SHOP MANUAL

KOMATSU

WA380-5

Machine model	Serial number
WA380-5	**60001 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.
- WA380-5 mounts the SAA6D114E-2 engine.
  For details of the engine, see the 114 Series Engine Shop Manual.

Printed in Japan 12-22 (01)

HOISTING INSTRUCTIONS

HOISTING

⚠ Heavy parts (25 kg or more) must be lifted with a hoist, etc. In the **DISASSEMBLY AND ASSEMBLY** section, every part weighing 25 kg or more is indicated clearly with the symbol

- If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:
  1) Check for removal of all bolts fastening the part to the relative parts.
  2) Check for existence of another part causing interference with the part to be removed.

WIRE ROPES

1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

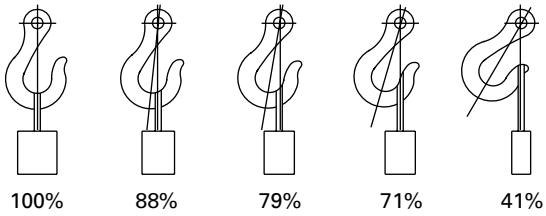
Wire ropes
(Standard "Z" or "S" twist ropes
without galvanizing)

Rope diameter	Allowable load	
mm	kN	tons
10	9.8	1.0
11.5	13.7	1.4
12.5	15.7	1.6
14	21.6	2.2
16	27.5	2.8
18	35.3	3.6
20	43.1	4.4
22.4	54.9	5.6
30	98.1	10.0
40	176.5	18.0
50	274.6	28.0
60	392.2	40.0

★ The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

2) Sling wire ropes from the middle portion of the hook.

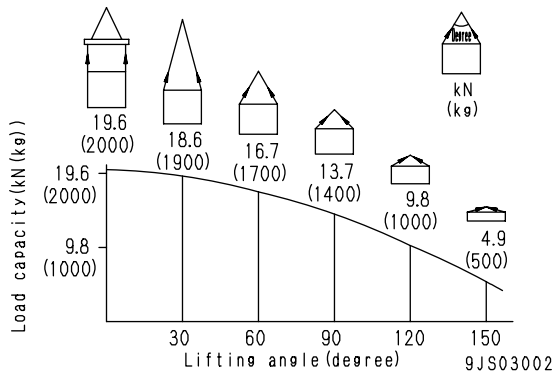
Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



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

⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.

4) Do not sling a heavy load with ropes forming a wide hanging angle from the hook.
When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load kN {kg} when hoisting is made with two ropes, each of which is allowed to sling up to 9.8 kN {1000 kg} vertically, at various hanging angles.
When two ropes sling a load vertically, up to 19.6 kN {2000 kg} of total weight can be suspended. This weight becomes 9.8 kN {1000 kg} when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 39.2 kN {4000 kg} if they sling a 19.6 kN {2000 kg} load at a lifting angle of 150°.



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

TABLE OF FUEL, COOLANT AND LUBRICANT

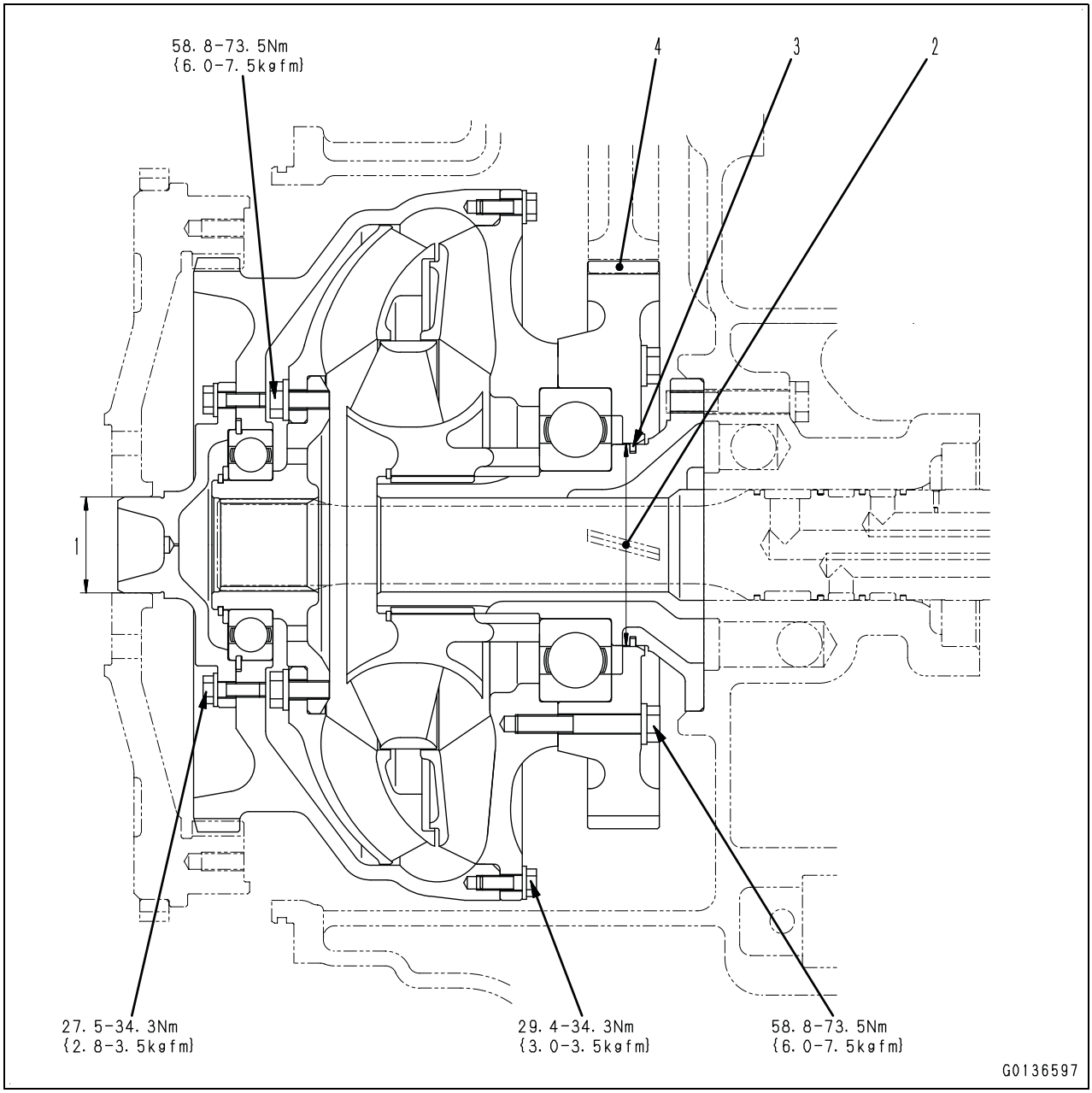
★ For details of the notes (Note 1, Note 2, ---) in the table, see the Operation and Maintenance Manual.

Reservoir	Fluid Type	Ambient Temperature -22 -4 14 32 50 68 86 104 122 °F -30 -20 -10 0 10 20 30 40 50 °C	Recommended Komatsu Fluids
Engine Oil Pan	Engine oil	SAE10W30DH	Komatsu EO10W30-DH
		SAE15W40DH	Komatsu EO15W40-DH
		SAE30DH	Komatsu EO30-DH
Transmission case	Power train oil (Note.1)	TO10	TO10
Hydraulic System	Power train oil	TO10	TO10
	Hydraulic oil	HO46-HM	HO46-HM
	Engine oil	SAE10W-30DH	Komatsu EO10W30-DH
		SAE15W40DH	Komatsu EO15W40-DH
Axle	Axle oil (Note.2)	AXO80	AXO80
	Engine oil	(Note.3)	EO50-CD
Pin / Bushing Grease fitting (Note.4)	Hyper grease (Note.5)	G2-T, G2-TE	G2-T, G2-TE
	Lithium EP grease	G2-LI	G2-LI
Cooling system	Supercoolant AF-NAC	AF-NAC (Note.6)	AF-NAC
Fuel tank	Diesel fuel	No.2-D	ASTM No.2-D
		No.1-D	ASTM No.1-D

★ As engine oil for the engine oil pan, SAE10W30 (API CH-4, CI-4) may be used instead of SAE10W30DH, and SAE15W40 (API CH-4, CI-4) may be used instead of SAE15W40DH.

Unit: ℓ

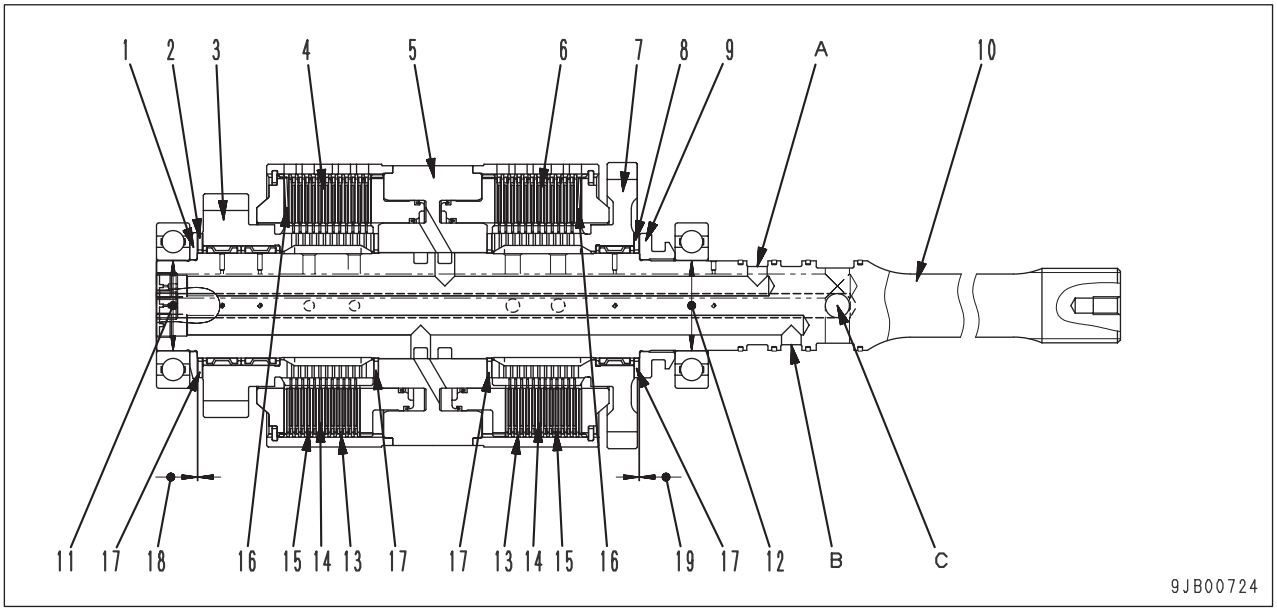
CAPACITY	WA380-5	
	Specified	Refill
Engine oil pan	37	32
Transmission case	62	54
Hydraulic system	186	129
Axle (each)	38	38
Fuel tank	300	—
Cooling system	36	—



Unit: mm

No.	Check item		Criteria			Remedy
1	Outside diameter of pilot		Standard size	Tolerance	Repair limit	Repair hard chrome plating or replace
			52	-0.010 -0.040	51.75	
2	Inside diameter of PTO gear seal ring sliding portion		110	+0.035 0	110.5	
3	Wear of stator shaft seal ring	Width	3	0 -0.10	2.7	Replace
		Thickness	4.3	±0.1	3.9	
4	Backlash of PTO drive gear and drive gear		0.17-0.45			

F and R clutches (Without a lock-up clutch)



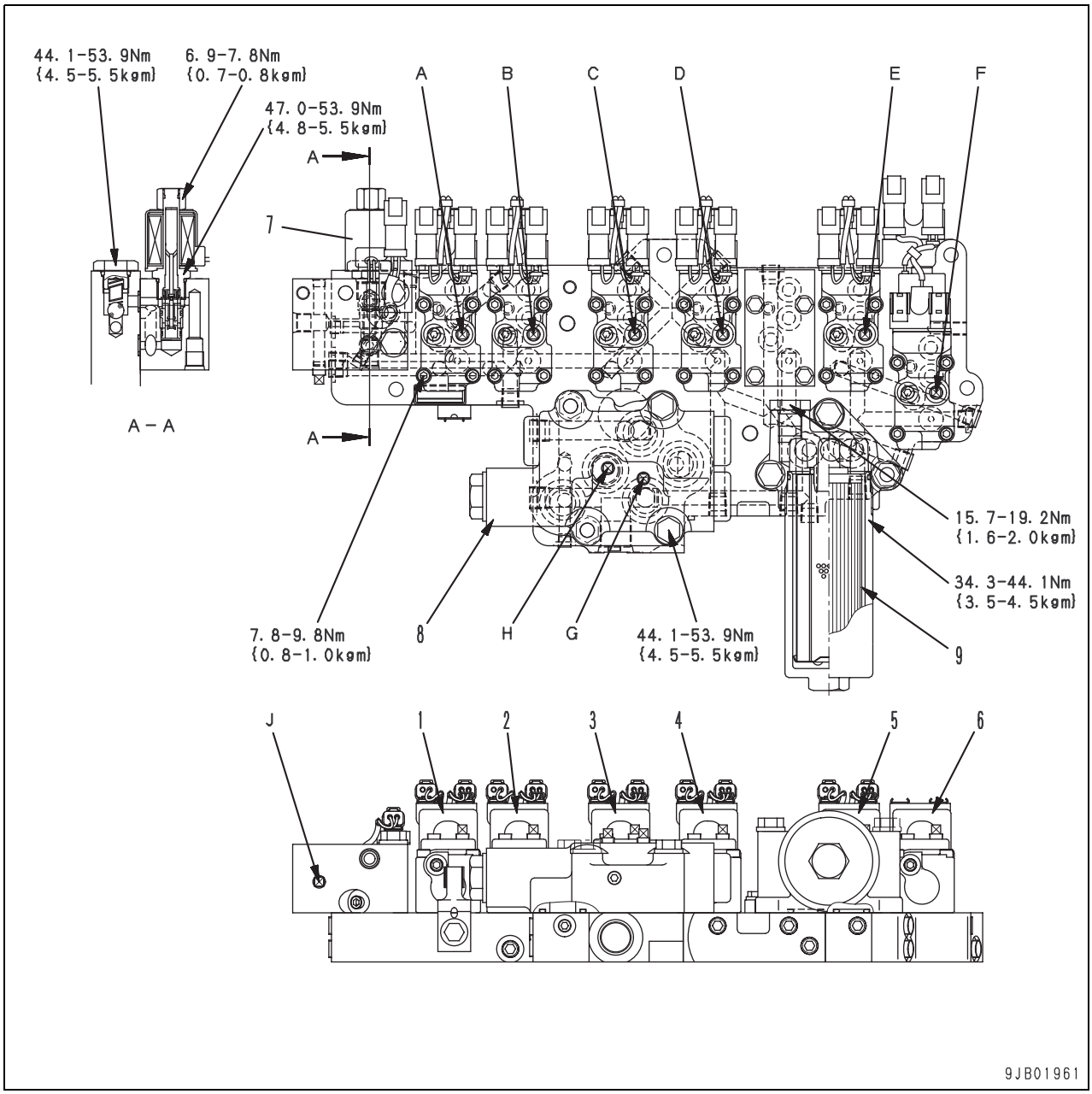
A: R clutch oil port
B: F clutch oil port
C: Lubricating oil port

1. Spacer
2. Thrust washer
3. R gear (Number of teeth: 31)
4. R clutch
5. F・R cylinder
6. F clutch
7. F gear (Number of teeth: 40)
8. Thrust washer
9. Spacer
10. Transmission input shaft

Unit: mm

No.	Check item		Criteria				Remedy
11	Clearance at bearing press fit part of shaft (F)		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole		
			60	+0.039 +0.020	0 -0.015	-0.054 - -0.020	—
12	Clearance at bearing press fit part of shaft (R)		60	+0.030 +0.011	0 -0.015	-0.045 - -0.011	—
13	Separator plate		Standard size	Tolerance		Clearance limit	
		Thickness	1.7	±0.05		1.5	
		Distortion	—	0.1		0.15	
14	Friction plate	Thickness	2.2	±0.08		1.6	
		Distortion	—	0.1		0.25	
15	Load of wave spring (Height: 2.2 mm)		1,010 N {103 kg}	±101 N {±10.3 kg}		859 N {87.6 kg}	
16	Warp of spring plate		1.4	±0.2		1.2	
17	Thickness of thrust washer of F and R clutches		3	±0.1		2.7	
18	End play of R gear		0.30 - 0.70				
19	End play of F gear		0.24 - 0.76				

Serial No.: (Transmission No. 110644) and up

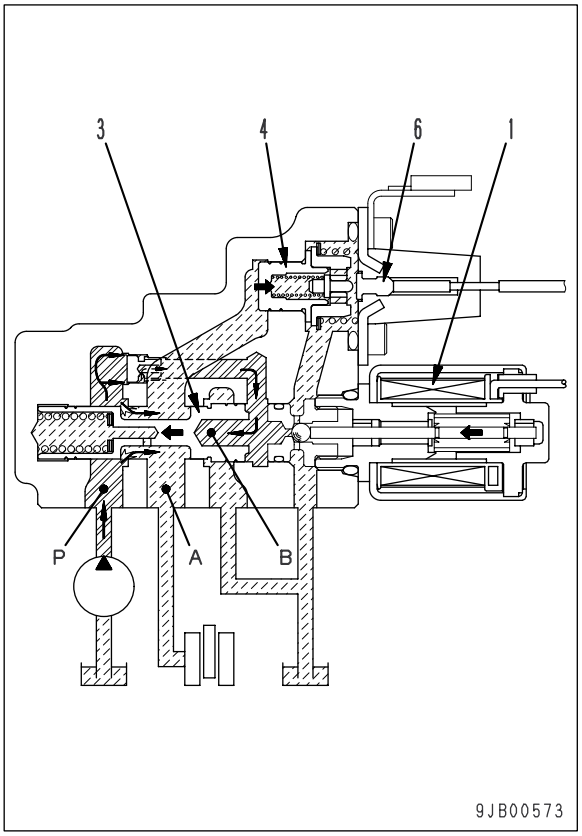


A : 2nd clutch oil pressure detection port
B : 3rd clutch oil pressure detection port
C : 1st clutch oil pressure detection port
D : 4th clutch oil pressure detection port
E : R clutch oil pressure detection port
F : F clutch oil pressure detection port
G : Main relief oil pressure detection port
H : Torque converter relief oil pressure detection port
J : Parking brake oil pressure detection port

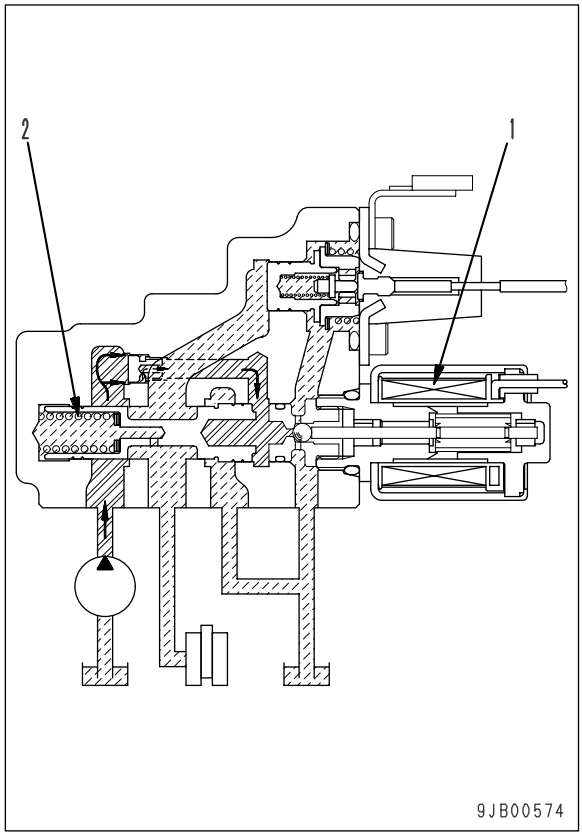
1. ECMV (for 2nd clutch)
2. ECMV (for 3rd clutch)
3. ECMV (for 1st clutch)
4. ECMV (for 4th clutch)
5. ECMV (for R clutch)
6. ECMV (for F clutch)
7. Parking brake solenoid valve
8. Main relief, torque converter relief valve
9. Last-chance filter

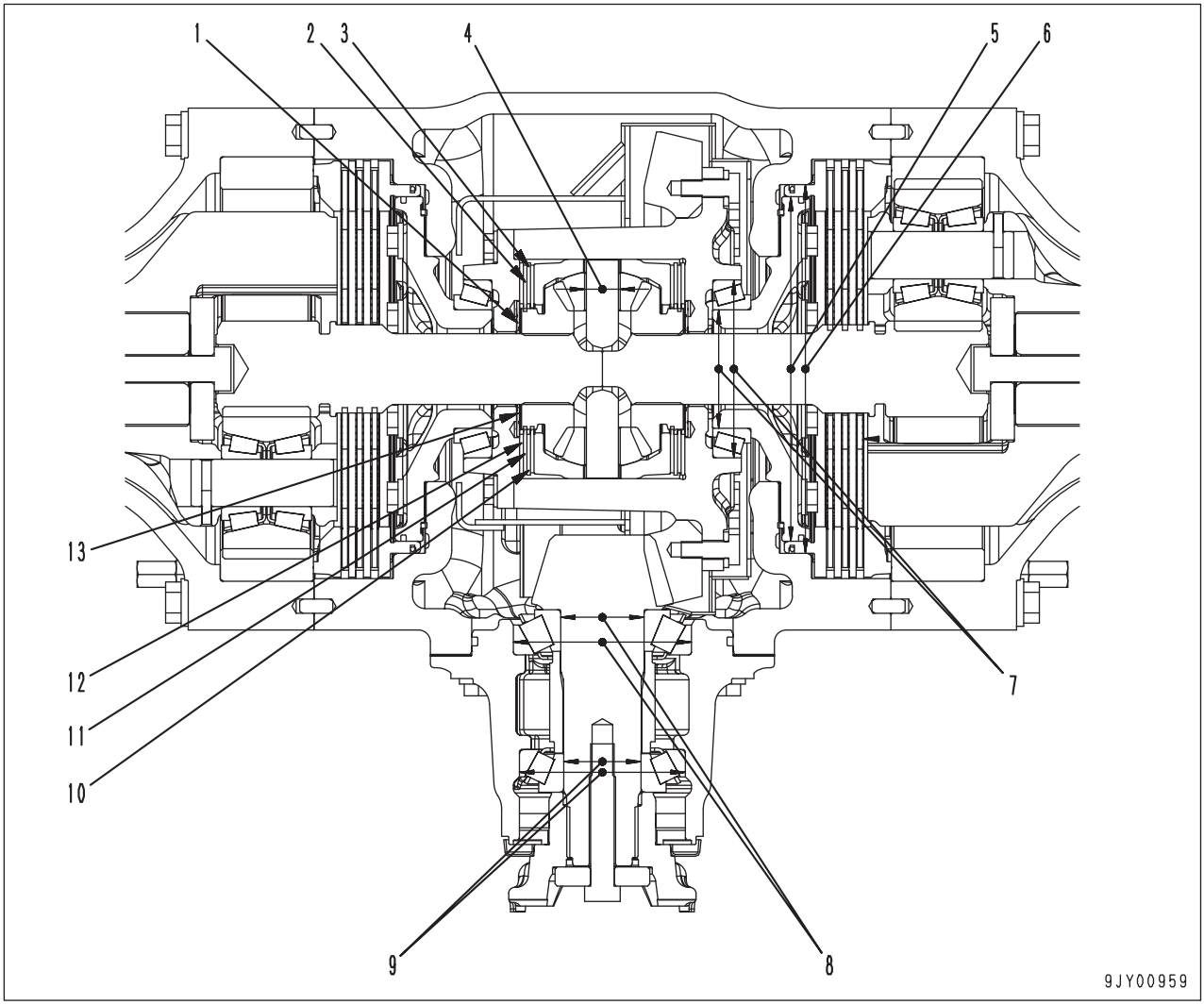
When traveling in direct drive (Changing from torque converter drive → direct drive)

1. During filling
   When the transmission shifts to direct drive (lock-up), if current is applied to proportional solenoid (1) by an electric signal, oil pressure is applied in chamber **B** to balance with the force of the solenoid, and pressure control valve (3) is pushed to the left. As a result, pump port **P** and clutch port **A** open, and oil starts to fill the clutch. When the clutch is filled with oil, oil pressure detection switch (4) is actuated, and fill switch (6) comes ON.



2. Adjusting pressure
   When electric current flows to proportional solenoid (1), the solenoid generates a propulsion force proportional to the current. The total of this propulsion force of the solenoid and the propulsion force of the oil pressure at the clutch port and the reaction force of pressure control valve spring (2) is adjusted so that it is balanced.




1
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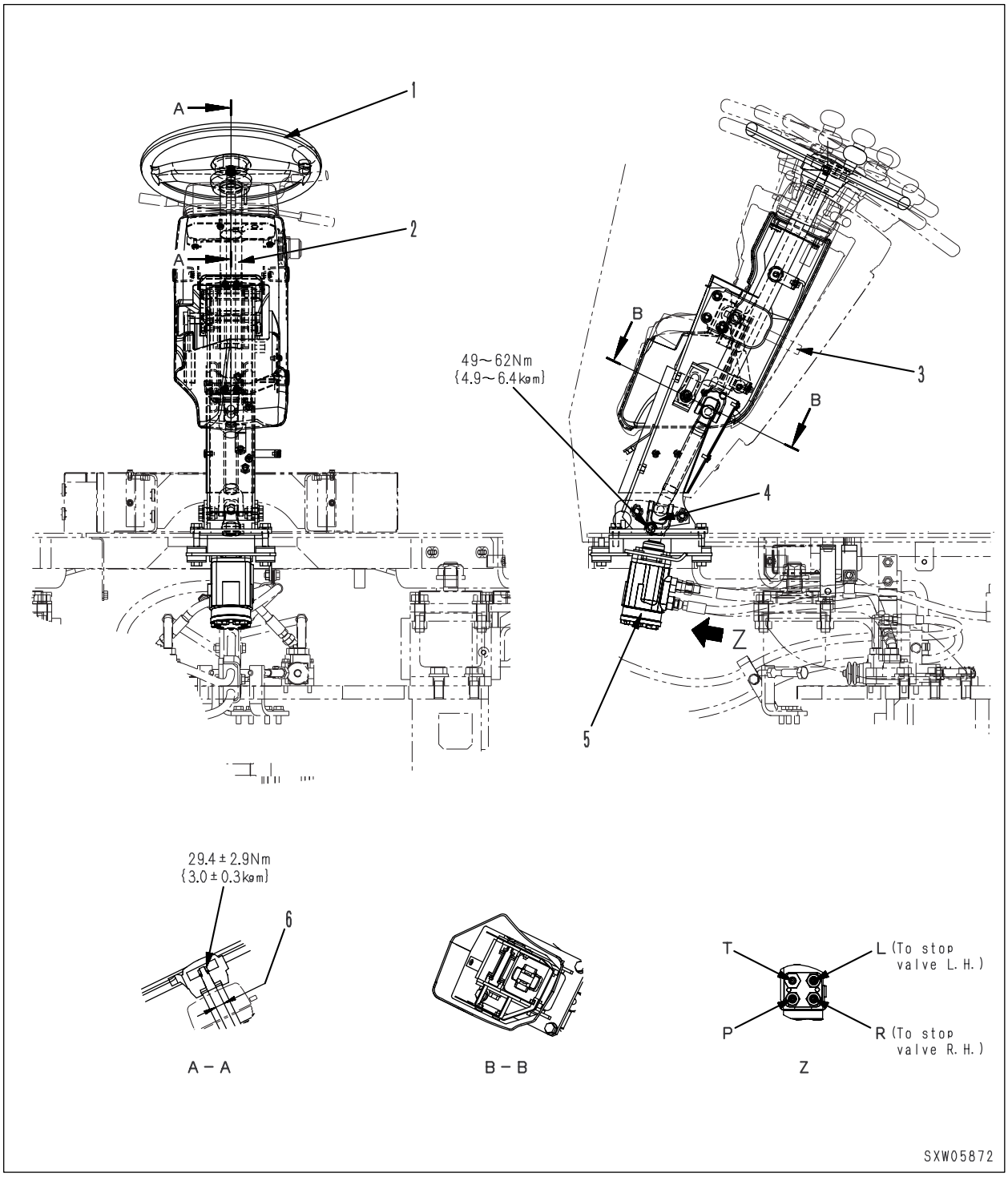
STEERING COLUMN, ORBIT-ROLL

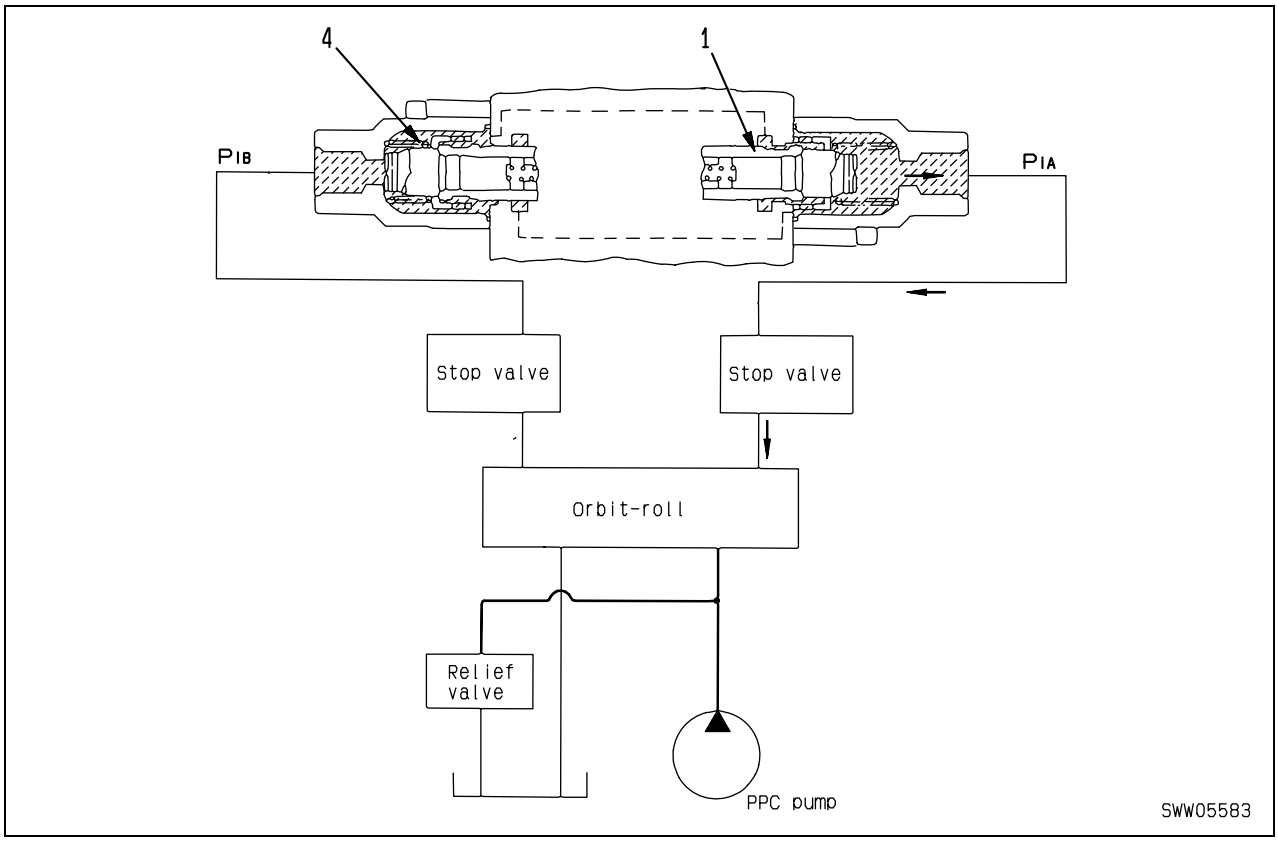


1. Steering wheel
2. Steering column
3. Tilt lever
4. Joint
5. Orbit-roll

Unit: mm

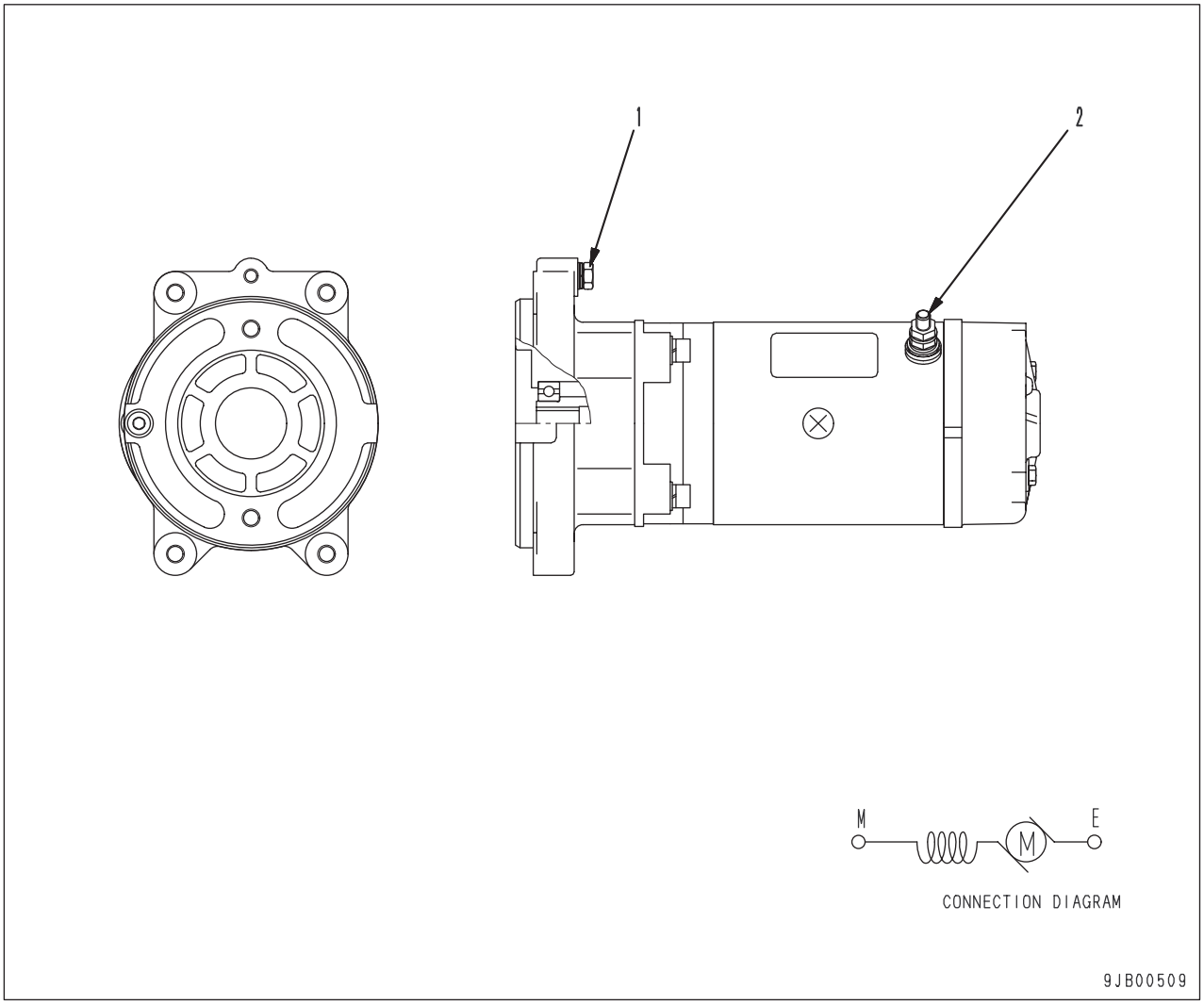
No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard Clearance	Clearance limit	
			Shaft	Hole			
6	Clearance between steering shaft and column bearing	19	0 -0.08	+0.15 -0.05	0.05 - 0.23	0.4	Replace

3. Spool returning (steering wheel stopped)



- When the steering wheel (Orbit-roll valve) is stopped, ports **PiA** and **PiB** are both connected to the drain circuit through the Orbit-roll valve. For this reason, steering spool (1) is returned to the neutral position by return spring (4).

EMERGENCY STEERING MOTOR (If equipped)



1.Terminal E
2.Terminal M

Function

- If there is an abnormal drop in the oil pressure in the steering circuit, the emergency steering motor receives a signal from the transmission controller and drives the emergency pump.

Specifications

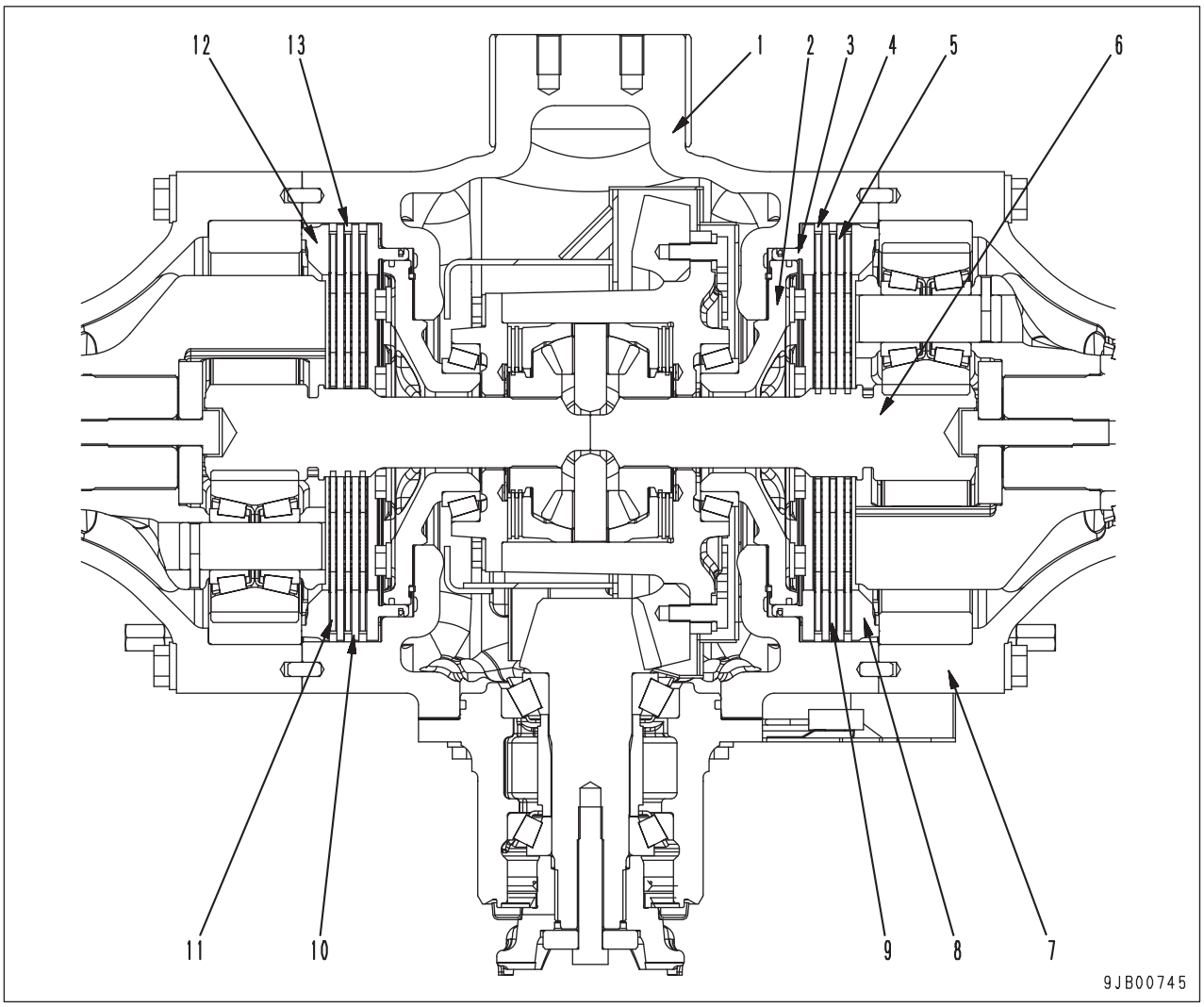
Type	Direct current motor
Rated voltage	24V
Rated output	0.9kW

Unit: mm

<table>
<tr><th>No.</th><th>Check item</th><th colspan="5">Criteria</th><th>Remedy</th></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Clearance between pedal mount hole and pin</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="16">Replace</td></tr>
<tr><td>Shaft</td><td>Hole</td></tr>
<tr><td>10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 -
0.175</td><td>0.25</td></tr>
<tr><td>9</td><td>Clearance between roller and pin</td><td>10</td><td>-0.025
-0.075</td><td>+0.1
0</td><td>0.025 -
0.175</td><td>0.25</td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Outside diameter of roller</td><td colspan="2">Standard size</td><td>Tolerance</td><td colspan="2">Repair limit</td></tr>
<tr><td colspan="2">30</td><td>0
-0.5</td><td colspan="2">29.2</td></tr>
<tr><td rowspan="3">11</td><td rowspan="3">Control spring</td><td colspan="3">Standard size</td><td colspan="2">Repair limit</td></tr>
<tr><td>Free length</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td></tr>
<tr><td>34.7</td><td>34.7</td><td>0 Nm
{0 kg}</td><td>33.7</td><td>—</td></tr>
<tr><td>12</td><td>Control spring</td><td>51.8</td><td>49.7</td><td>40.3 Nm
{4.12 kg}</td><td>50.8</td><td>—</td></tr>
<tr><td>13</td><td>Return spring</td><td>197.8</td><td>58</td><td>116.4 Nm
{11.88 kg}</td><td>178</td><td>—</td></tr>
<tr><td>14</td><td>Return spring</td><td>31.5</td><td>19.5</td><td>16.7 Nm
{1.7 kg}</td><td>28</td><td>—</td></tr>
<tr><td>15</td><td>Return spring</td><td>17</td><td>16.5</td><td>17.7 Nm
{1.8 kg}</td><td>—</td><td>—</td></tr>
</table>

REAR

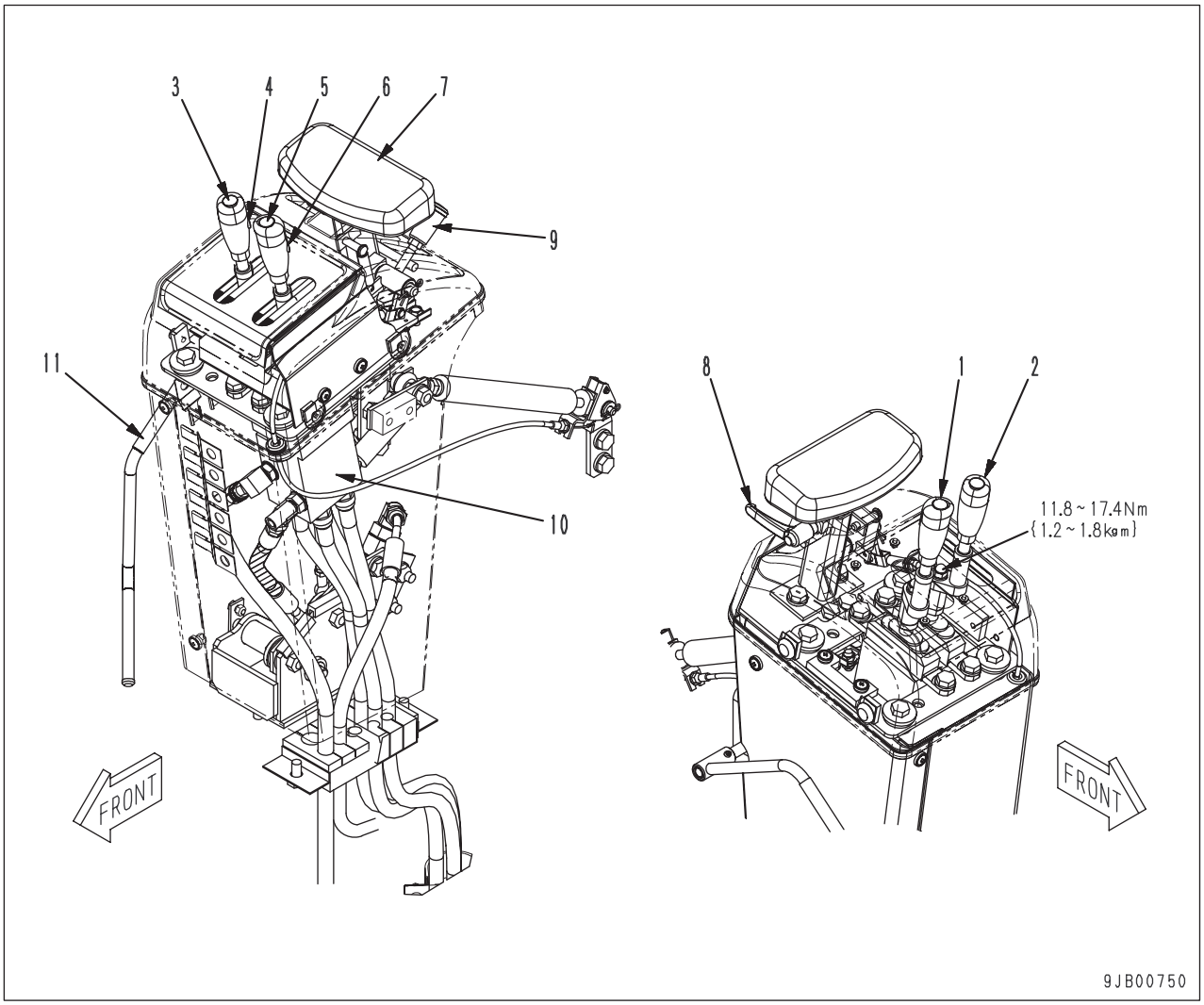
★ Figure shows brake with limited slip differential.



1. Differential housing
2. Bearing carrier
3. Piston
4. Spring
5. Inner ring
6. Sun gear shaft
7. Axle housing
8. Outer ring
9. Discs (x3)

WORK EQUIPMENT CONTROL LEVER

For PPC valve

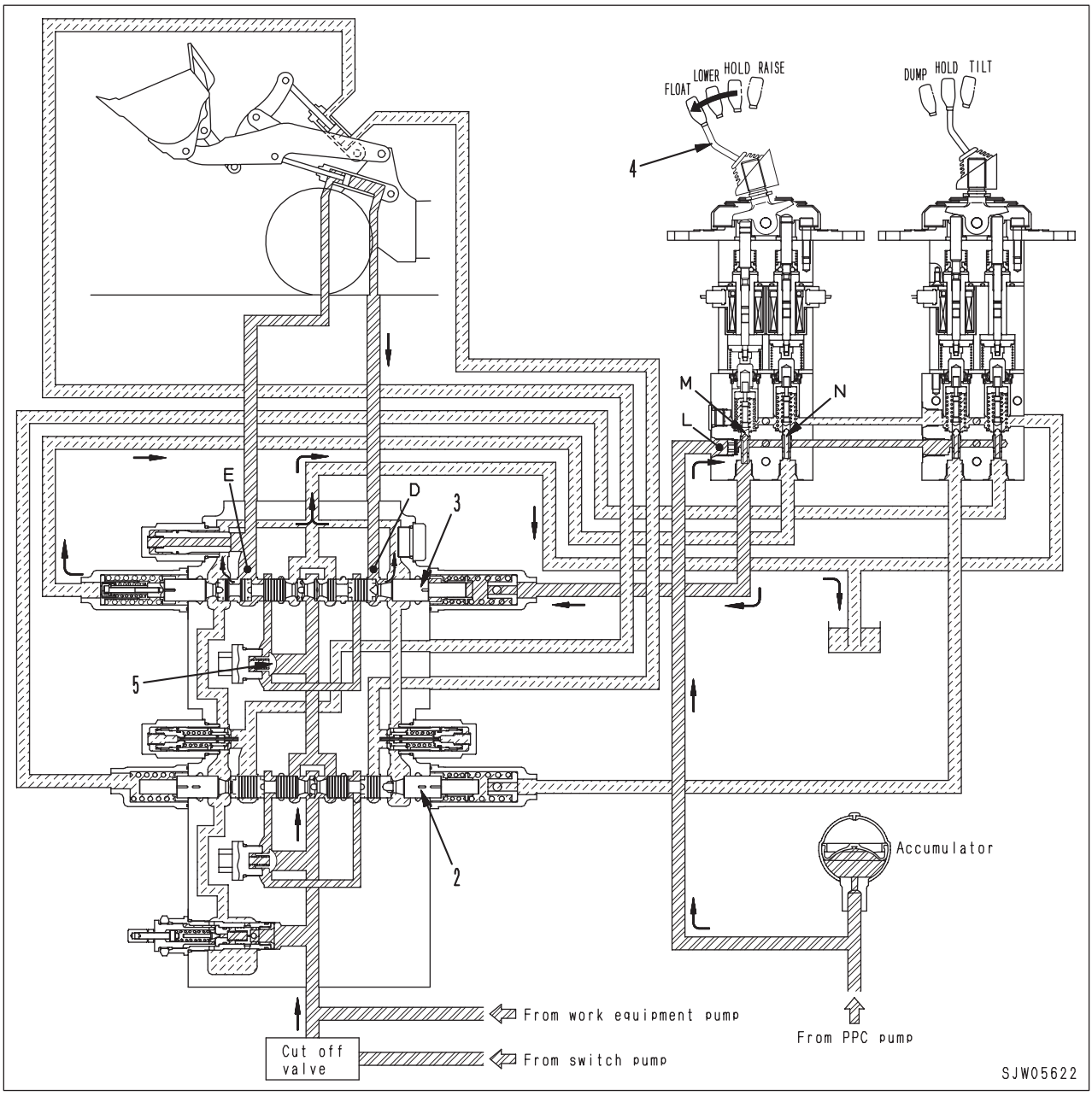


1. Lift arm control lever
2. Bucket control lever
3. Kick down switch
4. Holding switch
5. Canceling switch
   (When equipped with load meter)
6. Sub-totaling switch
   (When equipped with load meter)
7. Wrist rest
8. Wrist rest height adjusting lever
9. Lever stand angle adjusting lever
10. Work equipment PPC valve
11. Work equipment lock lever

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
12	Spool return spring (For bucket)	Free length	Installed length	Installed load	Free length	Installed load	If spring is damaged or deformed, replace it
		54.8	53.5	125 N {12.7 kg}	—	—	
13	Spool return spring (For bucket and lift arm)	54.8	52.2	235 N {24 kg}	—	—	
14	Spool return spring (For bucket and lift arm)	30.7	26.8	235 N {24 kg}	—	—	
15	Spool return spring (For lift arm)	55.3	40.0	233 N {23.8 kg}	—	—	
16	Spool return spring (For lift arm)	86.8	83.5	208 N {21.2 kg}	—	—	
17	Main valve spring of main relief valve	39.5	23.2	33.3 N {3.4 kg}	—	—	
18	Poppet spring of relief valve	49.3	41.9	259 N {26.4 kg}	47.8	208 N {21.2 kg}	
19	Check valve spring	32.6	24.5	44.1 N {4.5 kg}	—	—	
20	Suction valve spring	27.9	19.0	6.86 N {0.7 kg}	—	—	

(4) FLOAT position of the lift arm spool

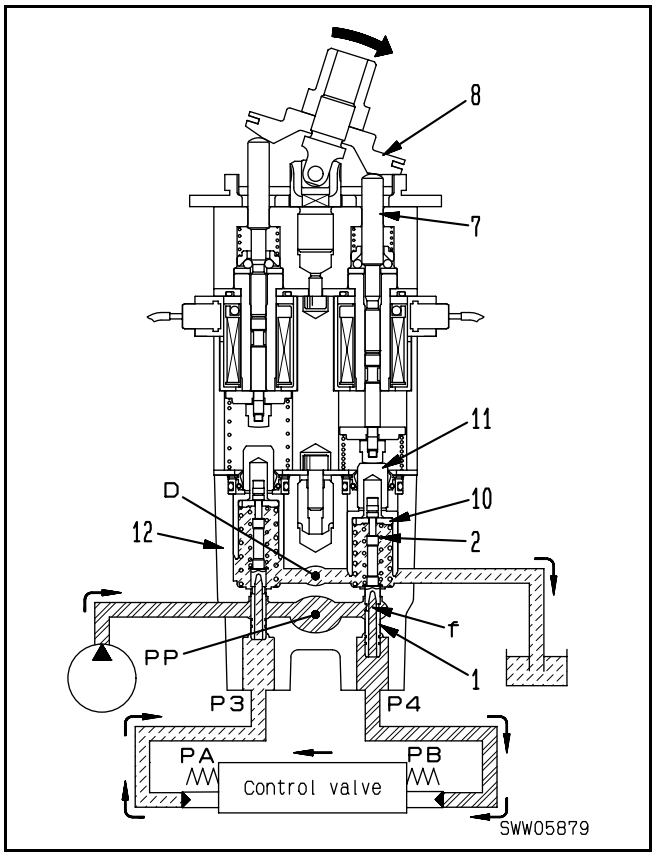


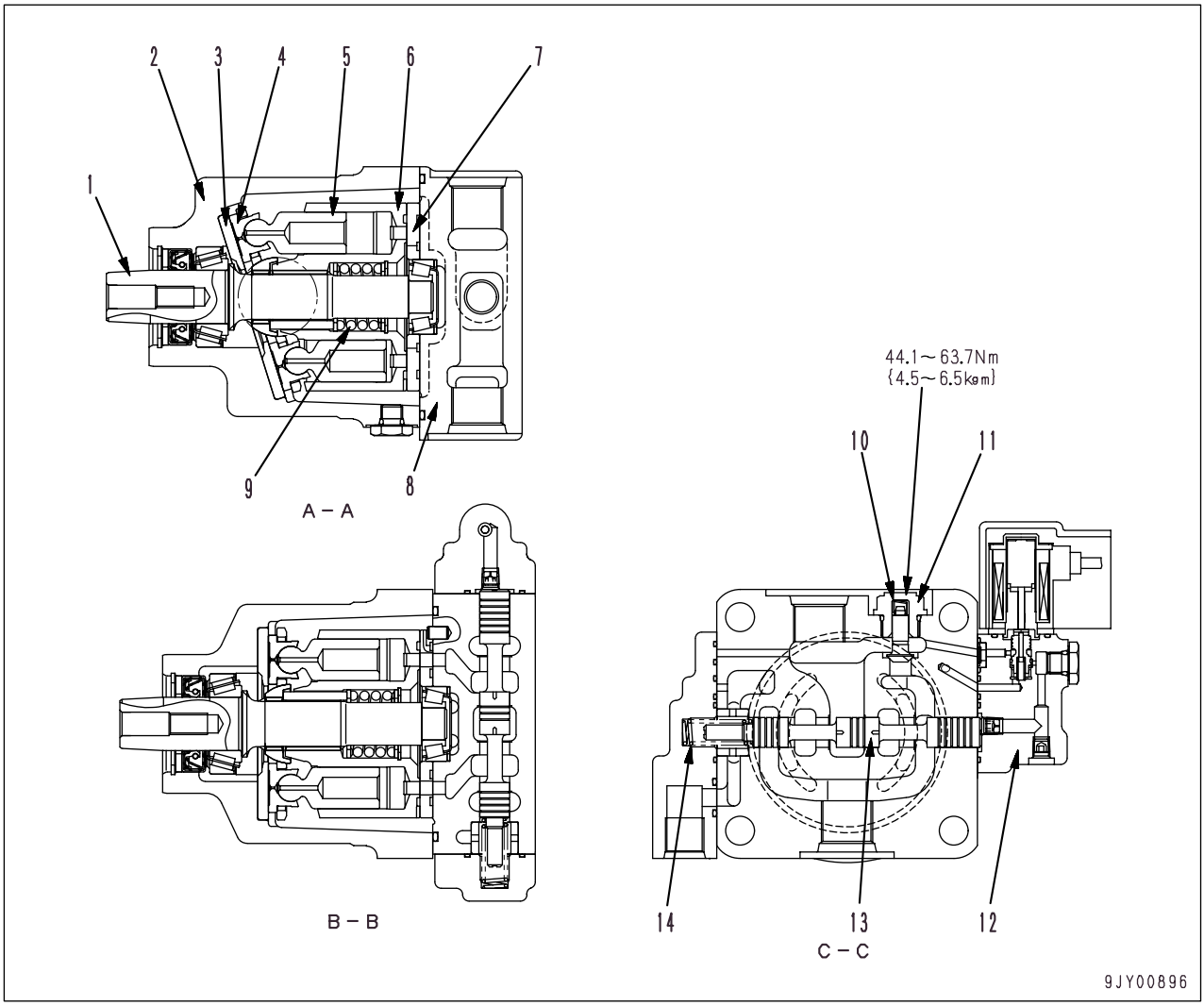
Operation

- When the lift arm lever is pushed to the FLOAT position, the lift arm spool (3) further moves from the LOWER position to the FLOAT position.
- The oil coming from the pump passes through the bypass circuit of the bucket spool (2) to flow to the bypass circuit of the lift arm spool (3).
- Because of the spool (3), the oil in the bypass circuit flows into the drain circuit and the oil cannot push-open the check valve.
- Also, since both of the lift cylinder RAISE circuit **D** and the LOWER circuit **E** are being connected to the drain circuit, the lift arm comes down by its own weight.
- As the result, while the bucket is contacting the ground surface, the bucket can move up and down when the ground surface is uneven.

2. At Fine Control (Neutral ➞ Fine Control)

- When the rod (7) and the piston (11) are pressed with the disc (8), the retainer (10) is also pressed, and the spool (1) is pressed with the metering spring (2) and moves downward.
- When the fine control hole **f** is interrupted from the drain chamber **D** as a result of the downward movement, it leads to the pump pressure chamber **PP** almost at the same time. Then, pilot pressure oil of the main pump is sent from the **P4** port to the **PB** port through the fine control hole **f**.
- When the pressure is increased at the port **P4**, the spool (1) is pushed back, and when the fine control hole **f** is interrupted from the pump pressure chamber **PP**, it leads to the drain chamber **D** almost at the same time, and the pressure is released from the **P4** port.
- Therefore, the spool (1) rises and falls so that pressure at the **P4** port balances with force of the metering spring.
  The positional relations between the retainer (10) and the body (12) (the fine control hole **f** is at the intermediate position between the drain chamber **D** and the pump pressure chamber **PP**) do not change until the retainer (10) gets to the spool (1).
- Since the metering spring (2) is tightened in proportion to control lever stroke, pressure at the **P4** port rises in proportion to the control lever stroke.
- Therefore, the control valve spool moves to the position where pressure of the **PB** chamber (the same as pressure at the **P4** port) balances with force of the return spring of the control valve spool.



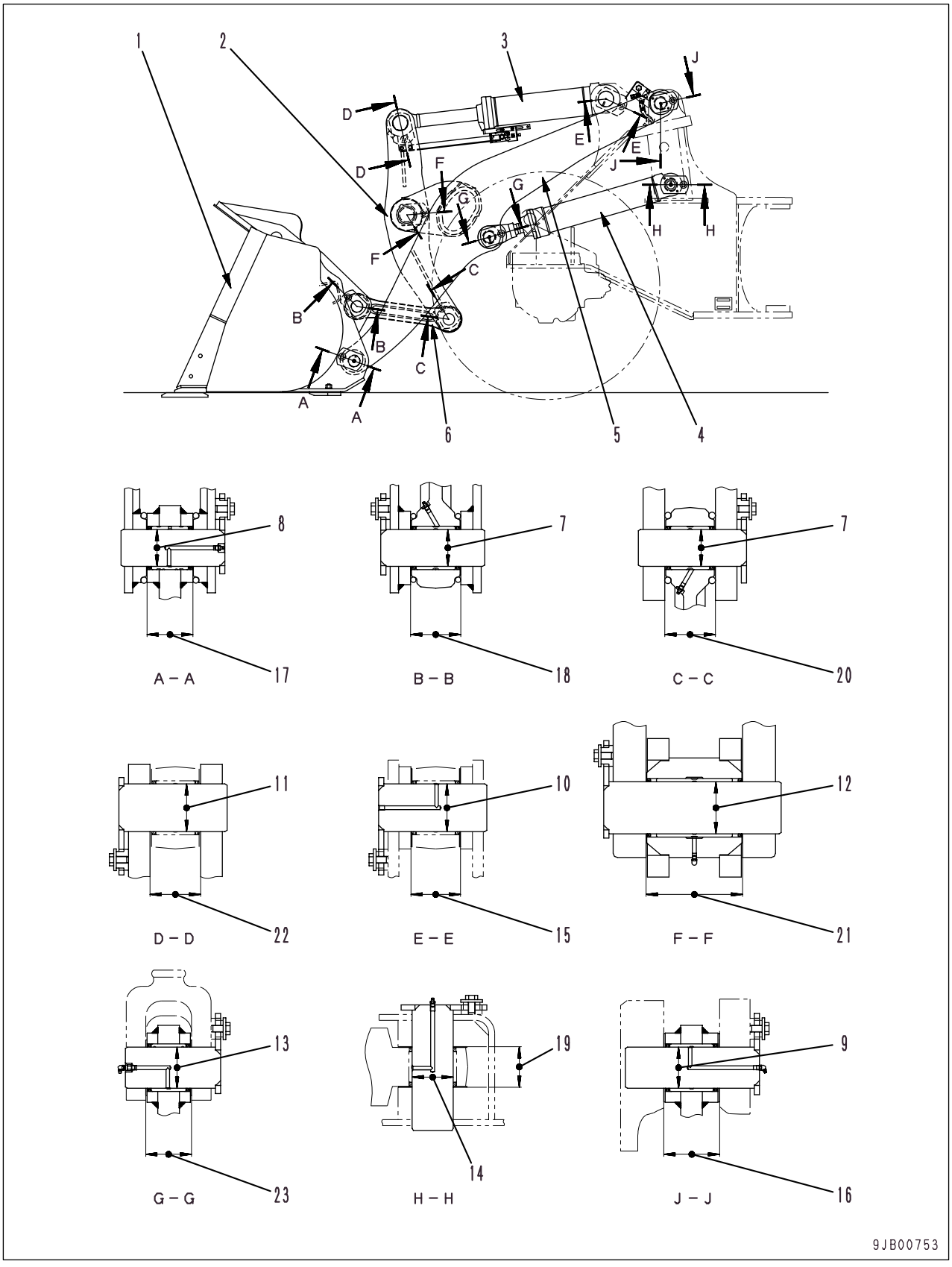


1. Output shaft
2. Case
3. Thrust plate
4. Shoe
5. Piston
6. Cylinder block
7. Valve plate
8. End cover
9. Center spring
10. Check valve spring
11. Check valve
12. Pilot valve
13. Changeover spool
14. Changeover spool spring

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
10	Check valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If spring is damaged or deformed, replace it
		13.0 x 6.5	7.0	3.43 N {0.35 kg}	—	2.55 N {0.26 kg}	

WORK EQUIPMENT LINKAGE



MACHINE MONITORING SYSTEM

Outline

- The machine monitor system uses the sensors and other devices installed to various parts of the machine to observe the condition of the machine. It processes this information swiftly and displays it on the monitor panel to inform the operator of the condition of the machine.
- The machine monitor is available in two different specifications, the standard specification and the load meter specification. As to the load meter specification, machine monitor functions are being supplemented to carry out the necessary load meter calculations and relevant indications, with an optional printer for printing out of the calculated data of the load meter.
- The indications of the machine monitor will be made under the normal mode and under the service mode.
- The machine monitor has ON/OFF output function of automatic preheating which assists with the starting of the engine.
- Normal mode indications are those which are usually being made for ordinary use by the machine operators. The description below applies to the contents of the main indications.

1. Items which are always indicated
   - Meters (Travel speedometer or engine tachometer)
   - Gauges (Engine coolant temperature gauge, torque converter oil temperature gauge, hydraulic oil temperature gauge and fuel level gauge)
   - Pilot indications
   - Service meter

   1) Load meter specification items which are always indicated
      (Items which are indicated in addition to the standard spec. indications)
      - Weight calculated by the load meter
      - Time

2. Items which will be indicated only when some abnormality occurs
   - Cautions
   - Action code indications (When the machine monitor mode changeover switch (>) is depressed and released while the action code is being indicated, the failure code (6 digits) will be indicated.)

3. When the time comes to change the filter or oil, necessary items for the filter change or oil change will be indicated on the character display. (Maintenance monitoring functions)

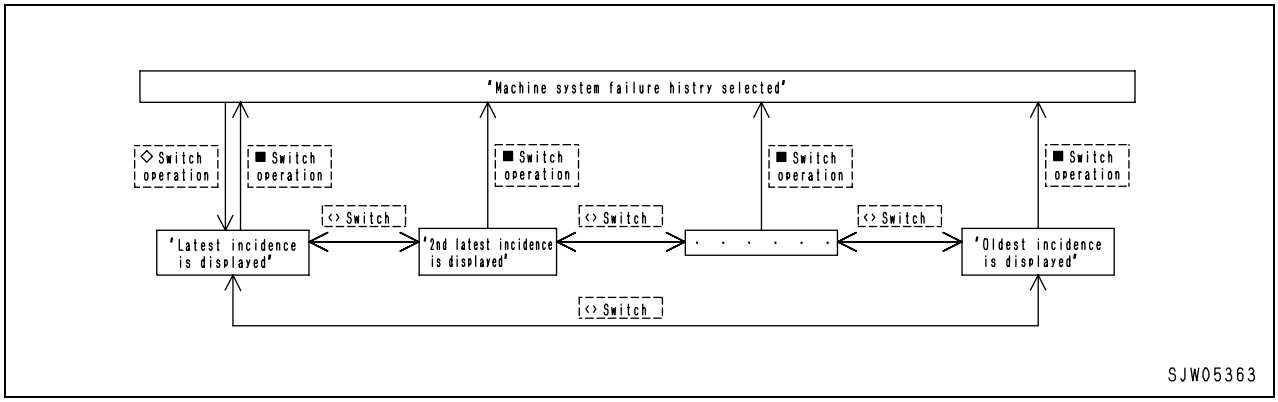
4. In addition to the above, this system is equipped with the functions to indicate the travel distance integrating meter (odometer), to reset the filter • oil changing time, to select the telephone number inputting language and to adjust the illuminance of the night time illumination for the machine monitor, by use of the character display and its operation switch, the machine monitor mode changeover switch.

   1) Other functions under the load meter specification
      With the load meter specification system, functions necessary to make changeovers of the load meter indication mode, to make changeovers of the printer output mode, to execute calibration of the load meter, and to adjust the clock time are being supplemented in addition to the standard specification functions.

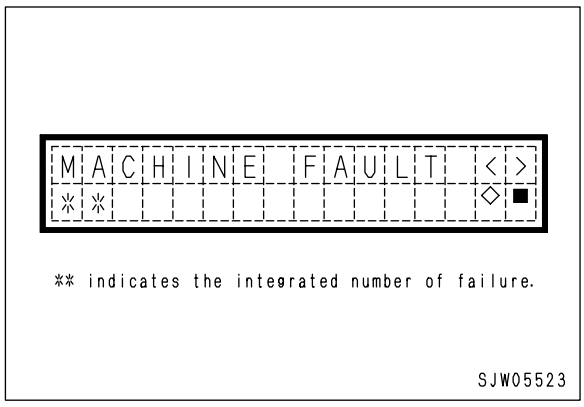
Category	No.	Items	Device	Night time dimming ○: Occurs. —: Does not occur.	Operating conditions	Operation status: Engine stopped: Warning buzzer	Engine stopped: Individual indications	Engine stopped: Concentrated warning	Engine stopped: Message indication	Engine in operation: Warning buzzer	Engine in operation: Individual indications	Engine in operation: Concentrated warning	Engine in operation: Message indication	Indication color	Remarks
Other symbols	19	Parking brake	LED	○	When the parking brake is in operation (OPEN)	—	○	—		—	○	—		Red	Turns ON as the contact goes OPEN when the parking brake is operated. This indicator will be commonly used with the parking brake dragging prevention LED.
					When the parking brake is released (CLOSE)	—	—	—		—	—	—		—	
	31	Auto greasing (Optional)	LED	○	Not in operation/Not installed	—	—	—		—	—	—		—	
					In operation	—	○	—		—	○	—		Green	
					The tank is empty	—	◎ 1Hz	—		—	◎ 1Hz	—		Green	
					Abnormal	—	◎ 2Hz	—		—	◎ 2Hz	—		Green	
	30	Preheating (Auto pre-heating)	LED	○	Other cases than below	—	—	—		—	—	—		—	When pre-heating and after heating are not made due to occurrence of some abnormality, the (including output section failure) alarm will not turn on.
					When pre-heating is being made	—	○	—		—	○	—		Red	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	32	Joystick changeover (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When the wheel steering is in operation	—	—	—		—	—	—		—	
					When the Joystick is being operated	—	○	—		—	○	—		Green	
					"Priority to the FNR lever" caution	☆	◎	○		☆	◎	○		Green	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	29	Semi auto digging (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When this function is not in operation	—	—	—		—	—	—		—	
					When the automatic digging is operation	—	○	—		—	○	—		Green	
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.
	22	Maintenance monitor	LED	○	Normal	—	—	—		—	—	—		—	
					Less than 30 hours after maintenance	—	◎	—	△	—	◎	—	△	—	Simultaneously, the message display will indicate the content. The indicator will light for 30 sec. only after the starting key is turned ON.
					Less than 30 hours before maintenance or maintenance time has come	—	○	—	△	—	○	—	△	Red	
	33	Right directional selector switch (Optional)	LED	○	When this option is not installed	—	—	—		—	—	—		—	
					When column shift is being used	—	—	—		—	—	—		—	
					When the R.H. FNR switch is being used When seasaw switch mode	—	○	—		—	○	—		Green	
					"Priority to the FNR lever" caution	☆	◎	○		☆	◎	○		Green	As for the "priority to the FNR lever" caution, when the optional Joystick is being employed, the Joystick indicator will flash.
					When a communication error has occurred	—	—	—		—	—	—		—	The indication will not be made when a communication error has occurred.

Items Related to the Fault History of Machine System

1) Display of the fault history of vehicle system
A current fault is displayed prior to the restored ones.
Pressing the > switch displays the next older fault.
Pressing the < switch displays the next newer fault.
After the oldest fault in memory was displayed, a screen is displayed allowing to select clearing the entire fault history of electric system of the relevant controller.
Pressing the ■ switch changes the screen to the [Select displaying abnormalities in machine system] screen on the first layer.



2) Selection of displaying the fault history of machine system (first layer)
Pressing the > switch changes the screen to the [Select the real-time monitor functions] screen.
Pressing the < switch changes the screen to the [Select displaying the fault history of machine system] screen.
Pressing the ■ switch changes the screen to the ordinary or alert screen.
Pressing the ◇ switch changes the screen to the [Display abnormalities in electric system] screen.



Item ID	Real-time monitoring item	Item displayed	Display unit	Displayed range	Component detected	Terminal No.	Remarks
	All the items are shown even if some of them are not equipped depending on models and options.	Abridged due to limitation of number of letters.	SI unit system so long as the values have units	A value out of the range displayed is shown as the lowest (highest) value in the range.			
Work equipment controller							
20202	Part No. of work equipment controller's ROM	BOOM ROM	—	—	Work equipment	—	Shows part No. of ROM
41900	Lift arm-raising EPC current	RAISE EPC	1mA	0-1000	Work equipment	L73-6	
41901	Lift arm-lowering EPC current	LOWER EPC	1mA	0-1000	Work equipment	L73-16	
41902	Bucket tilt EPC current	TILT EPC	1mA	0-1000	Work equipment	L73-5	
41903	Bucket dump EPC current	DUMP EPC	1mA	0-1000	Work equipment	L73-15	
41904	R.H. Joystick EPC current	R.H. J/S EPC	1mA	0-1000	Work equipment	L73-26	
41905	L.H. Joystick EPC current	L.H. J/S EPC	1mA	0-1000	Work equipment	L73-36	
41906	3rd valve 1 EPC current	3RD EPC1	1mA	0-1000	Work equipment	L73-25	
41907	3rd valve 2 EPC current	3RD EPC2	1mA	0-1000	Work equipment	L73-35	
42000	Lever potentiometer-voltage lift arm 1	BOOM POT1	0.01V	0.00-5.00	Work equipment	L71-19	
42001	Lever potentiometer-voltage lift arm 2	BOOM POT2	0.01V	0.00-5.00	Work equipment	L71-13	
42002	Lever potentiometer-voltage bucket 1	BUCKET POT1	0.01V	0.00-5.00	Work equipment	L71-7	
42003	Lever potentiometer-voltage bucket 2	BUCKET POT2	0.01V	0.00-5.00	Work equipment	L71-1	
42004	Lever potentiometer-voltage Joystick 1	J/S POT1	0.01V	0.00-5.00	Work equipment	L71-9	
42005	Lever potentiometer-voltage Joystick 2	J/S POT2	0.01V	0.00-5.00	Work equipment	L71-3	
42006	Lever potentiometer-voltage 3rd valve 1	3RD POT1	0.01V	0.00-5.00	Work equipment	L71-20	
42007	Lever potentiometer-voltage 3rd valve 2	3RD POT2	0.01V	0.00-5.00	Work equipment	L71-14	
06002	Lift arm angle	BOOM ANG	1°	-41-46	Work equipment	L71-8	
40401	Lift arm bottom pressure	BTM PRESS	0.01MPa	0.00-50.00	Work equipment	—	No function
42100	Number of times of lift arm lever operation	BOOM LVR	1000	0-256000 (incremental step=1000)	Work equipment	Calculated value	
42101	Number of times of bucket lever operation	BUCKET LVR	1000	0-256000 (incremental step=1000)	Work equipment	Calculated value	
42102	Number of times of 3rd lever operation	3RD LVR	1000	0-256000 (incremental step=1000)	Work equipment	Calculated value	
01003	Engine speed	ENG SPEED	1rpm	0-3000	Work equipment	L72-10	
40001	Travel speed	SPEED	1km/h	0-50	Work equipment	L72-20	
40910	Input signal D_IN_0-7	D-IN--0------7	—	10101010	Work equipment	See separate sheet	
40911	Input signal D_IN_8-15	D-IN--8-----15	—	10101010	Work equipment	See separate sheet	
40912	Input signal D_IN_16-23	D-IN-16-----23	—	10101010	Work equipment	See separate sheet	
40913	Input signal D_IN_24-31	D-IN-24-----31	—	10101010	Work equipment	See separate sheet	
40917	Output signal D_IN_0-6	D-OUT-0------6	—	1010101	Work equipment	See separate sheet	
40916	Output signal SOL/0-0-5	SOL/0-0------5	—	101010	Work equipment	See separate sheet	

Total Load Display and Residual Quantity Display

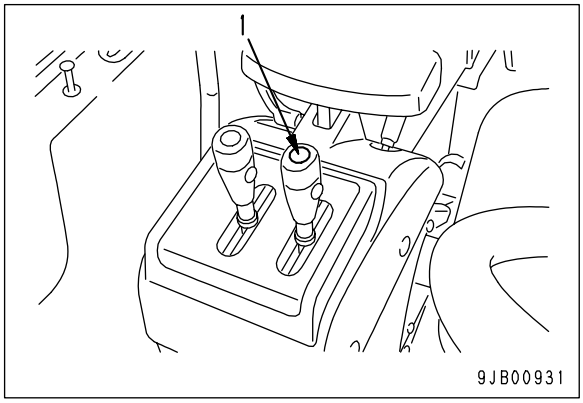
Actual total load weight (t)	Total load display	Remarks
- -99.5	-99.9	To be displayed with decimal point
-99.4 - -0.1	-**.*	To be displayed with decimal point (rounding off the second fractions)
0 - 999.4	***.*	To be displayed with decimal point (rounding off the second fractions)
999.5 - 9999.4	****	To be displayed in integers only (counting factions of 0.5 and over as a unit and cutting away the rest)
9999.5 -	9999	To be displayed in integers only.

Unit of Calculated Weight

- All calculated weights are displayed in the SI unit (metric ton). When "MPH" is selected to display travel speed with the rotary switch on the back of the monitor, however, it is possible to change the unit to short ton by setting the optional device in the service mode. In this case, weights are printed out in short ton as well.

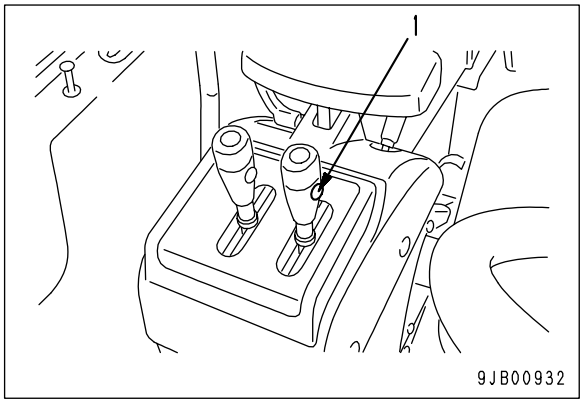
⚠ In countries where the SI unit is adopted, the units of travel speed and load weight should not be selected in any unit other than the SI unit.

Load Meter Cancel Switch



- When this switch (1) is pressed during the calculated weight display holding time (15 seconds after calculation), the bucket load is judged not to be loaded and the calculation is cancelled. The display of total load (or residual quantity) is also cancelled to be increased (or decreased), and returns to the previous value.

Load Meter Sub-total Switch



- To clear the total load display (in the addition mode), or to clear the residual quantity display (in the subtraction mode), or to print out displays, keep pressing this switch (1) for more than 2 seconds.

Specification	Operation after the switch is pressed
Without printer	The total load display (or residual quantity display) is cleared.
With printer	The stored sub-total data are printed out. After being output, the sub-total data are cleared.

Transmission initial learning setting

Learning for correcting the solid difference of transmission

1. Learning data reset
   Issue the learning data reset command to reset all learning data stored in the non-volatile memory.

Display of Transmission initial learning and procedure for resetting data

(1) Hold down the ■ switch and < switch for 5 seconds or more at the same time, and change to the ID entry screen. (Figure 1)

(2) Use the < and > switch to enter ID, and press the ◇ switch to enter the service person screen.

(3) Use the < and > switch to display the sensor initialization selection screen (Figure 2), and press the ◇ switch to decide the value.

(4) Use the < and > switch to display the Transmission initial learning screen (Figure 3) of set item 1.

(5) Depress the ◇ switch, and the transmission initial learning setting screen (Fig. 4-1 or Fig. 4-2) appears.

(6)-1 If the initial learning has not been carried out, the initial learning incompletion (reset) screen (Fig. 4-1) appears.

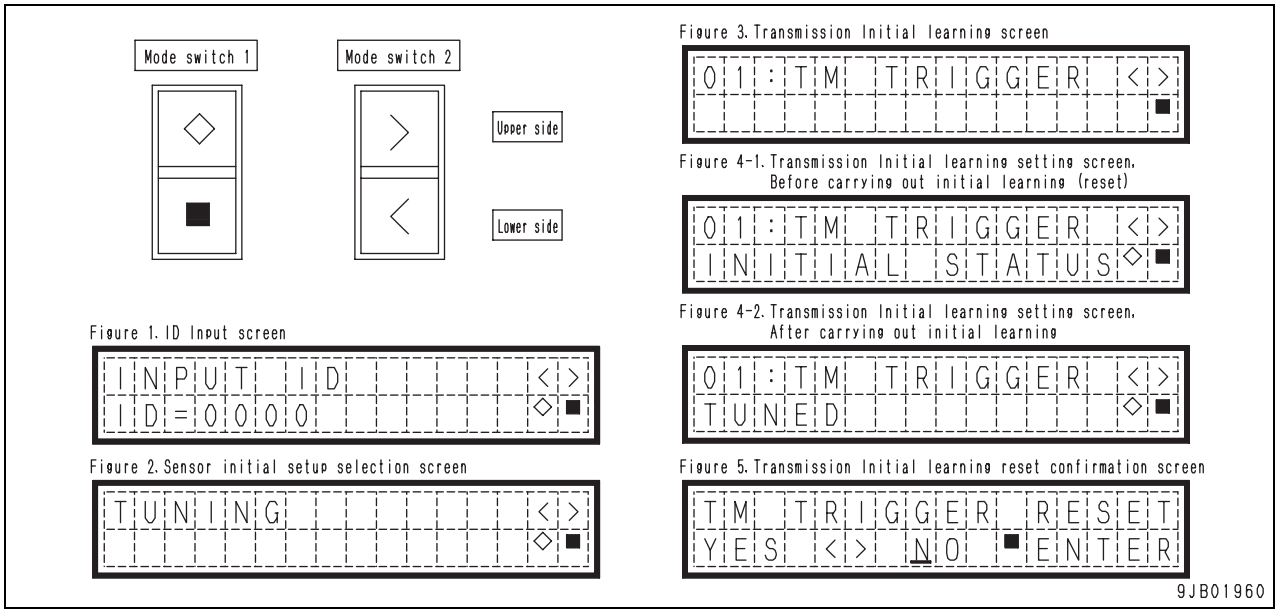
(6)-2 If the initial learning has been carried out, the initial learning completion screen (Fig. 4-2) appears.

(7) To reset the initial learning, depress the ◇ switch to display the initial learning reset screen (Fig. 5).

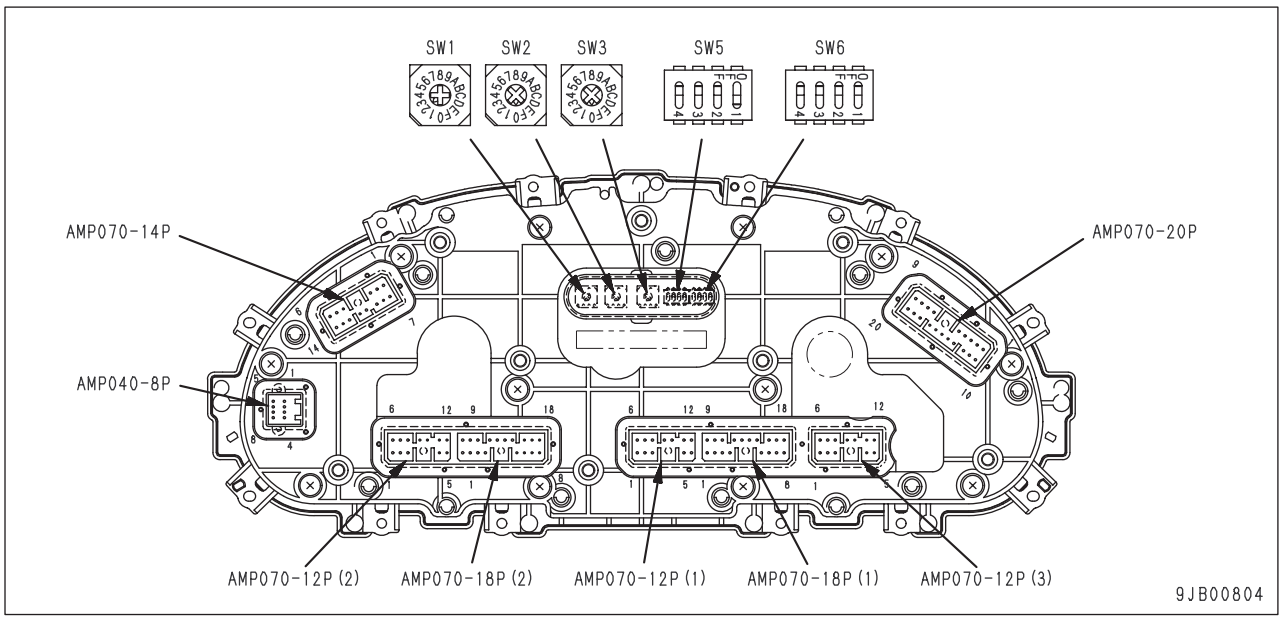
(8)-1 To reset the initial learning, select YEW with the < switch and depress the ■ switch.

After the ■ switch is depressed, if the initial learning incompletion (reset) screen (Fig. 4-1) appears, the initial learning is reset.

(8)-2 If you do not need to reset the initial learning, select NO and depress the ■ switch.
After the ■ switch is depressed, the screen before the ž switch was depressed (Fig. 4-1 or Fig. 4-2) appears and resetting is cancelled.



If the initial learning is necessary, carry out (1) - (5), and then carry out the resetting operation (up to (8)-1) once while either the screen in (6)-1 or the screen in (6)-2 is displayed.



AMP070-20P [CN-L51]

Pin No.	Specifications	I/O	Group	Setting state	Signal name	WA380-5	Remarks
1	—	—	—		—	—	
2	Small lamp power	I	—	Power +24V	—	—	
3	Small lamp power	I	—	Power +24V	—	—	
4	NSW power (+24V)	I	—	Power +24V	NSW power (+24V)	NSW power (+24V)	
5	NSW power (+24V)	I	—	Power +24V	NSW power (+24V)	NSW power (+24V)	
6	SW power (+24V)	I	—	Power +24V	SW power (+24V)	SW power (+24V)	
7	SW power (+24V)	I	—	Power +24V	SW power (+24V)	SW power (+24V)	
8	—	—	—		—	—	
9	GND	I	—	GND	GND	GND	
10	GND	I	—	GND	GND	GND	
11	D_OUT_3 (+24V, sink 200mA)	O	A	D/0 sink	—	—	
12	D_OUT_2 (+24V, sink 200mA)	O	A	D/0 sink	(Auto preheating relay)	—	
13	D_OUT_1 (+24V, sink 200mA)	O	A	D/0 sink	Pre-lube relay	—	
14	D_OUT_0 (+24V, sink 200mA)	O	A	D/0 sink	Buzzer 1 (Machine monitor)	Buzzer 1 (Machine monitor)	
15	Sensor power output (+24V)	O	—	Sensor power	Lift arm pressure sensor power	Lift arm pressure sensor power	For load meter (Spare for standard)
16	Sensor power output (+5V)	O	—	Sensor power	Lift arm angle sensor power	Lift arm angle sensor power	For load meter (Spare for standard)
17	GND	I	—	GND	GND	GND	
18	GND	I	—	GND	GND	GND	
19	GND	I	—	GND	GND	GND	
20	GND	I	—	GND	GND	GND	

3) Description of the control

(1)	Transmission cutoff control		This function causes the Transmission to neutral as a pressure greater than the predetermined level is signaled by the left brake pressure sensor (when Transmission cutoff switch is ON).
(2)	Set up of cutoff point	Enable condition	Transmission cutoff switch ON (Transmission cutoff is enabled)
		Setup procedure	1) Step on the left brake pedal until it comes to the position desired as the cutoff point. 2) Push and release the Transmission cutoff set switch. 3) The pressure at the time when the switch is released is temporarily stored. The setup complete buzzer is sounded twice (beep). 4) At the same time, the indicator built in the Transmission cutoff switch flashes for 2.5 seconds. 5) After the flashing for 2.5 seconds, the brake position is stored on memory (your setting is held after the key is turned off).
		Reset procedure	1) Push and release the Transmission cutoff set switch. 2) The indicator built in the Transmission cutoff switch will flash for 2.5 seconds. 3) While the flashing continued, push and release the Transmission cutoff set switch again. 4) As the flashing is ended, the cutoff point is set as the default left brake pressure. The setup cancel buzzer is sounded. 5) The setup (default) value is stored on memory (the set value is held after the key is turned off).

4) Output conditions for the buzzer, indicator (main monitor) and indicator built in the Transmission cutoff switch

Output condition	Indicator built in the Transmission cutoff switch	Buzzer sound	Cutoff point
When Transmission cutoff switch is ON	Comes on	Not available	Control is done based on the value stored in previous operation
While Transmission cutoff point is being set	Flashes	Setup complete buzzer is sounded as the set switch is released	Pressure at your releasing the set switch is stored
When Transmission cutoff switch is ON but error is present on sensor	Goes off	Not available	No control is provided. Stored value is not changed.
When Transmission cutoff switch is ON but error is present on set switch	Goes off	Not available	Control is done based on the value stored in previous operation. Stored value is not changed.
When Transmission is OFF	Goes off	Not available	No control is provided

5) Transmission cutoff point settable range

Settable range	Note: If you specify a value less than 0.49MPa (5kg/cm²), it will be set as 0.49MPa (5kg/cm²).
0.49-4.41MPa {5-45kg/cm²}	Note: When a value larger than 4.41MPa (45kg/cm²), it will be set as 4.41MPa (45kg/cm²). The default value is 1.47MPa (15kg/cm²).

A separation of 0.20MPa (2kg/cm²) is provided between the cutoff IN pressure (causing Transmission to neutral) and OUT (reset) pressure.
Example: When 0.98MPa (10kg/cm²) is set on the pressure sensor
Cutoff IN pressure = 0.98MPa (10kg/cm²)
Cutoff OUT pressure = 0.78MPa (8kg/cm²)

10. Engine Overrun Protection Function
If you try to shift down while travelling downhill at a high-speed with the accelerator being stepped on, engine overrun can result from driving force of the tires.
In order to prevent this engine overrun, the transmission controller restricts the shift down operation depending on the given engine speed and revolution of the transmission output shaft (travel speed).
Following lists the conditions for turning on or off the protection:

1) Protect condition: If shift down is tried when the protect condition = A or (B & C) is met, an alarm is output in stead of the shift down output.

2) Protect cancel condition: When the protect-cancel condition = D & (E or F) is met, the shift down output is generated in stead of the alarm.

	Protection condition [A or (B and C)]			Cancel condition [D and (E or F)]		
Targeted shift down gear speed	Condition A	Condition B	Condition C	Condition D	Condition E	Condition F
	Transmission output speed	Transmission output speed	Engine speed	Transmission output speed	Transmission output speed	Engine speed
3rd speed	None	2,658 rpm or above	2,100 rpm or above	None	Less than 2,436 rpm	Less than 1,900 rpm
2nd speed	2,658 rpm or above	1,846 rpm or above	2,100 rpm or above	Less than 2,436 rpm	Less than 1,698 rpm	Less than 1,900 rpm
1st speed	1,846 rpm or above	1,107 rpm or above	2,100 rpm or above	Less than 1,698 rpm	Less than 997 rpm	Less than 1,900 rpm

3) Protect alarm cancel condition: In any of the following cases, output of the protect alarm is stopped and normal control is restored.
   ① When matching is established between the input instruction and output instruction from the gearshift lever (shift switch).
   ② When a shift above the one specified with the output instruction is selected from the gearshift lever (shift switch).

4) Operations restricted while the shift down protect is turned on: As long as the protect is turned on, hold and kick down operations are disabled.

Transmission output shaft speed and travel speed Protection travel speed (km/h)

		WA380-5 (small diameter tire)	WA380-5 (large diameter tire)
Transmission output shaft speed converted to travel speed (rpm)	2,658	30.3	33.2
	1,846	21.1	23.0
	1,107	12.6	13.8

11. Troubleshooting
The transmission controller self diagnoses the system by monitoring the input/output signals constantly.
If any errors are found in the self-diagnosis, the controller sends the error information to the machine monitor via the network. The machine monitor allows you to check the errors.

1. Work equipment control

   1) Electric lever control
   Lift arm controlling function

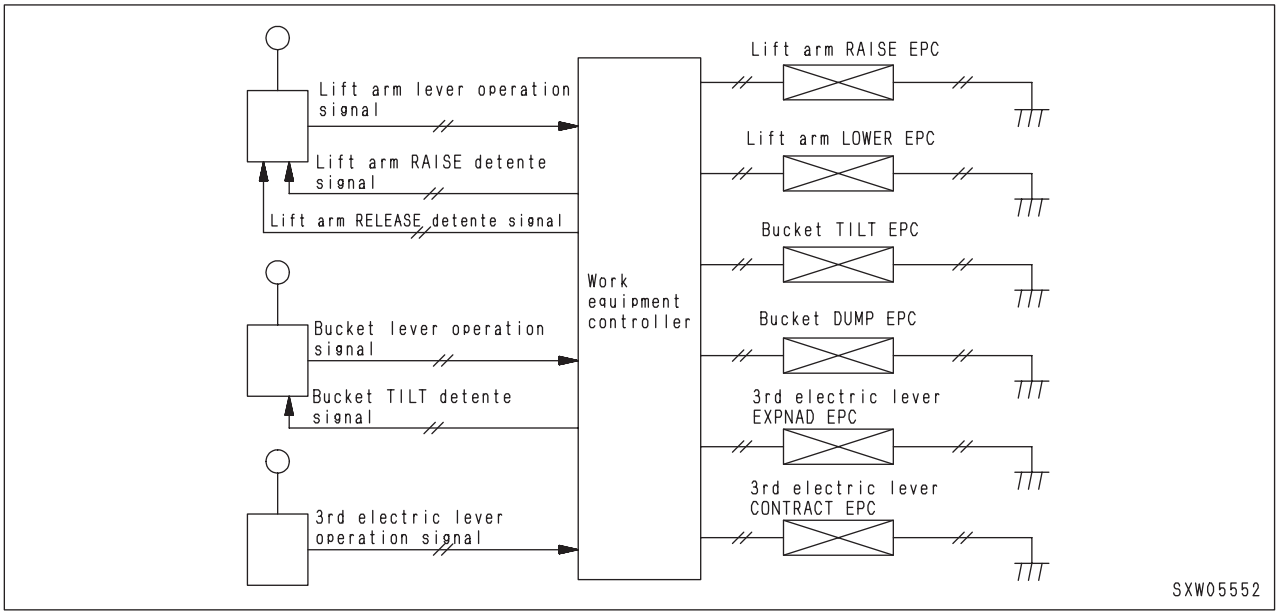
- This function controls the EPC valve according to how much the lift arm lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the lift arm RAISE/LOWER function to be performed.

   Bucket controlling function

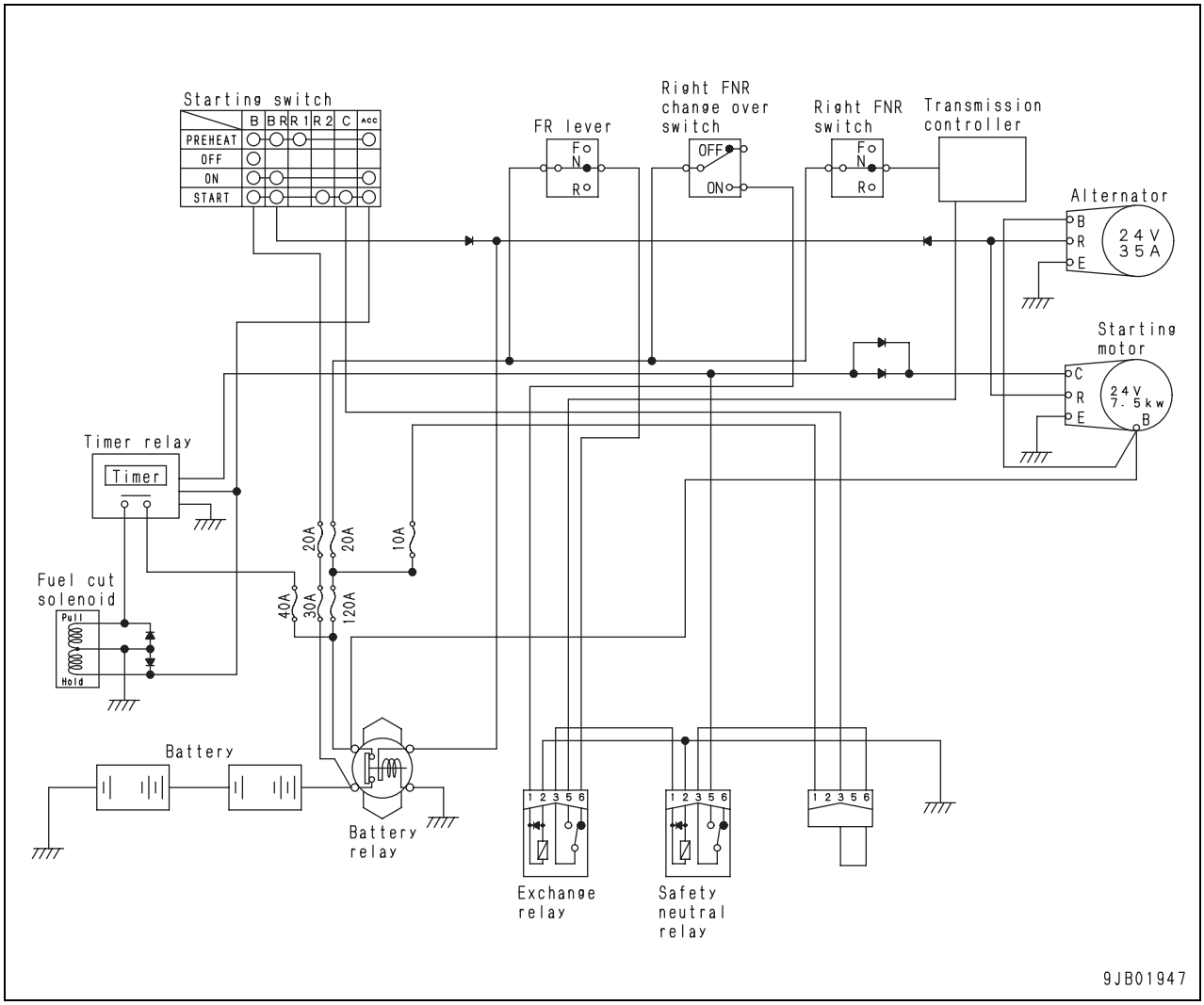
- This function controls the EPC valve according to how much the bucket lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the bucket TILT/DUMP function to be performed.

   3rd Lever controlling function

- This function controls the EPC valve according to how much the 3rd lever was moved to allow the control valve of the work equipment to operate, which, in turn allows the 3rd valve cylinder EXTEND/RETRACT function to be performed.



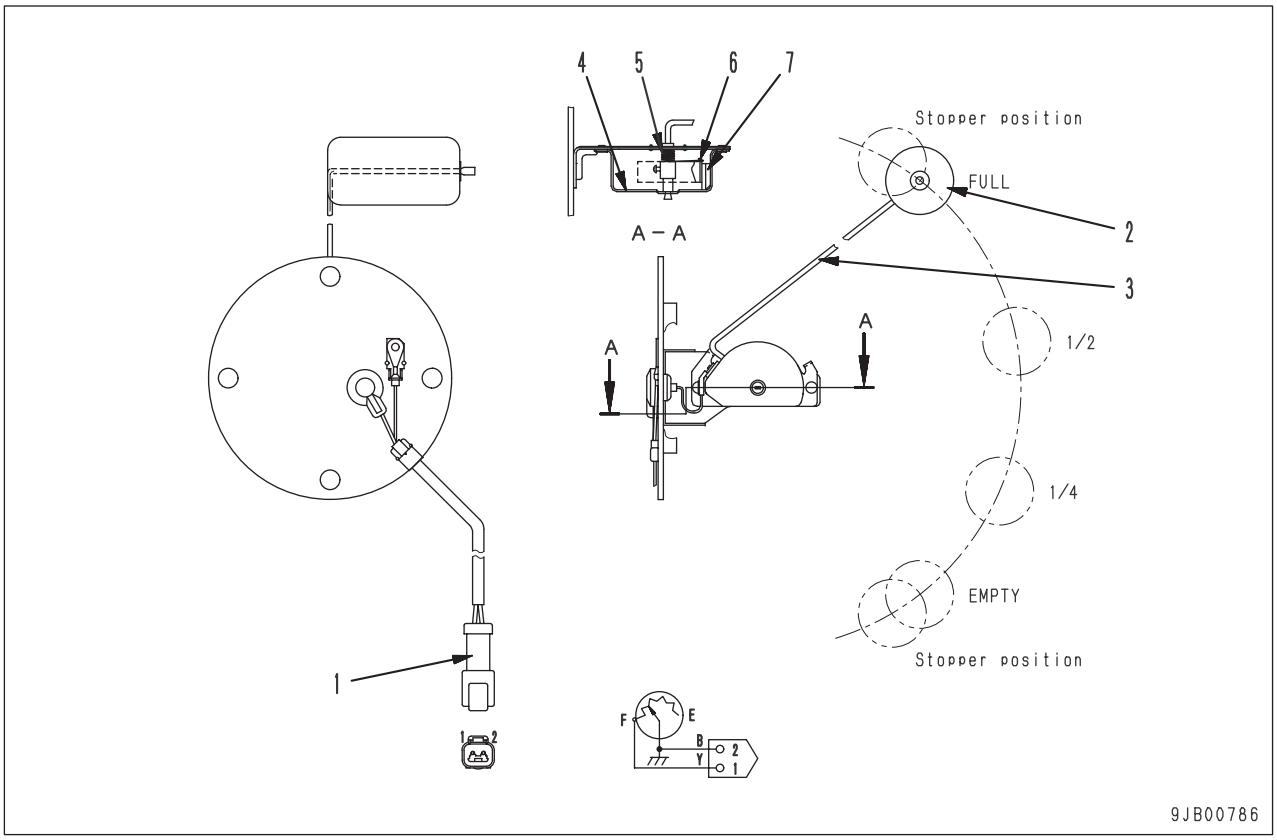
ENGINE STOP CIRCUIT



Operation

- The current from ACC terminal of starting switch to hold side coil of fuel cut solenoid is cutoff when starting is turned (OFF). Fuel supply to engine is shut off.
  When the fuel supply is stopped, the engine reduces its speed and stops. Then, the power generation of the alternator stops to shut off voltage supply from the terminal R of the alternator. In addition, the current from the terminal BR of starting switch is shut off. Consequently, the battery relay contact opens to shut down the power supplied to every circuit of the machine.

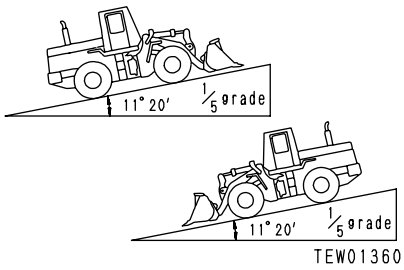
FUEL LEVEL SENSOR

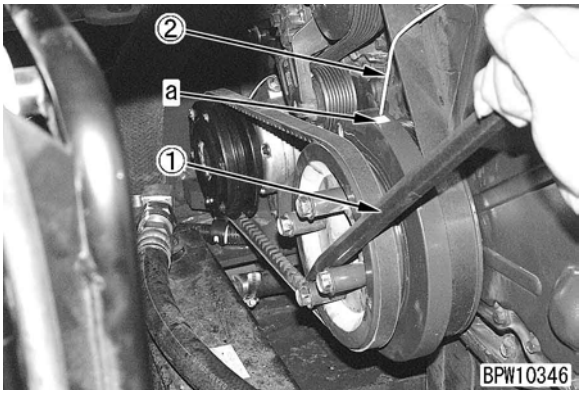


1. Connector
2. Float
3. Arm
4. Body
5. Spring
6. Contact
7. Spacer

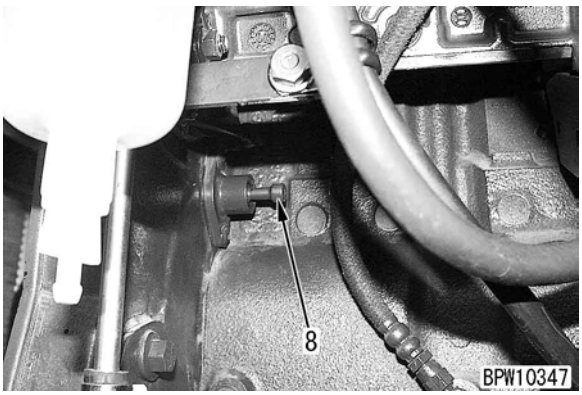
Function

- This sensor is mounted to the side surface of the fuel tank. The float moves vertically depending on the remaining quantity of the fuel.
  The movement of the float operates the variable resistor through the arm and sends a signal to the machine monitor to indicate the remaining quantity of the fuel.

Machine model					WA380-5	
Category	Item		Measurement Conditions	Unit	Standard Value For New Machine	Service Limit Value
Parking brake	Parking brake inlet pressure		• Torque converter oil temperature: 60 - 80 °C • Engine speed: Low idling	MPa {kg/cm^2}	Min. 2.27 {Min. 23.1}	Min. 2.27 {Min. 23.1}
	Performance		• Tire inflation pressure: Specified pressure • Flat paved road with 1/5 (11° 20′) grade • Dry, paved road surface • Machine at operating condition 	—	Holds in position	Holds in position
	Disc thickness			mm	3.2 ± 0.08	2.97
PPC	PPC valve basic pressure		• Hydraulic oil temperature: 45 - 55 °C • Engine speed: High idling	MPa {kg/cm^2}	$3.72^{+0.2}_{0}$ {38^{+2}_{0}}	$3.72^{+0.2}_{-0.2}$ {38^{+2}_{-2}}
	PPC valve output pressure	Lift arm RAISE, FLOAT; Bucket DUMP, TILT	• Hydraulic oil temperature: 45 - 55 °C • Engine speed: High idling • Control lever operated fully		$3.72^{+0.1}_{-0.1}$ {38^{+1}_{-1}}	$3.72^{+0.1}_{-0.2}$ {38^{+1}_{-2}}
		Lift arm LOWER			2.2 ± 0.25 {22.5 ± 2.5}	2.2 ± 0.39 {22.5 ± 4}



★ Pushing depth of timing pin (8): 8 mm



★ When the No. 1 cylinder piston is at the compression top dead center, the No. 1 cylinder rocker arm can be moved with the hand by the valve clearance. If the rocker arm does not move, the piston is not at the compression top dead center. In this case, revolve the crankshaft 1 more turn."

★ After setting the No. 1 cylinder piston to the compression top dead center, make a match mark on the damper and install pointer ② to the front cover with a wire."

★ If checking with the timing pin installed to the engine is difficult, metallic pin assembly F1 may be used."

★ After setting to the compression top dead center, be sure to pull out the timing pin."

8. While the No. 1 cylinder piston is at the compression top dead center, adjust the clearances of the valves marked with ● in the valve arrangement table. Then, revolve the crankshaft forward by 360 degrees and adjust the clearances of the valves marked with ○.

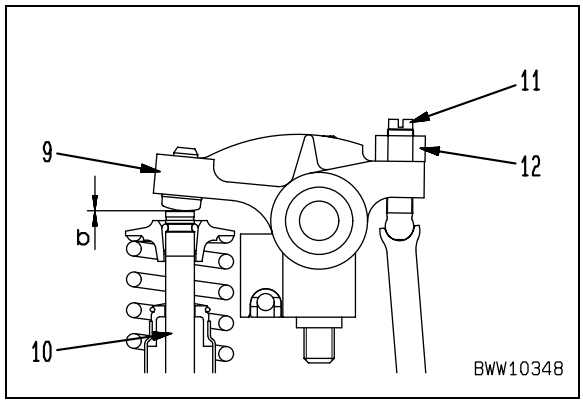
Valve arrangement table

Cylinder No.	1	2	3	4	5	6
Exhaust valve		●	○	●	○	●	○
Air intake valve	●	●	○	●	○	○	

BKP00211

9. Insert filler gauge F2 in clearance **b** between rocker lever (9) and valve stem (10) and adjust the clearance with adjustment screw (11).

★ Turn the adjustment screw so that the inserted filler gauge will move lightly.



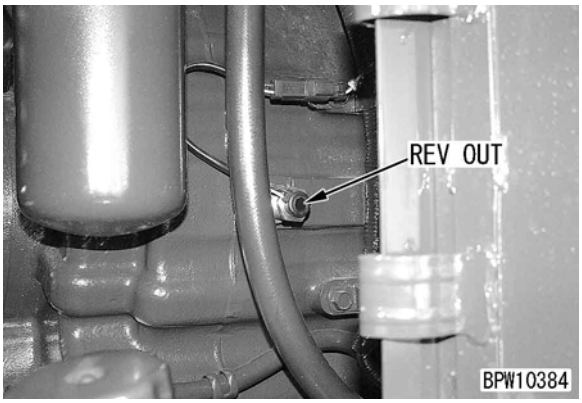
10. Secure adjustment screw (11) and tighten locknut (12).

Locknut : **24 ± 4.0 Nm {2.45 ± 0.41 kgm}**

★ After tightening the locknut, check the valve clearance again."

ADJUSTING TRANSMISSION SPEED SENSOR

- Adjust speed sensor (1) (CN-REV OUT) according to the following procedure.



1. Open the left cover of the rear frame.

2. Screw in sensor (1) until its tip comes in contact with a tooth tip of gear (2).

★ Before installing the sensor, check that its tip is free from a steel chip, a flaw, etc.

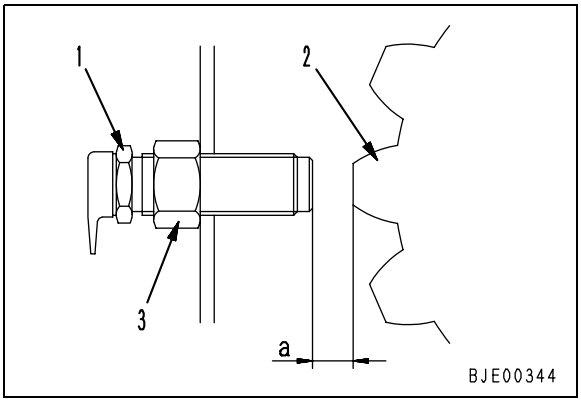
Threaded parts: **Gasket sealant (LG-5)**

3. Return sensor (1) by 1/2 - 1 turn.

★ Adjust clearance **a** between the sensor tip and gear tooth tip to about 1.5 mm.

4. Lock sensor (1) with nut (3).

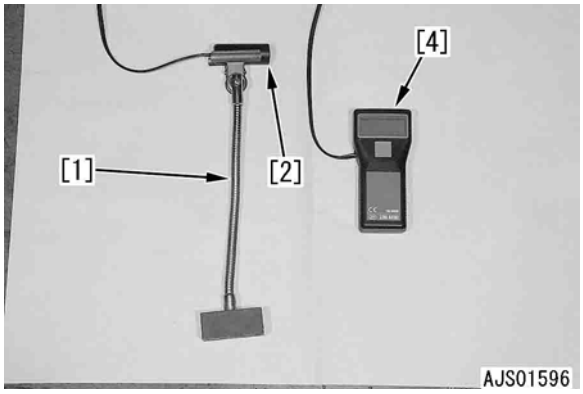
Nut: **69 - 74 Nm {7.0 - 7.5 kgm}**



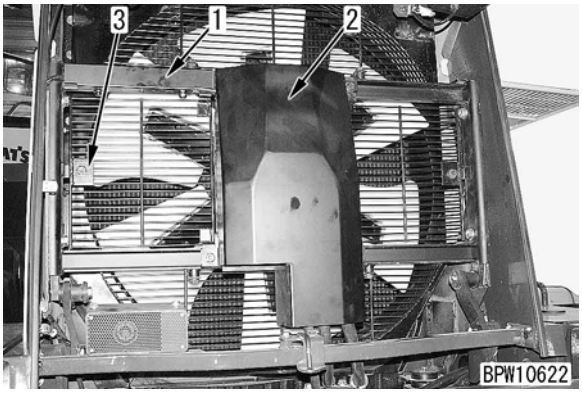
TESTING HYDRAULIC FAN

Check tool

Sym-bol	Part No.	Part Name	Qty	Remarks
J	799-205-1100	Multi-tachometer	1	Measurement range: 6 - 99999.9rpm

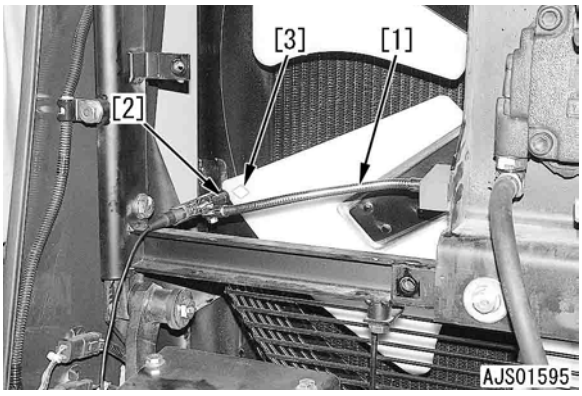


1. Open the radiator grill and remove covers (1), (2), and (3).



2. Install stand [1] and probe [2] of multi-tachometer **J**.

3. Stick reflector tape [3] to the fan.



4. Run the engine and measure the fan speed with multitachometer [4] at the high idle and low idle engine speeds.

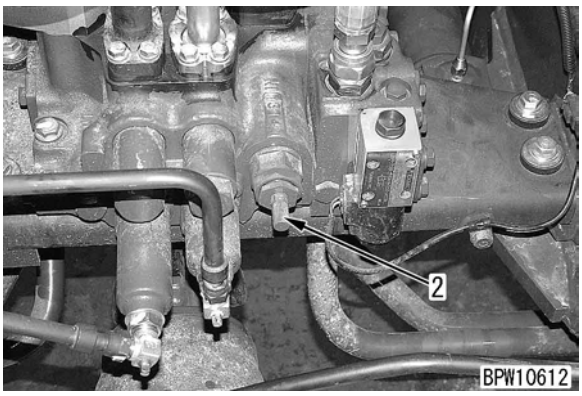
Adjusting

1. Adjusting work equipment relief valve

WARNING! When adjusting the oil pressure, be sure to stop the engine.

1) Raise the lift arm and install a support to it and remove front frame inspection cover (1).

2) Remove cap nut (2) of the relief valve.



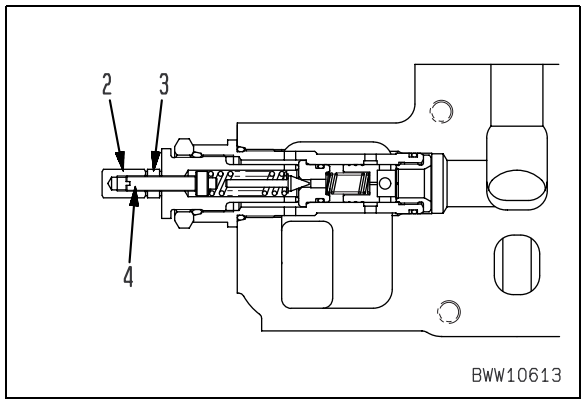
3) Loosen locknut (3) and adjust with adjustment screw (4).

★ As the adjustment screw is
- To INCREASE the pressure, turn CLOCKWISE.
- To DECREASE the pressure, turn COUNTERCLOCKWISE.

★ Quantity of adjustment per turn of adjustment screw: 3.5 MPa {35.7 kg/cm^2}

Locknut : **28 - 34 Nm {2.8 - 3.5 kgm}**

★ After adjusting, measure the work equipment relief pressure again according to the procedure in "Measuring" shown above.



RELEASING REMAINING PRESSURE IN HYDRAULIC CIRCUIT

1. Releasing remaining pressure between each hydraulic cylinder and control valve.
   ★ If the piping between the hydraulic cylinder and the control valve is to be disconnected, release the remaining pressure from the circuit as follows.
   1) Stop the engine.
   2) Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.
   3) Operate the control levers.
      ★ When the levers are operated 2 - 3 times, the pressure stored in the PPC accumulator is removed. Start the engine again, run at low idling for approx. 5 minutes to charge the accumulator, the stop the engine and operate the control levers.
      ★ Repeat the above operation 2 - 3 times to release all the remaining pressure.

2. Releasing remaining pressure in brake accumulator circuit.
   ★ If the piping between the brake accumulator and parking brake manual valve, between the accumulator and the accumulator check valve, or between the accumulator and brake valve is to be disconnected, release the remaining pressure from the circuit as follows.
   1) Stop the engine.
   2) Depress the brake pedal at least 100 times to release the pressure inside the brake accumulator circuit.

3. Releasing remaining pressure in PPC accumulator circuit.
   ★ If the piping between the PPC accumulator and PPC valve is to be disconnected, release the remaining pressure from the circuit as follows.
   • Operate the control lever 2 - 3 times to release the remaining pressure in the circuit.

RELEASING REMAINING PRESSURE IN E.C.S.S. CIRCUIT

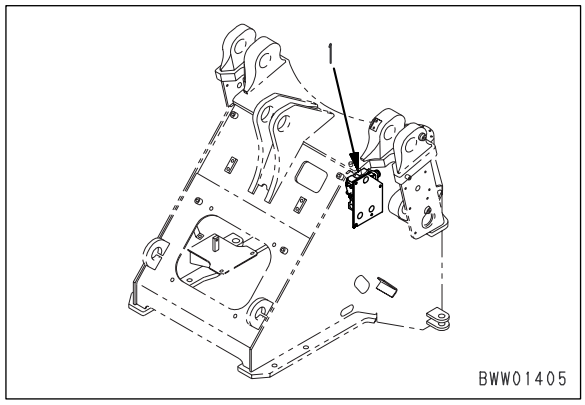
★ When removing the piping of the E.C.S.S. circuit and E.C.S.S. valve, release the pressure in the accumulator as follows.

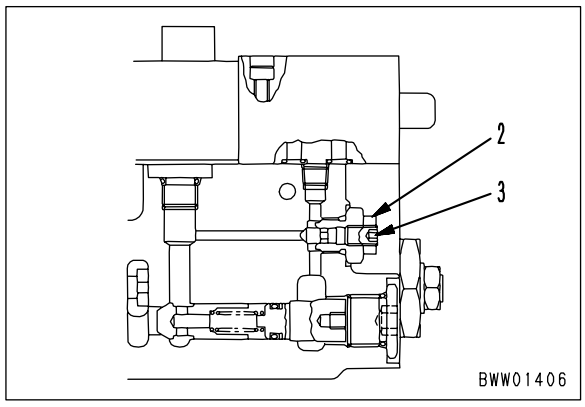
1. Loosen locknut (2) of E.C.S.S. valve (1).

2. Loosen adjustment screw (3) 1/2 - 1 turn and release the pressure from the accumulator.
   • Locknut (2) and adjustment screw (3) are painted red.

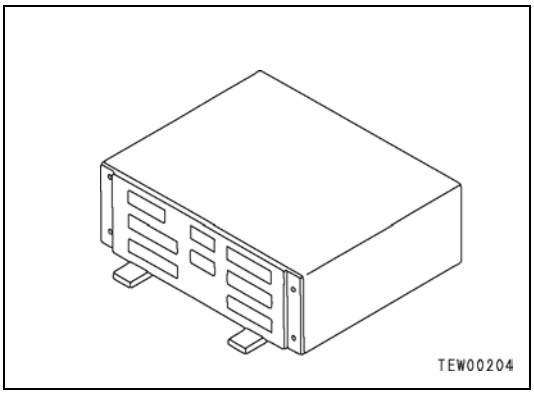
3. After releasing the remaining pressure, return adjustment screw (3) to its original position and tighten locknut (2) securely.

Locknut : **12.7 ± 0.6 Nm {1.3 ± 0.06 kgm}**

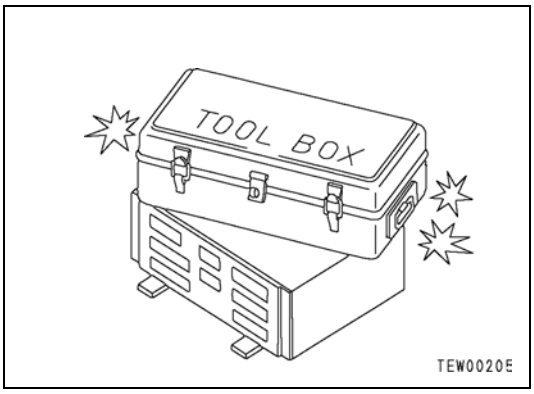




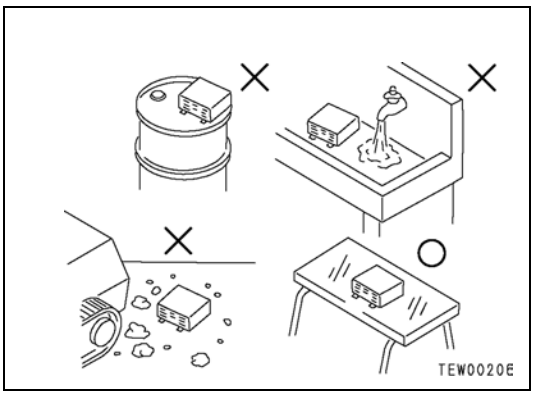
3) Handling control box
   (1) The control box contains a microcomputer and electronic control circuits.
   This controls all of the electronic circuits on the machine, so be extremely careful when handling the control box.
   (2) Do not open the cover of the control box unless necessary.



   (3) Do not place objects on top of the control box.
   (4) Cover the control connectors with tape or a vinyl bag.
   Never touch the connector contacts with your hand.
   (5) Do not leave the control box in a place where it is exposed to rain.

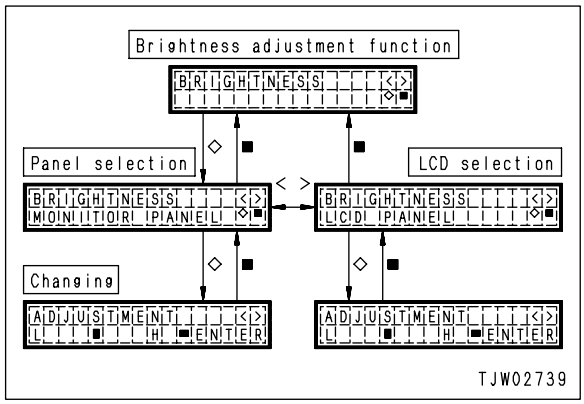


   (6) Do not place the control box on oil, coolant, or soil, or in any hot place, even for a short time. (Place it on a suitable dry stand)
   (7) Precautions when carrying out arc welding
   When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the control box. Fit an arc welding ground close to the welding point.

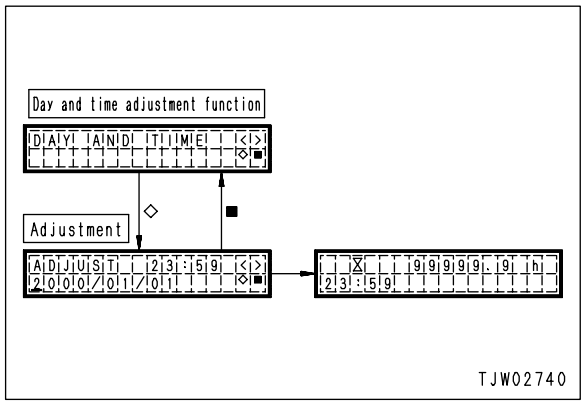


2. Points to remember when troubleshooting electric circuits
   1) Always turn the power OFF before disconnecting or connecting connectors.
   2) Before carrying out troubleshooting, check that all the related connectors are properly inserted.
      ★ Disconnect and connect the related connectors several times to check.
   3) Always connect any disconnected connectors before going on to the next step.
      ★ If the power is turned ON with the connectors still disconnected, unnecessary abnormality displays will be generated.
   4) When carrying out troubleshooting of circuits (measuring the voltage, resistance, continuity, or current), move the related wiring and connectors several times and check that there is no change in the reading of the tester.
      ★ If there is any change, there is probably defective contact in the circuit.

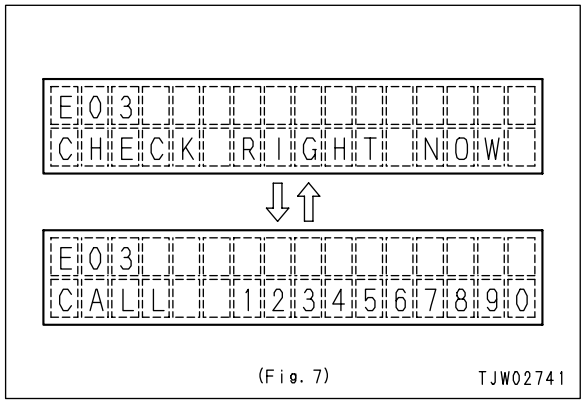
7. Monitor brightness adjustment function
   The brightness of the machine monitor can be adjusted by the switch to 7 levels.
   ★ For details, see the "OPERATION AND MAINTENANCE MANUAL, Machine Monitor and Other Functions".



8. Time adjustment function (load meter specification)
   The setting of the date and time on the machine monitor can be selected by the switch.
   ★ For details, see the "OPERATION AND MAINTENANCE MANUAL, Handling Load Meter".



9. Action code display function
   If any abnormality occurs on the machine, the degree of the abnormality is automatically displayed as a user code on the machine monitor to recommend appropriate action to the operator.
   ★ The diagram on the right shows an example of action code [E03] and [CALL + Telephone number] being displayed in turn.
   ★ When action codes [E00], [E01], and [E02] are displayed, [CALL + Telephone number] is not displayed.



★ Correspondence between action code and recommendation to operator

Action Code	CALL + Telephone Number	Action Recommended to Operator
E00	Not displayed	• Returns mis-operated switch or lever to normal condition
E01	Not displayed	• Carry out inspection and maintenance after completion of operations or when changing shifts between operators
E02	Not displayed	• When overrun related display is shown: Reduce when engine speed and travel speed while continuing operations. • When overheat related display is shown: Stop machine and keep engine running at mid-range speed under no load.
E03	Displayed	• Stop engine and machine immediately and contact serviceman.

4) Switching trouble data display
   If the [>] button or [<] button is pressed during the display of trouble data, the display switches to the other recorded trouble data.
   - [>] button: Go on to data for the next record number
   - [<] button: Go back to data for last record number
5) Deleting trouble data (not permitted)
   ★ The trouble data for the mechanical system cannot be deleted.

16. Filter, oil replacement interval setting function
    The machine monitor can set the maintenance interval for filters and oil. This forms the base for the filter and oil replacement interval and display.
    ★ For details, see "STRUCTURE AND FUNCTION, Maintenance monitor items".

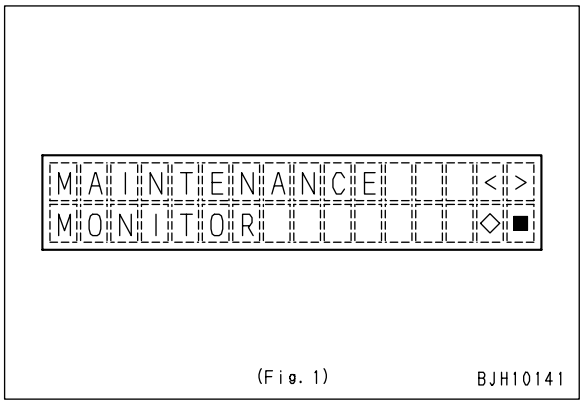
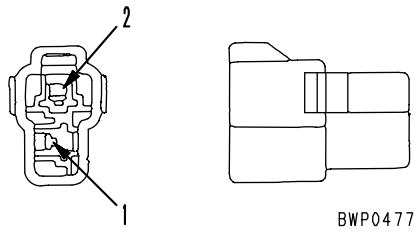
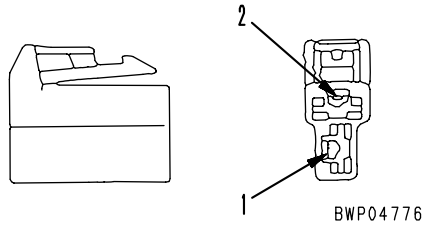
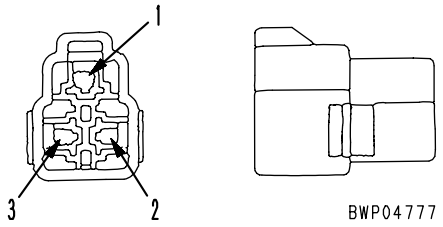
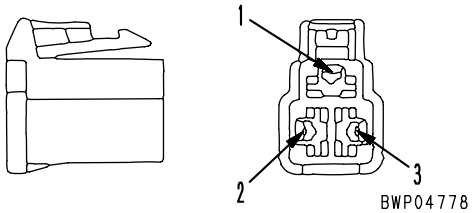
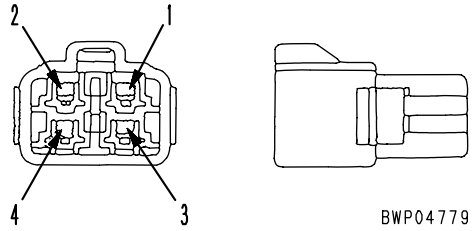
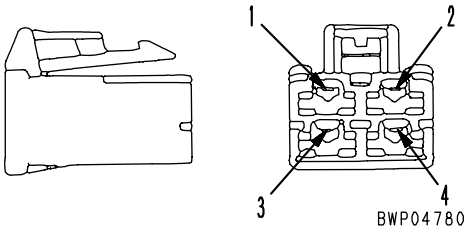
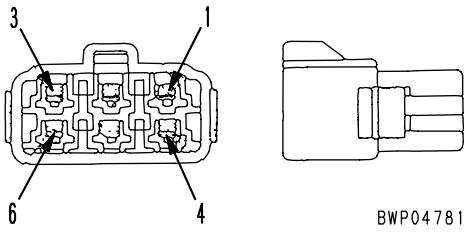
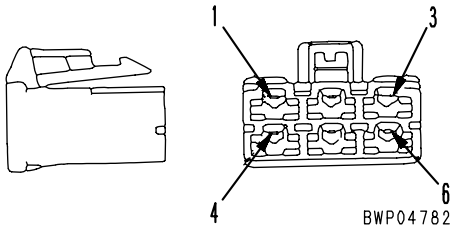


Table of filter and oil replacement interval set items [when shipping]

No.	Item	Code	Display	Replacement Interval
1	Engine oil	01	ENG OIL	500
2	Engine oil filter	02	ENG OIL FILTER	500
3	Fuel filter	03	FUEL FILTER	500
4	Corrosion resistor	06	CORR RESISTOR	1000
5	Transmission oil	12	TM OIL	1000
6	Transmission oil filter	13	TM OIL FILTER	1000
7	Hydraulic oil filter	04	HYD OIL FILTER	2000
8	Hydraulic tank breather element	05	BREATHER ELE	2000
9	Axle oil	15	AXLE OIL	2000
10	Hydraulic oil	10	HYD OIL	2000

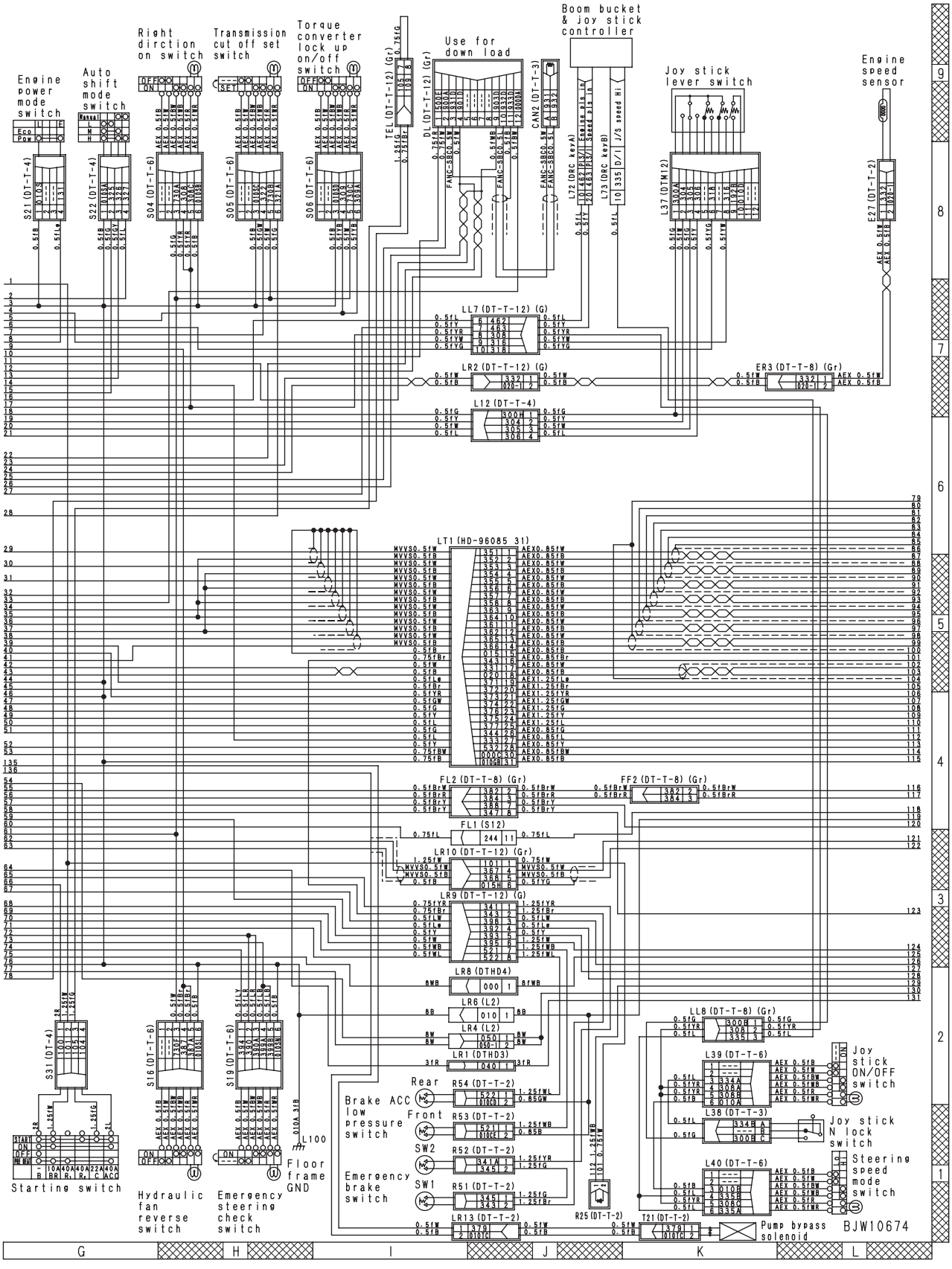
Number of Pins	KES1 Automobile Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
2			–
	Part number: 08027-10210 (Natural color) 08027-10220 (Black)	Part number: 08027-10260 (Natural color) 08027-10270 (Black)	
3			–
	Part number: 08027-10310	Part number: 08027-10360	
4			–
	Part number: 08027-10410 (Natural color) 08027-10420 (Black)	Part number: 08027-10460 (Natural color) 08027-10470 (Black)	
6			–
	Part number: 08027-10610 (Natural color) 08027-10620 (Black)	Part number: 08027-10660 (Natural color) 08027-10670 (Black)	

T-ADAPTER TABLE

★ The part Nos. of the T-adapter boxes and T-adapters are shown in the columns and those of the wiring harness checker assemblies are shown in the lines.

			KIT No.																
Port No.	Connector type	Pin No.	799-601-2500	799-601-2700	799-601-2800	799-601-2900	799-601-3000	799-601-5500	799-601-6000	799-601-6500	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	—
799-601-2600	For measuring box	Econo-21P	○		○	○						○	○		○					
799-601-3100	For measuring box	MS-37P					○													
799-601-3200	For measuring box	MS-37P					○													
799-601-3300	For measuring box	Econo-24P							○											
799-601-3360	Plate	For MS box																		
799-601-3370	Plate	For MS box																		
799-601-3380	Plate	For MS box																		
799-601-3410	BENDIX(MS)	24P							○	○										
799-601-3420	BENDIX(MS)	24P							○	○										
799-601-3430	BENDIX(MS)	17P							○	○										
799-601-3440	BENDIX(MS)	17P							○	○										
799-601-3450	BENDIX(MS)	5P						○	○											
799-601-3460	BENDIX(MS)	10P							○	○										
799-601-3510	BENDIX(MS)	5P						○	○											
799-601-3520	BENDIX(MS)	14P						○	○											
799-601-3530	BENDIX(MS)	19P							○	○										
799-601-2910	BENDIX(MS)	14P						○	○											
799-601-3470	CASE								○											
799-601-2710	MIC	5P	○	○		○							○							
799-601-2720	MIC	13P	○	○		○							○							
799-601-2730	MIC	17P	○	○	○	○						○	○		○					
799-601-2740	MIC	21P	○	○	○	○						○	○		○					
799-601-2950	MIC	9P									○	○	○		○					
799-601-2750	ECONO	2P	○	○																
799-601-2760	ECONO	3P	○	○																
799-601-2770	ECONO	4P	○	○																
799-601-2780	ECONO	8P	○	○																
799-601-2790	ECONO	12P	○	○																
799-601-2810	DLI	8P	○	○																
799-601-2820	DLI	12P	○	○																
799-601-2830	DLI	16P	○	○																
799-601-2840	Extension cable		○	○									○							
799-601-2850	CASE		○																	
799-601-7010	X	1P											○		○					
799-601-7020	X	2P									○	○	○		○					
799-601-7030	X	3P									○	○	○		○					
799-601-7040	X	4P									○	○	○		○					
799-601-7050	SWP	6P									○	○	○							
799-601-7060	SWP	8P									○	○	○							
799-601-7310	SWP	12P																		○
799-601-7070	SWP	14P											○		○					

Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
L08	DT-T	6	Machine monitor switch (Screen selector switch)	Q-1			A-8	
L09	DT-T	2	Stop lamp switch	Q-1			D-8	
L10	DT-T	3	Left brake pressure sensor	R-1	B-6			
L11	DT-T	2	Air suspension seat	S-1				
L12	DT-T	4	R direction switch	O-7	J-7	E-3		
L13	DT-T	2	Lift arm N lock switch	O-7		D-8		
L14	DT-T	4	Kickdown and hold switch	O-7	B-8	G-2		
L15	DT-T	4	Load meter cancel and sub-total switch	O-7		H-2	D-8	
L16	M	2	Intermediate connector (DC converter)	V-2				
L17	M	4	DC24V/DC12V converter	W-5				
L18	Yazaki	2	DC12V socket	W-3				
L19	M	4	Flasher unit	U-8			H-8	
L20	M	2	Alarm buzzer	U-8			I-7	
L21	S	10	Front and rear wiper switch	N-1				
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6		E-8		
L25S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		C-8
L26E	DT-T	2	Lift arm and bucket EPC lever	P-8		E-8		
L26S	DT-T	2	Work equipment lever electrical detent	N-6		G-2		B-8
L27	DT-T	2	Lift arm and bucket EPC lever	N-6		D-8		
L27S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		B-8
L28	DT-T	4	Lift arm and bucket EPC lever	P-8		D-8		
L29	DT-T	4	Lift arm and bucket EPC lever	O-7		E-8		
L30	DT-T	4	3rd EPC lever	P-8		D-8		
L31	M	6	Intermittent wiper timer	W-7				
L34	DT-T	4	Joystick lever positioner	W-6		B-1		
L35	DT-T	2	Joystick EPC solenoid	P-1		E-1		
L36	DT-T	2	Joystick EPC solenoid	P-1		D-1		
L37	DTM	12	Joystick lever switch	M-6	K-8			
L38	DT-T	3	Joystick N lock switch	W-7	K-1	B-2		
L39	DT-T	6	Joystick ON/OFF switch	S-1	K-2	B-2		
L40	DT-T	6	Steering speed mode switch	S-1	K-1	B-1		
L41	Relay	6	Joystick cutoff relay	N-6		D-1		
L42	Plug	1	Connector (Spare power supply)	A-5				
L43	Plug	1	Connector (Spare power supply)	A-5				
L44	M	6	Intermediate connector (Printer)	V-3			I-7	
L45	D-sub	25	Printer (Load meter)				I-8	
L46	G	4	Printer (Load meter)				H-9	
L51	AMP070	20	Monitor panel controller	M-5	A-2	O-2	B-7	B-4
L52	AMP070	18	Monitor panel controller	M-4			B-6	
L53	AMP070	12	Monitor panel controller	M-2	A-2		B-5	
L54	AMP070	18	Monitor panel controller	M-4	A-2	O-2	B-4	
L55	AMP070	12	Monitor panel controller	M-4	A-2	O-2	B-4	B-4
L56	AMP070	12	Monitor panel controller	M-5	B-2	O-2	B-3	
L57	AMP070	14	Monitor panel controller	M-4			B-2	
L58	AMP040	8	Monitor panel controller	M-2				

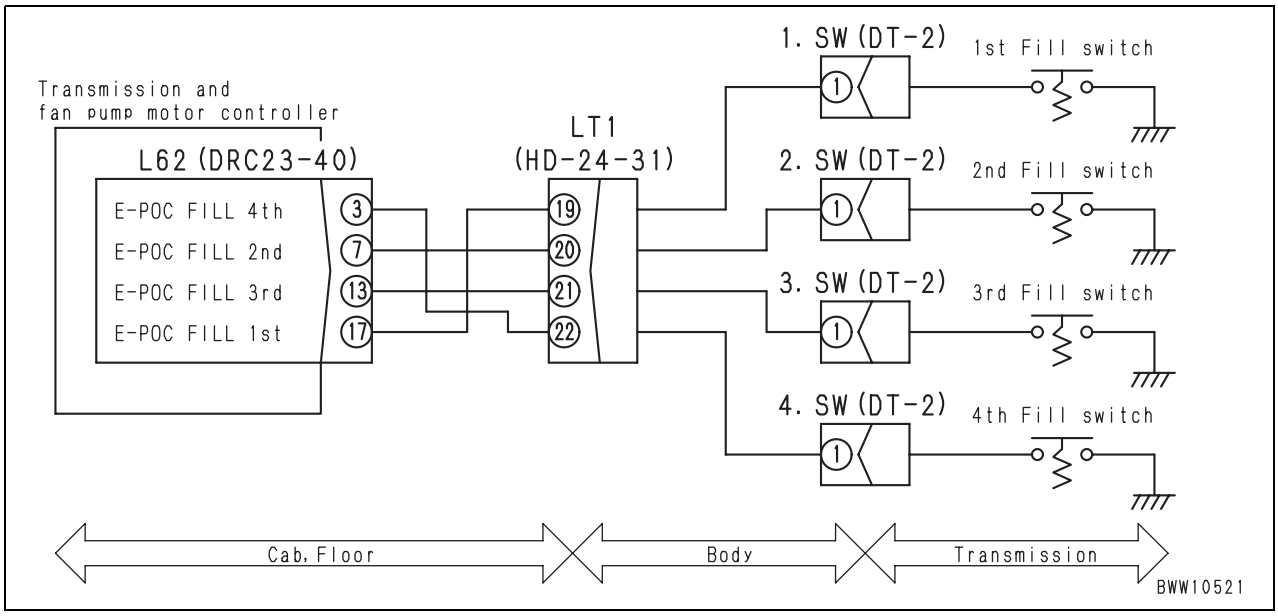

Engine power mode switch
Auto shift mode switch
Right dirction on switch
Transmission cut off set switch
Torque converter lock up on/off switch
Use for down load
Boom bucket & joy stick controller
Joy stick lever switch
Engine speed sensor
Starting switch
Hydraulic fan reverse switch
Emergency steering check switch
Floor frame GND
Brake low pressure switch
Rear
Front
SW2
Emergency brake switch
SW1
Joy stick ON/OFF switch
Joy stick N lock switch
Steering speed mode switch
Pump bypass solenoid
BJW10674

FAILURE CODE [15SGLH]

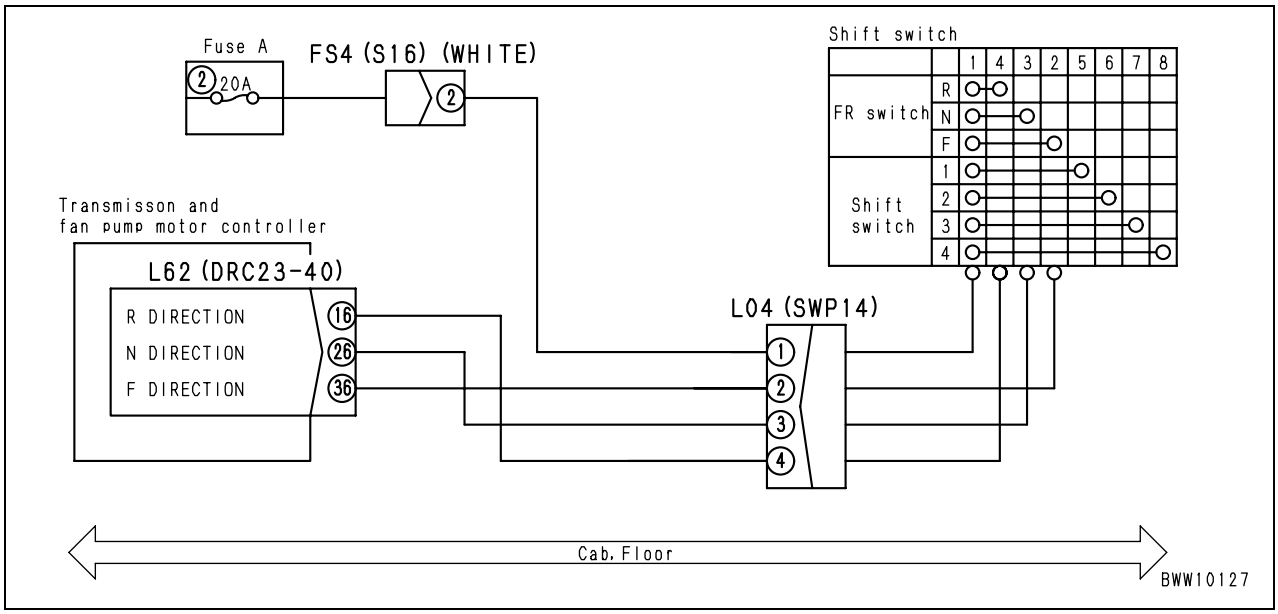
Action Code	Failure Code	Controller Code	Trouble	3rd_ECMV fill switch system disconnected
E01	15SGLH	TM		
Description of Trouble	• No 3rd_ECMV fill switch signal is input when 3rd_ECMV is ON.			
Controller Reaction	• Assumes that the 3rd_ECMV fill switch signal is OFF and uses fill-less modulation data.			
Effect on Machine	• May not travel at 3rd speed. • Gear shifting shock or time lag may occur on 3rd-speed-travel switchover.			
Related Information	• Can be checked with the monitoring function (Code: 40908, D-IN-28).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective 3rd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 3.SW. 3) Connect T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling.			
			Between 3.SW (Male) ① - body	Gear shift lever = 3rd speed	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 3.SW. 3) Connect T-adapter.			
			Wiring harness between L62 (Female) ⑬ - 3.SW (Female) ①		Resistance	1 Ω and below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adapter. 4) Start engine. 5) Turn transmission cut-off switch OFF. 6) Turn parking brake switch OFF. 7) Do not apply parking brake while traveling. 8) Turn manual/auto shift selector switch to “Manual”. 9) Turn forward-reverse lever (Or switch) to “F” or “R”.			
			Between L62 ⑬ - body	Gear shift lever = 3rd speed	Voltage	1 V and below
				Other than above	Voltage	20 - 30 V

Related circuit diagram

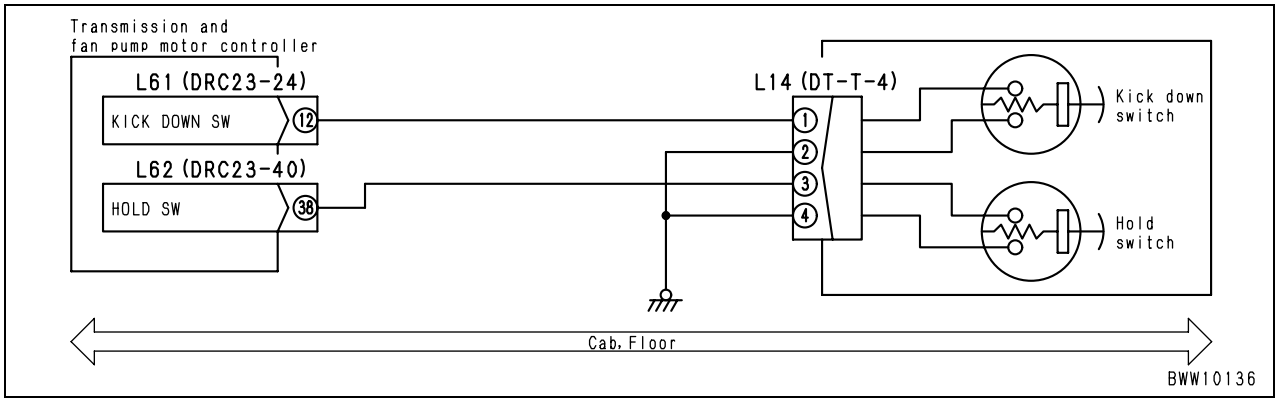


Related circuit diagram

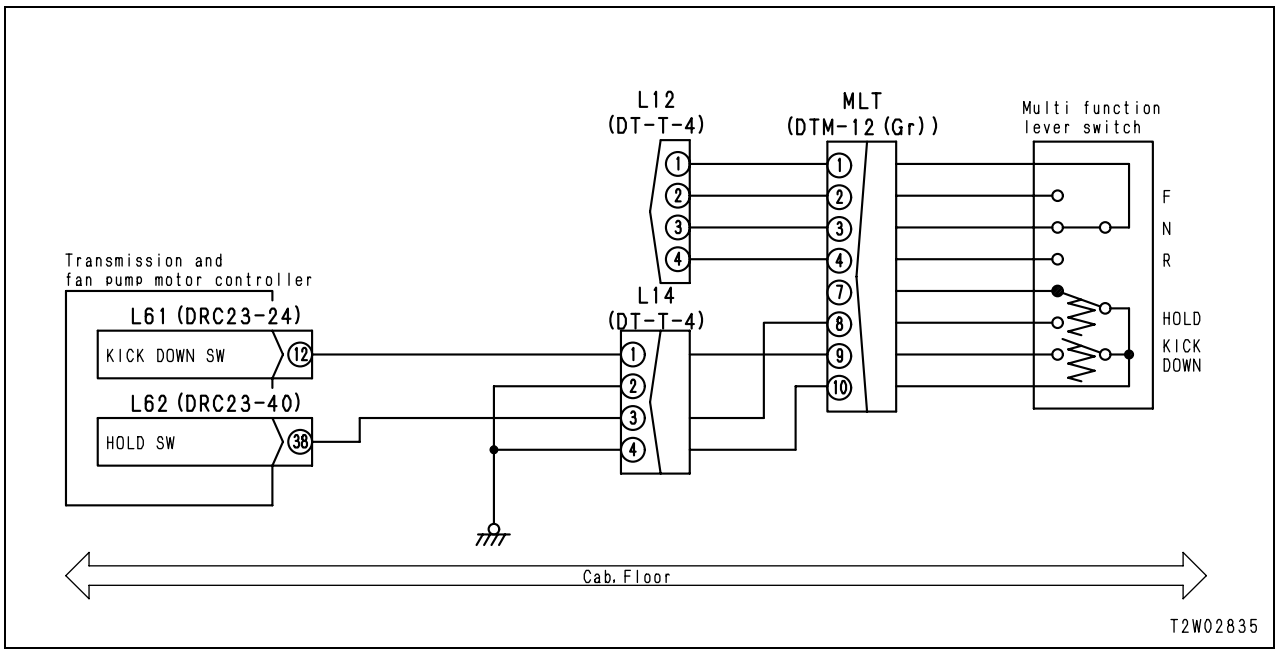


Related circuit diagram

For standard



When multi function mono lever mounted

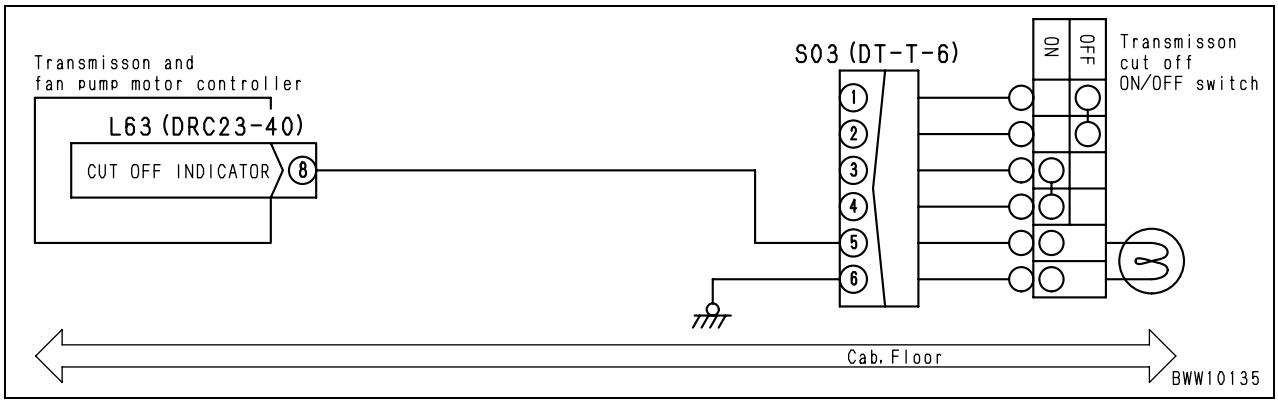


FAILURE CODE [DT20KB]

Action Code	Failure Code	Controller Code	Trouble	Ground fault of built-in indicator lamp system of transmission cut-off switch
—	DT20KB	TM		
Description of Trouble	• Due to ground fault of the built-in indicator lamp system of transmission cut-off switch, no output goes to the indicator lamp.			
Controller Reaction	• No action.			
Effect on Machine	• The indicator lamp built in the transmission cut-off switch does not come on.			
Related Information	—			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S03. 3) Connect T-adapter.			
			Between L63 (Female) ⑧/S03 (Female) ⑤ - body		Resistance	1 Ω or above
	2	Defective built in indicator lamp of transmission cut-off switch	1) Turn starting switch OFF. 2) Disconnect connector S03. 3) Connect T-adapter. 4) Turn on starting switch.			
			Between S03 ⑤ - ⑥	Cutoff switch = ON	Voltage	17 - 30 V
				Cutoff switch = OFF	Voltage	1 V or below
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L63 ⑧ - body	Cutoff switch = ON	Voltage	17 - 30 V
				Cutoff switch = OFF	Voltage	1 V or below

Related circuit diagram

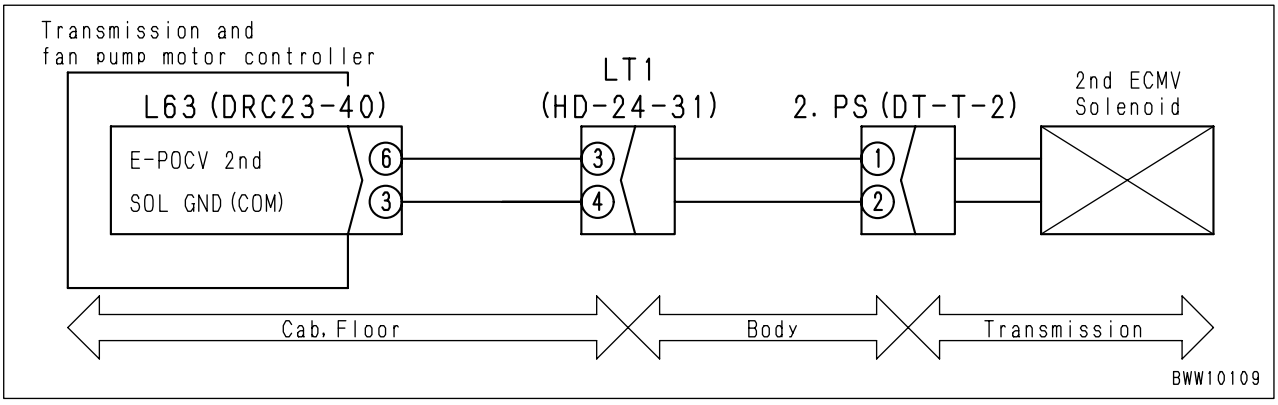


FAILURE CODE [DXH5KB]

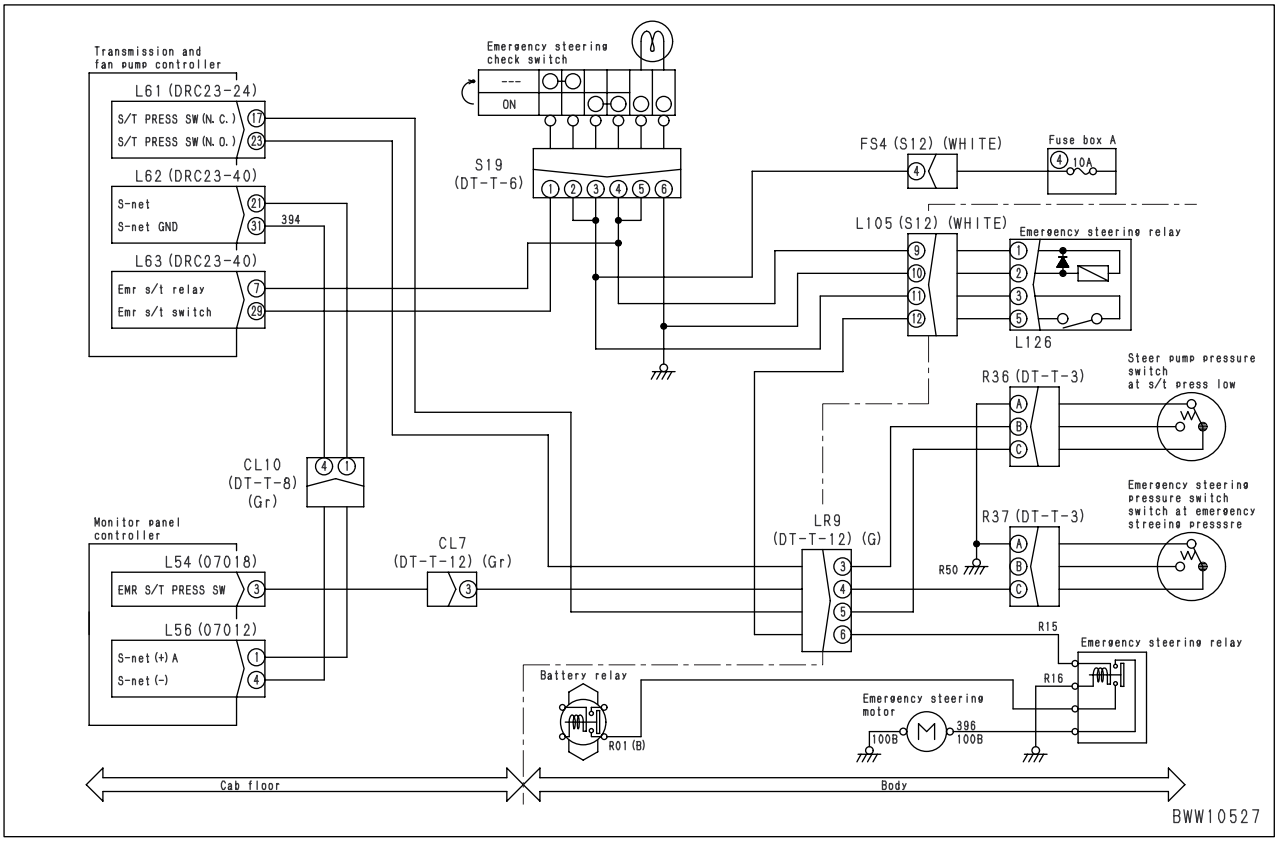
Action Code	Failure Code	Controller Code	Trouble	2nd_ECMV solenoid system short-circuiting
E03	DXH5KB	TM		
Description of Trouble	• Due to ground fault of the 2nd_ECMV solenoid system, no output goes to the 2nd_ECMV.			
Controller Reaction	• Turns output to the 2nd_ECMV solenoid OFF.			
Effect on Machine	• "2nd" cannot be engaged. (Traveling in other passes is possible.)			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
	1	Defective 2nd_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 2.PS. 3) Connect T-adapter.		
			Between 2.PS (Male) ① - ②	Resistance	5 - 15 Ω
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and 2.PS. 3) Connect T-adapter.		
			Wiring harness between L63 (Female) ⑥/2.PS (Female) ① - body	Resistance	1 MΩ or above
	3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (Female) ⑥ - ③	Resistance	5 - 15 Ω

Related circuit diagram



Related circuit diagram

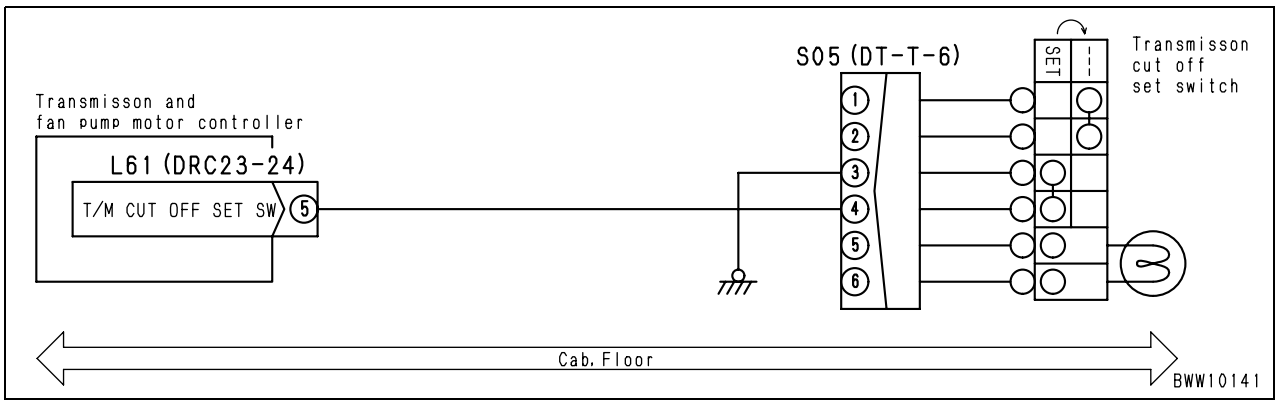


TROUBLESHOOTING CODE [TM-7]

Troubleshooting code	Failure Code	Controller Code	Trouble	Transmission cut-off setting switch system discontinuity or hot short-circuiting
TM-7	—	(TM)		
Description of Trouble	• Due to discontinuity or hot short-circuiting of the transmission cut-off setting switch system, the cut-off setting signal is left as input.			
Controller Reaction	• No reaction.			
Effect on Machine	• The transmission cut-off point cannot be reset.			
Related Information	• Can be checked with the monitoring function (Code: 40905, D-IN-3).			

	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective transmission cut-off setting switch	1) Turn starting switch OFF. 2) Disconnect connector S05. 3) Connect T-adapter.			
			Between S05 (Male) ④ - ③	Cut-off setting switch = ON	Resistance	1 Ω or below
				Cut-off setting switch = OFF	Resistance	1 MΩ or above
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S05. 3) Connect T-adapter.			
			Wiring harness between L61 (Female) ⑤ - S05 (Female) ④		Resistance	1 MΩ or above
	3	Hot short-circuiting between harnesses	1) Turn starting switch OFF. 2) Disconnect connectors L61 and S03. 3) Connect T-adapter.			
			Between L61 (Female) ⑤/S05 (Female) ④ - body		Voltage	1 V or below
	4	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L61 and S05. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L61 ⑤ - body	Cut-off setting switch = ON	Voltage	1 V or below
				Cut-off setting switch = OFF	Voltage	20 - 30 V

Related circuit diagram

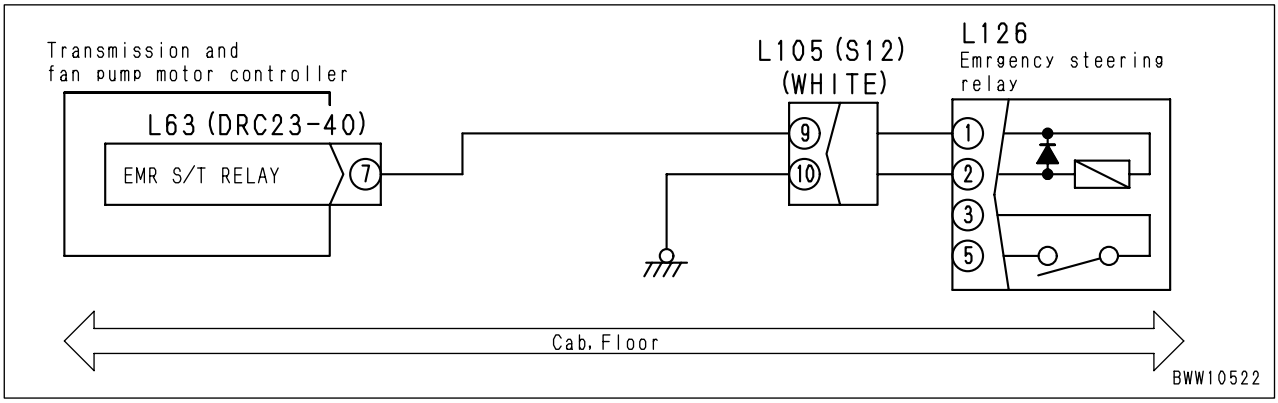


TROUBLESHOOTING CODE [TM-15]

Troubleshooting code	Failure Code	Controller Code	Trouble	Motor-driven emergency steering relay output system hot short-circuiting
TM-15	—	—		
Description of Trouble	• Due to hot short-circuiting of the motor-driven emergency steering relay output system, the emergency steering motor keeps operating.			
Controller Reaction	• No reaction.			
Effect on Machine	• The emergency steering motor keeps operating.			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L105. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (Female) ⑦/S105 (Female) ⑨ - body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (Female) ⑦ - body	Resistance	200 - 400 Ω

Related circuit diagram

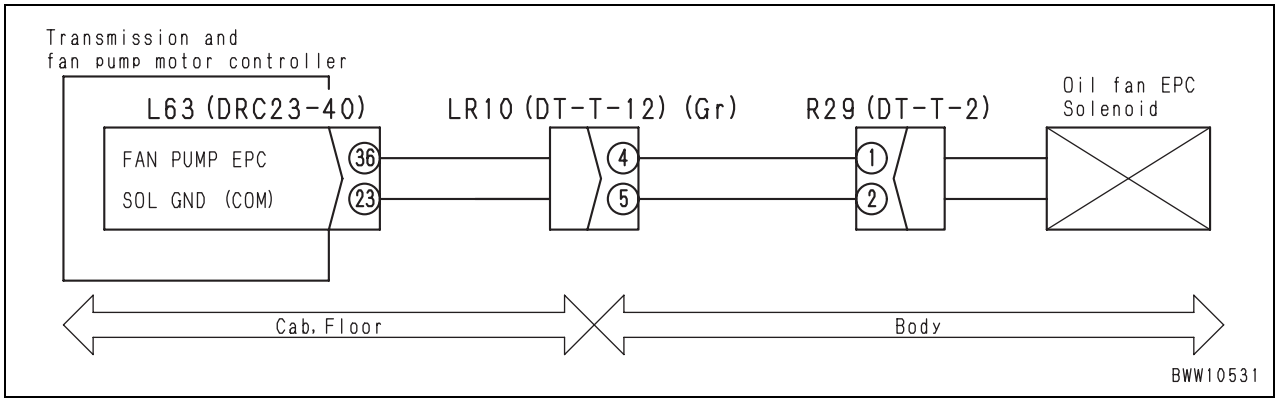


TROUBLESHOOTING CODE [TM-27]

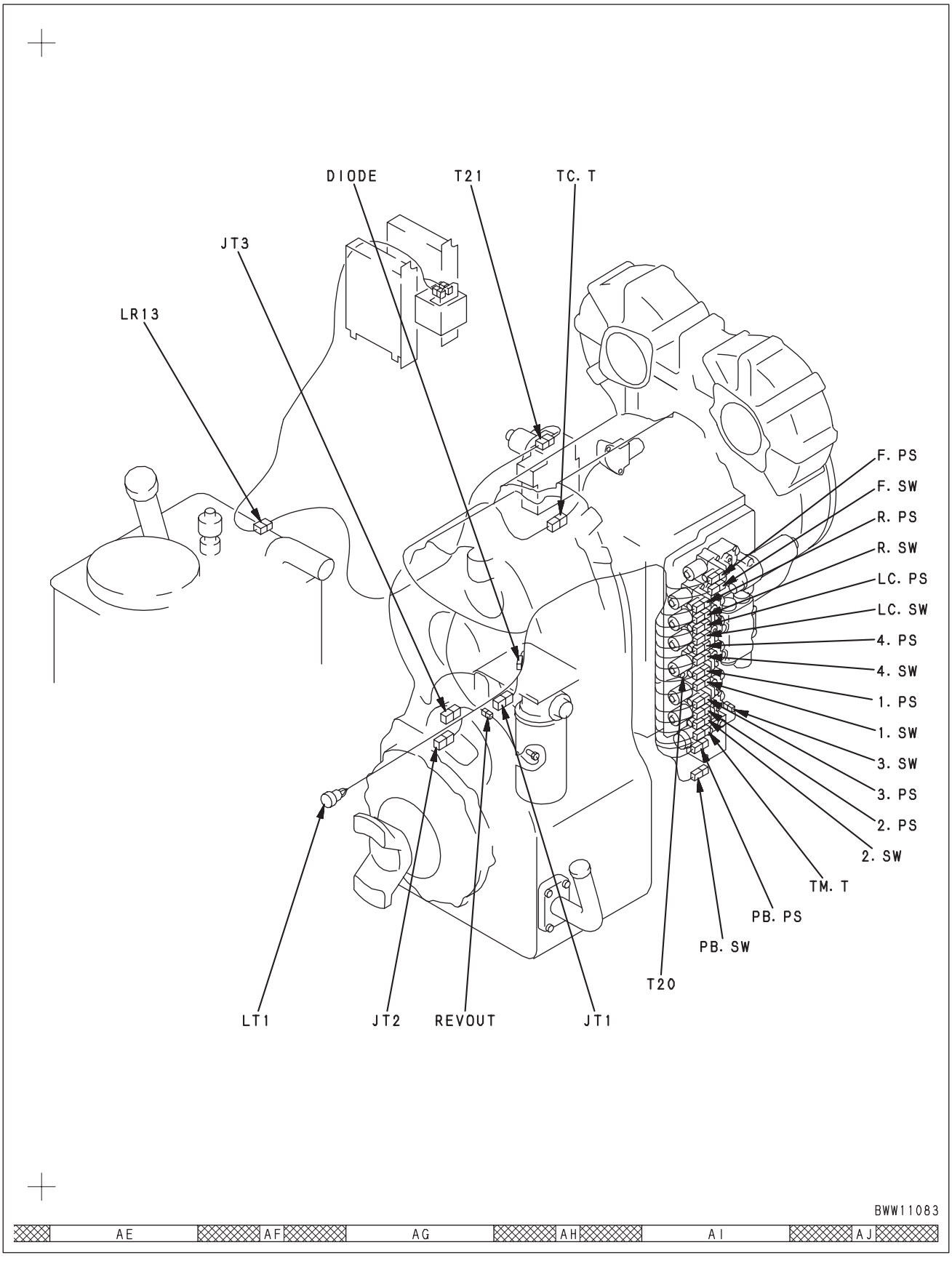
Troubleshooting code	Failure Code	Controller Code	Trouble	Fan pump EPC solenoid system hot short-circuiting
TM-27	—	—		
Description of Trouble	• Due to hot short-circuiting of the fan pump EPC solenoid system, the fan operates with minimum revolution.			
Controller Reaction	• No reaction.			
Effect on Machine	• The fan operates with minimum revolution.			
Related Information	—			

Possible Causes and Standard Values		Causes	Standard Values in Normal State and Remarks on Troubleshooting		
	1	Wiring harness hot short-circuiting	1) Turn starting switch OFF. 2) Disconnect connectors L63 and R29. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L63 (Female) ㊱/R29 (Female) ① - body	Voltage	1 V or below
	2	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.		
			Between L63 (Female) ㊱ - ㉓	Resistance	5 - 10 Ω

Related circuit diagram



Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
L08	DT-T	6	Machine monitor switch (Screen selector switch)	Q-1			A-8	
L09	DT-T	2	Stop lamp switch	Q-1			D-8	
L10	DT-T	3	Left brake pressure sensor	R-1	B-6			
L11	DT-T	2	Air suspension seat	S-1				
L12	DT-T	4	R direction switch	O-7	J-7	E-3		
L13	DT-T	2	Lift arm N lock switch	O-7		D-8		
L14	DT-T	4	Kickdown and hold switch	O-7	B-8	G-2		
L15	DT-T	4	Load meter cancel and sub-total switch	O-7		H-2	D-8	
L16	M	2	Intermediate connector (DC converter)	V-2				
L17	M	4	DC24V/DC12V converter	W-5				
L18	Yazaki	2	DC12V socket	W-3				
L19	M	4	Flasher unit	U-8			H-8	
L20	M	2	Alarm buzzer	U-8			I-7	
L21	S	10	Front and rear wiper switch	N-1				
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6		E-8		
L25S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		C-8
L26E	DT-T	2	Lift arm and bucket EPC lever	P-8		E-8		
L26S	DT-T	2	Work equipment lever electrical detent	N-6		G-2		B-8
L27	DT-T	2	Lift arm and bucket EPC lever	N-6		D-8		
L27S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		B-8
L28	DT-T	4	Lift arm and bucket EPC lever	P-8		D-8		
L29	DT-T	4	Lift arm and bucket EPC lever	O-7		E-8		
L30	DT-T	4	3rd EPC lever	P-8		D-8		
L31	M	6	Intermittent wiper timer	W-7				
L34	DT-T	4	Joystick lever positioner	W-6		B-1		
L35	DT-T	2	Joystick EPC solenoid	P-1		E-1		
L36	DT-T	2	Joystick EPC solenoid	P-1		D-1		
L37	DTM	12	Joystick lever switch	M-6	K-8			
L38	DT-T	3	Joystick N lock switch	W-7	K-1	B-2		
L39	DT-T	6	Joystick ON/OFF switch	S-1	K-2	B-2		
L40	DT-T	6	Steering speed mode switch	S-1	K-1	B-1		
L41	Relay	6	Joystick cutoff relay	N-6		D-1		
L42	Plug	1	Connector (Spare power supply)	A-5				
L43	Plug	1	Connector (Spare power supply)	A-5				
L44	M	6	Intermediate connector (Printer)	V-3			I-7	
L45	D-sub	25	Printer (Load meter)				I-8	
L46	G	4	Printer (Load meter)				H-9	
L51	AMP070	20	Monitor panel controller	M-5	A-2	O-2	B-7	B-4
L52	AMP070	18	Monitor panel controller	M-4			B-6	
L53	AMP070	12	Monitor panel controller	M-2	A-2		B-5	
L54	AMP070	18	Monitor panel controller	M-4	A-2	O-2	B-4	
L55	AMP070	12	Monitor panel controller	M-4	A-2	O-2	B-4	B-4
L56	AMP070	12	Monitor panel controller	M-5	B-2	O-2	B-3	
L57	AMP070	14	Monitor panel controller	M-4			B-2	
L58	AMP040	8	Monitor panel controller	M-2				

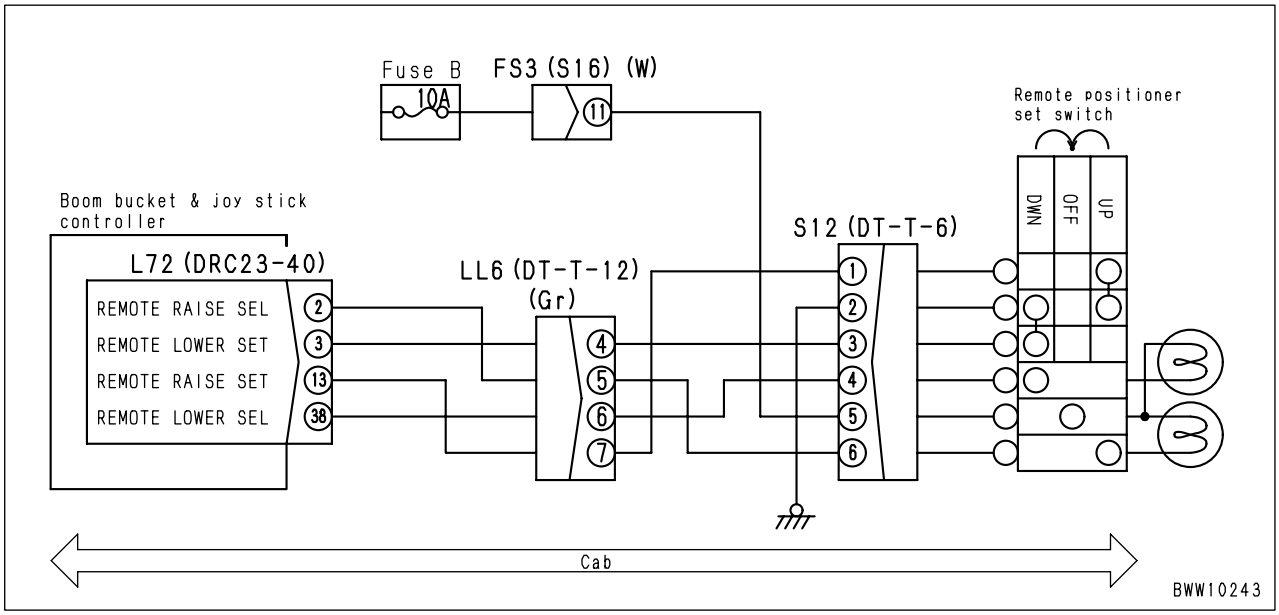

DIODE
T21
TC. T
JT3
LR13
F. PS
F. SW
R. PS
R. SW
LC. PS
LC. SW
4. PS
4. SW
1. PS
1. SW
3. SW
3. PS
2. PS
2. SW
TM. T
PB. PS
PB. SW
T20
LT1
JT2
REVOUT
JT1
BWW11083
AE
AF
AG
AH
AI
AJ

FAILURE CODE [DD1BLD]

Action Code	Failure Code	Controller Code	Trouble	Defective remote positioner DOWN set switch (Ground fault)
E03	DD1BLD	WRK		
Description of Trouble	• Cannot be set to DOWN because the remote positioner DOWN set switch system is grounded improperly.			
Controller Reaction	• Cancels the DOWN set position setting and the remote DOWN stop setting. • The DOWN set indicator is switched off the light. • DOWN set indicator goes out.			
Effect on Machine	• The DOWN set position cannot be set.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L72 and S12. 3) Connect T-adapter.			
			Between L72 (Female) ⑬/S12 (Female) ① - body		Resistance	1 MΩ and above
	2	Defective remote positioner set switch	1) Turn starting switch OFF. 2) Disconnect connector S12. 3) Connect T-adapter.			
			Between S12 (Male) ③ - ②	Remote positioner set switch = Up	Resistance	1 Ω and below
				Remote positioner set switch = Other than above	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L72 (Male) ③ - body	Remote positioner set switch = Up	Voltage	1 V and below
				Remote positioner set switch = Other than above	Voltage	20 - 30 V

Related circuit diagram

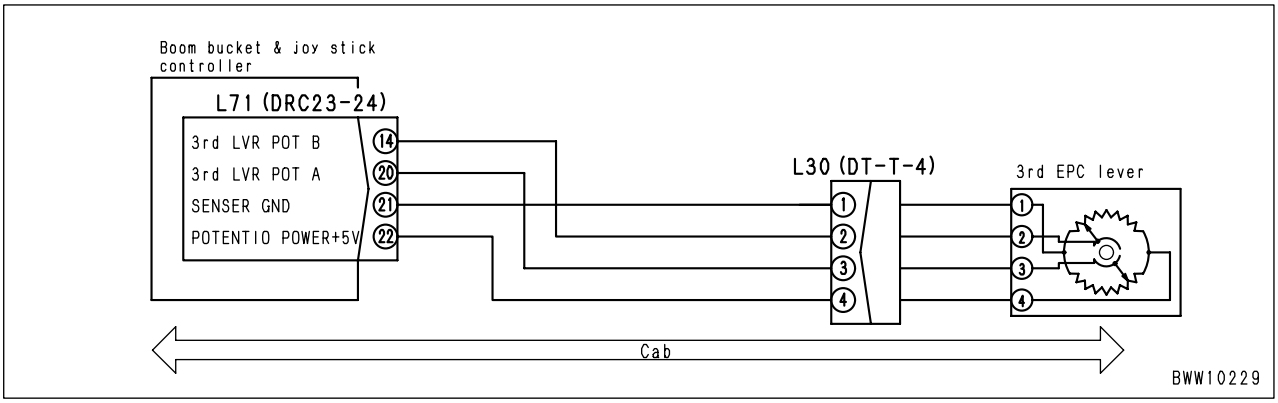


FAILURE CODE [DK5DKA]

Action Code	Failure Code	Controller Code	Trouble	Defective 3rd valve lever potentiometer system (Main circuit discontinuity or ground fault)
E03	DK5DKA	WRK		
Description Of Trouble	• The 3rd valve lever potentiometer signal system is disconnected (Main circuit discontinuity or ground fault).			
Controller Reaction	• Turns off the 3rd RPC solenoid output.			
Effect on Machine	• The 3rd valve cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42003).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Wiring harness between L71 (Female) ⑳- L30 (Female) ③	Resistance	1 Ω and below
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter.		
			Between L71 (Female) ⑳ - body	Resistance	1 MΩ and above
	3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L30. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 ② - ①	Voltage	2.5 - 2.6 V
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L30 ⑳ - ㉑ (Lever neutral)	Voltage	2.4 - 2.6 V

Related circuit diagram

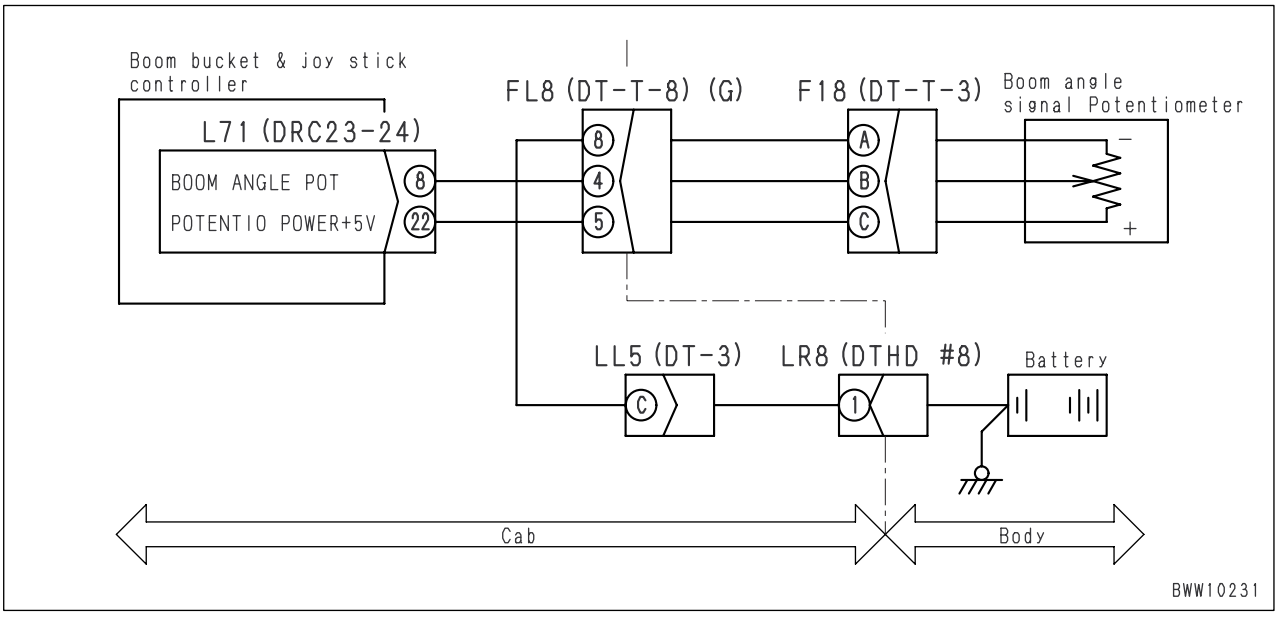


FAILURE CODE [DKAOKY]

Action Code	Failure Code	Controller Code	Trouble	Defective lift arm angle sensor system (Short circuit)
E01	DKAOKY	WRK		
Description Of Trouble	• Short circuit of the lift arm angle signal system and the GND system disconnection.			
Controller Reaction	• Controls the voltage value of the lift arm EPC potentiometer signal as input voltage. • Cancels the remote positioner function. • Cancels the semi-auto excavation function.			
Effect on Machine	• The remote positioner and the semi-auto excavation function cannot operate.			
Related Information	• Can be checked with the monitoring function (Code: 06002).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective wiring harness short circuit (The signal harness contacts the power supply harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and F18. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Wiring harness between L71 (Female) ⑧, F18 (Female) Ⓑ - body		Voltage	1 V and below
	2	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and F18. 3) Connect T-adapter.			
			Wiring harness between F18 (Female) Ⓐ - body		Resistance	1 Ω and below
	3	Defective lift arm angle sensor	1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between F18 Ⓒ - Ⓐ		Voltage	4.75 - 5.25 V
			Between F18 Ⓑ - Ⓐ	At the time of boom RAISE stroke end	Voltage	3.5 - 4.0 V
				At the time of boom LOWER stroke end	Voltage	1.0 - 2.0 V
			1) Turn starting switch OFF. 2) Disconnect connector F18. 3) Connect T-adapter.			
			Between F18 Ⓒ - Ⓐ		Resistance	4 - 6 kΩ
	4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L71 ㉒ - body	The whole gamut	Voltage	4.75 - 5.25 V
			Between L71 ⑧ - body	At the time of the boom maximum raising	Voltage	3.5 - 4.0 V
				At the time of the boom maximum lowering	Voltage	1.0 - 2.0 V

Related circuit diagram

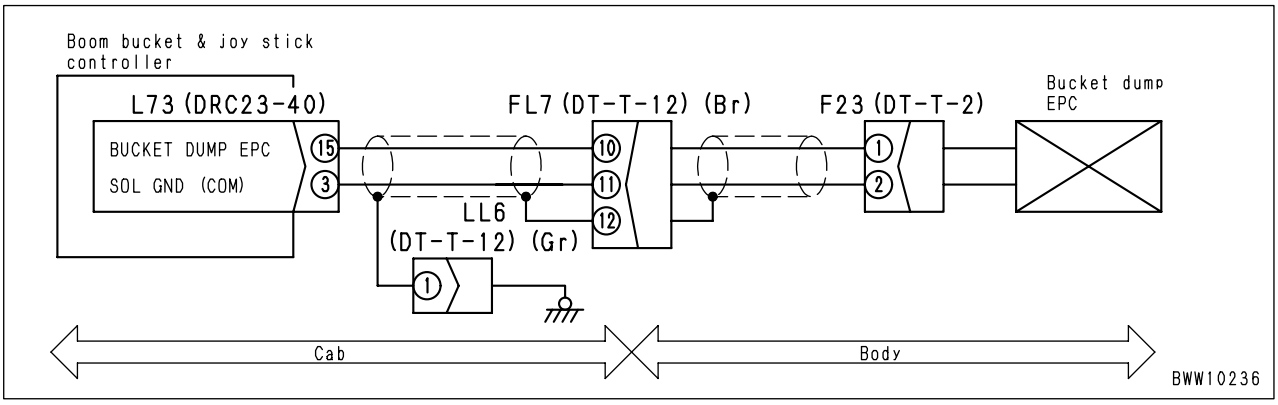


FAILURE CODE [DW4SKB]

Action Code	Failure Code	Controller Code	Trouble	Bucket DUMP EPC solenoid system ground fault
E03	DW4SKB	WRK		
Description Of Trouble	• The bucket DUMP EPC solenoid system ground fault prevents output to the bucket DUMP EPC solenoid.			
Controller Reaction	• Stops the output to the bucket DUMP EPC solenoid.			
Effect on Machine	• The bucket DUMP cannot move.			
Related Information	• Can be checked with the monitoring function (Code: 41903).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Defective bucket DUMP EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F23. 3) Connect T-adapter.		
			Between F23 (Male) ① - ②	Resistance	9 - 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F23. 3) Connect T-adapter.		
			Wiring harness between L73 (Female) ⑮ - body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (Female) ⑮ - ③	Resistance	9 - 10.2 Ω

Related circuit diagram

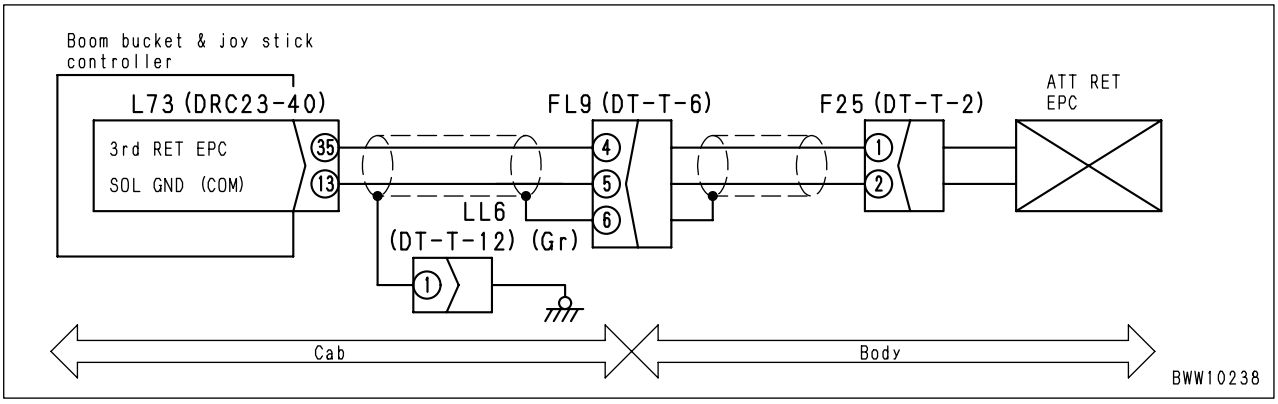


FAILURE CODE [DXHKKB]

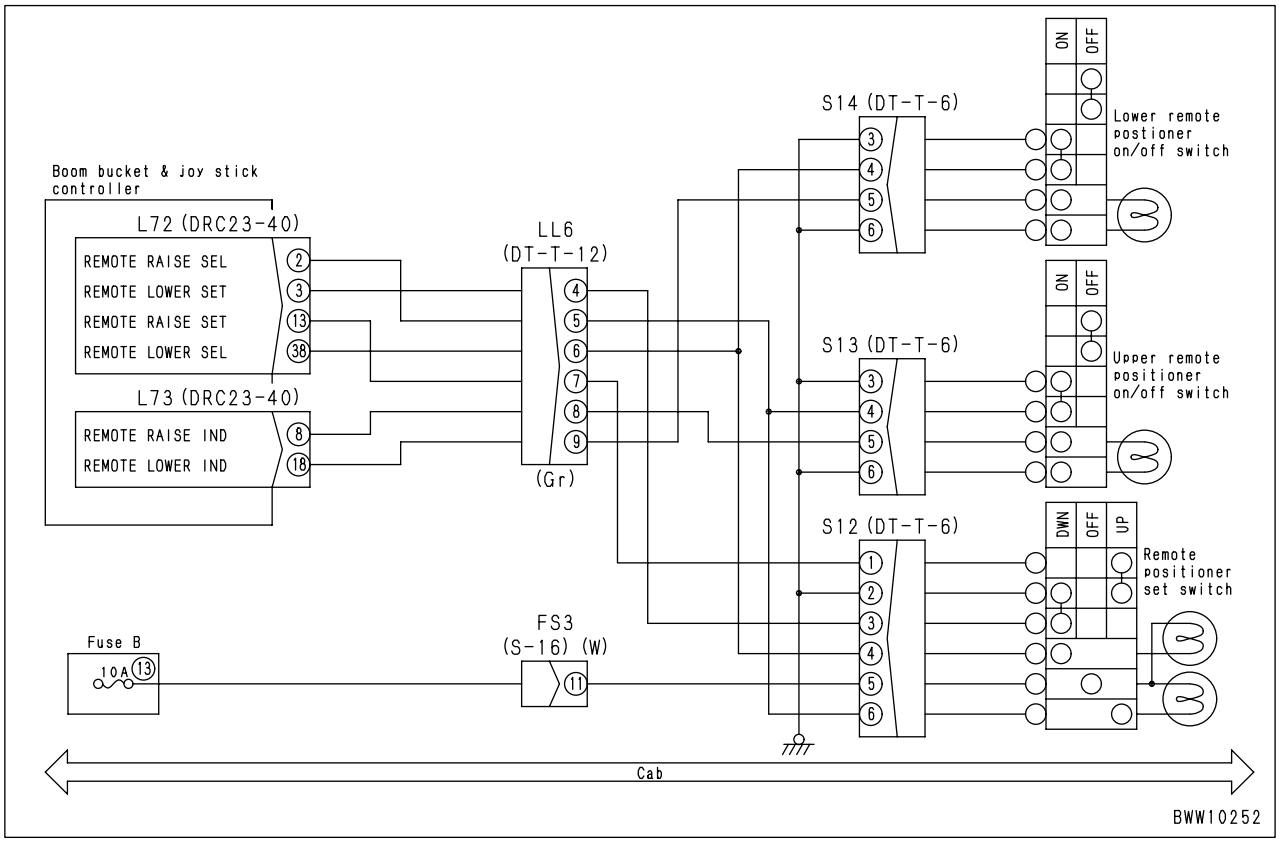
Action Code	Failure Code	Controller Code	Trouble	3rd valve retraction EPC solenoid system ground fault
E03	DXHKKB	WRK		
Description Of Trouble	• 3rd valve retraction EPC solenoid system ground fault prevents output to the 3rd valve EPC solenoid.			
Controller Reaction	• Stops output to the 3rd valve retraction EPC solenoid.			
Effect on Machine	• The 3rd valve cannot retracted.			
Related Information	• Can be checked with the monitoring function (Code: 41907).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
	1	Defective 3rd valve retraction EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector F25. 3) Connect T-adapter.		
			Between F2 (Male) ① - ②	Resistance	9 - 10.2 Ω
	2	Wiring harness ground fault and defective short circuit	1) Turn starting switch OFF. 2) Disconnect connector L73 and F25. 3) Connect T-adapter.		
			Wiring harness between L73 (Female) ㉟ - body	Resistance	1 MΩ and above
	3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (Female) ㉟ - ③	Resistance	9 - 10.2 Ω

Related circuit diagram



Related circuit diagram

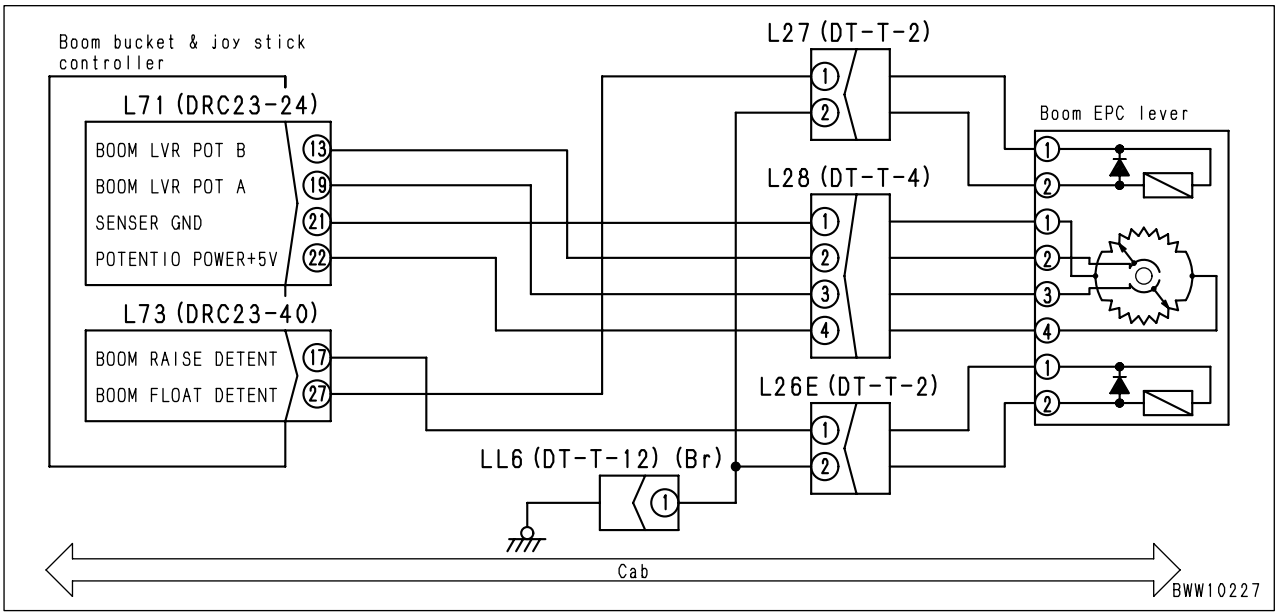


TROUBLESHOOTING CODE: [WRK-14]

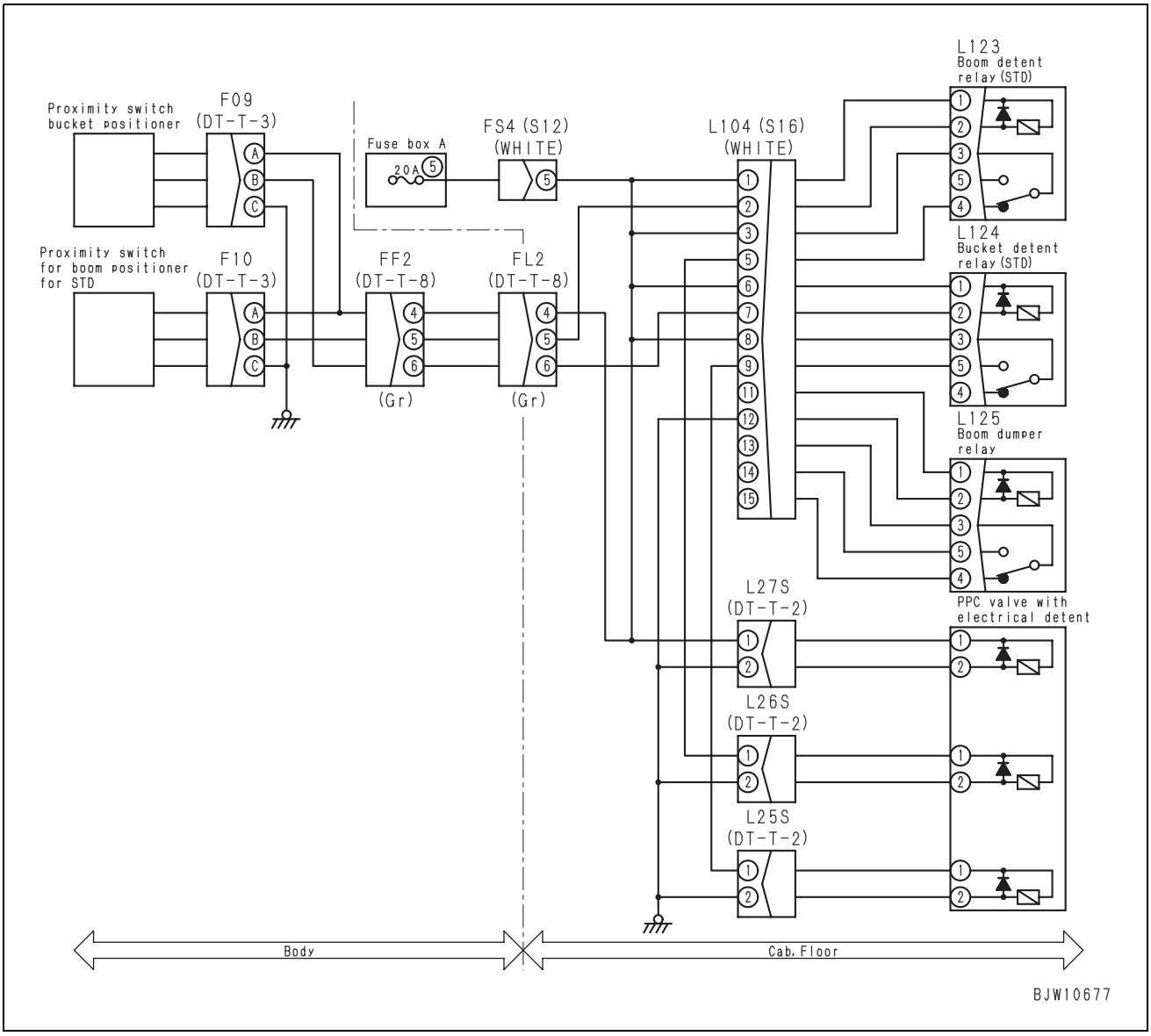
Troubleshooting Code	Failure Code	Controller Code	Trouble	Hot short-circuited lift arm FLOATING magnet detent output system
WRK-14	—	(WRK)		
Description of Trouble	• FLOATING detent cannot be cancelled due to short-circuited lift arm FLOATING magnet detent output system.			
Controller Reaction	• No reaction.			
Effect on Machine	• RAISE detent left turned ON. • Normal operation is possible excluding automatic cancel of detent.			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
	1	Short-circuited wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L27. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 (Female) ㉗, L27 (Female) ① - body	Voltage	1 V and below
	2	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (Female) ㉗ - body	Resistance	35 - 45 Ω

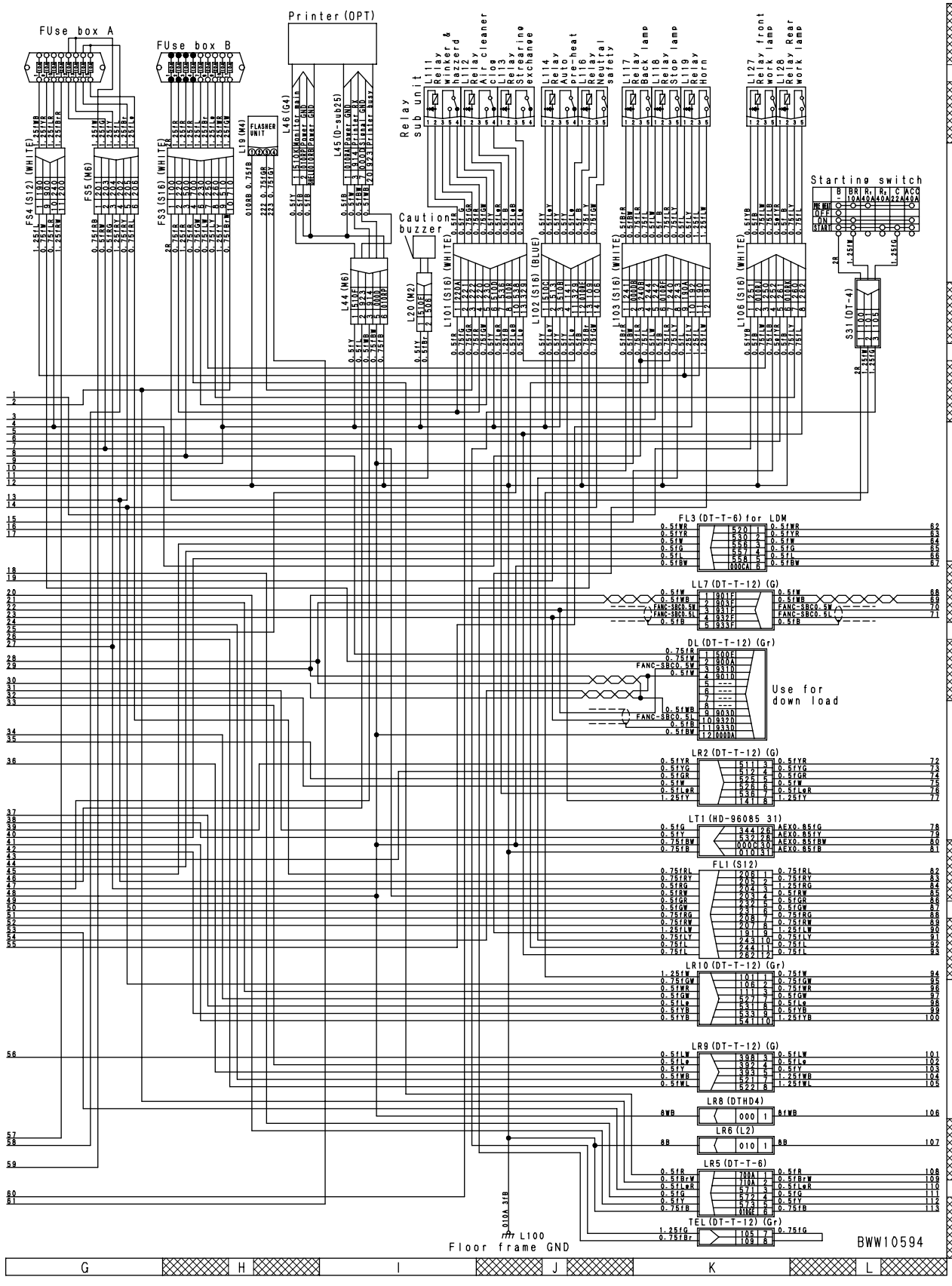
Related circuit diagram



Related circuit diagram



Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
L08	DT-T	6	Machine monitor switch (Screen selector switch)	Q-1			A-8	
L09	DT-T	2	Stop lamp switch	Q-1			D-8	
L10	DT-T	3	Left brake pressure sensor	R-1	B-6			
L11	DT-T	2	Air suspension seat	S-1				
L12	DT-T	4	R direction switch	O-7	J-7	E-3		
L13	DT-T	2	Lift arm N lock switch	O-7		D-8		
L14	DT-T	4	Kickdown and hold switch	O-7	B-8	G-2		
L15	DT-T	4	Load meter cancel and sub-total switch	O-7		H-2	D-8	
L16	M	2	Intermediate connector (DC converter)	V-2				
L17	M	4	DC24V/DC12V converter	W-5				
L18	Yazaki	2	DC12V socket	W-3				
L19	M	4	Flasher unit	U-8			H-8	
L20	M	2	Alarm buzzer	U-8			I-7	
L21	S	10	Front and rear wiper switch	N-1				
L25E	DT-T	2	Lift arm and bucket EPC lever	M-6		E-8		
L25S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		C-8
L26E	DT-T	2	Lift arm and bucket EPC lever	P-8		E-8		
L26S	DT-T	2	Work equipment lever electrical detent	N-6		G-2		B-8
L27	DT-T	2	Lift arm and bucket EPC lever	N-6		D-8		
L27S	DT-T	2	Work equipment lever electrical detent	N-7		G-2		B-8
L28	DT-T	4	Lift arm and bucket EPC lever	P-8		D-8		
L29	DT-T	4	Lift arm and bucket EPC lever	O-7		E-8		
L30	DT-T	4	3rd EPC lever	P-8		D-8		
L31	M	6	Intermittent wiper timer	W-7				
L34	DT-T	4	Joystick lever positioner	W-6		B-1		
L35	DT-T	2	Joystick EPC solenoid	P-1		E-1		
L36	DT-T	2	Joystick EPC solenoid	P-1		D-1		
L37	DTM	12	Joystick lever switch	M-6	K-8			
L38	DT-T	3	Joystick N lock switch	W-7	K-1	B-2		
L39	DT-T	6	Joystick ON/OFF switch	S-1	K-2	B-2		
L40	DT-T	6	Steering speed mode switch	S-1	K-1	B-1		
L41	Relay	6	Joystick cutoff relay	N-6		D-1		
L42	Plug	1	Connector (Spare power supply)	A-5				
L43	Plug	1	Connector (Spare power supply)	A-5				
L44	M	6	Intermediate connector (Printer)	V-3			I-7	
L45	D-sub	25	Printer (Load meter)				I-8	
L46	G	4	Printer (Load meter)				H-9	
L51	AMP070	20	Monitor panel controller	M-5	A-2	O-2	B-7	B-4
L52	AMP070	18	Monitor panel controller	M-4			B-6	
L53	AMP070	12	Monitor panel controller	M-2	A-2		B-5	
L54	AMP070	18	Monitor panel controller	M-4	A-2	O-2	B-4	
L55	AMP070	12	Monitor panel controller	M-4	A-2	O-2	B-4	B-4
L56	AMP070	12	Monitor panel controller	M-5	B-2	O-2	B-3	
L57	AMP070	14	Monitor panel controller	M-4			B-2	
L58	AMP040	8	Monitor panel controller	M-2				

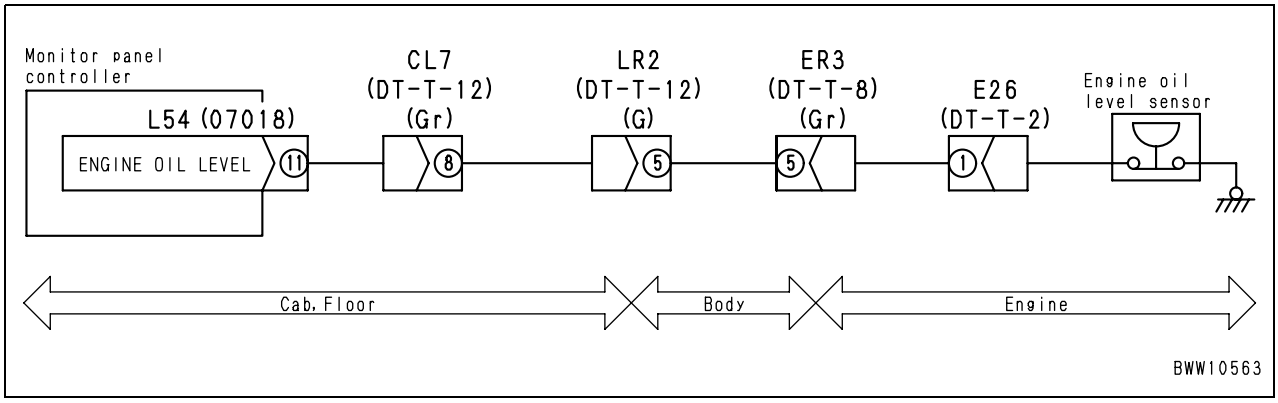

FUse box A
FUse box B
Printer (OPT)
Relay sub unit
Caution buzzer
FLASHER UNIT
Starting switch
Floor frame GND
BWW10594

FAILURE CODE [B@BAZK]

Action Code	Failure Code	Controller Code	Trouble	Engine oil level low
E01	B@BAZK	MON		
Description of Trouble	• The engine oil level sensor circuit is opened.			
Controller Reaction	• Triggers an alarm.			
Effect on Machine	• The engine oil level is low (The engine may be damaged).			
Related Information	• Can be checked with the monitoring function (Code: 40903, D-IN-29).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Low engine oil level	—			
	2	Defective engine oil level sensor	1) Turn starting switch OFF. 2) Disconnect connector E26. 3) Connect t-adapter.			
			Between E26 (Male) ① - body	Oil level is normal	Resistance	1 Ω and below
				Oil level is low	Resistance	1 MΩ and above
	3	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and E26. 3) Connect t-adapter.			
			Wiring harness between L54 (Female) ⑪ - E26 (Female) ①		Resistance	1 Ω and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.			
			Between L54 (Female) ⑪- body	Oil level is normal	Resistance	1 Ω and below
				Oil level is low	Resistance	1 MΩ and above

Related circuit diagram

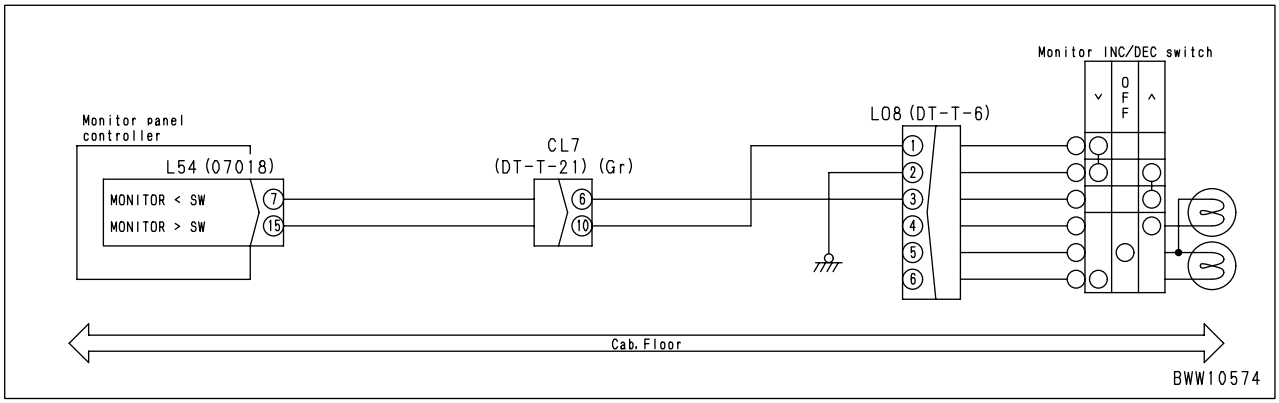


FAILURE CODE [DD18LD]

Action Code	Failure Code	Controller Code	Trouble	Monitor panel mode selector switch 2 [<] (Panel SW4) input error
E01	DD18LD	MON		
Description of Trouble	• The monitor panel mode selector switch 2 [>] (Panel SW4) input circuit remains closed for more than one minute.			
Controller Reaction	• Activates an alarm.			
Effect on Machine	• The monitor cannot be operated.			
Related Information	• The input signal (0 or 1) of the monitor panel mode selector switch 2 [>] (Panel SW4) can be verified with the monitoring function (Code: 40904, D-IN-37). • Since [<] switch is faulty, the monitoring function may not be activated.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 2 [>]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (Female) ① - ②	When monitor panel mode selector switch 2 [>] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
	2	Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (Female) ⑮/L08 (Female) ① - body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 ⑮ - body	When monitor panel mode selector switch 2 [>] is turned ON	Voltage	1 V or less
				Other than above	Voltage	20 - 30 V

Related circuit diagram

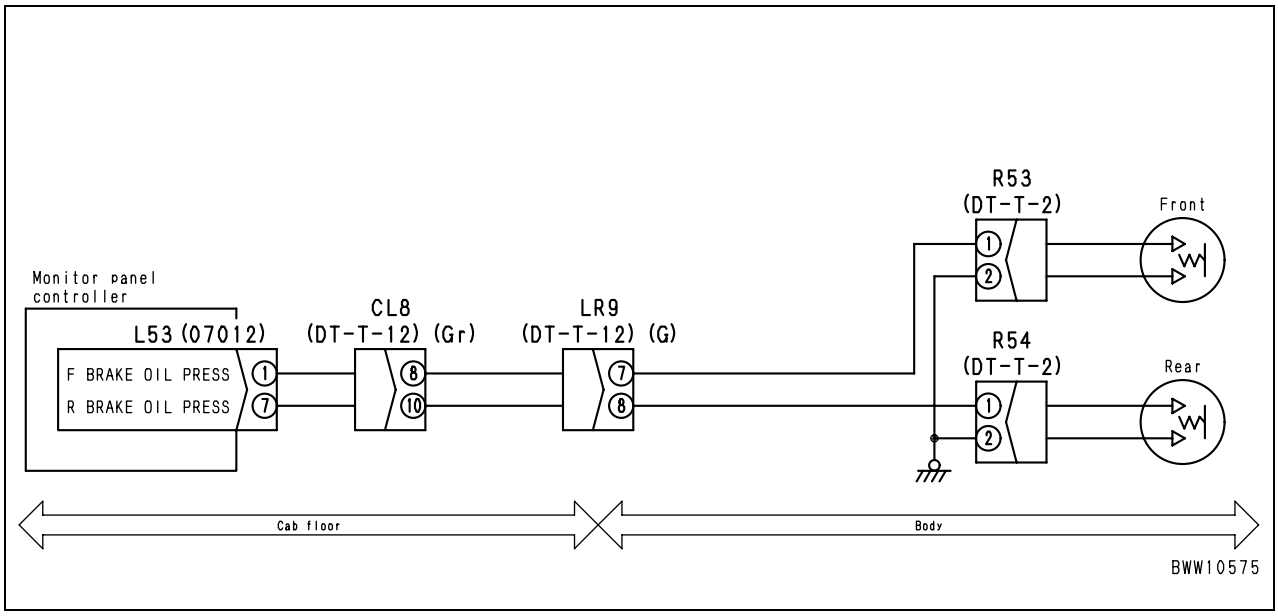


TROUBLESHOOTING CODE [MON-3]

Troubleshooting Code	Failure Code	Controller Code	Trouble	The brake oil pressure caution lamp does not light up when the emergency brake is applied (Rear circuit)
MON-3	—	(MON)		
Description of Trouble	• The accumulator pressure sensor (Rear) circuit remains CLOSED (i.e. rear brake oil pressure is normal) when the emergency brake is actuated.			
Controller Reaction	• No reaction.			
Effect on Machine	• The brake oil pressure caution lamp does not light up when the emergency brake is actuated and when the brake oil pressure is decreased.			
Related Information	• Can be verified with the monitoring function (Code: 40902_D-IN-17).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Faulty brake oil pressure sensor (Rear brake circuit)	1) Turn starting switch OFF. 2) Disconnect connector R54. 3) Connect T-adapter. 4) Start engine.			
			Between R54 (Male) ① - ②	When rear brake oil pressure is above 5.88 MPa {60 kg/cm^2}	Resistance	1 Ω and below
				When rear brake oil pressure is below 5.88 MPa {60 kg/cm^2}	Resistance	1 MΩ and above
	2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L53 and R54. 3) Connect T-adapter.			
			Between L53 (Female) ⑦/R54 (Female) ① - body		Resistance	1 MΩ and above
	3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L53. 3) Connect t-adapter.			
			Between L53 (Female) ⑦ - body	When rear brake oil pressure is above 5.88 MPa {60 kg/cm^2}	Resistance	1 Ω and below
				When rear brake oil pressure is below 5.88 MPa {60 kg/cm^2}	Resistance	1 MΩ and above

Related circuit diagram

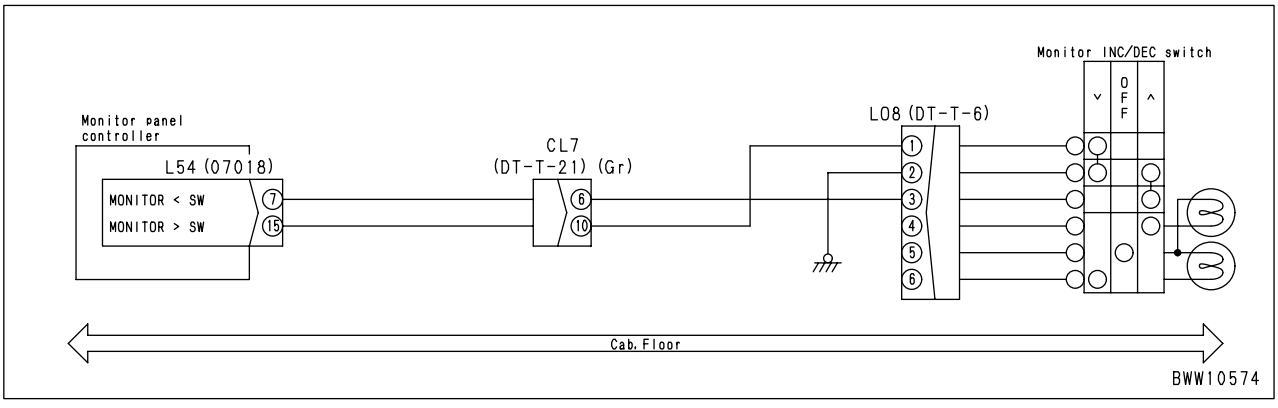


TROUBLESHOOTING CODE [MON-14]

Troubleshooting Code	Failure Code	Controller Code	Trouble	Input fault in monitor panel mode switch 2 [<] (Panel SW3)
MON-14	—	(MON)		
Description of Trouble	• The input circuit of the monitor panel mode switch 2 [<] (Panel SW3) is in the OPEN state.			
Controller Reaction	• No reaction.			
Effect on Machine	• The monitor operation is impossible.			
Related Information	• The input signal (0/1) of the monitor panel mode switch 2 [<] (Panel SW3) can be checked with the monitoring function (Code: 40904, D-IN-38). • Since the [<] switch is abnormal, the monitoring function may not be implemented.			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
Possible Causes and Standard Values	1	Defective monitor panel mode switch 2 [<]	1) Turn starting switch OFF. 2) Disconnect connector L08. 3) Connect T-adapter.			
			Between L08 (Female) ③ - ②	When the monitor panel mode switch 2 [<] is ON	Resistance	1 Ω and below
				Others	Resistance	1 MΩ and above
	2	Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter.			
			Between L54 (Female) ⑦ - L08 (Female) ③		Resistance	1 Ω and below
	3	Harness hot short fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and L08. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L54 (Female) ⑦, L08 (Female) ③ - body		Voltage	1 V and below
	4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter. 4) Turn starting switch ON.			
			Between L54 (Female) ⑦ - body	When the monitor panel mode switch 2 [<] is ON	Voltage	1 V and below
				Others	Voltage	20 - 30 V

Related circuit diagram



H-3 a The travel speed is slow, the thrusting force is weak, the uphill traveling power is weak, and the gear is not shifted

Ask the operator about the following:
- Has an abnormality occurred suddenly?
  → Breakage of related equipment
  Did any abnormal noise occur at the time and where?
- Have any abnormal signs come to occur gradually?
  → Wear of related equipment, defective seal

Check of abnormality
- Execute digging and measure traveling speeds on a level ground and on a slope to check whether the abnormality actually occurs or is a matter of operator's sense

Inspection before diagnosis
- Is any failure code of the electrical system displayed on the machine monitor?
- Are the transmission oil level and the oil type appropriate?
- Haven't the transmission filter and strainer been clogged?
- Is any external oil leak found on the mating faces of pipes and valves around the torque converter and the transmission?
- Isn't the wheel brake or the parking brake being dragged?
- Are the tire air pressure and the tread shape appropriate?
- Is the operating method correct?

Note: When the inspection result was "Engine Degradation," proceed to Engine System Troubleshooting (S Mode).

No.	Diagnosis \ Remedy		Cause																			
			Torque Converter Charging Pump			Torque Converter Oil Cooler		Torque Converter		Main Relief Valve			ECMV	Transmission				Parking Brake	Others	
			a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
			Clogging of strainer	Air intake on pump suction side	The charging pump is defective	Clogging of oil cooler and pipe (After torque converter outlet)	Breakage of oil cooler and pipe (After torque converter outlet)	Oil leak inside torque converter	Internal breakage of torque converter	Defective operation of torque converter relief valve	Drop of main relief valve set pressure	Clogging of last change filter	Defective operation of relevant ECMV	Internal breakage of transmission	Defective seal of relevant clutch piston	Defective seal of relevant clutch shaft	Clogging of breather	Defective seal of parking brake piston	Defective seal of work equipment and steering system hydraulic pump shaft (Mixing of hydraulic oil in transmission case)	Engine degradation
			C X	Δ X	X	Δ X	X	Δ X	Δ X	Δ X	Δ X	X	*1	Δ X	*1	X	C X	X	Δ X	Note
1	Any abnormality occurs at all gear speeds		○	○	○	○	○	○	○	○	○	○		○			○	○	○	○
2	Any abnormality occurs at specific gear speeds												○	○	○	○				
3	When the transmission oil temperature is low, the charging pump or the transmission filter causes any abnormal noise		○	○																
4	The torque converter oil temperature rises abnormally high		○	○	○	○	○	○	○	○				○			○		○	
5	The transmission oil level rises or falls					○	○										○		○	○
6	Metal (Aluminum, copper, iron, etc.) powers are adhered to the transmission filter or the strainer				○				○					○						
7	The engine low idling and high idling speeds are measured to be abnormal								○					○						○
8	When the stall speed of the torque converter is measured	The speed is high	○	○	○		○	○	○	○		○		○			○			
9		The speed is low																		○
10	When the ECMV output (Clutch) oil pressure is measured	The oil pressure drops as the temperature rises			○										○	○		○		
11		The oil pressure is low at all gear speeds	○	○	○						○	○		○			○	○		○
12		The oil pressure is low at specific gear speeds											○	○	○	○				
13		The oil pressure does not become stable as the gauge touches the oil	○	○																
14	When the torque converter relief (Inlet) oil pressure is measured, the oil pressure is low. (Nos. 11-13 are normal.)							○	○	○										
15	When the oil pressure at the torque converter outlet is measured, the oil pressure is low. (No. 14 is normal.)						○													

*1 Proceed to the paragraph of "Defective clutch and ECMV Specifying Method (Check by Failure Code)."

H-13 The brake is not released or is dragged

Inspection before diagnosis

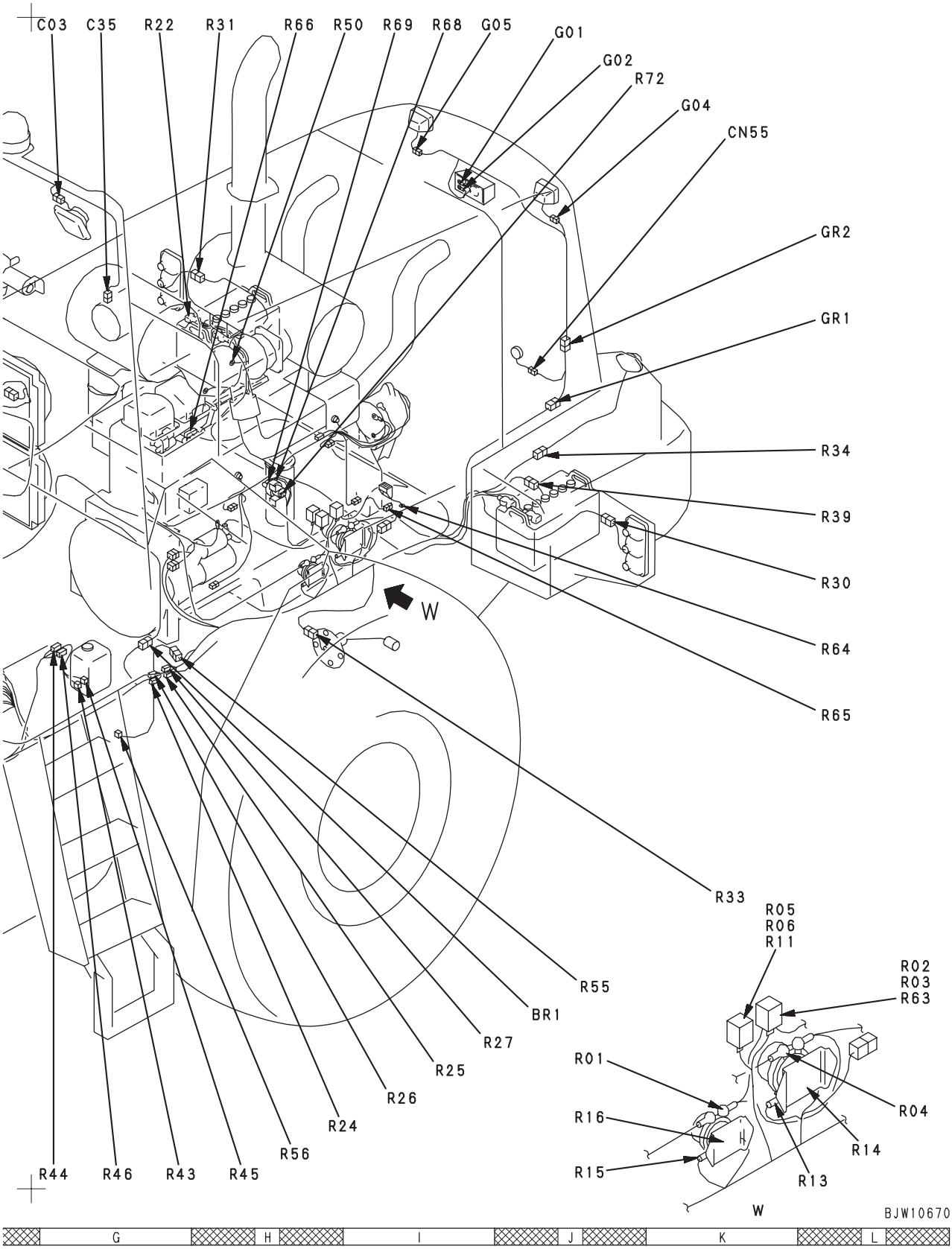
- Has the brake pedal returned completely?
- Is the parking brake released completely?

Check of Abnormality

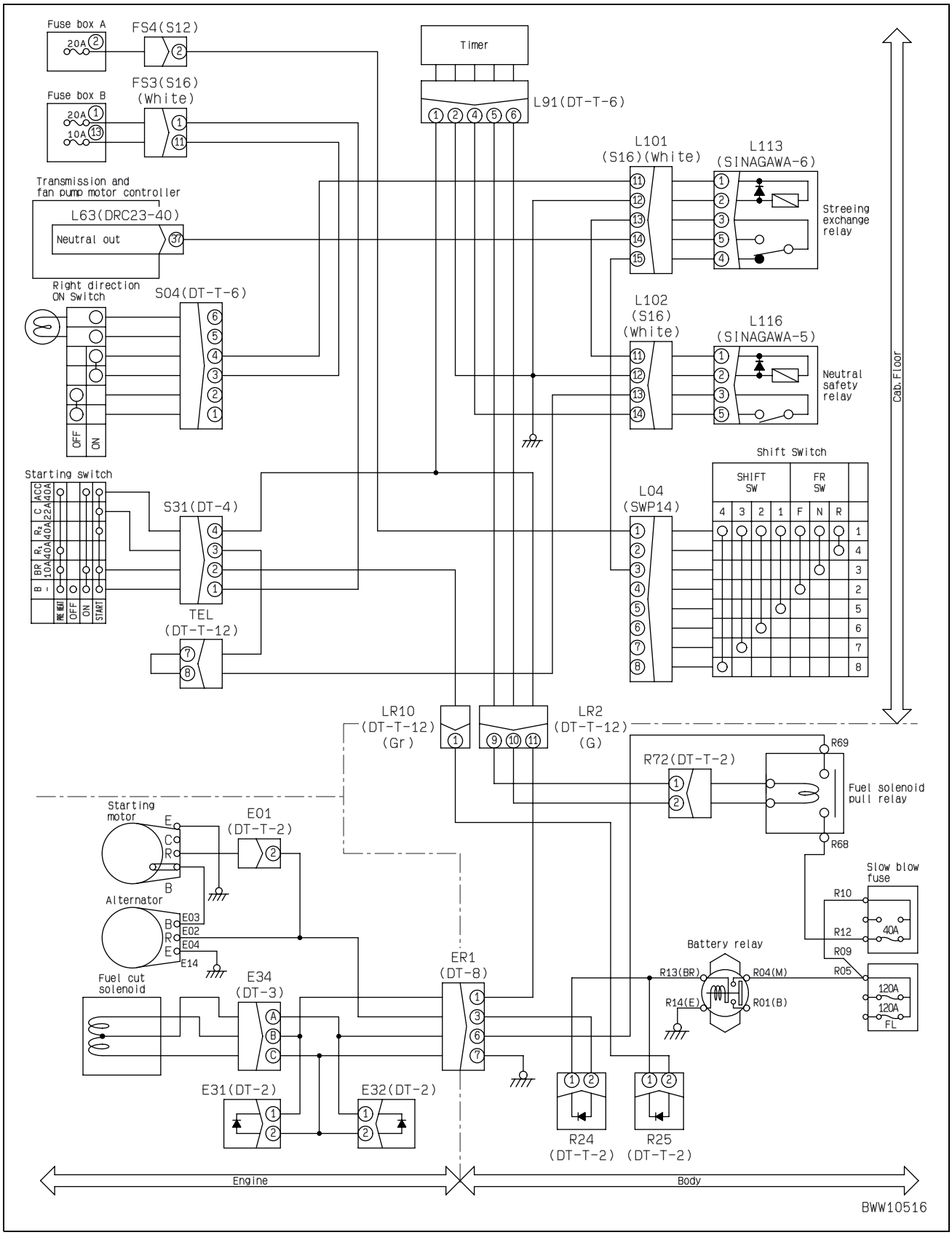
- Abnormal heat of brake
- Does the machine travel smoothly by inertia on a level ground?

No.	Remedy / Diagnosis	Cause		
		a	b	c
		Defect inside brake valve (Stocking of piston)	Abnormal lining of brake in axle	Defective operation of brake piston in axle
		Δ X	Δ X	Δ X
1	The brake pedal is released, but the brake is still applied	○	○	○
2	When the brake pedal is released, oil is drained from the air bleeder, the circuit pressure drops and the brake is released	○		
3	The four wheels are jacked up, the axle is placed on a table, the engine is stopped, the parking brake is released and the tires are rotated by hand but a specific tire hardly rotates		○	○

TROUBLESHOOTING OF ELECTRICAL SYSTEM (E MODE)


C03
C35
R22
R31
R66
R50
R69
R68
G05
G01
G02
R72
G04
CN55
GR2
GR1
R34
R39
R30
R64
R65
W
R33
R05
R06
R11
R02
R03
R63
R55
BR1
R27
R25
R26
R24
R56
R01
R04
R16
R14
R15
R13
R44
R46
R43
R45
W
BJW10670
G
H
I
J
K
L

Related circuit diagram

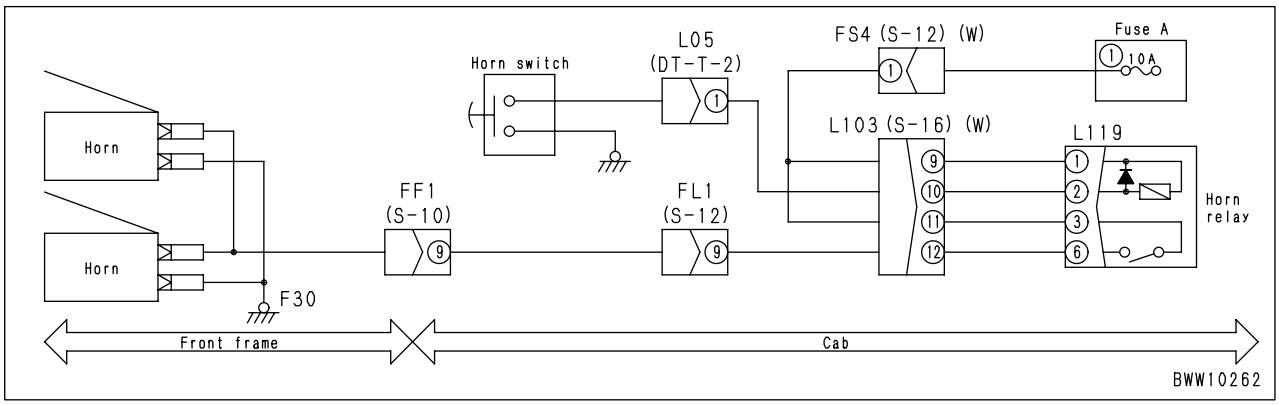


TROUBLESHOOTING CODE: [E-8]

Troubleshooting Code	Failure Code	Controller Code	Trouble	The wind washer does not function
E-8	—	—		
Description of Trouble	• Since a fault occurs in the window washer motor, switch, timer (Front only), or harness, the wind washer does not function.			
Controller Reaction	—			
Effect on Machine	• The wind washer does not function.			
Related Information	• When the wiper function is normal (When the wiper function is also abnormal, first diagnose the wiper function fault in E-5).			

	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
Possible Causes and Standard Values	1	Washer motor fault	1) Turn starting switch OFF. 2) Disconnect connectors R43 and R45. 3) Connect T-adapter. 4) Turn starting switch ON.		
			• Front washer motor		
			Between R43 ① - body	Voltage	20 - 30 V
			• Rear washer motor		
			Between R45 ① - body	Voltage	20 - 30 V
	2	Wiper switch fault	1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect T-adapter.		
			• Common to front switch and rear switch		
			Between L21 ⑦ - body	Voltage	20 - 30 V
			1) Turn starting switch OFF. 2) Disconnect connector L21. 3) Connect T-adapter.		
			• Front switch		
			Between L21 (Male) ⑦ - ⑥ (Washer switch ON)	Resistance	1 Ω and below
			Between L21 (Male) ⑦ - ⑥ (Washer switch OFF)	Resistance	1 MΩ and above
			• Rear switch		
			Between L21 (Male) ⑦ - ⑩ (Washer switch ON)	Resistance	1 Ω and below
			Between L21 (Male) ⑦ - ⑩ (Washer switch OFF)	Resistance	1 MΩ and above
			Between L21 (Male) ⑦ - ⑨, and ⑩ (Washer wiper Lo switch ON)	Resistance	1 Ω and below
	3	Wiper timer (Relay) fault (Front wiper only)	1) Turn starting switch OFF. 2) Disconnect connector L31. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L31 ③ - body	Voltage	20 - 30 V
			Between L31 ② - body (Washer switch ON)	Voltage	20 - 30 V
			Between L31 ⑤ - body (0.2 - 0.8 sec. after the washer switch was turned ON)	Voltage	20 - 30 V

Related circuit diagram



(3) 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
- Improper selection of fuel and oil

		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 cylinder 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				◎	◎	◎						
Check items	Rust and water are found when fuel tank is drained				◎	◎							
	Dust indicator lamp is red						◎						
	Indicator lamp does not light up							◎					
	Starting motor cranks engine slowly								◎				
	Mud is stuck to fuel tank cap										○		
	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 piping 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 tank cap is inspected directly, it is found to be clogged											●	
	Remedy	Replace	Replace	Replace	Clean	Clean	Clean	Correct	Replace	Correct	Clean	Clean	Replace

S-14 Coolant temperature becomes too high (Overheating)

General causes why coolant temperature becomes too high

- Lack of cooling air (deformation, damage of fan)
- Drop in heat dissipation efficiency
- Defective cooling circulation system
- Rise in oil temperature in power train

★ Carry out troubleshooting for chassis.

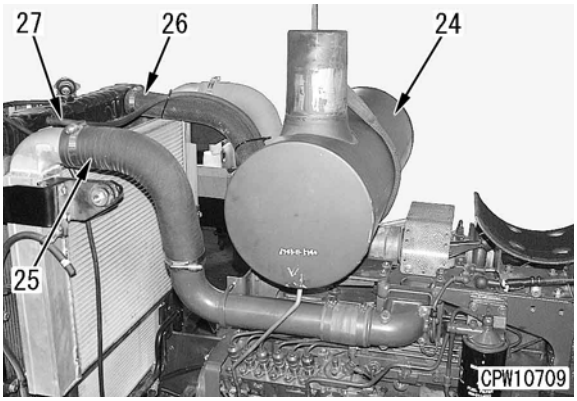
			Causes: Broken water pump	Clogged, crushed radiator fins	Clogged radiator core	Defective thermostat (does not open)	Defective water temperature gauge	Lack of cooling water	Fan belt slipping, worn fan pulley	Clogged, broken oil cooler	Defective pressure valve	Broken cylinder head, head gasket	Holes made by pitting	Rise in torque converter oil temperature
Questions	Confirm recent repair history													
	Degree of use of machine	Operated for long period		△	△						△	△		
	Condition of overheating	Suddenly overheated	◎					○	○					
		Always tends to overheat		◎	◎	○			○					
	Water temperature gauge	Rises quickly				◎		○						
		Does not go down from red range					◎							
Check items	Radiator water level sensor lights up							◎						
	Fan belt whines under sudden load								◎					
	Cloudy white oil is floating on cooling water									◎				
	Cooling water flows out from overflow hose										◎			
	Excessive air bubbles inside radiator, water spurts back											◎		
	Engine oil level has risen, oil is cloudy white								○				◎	
	There is play when fan pulley is rotated		◎											
	Radiator shroud, inside of underguard are clogged with dirt or mud			◎				◎						
	When light bulb is held behind radiator, no light passes through			◎										
	Water is leaking because of cracks in hose or loose clamps						◎							
	When belt tension is inspected, it is found to be loose							◎						
	Power train oil temperature enters red range faster than engine water temperature													◎
Troubleshooting	Temperature difference between top and bottom radiator tanks is excessive		●											Carry out troubleshooting for chassis.
	Temperature difference between top and bottom radiator tanks is slight			●										
	When water filler port is inspected, core is found to be clogged				●									
	When function test is carried out on thermostat, it does not open even at cracking temperature					●								
	When water temperature is measured, it is found to be normal						●							
	When oil cooler is inspected directly, it is found to be clogged							●						
	When measurement is made with radiator cap tester, set pressure is found to be low								●					
	When compression pressure is measured, it is found to be low									●				
	Remove oil pan and inspect directly										●			
		Remedy	Replace	Correct	Correct	Replace	Replace	Add	Correct	Replace	Replace	Replace	Replace	—

Component	Symbol		Part No.	Part Name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Hydraulic cylinder assembly	I	1	790-502-1003	Repair stand	●	1			Disassembly, assembly of hydraulic cylinder assembly
			790-101-1102	Hydraulic pump	●	1			
		2	790-102-2303	Wrench assembly	●	1			For steering cylinder head
			or						
			790-330-1100	Wrench assembly	●	1			
		3	790-302-1270	Socket (Width across flats: 50 mm)	●	1			For steering cylinder piston nut
		4	790-102-4300	Wrench assembly	●	1			For boom and bucket cylinder pistons
			790-102-4310	Pin	●	1			
		5	790-720-1000	Expander	●	1			For assembly of piston ring
		6	796-720-1640	Ring	●	1			
			07281-00909	Clamp	●	1			
			796-720-1680	Ring	●	1			
			07281-01589	Clamp	●	1			
			796-720-1690	Ring	●	1			
			07281-01919	Clamp	●	1			
		7	790-201-1702	Push tool kit	●	1			For assembly of cylinder head bushing
			• 790-101-5021	Grip	●	1			
			• 01010-80816	Bolt	●	1			
			• 790-201-1751	Push tool	●	1			
			• 790-201-1841	Push tool	●	1			
		8	790-201-1500	Push tool kit	●	1			For assembly of cylinder head dust seal
			• 790-101-5021	Grip	●	1			
			• 01010-80816	Bolt	●	1			
			• 790-201-1560	Plate	●	1			
			• 790-201-1650	Plate	●	1			
Air conditioner assembly	X		799-703-1200	Service tool kit	■	1			Charging of air conditioner gas
			799-703-1100	Vacuum pump (100V)	■	1			
			799-703-1110	Vacuum pump (220V)	■	1			
			799-703-1120	Vacuum pump (240V)	■	1			
			799-703-1401	Gas leak detector	■	1			
Operator's cab glass	X	2-1	793-498-1120	Clear plate	■	2			Installation of operator's cab glass
		2-2	793-498-1130	plate	■	2			
		2-3	793-498-1110	Magnet	■	2			
		3	793-498-1210	Lifter (Suction cups)	■	2			

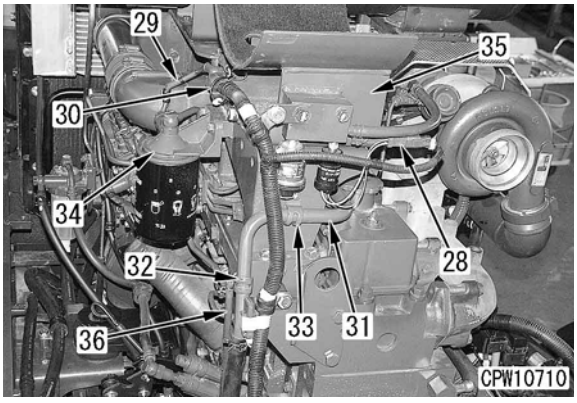
9. Lift and remove the muffler assembly (24).

Muffler assembly: 36 kg

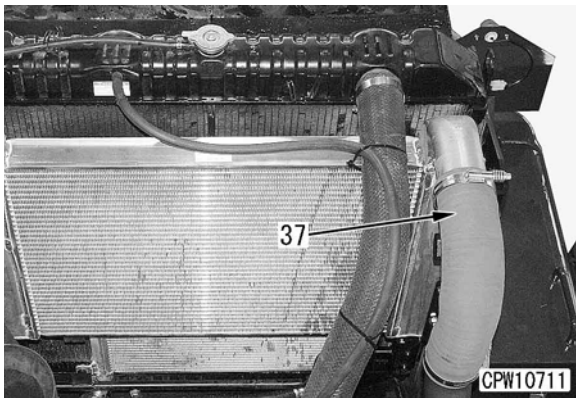
10. Disconnect the aftercooler outlet hose (25).
11. Disconnect the radiator inlet hose (26).
12. Disconnect the aeration hose (27).



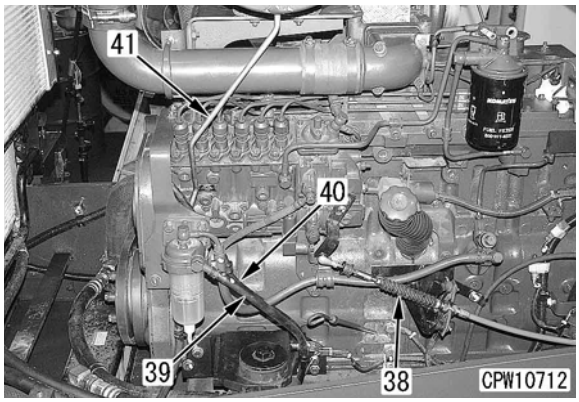
13. Air cleaner bracket
    1) Remove the dust indicator connector (28).
    2) Disconnect the ground wiring harness (29) and also remove the heater replay (30).
    3) Disconnect the breather hose (31) from the head cover, remove the clamps (32) and (33) and bring it to the left side of the engine.
    4) Remove the fuel filter (34) from the bracket.
    5) Remove the air cleaner bracket (35).
14. Disconnect the spill hose (36).



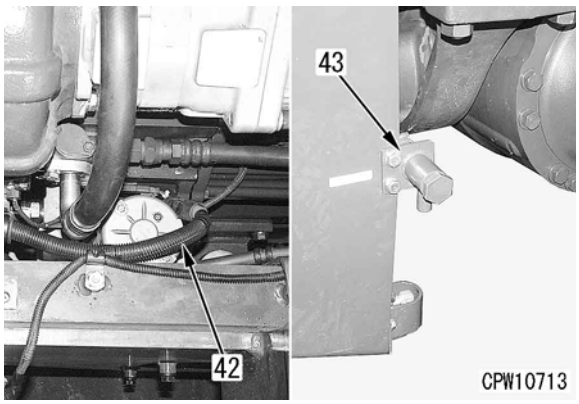
15. Disconnect the turbo outlet hose (37).



16. Disconnect the accelerator cable (38). [*2]
17. Disconnect the fuel suction hose (39) and return hose (40) and remove the clamp from the engine. [*3]
18. Remove the clamp and disconnect the tube (41) from the engine.

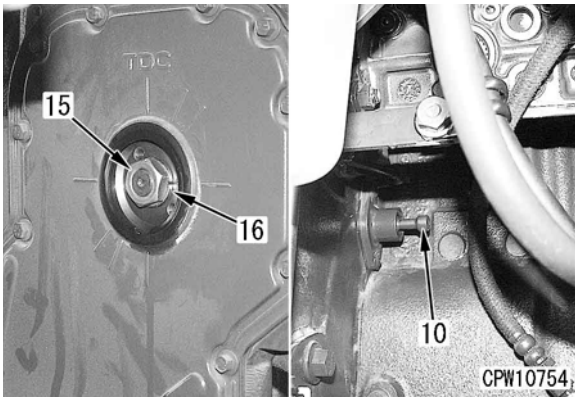


19. Disconnect the wiring harness (42) from the emergency motor and bring it to the engine side.
20. Remove the engine oil drain valve (43).



5) Set the washer (16) in and tighten the nut (15) temporarily.
   ★ Attach the washer and the nut carefully so that they do not drop in the case.
   ★ Tighten the nut temporarily by applying the torque of about:
   50 Nm {4.9 kgfm), disengage the timing pin and tighten the nut by applying the specified torque.

6) Disengage the timing pin (10).



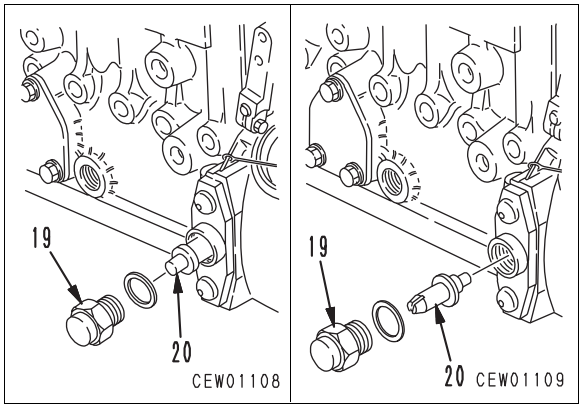
7) Remove the plug (19), reverse the position of the timing pin (20) to set it in and attach the plug to the injection pump.

Plug: 14.7 Nm {1.5 kgfm}

8) Tighten the drive nut (15) of the fuel injection pump permanently.

Nut:
178 ± 13 Nm {18.2 ± 1.3 kgfm}

9) Carry out the following installations in the reverse order to removal.



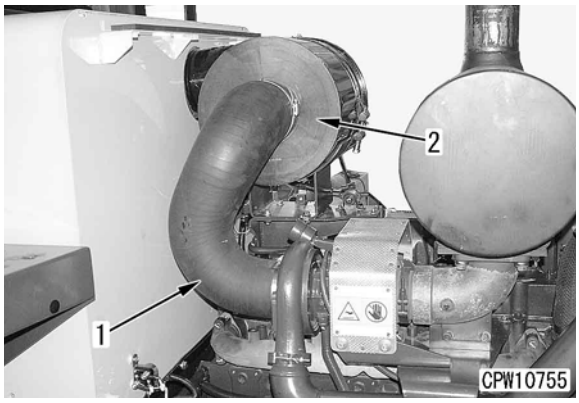
- Bleed air from the fuel system.

REMOVAL AND INSTALLATION OF NOZZLE HOLDER ASSEMBLY

REMOVAL

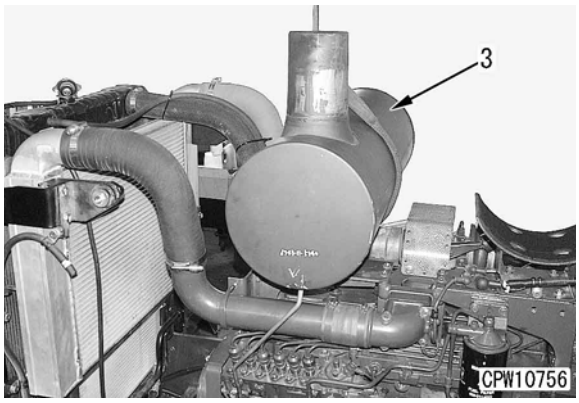
WARNING! Disconnect the battery (-) terminal in advance.

1. Engine hood assembly
   See Paragraph 2 of "Removal of Cylinder Head Assembly" and remove the engine hood assembly.
2. Disconnect the dust indicator hose and the air intake hose (1), and remove the air cleaner assembly (2). [*1]



3. Remove the muffler assembly (3).

Muffler assembly: 36 kg



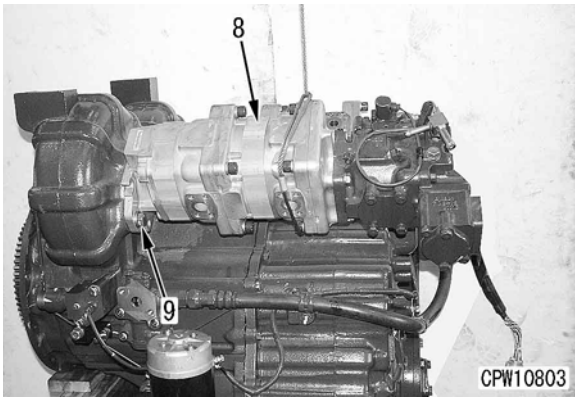
4. Air cleaner bracket
   1) Remove the dust indicator sensor connector (4).
   2) Disconnect the ground wiring harness (5), and remove the heater relay (6).
   3) Remove the clamps (8) and (9) of the breather hose (7) from the bracket (11).

BLEEDING AIR OF BRAKE CIRCUIT

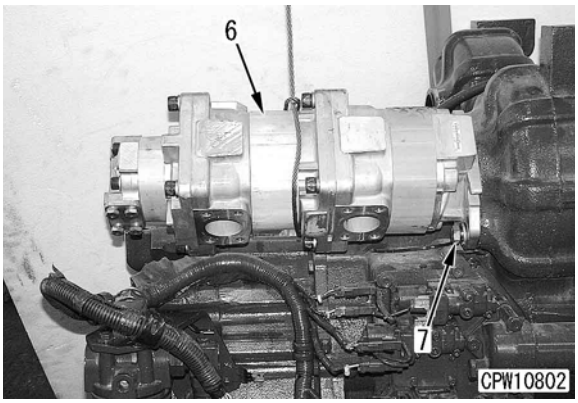
- After completing the installation, see the paragraph of "Bleeding Air of Brake Circuit" in Inspection and Adjustment to bleed air of the brake circuit.
- Oil supply

  Supply hydraulic oil (the designated one) up to the specified level. Supply transmission oil (the designated oil) up to the specified level.

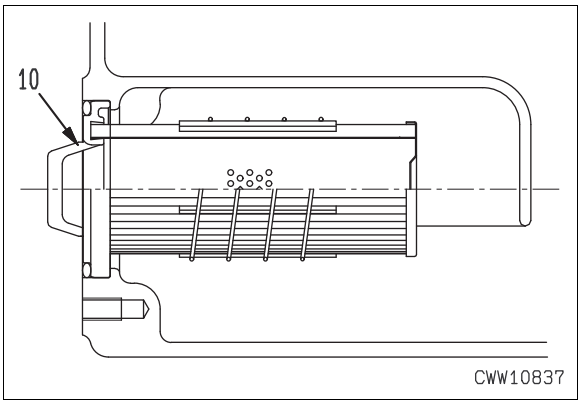
17. Steering, switch and fan pump assembly
    Lift and install the pump assembly (8), and tighten 2 pieces for the mounting bolt (9).



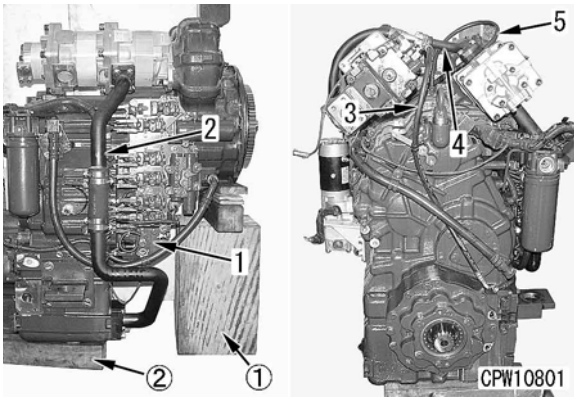
18. Transmission, work equipment and PPC pump assembly
    1) Lift and install the pump assembly (6), and tighten 2 pieces of the mounting bolt (7).



    2) Attach the strainer (10).

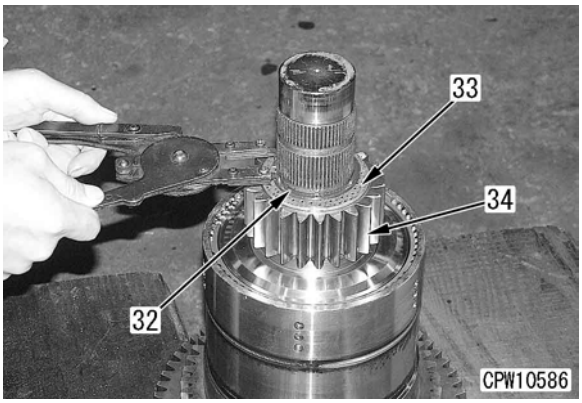


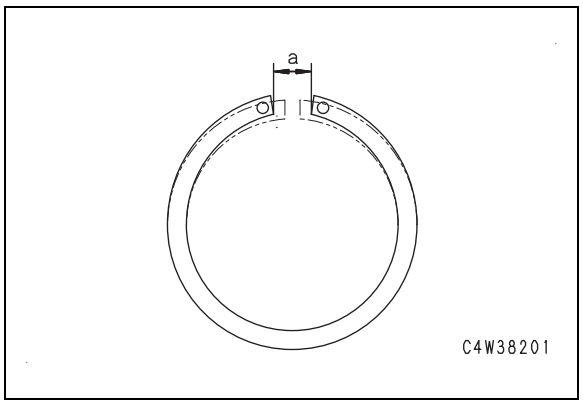
    3) Connect the hoses (4) and (3) and the breather hose (5).
    4) Connect the suction tube (2).



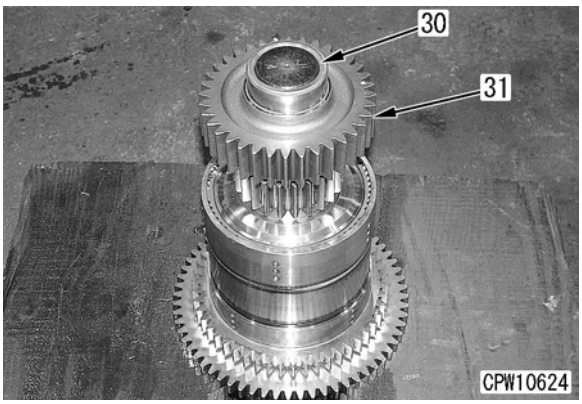
3) Assemble thrust washer (33) and snap ring (32).

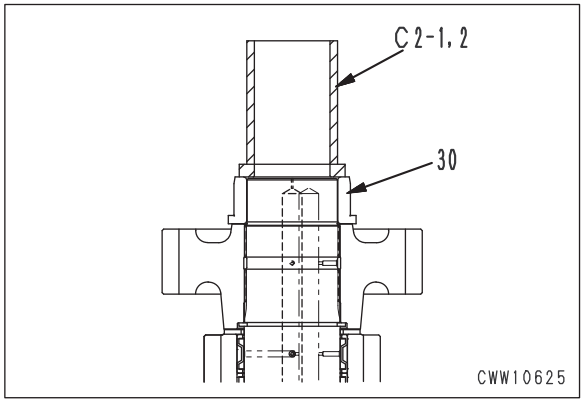
★ Do not reuse the snap ring (32). Install a new one when reassembling.
If you expand the ring excessively during assembly, it may be deformed. Be sure to set the abutment joint (a) to 23mm or less (inside diameter (b) is 64.1mm or less).





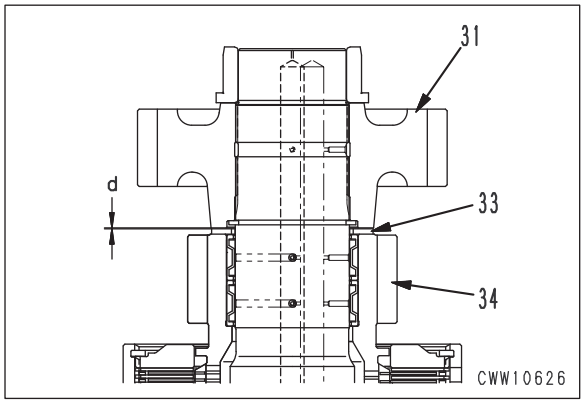
10. Idler gear
1) Assemble idler gear (31) and use tools **C2-1** and **C2-2** to press-fit inner race (30).





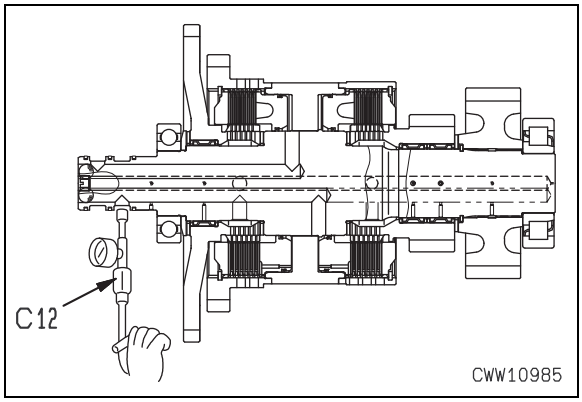
2) Check that the clearance **d** between idler gear (31) and thrust washer (33) is within a standard value.
Standard value **d**: 0.26 - 0.74 mm

★ Measure the clearance **d** using a dial gauge or clearance gauge.



11. Clutch pack operation test
Use tool **C12** to make compressed air blow in the oil hole of the shaft and each clutch operates.

★ If the gear at the side where air blew in is secured, the clutch operates normally.



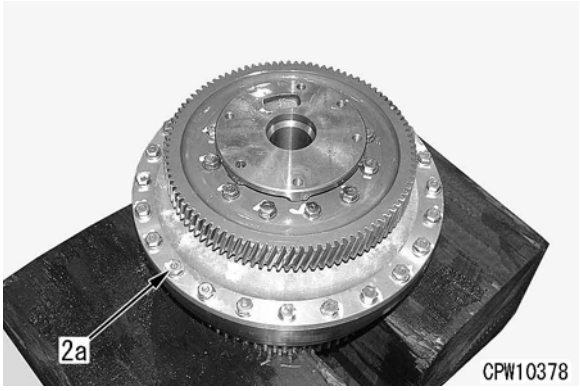
DISASSEMBLY AND ASSEMBLY OF TORQUE CONVERTER ASSEMBLY (STANDARD SPECIFICATION)

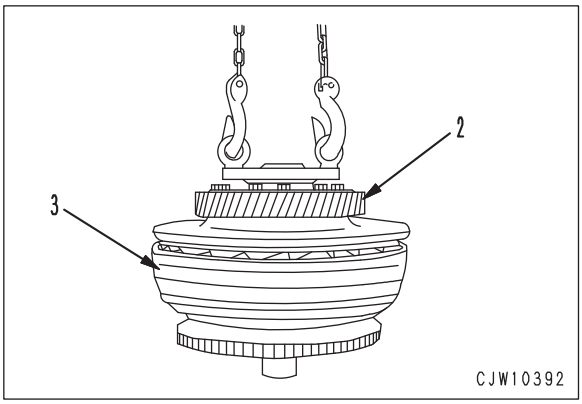
SPECIAL TOOLS

Symbol	Part Number	Part Name	Necessity	Quantity	New/Revised	Simplified Drawing
B	790-501-5000	Unit repair stand	●	1		
	790-501-5200	Unit repair stand	●	1		
	790-901-2110	Bracket	●	1		
	790-901-2150	Plate	●	1		

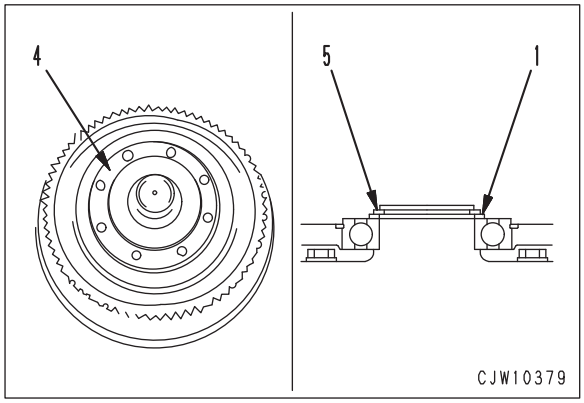
DISASSEMBLY

1. With reference to up to item 10 of the disassembly of "Disassembly and Assembly of Transmission Assembly", dismount the torque converter and load it on the block or mount it on tool **B**.
2. Turbine and case assembly
   1) Mount the eyebolt on the stator shaft and dismount bolt (2a), then dismount stator shaft pump assembly (2) from turbine case assembly (3).

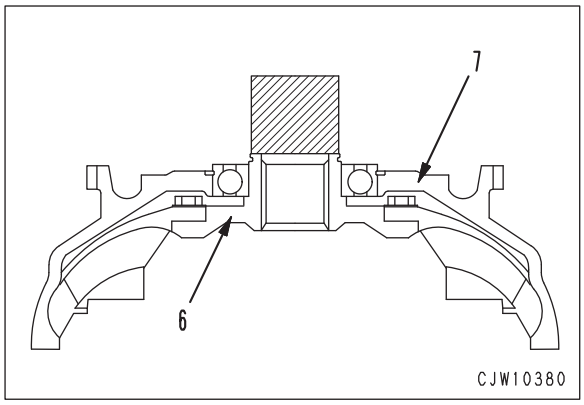




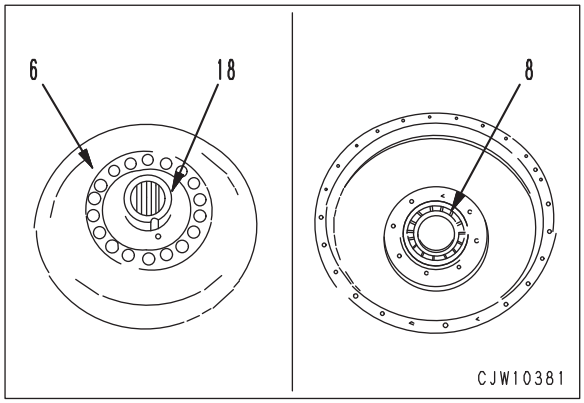
   2) Disassemble the turbine and case assembly in the following procedure.
      i) Dismount pilot (4).
      ii) Remove snap ring (5) and dismount plate (1).



      iii) Press the boss portion of turbine (6) and dismount it from case (7).



      iv) Dismount the mounting bolt and disconnect turbine (6) and boss (18).
      v) Dismount bearing (8) from the case.



[*3]

★ With reference to the item of Testing and Adjusting "Air Bleeding of Brake Circuit", bleed air from the brake circuit.

[*4]

Mounting bolt: Width across flats 41 mm

Mounting bolt:
1,029 ± 98 Nm {105 ± 10 kgfm}

[*5]

★ With reference to the item of Testing and Adjusting "Air Bleeding of Brake Circuit", bleed air from the brake circuit.

[*6]

Busing portion of support:
Grease (G2-LI)

[*7]

Mounting bolt for cover (12) and holder (13):
Adhesive (LT-2)

Mounting bolt for cover (12): Width across flats 19 mm

Mounting bolt for holder (13): Width across flats 30 mm

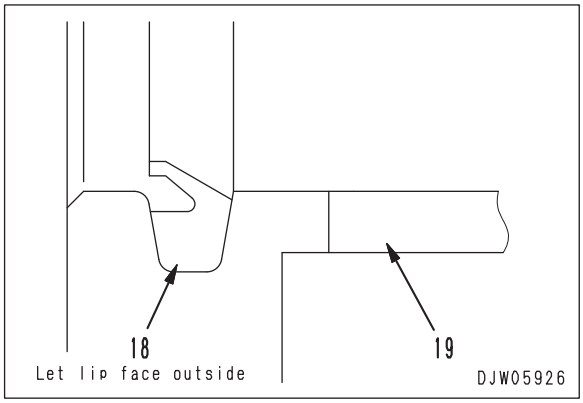
Mounting bolt for cover (12) and holder (13):
245 - 309 Nm {25 - 31.5 kgfm}

[*8]

★ Mount bushing facing the chamfering side to the opposite side of cover (17).

[*9]

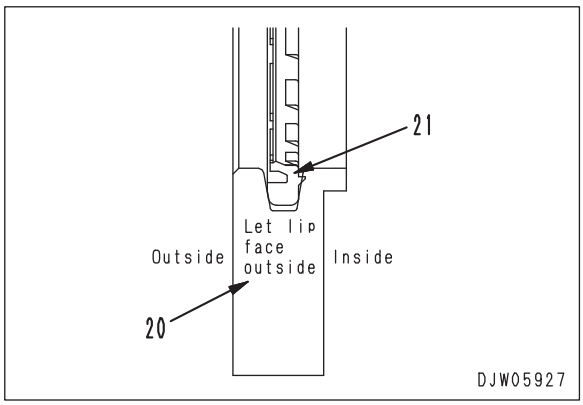
★ Mount dust seal (18) facing the lip outwards.
- (19) is a bushing.

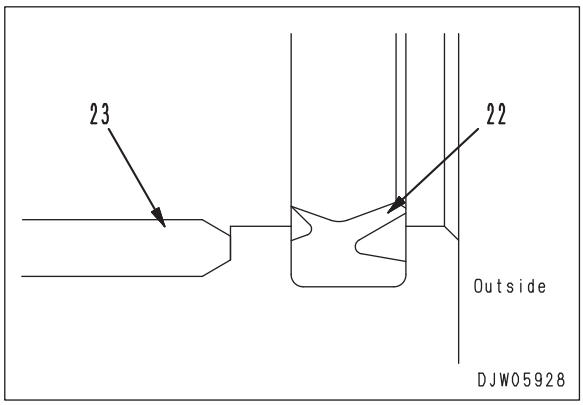


[*10]

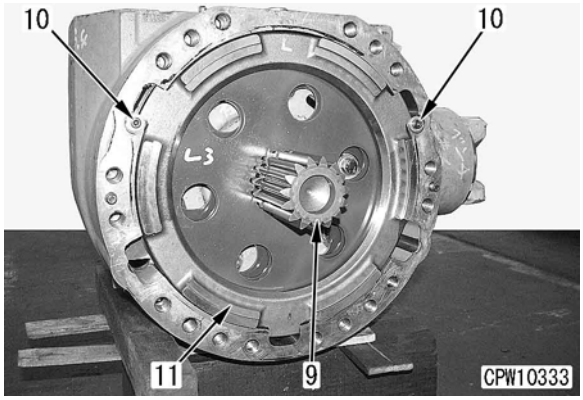
★ Mount dust seal (21) facing the "thick lip" outwards.
- (20) is a cover.

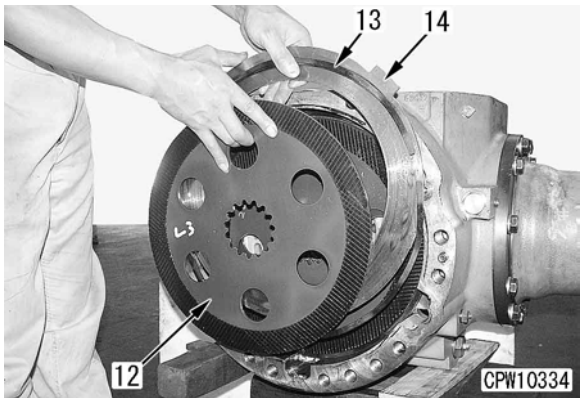
★ Mount dust seal (22) facing the lip outwards.
- (23) is a bushing.



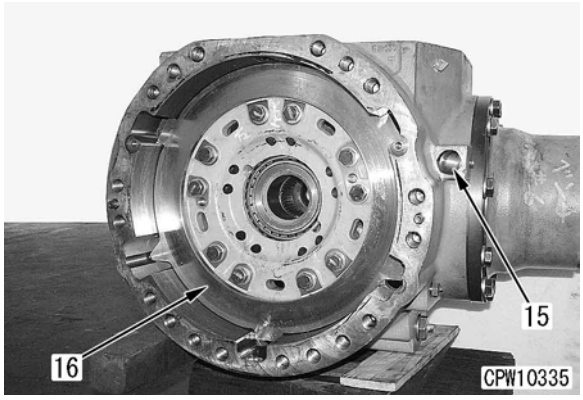


6. Brake
   1) Remove the shaft (9).
   2) Remove the bolt (10) and also remove the outer plate (11).
   3) Remove the disk (12), spring (13), and plate (14).
      ★ Mark so that the parts on the left and right are not mixed.

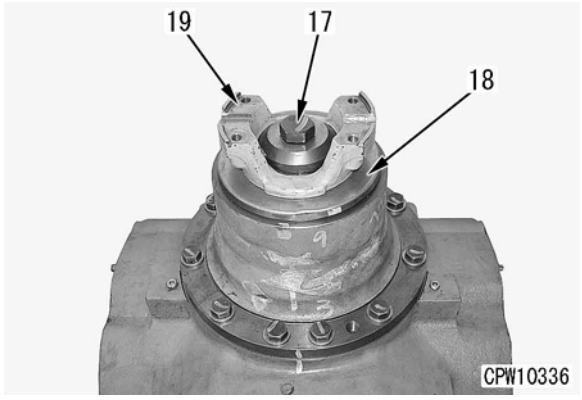




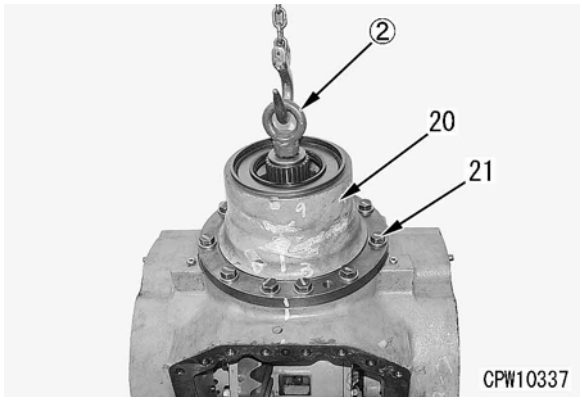
   4) Blow air into the brake tube joint unit (15) and remove the piston (16).

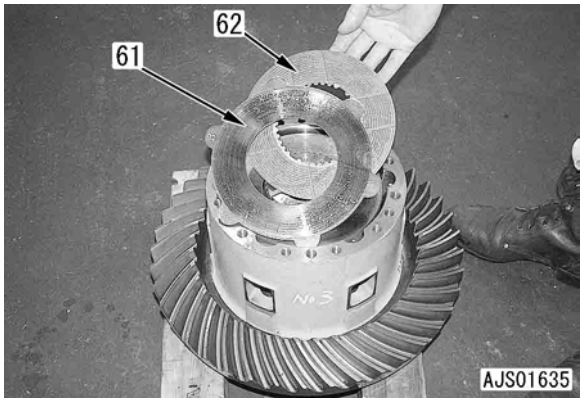


7. Cage assembly
   1) Lift the differential case and turn up the cage assembly.
   2) Remove the bolt (17) and also remove the coupling (19) with the protector (18).
      ★ Do not remove the protector from the coupling unless required.

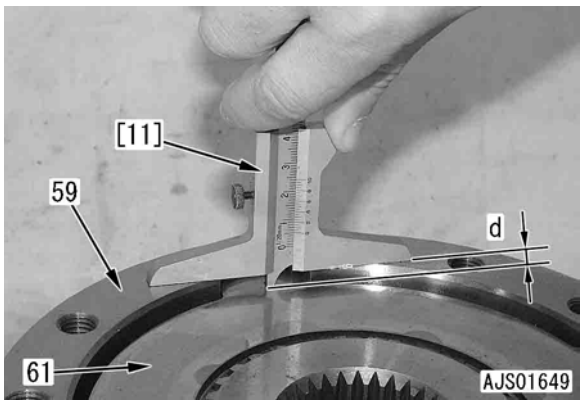


   3) Attach the lift bolt [2] and temporarily lift the cage assembly (20).
      ★ Mark index symbols on the cage and differential case so that they smoothly match at assembly.
   4) Remove the bolt (21).
   5) Screw the pull-up bolt and pull up the case assembly until the o-ring appears.
   6) Lift the cage assembly and remove it.

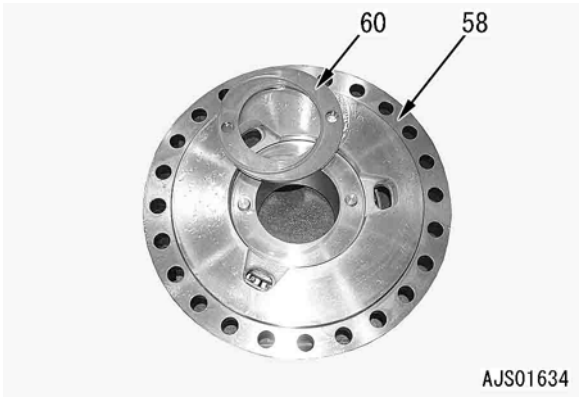




12) Adjust the clearance between the case and plate.
   i) Using depth gauge [11], measure distance **d** from the end face of case (59) to the end face of plate (61).
      • Distance **d**: 0.2 - 0.6 mm
   ii) If distance **d** is out of the standard range, replace the plate with the one with proper thickness so that distance **d** will be in the standard range.
      ★ Replace the plates on both right and left sides so that the total thickness of the 2 plates on each side will be the same, and then perform the above procedure from step 7).
      • Thicknesses of plates (Rear)
        : 3.0 mm (Part No. 424-22-27450)
        : 3.1 mm (Part No. 424-22-27460)



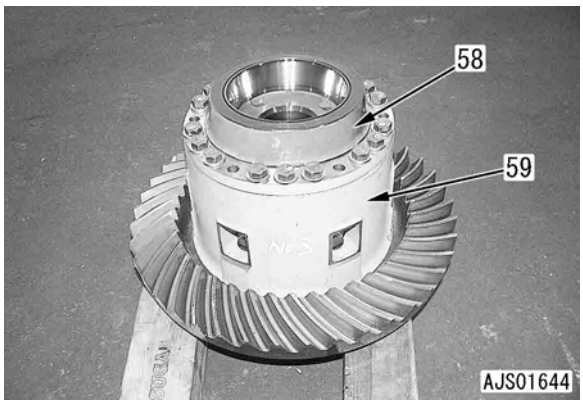
13) Install the washer (60) on the cover (58).
   ★ Coat the washer with grease thinly and stick it to the cover.



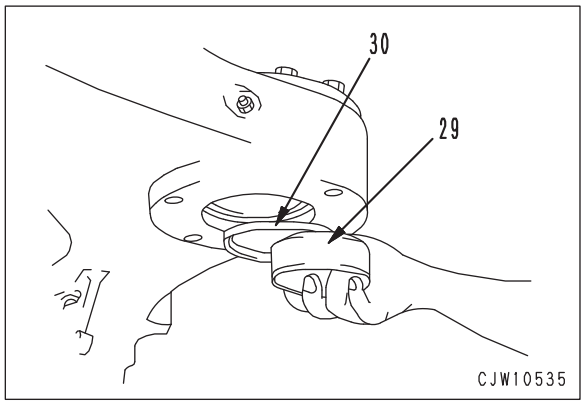
14) Install the cover (58) on the case (59).
   ★ Install them by aligning the mating marks put when disassembling.

Mounting bolt: Width across flats 19 mm

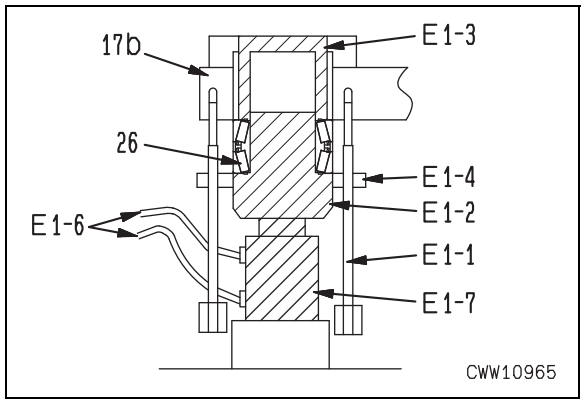
Mounting bolt:
98 - 123 Nm {10 - 12.5 kgfm}



5) Assemble the dust seal (30) and spacer (29) from the lower side of the front frame.
   ★ At pressing, turn the dust seal lip outside.
   ★ Assemble the spacer (29) from the lower side so that the more largely chamfered side faces to the bearing side.

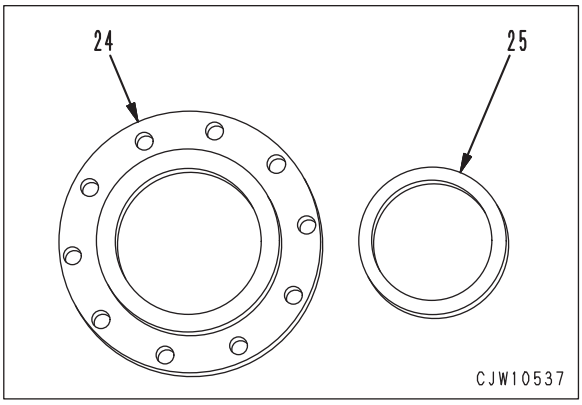


2. Lower hinge
   1) Use tool **E1** to press the bearing (26) in the front frame (17b).
      ★ At pressing, use tool **E1-4** as a guide.
      ★ Take care that the bearing does not incline.
      ★ Sufficiently grease the bearing.



   2) Press the dust seal (25) in the retainer (24).
      ★ At pressing, turn the dust seal lip outside.

Seal lip: Grease (G2-LI)



   3) Fasten the retainer (24) equally with three mounting bolts and select a shim so that the maximum of clearance **b** between the retainer and hinge is 0.1 mm or less. Then assemble the retainer.
      Mounting bolt: Width across flats 19 mm

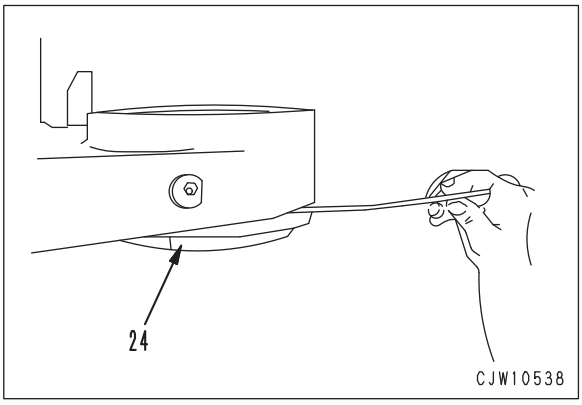
Mounting bolt:
20 ± 2 Nm {2 ± 0.2 kgfm}
(At adjustment of shim)

   4) After adjusting the shim, fasten all the retainer mounting bolts with the specified torque.

Mounting bolt:
Adhesive (Lock tight 2701)

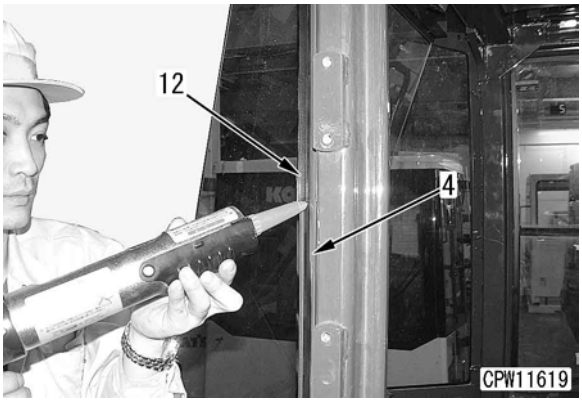
Mounting bolt: Width across flats 19 mm

Mounting bolt:
98 - 123 Nm {10 - 12.5 kgfm}

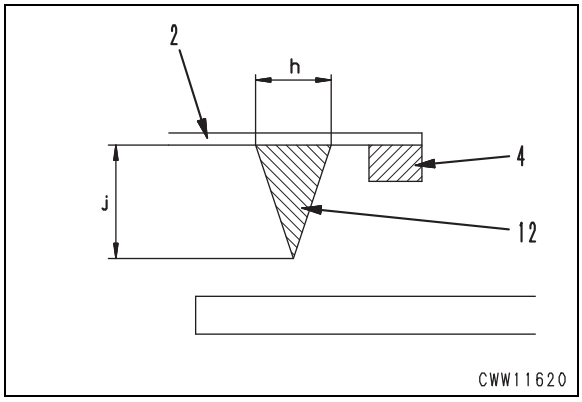


4) Remove release tape (13) of the both-sided adhesive tape on the glass side.

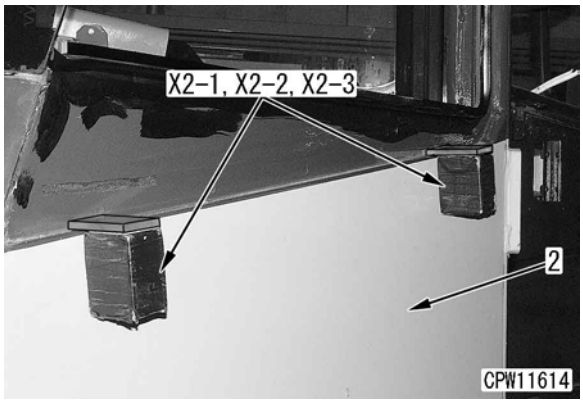
5) Apply adhesive (12) to the outside of both-sided adhesive tape (4) of the operator's cab.
   ★ Before applying the adhesive, check that the primer is applied to the surface to which the adhesive will be applied.



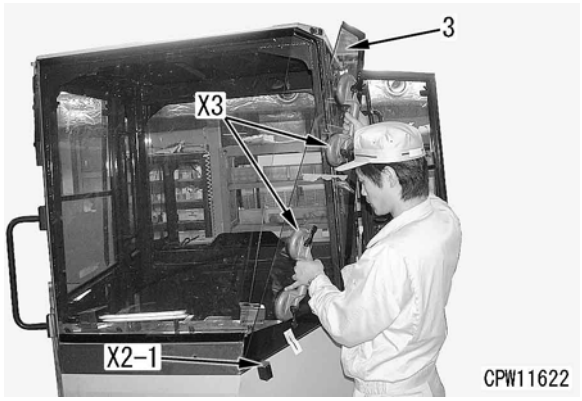
   ★ Apply adhesive (12) to dimensions (h) and (j) of both-sided adhesive tape (4) of operator's cab (2).
      • Dimension (h): 10 mm
      • Dimension (j): 12 mm (Approx. twice as high as adhesive tape)
   ★ Apply adhesive (12) higher than both-sided adhesive tape (4).
   ★ Apply the adhesive evenly.



8. Install window glass (3).
   ★ If the glass is positioned wrongly, the adhesive must be removed and cleaned, and then the primer and adhesive must be applied again. Accordingly, position the glass carefully when sticking it.
   1) Similarly to step 1, match tools **X2-1**, **X2-2**, and **X2-3** and set them to the 2 lower places of the window glass sticking part of operator's cab (2).



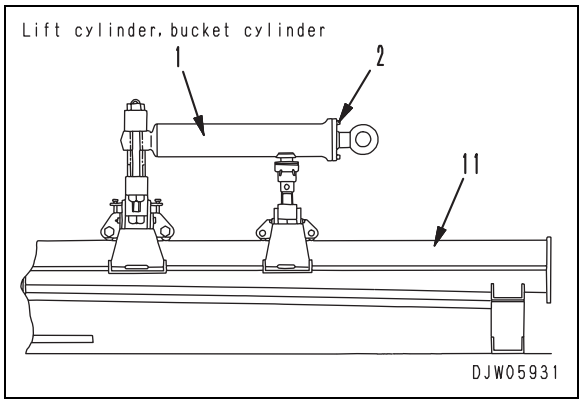
   2) Using tool **X3**, raise and place window glass (3) on tool **X2-1** (5-mm spacer) and stick it to the operator's cab.
      ★ Match the lines of the match tapes stuck in step 1.
      ★ Stick the glass within 10 minutes after applying the adhesive.
      ★ Before sticking the glass, check that the primer is applied to the surface to which the glass will be stuck.



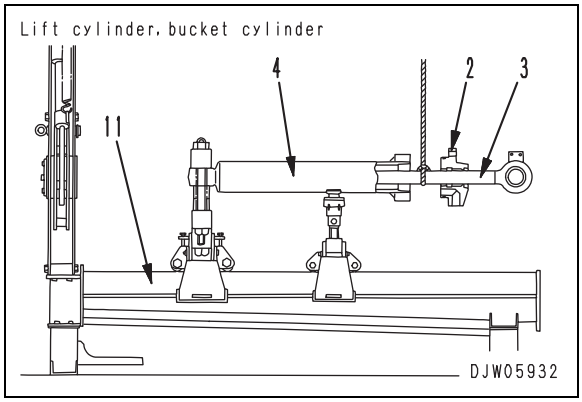
- Lift and bucket cylinder assembly

1) Remove the cylinder head (2) attachment bolts.

Cylinder	Width across flats of bolt (mm)
Lift cylinder	24
Bucket cylinder	27

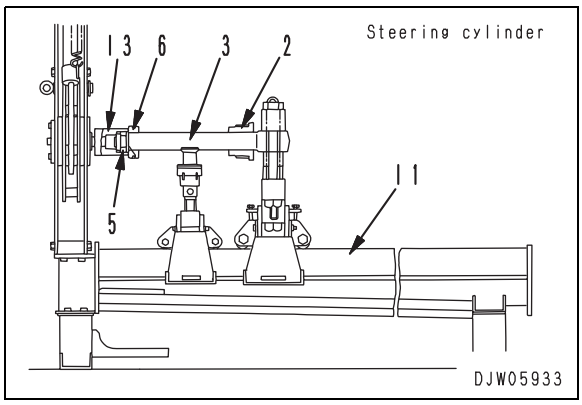


2) Pull out the cylinder head piston rod assembly (3) from the cylinder (4).
   ★ When the piston rod assembly is pulled out from the cylinder, oil leaks. Prepare an oil receiver.



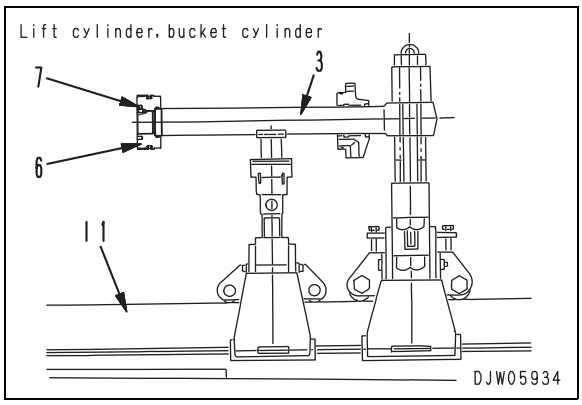
3. Piston and cylinder head
   - Steering cylinder assembly

   1) Set the cylinder head and piston rod assembly (3) to tool **I1**.
   2) Use tool **I3** to remove the nut (5).
      ★ Width across flats of nut: 50 mm.
   3) Remove the piston (6) and also detach the cylinder head (2).

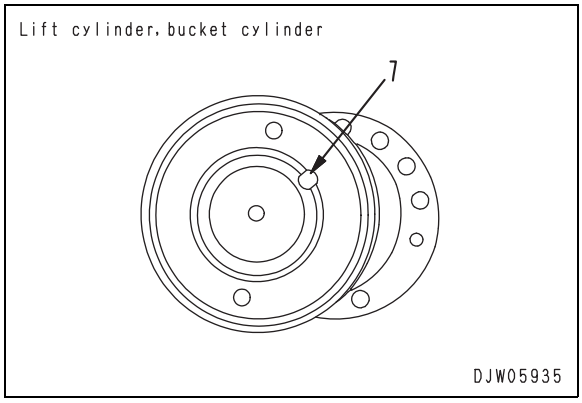


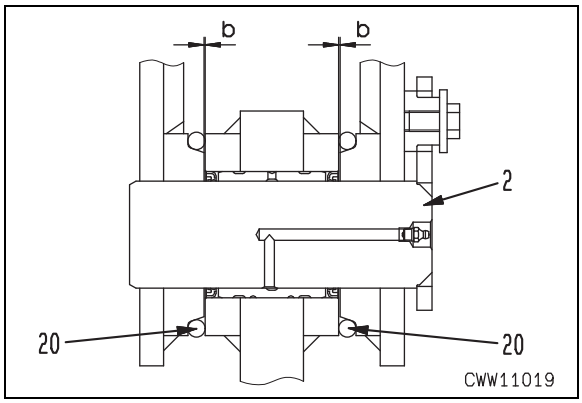
- Lift/bucket cylinder assembly

1) Set the cylinder head and piston rod assembly (3) to tool **I1**.



2) Remove the piston assembly turn stopper screw (3).
   ★ Screw size: M12 X pitch 1.75.





[*3]

- Bucket cylinder

WARNING! When fitting the pin hole position, absolutely do not insert fingers in the pin hole.

- Adjust the bucket positioner, referring to "Adjustment of Bucket Positioner" in Inspection and Adjustment.

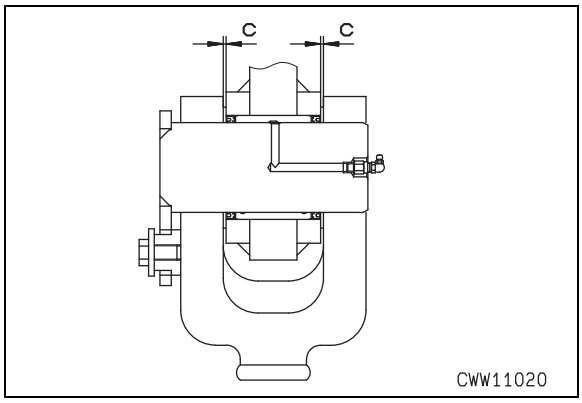
[*4]

- Lift cylinder

WARNING! When starting the engine, confirm that the forward/backward lever is set to the neutral level and the parking brake is applied.

WARNING! When fitting the pin hole position, absolutely do not insert fingers in the pin hole.

★ Clearance **c**: 1.5 mm or less.



[*5]

★ Confirm the operation, referring to "Inspection and Adjustment of boom Kick-Out" in Inspection and Adjustment.

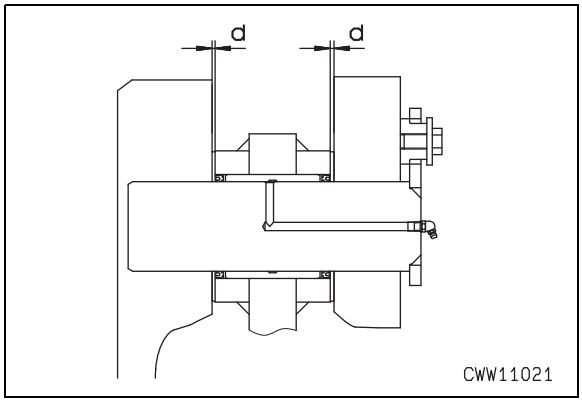
[*6]

- Perform the calibration, referring to "Handling of Road Meter" in the instruction manual.

[*7]

WARNING! When fitting the pin hole position, absolutely do not insert fingers in the pin hole.

★ Clearance **d**: 1.5 mm or less.



[*8]

★ Fix the bucket link to the bell crank using a wire.

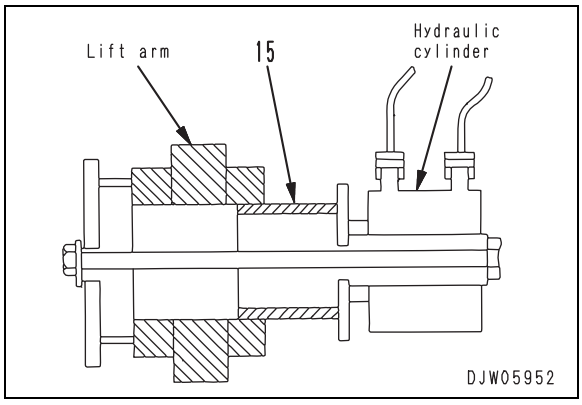
★ Take care that the cord ring is not engaged.

[*9]

- Dust seal, bush

Press the bush (15) in the bucket link, bell crank, and lift arm respectively using a press. Then assemble the dust seal.

Bush: Grease (G2-LI)



- Greasing

Grease each pin.