SHOP MANUAL

KOMATSU

D31EX, PX-21
D37EX, PX-21

MACHINE MODEL	SERIAL No.
D31EX-21	**50001 and up**
D31PX-21	**50001 and up**
D37EX-21	**5001 and up**
D37PX-21	**5001 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.
- D31, D37EX, PX-21 mount the SAA4D102E-2 engine.
  For details of the engine, see the 102-2 Series Engine Shop Manual.

Printed in Japan 11-07 (01)

8. Precautions for disconnecting and connecting hoses and tubes in air conditioner circuit

1) Disconnection

⚠ **Collect the air conditioner refrigerant (R134a) from the air conditioner circuit in advance.**

★ Ask professional traders for collecting and filling operation of refrigerant (R134a).

★ Never release the refrigerant (R134a) to the atmosphere.

⚠ **If the refrigerant gas (R134a) gets in your eyes, you may lose your sight. Accordingly, when collecting or filling it, you must be qualified for handling the refrigerant and put on protective goggles.**

2) Connection

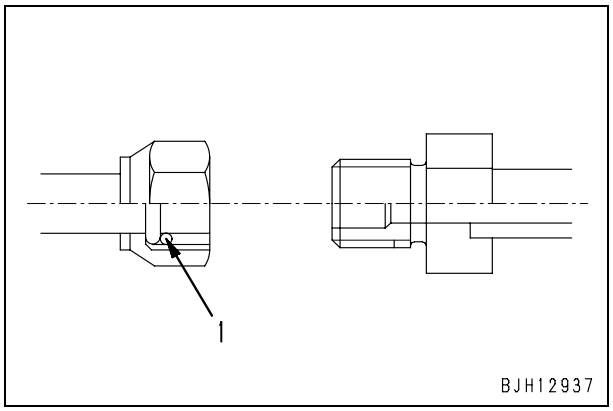
1] When installing the air conditioner circuit hoses and tubes, take care that dirt, dust, water, etc. will not enter them.

2] When connecting the air conditioner hoses and tubes, check that O-rings (1) are fitted to their joints.

3] Check that each O-ring is not damaged or deteriorated.

4] When connecting the refrigerant piping, apply compressor oil for refrigerant (R134a) **(DENSO: ND-OIL8, ZEXEL: ZXL100PG (equivalent to PAG46))** to its O-rings.

★ Example of O-ring (Fitted to every joint of hoses and tubes)



★ For tightening torque, see the precautions for installation in each section of “Disassembly and assembly”.

4) Checking muffler and exhaust pipe for damage and looseness
   1] Visually check the muffler, exhaust pipe and their mounting parts for a crack and damage.
      If any part is damaged, replace it.
   2] Check the mounting bolts and nuts of the muffler, exhaust pipe and their mounting parts for looseness.
      If any bolt or nut is loosened, retighten it.
5) Checking muffler function
   Check the muffler for abnormal sound and sound different from that of a new muffler.
   If any abnormal sound is heard, repair the muffler, referring to “Troubleshooting” and “Disassembly and assembly”.

Liters to U.K. Gallons

1 ℓ = 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	7.699	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

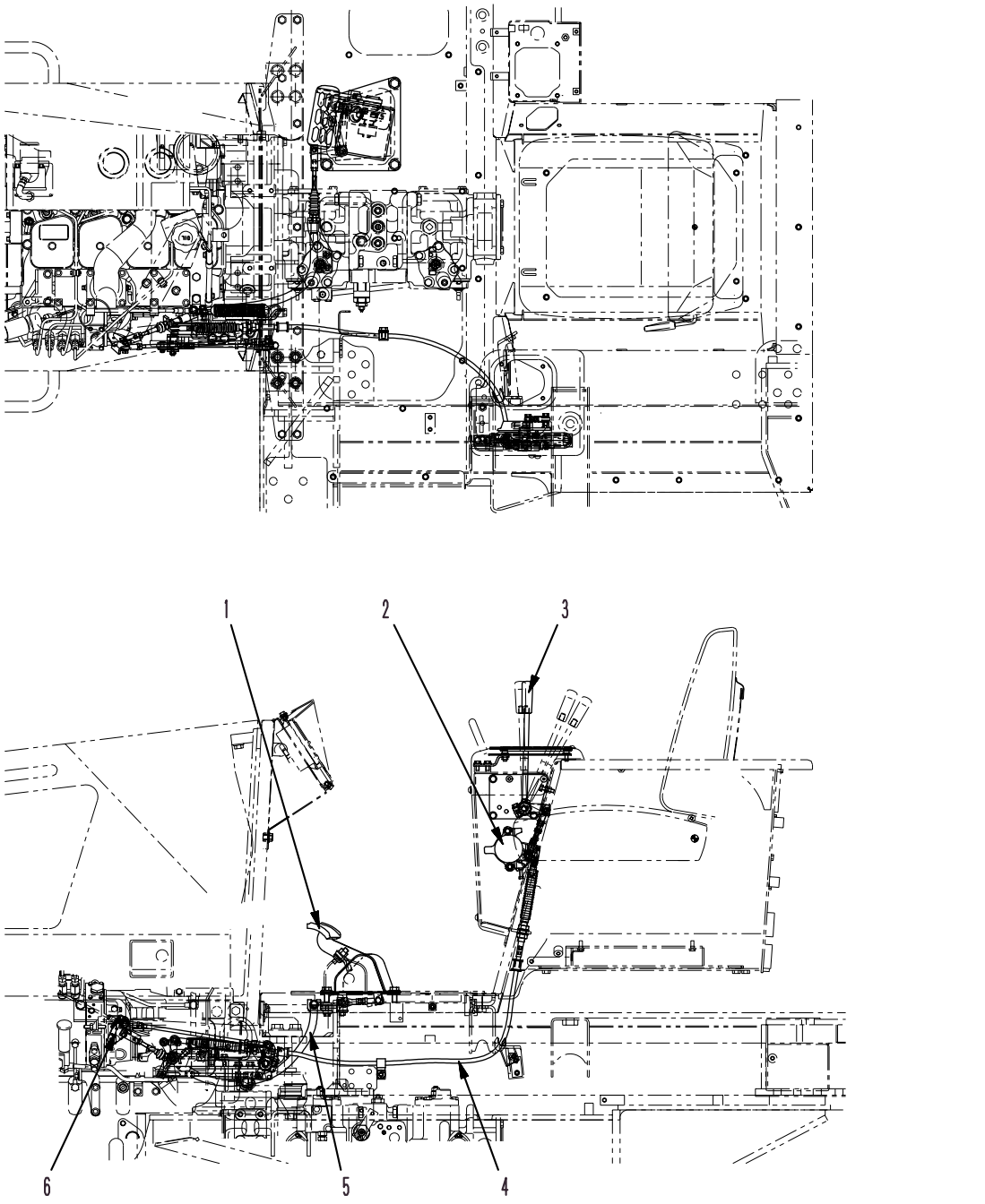
kgm to ft.lb

1 kgm = 7.233 ft.lb

	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

D37EX-21	D37PX-21				
400 mm Single shoe	600 mm Single shoe	600 mm Swamp shoe			
5105 and up	5091 and up				
6,030	6,330	6,310			
7,410	7,770	7,750			
7,750	8,110	8,090			
– (Pivot turn)	– (Pivot turn)	– (Pivot turn)			
30	30	30			
35	35	35			
4.3	4.3	4.3			
6.5	6.5	6.5			
8.5	8.5	8.5			
4.3	4.3	4.3			
6.5	6.5	6.5			
8.5	8.5	8.5			
33.3 {0.34}	23.5 {0.24}	22.5 {0.23}			
40.2 {0.41}	28.4 {0.29}	28.4 {0.29}			
42.1 {0.43}	29.4 {0.30}	29.4 {0.30}			
3,055	3,055	3,060			
4,015	3,995	3,975			
4,085	4,065	4,045			
1,850	2,250	2,250			
2,720	3,250	3,250			
2,700	2,700	2,720			
2,015	2,015	2,035			
2,700	2,700	2,720			
2,700	2,700	2,720			
1,450	1,650	1,650			
2,240	2,240	2,240			
400	600	600			
315	315	385			

ENGINE CONTROL

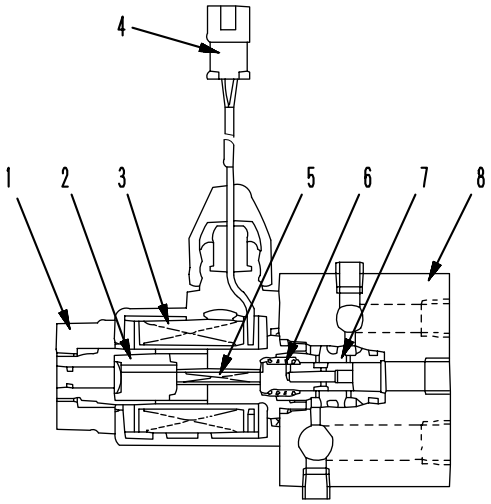


9JB00304

1. Decelerator pedal
2. Clutch
3. Fuel control lever
4. Fuel control cable
5. Decelerator cable
6. Governor lever

Outline

- The control of the engine speed is carried out with fuel control lever (3) or decelerator pedal (1).



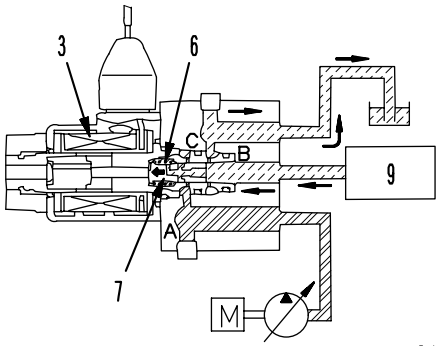
9JB00311

1. Nut
2. Plunger
3. Coil
4. Connector
5. Push pin
6. Spring
7. Spool
8. Block

Operation

When solenoid is de-energized

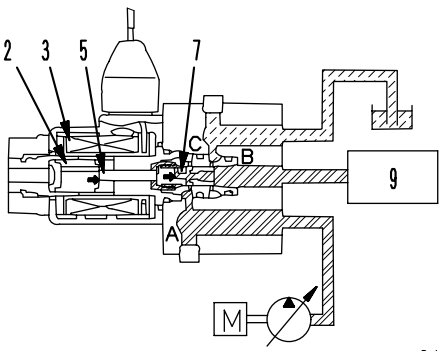
- The signal current does not flow from the controller, so coil (3) is de-energized.
- For this reason, spool (7) is pushed fully to the left by spring (6).
- As a result, port **A** closes and the flow of pressurized oil from the pump does not flow to actuator (9).
  At the same time, the oil from actuator (9) flows from port **B** to port **C** and then, it is drained.



9JB00312

When solenoid is energized

- When the signal current flows to the solenoid valve, coil (3) is excited, and propulsion force to the right is generated in plunger (2).
- For this reason, spool (7) is pushed to the right by push pin (5).
- As a result, the pressurized oil from the pump flows from port **A** through port **B**, and goes to actuator (9).
  At the same time, port **C** closes, so the oil is not drained.



9JB00313

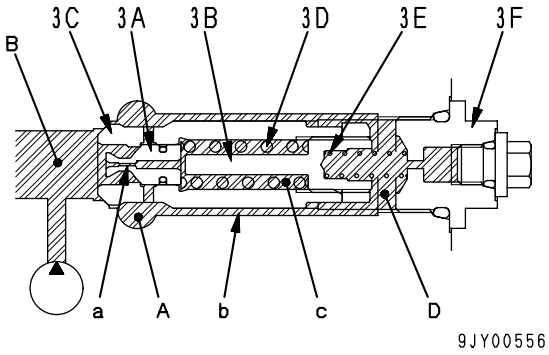
1. When it is high-pressure relief valve

Function

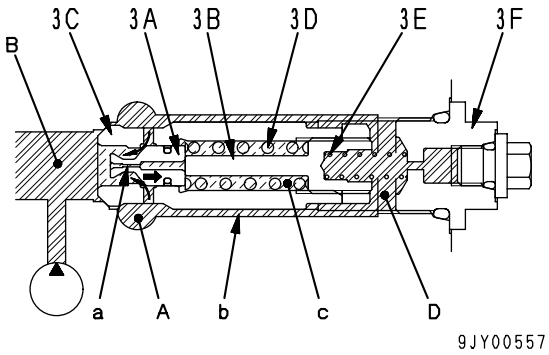
- It restricts the maximum pressure inside the HST circuit to protect the circuit.

Operation
(valve at piston pump discharge side)

- Port **A** is connected to the pump circuit and port **B** is connected to the charge circuit. The pressure oil passes through drill hole **a** in piston (3A) and also fills port **C**.
- The oil at high-pressure port **A** passes through passage groove **b** in the body and also fills port **D**.
- Poppet (3A) is in tight contact with valve seat (3C).
- If abnormal pressure is generated in the circuit and the oil pressure at ports **A** and **D** reaches the pressure set by spring (3D), poppet (3A) is pushed to the right, and the oil at port **A** is relieved to port **B**, so the oil pressure at port **A** goes down.



9JY00556



9JY00557

2. When it is safety-suction valve

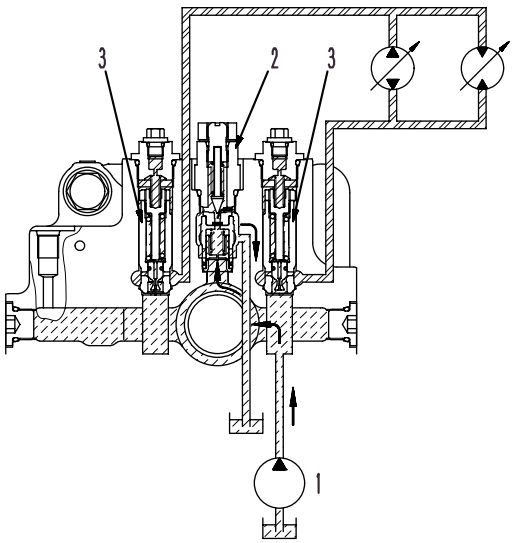
Function

- This ensures the oil flow in in the HST closed circuit. It prevents the charge oil flow from flowing to the pump high-pressure side (discharge side).

Operation

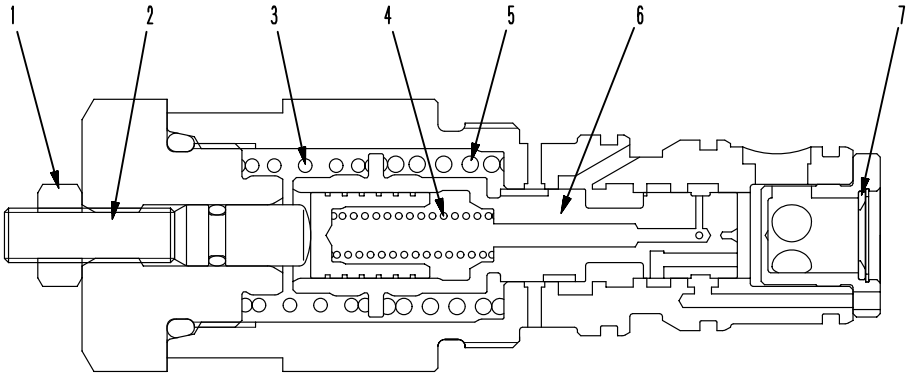
1) When HST pump discharge amount is 0

- The HST closed circuit is sealed, so the charge pressure oil does not flow into the HST circuit.
- Therefore, the charge pressure oil from charge pump (1) all passes through charge safety valve (2) and is drained to the inside of the case.



9JY00558

AS VALVE



9JY00573

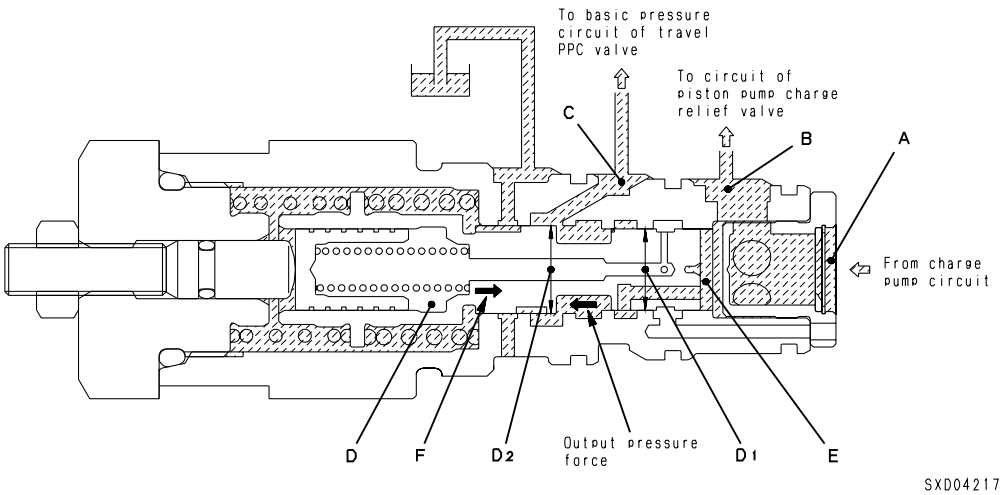
Function

- This valve is installed to the main piston pump. It reduces the pressure of the oil from the charge pump and controls it to the basic pressure of the travel PPC valve for the travel speed control.
- This outputs an oil pressure proportional to the change in the engine speed.

1. Locknut
2. Adjustment screw
3. Spring (plug end)
4. Spring (inside piston)
5. Spring (valve end)
6. Valve
7. Orifice

Operation

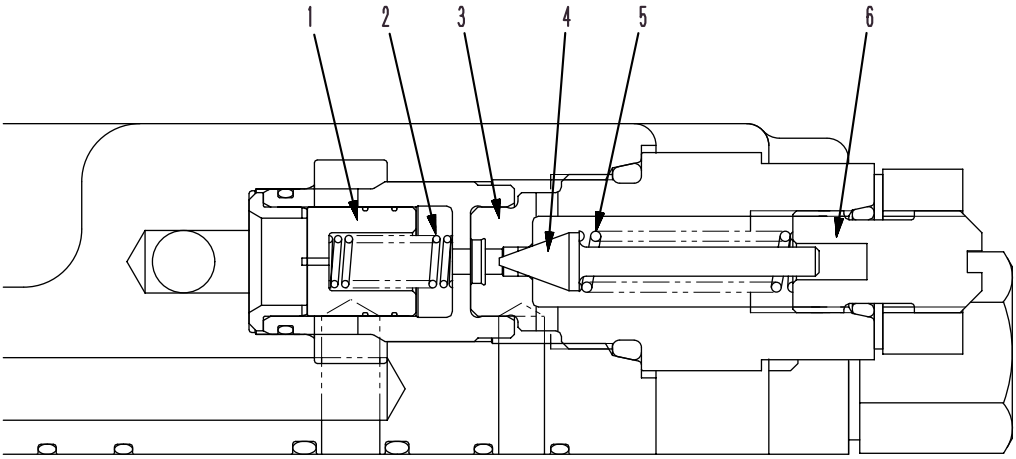
1. When reducing pressure



SXD04217

- The oil from the charge pump passes through orifice (7), and always flows from port **B** to the piston pump charge circuit.
- When the oil from the charge pump passes through orifice (7), a difference in pressure is formed between port **A** and port **B**. This difference in pressure is taken to chambers **D** and **E** of valve (6) and generates a hydraulic propulsion force in direction **F**.
- At the same time, the pressure oil is reduced from the charge relief pressure of port **B**, and is output to port **C** (valve area difference: **D2**>**D1**) to balance with **F**.
- In other words, the control pressure matches the oil flow from the charge pump that increases or decreases according to the engine speed, and is output to port **C**.

8. Charge relief valve



9JY00584

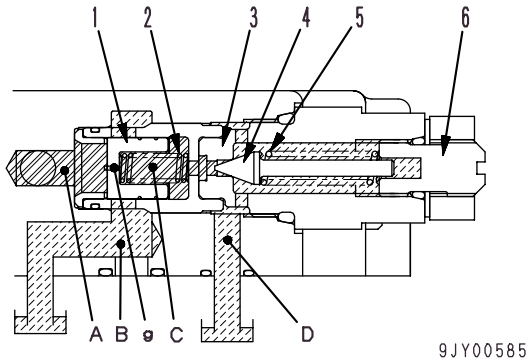
1. Valve
2. Spring
3. Valve seat
4. Poppet
5. Spring
6. Adjustment screw

Function

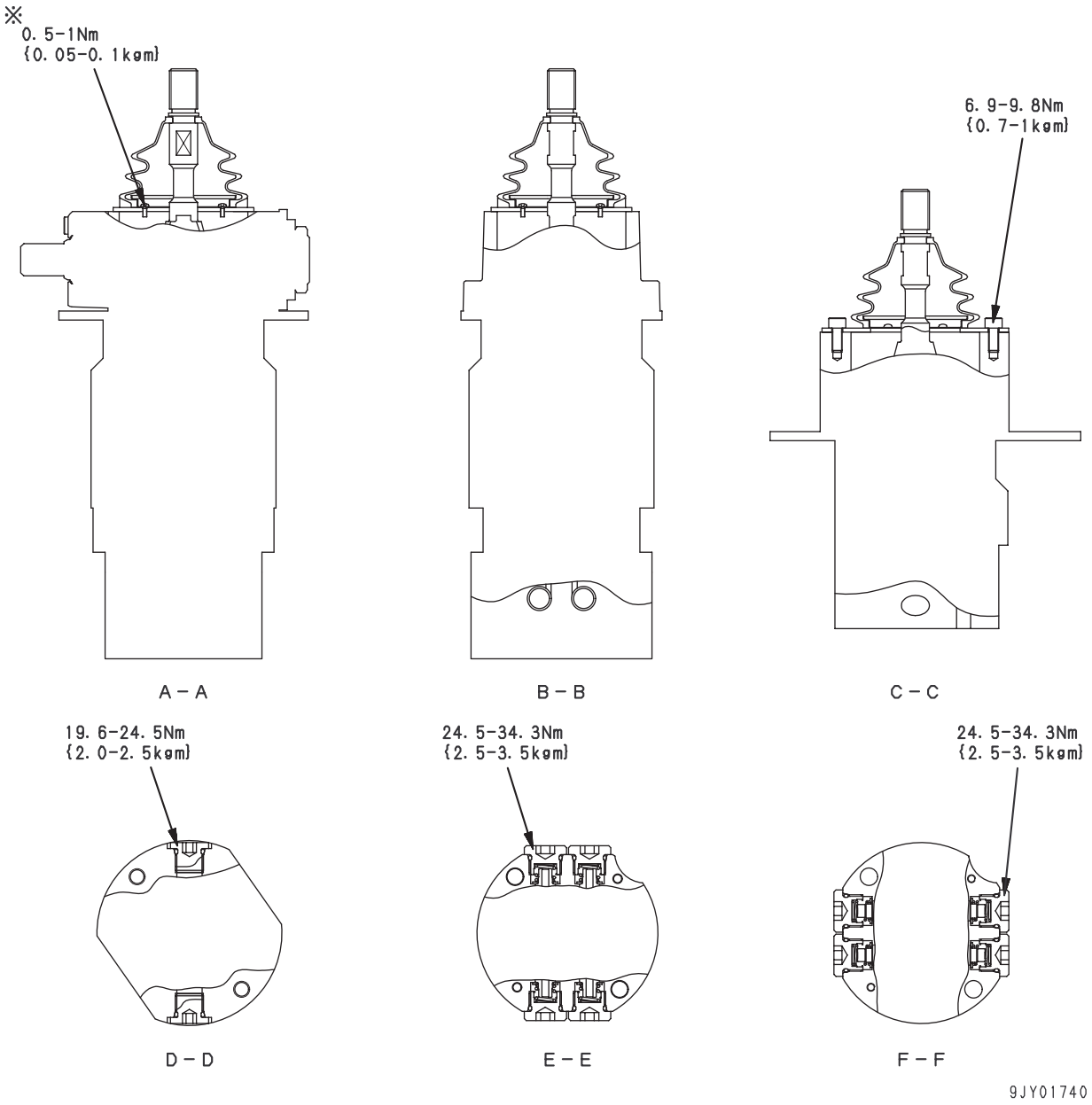
- The charge relief valve is installed inside the 3rd speed valve. It prevents the pressure at the HST main low-pressure side (charge pressure) selected by the shuttle valve from going above the set pressure. At the same time, it relieves the determined oil flow inside the motor case and prevents the motor from overheating.
- In addition, it discharges the dirtiest oil inside the HST main circuit to the outside and acts to keep the inside of the HST main circuit clean.

Operation

- Port **A** connects the pressure at the HST main low-pressure side (charge circuit) selected by the shuttle valve.
- In addition, ports **B** and **D** are connected to the tank drain circuit through the HST motor case.
- The pressure oil passes through orifice **g** in valve (1) and fills chamber **C**. Poppet (4) is fitted tightly to valve seat (5).



9JY00585



P: From control pump
T: To tank

POUT1: To HST pump flow control piston (R.H. FORWARD)
POUT2: To HST pump flow control piston (L.H. REVERSE)
POUT3: To HST pump flow control piston (L.H. FORWARD)
POUT4: To HST pump flow control piston (R.H. REVERSE)

Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="2">17</td><td rowspan="2">Deformation of track frame</td><td colspan="3">Item</td><td colspan="2">Repair limit</td><td rowspan="2">Correct</td></tr>
<tr><td colspan="3">Curvature
Twisting
Opening of idler portion</td><td colspan="2">7 (for length of 3,000)
3 (for length of 300)
5</td></tr>
<tr><td rowspan="3">18</td><td rowspan="3">Recoil spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td><td rowspan="3">Replace</td></tr>
<tr><td>Free length x OD</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>465 x ϕ 161</td><td>375.6</td><td>71.5 kN {7,300 kg}</td><td>454</td><td>63.7 kN {6,500 kg}</td></tr>
<tr><td rowspan="3">19</td><td rowspan="3">Clearance between rod and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td><td rowspan="2">Clearance limit</td><td rowspan="3">Replace bushing</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>ϕ 55</td><td>–0.030
–0.076</td><td>+0.163
+0.006</td><td>0.036 – 0.239</td><td>0.5</td></tr>
</table>

Outline

- Recoil spring (9) moves rod (7) to the front or rear when grease is added or removed from lubricator (15), and adjusts the track tension. Recoil spring (9) also acts to absorb any sudden shock applied to idler (1).
  Grease : G2-LI
  Filling amount of grease: 160 cc

- Track roller

Model	Q'ty	Flange type and arrangement
D31EX-21	5	S, S, S, S, S (S, W, S, W, S)
D31PX-21 D37EX-21 D37PX-21	6	S, S, S, S, S, S (S, W, S, S, W, S)

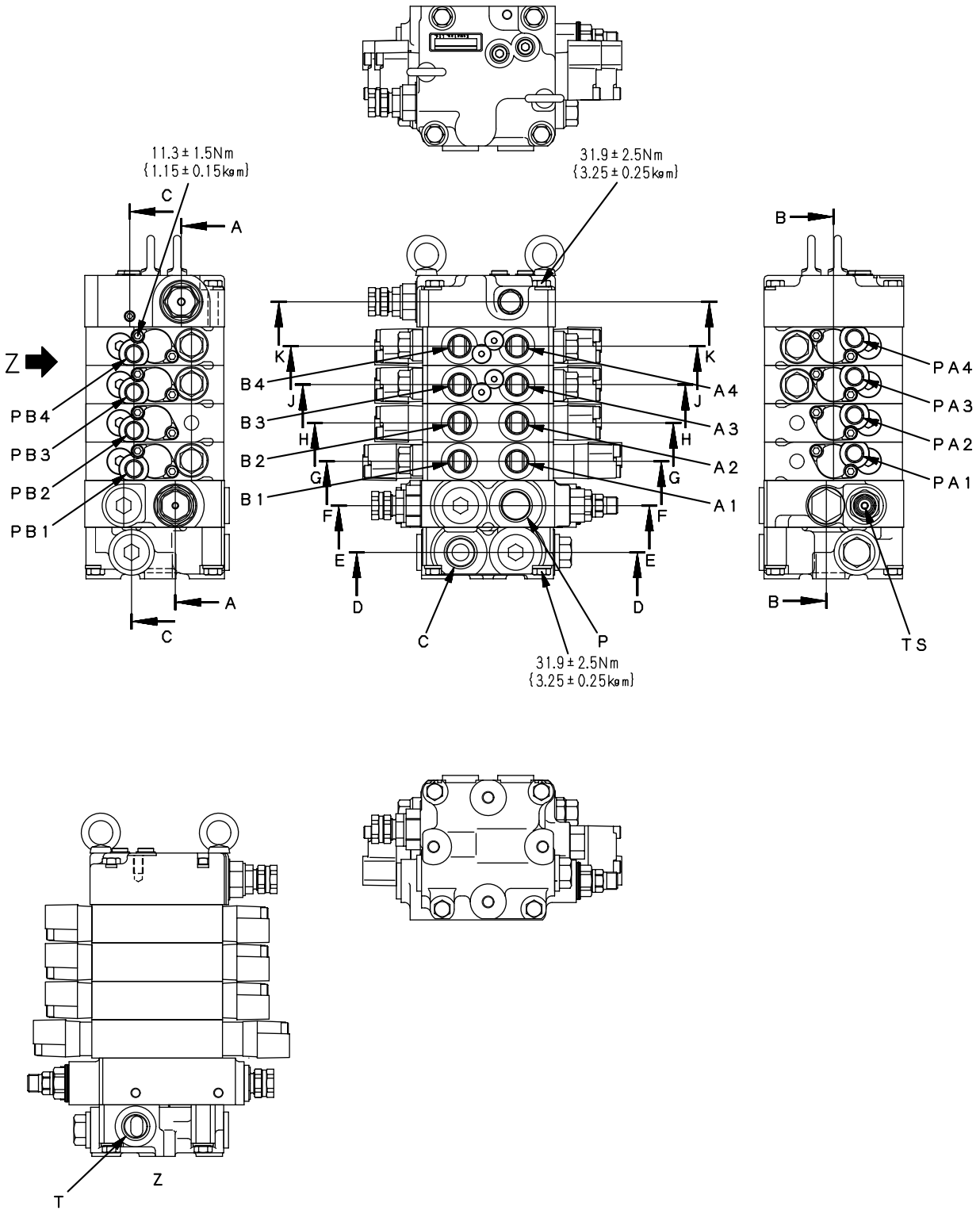
S : Single flange
W : Double flange
The arrangement inside ( ) indicates the arrangement when the double flange roller (If equipped) is installed.

Unit: mm

<table>
<tr><th>No.</th><th colspan="2">Check item</th><th colspan="4">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="4">20</td><td rowspan="4">Shoe bolt</td><td rowspan="2">a. Regular link</td><td colspan="2">Tightening torque (Nm {kgm})</td><td colspan="2">Tightening angle (º)</td><td rowspan="4">Tighten</td></tr>
<tr><td colspan="2">265 ± 30 {27 ± 3}</td><td colspan="2">—</td></tr>
<tr><td rowspan="2">b. Master link</td><td>Tightening torque (Nm {kgm})</td><td>Tightening angle (º)</td><td colspan="2">Lower limit torque (Nm {kgm})</td></tr>
<tr><td>150 ± 40
{15 ± 4}</td><td>180 ± 10</td><td colspan="2">255 {26}</td></tr>
<tr><td colspan="2">No. of shoes (one side)</td><td colspan="4">D31EX : 38 D31PX : 40
D37EX : 41 D37PX : 41</td><td>—</td></tr>
<tr><td rowspan="2">21</td><td colspan="2" rowspan="2">Interference between bushing and link</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard interference</td><td rowspan="11">Adjust or replace</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>22</td><td colspan="2">Interference between regular pin and link</td><td>ϕ 28</td><td>+0.150
0</td><td>–0.148
–0.200</td><td>0.148 – 0.350</td></tr>
<tr><td rowspan="2">23</td><td colspan="2" rowspan="2">Clearance between regular pin and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>ϕ 28</td><td>+0.150
0</td><td>+0.830
+0.330</td><td>0.180 – 0.830</td></tr>
<tr><td rowspan="2">※
24</td><td colspan="2" rowspan="2">Interference between master pin and link</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard interference</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>—</td><td>—</td><td>—</td><td>—</td></tr>
<tr><td rowspan="2">※
25</td><td colspan="2" rowspan="2">Clearance between master pin and bushing</td><td rowspan="2">Standard size</td><td colspan="2">Tolerance</td><td rowspan="2">Standard clearance</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>—</td><td>—</td><td>—</td><td>—</td></tr>
</table>

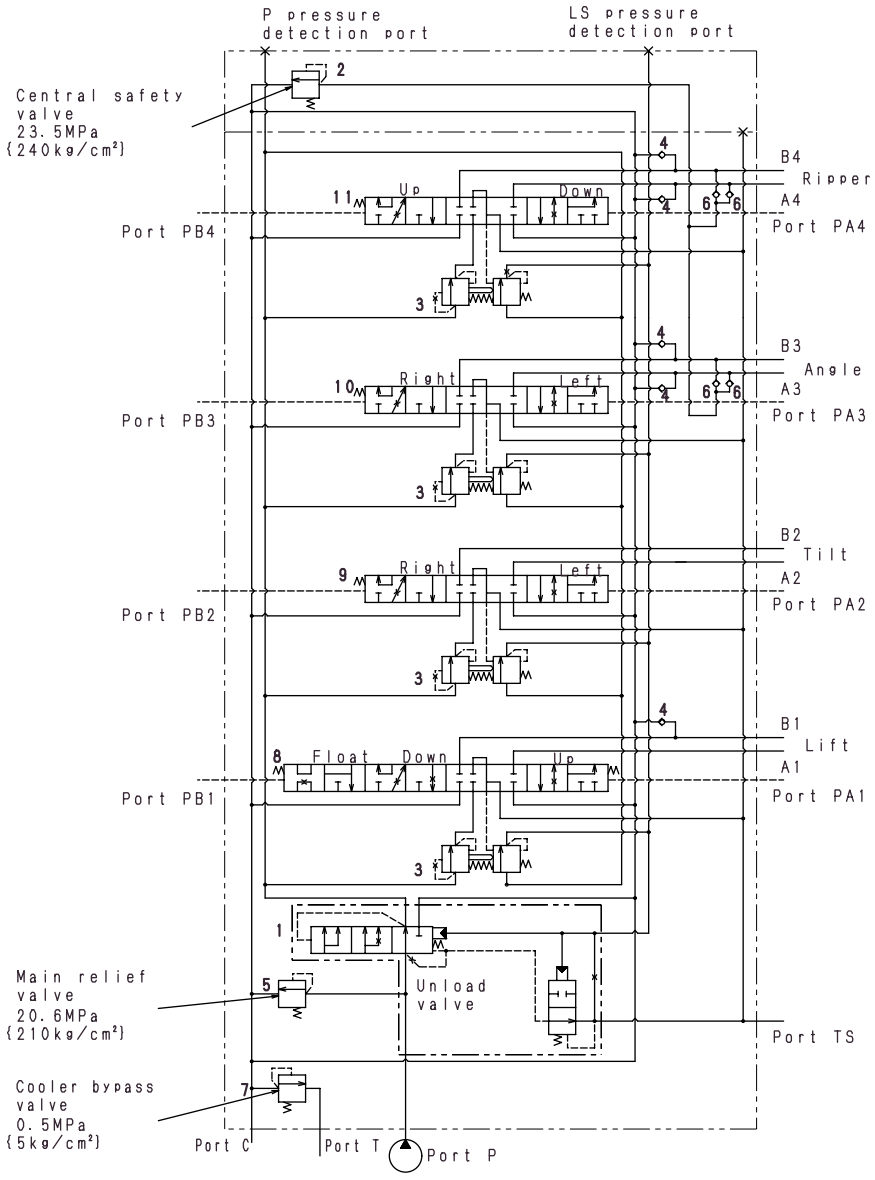
Items marked with ※ indicate dry type track.

(1/5)


11.3±1.5Nm
{1.15±0.15kgm}
31.9±2.5Nm
{3.25±0.25kgm}
C
A
Z
PB4
PB3
PB2
PB1
B4
B3
B2
B1
K
J
H
G
F
E
D
A4
A3
A2
A1
B
PA4
PA3
PA2
PA1
TS
P
31.9±2.5Nm
{3.25±0.25kgm}
T
9JY00604

3. Functions and operation of each valve

1) Names of hydraulic circuits and valves



Hydraulic circuit diagram

SJD04459

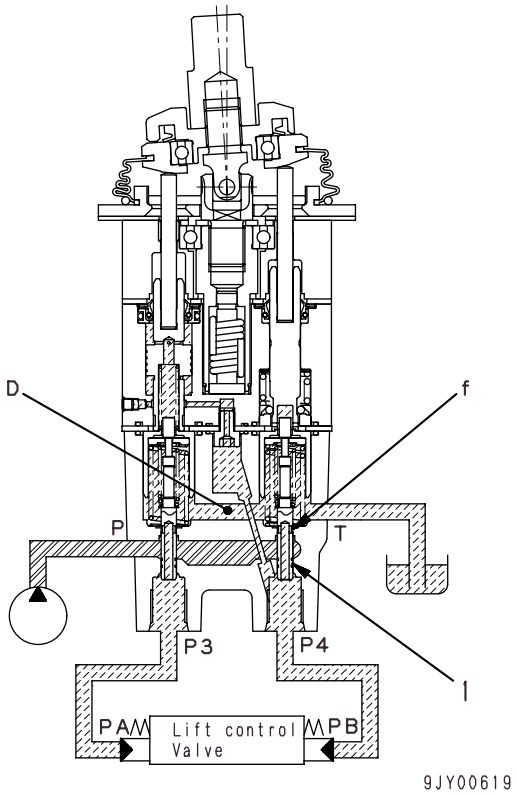
1. Unload valve
2. Safety valve
   (set pressure: 23.5 MPa {240 kg/cm^2})
3. Pressure compensation valve
4. Suction valve
5. Main relief valve
   (set pressure: 20.6 MPa {210 kg/cm^2})
6. Check valve
7. Cooler bypass valve
   (cracking pressure: 0.5 MPa {5 kg/cm^2})
8. Lift spool
9. Tilt spool
10. Angle spool
11. Ripper spool

Operation

1. At Neutral

1) For blade lift

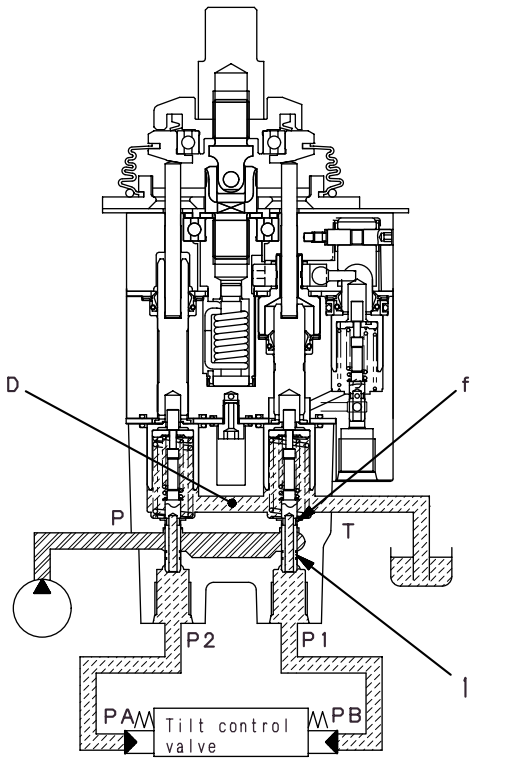
- Ports **PA** and **PB** of the blade lift control valve and ports **P3** and **P4** of the PPC valve are connected to drain chamber **D** through fine control hole **f** of spool (1).



9JY00619

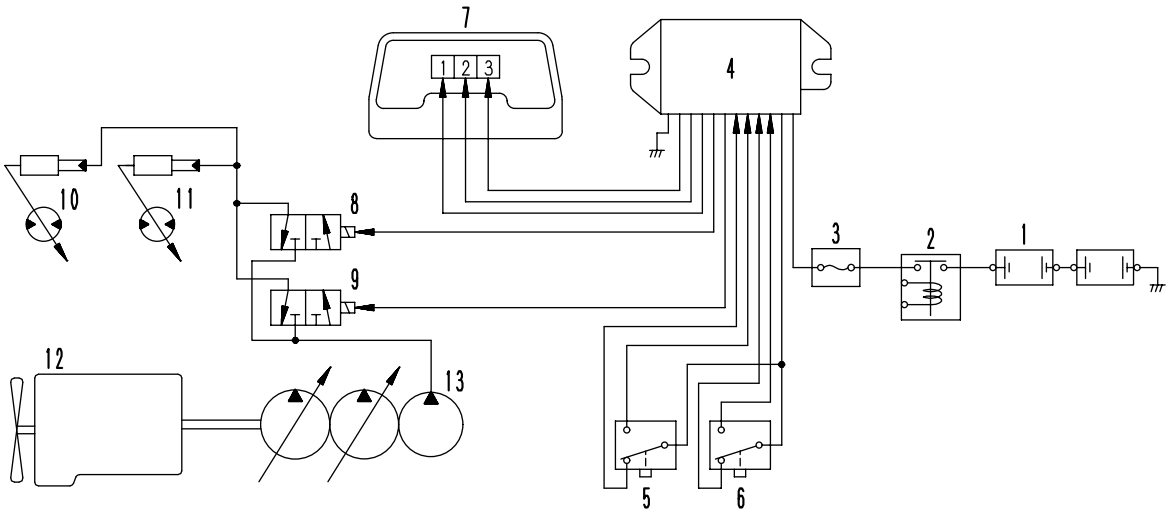
2) For blade tilt

- Ports **PA** and **PB** of the blade tilt control valve and ports **P1** and **P2** of the PPC valve are connected to drain chamber **D** through fine control hole **f** of spool (1).



9JY00620

GEARSHIFT CONTROL SYSTEM

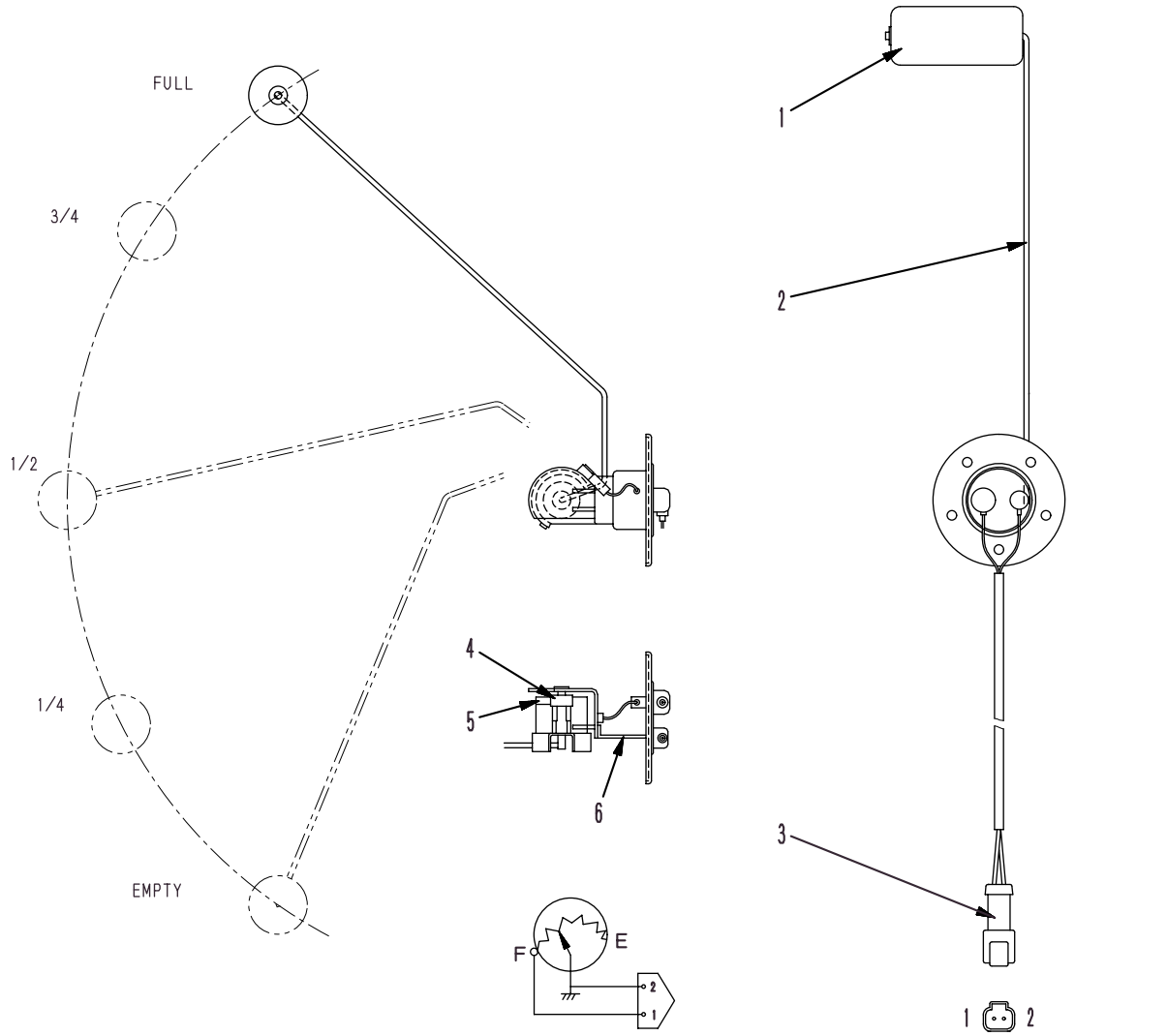


1. Battery
2. Battery relay
3. Fuse box
4. Shift controller
5. Shift UP switch
6. Shift DOWN switch
7. Monitor panel
8. 2nd speed selector solenoid valve
9. 3rd speed selector solenoid valve
10. L.H. HST motor
11. R.H. HST motor
12. Engine
13. Charge pump

Function

- Each time shift UP switch (5) on the steering, direction, and speed lever is pressed, the transmission shifts up 1st → 2nd → 3rd; each time shift DOWN switch (6) is pressed, the transmission shifts down 3rd → 2nd → 1st. The speed range display lamp on monitor panel (7) lights up according to the transmission speed.
  (When the starting switch is turned ON, it automatically displays 1st.)
- If any abnormality occurs in the shift signal (short circuit in wiring, etc.), the existing speed range is held. If there is an abnormal drop in the voltage of the power supply (less than 16 – 18 V), the speed range is held in 1st.

FUEL LEVEL SENSOR



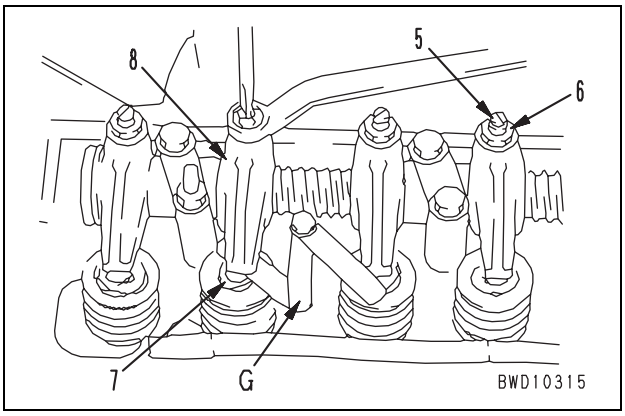
1. Float
2. Arm
3. Connector
4. Variable resistance
5. Contact
6. Body

Function

- The fuel level sensor is installed to the fuel tank, and the float (1) moves up and down according to the amount of fuel remaining in the tank. The movement of float (1) actuates variable resistor (4) through arm (2), and the signal is sent to the monitor panel to display the fuel level.

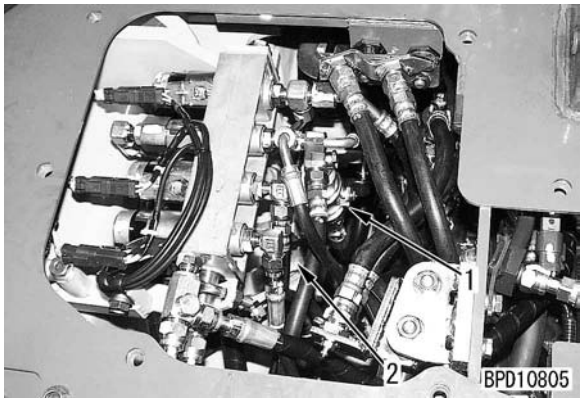
<table>
<tr><th>System</th><th>Component</th><th>Connector No.</th><th>Inspection method</th><th>Judgement table</th><th>Measurement conditions</th></tr>
<tr><td rowspan="5">Machine monitor</td><td>Coolant temperature sensor (coolant temperature gauge)
HST oil temperature sensor (HST oil temperature gauge)</td><td>CN20 (male)
CN12 (male)</td><td>Measure resistance</td><td>If the condition is as shown in the table below, the sensor is normal.<table><tr><th>Atmosphere temperature</th><th>Normal</th></tr><tr><td>120ºC
|
106ºC
|
100ºC
|
80ºC
|
60ºC
|
50ºC</td><td>Approx. 10 Ω
|
Approx. 14 Ω
|
Approx. 16.5 Ω
|
Approx. 30 Ω
|
Approx. 56 Ω
|
Approx. 80 Ω</td></tr></table></td><td>1) Turn starting switch OFF
2) Disconnect CN20 (Coolant temperature sensor)
Disconnect CN12 (HST oil temperature sensor)</td></tr>
<tr><td>Engine oil pressure sensor</td><td>—</td><td>Continuity</td><td>If the condition is as shown in the table below, the sensor is normal.<table><tr><td>Engine oil pressure Min. 0.049MPa {0.5kg/cm^2}</td><td>No continuity</td></tr><tr><td>Engine oil pressure Max. 0.049MPa {0.5kg/cm^2}</td><td>Continuity</td></tr></table></td><td>1) Start engine</td></tr>
<tr><td>Fuel level sensor (fuel gauge)</td><td>CN13 (male)
–
—</td><td>Measure resistance</td><td>If the condition is as shown in the table below, the sensor is normal. (25ºC)<table><tr><th></th><th>CN13 (male)(1)–(2)</th></tr><tr><td>Full</td><td>Approx. 12 Ω max.</td></tr><tr><td>Empty</td><td>Approx. 85–110 Ω</td></tr></table></td><td>1) Turn starting switch OFF</td></tr>
<tr><td>Alternator</td><td>Alternator R terminal – chassis</td><td>Measure voltage</td><td>While engine is running (more than 1/2 throttle)→27.5–29.5V
★ If the battery is old, or after starting in cold areas, the voltage may not rise for sometime.</td><td>1) Start engine</td></tr>
<tr><td>Charge filter clogging sensor</td><td>—</td><td>Continuity</td><td>If the condition is as shown in the table below, the sensor is normal.<table><tr><td rowspan="2">Differential pressure of filter</td><td>Min. 0.2 MPa {2 kg/cm^2}</td><td>Continuity</td></tr><tr><td>Max. 0.2 MPa {2 kg/cm^2}</td><td>No Continuity</td></tr></table></td><td>1) Start engine</td></tr>
</table>

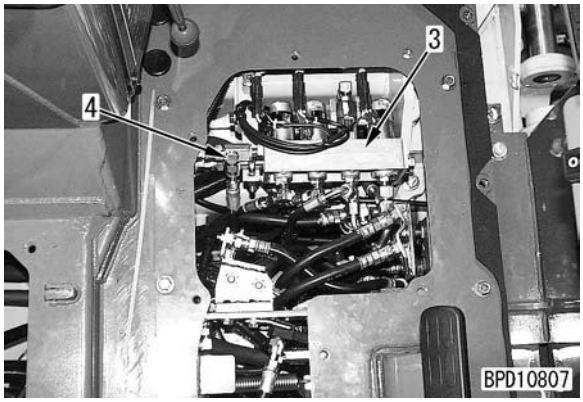
★ Loosen lock nut (6) of adjustment screw (5) and insert specified thickness gauge **G** in the clearance between valve stem (7) and rocker arm (8) and adjust the clearance with the adjustment screw so that the thickness gauge can be moved lightly, then tighten the lock nut to secure the adjustment screw.
kgm Locknut: **24.0 Nm {2.45 kgm}**
★ The firing order of the engine is 1-3-4-2.
★ Valve clearance
Intake side: 0.25 mm
Exhaust side: 0.51 mm

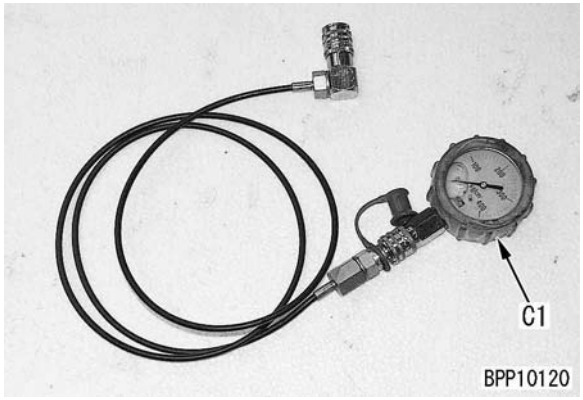


2. Measuring charge circuit pressure

1) Stop the engine.
2) Loosen the hydraulic oil filler cap to release the residual pressure from the hydraulic tank.
3) Remove the floor cover.
4) Turn tow valve lever (1) of the travel brake circuit downward until it stops (to the full close position). (Same conditions as when measuring high-pressure cut-off)
5) Remove oil pressure pickup plug (4) (Thread dia. = 10 mm, Pitch = 1.25 mm) from the inlet of solenoid valve block and install nipple **C3** of oil pressure kit **C**, then connect oil pressure gauge **C1** (6 MPa {60 kg/cm^2}).







6) Start the engine.
7) Run the engine at high idling and measure the charge circuit pressure under the following conditions when the hydraulic oil temperature is 45 - 55°C.
   i) Directional lever at Neutral
   ii) Travel lever at end of FORWARD stroke and end of left steering stroke
   iii) Travel lever at end of FORWARD stroke and end of right steering stroke

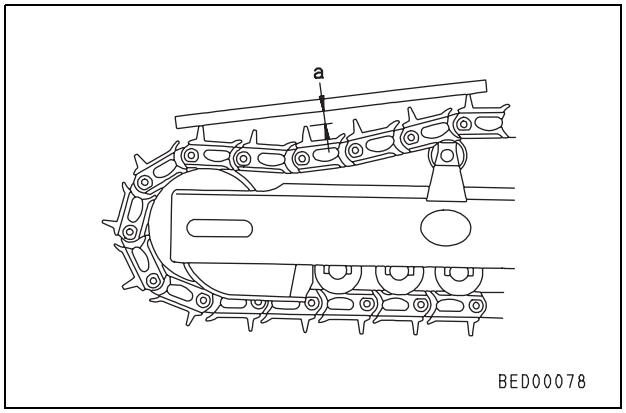
3. Measuring control oil pressure (AS pressure)

1) Stop the engine.
2) Loosen the hydraulic oil filler cap to release the residual pressure from the hydraulic tank.
3) Remove the floor cover.
4) Remove oil pressure pickup plug (5) (Thread dia. = 10 mm, Pitch = 1.25 mm) from the control pressure outlet of the HST pump and install the adapter and nipple **C3** of oil pressure kit **C1**, then connect oil pressure gauge **C1** (6 MPa {60 kg/cm^2}).

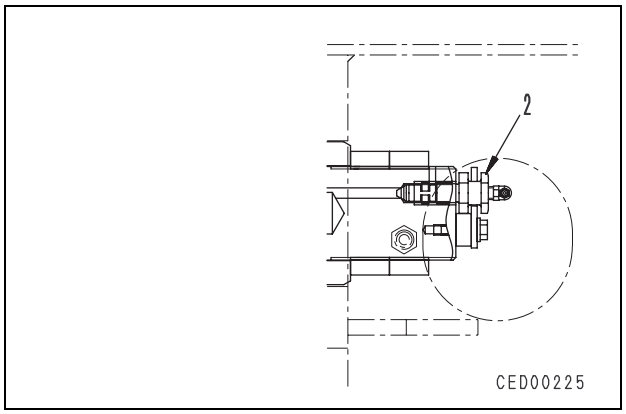
TESTING AND ADJUSTING TRACK SHOE TENSION

⚠ Since the machine must be moved to adjust the track shoe tension, be sure to set the work equipment lock lever to the "LOCK" position.

1. Stop the machine on a level ground.
   ★ Move the machine forward and stop it without applying the brake.
2. Place a straight bar between the front idler and carrier roller and adjust clearance "**a**" between it and grouser at center.
   ★ Dimension "**a**": 20 – 30 mm



3. **Tensing track shoe**
   Supply grease through lubricator (2).
   ★ If the grease does not flow in, move the machine forward slowly. Stop without applying the brake at this time, too.

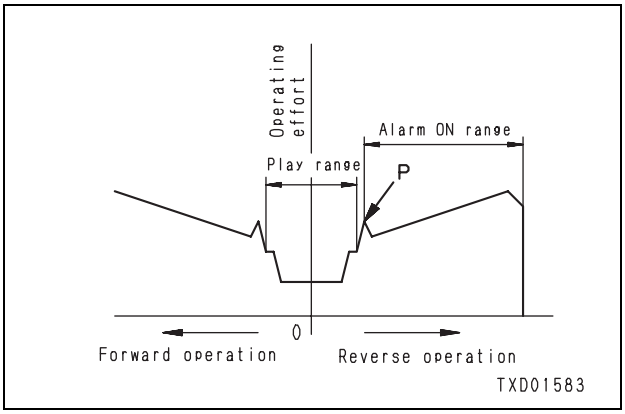


4. **Loosening track shoe**
   Loosen lubricator (2) gradually.

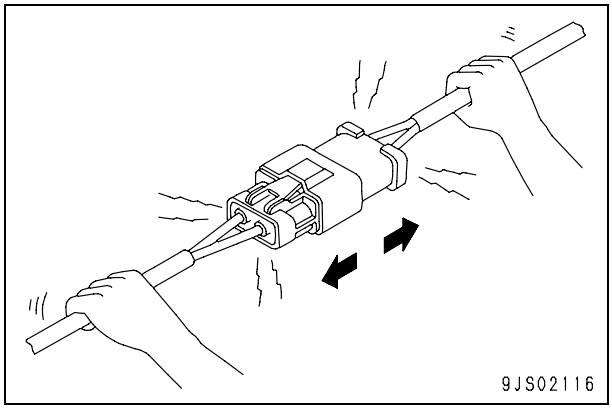
⚠ Since high pressure is applied to the lubricator, do not loosen it more than 1 turn. If the grease does not flow out, move the machine forward and in reverse slowly.

2. Relationship between PPC valve operating effort graph and position to turn on alarm

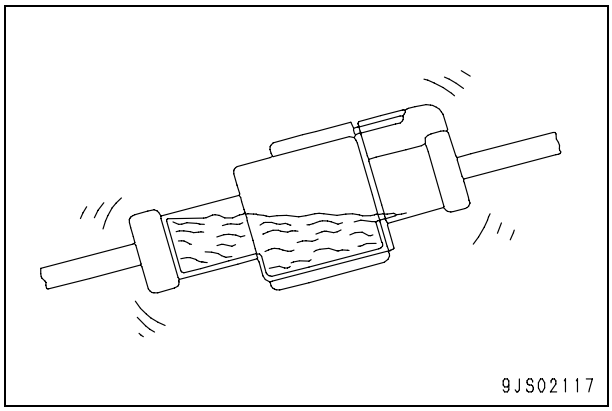
- Point **P**: The alarm must be turned on at the point of the maximum operating effort of the detent.



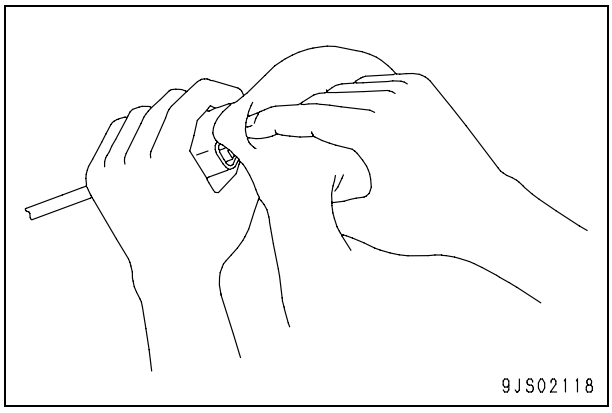
3) Disconnections in wiring
If the wiring is held and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping of the connector may separate, or the soldering may be damaged, or the wiring may be broken.



4) High-pressure water entering connector
The connector is designed to make it difficult for water to enter (drip-proof structure), but if high-pressure water is sprayed directly on the connector, water may enter the connector, depending on the direction of the water jet. Accordingly, take care not to splash water over the connector. The connector is designed to prevent water from entering, but at the same time, if water does enter, it is difficult for it to be drained. Therefore, if water should get into the connector, the pins will be short-circuited by the water, so if any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.



5) Oil or dirt stuck to connector
If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, so there will be defective contact. If there is oil or grease stuck to the connector, wipe it off with a dry cloth or blow it dry with compressed air and spray it with a contact restorer.
- ★ When wiping the mating portion of the connector, be careful not to use excessive force or deform the pins.
- ★ If there is oil or water in the compressed air, the contacts will become even dirtier, so remove the oil and water from the compressed air completely before cleaning with compressed air.



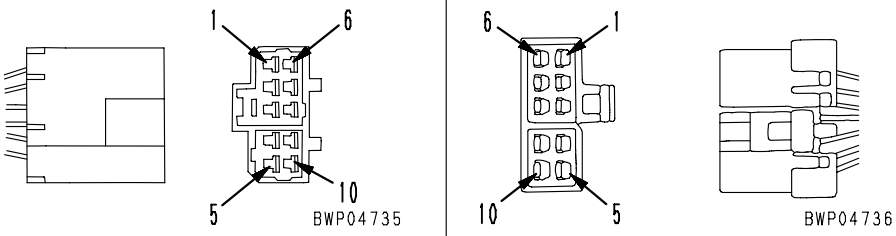
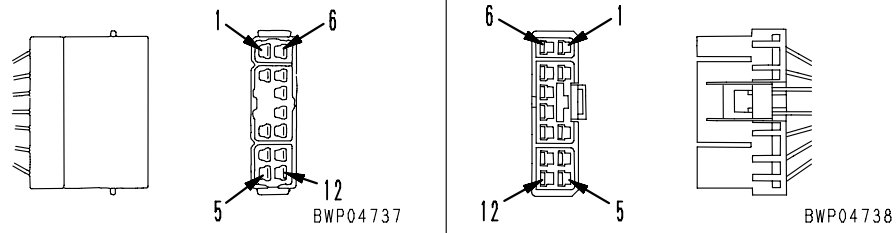
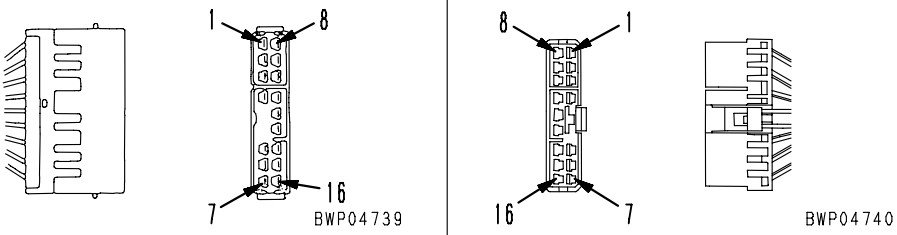
METHOD OF USING TROUBLESHOOTING CHARTS

1. Category of troubleshooting code number

Troubleshooting Code No.	Component
E-OO	Troubleshooting of electrical system
H-OO	Troubleshooting of hydraulic, mechanical system
M-OO	Troubleshooting of machine monitor system

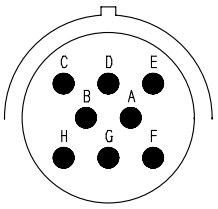
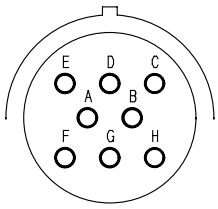
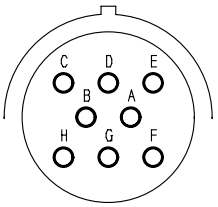
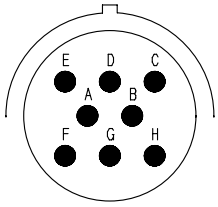
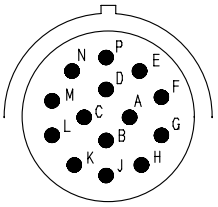
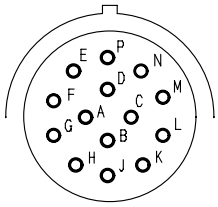
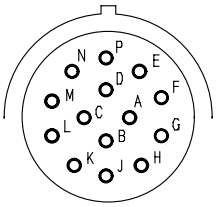
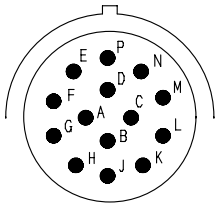
2. Method of using YES/NO troubleshooting flowchart

1) Troubleshooting code number and problem
   The title at the top of the troubleshooting chart gives the failure code and problem with the machine.
   Example: M-13 Abnormality in buzzer
2) General precautions
   When carrying out troubleshooting, precautions are given at the top of the page under the title and marked with ★.
   The common precautions are marked ★ in the Contents, so they must always be followed checked before carrying out the troubleshooting.
   Example: ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
   ★ Always connect any disconnected connectors before going on the next step.
3) Distinguishing conditions
   Even with the same problem, the method of troubleshooting may differ according to the model, component, or problem. In such cases, the failure mode is further divided into sections marked with small letters (for example, a)), so go to the appropriate section to carry out troubleshooting.
   If the troubleshooting table is not divided into sections, start troubleshooting from the first check item in the flowchart.
   Example: a) When starting switch is turned ON (3 sec), buzzer does not sound
   b) Buzzer always sounds
4) Method of following troubleshooting chart
   - Check or measure the item inside □ (NO / YES) , and according to the answer follow either the YES line or the NO line to go to the next □.
     (Note: The number written at the top right corner of the □ is an index number; it does not indicate the order to follow.)
   - Following the YES or NO lines according to the results of the check or measurement will lead finally to the Cause box. Check the cause and take the action given in the Remedy box on the right.
   - To the left of the □ there is ⬚ (a box formed by a broken line). This contains the methods for inspection or measurement, and the judgement values.
     If the judgement values to the left of the □ are correct or the answer to the question inside the □ is YES, follow the YES line; if the judgement value is not correct, or the answer to the question is NO, follow the NO line.
   - The ⬚ gives the preparatory work needed for inspection and measurement, and the judgement values. If this preparatory work is neglected, or the method of operation or handling is mistaken, there is danger that it may cause mistaken judgment, or the equipment may be damaged. Therefore, before starting inspection or measurement, always read the instructions carefully, and start the work in order from the first item.
5) Position of installation, pin number
   For details of the connector pin number and check and measurement locations of the connector pin numbers appearing in the flowchart, see CONNECTOR TYPE AND MOUNTING LOCATION.

No. of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10 (Blue)			—
	—	—	
12 (Blue)			799-601-7160
	Part No. : 08056-11272	Part No. : 08056-11282	
16 (Blue)			799-601-7170
	Part No. : 08056-11672	Part No. : 08056-11682	

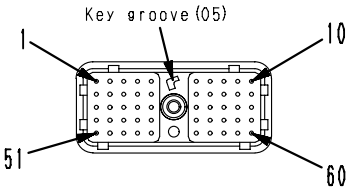
9JS04895

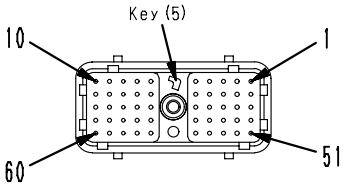
[The pin No. is also marked on the connector (electric wire insertion end)]

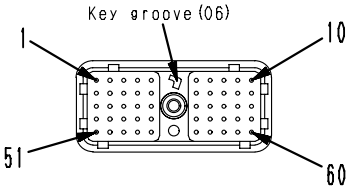
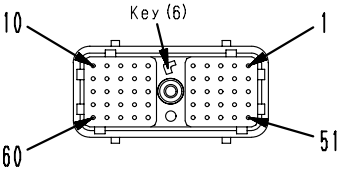
Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
18-8 (1)	Pin (male terminal)	Socket (female terminal)	799-601-9210
	 BWP05001	 BWP05002	
	Part No. :08191-11201, 08191-11202, 08191-11205, 08191-11206	Part No. :08191-14101, 08191-14102, 08191-14105, 08191-14106	
	Socket (female terminal)	Pin (male termial)	799-601-9210
	 BWP05003	 BWP05004	
	Part No. :08191-12201, 08191-12202, 08191-12205, 08191-12206	Part No. :08191-13101, 08191-13102, 08191-13105, 08191-13106	
18-14 (2)	Pin (male terminal)	Socket (female terminal)	799-601-9220
	 BWP05005	 BWP05006	
	Part No. :08191-21201, 08191-12202, 08191-21205, 08191-12206	Part No. :08191-24101, 08191-24102, 08191-24105, 08191-24106	
	Socket (female terminal)	Pin (male termial)	799-601-9220
	 BWP05007	 BWP05008	
	Part No. :08191-22201, 08191-22202, 08191-22205, 08191-22206	Part No. :08191-23101, 08191-23102, 08191-23105, 08191-23106	

9JS04904

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

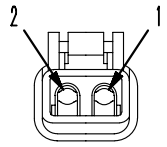
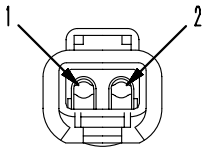
<table>
<tr><td rowspan="2">No. of pins</td><td colspan="2">DRC26 Series connector</td><td rowspan="2">T-adapter Part No.</td></tr>
<tr><td>Male pin (female housing)</td><td>Female pin (male housing)</td></tr>
<tr><td rowspan="3">60
-05※</td><td> 

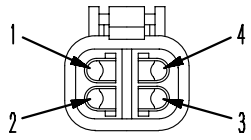
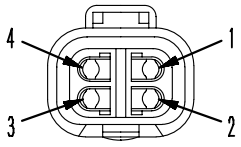
BJD14063</td><td> 

BJD14064</td><td rowspan="3">799-601-4220
(Kit:799-601-4101)</td></tr>
<tr><td>–</td><td>Part No. 08194-04104</td></tr>
<tr><td colspan="2">※-05:Key position</td></tr>
<tr><td rowspan="3">60
-06※</td><td rowspan="2"> 
</td><td rowspan="2"> 
</td><td>Socket Part No.</td></tr>
<tr><td rowspan="2">799-601-4390</td></tr>
<tr><td>–</td><td>–</td></tr>
<tr><td colspan="3">※-06:Key position</td></tr>
</table>

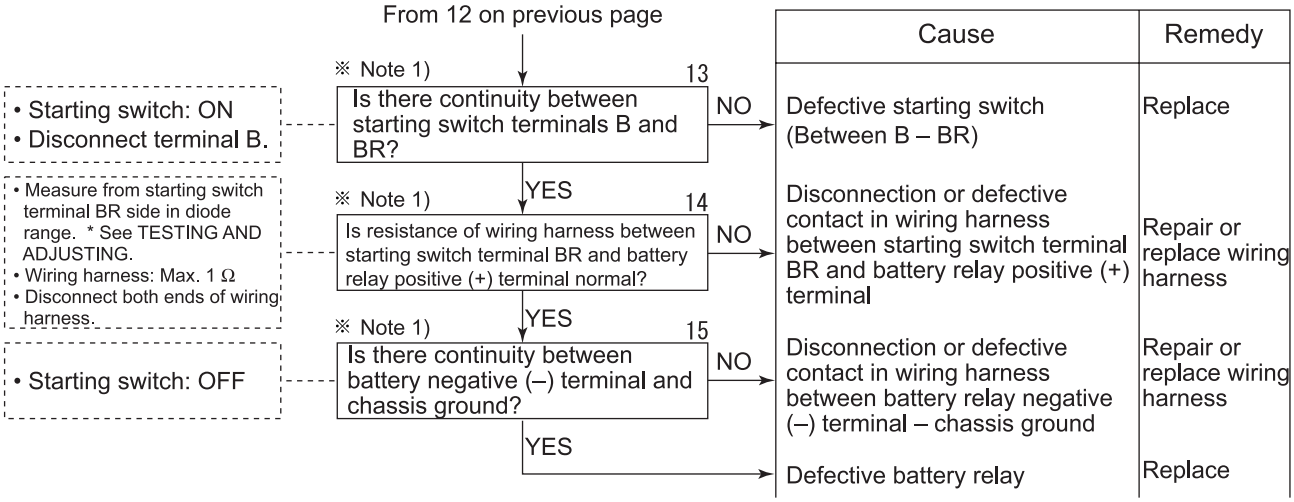
BJH13185

DT series connector for engine

No. of pins	WIF (water in fuel) sensor (107, 114 engine)		
	Body (plug)	Body (receptacle)	T-adapter Part No.
2	 BWP05037	 BWP05038	799-601-9020 (kit:799-601-4101) (kit:799-601-4201)
	Part No. :08192-12200 (normal type) 08192-22200 (fine wire type)	Part No. :08192-12100 (normal type) 08192-22100 (fine wire type)	

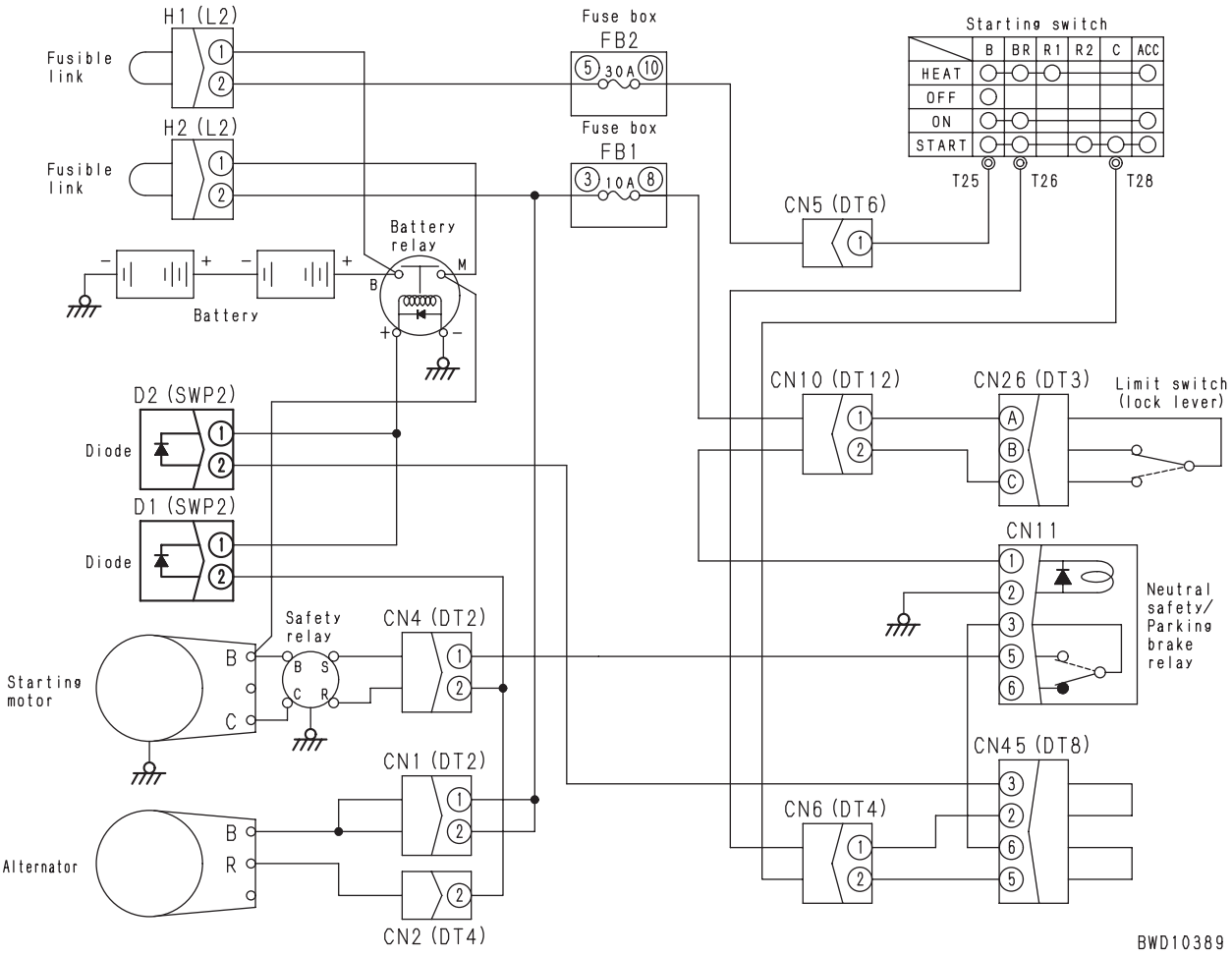
No. of pins	EGR (by pass) valve stroke sensor (125, 140, 170 engine)		
	Body (plug)	Body (receptacle)	T-adapter Part No.
4	 BWP05041	 BWP05042	799-601-9020 (kit:799-601-4101) (kit:799-601-4201)
	Part No. :08192-14200 (normal type) 08192-24200 (fine wire type)	Part No. :08192-14100 (normal type) 08192-24100 (fine wire type)	

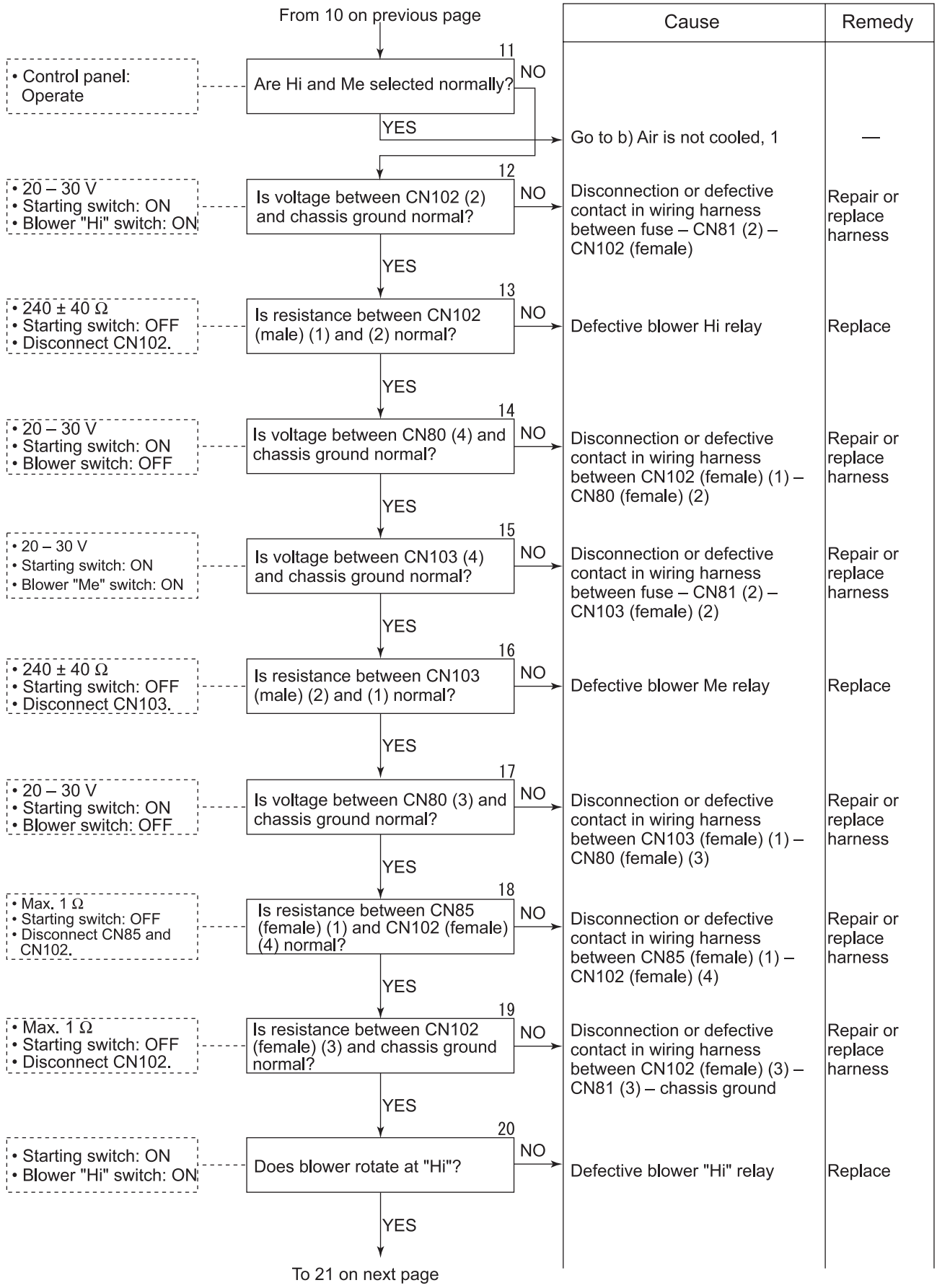
B3W14066



※ Note 1) This may be checked by testing if the lamp lights up or if the horn sounds normally.

E-1. Related electrical circuit diagram




From 10 on previous page
Cause
Remedy
11
• Control panel: Operate
Are Hi and Me selected normally?
NO
YES
Go to b) Air is not cooled, 1
—
12
• 20 – 30 V
• Starting switch: ON
• Blower "Hi" switch: ON
Is voltage between CN102 (2) and chassis ground normal?
NO
Disconnection or defective contact in wiring harness between fuse – CN81 (2) – CN102 (female)
Repair or replace harness
YES
13
• 240 ± 40 Ω
• Starting switch: OFF
• Disconnect CN102.
Is resistance between CN102 (male) (1) and (2) normal?
NO
Defective blower Hi relay
Replace
YES
14
• 20 – 30 V
• Starting switch: ON
• Blower switch: OFF
Is voltage between CN80 (4) and chassis ground normal?
NO
Disconnection or defective contact in wiring harness between CN102 (female) (1) – CN80 (female) (2)
Repair or replace harness
YES
15
• 20 – 30 V
• Starting switch: ON
• Blower "Me" switch: ON
Is voltage between CN103 (4) and chassis ground normal?
NO
Disconnection or defective contact in wiring harness between fuse – CN81 (2) – CN103 (female) (2)
Repair or replace harness
YES
16
• 240 ± 40 Ω
• Starting switch: OFF
• Disconnect CN103.
Is resistance between CN103 (male) (2) and (1) normal?
NO
Defective blower Me relay
Replace
YES
17
• 20 – 30 V
• Starting switch: ON
• Blower switch: OFF
Is voltage between CN80 (3) and chassis ground normal?
NO
Disconnection or defective contact in wiring harness between CN103 (female) (1) – CN80 (female) (3)
Repair or replace harness
YES
18
• Max. 1 Ω
• Starting switch: OFF
• Disconnect CN85 and CN102.
Is resistance between CN85 (female) (1) and CN102 (female) (4) normal?
NO
Disconnection or defective contact in wiring harness between CN85 (female) (1) – CN102 (female) (4)
Repair or replace harness
YES
19
• Max. 1 Ω
• Starting switch: OFF
• Disconnect CN102.
Is resistance between CN102 (female) (3) and chassis ground normal?
NO
Disconnection or defective contact in wiring harness between CN102 (female) (3) – CN81 (3) – chassis ground
Repair or replace harness
YES
20
• Starting switch: ON
• Blower "Hi" switch: ON
Does blower rotate at "Hi"?
NO
Defective blower "Hi" relay
Replace
YES
To 21 on next page

E-10. Backup alarm does not sound during reverse travel

★ Before carrying out the troubleshooting, check that fusible link H2 and fuse FB2 No. 2 are normal.
★ Before carrying out the troubleshooting, adjust the proximity switch (See TESTING AND ADJUSTING).

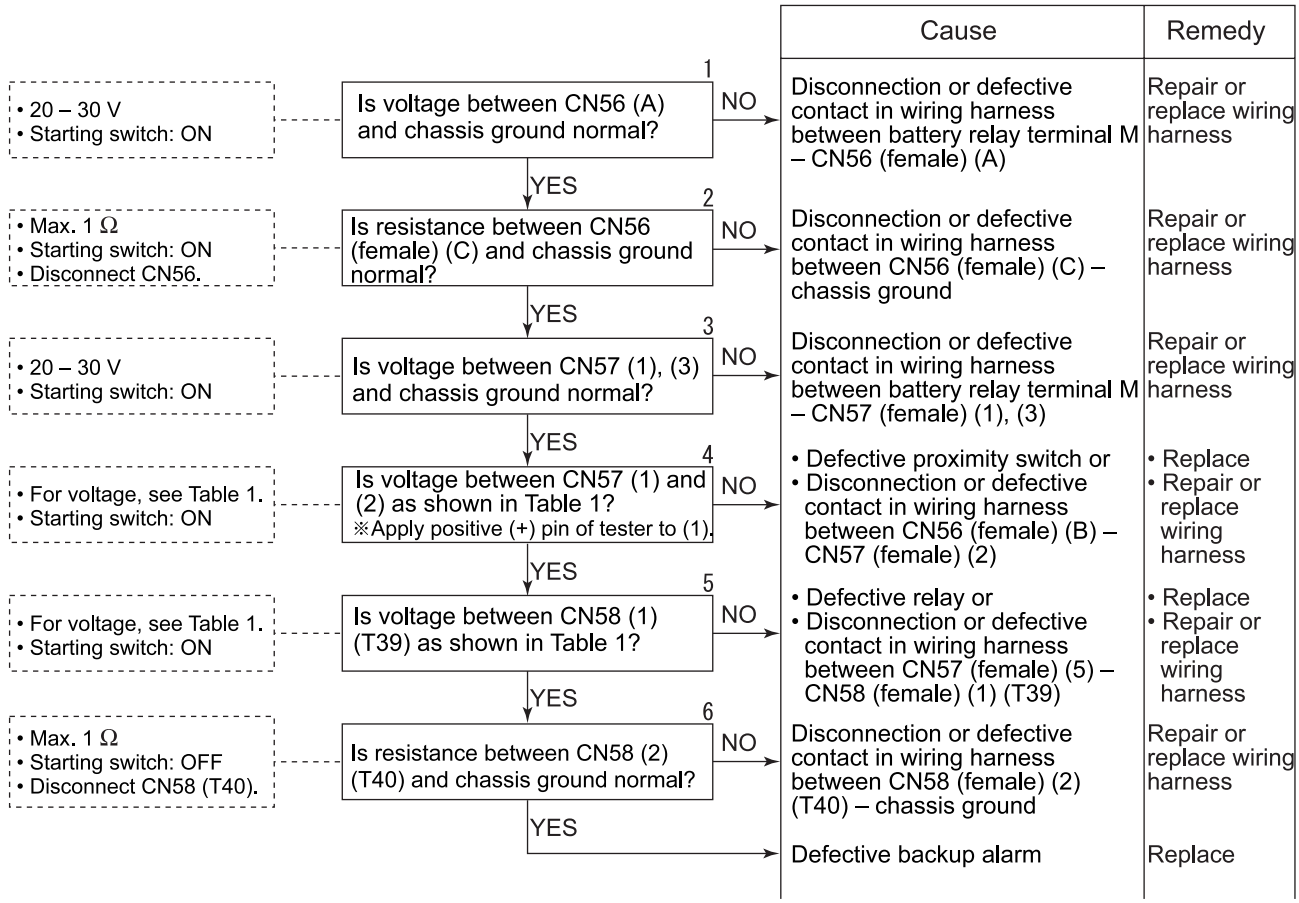


Table 1 Voltage when proximity switch is turned ON and OFF

	Forward, Neutral	Reverse
Between CN57 (1) – (2)	Max. 1 V	20V – 30V
Between CN58 (1) (T39) – Chassis ground	Max. 1 V	20V – 30V

←Note that voltage difference is shown.

H-10. Starting time lag is large

★ Before carrying out the troubleshooting, check the oil level in the hydraulic tank.
★ Check the electric system first. If it is normal, carry out the following troubleshooting.

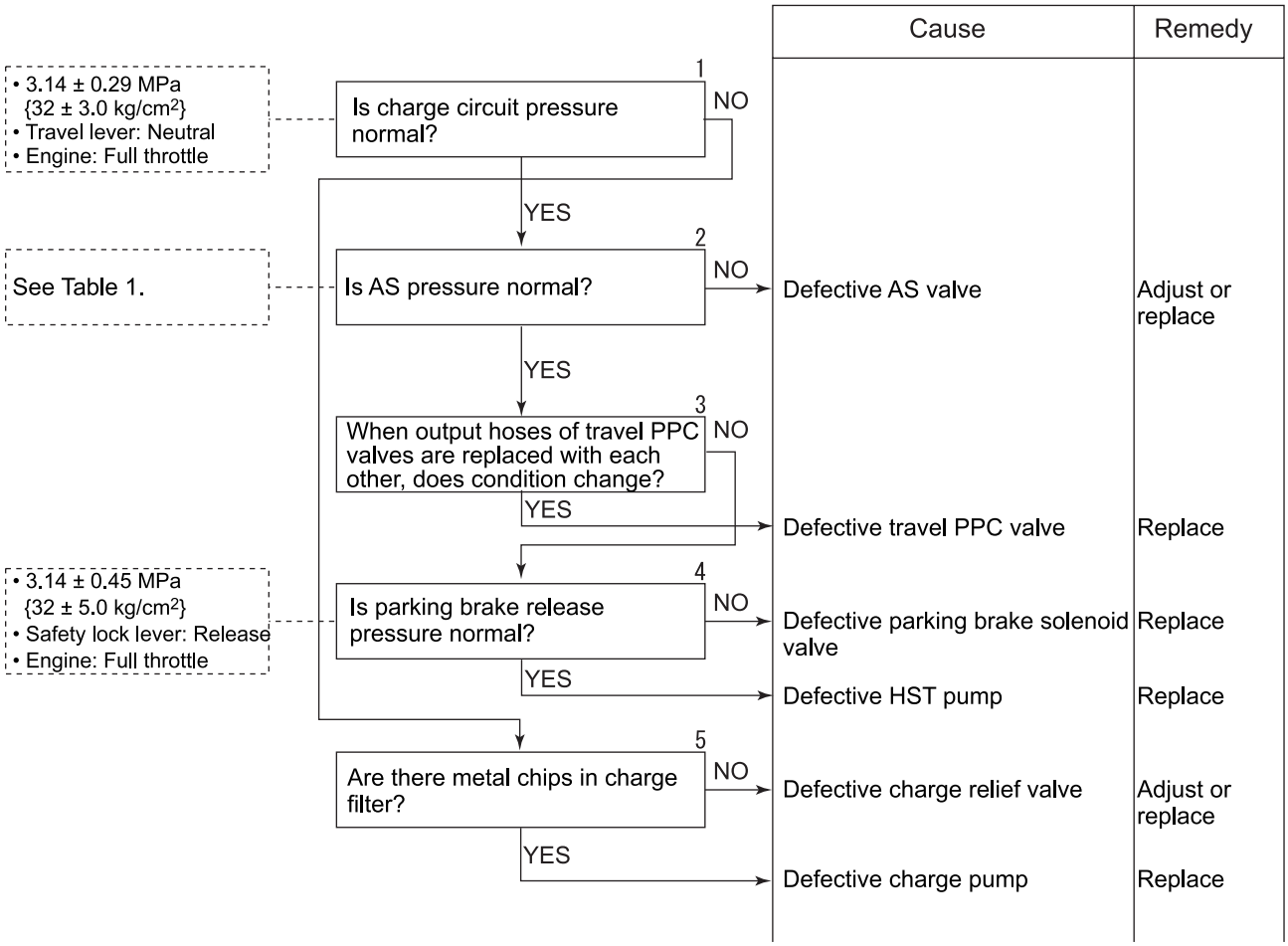


Table 1 AS pressure

Engine speed (rpm)	Operation of brake pedal	Oil pressure MPa {kg/cm^2}
1,100	Released	0.29 – 0.78 {3.0 – 8.0}
1,800	Released	1.76 – 2.40 {18 – 24.5}
Full	Pressed	Max. 0.49 {Max. 5.0}

TROUBLESHOOTING FOR MACHINE MONITOR SYSTEM (M-MODE)

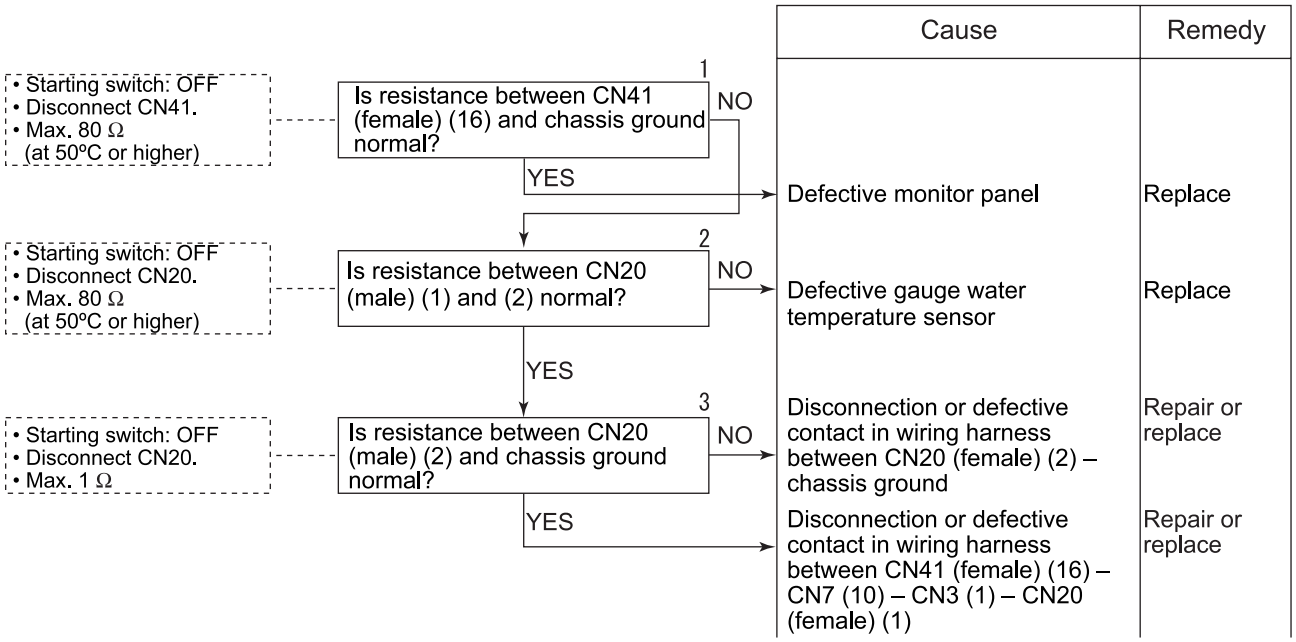
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on to the next step.

M-5. Trouble in engine water temperature gauge

★ Before carrying out the following troubleshooting, check that the engine oil pressure caution lamp and charge caution lamp light up when the starting switch is turned on.

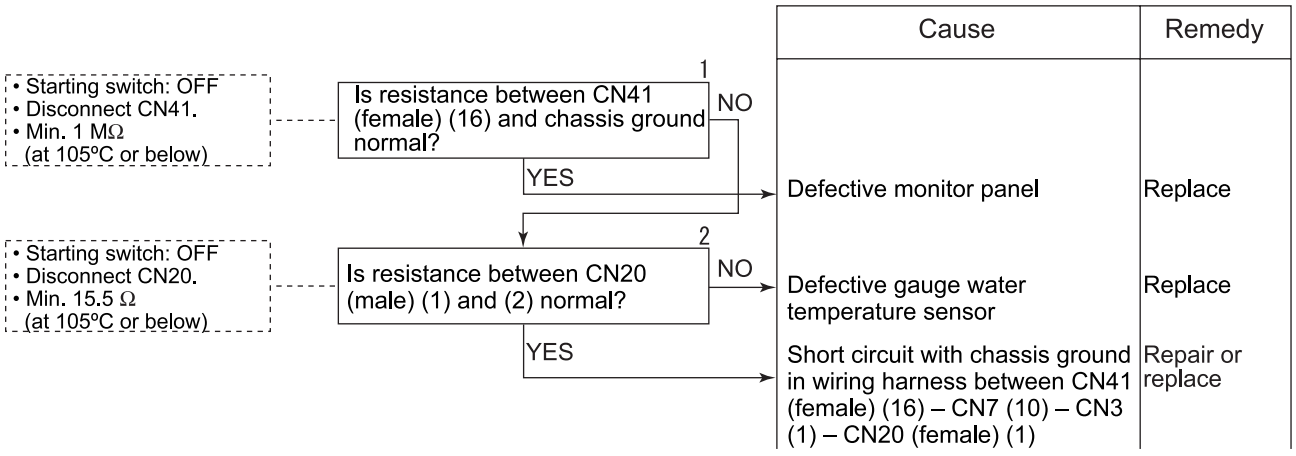
a) Gauge does not rise above C (lowest point).

★ Before carrying out the following troubleshooting, check that the temperature of the engine water is above 52ºC.



b) Gauge does not lower below H (Highest point).

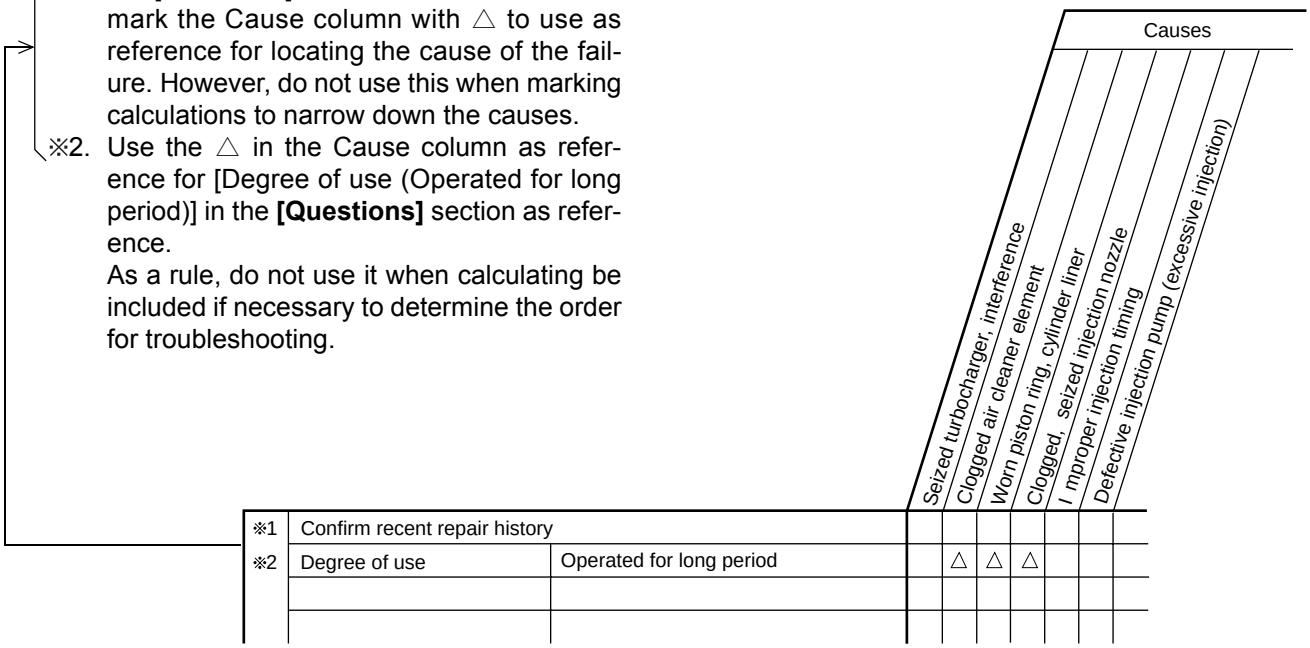
★ Before carrying out the following troubleshooting, check that the temperature of the engine water is below 105ºC.



The basic method of using the troubleshooting chart is as follows.
Items listed for **[Questions]** and **[Check items]** that have a relationship with the Cause items are marked with ○, and of these, causes that have a high probability are marked with ◎.
Check each of the **[Questions]** are **[Check items]** in turn, and marked the ○ or ◎ in the chart for items where the problem appeared. The vertical column (Causes) that has the highest number of points is the most probable cause, so start troubleshooting for that item to make final confirmation of the cause.

※1. For [Confirm Section, ask repair history] in the [Questions] Section, ask the user, and mark the Cause column with △ to use as reference for locating the cause of the failure. However, do not use this when marking calculations to narrow down the causes.

※2. Use the △ in the Cause column as reference for [Degree of use (Operated for long period)] in the **[Questions]** section as reference.
As a rule, do not use it when calculating be included if necessary to determine the order for troubleshooting.



S-6 Engine lacks output (or lacks power)

General causes why engine lacks output
- Insufficient intake of air
- Insufficient supply of fuel
- Improper condition of fuel injection
- Improper fuel used
  (if non-specified fuel is used, output drops)
- Lack of output due to overheating
  - ★ If there is overheating and lack of output, carry out troubleshooting for S-14 Coolant temperature becomes too high (Overheating).

			Causes: Clogged air cleaner element	Seized turbocharger, interference	Worn piston ring, cylinder	Clogged fuel filter, strainer	Clogged feed pump strainer	Clogged fuel injection nozzle, defective spray	Seized fuel injection pump plunger	Improper valve clearance	Defective contact of valve and valve seat	Bent governor spring, defective adjustment	Clogged, leaking fuel piping	Clogged air breather hole in fuel tank	Defective boost compensator diaphragm
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period	△		△	△	△				△				
	Power was lost	Suddenly		◎											◎
		Gradually	○		○	○	○	○			○				
	Engine oil must be added more frequently				◎										
	Replacement of filters has not been carried out according to Operation Manual		◎			◎	◎								
	Non-specified fuel is being used					◎	◎	◎	◎						
Check items	Air cleaner clogging monitor lights up		◎												
	Color of exhaust gas	Black	◎	◎											
		Blue under light load			◎										
	Noise of interference is heard from around turbocharger			◎											
	Blow-by gas is excessive				◎										○
	Engine pickup is poor and combustion is irregular			◎				○					○	○	
	High idle speed under no load is normal, but speed suddenly drops when load is applied					◎	◎							○	
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low							◎	○						
	There is hunting from engine (rotation is irregular)					○	○						○	○	
	Clanging sound is heard from around cylinder head									◎					
	High idle speed of engine is low								○			◎			
	Leakage from fuel piping												◎		
Troubleshooting	When air cleaner element is inspected directly, it is found to be clogged		●												
	When turbocharger is rotated by hand, it is found to be heavy			●											
	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						●								
	Speed does not change when operation of certain cylinders is stopped							●							
	When control rack is pushed, it is found to be heavy, or does not return								●						
	When valve clearance is checked directly, it is found to be outside standard value									●					
	When fuel dial is placed at FULL position, lever does not contact stopper											●			
	When feed pump is operated, operation is too light or too heavy												●		
	When fuel tank cap is inspected directly, it is found to be clogged													●	
		Remedy	Clean	Replace	Replace	Clean	Clean	Correct	Replace	Adjust	Replace	Adjust	Correct	Clean	Replace

S-16 Vibration is excessive

★ If there is abnormal noise together with the vibration, carry out troubleshooting also for "S-15 Abnormal noise is made".

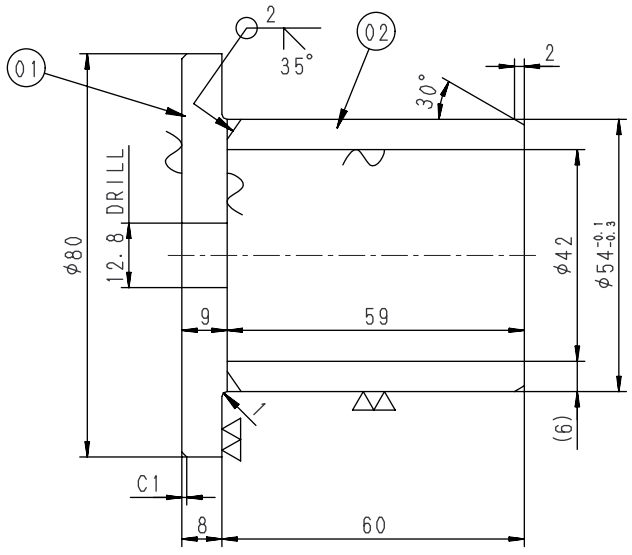
General causes why vibration is excessive
- Defective parts (abnormal wear, breakage)
- Improper alignment
- Abnormal combustion

			Causes: Worn connecting rod, main bearing	Worn cam bushing	Loose engine mounting bolts, broken cushion	Broken part inside damper	Center of engine and hydraulic pump misaligned	Improper gear train backlash	Defective dynamic valve system (valve, rocker lever, etc. stuck)	Defective fuel injection pump (excessive fuel injection)
Questions	Confirm recent repair history									
	Degree of use of machine	Operated for long period	△	△	△					
	Condition of vibration	Suddenly increased				○			○	
		Gradually increased	○	○	○					
	Non-specified oil is being used		○	○						
Check items	Metal particles are found in oil filter		◎	◎						
	Metal particles are found when oil is drained		◎	◎						
	Oil pressure is low at low idle		○	○						
	Vibration occurs at mid-range speed				○	○				
	Vibration follows engine speed				○	○	○	○		
	Exhaust smoke is black								◎	○
	Seal on fuel injection pump has come off									◎
Troubleshooting	Remove oil pan and inspect directly		●							
	Remove side cover and inspect directly			●						
	Inspect directly for loose engine mounting bolts, broken cushion				●					
	Inspect inside of damper directly					●				
	When face runout and radial runout are inspected, they are found to be incorrect						●			
	Remove front cover and inspect directly							●		
	Remove fuel head cover and inspect directly								●	
	Fuel injection pump test shows that fuel injection amount is incorrect									●
		Remedy	Replace	Replace	Replace	Replace	Correct	Correct	Replace	Adjust

SKETCHES OF SPECIAL TOOLS

NOTE: Komatsu cannot accept any responsibility for special tools manufactured according to these sketches.

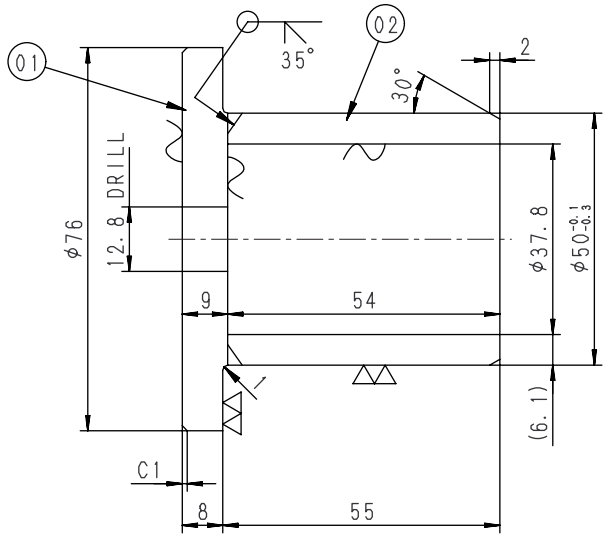
L1 Push tool



DDD03171

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKES	HEAT TRETMENT	MATERIAL
02	TUBE	STKM13A	1	0.42	φ57xt7.5	---	SEE DWG
01	PLATE	SS400P	1	0.34	t9	PART NAME	QTY
After welding, carry out machining ▽						PUSH TOOL	1
						791T-430-3210 △	

L3 Push tool



DDD03172

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKES	HEAT TRETMENT	MATERIAL
02	TUBE	STKM13A	1	0.35	φ50.8xt6.5	---	SEE DWG
01	PLATE	SS400P	1	0.31	t9	PART NAME	QTY
After welding, carry out machining ▽						PUSH TOOL	1
						791T-430-3220 △	

INSTALLATION OF CYLINDER HEAD ASSEMBLY

- Carry out installation in the reverse order to removal.

※ 1
★ When connecting the hose, apply spray grease to the mating part (tube).
kgm Charge air cooler hose clamp:
5.9 ± 0.5 Nm {0.6 ± 0.05 kgm}

※ 2
kgm Air cleaner hose clamp:
5.9 ± 0.5 Nm {0.6 ± 0.05 kgm}

※ 3
kgm Band: **9.8 ± 1.0 Nm {1.0 ± 0.1 kgm}**

※ 4
★ Install the air cleaner cover with the top mark up.

※ 5
kgm Bolt: **1.86 – 2.45 Nm {0.19 – 0.25 kgm}**
kgm Nut: **2.45 – 2.94 Nm {0.25 – 0.3 kgm}**

※ 6
kgm Nut: **23.5 – 29.4 Nm {2.4 – 3 kgm}**

※ 7
★ When connecting the hose, apply spray grease to the mating part (tube).
kgm Charge air cooler hose clamp:
5.9 ± 0.5 Nm {0.6 ± 0.05 kgm}

※ 8
★ Use a new clamp.
kgm Clamp: **8.8 ± 0.5 Nm {0.9 ± 0.05 kgm}**

※ 9
★ Pass the reservoir tank drain hose through the guide pipe of the shroud.

※10
kgm Radiator hose clamp:
8.8 ± 0.5 Nm {0.9 ± 0.05 kgm}

※11
kgm Tension pulley bolt:
43 ± 6 Nm {4.38 ± 0.61 kgm}

※12
kgm Bracket mounting bolt:
24 ± 4 Nm {2.45 ± 0.41 kgm}

※13
★ Adjust the engine stop solenoid linkage. For details, see TESTING AND ADJUSTING, Adjusting engine stop solenoid linkage.

※14
kgm Bracket mounting bolt:
24 ± 4 Nm {2.45 ± 0.41 kgm}

※15
kgm Bracket mounting bolt:
24 ± 4 Nm {2.45 ± 0.41 kgm}

※16
★ When connecting the hose, apply spray grease to the mating part (tube).
kgm Charge air cooler hose clamp:
5.9 ± 0.5 Nm {0.6 ± 0.05 kgm}

※17
kgm Nipple: **34 ± 5 Nm {3.5 ± 0.5 kgm}**
kgm Bolt: **10 ± 2 Nm {1.0 ± 2.0 kgm}**

※18
kgm Nut: **29.4 – 44.2 Nm {3 – 4.5 kgm}**

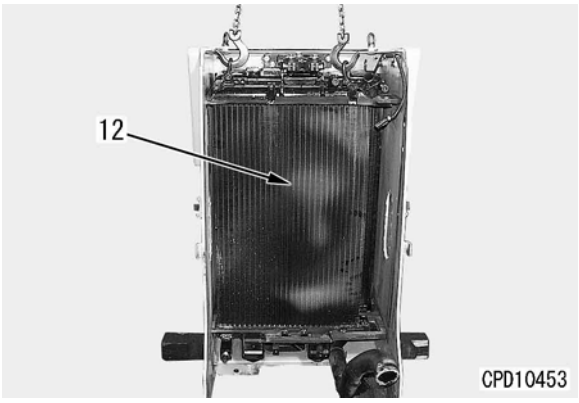
※19
kgm Bolt: **24 ± 4 Nm {2.45 ± 0.41 kgm}**

※20
★ Secure clearance of at least 10 mm between the ground wire and fuel tube.

※21
- Install the rocker arm assembly and cylinder head assembly according to the following procedure.
  ★ Check that there is not dirt or foreign matter on the mating face of the cylinder head and in the cylinders.
1) Set cylinder head gasket (59) to the cylinder block.
   ★ Check that the gasket is matched to the holes of the block.
2) Sling cylinder head assembly (58) and set it to the cylinder block.
3) Install push rod (57).
4) Install rocker arm assembly (56) and tighten the bolt with your fingers.
   ★ Check that the adjustment screw ball is fitted to the socket of the push rod.

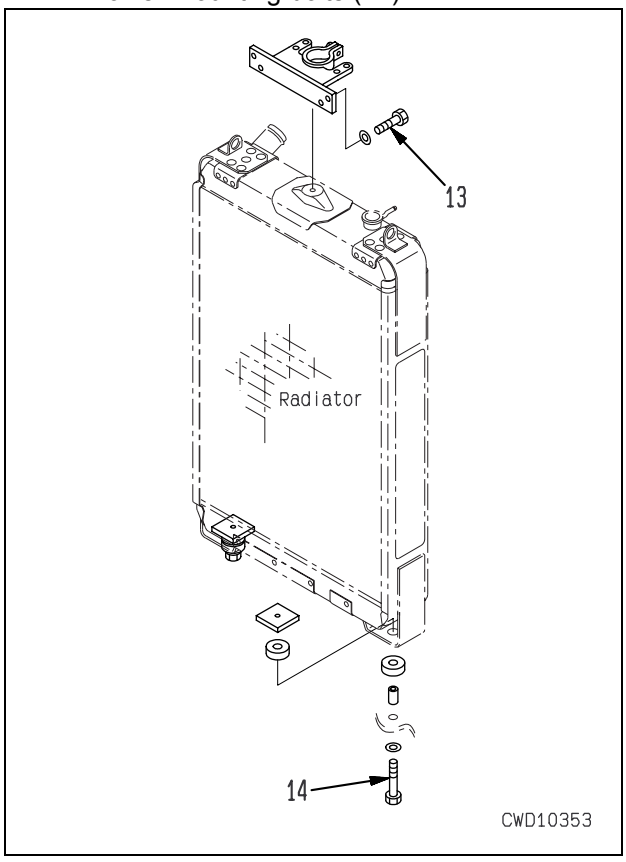
3) Lift off oil cooler assembly (12).

kg Oil cooler: **35 kg**



3. Radiator assembly

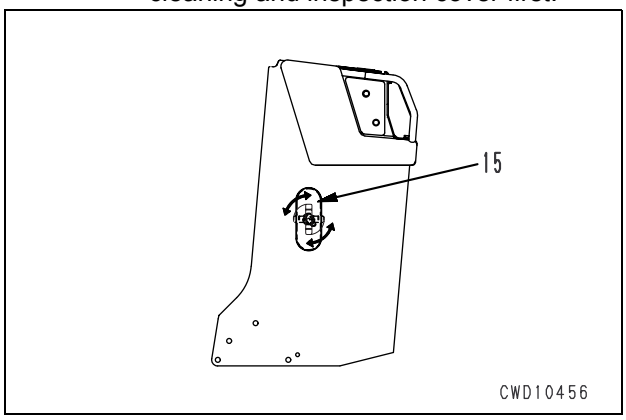
1) Remove 4 upper mounting bolts (13) and 2 lower mounting bolts (14).



2) Remove right cleaning and inspection cover (15).

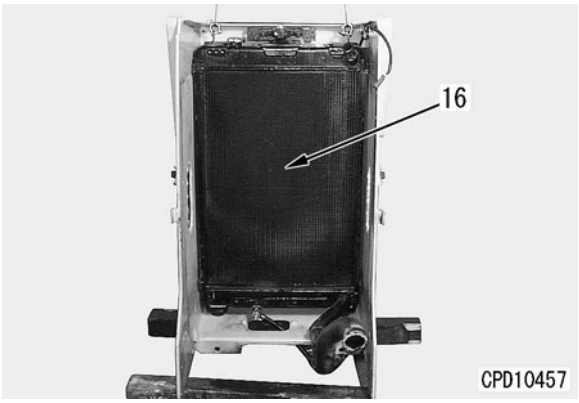
★ If the mounting bolt of the cleaning and inspection cover is loosened with an impact wrench, it is loosened too much and the bolt pin is broken. Accordingly, loosen it with a wrench by hand.

★ If the oil cooler assembly is removed without removing the cleaning and inspection cover, the pin may touch and break the core. Accordingly, remove the cleaning and inspection cover first.

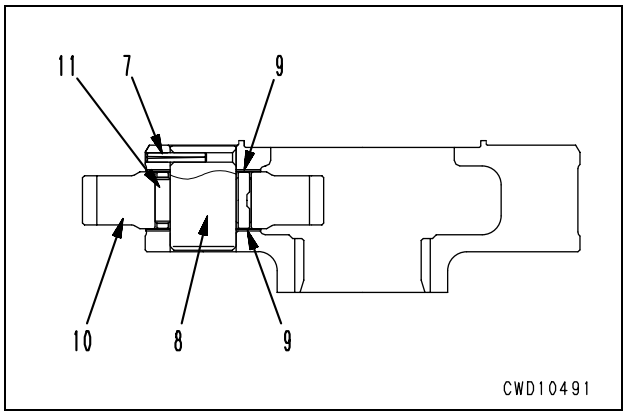


3) Lift off radiator (16).

kg Radiator: **80 kg**

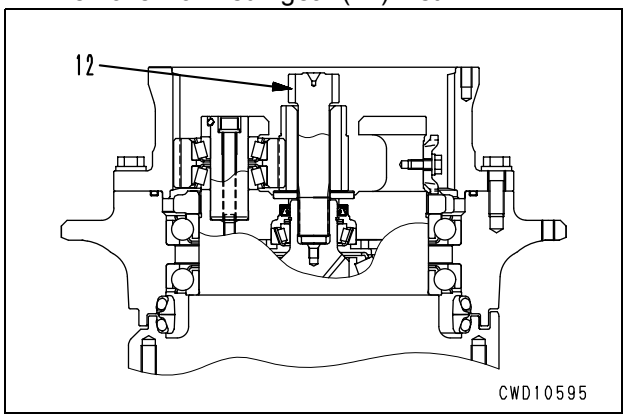


3) Disassemble No. 1 planetary carrier assembly according to the following procedure.
   i) Drive pin (7) into shaft (8).
      ★ 3 sets
   ii) Remove shaft (8) from No. 1 planetary carrier assembly.
      ★ After removing the shaft, remove pin (7) from shaft (8).
      ★ 3 sets
   iii) Remove 2 thrust washers (9), gear (10), and bearing (11).
      ★ 3 sets.



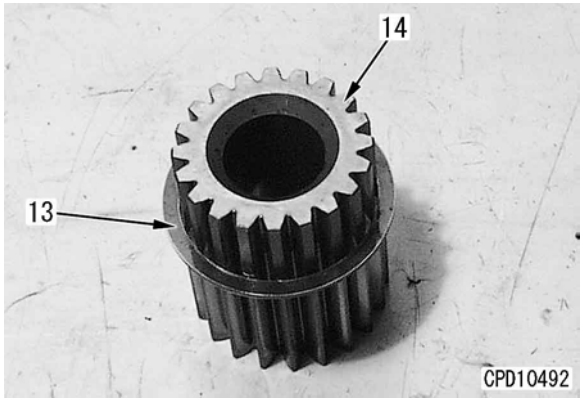
5. No. 1 sun gear

Remove No. 1 sun gear (12) first.



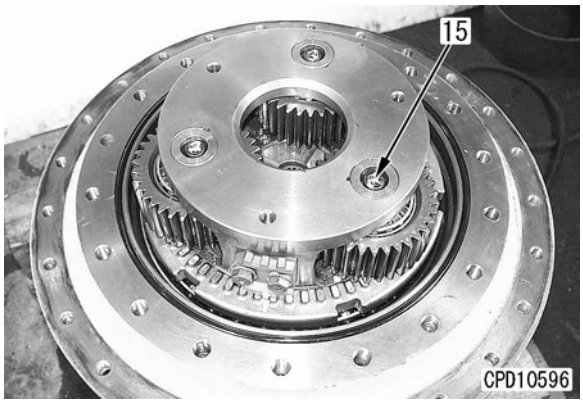
6. No. 2 sun gear

1) Remove thrust washer (13).
2) Remove No. 2 sun gear (14).

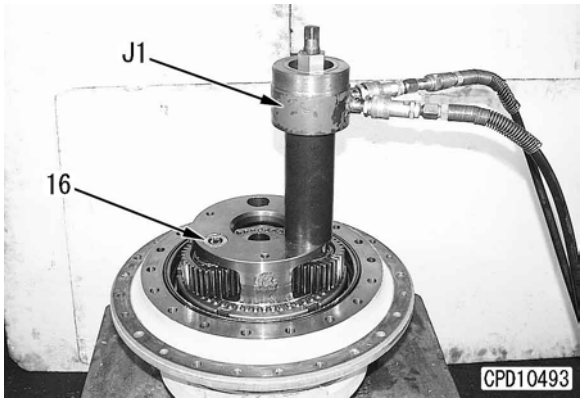


7. No. 2 planetary carrier assembly (Travel motor case)

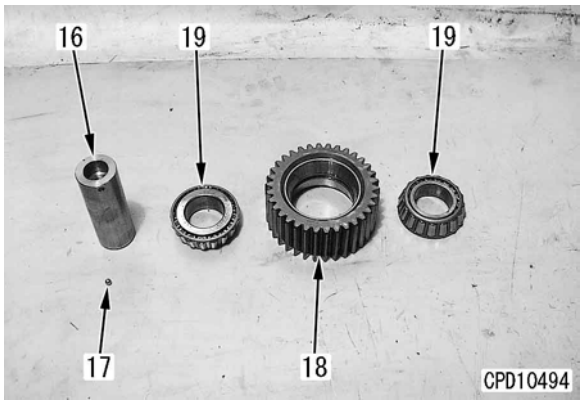
1) Remove mounting bolts (15).
   ★ 3 sets



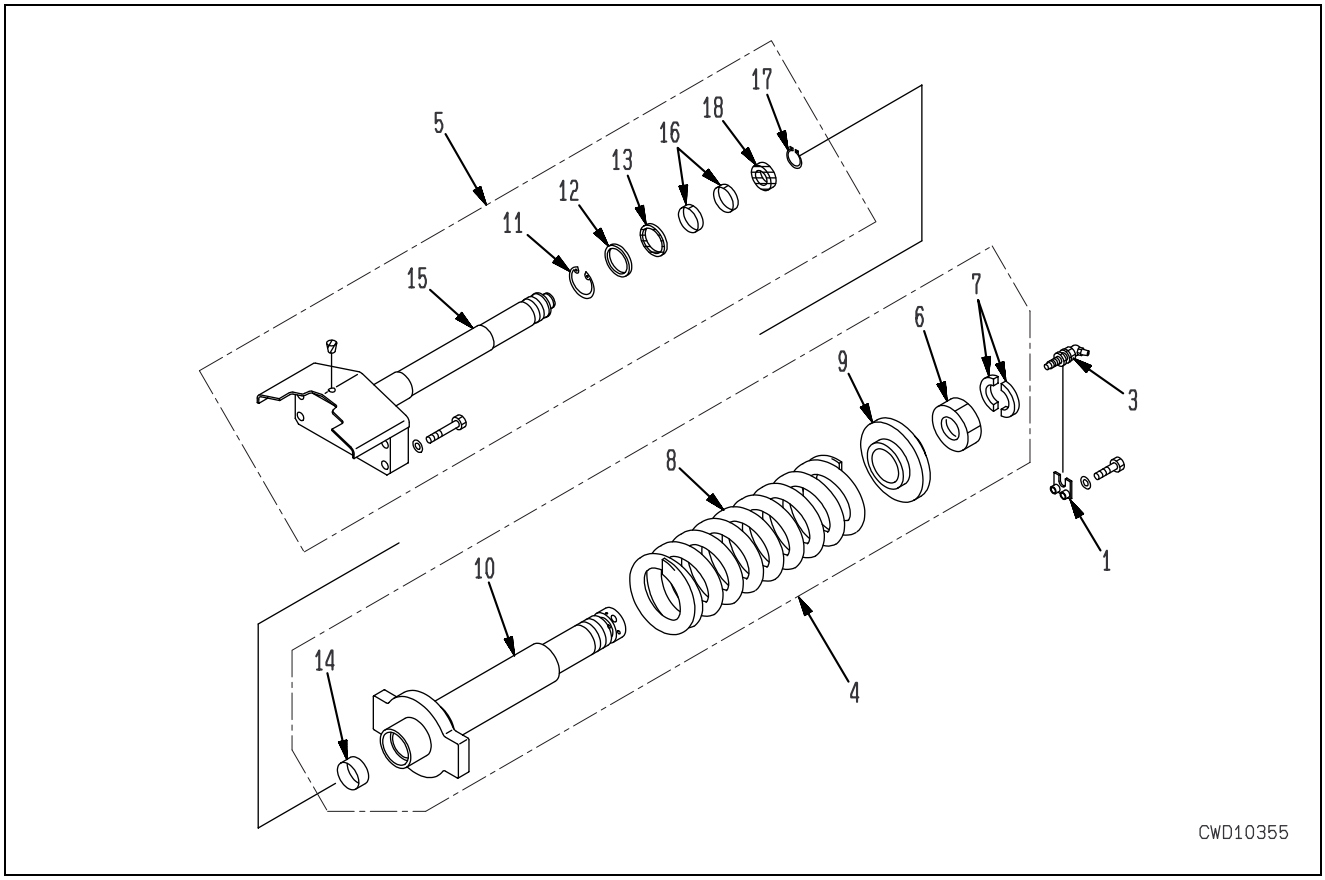
2) Using tools **J1**, pull shaft (16) out of No. 2 planetary carrier assembly.
   ★ 3 sets



3) Remove ball (17).
   ★ 3 sets
4) Remove gear (18) from No. 2 planetary carrier assembly.
   ★ 3 sets
5) Remove 2 inner race bearings (19) from gear (18).
   ★ 3 sets



ASSEMBLY OF RECOIL SPRING ASSEMBLY

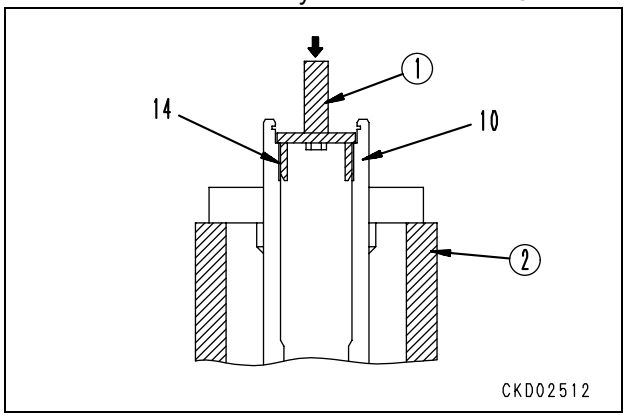


1. Assembly of rod assembly

1) Install U-packing (18) to rod assembly (5) and secure it with snap ring (17).
2) Install wear ring (16).

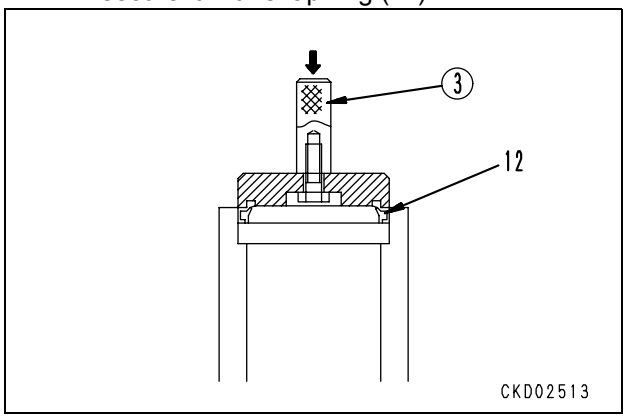
2. Assembly of recoil spring assembly

1) Using push tool ①, press fit bushing (14) to cylinder (10).
   ★ Secure the cylinder with block ②.



2) Install seal (13) to cylinder (10).

3) Using push tool ③, install spacer (12) and secure it with snap ring (11).



ASSEMBLY OF CARRIER ROLLER ASSEMBLY

1. Assembly of shaft, support assembly.

1) Set support (9) on block ⑤, and using push tool ⑥, press fit shaft (10).

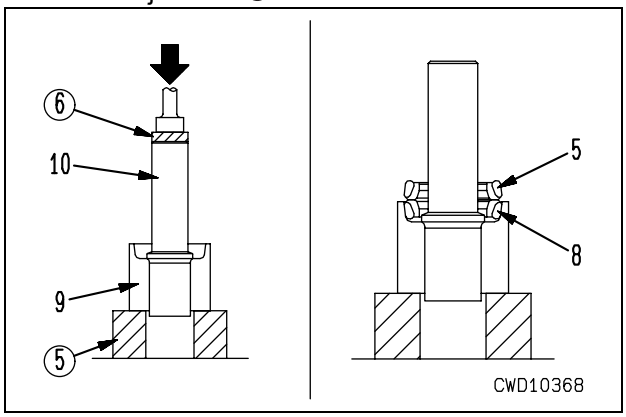
★ Press-fitting force:
19.6 – 106.8 kN (2 – 10.9 ton)

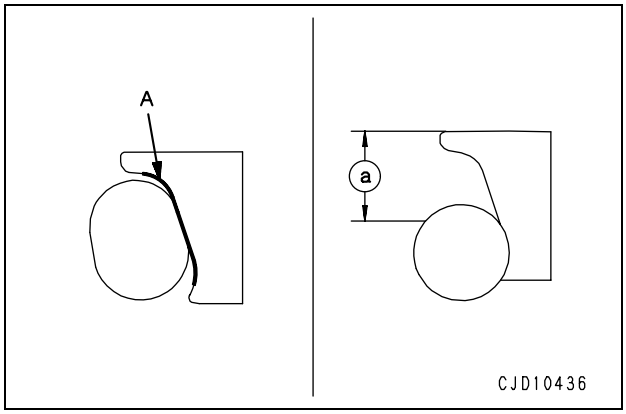
Shaft: **Anti-friction compound (LM-P)**

2) Install floating seals (8) and (5).

★ When installing the floating seal, degrease and dry the parts indicated with thick line A (O-ring and mating face of the O-ring).

★ After installing the floating seal, check that its slant is within 1 mm and its projection "ⓐ" is 4 – 8 mm.



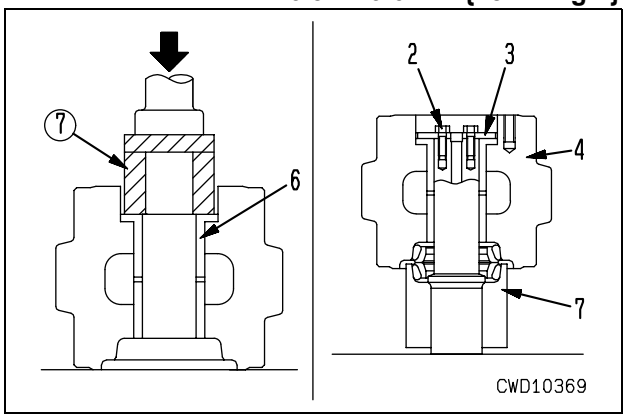


2. Assembly of roller assembly.
Using push tool ⑦, press fit bushing (6).

3. Set shaft and support assembly (7) in position, and assemble roller assembly (4).

4. Assemble plate (3), and tighten with bolt (2).

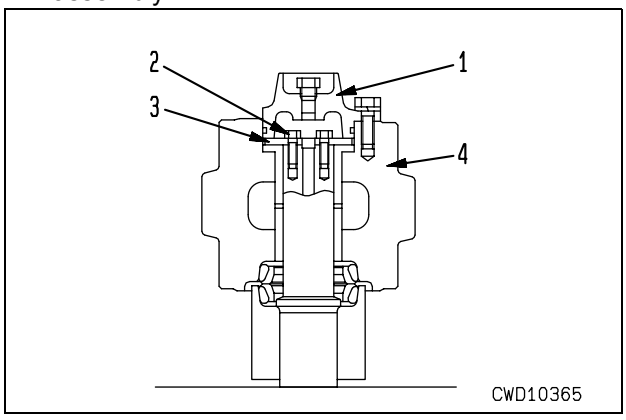
kgm Mounting bolt:
176.5 ± 19.6 Nm {18 ± 2 kgm}

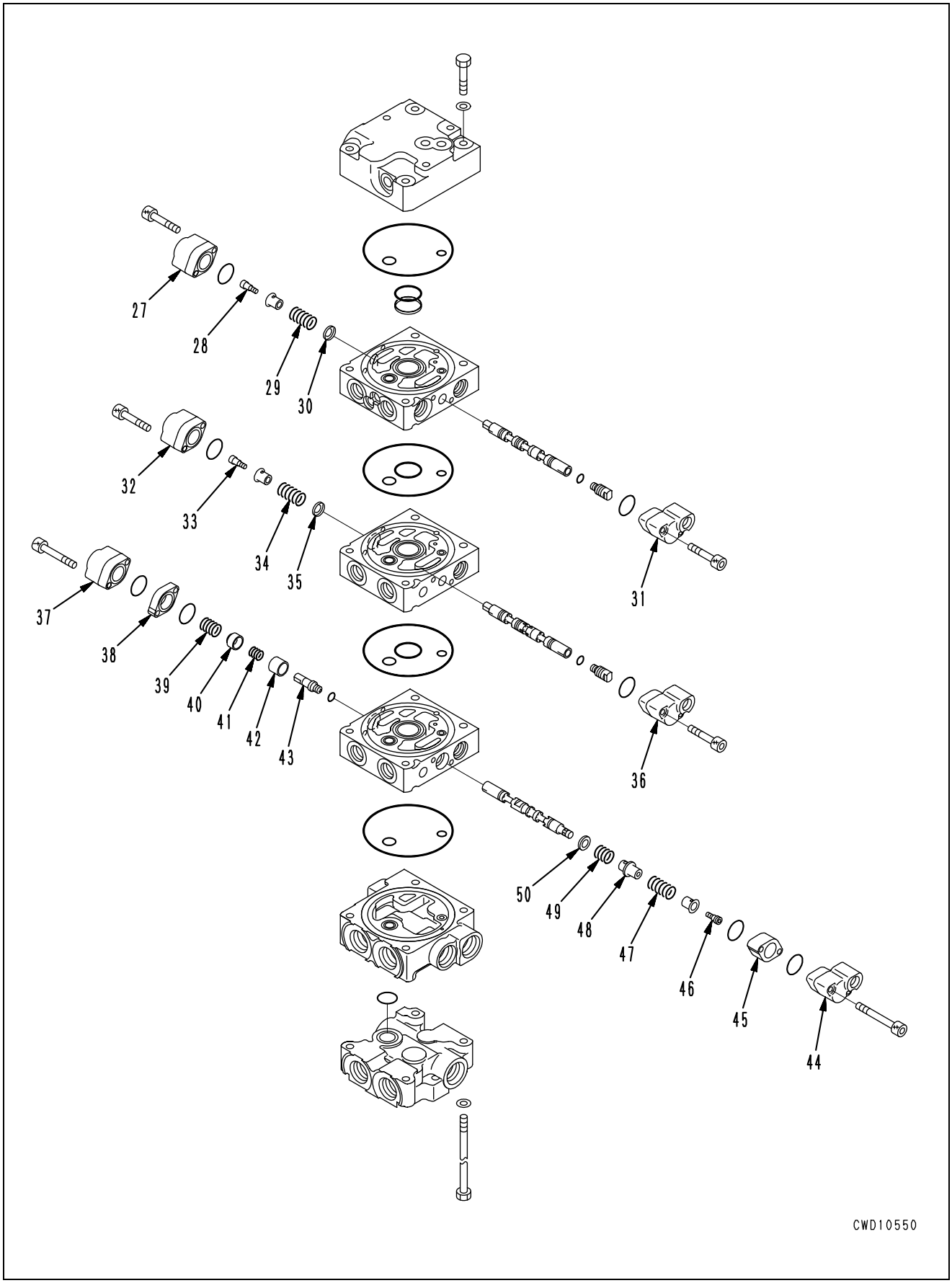


5. Fill roller with oil.

Carrier roller: **Approx. 200 – 220 cc (Engine oil EO30-CD)**

6. Fit O-ring to cap (1) and install to carrier roller assembly.

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REMOVAL OF OPERATOR'S SEAT FRAME ASSEMBLY

⚠ Disconnect the cable from the negative (–) terminal of the battery.
⚠ Lower the work equipment to the ground and stop the engine. Then, loosen the hydraulic oil filler cap slowly to release the internal pressure of the hydraulic tank.
⚠ Loosen the heater hose valve (If the machine is equipped with the heater or air conditioner).
⚠ Close the fuel stop valve.

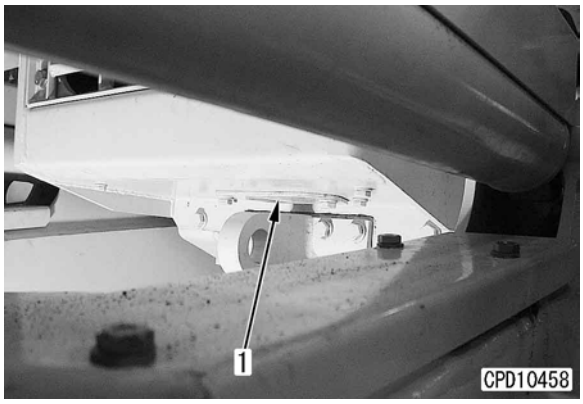
1. Drain the hydraulic oil.

Hydraulic tank: **47 ℓ**

2. Remove the mounting bolts and cover (1).

3. Loosen the radiator cap and drain the cooling water.

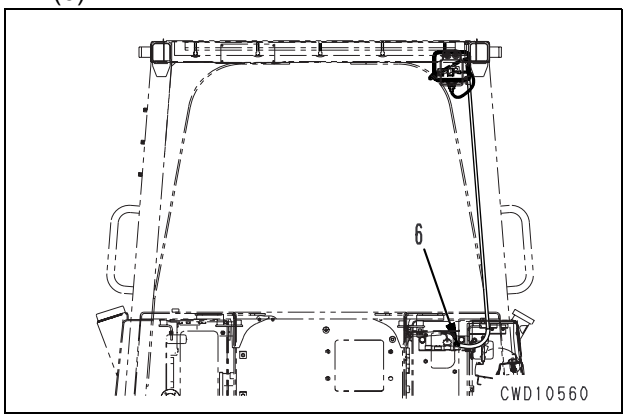
Radiator: Approx. **15 ℓ**



4. Remove the mounting bolts and cover (2).
★ Both sides

5. Remove rear covers (3), (4), and (5).

6. Disconnect rear lamp wiring connector (CN33) (6).



7. Lift off ROPS guard (7). ※ 1

kg ROPS guard: **340 kg**