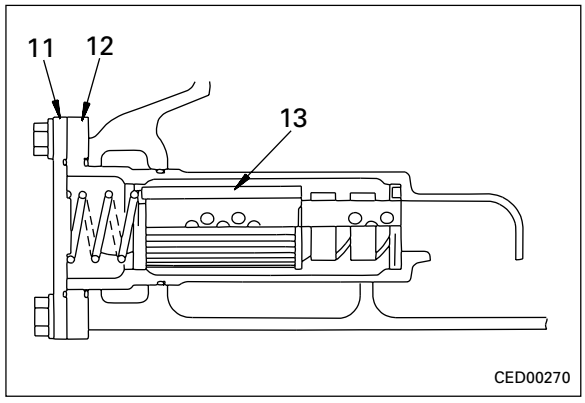


26. Coupling
1) Assemble spacer (17).
2) Install coupling (16).
   Coupling bolt: **Adhesive (LT-2)**
   Coupling bolt:
   176.5 ± 19.6 Nm {18 ± 2 kgm}
3) Fit holder (15) and tighten bolt (14).

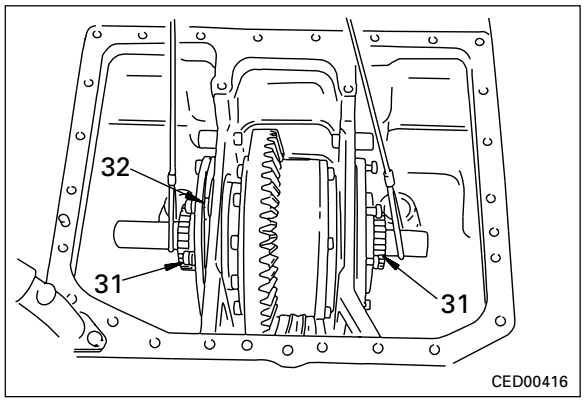




27. Strainer
1) Install strainer case (12).
2) Assemble strainer assembly (13) and spring to strainer case (12), then install cover (11).
   ★ Clean the strainer assembly before assembling it again.

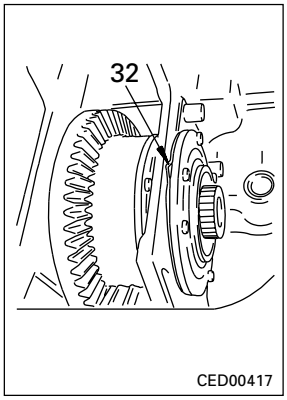


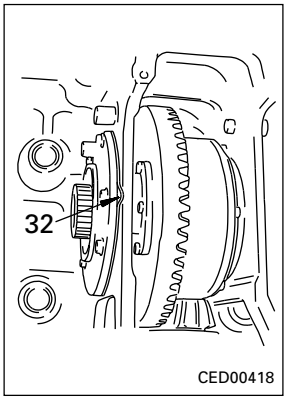
iii) Pass pipe through center, sling again, then assemble removed shim (32), and install cage and sun gear assembly (31).
Mounting bolt:
66.2 ± 7.4 Nm {6.75 ± 0.75 kgm}



3. Adjusting preload

1) Adjust shim (32) so that starting torque at tip of bevel gear is 13.7 – 22.6 N {1.4 – 2.3 kg}.
   ★ Do not mesh the bevel pinion when adjusting.
2) Adjust so that thickness of shim is more or less equal on left and right.
   ★ There are three types of shim thickness: 0.2, 0.3. 1.0 mm

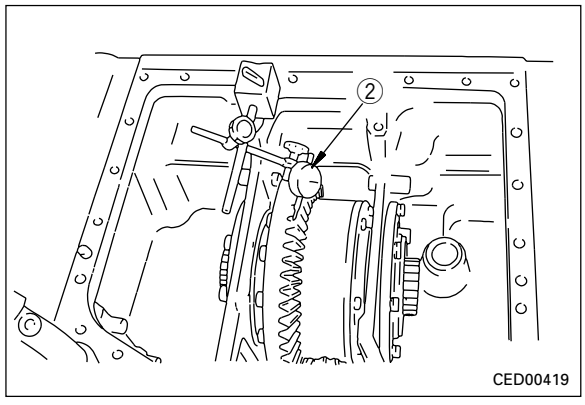


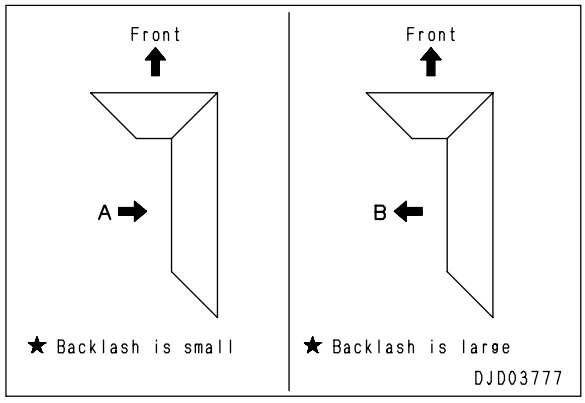


4. Adjusting tooth contact, backlash

1) Adjusting backlash
   Put the probe of dial gauge ② at right angles in contact with the tip of the bevel gear teeth. Hold the bevel pinion in position, and read the measurement when the bevel gear is moved forward and backward.
   ★ Standard value for backlash: 0.18 – 0.25 mm
   ★ Measure at a minimum of three points on opposite sides.
   • If the result of the inspection shows that the correct backlash is not being obtained, adjust as follows.

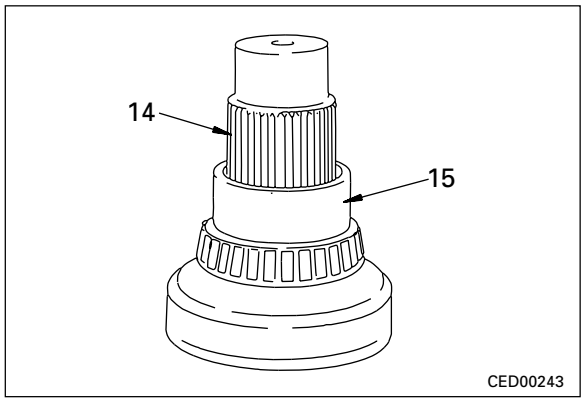
   • Adjust by changing the shim thickness at the cage. However, do not change the preload of the bearing. Adjust by moving shims between one side and the other. Always keep the same total thickness of shims.



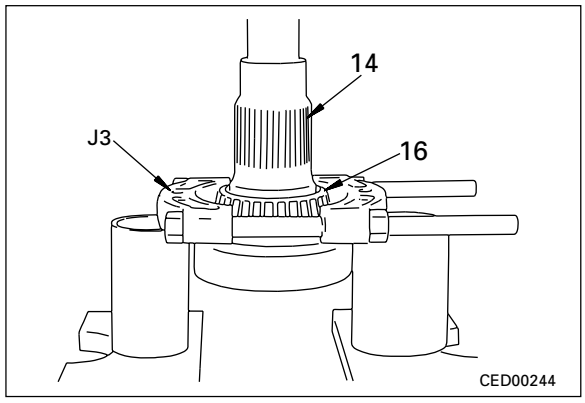


12. Disassembly of drive shaft assembly

1) Remove collar (15) from drive shaft (14).

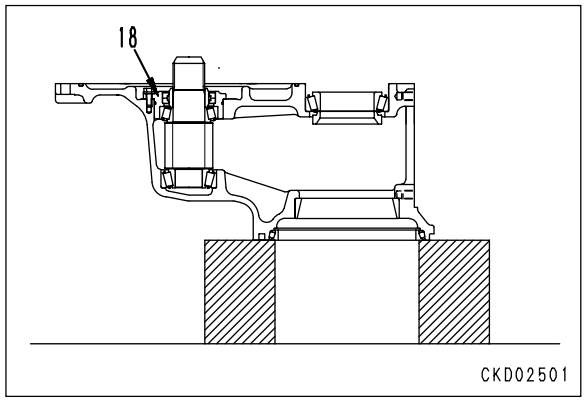


2) Set to press, and using tool **J3**, pull out bearing inner race (16) from drive shaft (14).



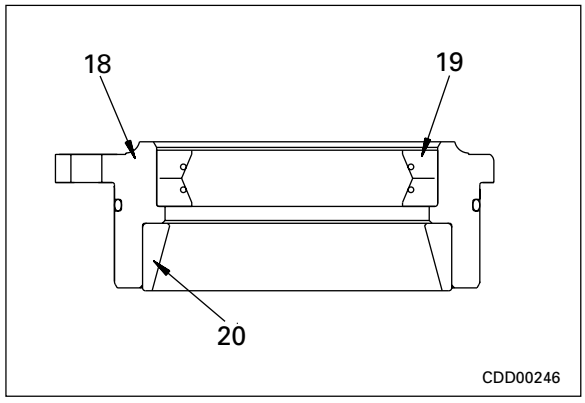
• **Pinion assembly**

13. Remove oil seal and bearing housing (18).



14. Disassembly of oil seal, bearing housing

1) Remove oil seal (19) from oil seal and bearing cage (18).
2) Remove bearing outer race (20).



DISASSEMBLY OF IDLER ASSEMBLY

1. Remove dowel pin (1), then remove support (2).

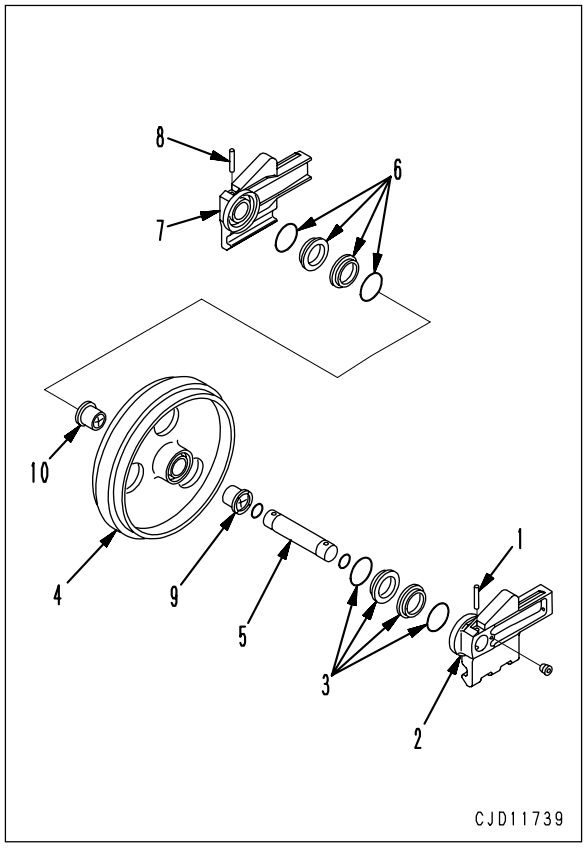
2. Remove floating seal (3) from support (2) and idler (4).

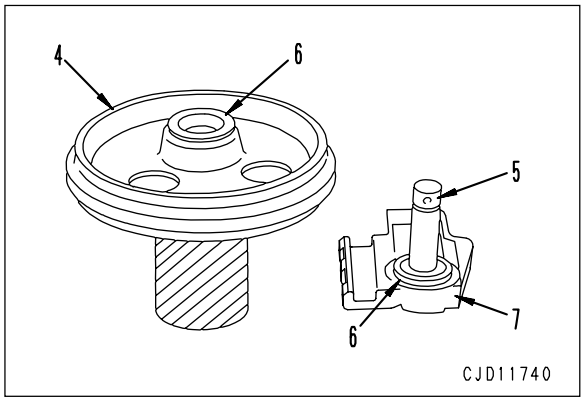
3. Pull out idler (4) from shaft (5) and support assembly (7).
★ It is filled with 150 cc. of oil, so drain the oil at this point or lay a cloth to prevent the area from becoming dirty.

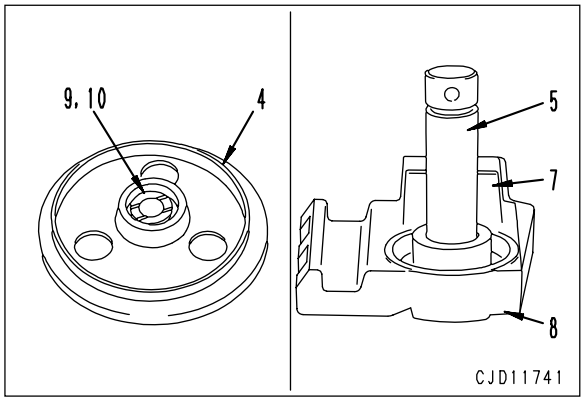
4. Remove floating seal (6) on opposite side from idler (4) and shaft (5) and support assembly (7).

5. Remove dowel pin (8), then remove support (7) from shaft (5).

6. Remove bushings (9) and (10) from idler (4).







5. Install spacer (5) with bolt (4).

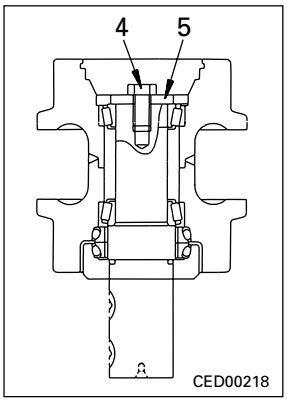
Bolt: **277.5 ± 32.4 Nm {28.3 ± 3.3 kgm}**

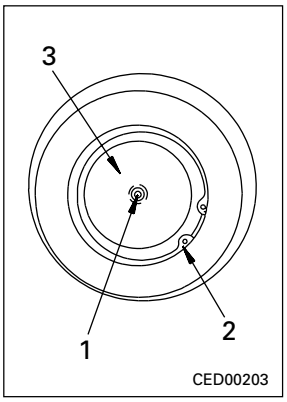
6. Using tool **L4**, add oil to carrier roller.

Carrier roller: **240 cc (GO140B)**

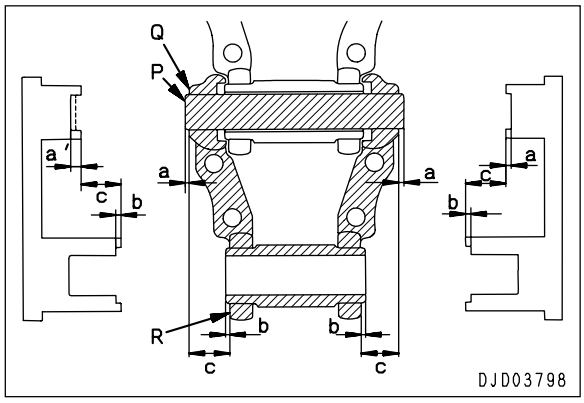
7. Fit O-ring to cover (3) and install to roller, then install snap ring (2).

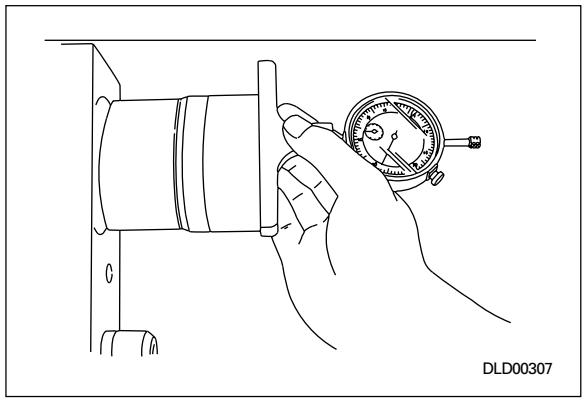
8. Check oil level and tighten plug (1).



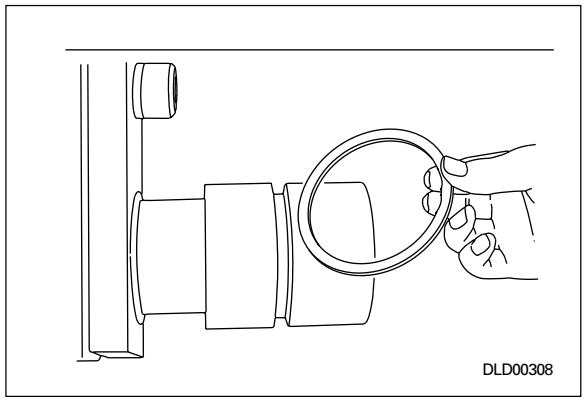


7) In order to keep the protrusion of the pin and bushing constant and the installation dimensions of the seal within the specified value during assembly, adjust the press-fitting jig dimensions of the link press.
   - ★ For details of the standard dimensions, see PRESS-FITTING JIG DIMENSION TABLE FOR LINK PRESS.
   - ★ To leave a small space for the pin when assembling, ensure that the dimension (dimension "**a'**") is greater than dimension "**a**" at the pin pushing portion of the left press-fitting jig.
     When assembling in order ① press fitting left link, ② press fitting right link, provide the extra space for the pin on the right press-fitting jig.
   - ★ If the end face of the pin (portion **P**) or the side face of the link (portions **Q**, **R**) are worn, add the amount of wear to the standard dimension when adjusting the dimension of the press-fitting jig so that the amount of protrusion of the left and right pin and bushing is uniform.

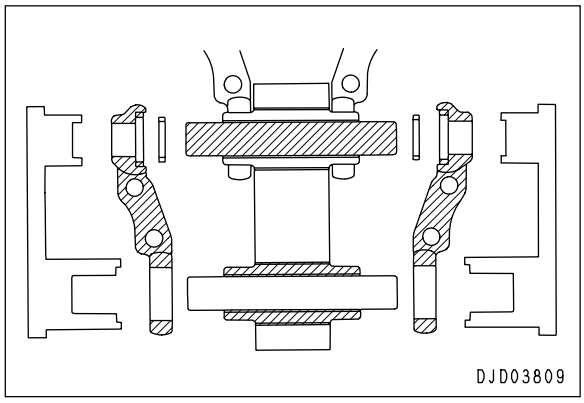


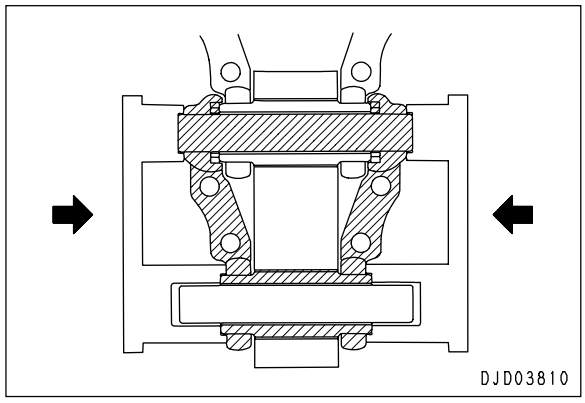


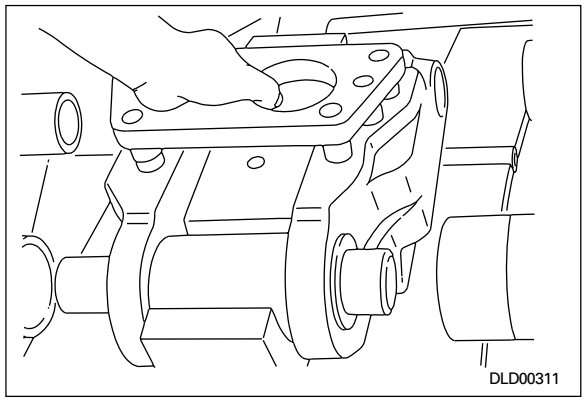
8) Adjust the relief pressure of the link press to make sure that the pushing force of the press does not exceed the specified value.
   - ★ If the pushing force is too strong, excessive force will be brought to bear on the spacer, and it will be pushed against the bushing. This will cause the spacer to break or will cause abnormal wear between the spacer and bushing end face.
   - ★ If the interference at the press-fitting portion is different from when the part is new, as when reusing a pin or bushing, measure several of the press-fitting portions, and use the table below to determine the set pushing force according to the average interference.
   - ★ Pushing force for pin, bushing:
     588 kN {60 ton}
     Pushing force ≒
     1.8 x average press-fitting force
     (Adjust the relief pressure of the link press and set the pushing force.)



6) Feed the master link portion, then set the pin and bushing in position.
   ★ When reusing the pin, assemble so that the side hole is on the link tread side in the same way as when the part is new. If the parts are not assembled facing the specified direction, the strength may drop, so mark the direction of the side hole clearly on the end face to prevent any mistake during assembly.
   ★ If the outside diameter of the pin is worn, assemble so that the face that is not worn is on the pulling side. However, in this case also assemble so that the side hole faces the tread surface of the link.
7) Set the left and right links in position, then operate the left and right pushing jigs to press fit the pin and bushing at the same time.
   ★ The seal may come off the link due to the play when press fitting, so press fit smoothly. If the seal comes off the link, stop the press-fitting operation and fit the seal correctly on the link, then start the press-fitting operation again.
   ★ Pushing force for pin, bushing:
   588 kN {60 ton}
   Pushing force ≒
   1.8 x average press-fitting force
   (Adjust the relief pressure of the link press and set the pushing force.)
8) Using a shoe bolt hole pitch gauge, measure the distance between the shoe bolt holes and stop press fitting when it is within the standard value.
9) Assemble the pin end master link as the final link.
   ★ Check that the left and right master links are press fitted in parallel.

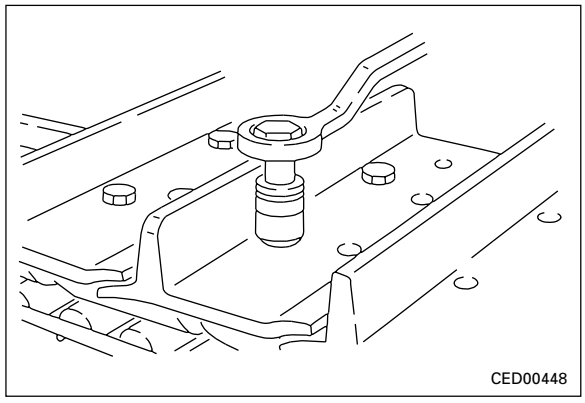




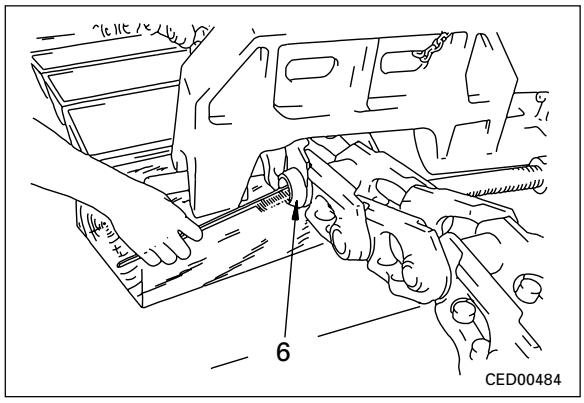


3. Shoe (regular link portion)
Set the link assembly on the bed, then use a shoe bolt impact wrench and torque wrench to install the shoe.

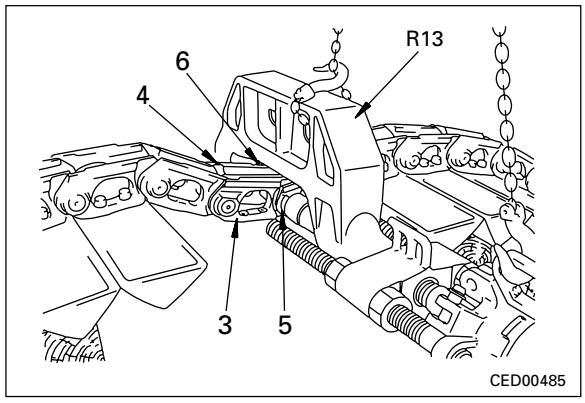
Shoe bolt (regular link):
Initial torque:
196 ± 19.6 Nm {20 ± 2 kgm}
Tightening angle: **120° ± 10°**



7) Coat press-fitting hole for pin in link (6) with gasket sealant (198-32-19890), then continue to press fit pin (2).



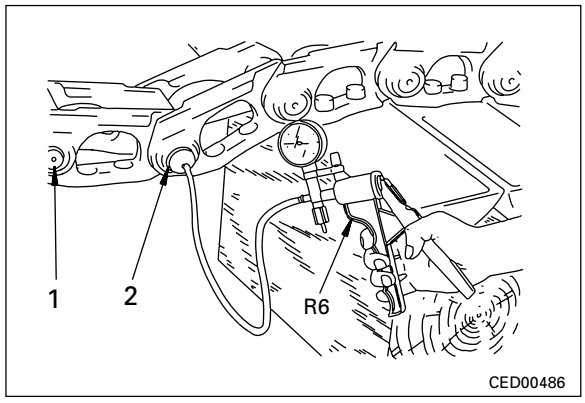
8) Using tool **R13**, apply specified pushing pressure to links (3) and (4) and links (5) and (6).
   ★ Pushing pressure of pin, bushing: 588 kN (60 ton)
   (Adjust the link press relief pressure and set the pushing pressure.)



8. Vacuum test

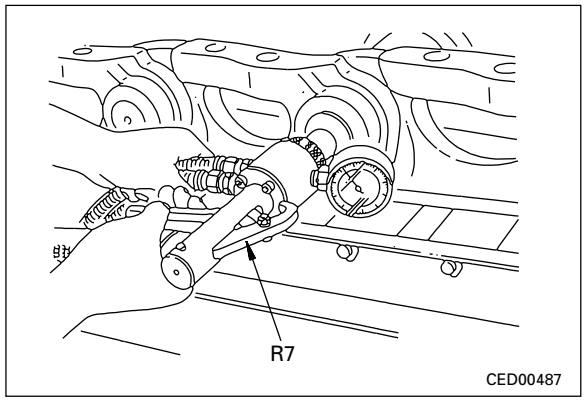
Using tool **R6**, remove air from small plug hole at end face of pins (1) and (2) and check sealing performance.

★ Check that the airtightness is maintained for 5 seconds at a negative pressure of 92.7 ± 2 kPa {695 ± 15 mmHg}.



9. Charging with oil

1) Using tool **R7**, charge with oil (GO90) through small plug hole in pin.
   ★ Be careful not to raise the pressure too high when charging with oil. This will have an adverse effect on the seal.
   ★ The oil will expand under heat, so be careful not to charge with too much oil.

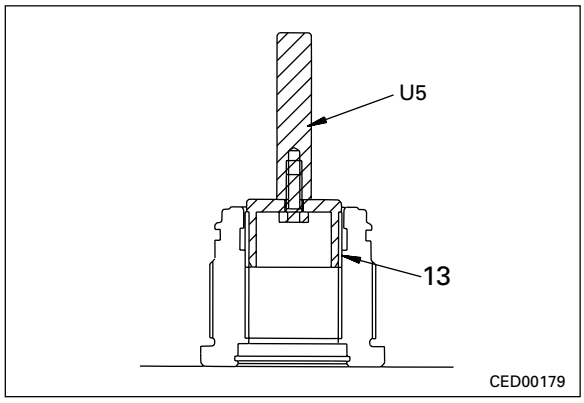


ASSEMBLY OF HYDRAULIC CYLINDER ASSEMBLY

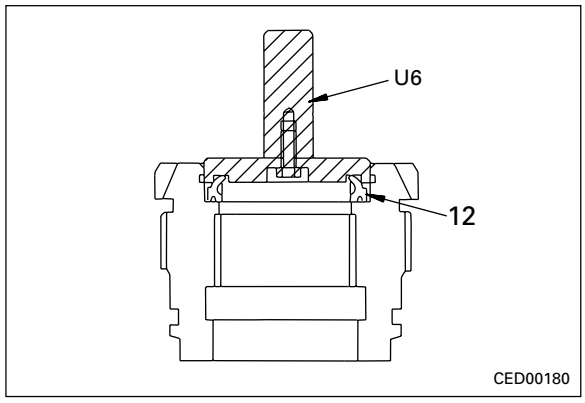
★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing. Be careful not to damage the rod packings, dust seals, or O-rings when assembling.

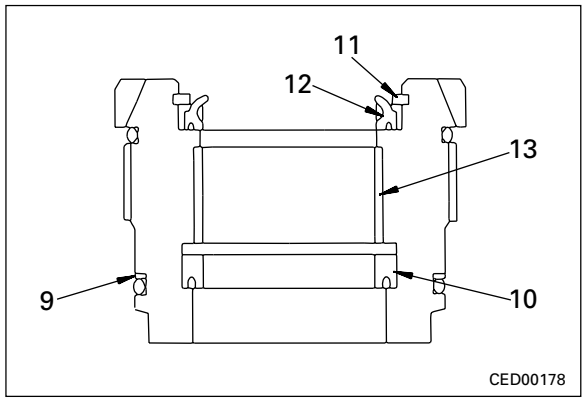
1. Piston rod assembly

1) Assembly of head assembly
   i) Using tool **U5**, press fit bushing (13).

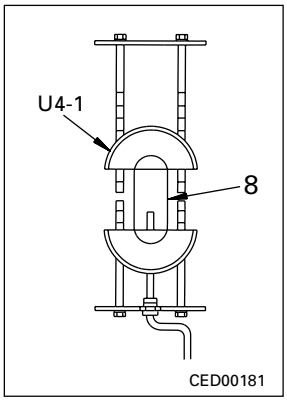


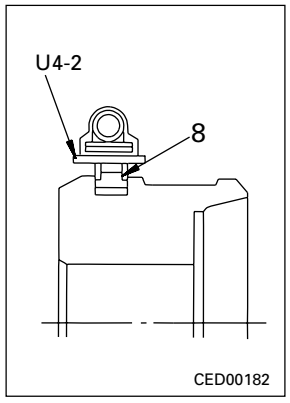
   ii) Using tool **U6**, assemble dust seal (12), and install snap ring (11).
   iii) Install packing (10).
   iv) Install backup ring (9) and O-ring.
      ★ Do not try to force the backup ring into position. Warm it in warm water (50 – 60°C) before fitting it.





2) Assembly of piston assembly
   i) Set piston ring (8) on tool **U4-1** and turn handle 8 – 10 times to expand ring.
   ii) Remove piston ring (8) from tool **U4-1**, and install to piston (5).
   iii) Using tool **U4-2**, compress piston ring (8).





REMOVAL OF HYDRAULIC TANK ASSEMBLY

⚠ Lower the work equipment to the ground and stop the engine. Release the remaining pressure in the circuit. For details, see TESTING AND ADJUSTING, RELEASING REMAINING PRESSURE IN HYDRAULIC CIRCUIT. Then loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.

1. Drain oil from hydraulic tank.

   Hydraulic tank: **44** ℓ

2. Open air conditioner condenser cover.

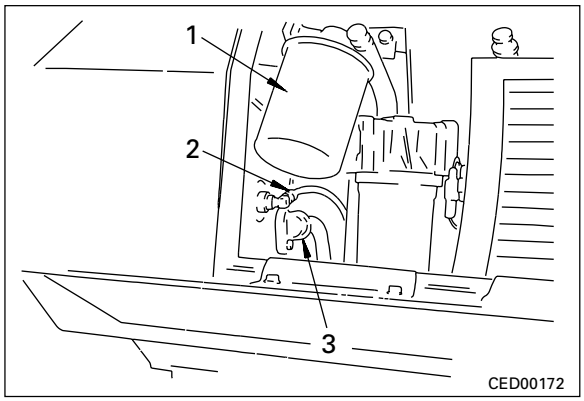
3. Disconnect filter assembly (1) from tank.
   ★ Remove with the drain hose still installed, and put it down.

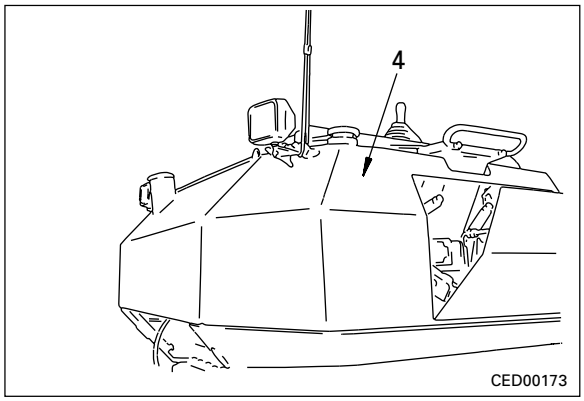
4. Disconnect return hose (2).

5. Disconnect suction tube (3).

6. Lift off hydraulic tank assembly (4).

   kg Hydraulic tank assembly: **42 kg**





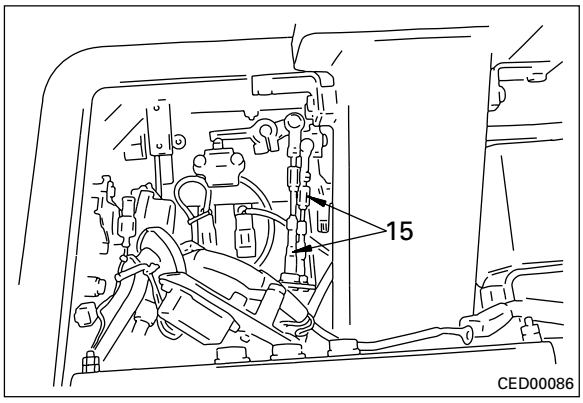
INSTALLATION OF HYDRAULIC TANK ASSEMBLY

- Carry out installation in the reverse order to removal.

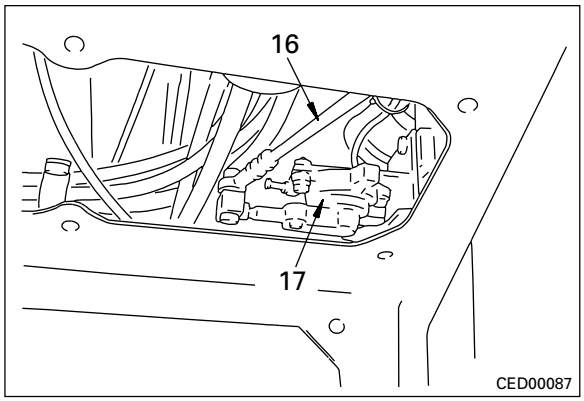
- **Refilling with oil (hydraulic tank)**
  Add oil through the oil filler to the specified level.
  ★ Run the engine to circulate the oil through the system. Then check the oil level again.

- **Bleeding air**
  Bleed the air from the piping.
  For details, see TESTING AND ADJUSTING, Bleeding air from hydraulic cylinder.

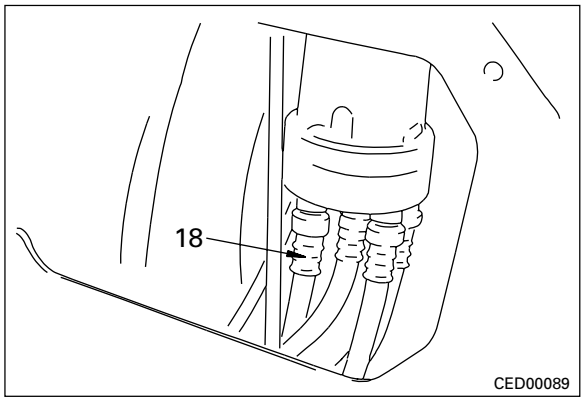
15. Disconnect 2 gear shift lever cables (15) from frame. ※ 1



16. Disconnect fuel control rod (16), then disconnect clutch assembly (17) from frame. ※ 2

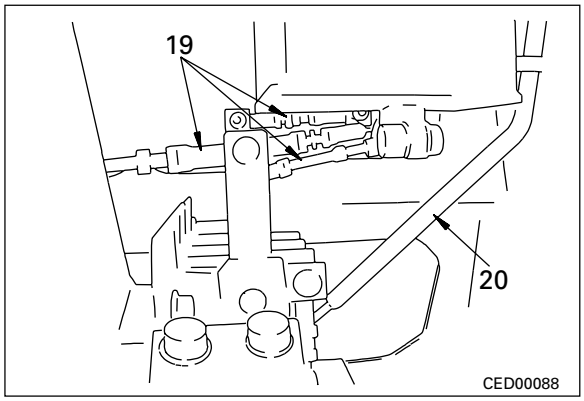


17. Disconnect 6 steering PPC hoses (18).
★ Make match marks on each hose.



18. Disconnect main control valve control rods (19). ※ 3

19. Disconnect safety rod (20).



Unit: mm

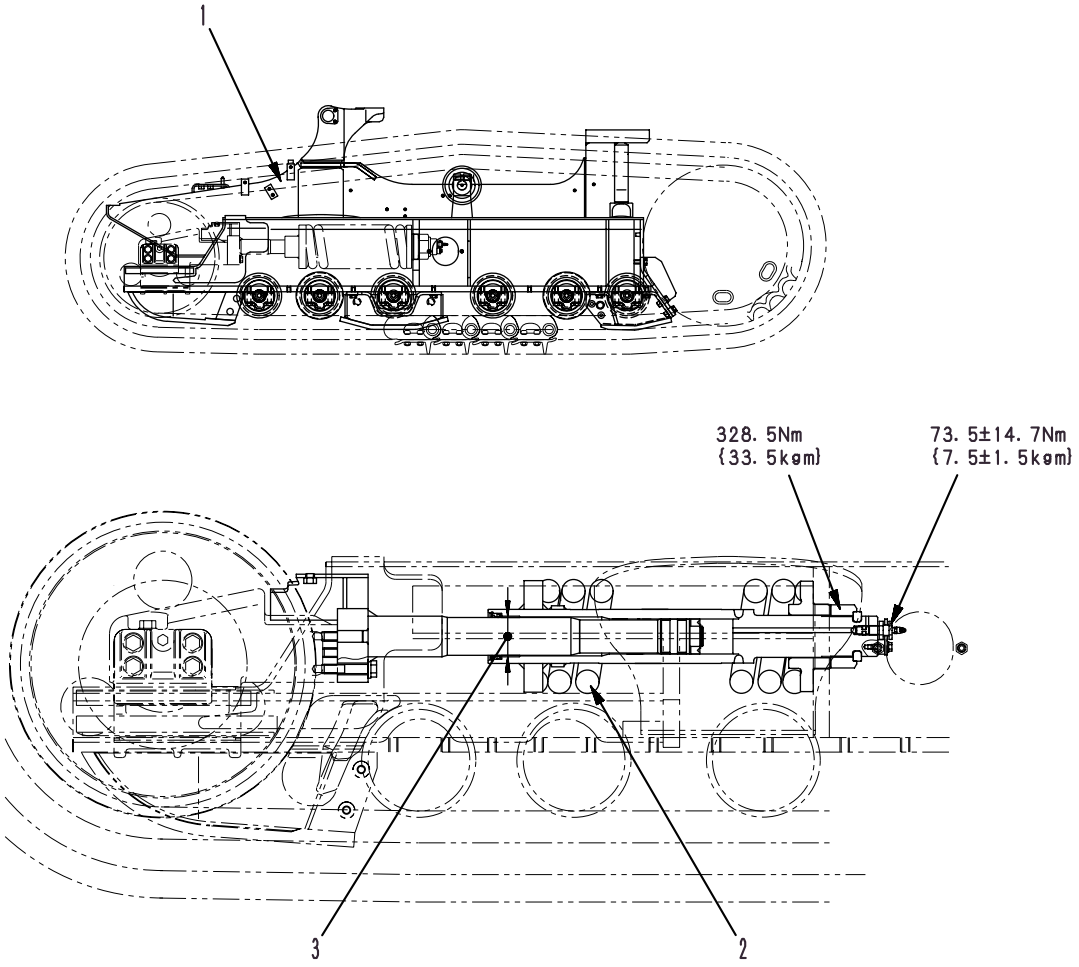
No.	Check item	Criteria					Remedy
1	Clearance between lubrication valve piston and clutch housing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace
			Shaft	Hole			
		12.0	–0.020 –0.030	+0.027 0	0.020 – 0.057	0.077	
2a	No. 1 clutch spring (large) (x5)	Standard size			Repair limit		
		Free length	Installed length	Installed load	Free length	Installed load	
		25.0	23.1	111.8 N (11.4 kg)	23.5	95.1 N (9.7 kg)	
2b	No. 1 clutch spring (small) (x5)	17.55	10.9	111.8 N (11.4 kg)	16.5	95.1 N (9.7 kg)	
3a	No. 2 clutch spring (large) (x5)	18.65	16.8	67.7 N (6.9 kg)	17.5	57.9 N (5.9 kg)	
3b	No. 2 clutch spring (small) (x5)	22.93	11.8	67.7 N (6.9 kg)	21.6	57.9 N (5.9 kg)	
4	No. 3 clutch spring (x5)	29.0	21.6	108.8 N (11.1 kg)	27.3	92.2 N (9.4 kg)	
5	No. 4 clutch spring (x5)	23.7	15.1	117.7 N (12.0 kg)	22.3	100.0 N (10.2 kg)	
6	No. 5 clutch spring (x5)	35.0	25.4	102.9 N (10.5 kg)	32.9	87.3 N (8.9 kg)	
7	Lubrication valve spring	25.4	23.6	18.9 N (1.93 kg)	24.6	17.9 N (1.83 kg)	
8	Cooler bypass valve spring	34.3	20.3	45.4 N (4.63 kg)	33.3	43.1 N (4.4 kg)	
9	Thickness of clutch disc	Standard size		Tolerance		Repair limit	
		3.0		±0.1		2.5	
10	Thickness of clutch plate	3.2		±0.1		2.9	
11	Thickness of pressure plate	3.2		±0.1		2.9	
12	No. 1,2 clutch overall assembly thickness (disc, plate: 5 each)	31.0		±0.32		28.3	
13	No. 3 clutch overall assembly thickness (disc, plate: 3 each)	18.6		±0.24		17.0	
14	No. 4 clutch overall assembly thickness (disc, plate: 2 each)	12.4		±0.20		11.3	
15	No. 5 clutch overall assembly thickness (disc x 3, plate x 4)	21.8		±0.26		20.2	

Unit: mm

No.	Check item	Criteria		Remedy
1	Thickness of brake plate	Standard size	Repair limit	Replace
		5.0	4.7	
	Distortion of brake plate	Tolerance	Repair limit	Correct or replace
		Within 0.3	0.6	
2	Thickness of brake lining	Standard size	Repair limit	Replace
		6.3	5.5	
3	Thickness of clutch plate	Standard size	Repair limit	
		5.0	4.7	
	Distortion of clutch plate	Tolerance	Repair limit	Correct or replace
		Within 0.3	0.6	
4	Thickness of clutch lining	Standard size	Repair limit	Replace
		6.0	5.5	
5	Backlash between sun gear and planetary pinion	Standard clearance	Clearance limit	
		0.13 – 0.33	—	
6	Clearance between planetary pinion and ring gear	0.15 – 0.35	—	
7	Backlash between bevel gear and pinion	0.18 – 0.25	—	Adjust or replace
8	Preload of taper roller bearing of bevel gear shaft	Standard shim thickness: 2.0 Reference when assembling new bearing [Starting torque: 2.4 – 3.9 Nm {0.24 – 0.40 kgm} Load at tip of bevel gear teeth: 13.7 – 22.6 N {1.4 – 2.3 kg}]		Adjust

TRACK FRAME, RECOIL SPRING

★ The diagram shows the D41E-6.

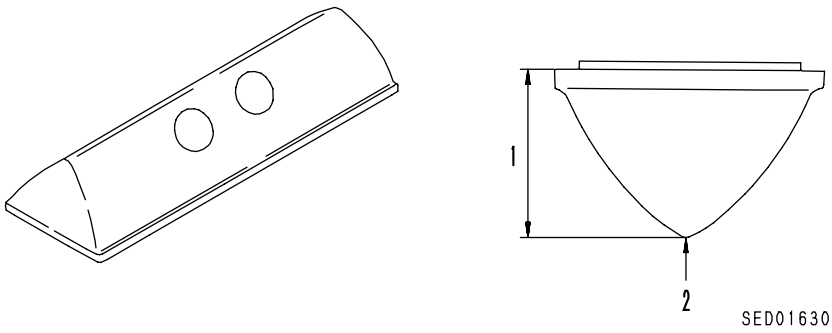


S2D05117

Unit: mm

No.	Check item	Criteria					Remedy
1	Deformation of track frame	Item			Repair limit		Correct
		Curvature			7 (for every length of 3,000)		
		Torsion			3 (for every length of 300)		
		Opening of idler			5		
2	Recoil spring	Standard size			Repair limit		Replace
		Free length x O.D.	Installed length	Installed load	Free length	Installed load	
		557 x 193	443	88.5 KN {9,028 kg}	544	78.8 KN {8,035 kg}	
3	Clearance between adjustment cylinder and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
			Shaft	Hole			
		65	–0.030 –0.078	+0.270 +0.061	0.091 – 0.348	1.0	

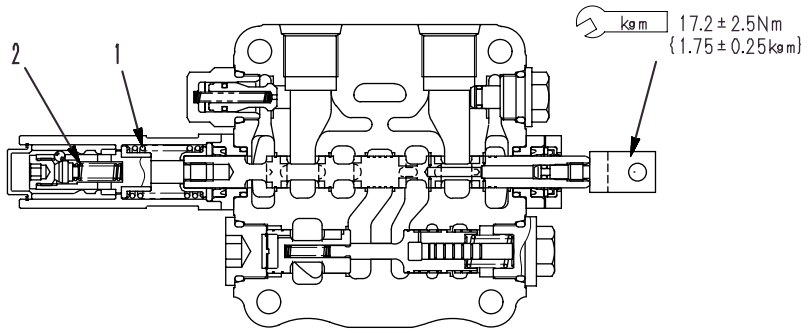
SWAMP SHOE
D41P (if equipped)



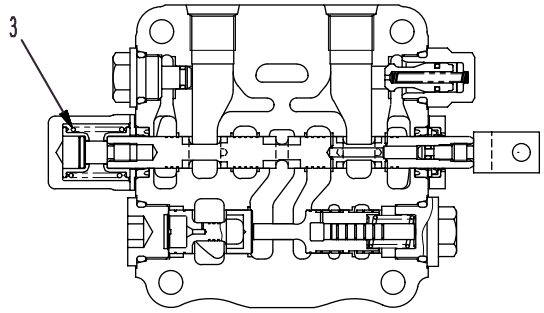
Unit: mm

No.	Check item	Criteria		Remedy
		Standard size	Repair limit	
1	Height	83	70	Rebuild or Replace
2	Thickness	18	5	

(4/5)



G – G



H – H

SAD02316

Unit: mm

No.	Check item	Criteria					Remedy
1	Lift spool spring	53.3 x 23.3	33.5	98.0 ± 5.9 N {10.0 ± 0.6 kg}	—	78.5 N {8 kg}	Replace
2	Lift detent spring	27.7 x 8.5	22	56.9 ± 3.4 N {5.8 ± 0.35 kg}	—	45.1 N {4.6 kg}	
3	Tilt spool spring	Standard size			Repair limit		
		Free length x O.D.	Installed length	Installed load	Free length	Installed load	
		55.7 x 22.3	26.5	98 ± 5.9 N {10.0 ±0.6 kg}	—	78.5 N {8.0 kg}	

90 OTHERS