

# SHOP MANUAL

# KOMATSU WA400-5

Machine model    Serial number

**WA400-5**            **70001 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.
- WA400-5 mounts the SAA6D114E-2 engine.  
For details of the engine, see the 114-2 Series Engine Shop Manual.

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


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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

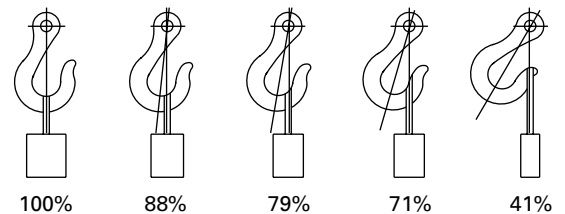
- 1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

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

Rope diameter	Allowable load	
	kN	tons
mm		
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.



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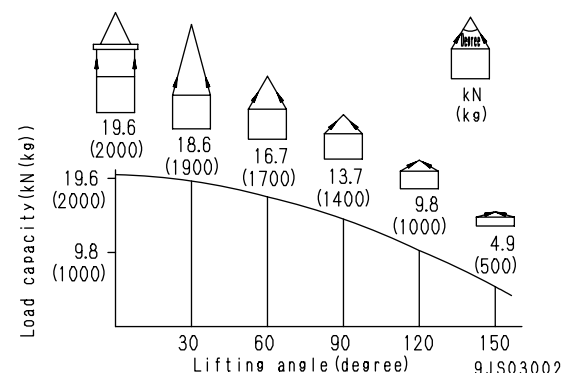
- 3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.

**⚠** 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°.



9JS03002

## kgm to ft. lb

1 kgm = 7.233 ft. lb

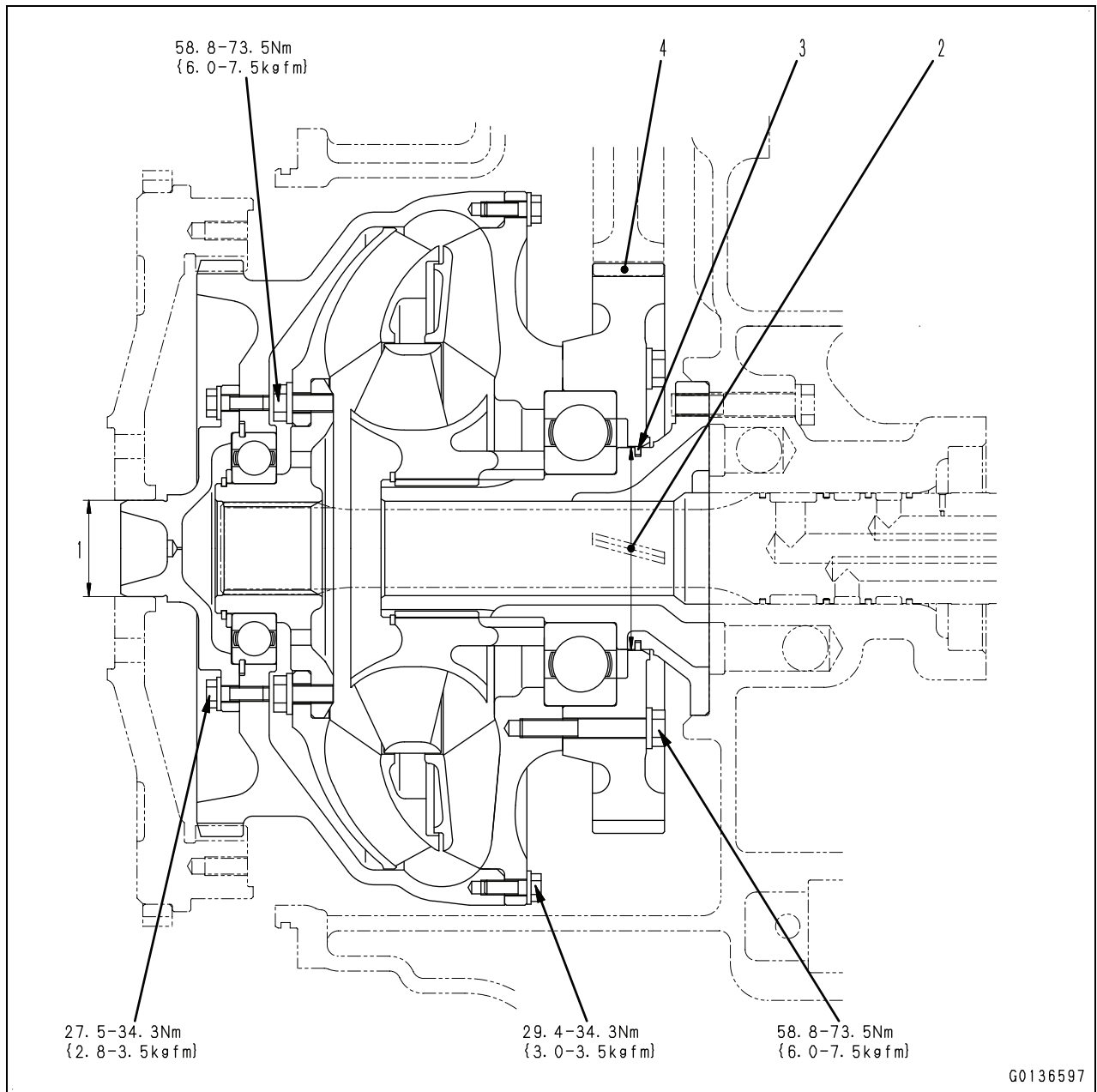
	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	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

# LIST OF LUBRICANT AND COOLANT

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE										
		-22 -30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122 °F 50°C		
Engine oil pan	Engine oil					SAE30						
			SAE10W									
		SAE10W-30										
						SAE15W-40						
Transmission case	Engine oil	SAE10W										
Hydraulic system		SAE 10W										
		SAE 5W-20										
		SAE 5W-30										
Axle (with standard differential)	Axle oil	AX075 (*4)										
Axle (*5) (with anti-slip differential)		See Next Page (*6)										
Fuel tank	Diesel fuel (*2)	ASTM D975 No. 2										
		(*1)										
Pins	Grease	NLGI No. 2										
Pins (with auto-greasing system)		(*3)		NLGI No. 2								
Greasing system		NLGI No. 2										
Cooling system	Water	Add antifreeze										

Unit: ℓ

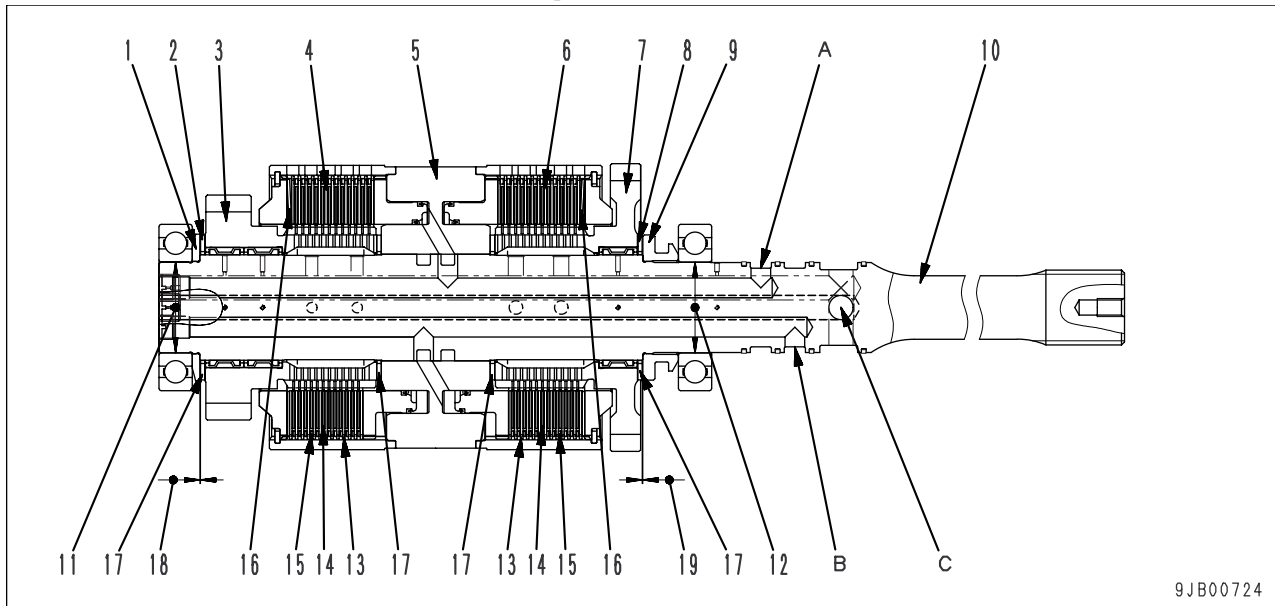
CAPACITY	WA400-5	
	Specified	Refill
Engine oil pan	37	32
Transmission case	62	54
Hydraulic system	186	129
Axle , Front / Rear	49 / 40	49 / 40
Fuel tank	300	—
Cooling system	36	—



Unit: mm

No.	Check item	Criteria			Remedy
		Standard size	Tolerance	Repair limit	
1	Outside diameter of pilot	ø 52	-0.010 -0.040	ø 51.75	Repair hard chrome plating or replace
2	Inside diameter of PTO gear seal ring sliding portion	ø 110	+0.035 0	ø 110.5	
3	Wear of stator shaft seal ring	Width	3 -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)**



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

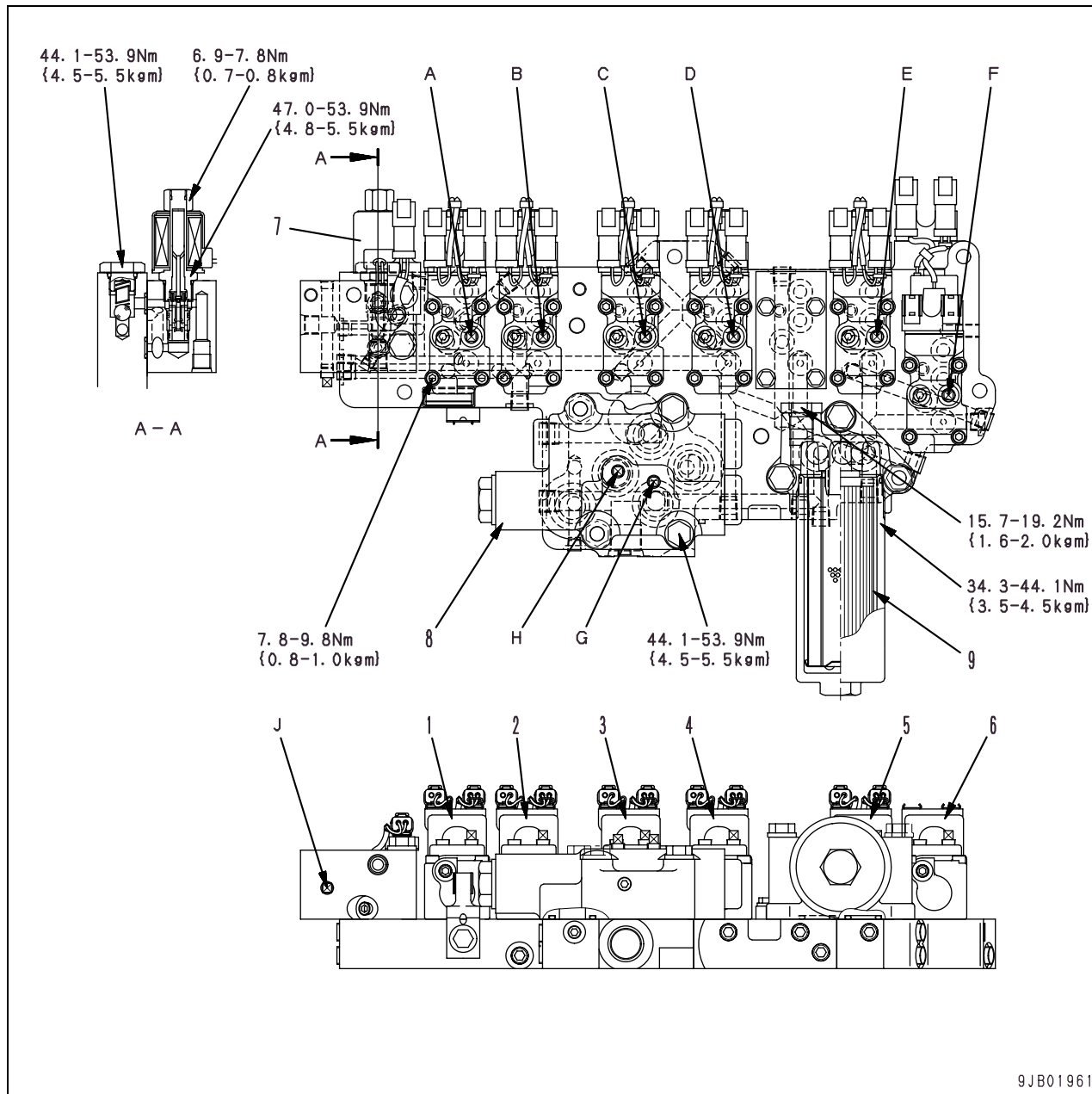
C: Lubricating oil port

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

Unit: mm

No.	Check item	Criteria				Remedy
		Standard size	Tolerance		Standard clearance	
11	Clearance at bearing press fit part of shaft (F)		ø 60	Shaft		Hole
+0.039 +0.020		0 -0.015				
12	Clearance at bearing press fit part of shaft (R)	ø 60	Shaft	Hole	-0.045 ~ -0.011	—
+0.030 +0.011			0 -0.015			
13	Separator plate	Standard size	Tolerance		Clearance limit	Replace
			Thickness	1.7		
14	Friction plate	Standard size	Tolerance		Clearance limit	
			Thickness	2.2		
15	Load of wave spring (Height: 2.2 mm)	1,010 N {103 kg}	Tolerance		859 N {87.6 kg}	
			±101 N {±10.3 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.: (T/M No. 110064) and up**



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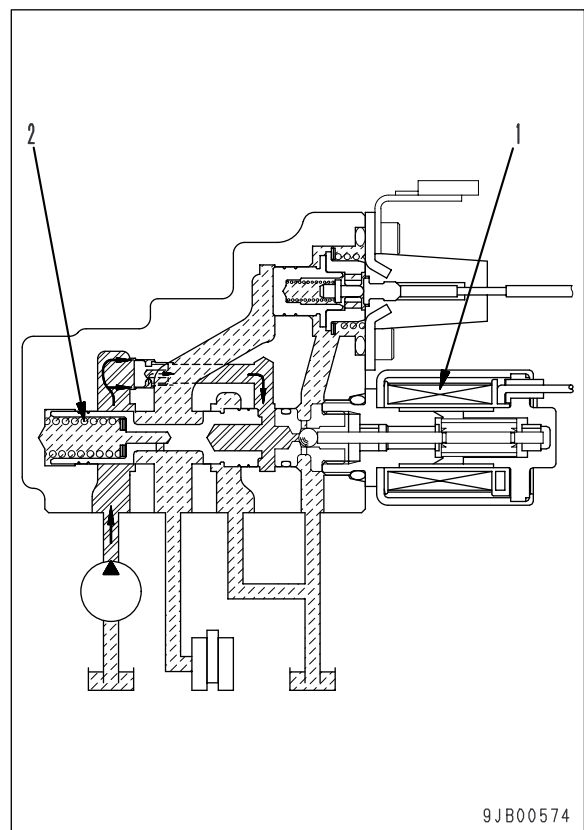
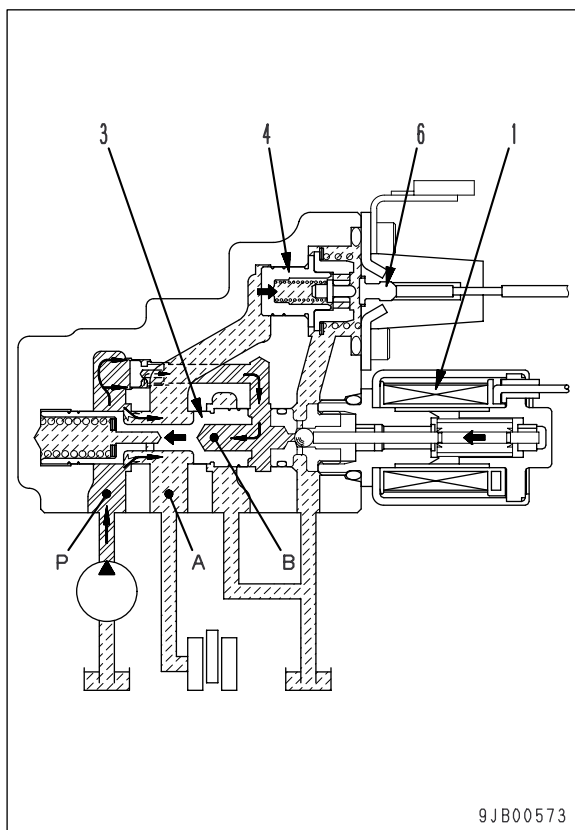
- A. 2nd clutch oil pressure detection port
- B. 3rd clutch oil pressure detection port
- C. 1st clutch oil pressure detection port
- D. 4th clutch oil pressure detection port
- E. R clutch oil pressure detection port
- F. F clutch oil pressure detection port
- G. Main relief oil pressure detection port
- 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)**

4. 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.

5. 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.

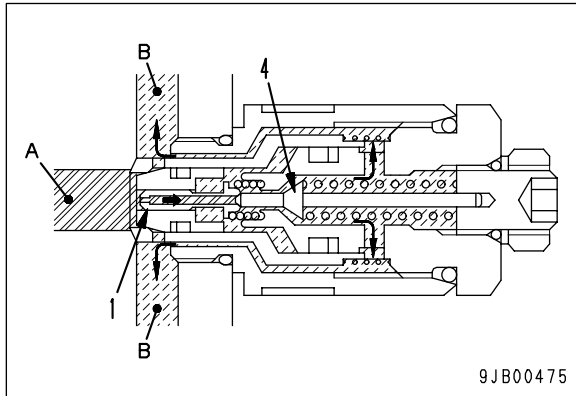




Unit: mm

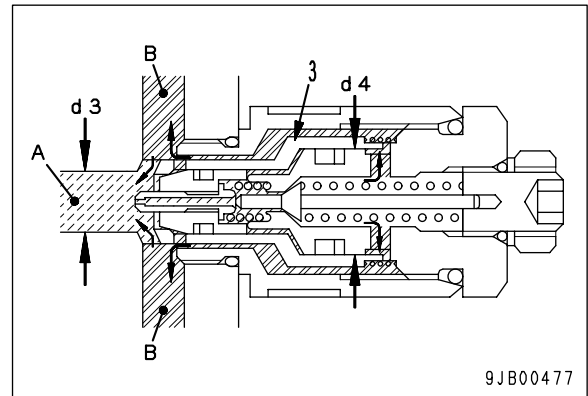
No.	Check item	Criteria					Remedy	
		Standard size	Tolerance		Standard Clearance	Clearance limit		
	Shaft		Hole					
6	Clearance between pinion gear bearing and shaft	40	+0.013 +0.002	0 -0.012	-0.025 ~ -0.002	—	Replace	
		7	+0.100 +0.030	+0.100 0	-0.100 ~ 0.070	—		
8	Clearance between oil seal and housing	Max. 0.2					Adjust	
9	Pressfitted part of axle shaft seal	Housing	215	+0.500 +0.300	-0.072 0	-0.500 ~ -0.228	—	Replace
		Shaft	180	0 -0.063	-0.300 -0.500	-0.500 ~ -0.237	—	
10	Clearance at press-fitted part of axle housing bearing	Outer race	180	0 -0.025	-0.045 -0.085	-0.085~ -0.020	—	Replace
		Inner race	120	+0.045 +0.023	0 -0.020	-0.065 ~ -0.023	—	
11	Clearance of pressfitted part of axle housing bearing	Outer race	157.162	+0.025 0	-0.012 -0.052	-0.077 ~ -0.012	—	Replace
		Inner race	98.425	+0.059 +0.037	+0.025 0	-0.059 ~ -0.012	—	
12	End play of axle shaft	0 ~ 0.1					Adjust	
13	Clearance of guide pin	12	+0.025 +0.007	+0.207 +0.145	0.120 ~ 0.200	—	Replace	

- When pilot poppet (4) opens, the pressure behind poppet (1) drops, so poppet (1) moves and seats pilot poppet (4).

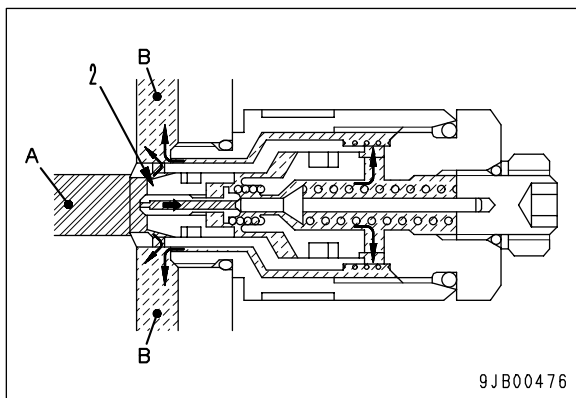


**Functioning as suction valve**

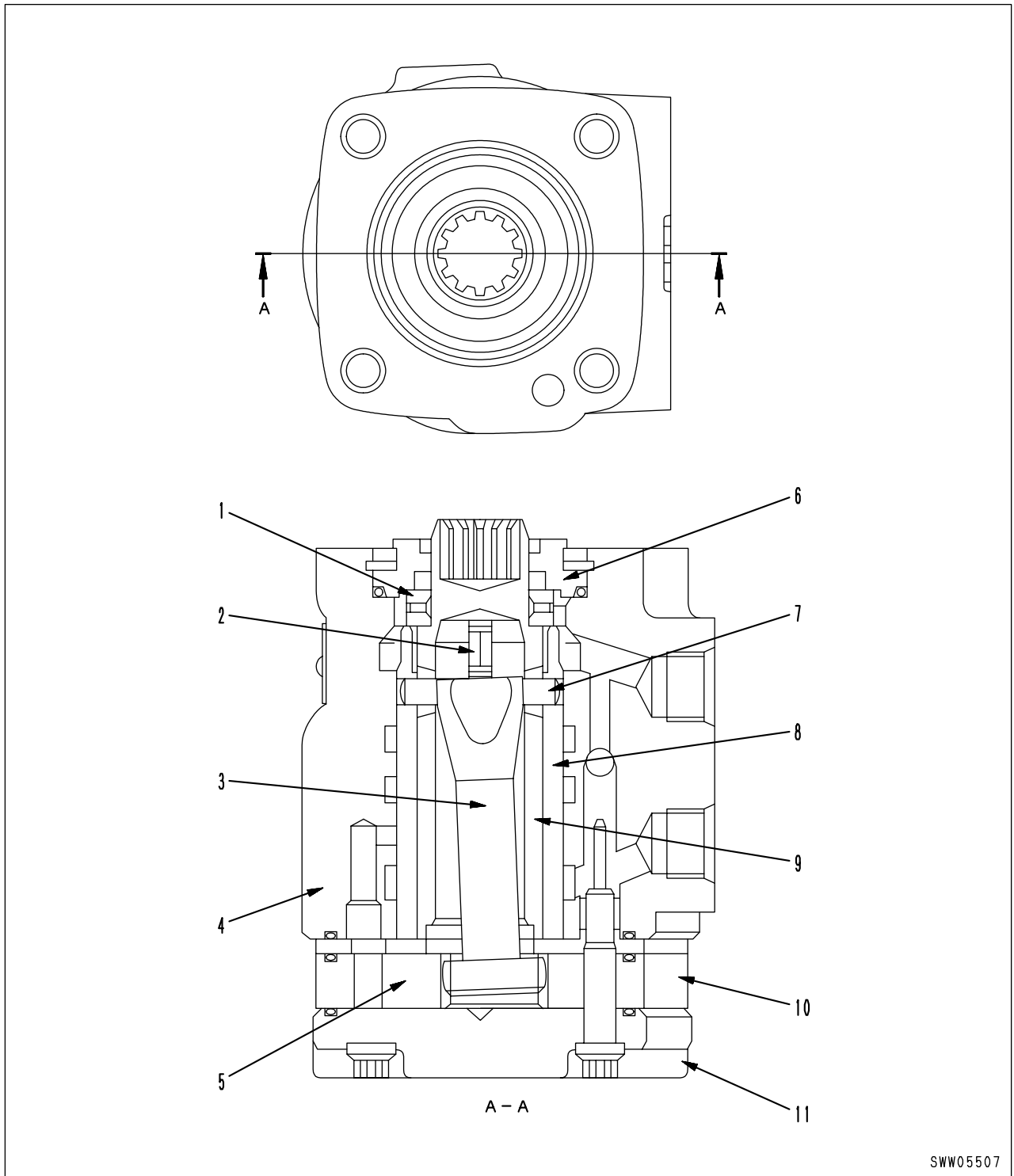
- If negative pressure forms at port **A**, check valve poppet (3) opens because of the difference in area between diameters **d3** and **d4**. When this happens, the oil flows from port **B** to port **A** to prevent any vacuum from forming.



- The pressure on the inside is lower than the pressure at port **A**, so relief valve poppet (2) opens. When this happens, the oil flows from port **A** to port **B** to prevent any abnormal pressure.



# ORBIT-ROLL VALVE

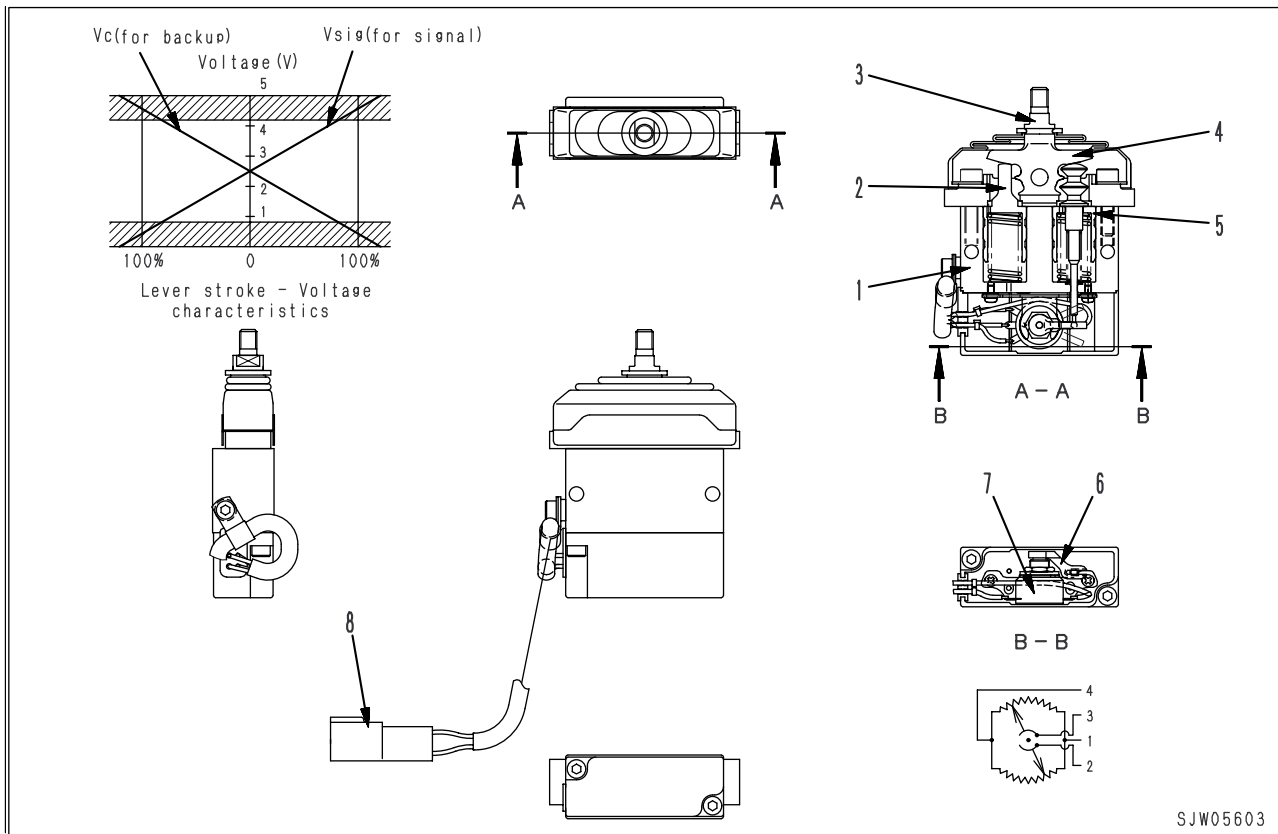


- 1. Needle bearing
- 2. Center spring
- 3. Drive shaft
- 4. Valve body

- 5. Rotor
- 6. Cover
- 7. Center pin
- 8. Sleeve

- 9. Spool
- 10. Stator
- 11. Lower cover

**STEERING LEVER (OP)**  
**(FOR JOYSTICK STEERING LEVER)**



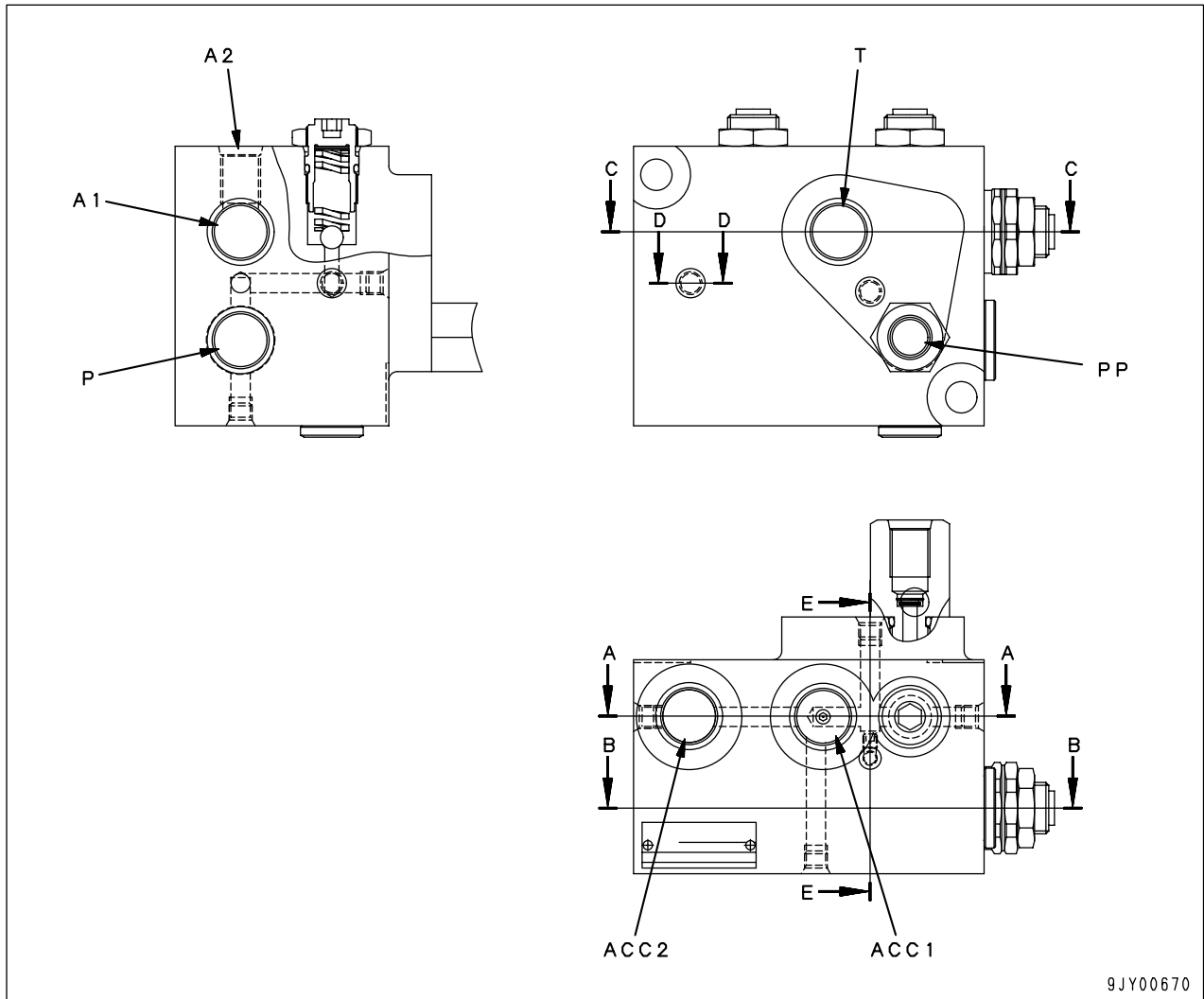
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- |           |                  |
|-----------|------------------|
| 1. Body   | 5. Retainer      |
| 2. Piston | 6. Lever         |
| 3. Lever  | 7. Potentiometer |
| 4. Disc   | 8. Connector     |

**Function**

- The steering potentiometer is installed to the left side part of the floor, and is interconnected by a link to the steering end of the monolever. When the monolever is operated in the steering direction, disc (4) is rotated through the link, pushes piston (2) down, and rotates potentiometer (7).
- Steering lever potentiometers sense lever angle and output angle signal to HSS controller.
- Two potentiometers are attached to the steering lever and they output a signal as shown in the diagram.

# CHARGE VALVE



9JY00670

A1: To the PPC (\*EPC) valve

A2: Plug

ACC1: To the RH brake valve PA

ACC2: To the RH brake valve PB

To the LH brake valve P

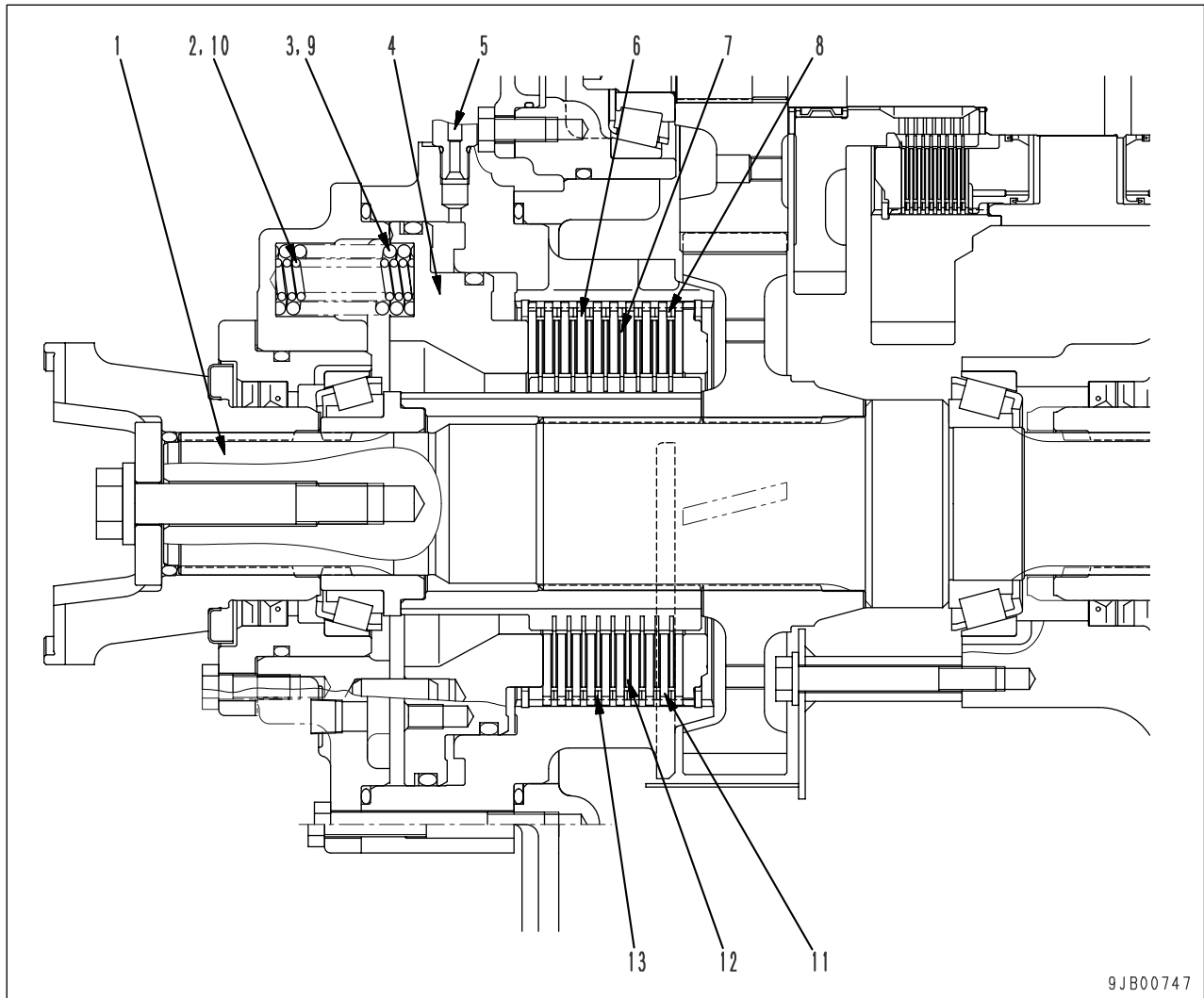
P: From the pump

PP: To the accumulator

T: Drain

\* EPC valves are optional parts.

## PARKING BRAKE



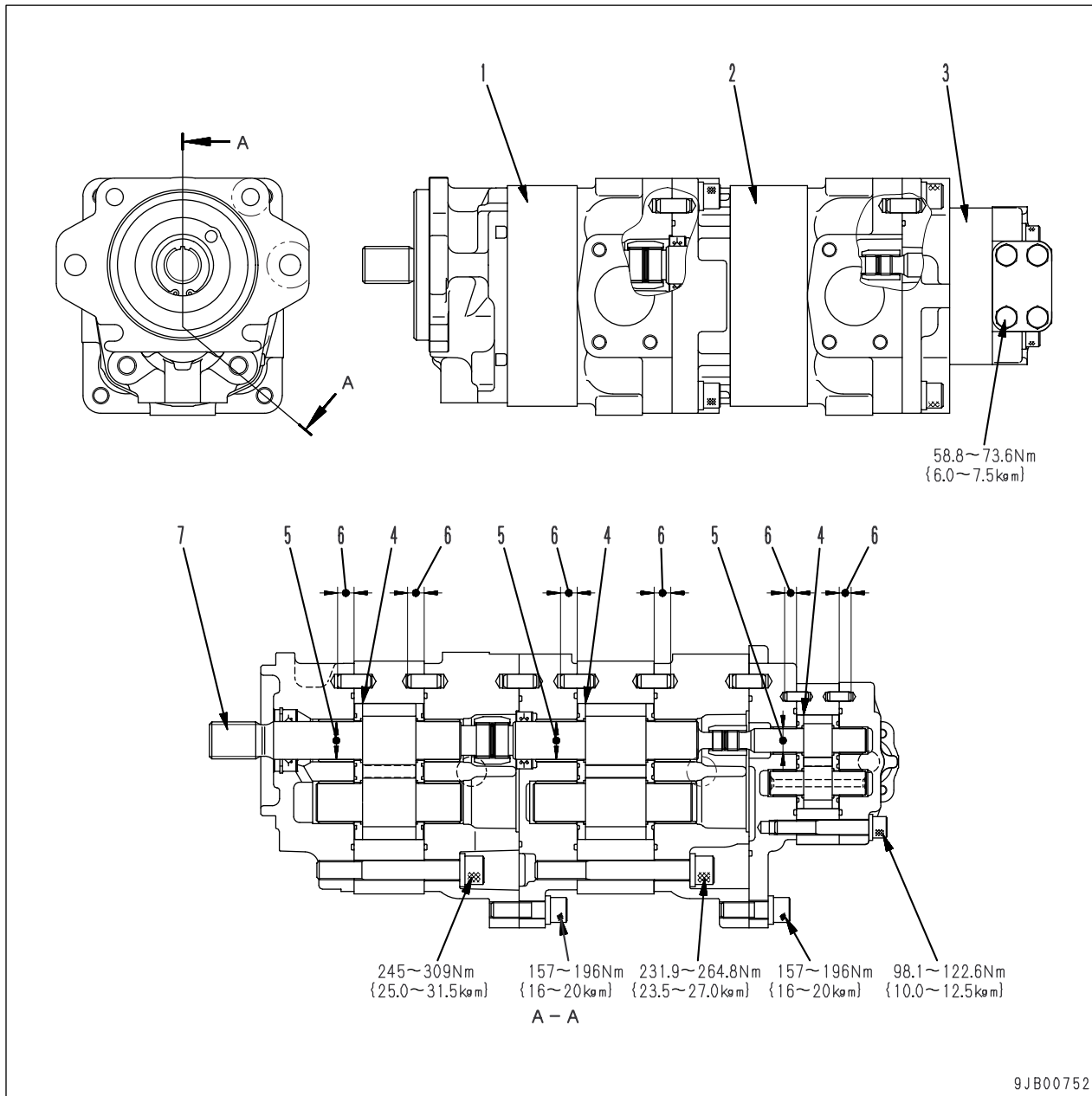
1. Output shaft
2. Spring
3. Spring
4. Piston
5. Parking brake oil port
6. Plate
7. Disc
8. Wave spring

### Outline

- The parking brake is a wet-type multiple-disc brake and is applied mechanically by a spring to apply braking force to transmission output shaft (1).
- The tension of spring (3) uses piston (4) to push discs (7) and plates (6) together and stop output shaft (1).
- When the brake is released, oil pressure from parking brake oil port (5) actuates piston (4) to release the force pushing discs (7) and plates (6) together.

# TORQUE CONVERTER CHARGING, WORK EQUIPMENT, AND PILOT CONTROL PUMPS

SAL (3) 80 + 90 + (1)22

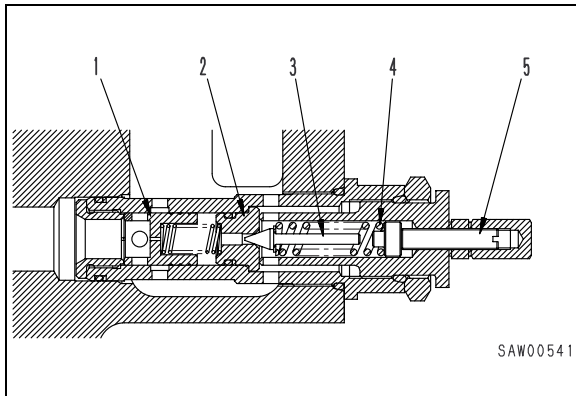


1. Torque converter charging pump
2. Work equipment pump
3. Pilot control pump

## Outline

- The torque converter charging, work equipment, and pilot control pumps are installed to the PTO shaft of the torque converter and driven by shafts to supply oil to the transmission, work equipment, and PPC circuit.

**3. Relief valve**



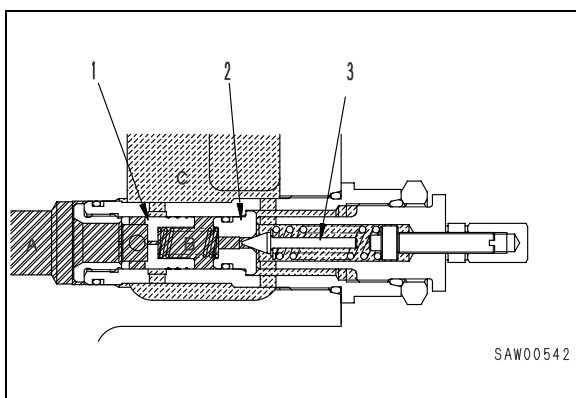
1. Main valve
2. Valve seat
3. Pilot poppet
4. Spring
5. Adjusting screw

**Function**

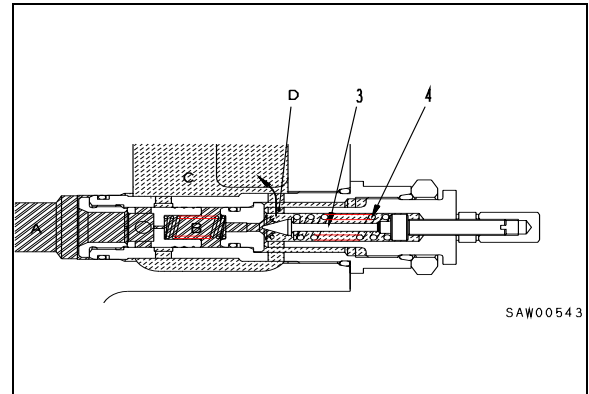
- The relief valve is installed to the inlet of the work equipment valve. When the oil pressure rises above the specified level, this valve drains the oil into the hydraulic tank to limit the maximum pressure of the work equipment circuit and protect the circuit.

**Operation**

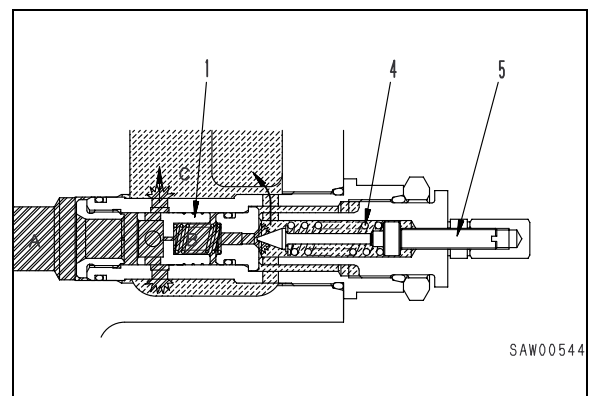
- The port **A** is connected to the pump circuit and the port **C** is connected to the drain circuit. The oil passes through the orifice of the main valve (1) to fill the port **B**. The pilot poppet (3) is contacting (seated) to the valve seat (2).

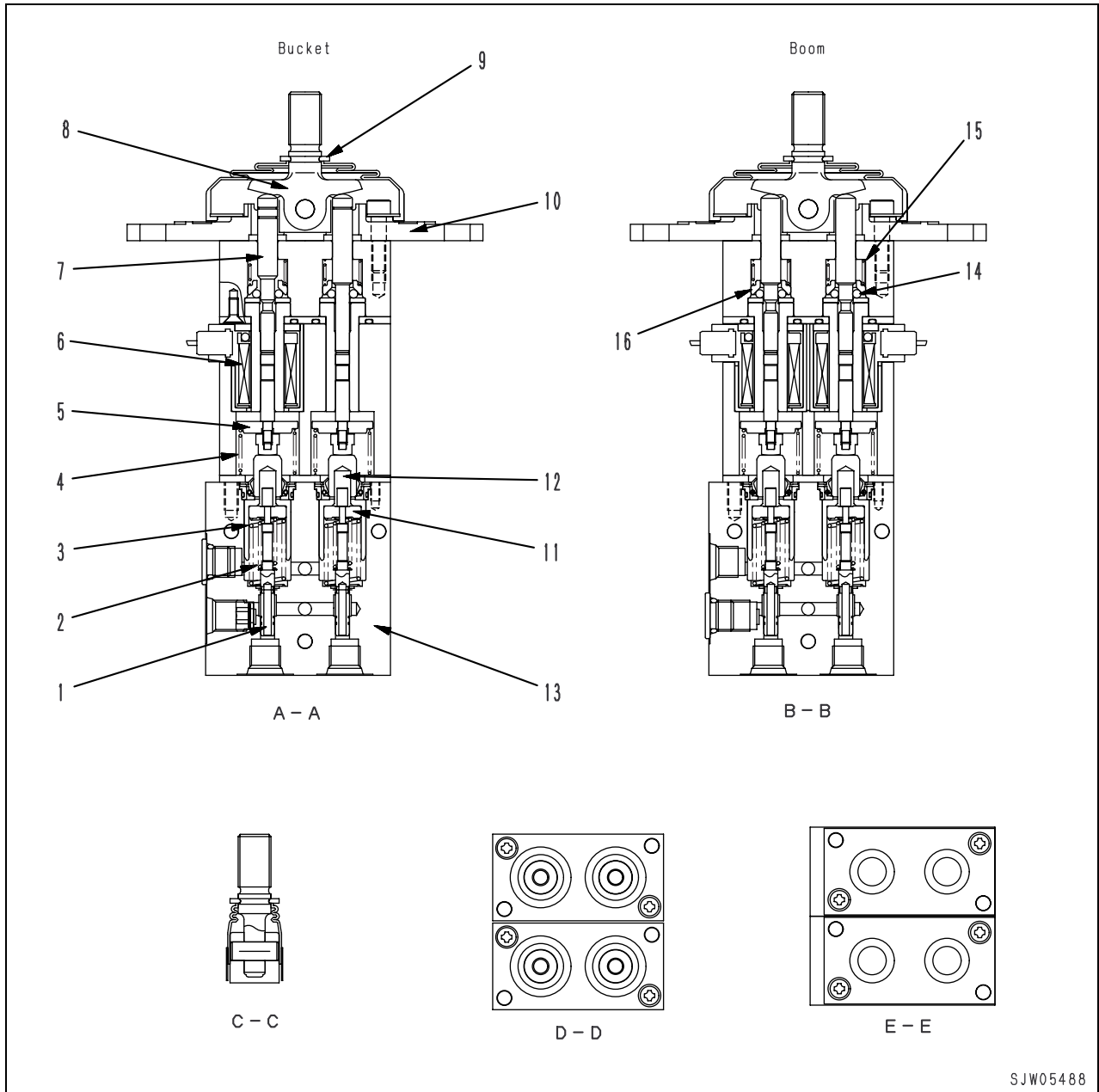


- When the hydraulic pressure inside the port **A** and the port **B** reaches the set pressure of the pilot poppet spring (4), the pilot poppet (3) opens to let the hydraulic pressure of the port **B** flow from the port **D** to the port **C** and the pressure of the port **B** drops.



- When the pressure at the port **B** drops, pressure difference occurs between the port **A** and the port **B** by the orifice of the main valve (1) and the main valve shall be pushed open to let the oil of the port **A** to pass through the port **C** to flow into the drain circuit, to release the abnormal pressure.
- The preset pressure can be changed by increasing or decreasing the tension of the pilot poppet spring (4).
- To change the preset pressure, remove the cap nut to loosen the lock nut. After that, screw-in the adjust screw (5) to raise the preset pressure and loosen the adjust screw to lower the preset pressure.



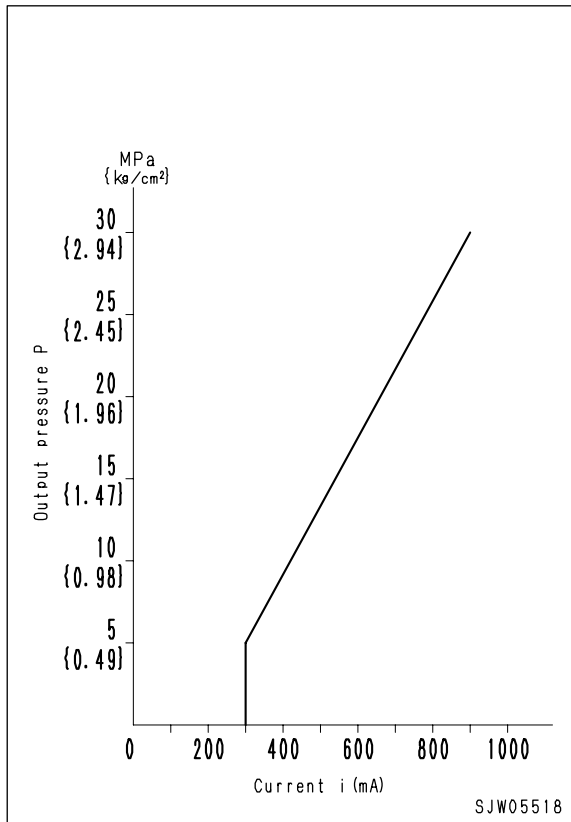


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- |                     |                   |
|---------------------|-------------------|
| 1. Spool            | 9. Ring           |
| 2. Metering spring  | 10. Plate         |
| 3. Centering spring | 11. Retainer      |
| 4. Spring           | 12. Piston        |
| 5. Retainer         | 13. Body          |
| 6. Solenoid         | 14. Ball          |
| 7. Rod              | 15. Detent spring |
| 8. Lever            | 16. Retainer      |

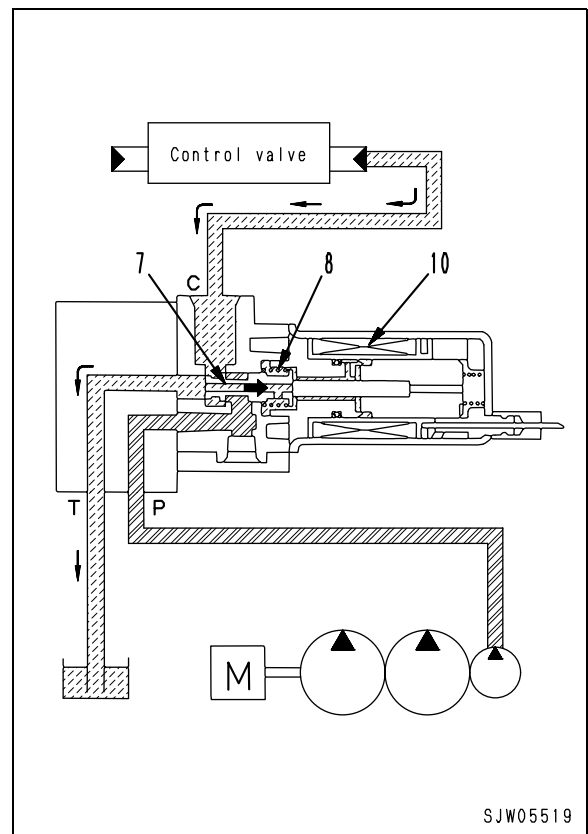
**Function**

- The EPC valve consists of the proportional solenoid section and the hydraulic valve section.
  - On the receiving signal current from the pump controller, the EPC valve generates an EPC output pressure in proportion to the signal current and applies it to the control valve.
- a. Output pressure **P**
  - b. Current **i**



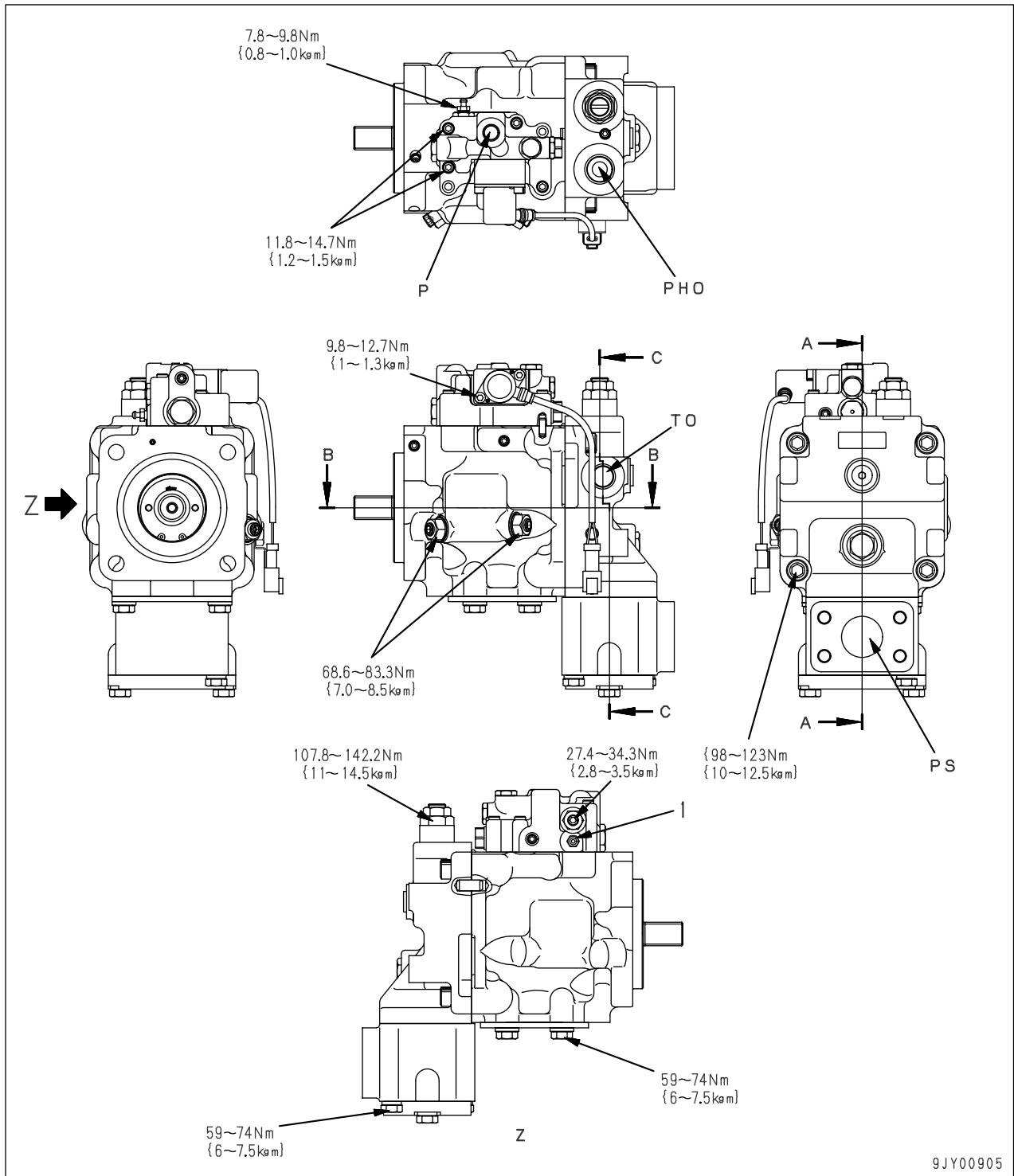
**Operation**

1. When the signal current is 0 (Coil is demagnetized)
  - While the signal current from the controller is not flowing in coil (10), coil (10) is demagnetized.
  - Accordingly, spool (7) is pressed by spring (8) to the right.
  - Port **P** is closed and the hydraulic oil from the control pump does not flow in the control valve.
- c. Control Valve



# COOLING FAN MOTOR DRIVE PUMP

Model: LPV30



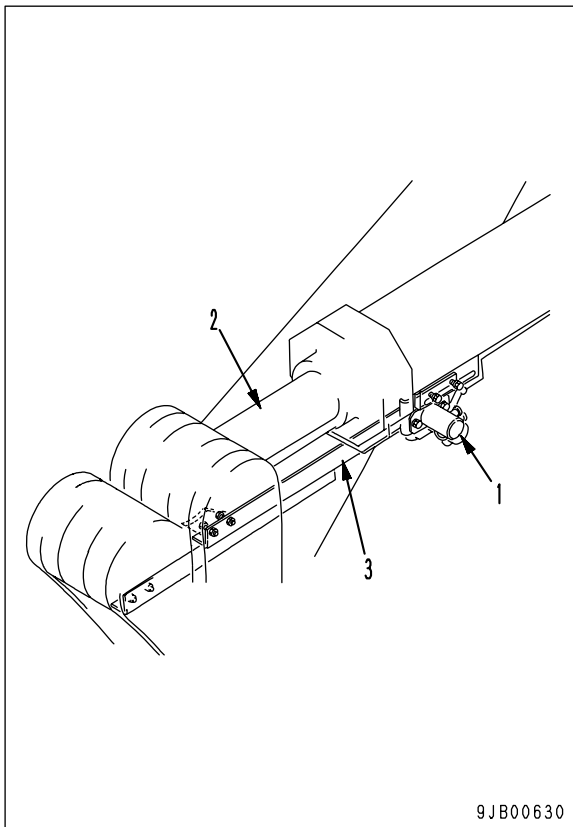
P : EPC valve main pressure  
PS: Suction port of pump

TO : Drain  
PHO: Discharge port of pump

## 1. Bleeder

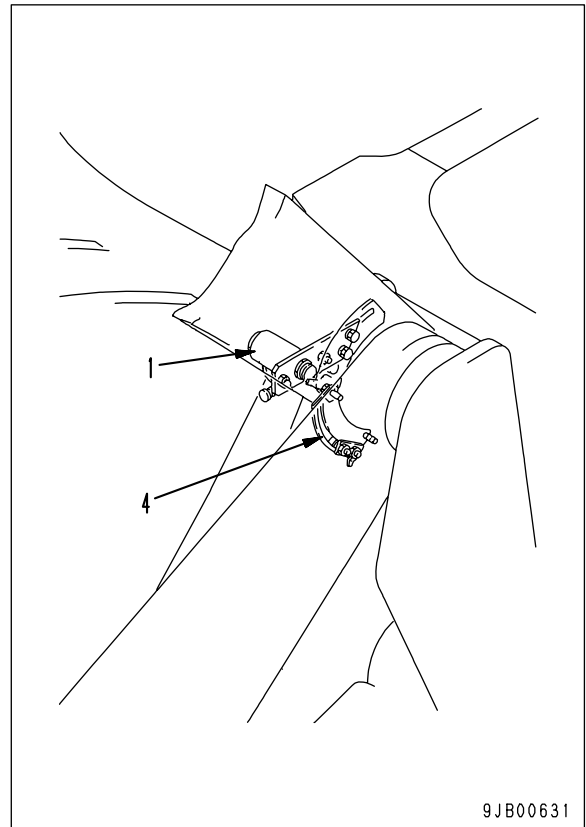
### **Bucket positioner**

- The bucket positioner is operated electrically and used to return the bucket control lever from the TILT position to the HOLD position to obtain proper digging angle automatically when the bucket is moved from the DUMP position to any bucket angle before the TILT position.
- Lever (3) is bolted to bucket cylinder rod (2) and proximity switch (1) is bolted to the cylinder.
- If the bucket control lever is moved from the DUMP position toward the TILT position, the bucket cylinder rod moves to the front side of the vehicle body and lever (3) moves forward, too. When proximity switch (1) leaves lever (3) at any point, the switch operates to return the bucket control lever to the neutral position.

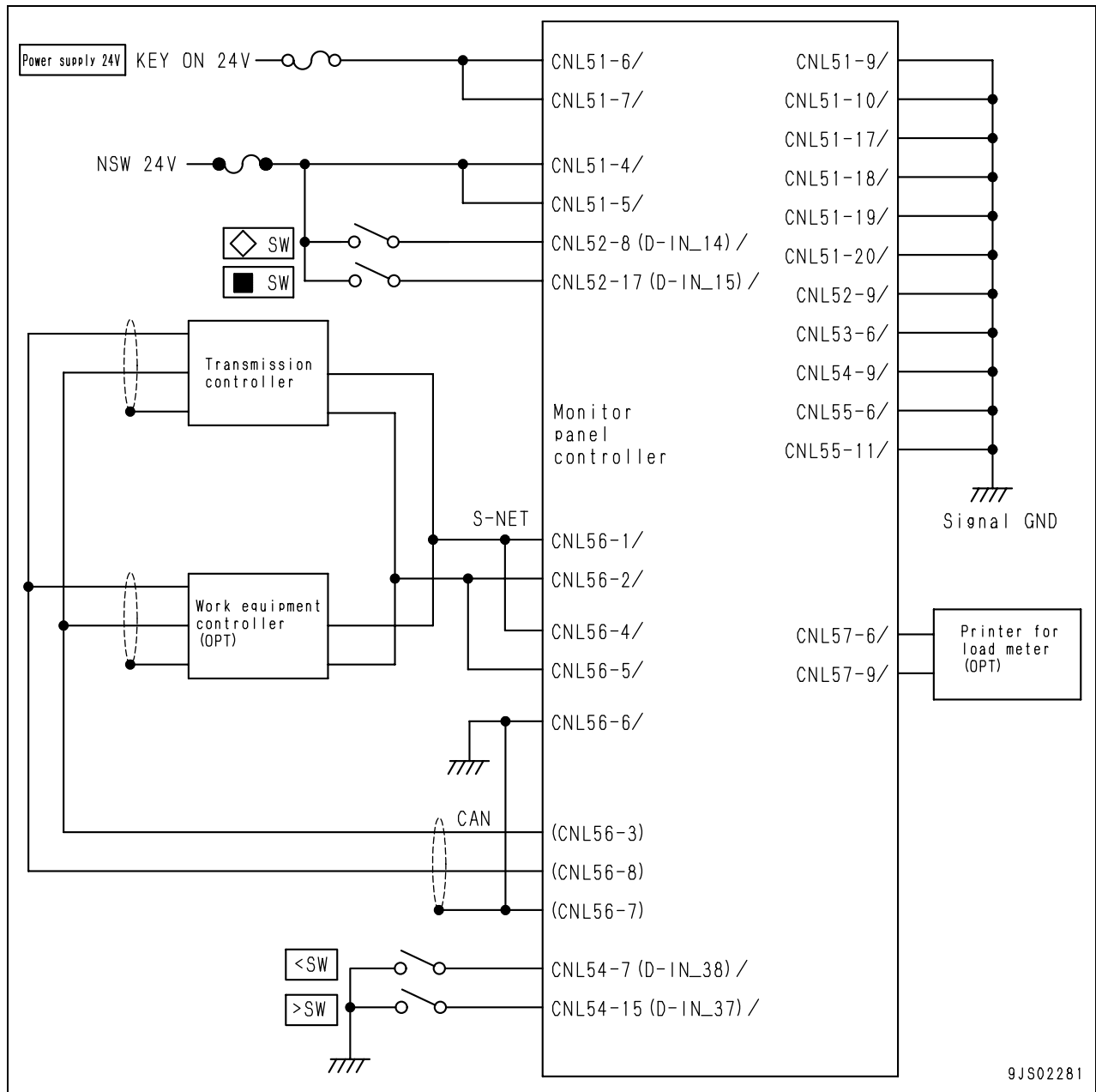


### **Lift arm kick-out**

- The lift arm kick-out is operated electrically and used to return the lift arm control lever to the hold position to stop the lift arm when the lift arm moves to any position before the maximum position.
- Plate (4) is fixed to the lift arm and proximity switch (1) is fixed to the frame. If the lift arm control lever is moved from the lower position to the raise position, the lift arm is raised. When the proximity switch and plate come near each other at any point, the switch operates to return the lift arm control lever to the hold position.



**Power supply and network**



4. When making the speedometer/tachometer indication changeover setting and tire size selection setting (Setting of the rotary switch [SW3])

Since the machine monitor is being set to the tire size of standard tires for speed calculations, when the tire size has been changed, it becomes necessary to adjust to the new tire size by the rotary switch [SW3] for compensation of the speed indications.

**Adjustment procedures**

Make the setting according to the following Table to fit to the tire size.

Meter indication changeover	SW3	Tire size	Remarks
km/h indication	3	STD tire	
MPH indication	4	STD tire	Usable in non-SI-unit employing countries only
rpm indication	5	STD tire	

Tire size	WA400-5
23.5-25	STD

Making the speedometer/tachometer indication changeover setting means to change the indication content of the speed meter located in the central section of the monitor.

Changeover from the speedometer to (engine) tachometer can also be made using the "option setting". After the above setting is made, the indication unit of the travel distance integrating meter (odometer) will become according to the setting made as above.

Since the MPH indication is only for the countries employing the non-SI-unit only, do not make the MPH indication setting for machines being used in countries employing the SI-unit.

In case other tires than the above or when the speed indications deviate from the actual speed by wears of the tires, it is possible to make tire compensations using the "option setting".

5. When making necessary setting when the engine controller is installed (Setting of the dip switch [SW5-1])

Make the setting as follows and do not change it.

Setting position of the SW5-1 in case of machines not equipped with the KOMATSU Common Rail engine (WA400-5 ): "OFF"

6. When making necessary setting for the work equipment/joy-stick controller (Setting of the dip switch [SW5-2])

When the work equipment/joy-stick controller is newly installed or removed, make the setting as follows.

Setting position of the SW5-2 in case the controller has been removed: "OFF"

Setting position of the SW5-2 in case the controller has been newly installed: "ON"

7. When making the setting of the dip switch [SW5-3]

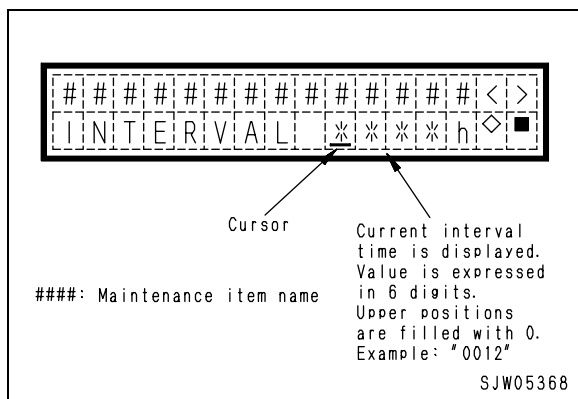
Make the setting as follows and do not change it.

Setting position of the SW5-3: "OFF"

- 4) Changing the maintenance interval time (third layer)  
 The change of the maintenance interval time can be set to any value within a range 0-9999h.  
 Pressing the ■SW causes the change of the time skipped, and changes the screen to the [Select the maintenance items] screen. In this case, a peep sounds for one second to notify that the operation is cancelled.

**How to Enter Interval Time**

- (1) Enter a number from 0-9 in the cursor position.
- (2) The cursor is at the highest digit first. Each time the < or > SW was pressed, the number changes by 1 within a range 0-9.
- (3) If the desired number was entered, press the ◇SW to apply it.
- (4) The cursor moves to the second highest digit. Repeat the procedures mentioned in c and d until the last number is filled in the lowest digit.
- (5) After the lowest digit was entered, press the ◇SW.
- (6) -1 If the entered value represents the time which can be set, the screen changes to the confirmation screen.
- (7) -2 Otherwise, the screen does not change to the confirmation screen but to the [Select the maintenance items] screen. In this case, a peep sounds for one second to notify that the operation is cancelled.
- (8) If a wrong number was entered, return to the [Maintenance items] screen with the ■SW, and do the procedure from the beginning again.



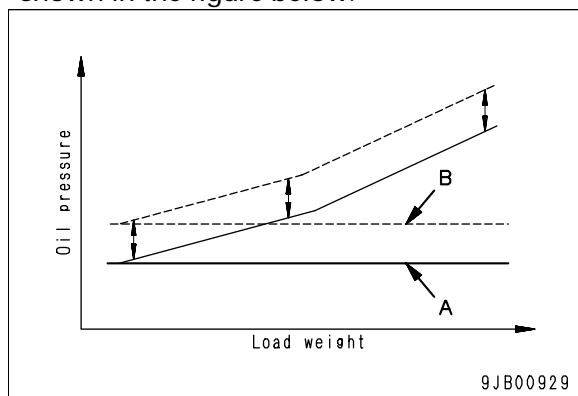
I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
Working machine controller (OP)				
D-IN-0	J/S ON/OFF change-over switch	L71	23	J/S (right FNR) selection=ON (24V)/OFF (OPEN)
D-IN-1	Work equipment safety-lock lever switch	L71	17	Operating position=ON(24V)/ Obstruction position=OFF(OPEN)
D-IN-2	No item	L71	11	ON (24V)/OFF (OPEN)
D-IN-3	No item	L71	5	ON (24V)/OFF (OPEN)
D-IN-4	No item	L71	24	ON (24V)/OFF (OPEN)
D-IN-5	No item	L71	18	ON (24V)/OFF (OPEN)
D-IN-6	No item	L71	12	ON (24V)/OFF (OPEN)
D-IN-7	No item	L71	6	ON (24V)/OFF (OPEN)
D-IN-8	J/S speed Hi/Lo change-over switch	L73	10	J/H Hi speed selection=ON (GND)/OFF (OPEN)
D-IN-9	Bucket proximity switch (horizontal)	L73	20	Horizontal position=ON (GND)/OFF (OPEN)
D-IN-10	Bucket full-stroke switch	L73	30	Stroke end position=ON (GND)/OFF (OPEN)
D-IN-11	No item	L73	40	ON (GND)/OFF (OPEN)
D-IN-12	Semi-auto digging hard switch	L73	9	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-13	Semi-auto digging soft switch	L73	19	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-14	No item	L73	29	ON (GND)/OFF (OPEN)
D-IN-15	No item	L73	39	ON (GND)/OFF (OPEN)
D-IN-16	No item	L72	35	ON (GND)/OFF (OPEN)
D-IN-17	No item	L72	25	ON (GND)/OFF (OPEN)
D-IN-18	No item	L72	15	ON (GND)/OFF (OPEN)
D-IN-19	No item	L72	5	ON (GND)/OFF (OPEN)
D-IN-20	No item	L72	36	ON (GND)/OFF (OPEN)
D-IN-21	No item	L72	26	ON (GND)/OFF (OPEN)
D-IN-22	No item	L72	16	ON (GND)/OFF (OPEN)
D-IN-23	No item	L72	6	ON (GND)/OFF (OPEN)
D-IN-24	No item	L72	37	ON (GND)/OFF (OPEN)
D-IN-25	No item	L72	27	ON (GND)/OFF (OPEN)
D-IN-26	No item	L72	17	ON (GND)/OFF (OPEN)
D-IN-27	No item	L72	7	ON (GND)/OFF (OPEN)
D-IN-28	Remote positioner raise set switch	L72	13	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-29	Remote positioner lower set switch	L72	3	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-30	Remote positioner raise selection switch	L72	2	Switch pressed=ON (GND)/OFF (OPEN)

**7. Calibration**

- There are two kinds of calibrations, i.e., the no-load calibration for measuring pressure when the bucket is empty and the load calibration for measuring pressure when a known weight is loaded. When the lift arm is raised while the bucket is fully tilted, the lift arm operating pressure without load (0kg) or with a known load weight is memorized.
- In general, accuracy can be fully secured only in calibration without load. When the center of gravity of a load is quite different from our pre-set position due to modification of the lift arm or the bucket, it is necessary to calibrate at the load.
- ★ The memory of calibration data is not deleted even while the battery is removed for a certain time.

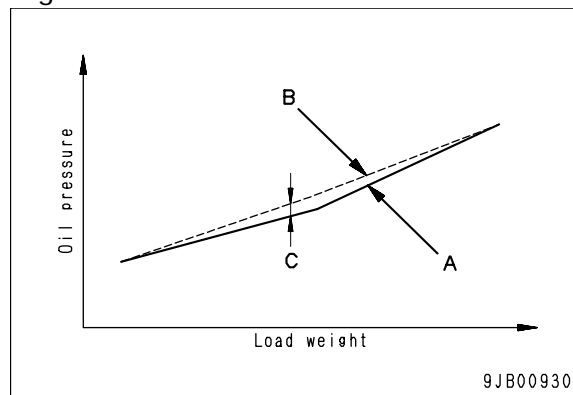
**No-load Calibration**

- This calibration is for canceling such weight difference peculiar to machine as work equipment weight, etc. and is intended to compensate offset error (B) from standard value (A) as shown in the figure below.



**Load Calibration**

- This calibration is for compensating the standard pressure in a loaded state and is intended to carry out the compensation (B) of an error from the standard value (A) in the vicinity of load calibration (C) conducted as shown in the figure below.



- ★ For the calibrating method, see the paragraph of Inspection and Adjustment of Load Meter in the Volume of Inspection and Adjustment.

**8. Calculation Stop**

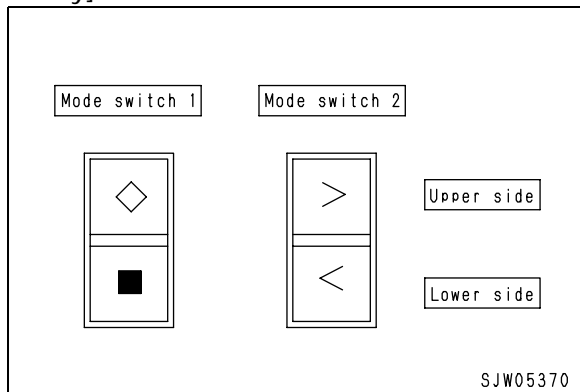
This function stops the calculating function of the load meter. During the calculation stop, the load meter display disappears, and the travel speed display or the engine speed display appears and the data is not added to the total data. To resume the calculation, select the Addition Mode or the Subtraction Mode.

- ★ For how to stop calculation, refer to the paragraph of "Operation of Load Meter" in the Operation and Maintenance Manual.

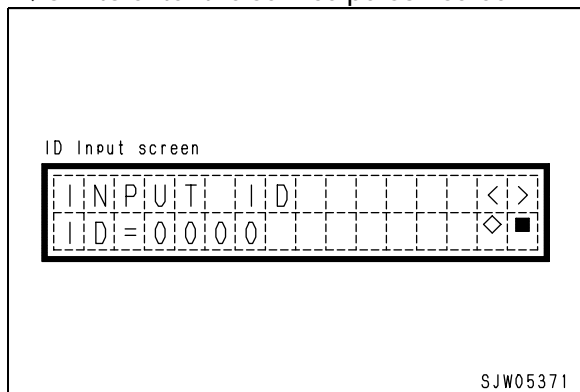
**Adjustment of lift arm angle for load meter (OP)**

**Adjustment of lift arm angle (upper position)**

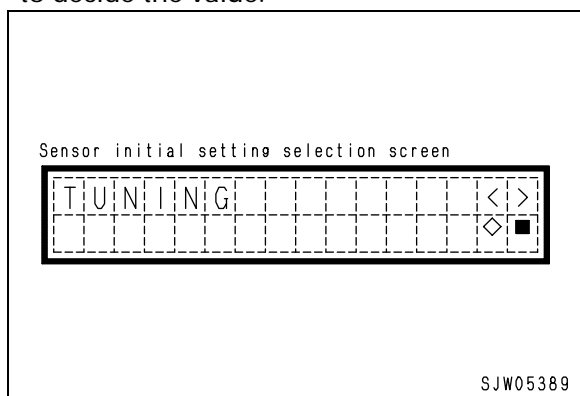
1. Hold down the ■SW < SW for 5 seconds or more at the same time, and change to the [ID Entry] screen.



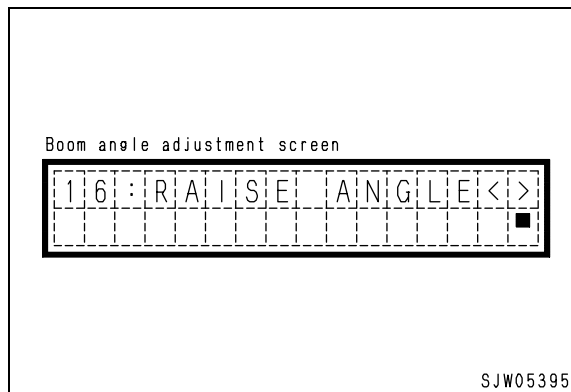
2. Use the < and > SW to enter ID, and press the ◇SW to enter the service person screen.



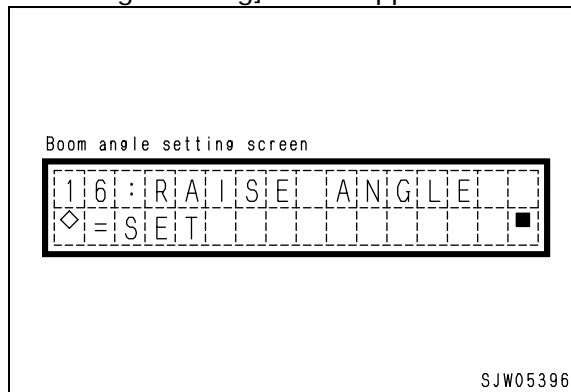
3. Use the < and > SW to display the [Sensor Initialization Setting] screen, and press the ◇SW to decide the value.



4. Press the < and > SW to display the [Work Equipment Lift Arm Angle Adjustment] screen on set item 16.



5. Press the ◇SW here; the [Work Equipment Lift Arm Angle Setting] screen appears.



6. Adjust the lift arm to the highest position without load.
7. Press the ◇SW here; the lift arm angle sensor value is read, and a difference between the read result and reference value is stored as an offset value.
8. The buzzer sounds twice (two short tones), and the menu returns to the [Lift Arm Angle Adjustment] screen. The setting is then completed.
9. Press the ■SW; the lift arm angle correction is ended even if it is in progress of processing.

	Shift lever position	Solenoid signal	Forward (F)	Reverse (R)	Gear speed change disabling time after the preceding change (sec)
			Speed (km/h)	Speed (km/h)	
When direction switch is shifted (1) (F→) N→R (R→) N→F	2, 3 or 4	4L/U→2T/C(L&M&H)	Zone I & II	Zone I & II	2
		4T/C→2T/C(L&M&H)	Zone I & II	Zone I & II	2
		3L/U→2T/C(L&M&H)	Zone I & II	Zone I & II	2
		3T/C→2T/C(L&M&H)	Zone I & II	Zone I & II	2
		1T/C→2T/C(L&M&H)	Through all speed ranges	Through all speed ranges	2
	4	4L/U→4T/C(H)	Zone III & 18.0 and up	Zone III & 18.0 and up	2
		4L/U→4T/C(M)	Zone III & 16.5 and up	Zone III & 16.5 and up	2
		4L/U→4T/C(L)	Zone III & 15.0 and up	Zone III & 15.0 and up	2
		4L/U→3T/C(H)	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		4L/U→3T/C(M)	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
		4L/U→3T/C(L)	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2
		4T/C→3T/C(H)	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		4T/C→3T/C(M)	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
		4T/C→3T/C(L)	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2
		3T/C→3T/C(H) No gear speed change	Zone III & 13.0~18.0	Zone III & 13.0~18.0	2
		3T/C→3T/C(M) No gear speed change	Zone III & 13.0~16.5	Zone III & 13.0~16.5	2
	3T/C→3T/C(L) No gear speed change	Zone III & 13.0~15.0	Zone III & 13.0~15.0	2	
	3	3L/U→3T/C(L&M&H)	Zone III	Zone III	2
		3T/C→3T/C(L&M&H) No gear speed change	Zone III	Zone III	2
When direction switch is shifted (2) F→N→R R→N→F	4	→4L/U(H)	23.7 and up	25.2 and up	---
		→4L/U(M)	22.2 and up	23.6 and up	---
		→4L/U(L)	20.7 and up	22.0 and up	---
		→4T/C(H)	18.0~23.7	18.0~25.4	0
		→4T/C(M)	16.5~22.2	16.5~23.9	0
		→4T/C(L)	15.0~20.7	15.0~22.4	0
		→3T/C(H)	10.2~18.0	10.2~18.0	0
		→3T/C(M)	9.0~16.5	9.0~16.5	0
	3	→3T/C(L)	7.0~15.0	7.0~15.0	0
		→3L/U(M&H)	13.9 and up	16.0 and up	---
		→3L/U(L)	11.0 and up	16.0 and up	---
		→3T/C(H)	10.2~13.9	10.2~16.0	0
		→3T/C(M)	9.0~13.9	9.0~16.0	0
	3 or 4	→3T/C(L)	7.0~11.0	7.0~16.0	0
		→2T/C(H)	up to 10.2	up to 10.2	0
		→2T/C(M)	up to 9.0	up to 9.0	0
	2	→2T/C(L)	up to 7.0	up to 7.0	0
		→2T/C(L&M&H)	Through all speed ranges	Through all speed ranges	---

9. 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.

Targeted shift down gear speed	Protection condition [A or (B and C)]			Cancel condition [D and (E or F)]		
	Condition A	Condition B	Condition C	Condition D	Condition E	Condition F
	TM output speed	TM output speed	Engine speed	TM output speed	TM 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 1698 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.

T/M output shaft speed and travel speed                      Protection travel speed (km/h)

		WA400-5 (small diameter tire)	WA400-5 (large diameter tire)
T/M 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

10. 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.

Input and output signals  
DEUTSCH-24P [CN-L61]

Pin No.	Signal name	I/O signal
1	NC	Input
2	Shift mode H	Input
3	NC	Input
4	Signal GND	—
5	T/M cutoff set switch	Input
6	Engine power mode switch	Input
7	Reverse fan rotation switch	Input
8	Shift mode M	Input
9	T/M oil temperature sensor	Input
10	Signal GND	—
11	T/M cutoff switch	Input
12	Kick down switch	Input

Pin No.	Signal name	I/O signal
13	NC	Input
14	Shift mode L	Input
15	NC	Input
16	Sensor supply source output (+24V)	Output
17	Steering pressure switch (NC)	Input
18	Lockup selector switch	Input
19	Left brake pressure sensor	Input
20	Rear brake oil temperature sensor	Input
21	Analog GND	—
22	Potentiometer power (+5V)	Output
23	Steering pressure switch (NO)	Input
24	ECSS switch	Input

DEUTSCH-40P(1) [CN-L62]

Pin No.	Signal name	I/O signal
1	NC	Output
2	ECMV fill switch L/U	Input
3	ECMV fill switch 4th	Input
4	232C_RxD	Input
5	Right FNR (J/S) forward-reverse R	Input
6	Neutralizer (P/B) signal	Input
7	ECMV fill switch 2nd	Input
8	NC	Output
9	Engine speed pulse unlatched output	Output
10	Engine speed signal (+)	Input
11	NC	Output
12	CAN shield	—
13	ECMV fill switch 3rd	Input
14	232_TxD	Output
15	Right FNR (J/S) forward-reverse N	Input
16	Forward-reverse lever R	Input
17	ECMV fill switch 1st	Input
18	NC	Output
19	Travel speed pulse unlatched output	Output
20	Travel speed signal (+)	Input

Pin No.	Signal name	I/O signal
21	S_NET	Input/Output
22	CAN0_L	Input/Output
23	CAN1_L	Input/Output
24	Write-to-flash-memory enable signal	Input
25	Right FNR (J/S) forward-reverse F	Input
26	Forward-reverse lever N	Input
27	ECMV fill switch R	Input
28	NC	Input
29	Pulse GND	—
30	NC	Input
31	S_NET GND	—
32	CAN0_H	Input/Output
33	CAN1_H	Input/Output
34	RS232C GND	—
35	Right FNR (J/S) switch	Input
36	Forward-reverse lever F	Input
37	ECMV fill switch F	Input
38	Shift hold switch	Input
39	Pulse GND	—
40	NC	Input

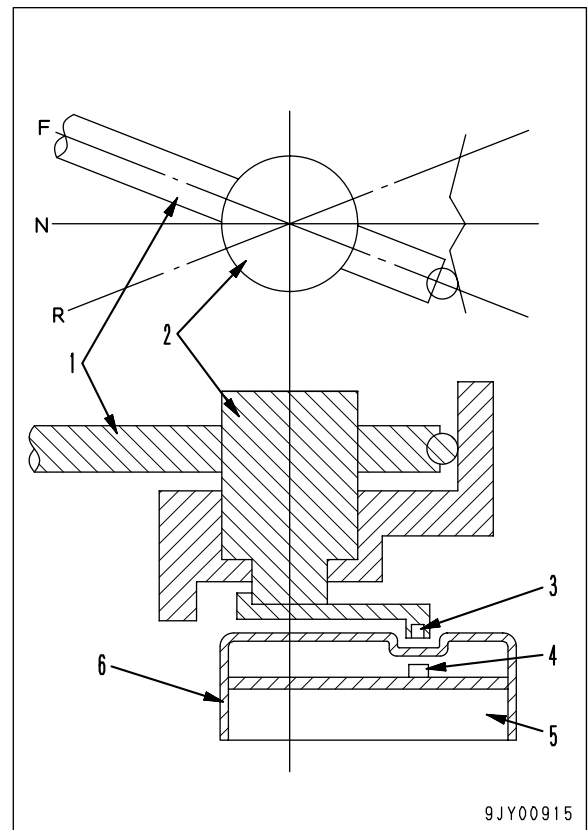
DEUTSCH-40P(2) [CN-L63]

Pin No.	Signal name	I/O signal
1	VB (controller power)	Input
2	VIS (solenoid power)	Input
3	SOL_COM (common solenoid ground)	Input
4	Back lamp relay	Output
5	ECMV F	Output
6	ECMV 2nd	Output
7	Electric emergency steering relay	Output
8	Indicator built in T/M cutoff switch	Output
9	J/S shift up switch	Input
10	Gearshift lever 1st speed	Input
11	VB (controller power)	Input
12	VIS (solenoid power)	Input
13	SOL_COM (common solenoid ground)	Input
14	Key switch signal	Input
15	ECMV R	Output
16	ECMV 3rd	Output
17	ECSS	Output
18	Low temperature bypass relay	Output
19	J/S shift down switch	Input
20	Gearshift lever 2nd speed	Input

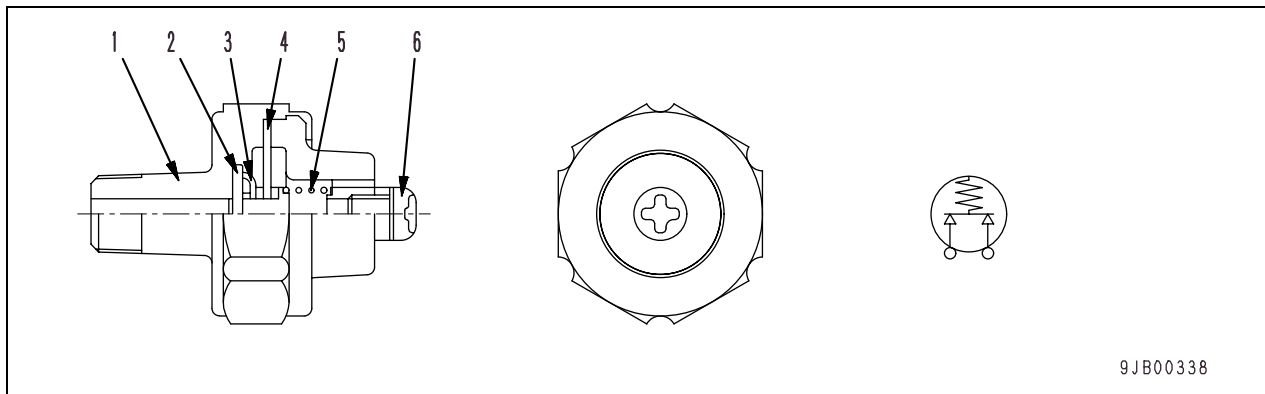
Pin No.	Signal name	I/O signal
21	GND (controller ground)	Input
22	VIS (solenoid power)	Input
23	SOL_COM (common solenoid ground)	Input
24	Key switch signal	Input
25	ECMV 1st	Output
26	ECMV 4th	Output
27	Switch pump cutoff relay	Output
28	Reverse fan pump rotation SOL	Output
29	Electric emergency steering operation sw	Input
30	Gearshift lever 3rd speed	Input
31	GND (controller ground)	Input
32	GND (controller ground)	Input
33	GND (controller ground)	Input
34	NC	—
35	ECMV L/U	Output
36	Fan pump EPC	Output
37	Neutral output	Output
38	Fan pump neutral SOL	Output
39	Starter switch C-terminal	Input
40	Gearshift lever 4th speed	Input

**Operation**

- The forward-reverse lever (1) and the gearshift lever shaft (2) on the combination switch are united with the magnet (3). Thus, as the lever (1) is moved, the magnet (3) is moved, too. The control switch (5) with the built-in hall IC (4) is attached under the magnet (3). A hall IC (4) is provided on the board for respective positions.
- If you set the forward-reverse lever (1) at **F** position, the magnet comes right above the hall IC (4) of the control switch at **F** position. Thus, magnetism of the magnet (3) is irradiated to the hall IC (4) through the clearance and case (6).
- Since the hall IC (4) is inside the magnetism detection circuit, the circuit detects magnetism from the magnet (3) and then sends the **F** position signal to the current amplifier circuit. Receiving this signal, the current amplifier circuit outputs the signal to operate the transmission.



**ENGINE OIL PRESSURE SENSOR**



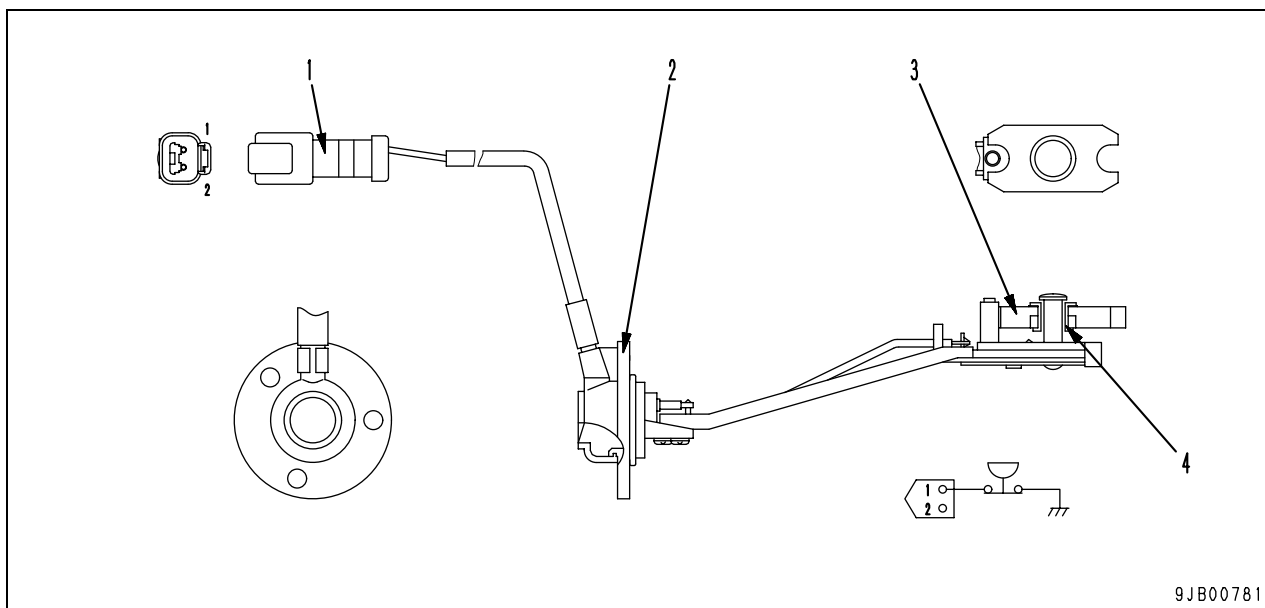
9JB00338

- |                 |              |
|-----------------|--------------|
| 1. Plug         | 4. Diaphragm |
| 2. Contact ring | 5. Spring    |
| 3. Contact      | 6. Terminal  |

**Function**

- This sensor is mounted to the engine block. The diaphragm detects oil pressure, and when it reaches below the specified value, the switch is turned ON.

**ENGINE OIL LEVEL SENSOR**



9JB00781

- |              |           |
|--------------|-----------|
| 1. Connector | 3. Float  |
| 2. Bracket   | 4. Switch |

**Function**

- This sensor is mounted to the side surface of the oil pan. The float lowers when the oil level reaches below the specified level, turning OFF the switch.

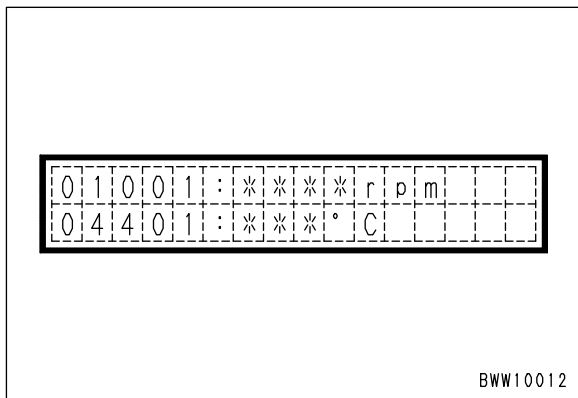
STANDARD VALUE TABLE FOR CHASSIS

The \* mark shows the value before the detent.

Machine Model				WA400-5				
Category	Item		Measurement Conditions	Unit	Standard Value For New Machine	Service Limit Value		
Directional lever	Operating effort	N - FORWARD, REVERSE	<ul style="list-style-type: none"> <li>Engine Stopped</li> <li>Measure at center of lever knob</li> </ul>	N {kg}	5.9 <sup>+4.9</sup> <sub>-3.0</sub> {0.6 <sup>+0.5</sup> <sub>-0.3</sub> }	Max. 16.7 {1.7}		
	Travel	N - FORWARD, REVERSE		mm	35 ± 10	35 ± 20		
Speed lever	Operating effort	1st - 2nd	<ul style="list-style-type: none"> <li>Engine stopped</li> <li>Measure at center of lever knob</li> </ul>	N {kg}	5.9 <sup>+4.9</sup> <sub>-3.0</sub> {0.6 <sup>+0.5</sup> <sub>-0.3</sub> }	Max. 16.7 {1.7}		
		2nd - 3rd			5.9 <sup>+4.9</sup> <sub>-3.0</sub> {0.6 <sup>+0.5</sup> <sub>-0.3</sub> }	Max. 16.7 {1.7}		
		3rd - 4th			5.9 <sup>+4.9</sup> <sub>-3.0</sub> {0.6 <sup>+0.5</sup> <sub>-0.3</sub> }	Max. 16.7 {1.7}		
	Travel	1st - 2nd		mm	35 ± 10	35 ± 20		
		2nd - 3rd		mm	35 ± 10	35 ± 20		
		3rd - 4th		mm	35 ± 10	35 ± 20		
Working equipment control lever	Operating effort	Lift arm	<ul style="list-style-type: none"> <li>Engine speed: Low idle</li> <li>Hydraulic oil temperature: 45 - 55 °C</li> </ul>	N {kg}	Max. 12.8 {1.3} *	Max. 19.6 {2.0} *		
					RAISE → HOLD	Max. 14.7 {1.5}	Max. 22.6 {2.3}	
					HOLD → LOWER	Max. 12.8 {1.3} *	Max. 19.6 {2.0} *	
					LOWER → HOLD	—	—	
		LOWER → FLOAT			Max. 15.7 {1.6}	Max. 23.5 {2.4}		
		FLOAT → HOLD			Max. 14.7 {1.5}	Max. 22.6 {2.3}		
		Bucket			HOLD → DUMP	Max. 17.7 {1.8}	Max. 26.5 {2.7}	
					HOLD → TILT	Max. 12.8 {1.3} *	Max. 19.6 {2.0} *	
	TILT → HOLD			Max. 14.7 {1.5}	Max. 22.6 {2.3}			
	Travel	Lift arm		HOLD → RAISE	<ul style="list-style-type: none"> <li>Engine speed: Low idle</li> <li>Hydraulic oil temperature: 45 - 55 °C</li> </ul>	mm	43 ± 9 *	43 ± 18 *
				HOLD → RAISE			43 ± 9 *	43 ± 18 *
				HOLD → RAISE			50 ± 9	50 ± 18
		Bucket		HOLD → RAISE			50 ± 9	50 ± 18
HOLD → RAISE			43 ± 9 *	43 ± 18 *				
Steering wheel	Play		<ul style="list-style-type: none"> <li>Engine stopped</li> <li>Machine facing straight to front</li> </ul>	mm	Max. 40	Max. 100		
	Operating effort		<ul style="list-style-type: none"> <li>Flat, horizontal, straight, dry paved road surface</li> <li>Engine speed: Low idle (Bucket empty)</li> </ul>	N {kg}	6.9 - 12.6 {0.7 - 1.3}	Max. 19.6 {2.0}		
	Turns (Not including play)		<ul style="list-style-type: none"> <li>Engine speed: High idle</li> <li>Left lock - right lock</li> </ul>	Turns	4.0 ± 0.4	4.0 ± 0.4		
	Operating time	Low idle	<ul style="list-style-type: none"> <li>Engine speed: Low idle</li> <li>Hydraulic oil temperature: 45 - 55 °C</li> <li>Left lock - Right lock</li> </ul>	Sec.	4.5 ± 0.4	Max. 7.0		
High idle		<ul style="list-style-type: none"> <li>P mode</li> <li>N mode</li> </ul>			3.6 ± 0.3	Max. 5.3		
Frame	Clearance between front frame and rear frame		<ul style="list-style-type: none"> <li>Engine speed: 1,200 rpm*</li> <li>Hydraulic oil temperature: 45 - 55 °C</li> <li>Flat, level, straight, dry, and paved road</li> <li>At max. steering angle</li> </ul>	mm	25 ± 2	—		

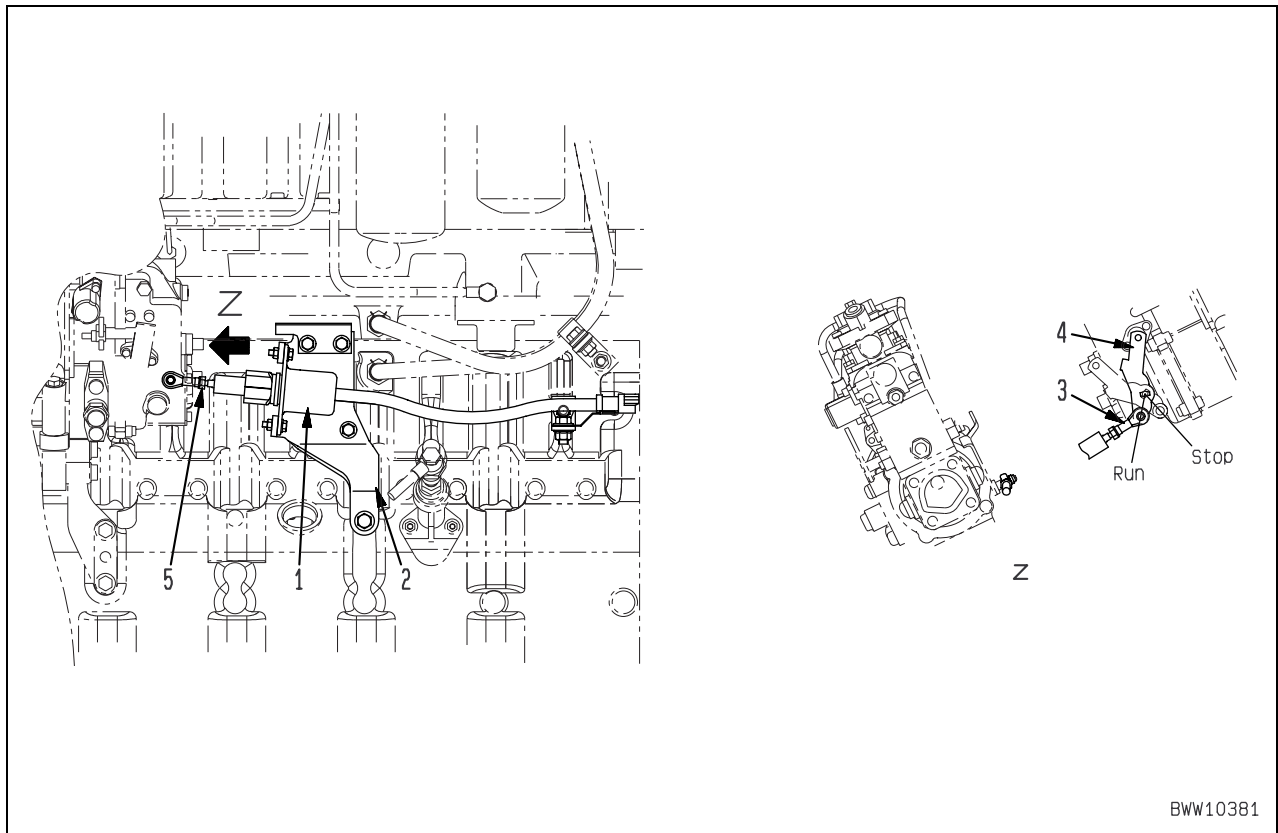
- 3. Measuring hydraulic stall speed:
  - 1) Switch to the monitoring function of Service Mode 1 and use the 2-item simultaneous monitoring function to display the following 2 items. For details, see SPECIAL FUNCTIONS OF MACHINE MONITOR in the TROUBLESHOOTING section.
    - ★ Monitoring items
      - (1) Code No. 01001: Engine speed
      - (2) Code No. 04401: Hydraulic oil temperature

- 6) Run the engine at high idle, stall the torque converter, extend the lift arm cylinder or bucket cylinder at the same time to relieve the circuit, and measure the engine speed.
  - ★ Do not keep the stall condition for more than 20 seconds. Make sure that the torque converter oil temperature does not exceed 120 °C.



- 2) Start the engine and run at high idle.
  - 3) Measure the engine speed when the lift arm cylinder or bucket cylinder is extended and the circuit is relieved.
- 4. Measuring torque converter stall + hydraulic stall (full stall) speed:
  - 1) The setting of the machine monitor is the same as 2-1) Measuring torque converter stall speed.
  - 2) Start the engine.
  - 3) Turn the transmission cut-off selector switch (2) OFF and depress the left brake securely.
  - 4) Place the directional lever at F4 or R4.
  - 5) Release the parking brake.

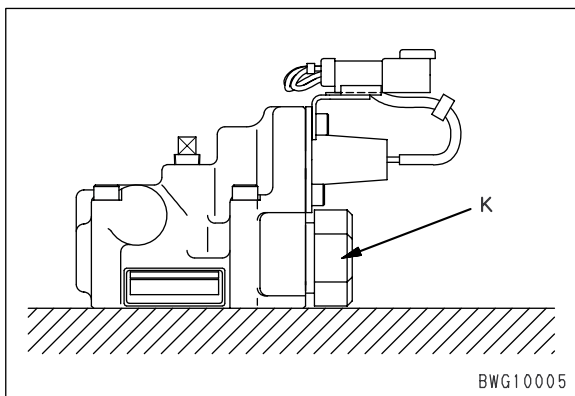
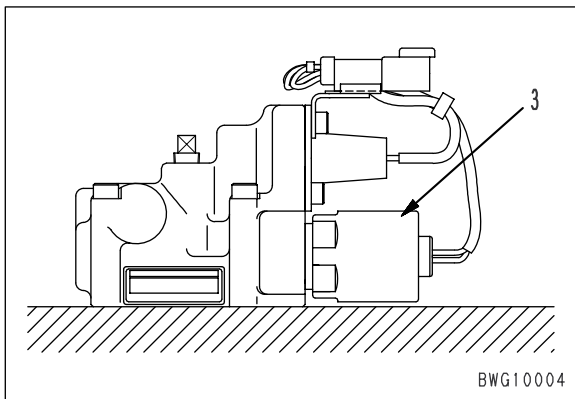
## ADJUSTING ENGINE STOP SOLENOID



★ If the fuel injection pump or engine stop solenoid is replaced, adjust the engine stop solenoid according to the following procedure.

1. Install solenoid (1) to bracket (2).
2. Install ball joint (3) to stop lever (4).
3. Install bracket (2) to the cylinder block.
4. Turn the starting switch to the ON position to turn on (hold) the solenoid.
5. Pull (Retract) rod (5) of solenoid (1) with the hand to the stroke end.
6. Check that stop lever (4) touches the stopper on the RUN side.
7. Install the solenoid so that its rod will be pulled to the stroke end without fail.
  - Stroke of solenoid: 25.4 mm
8. Check that the engine "starts" and "stops" normally and the solenoid is not heated abnormally.

3. Depending on the direction for moving the machine (forward or reverse), remove 2 ECMV solenoids (3) and install plug K.
  - FORWARD: F solenoid and 2nd solenoid
  - REVERSE: R solenoid and 2nd solenoid
  - ★ If there is any mistake in the selection of the solenoid to remove, there is danger that the transmission may be damaged.
  - ★ Install plus K with the protruding surface facing the ECMV. Check also that there is an O-ring installed to the mating surface.
  - ★ Be careful not to let any dirt or mud get inside the removed solenoid or valve.



4. Depress the brake pedal securely.
5. Start the engine, release the parking brake, then release the brake pedal gradually to allow the machine to start, and move the machine.
  - ★ If a failure in the electrical system makes it impossible to release the parking brake, release the parking brake manually. For details, see MANUAL RELEASE METHOD FOR PARKING BRAKE.



**WARNING!** Remove the chocks from under the tires.




**WARNING!** When the engine is started, the transmission is also engaged to start the machine. To ensure safety when starting the engine, check carefully that the direction of travel and area around the machine are safe, and always keep the brake pedal depressed.

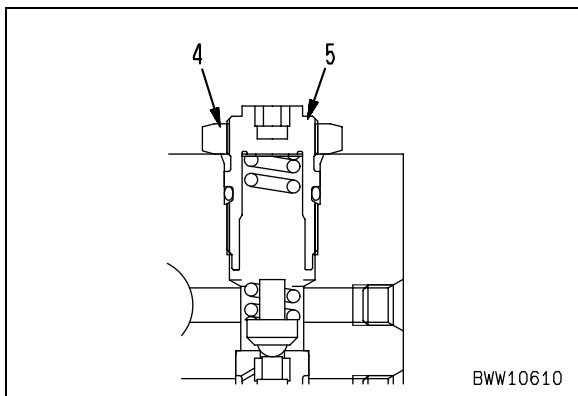
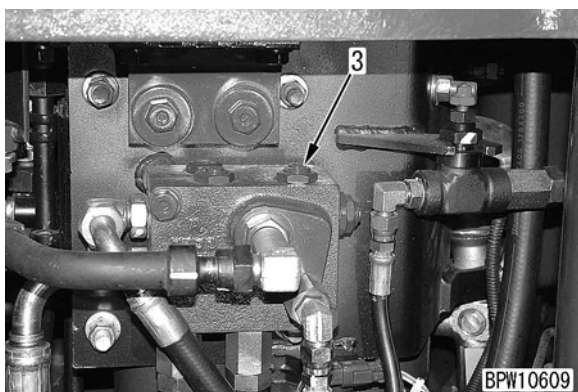


**WARNING!** After moving the machine, stop the engine, apply the parking brake, and put chocks under the tires.

**Adjusting**

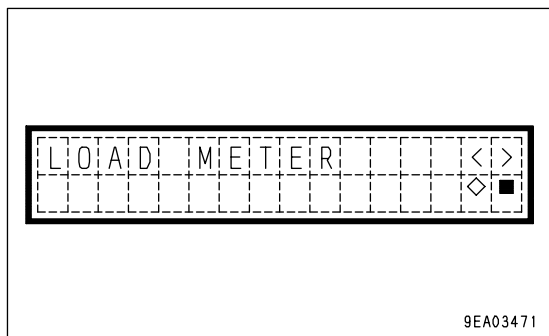
- ★ When the accumulator charge cut-out pressure is adjusted, the cut-in pressure also changes because of the valve area ratio.
- 1. Loosen locknut (4) of accumulator charge cut-out valve (3), then turn adjustment screw (5) to adjust.
  - ★ Turn the adjustment screw to adjust as follows.
    - To INCREASE the pressure, turn CLOCKWISE.
    - To DECREASE the pressure, turn COUNTERCLOCKWISE.
  - ★ Amount of adjustment for one turn of adjustment screw: 5.59 MPa {57 kg/cm<sup>2</sup>}

 Locknut: .....  
..... 9.8 - 11.8 Nm {1.0 - 1.2 kgm}

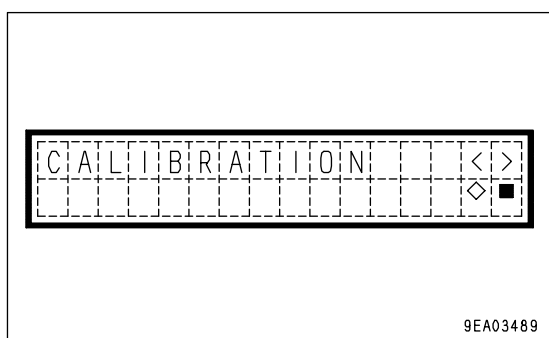


- ★ After completion of the adjustment, repeat the above procedure for testing to check the accumulator charge cut-in pressure and cut-out pressure again.

- 2) Press (◇) on monitor panel mode selector switch 1 to display LOAD METER.



- 3) Press (◇) on monitor panel mode selector switch 1, and then press (>) or (<) on monitor panel mode selector switch 2 to select CALIBRATION.



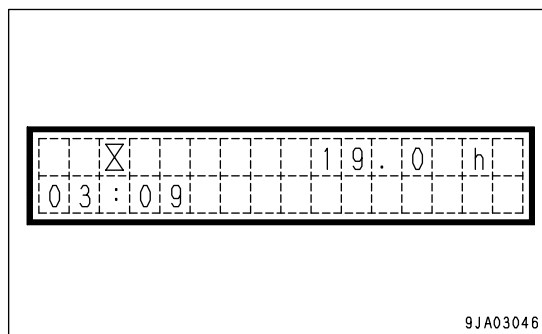
3. After calibrating the load meter for no load, perform TESTING again to check the measurement accuracy of the load meter.
4. If the measurement accuracy of the load meter does not satisfy the standard, calibrate the load meter for load in the operator mode.
  - ★ Calibrate the load meter for load with weights of the normal load and 1/2 of the normal load.  
In the calibration for load, the load meter automatically judges the data of the normal load or the data of 1/2 of the normal load and changes the standard data according to the numeral data input when calibration is started.

Model	Set range of calibration of normal load data	Set range of calibration of 1/2 of normal load data
WA400-5	5.3 t – 5.9 t	2.6 t – 3.0 t

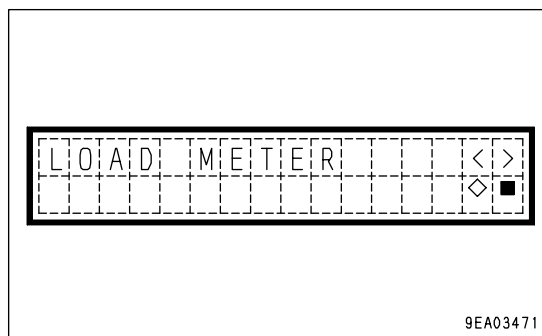
- ★ When using the vehicle with loads heavier than the normal load, do not calibrate with the normal load but calibrate with the maximum hauling capacity for higher accuracy. Note that a load larger than twice the normal load is not calculated.

**Performing Calibration for Load (Zero Point Adjustment)  
(Supplementary Explanations)**

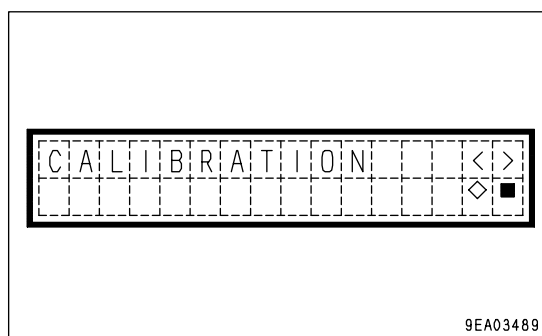
- 1) Check that the service meter and clock appears normally on the character display.



- 2) Press (◇) on monitor panel mode selector switch 1 to display load meter.

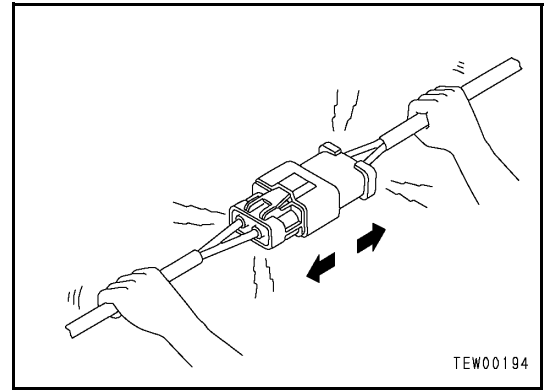


- 3) Press (◇) on monitor panel mode selector switch 1, and then press (>) or (<) on monitor panel mode selector switch 2 to select CALIBRATION.



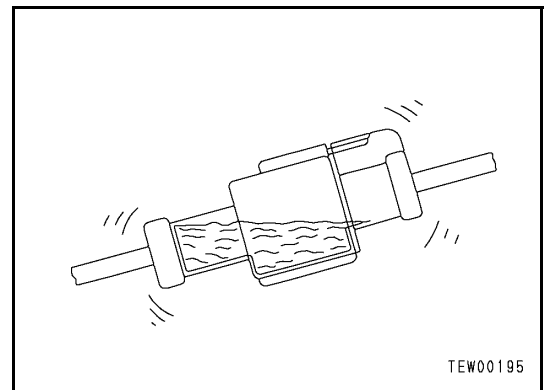
## ③ Disconnections in wiring

If the wiring is held and tugged and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping compression of the connectors to the wire may be loosened, or the soldering may be damaged, or the wiring may be broken.



## ④ High pressure water entering a connector

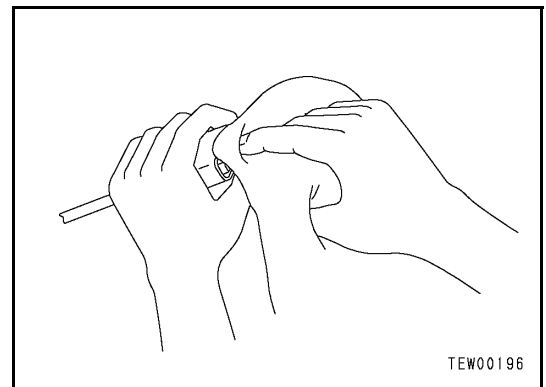
The connector is designed to make it difficult for water to enter (drip-proof structure), but if high-pressure water is sprayed directly on the connector, water may enter the connector depending on the direction of the water jet. The connector is designed to prevent water from entering, but if water does enter, it is difficult for it to be drained. Therefore, if water should get into the connector, the pins will be short-circuited by the water, so if any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.



## ⑤ Oil, grease or dirt stuck to connector

If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, and this will cause a defective contact. If there is oil or grease or dirt stuck to the connector, wipe it off with a dry cloth or blow dry with air, and spray it with a contact restorer.

- ★ When wiping the mating portion of the connector, be careful not to use excessive force or deform the pins.
- ★ If there is water or oil present, it will increase the contamination of the points, so clean with air until all water and oil has been removed.



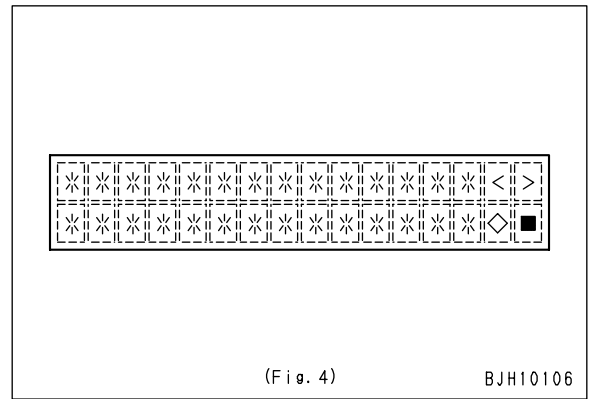


- 5) Menu selection in Service Mode 1  
Press the [>] or [<] buttons on the menu screen and the menus of Service Mode 1 are displayed endlessly in the following order.

- ★ The menu is displayed in the places marked with [\*].
- [ > ] button: Go on to the next menu
- [ < ] button: Go back to previous menu
- ① ELECTRICAL FAULT: Trouble data display function for electrical system
- ② MACHINE FAULT: Trouble data display function for mechanical system
- ③ REAL-TIME MONITOR: Machine data monitoring function
- ④ CYLINDER CUT-OUT: Reduced cylinder mode
- ⑤ TUNING: Adjustment function
- ⑥ MAINTENANCE MONITOR: Filter, oil replacement interval setting function
- ⑦ OPTION SELECT: Option installation selection function
- ⑧ MACHINE No. SET: Serial No. setting function
- ⑨ INITIALIZE: Initialize function (exclusive function for factory)

- 6) Completion of mode, function  
When operating at any point in any function, it is possible to finish the mode or function by using any of the following methods.

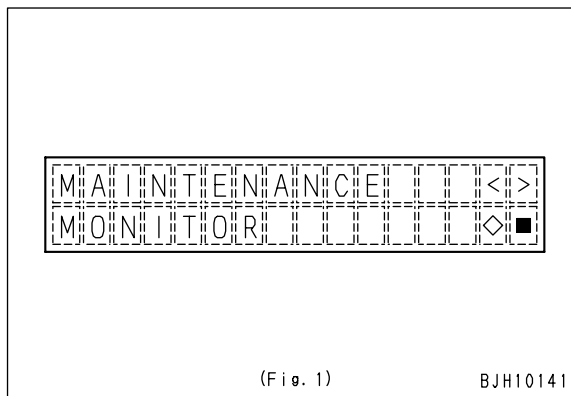
- ① When continuing operations in another mode or function: Press the [■] button and return to the mode screen to be used or menu screen to be used.
  - ★ Note that if the [■] button is pressed on the YES/NO screen, the function will be executed.
  - ★ If you return to the normal screen (operator mode) by mistake, repeat the procedure from Step 1) above (there is no need to input the ID again).
- ② When completing all operations:  
Turn the starting switch OFF.



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.



(Fig. 1)

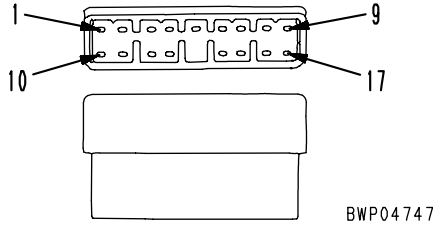
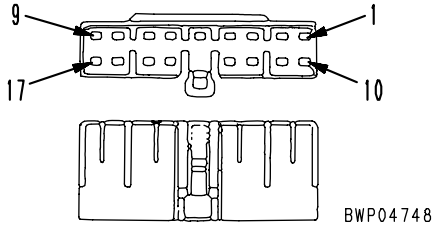
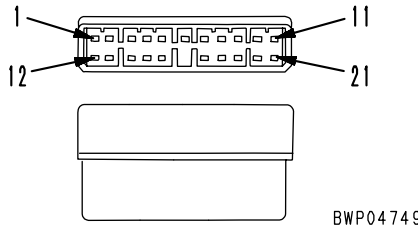
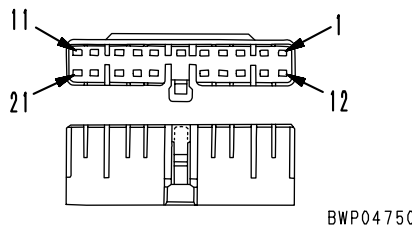
BJH10141

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

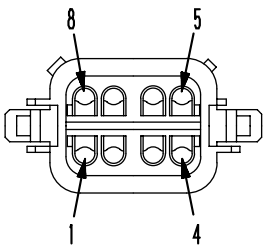
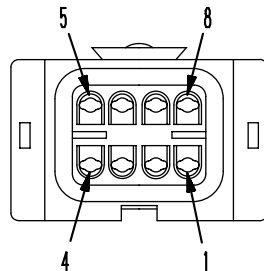
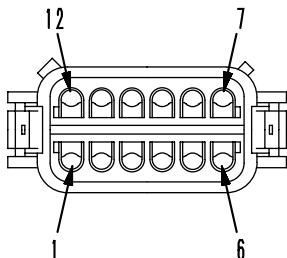
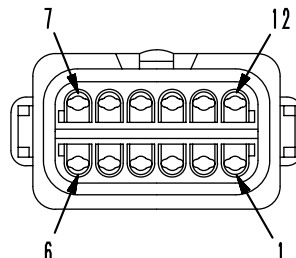
No.	Item	Code	Display	Replacement Interval
1	Engine oil	01	ENG OIL	500
2	Engine oil filter	02	ENG OIL FILTER	500
3	Fuel filter	03	FUEL FILTER	500
4	Corrosion resistor	06	CORR RESISTOR	1000
5	Transmission oil	12	TM OIL	1000
6	Transmission oil filter	13	TM OIL FILTER	1000
7	Hydraulic filter	04	HYD OIL 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

**TROUBLESHOOTING**

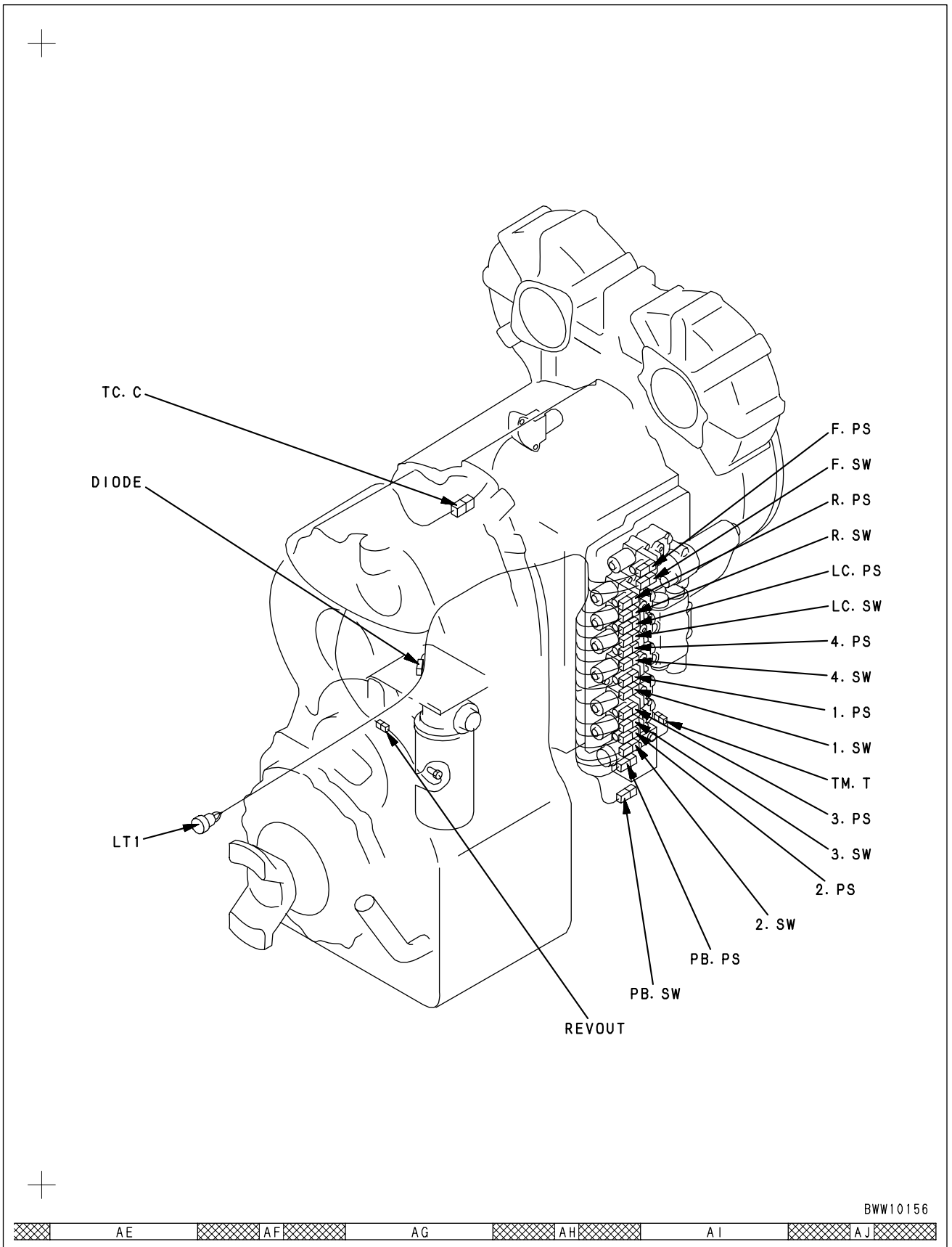
No.	Phenomena considered to be failures	Troubleshooting						
		Failure code	TM mode	WRK mode	MON mode	H mode	E mode	(Engine)
Failures related to hydraulic and mechanical system (H mode)								
94	The bucket comes to operate slowly in the midst of tilting-back					H-24		
95	The bucket cylinder cannot hold down the bucket					H-25		
96	Hydraulic drifts of the bucket occur often					H-26		
97	The bucket wobbles during travel with cargo (The work equipment valve is set to "HOLD")					H-27		
98	When the control lever is switched from "HOLD" to "TILT," the bucket falls temporarily					H-28		
99	The control levers of lift arm and bucket do not move smoothly and heavy					H-29		
Failures related to electrical system (E mode)								
100	The engine power modes cannot be selected						E-4	
101	The front wiper does not function						E-5	
102	The rear wiper does not function						E-6	
103	The side wiper does not function (If equipped)						E-7	
104	The wind washer does not function						E-8	
105	The headlamp (Lo beam) does not light on						E-9	
106	The headlamp (Hi beam) does not function						E-10	
107	The clearance lamp does not light on (Small lamp)						E-11	
108	The turn signal does not blink						E-12	
109	The horn does not sound						E-13	
110	The air conditioner does not work or does not stop						E-14	

Number of Pins	MIC Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
17	 <p>BWP04747</p>	 <p>BWP04748</p>	799-601-2730
	Body part number: 79A-222-2730 (Quantity: 2 pieces)	Body part number: 79A-222-2720 (Quantity: 2 pieces)	
21	 <p>BWP04749</p>	 <p>BWP04750</p>	799-601-2740
	Body part number: 79A-222-2750 (Quantity: 2 pieces)	Body part number: 79A-222-2740 (Quantity: 2 pieces)	
—	Body part number: 79A-222-2770 (Quantity: 50 pieces)	Body part number: 79A-222-2760 (Quantity: 50 pieces)	—

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

Number of Pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part Number
8	 <p style="text-align: center;">BWP05045</p>	 <p style="text-align: center;">BWP05046</p>	8GR: 799-601-9060 8B: 799-601-9070 8G: 799-601-9080 8BR: 799-601-9080
	Part number: 08192-1820 <Galpha>@ (normal type) 08192-2820 <Galpha>@ (fine wire type)	Part number: 08192-1810 <Galpha>@ (normal type) 08192-2810 <Galpha>@ (fine wire type)	
12	 <p style="text-align: center;">BWP05047</p>	 <p style="text-align: center;">BWP05048</p>	12GR: 799-601-9110 12B: 799-601-9120 12G: 799-601-9130 12BR: 799-601-9140
	Part number: 08192-1920 <Galpha>@ (normal type) 08192-2920 <Galpha>@ (fine wire type)	Part number: 08192-1910 <Galpha>@ (normal type) 08192-2910 <Galpha>@ (fine wire type)	

Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
E01	DT-T	2	Intermediate connector (Starting motor)	b-1	W-4
E02	Terminal	1	Alternator R	d-3	X-5
E03	Terminal	1	Alternator B	d-3	X-5
E04	Terminal	1	Alternator E	d-3	X-5
E05	Terminal	1	Engine heater relay	c-9	Q-9
E06	Terminal	1	Engine heater relay	a-9	Q-9
E07	Terminal	1	Engine heater relay	a-9	Q-9
E08	DT-T	2	Engine water temperature sensor (Monitor)	c-1	O-8
E09	DT-T	2	Engine water temperature sensor (Preheater)	d-2	O-8
E10	DT-T	2	Air conditioner compressor magnet clutch	d-2	—
E11	DT-T	2	Diode (Air conditioner compressor)	d-4	—
E14	Terminal	1	Ground (Rear frame)	a-5	X-5
E26	DT-T	2	Engine oil level sensor	a-5	P-8
E27	DT-T	2	Engine speed sensor	c-6	TM
E28	DT	2	Diode (Engine heater relay)	c-9	O-8
E29	Terminal	1	Engine oil pressure switch	b-5	P-8
E30	Terminal	1	Starting motor B	b-1	X-4
E31	DT-T	2	Diode	—	E
E32	DT-T	2	Diode (Fuel cut solenoid)	c-6	E
E33	DT-T	2	Dust indicator	b-9	O-8
E34	DT-T	3	Fuel cut solenoid	c-7	—
ER-1	DT-T (G)	8	Intermediate connector (Engine)	Z-2	P-5
ER-3	DT-T (Gr)	8	Intermediate connector (Engine)	a-1	O-5
F01	M	6	Intermediate connector (R.H. Front lamp)	A-5	U-3
F02	M	6	Intermediate connector (L.H. Front lamp)	D-1	U-3
F03	Terminal	1	Horn (303 Hz)	A-1	W-1
F04	Terminal	1	Horn (303 Hz)	A-1	W-1
F05	Terminal	1	Horn (303 Hz)	C-1	W-1
F06	Terminal	1	Horn (303 Hz)	B-1	W-1
F07	DT-T	2	Switching pump cut-off solenoid	c-1	TM
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Bucket positioner proximity switch (STD)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	C-1	TM
F14	DT-T	2	Diode (Damper solenoid)	D-1	TM
F15	DT-T	3	Lift arm angle signal (For load meter)	A-2	M-8
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	M-8
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	M-8
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	WRK
F19	DT-T	3	Bucket positioner proximity switch (For bucket EPC)	A-3	WRK
F20	DT-T	2	Lift arm RAISE EPC	A-2	WRK
F21	DT-T	2	Lift arm LOWER EPC	A-1	WRK
F22	DT-T	2	Bucket CURL EPC	A-1	WRK
F23	DT-T	2	Bucket DUMP EPC	A-1	WRK
F24	DT-T	2	ATT. EXT. EPC (OPT)	A-3	WRK
F25	DT-T	2	ATT. RET. EPC (OPT)	A-2	WRK
F26	DT-T	2	Lift arm EPC cut-off solenoid	B-1	WRK
F27	DT-T	2	Diode (For boom EPC cut-off solenoid)	A-4	WRK

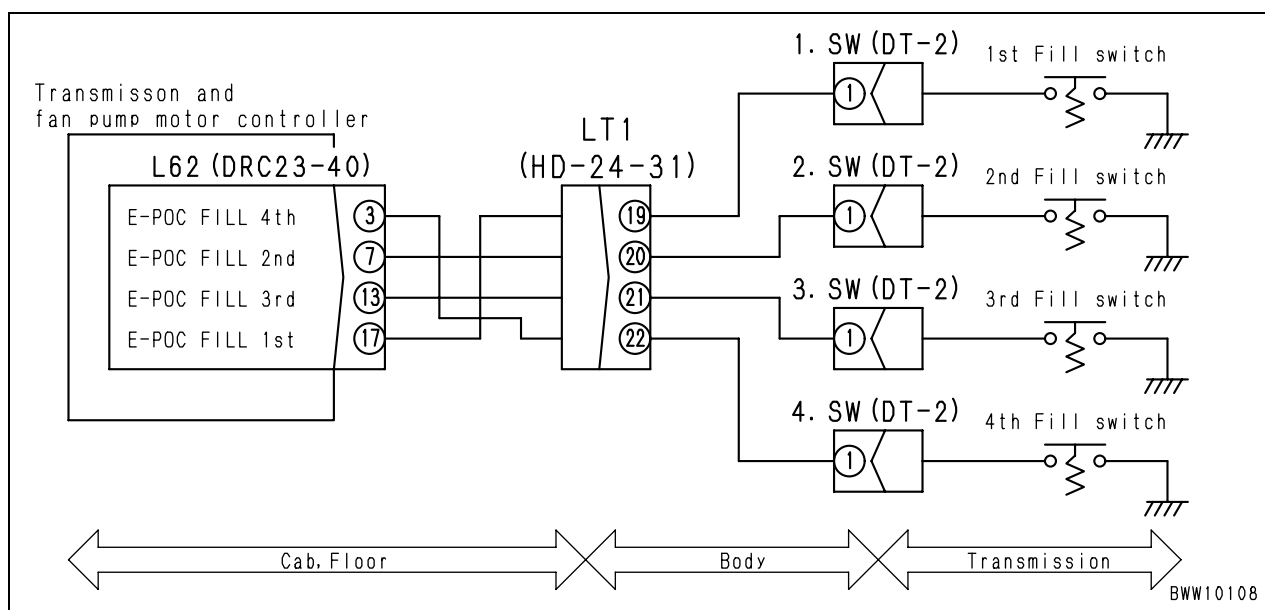


### FAILURE CODE [15SFLH]

Action code	Failure code	Controller code	Trouble	2nd_ECMV fill switch system disconnected
E01	15SFLH	TM		
Description of trouble	<ul style="list-style-type: none"> <li>No 2nd_ECMV fill switch signal is input when 2nd_ECMV is ON.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>Assumes that the 2nd_ECMV fill switch signal is OFF and uses fill-less modulation data.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>May not travel at 2nd speed.</li> <li>Gear shifting shock or time lag may occur on 2nd-speed-travel switchover.</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 40908, D-IN-27).</li> </ul>			

Possible causes and standard values in normal state	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
		1	Defective 2nd_ECMV fill switch	1) Turn starting switch OFF. 2) Disconnect connector 2.SW. 3) Connect T-adaptor. 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 2.SW (Male) (1) - body				Gear shift lever = 2nd speed	Resistance	Max. 1 Ω
			Other than above	Resistance	Min. 1 MΩ	
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and 2.SW. 3) Connect T-adaptor.			
			Wiring harness between L62 (Female) (7) - 2.SW (Female) (1)		Resistance	Max. 1 Ω
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Insert T-adaptor. 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 (7) - body		Gear shift lever = 2nd speed	Voltage	Max. 1 V	
			Other than above	Voltage	20 - 30 V	

Related circuit diagram

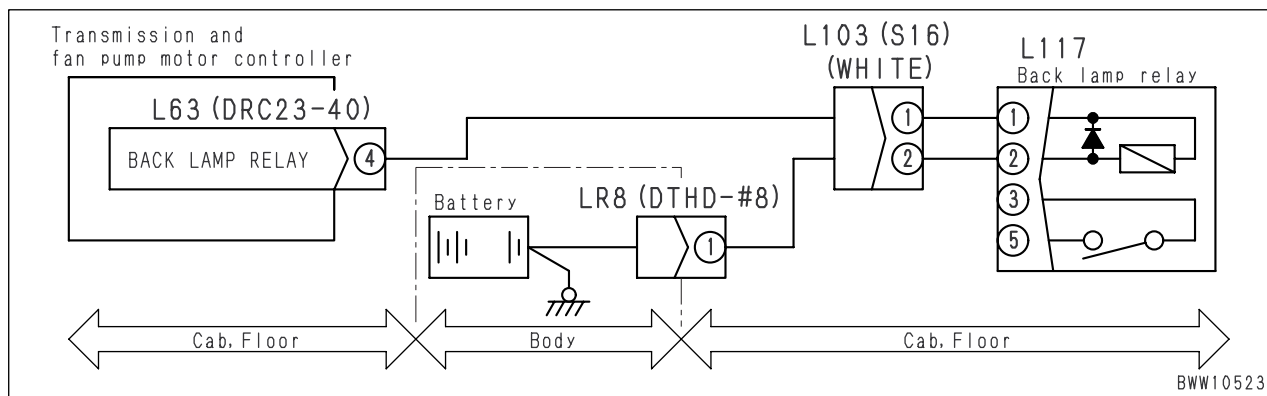


### FAILURE CODE [D160KB]

Action code	Failure code	Controller code	Trouble	Backup lamp relay output system grounded
E03	D160KB	TM		
Description of trouble	<ul style="list-style-type: none"> <li>No signal is output to the backup lamp relay due to grounding.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>Turns output to the backup lamp relay OFF.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>No backup buzzer sounds or the backup lamp does not come on (Traveling is possible).</li> </ul>			
Related information	—			

Possible causes and standard values in normal state	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
		1	Defective backup lamp relay (L117)	1) Turn starting switch OFF. 2) Replace relay. 3) Turn starting switch ON. 4) Turn forward-reverse lever to "R".	
This Failure code (D160KB) issued				Relay L117 is not defective	
This Failure code (D160KB) not issued				Relay L117 is defective	
1) Turn starting switch OFF. 2) Disconnect connector L103. 3) Connect T-adaptor.					
Between L103 (Female) (1) - (2)		Resistance	200 - 400 Ω		
2		Ground fault in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L103. 3) Connect T-adaptor.		
	Between L63 (Female) (4)/L103 (Male) (1) - body		Resistance	Min. 1 MΩ	
3	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adaptor.			
		Between L63 (Female) (4) - body	Resistance	200 - 400 Ω	

#### Related circuit diagram





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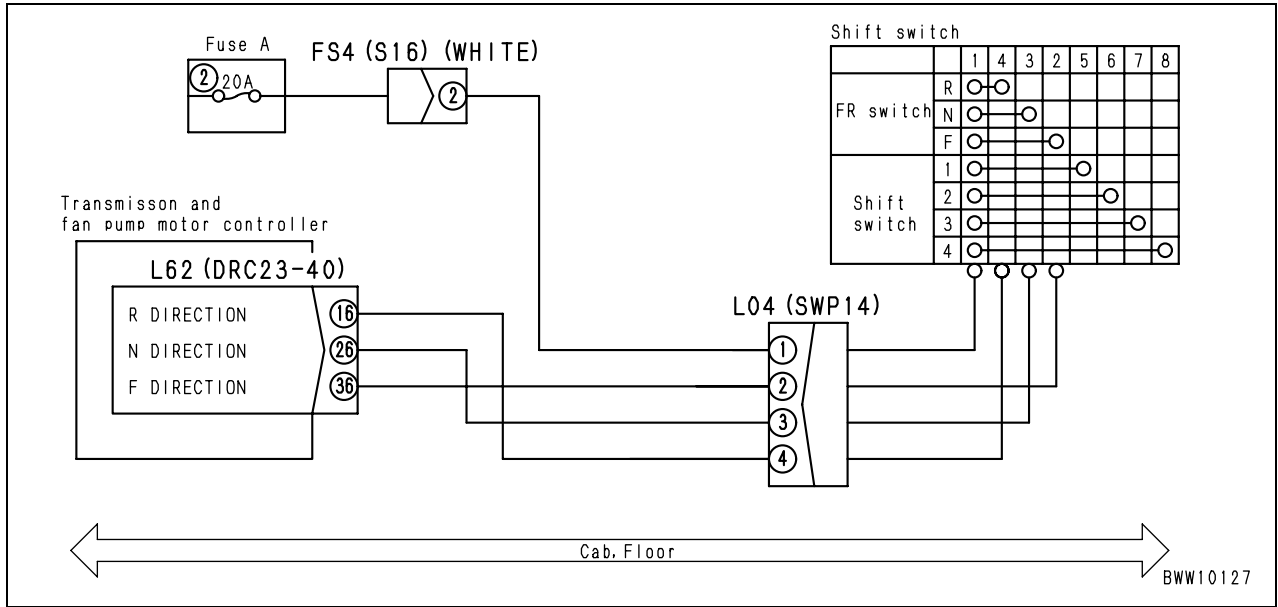
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Related circuit diagram



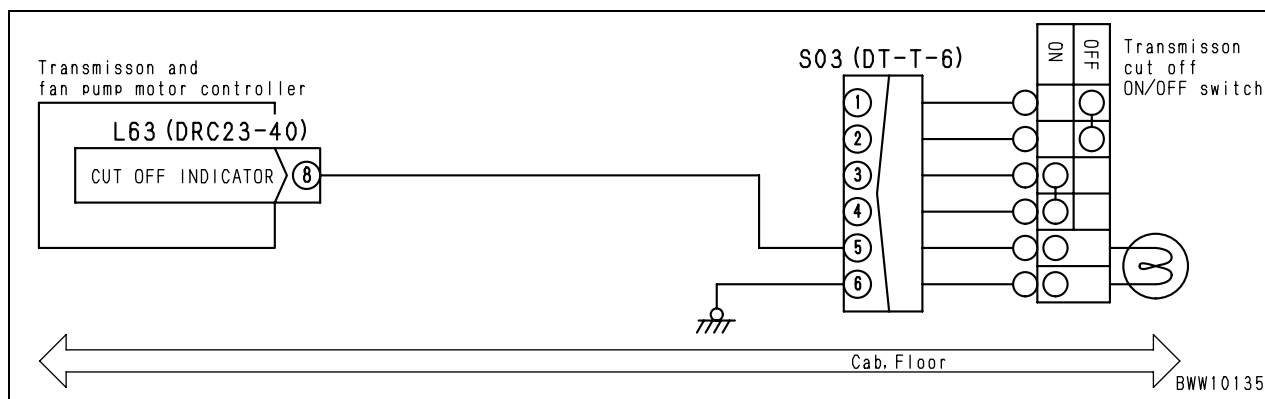


### FAILURE CODE [DT20KB]

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	<ul style="list-style-type: none"> <li>Due to ground fault of the built-in indicator lamp system of transmission cut-off switch, no output goes to the indicator lamp.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>No action.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>The indicator lamp built in the transmission cut-off switch does not come on.</li> </ul>			
Related information	—			

Possible causes and standard values in normal state	Causes		Standard Values in Normal State and Remarks on Troubleshooting				
		1	Ground fault in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S03. 3) Connect T-adaptor.			
Between L63 (Female) (8)/S03 (Female) (5) - body				Resistance	Min. 1 Ω		
2		Defective built in indicator lamp of transmission cut-off switch	1) Turn starting switch OFF. 2) Disconnect connector S03. 3) Connect T-adaptor. 4) Turn on starting switch.				
			Between S03 (5) - (6)	Cutoff switch = ON	Voltage	17 - 30 V	
				Cutoff switch = OFF	Voltage	Max. 1 V	
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adaptor. 4) Turn starting switch ON.				
	Between L63 (8) - body		Cutoff switch = ON	Voltage	17 - 30 V		
			Cutoff switch = OFF	Voltage	Max. 1 V		

#### Related circuit diagram

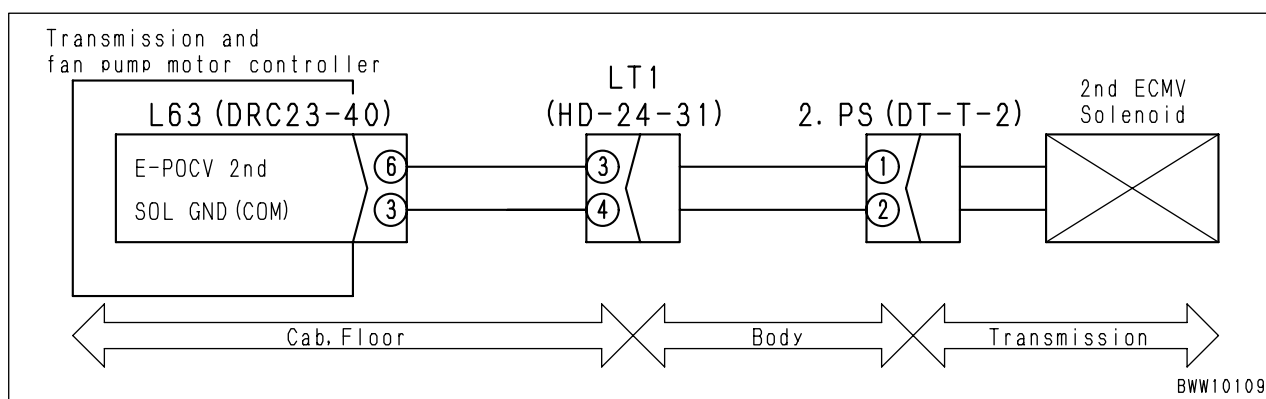


### FAILURE CODE [DXH5KB]

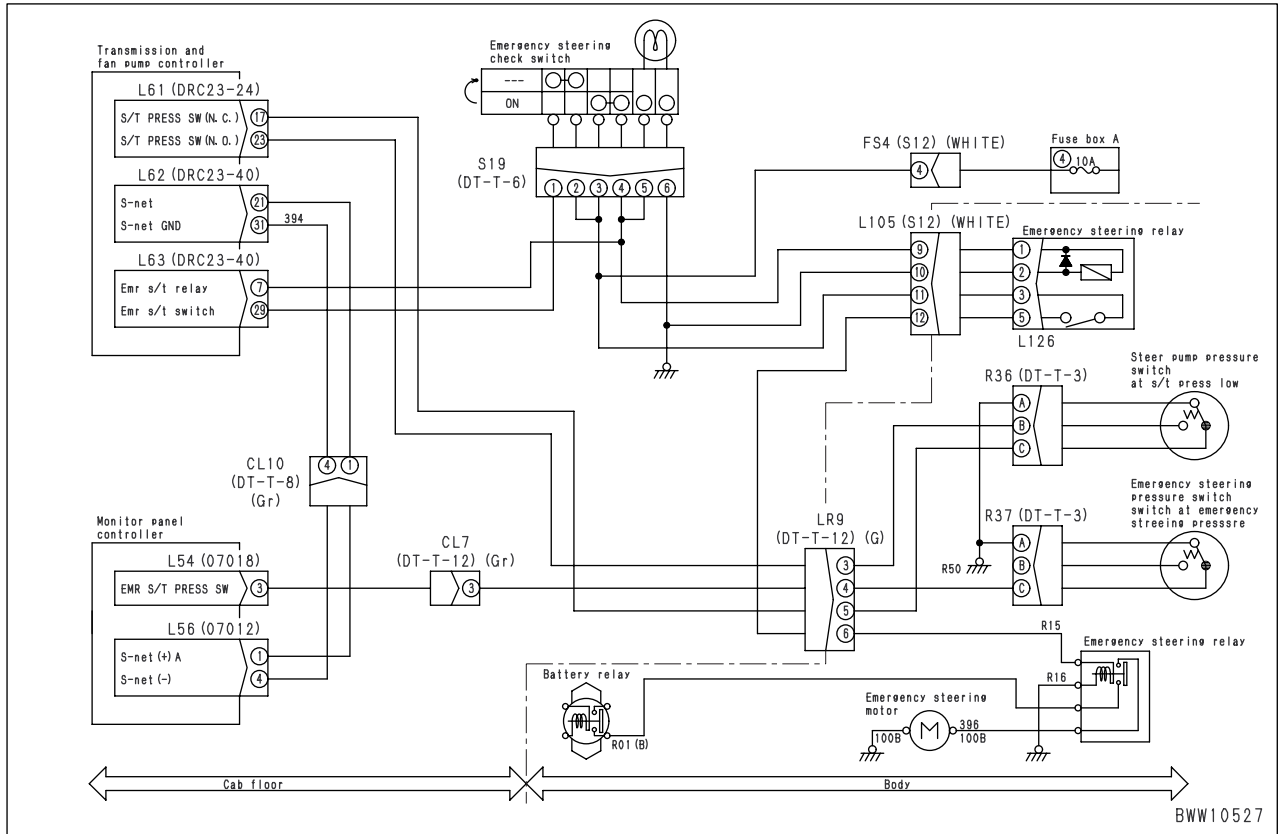
Action code	Failure code	Controller code	Trouble	2nd_ECMV solenoid system short-circuiting
E03	DXH5KB	TM		
Description of trouble	<ul style="list-style-type: none"> <li>Due to ground fault of the 2nd_ECMV solenoid system, no output goes to the 2nd_ECMV.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>Turns output to the 2nd_ECMV solenoid OFF.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>The first pass cannot be engaged. (Traveling in other passes is possible.)</li> </ul>			
Related information	—			

Possible causes and standard values in normal state	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		Ground fault in wiring harness	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	Min. 1 MΩ
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

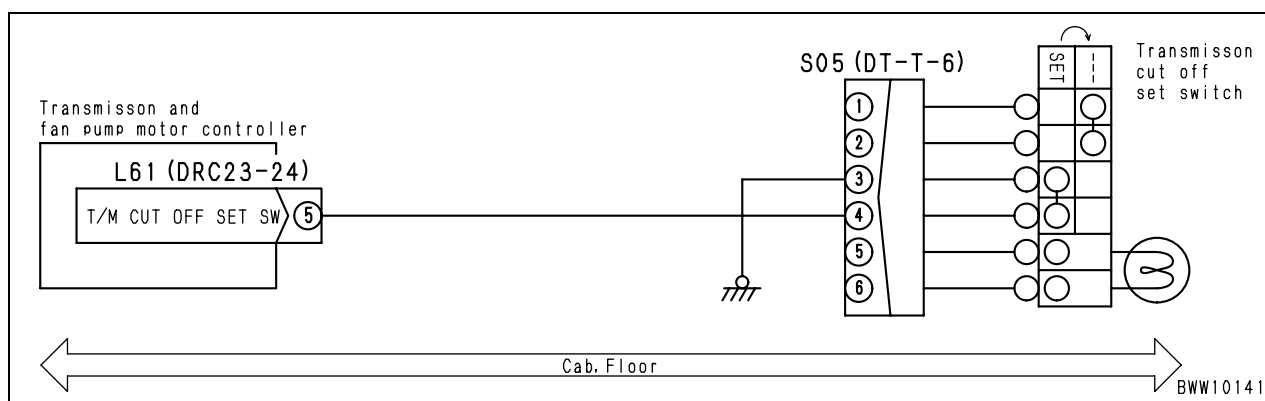


**ACTION CODE [TM-7]**

Action Code	Error Code	Controller Code	Trouble	Transmission cut-off setting switch system discontinuity or hot short-circuiting
TM-7	—	(TM)		
Description of Trouble	<ul style="list-style-type: none"> <li>Due to discontinuity or hot short-circuiting of the transmission cut-off setting switch system, the cut-off setting signal is left as input.</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>No reaction.</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>The transmission cut-off point cannot be reset.</li> </ul>			
Related Information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 40905, D-IN-3).</li> </ul>			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
		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**

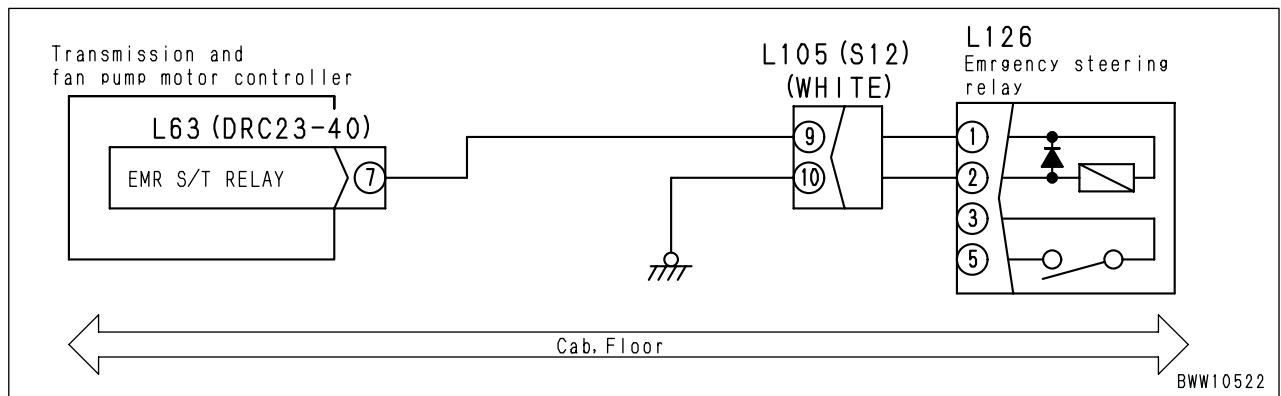


### ACTION CODE [TM-15]

Action code	Failure code	Controller code	Trouble	Motor-driven emergency steering relay output system hot short-circuiting
TM-15	—	—		
Description of trouble	<ul style="list-style-type: none"> <li>Due to hot short-circuiting of the motor-driven emergency steering relay output system, the emergency steering motor keeps operating.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>None in particular.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>The emergency steering motor keeps operating.</li> </ul>			
Related Information	—			

Possible causes and standard values in normal state	Causes		Standard Values in Normal State and Remarks on Troubleshooting				
	1	Hot short in wiring harness	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
2			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 (Female) (7) - body

#### Related circuit diagram

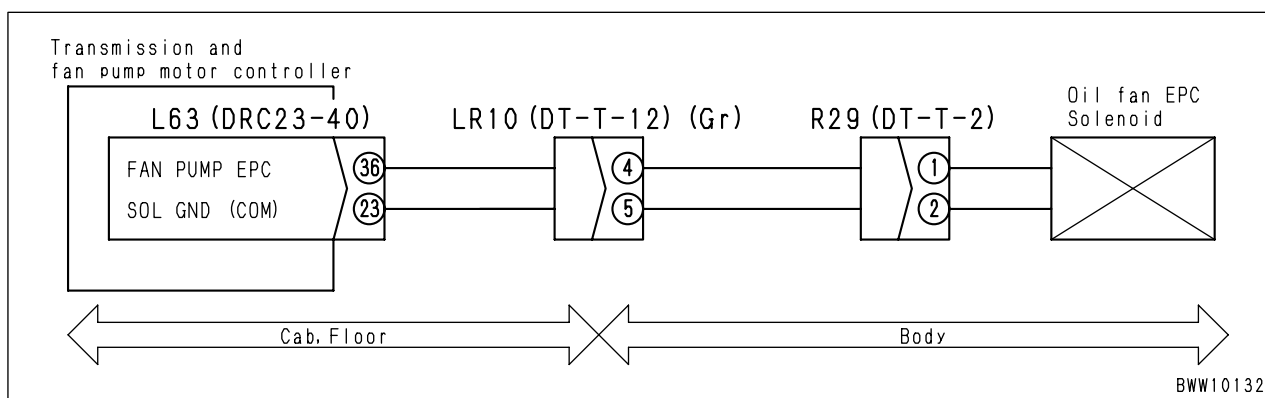


### ACTION CODE [TM-27]

Action Code	Error Code	Controller Code	Trouble	Fan pump EPC solenoid system hot short-circuiting
TM-27	—	—		
Description of Trouble	<ul style="list-style-type: none"> <li>Due to hot short-circuiting of the fan pump EPC solenoid system, the fan operates with minimum revolution.</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>No reaction.</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>The fan operates with minimum revolution.</li> </ul>			
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
2			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 (Female) ③⑥ ~ ②

#### Related circuit diagram



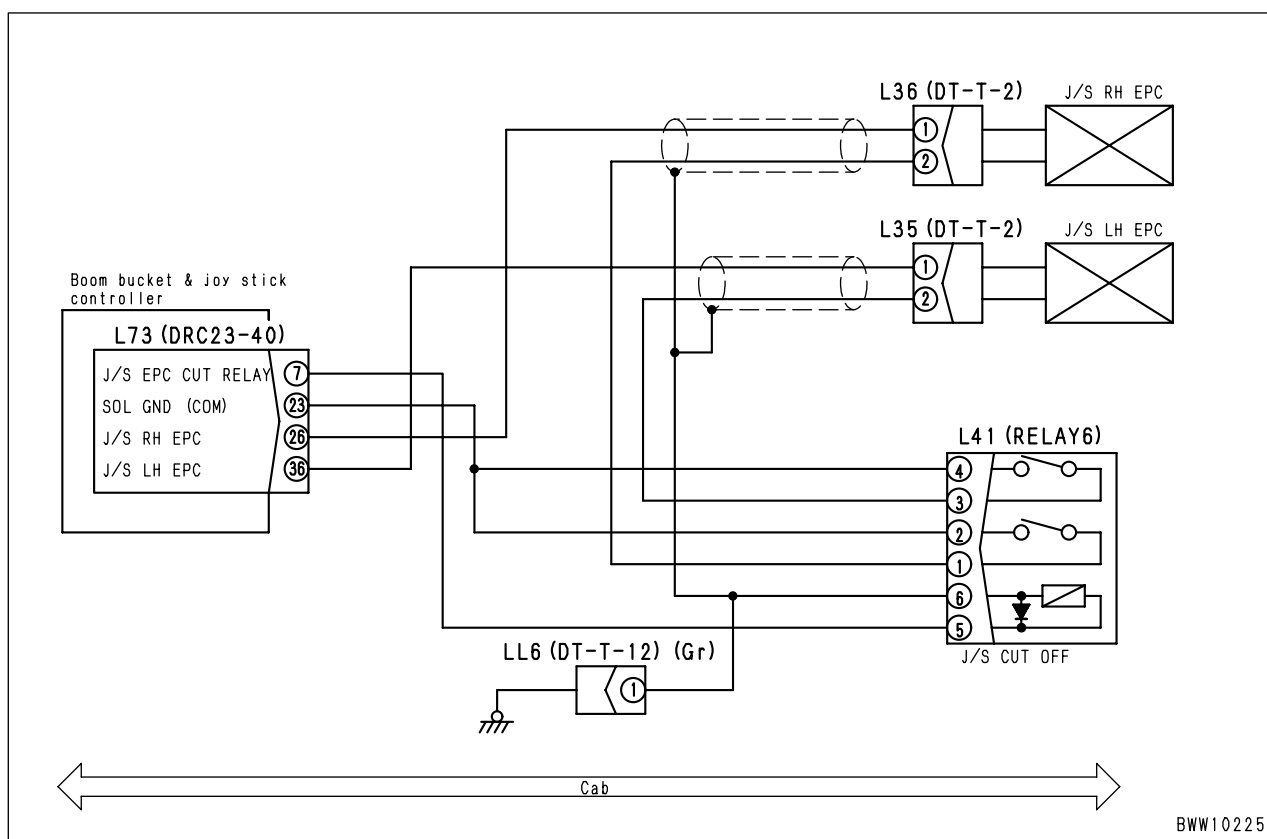
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R10	Terminal	1	Slow-blow fuse	K-3	E
R11	Terminal	1	Slow-blow fuse	K-2	X-7
R12	Terminal	1	Slow-blow fuse	K-3	E
R13	Terminal	1	Battery relay	L-1	X-6
R14	Terminal	1	Battery relay	L-1	X-6
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	G-9	T-9
R24	DT-T	2	Diode (Battery relay)	I-1	P-1
R25	DT-T	2	Diode (Battery relay)	I-2	P-1
R26	DT-T	2	Diode (Starting motor)	H-1	P-1
R27	DT-T	2	Diode (Starting motor)	J-2	P-1
R29	DT-T	2	Fan pump EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-5	S-8
R31	M	6	Rear combination lamp (Right)	H-9	S-8
R32	DT-T	2	Coolant level sensor	B-8	X-8
R33	DT-T	2	Fuel level gauge sensor	K-3	U-8
R34	M	2	License lamp	L-6	—
R36	DT-T	3	Steering pump pressure switch	E-1	V-8
R37	DT-T	3	Emergency steering pressure switch	D-1	W-8
R38	DT-T	6	Auto grease controller	—	N-1
R39	DT-T	2	Battery level sensor	L-6	T-7
R43	KES1	2	Front windshield washer	G-1	—
R44	DT-T	2	Diode (Washer)	G-1	—
R45	KES1	2	Rear windshield washer	H-1	—
R46	DT-T	2	Diode (Washer)	G-1	—
R47	DT-T	2	Hydraulic oil temperature sensor	A-6	W-1
R50	Terminal	1	Ground (Rear frame)	I-9	T-1
R51	DT-T	2	Emergency brake switch 1	F-1	TM
R52	DT-T	2	Emergency brake switch 2	F-1	TM
R53	DT-T	2	Front brake accumulator low pressure switch	F-1	W-8
R54	DT-T	2	Rear brake accumulator low pressure switch	F-1	W-8
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	—
R56	DT-T	2	Rear brake oil temperature sensor	H-1	—
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground (Rear frame)	L-5	—
R65	DT-T	6	Cooler automatic tilt motor switch (OPT)	L-4	—
R66	DT-T	2	Cooler automatic tilt motor	H-9	—
R68	Terminal	1	Fuel solenoid relay	I-9	—
R69	Terminal	1	Fuel solenoid relay	I-9	—
R72	DT-T	2	Fuel solenoid relay	K-9	—
REV OUT	DT-T	2	Speed sensor	e-3	TM
S01	DT-T	6	Front working lamp switch	O-1	C-8
S02	DT-T	6	Rear working lamp switch	O-1	C-8
S03	DT-T	6	Transmission cut-off ON/OFF switch	M-4	—
S04	DT-T	6	Right FNR selector switch	—	TM

### ERROR CODE [D193KA]

Action Code	Error Code	Controller Code	Trouble	Defective joystick steering cut relay system (Main circuit disconnected)
E03	D193KA	WRK		
Description of Trouble	<ul style="list-style-type: none"> <li>The joystick steering solenoid cut relay output system is disconnected (Defective).</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>Stops the joystick steering solenoid cut relay output and joystick steering EPC solenoid output (Both left and right).</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>The joystick steering cannot be operated.</li> </ul>			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective relay (L41)	1) Turn starting switch OFF. 2) Disconnect connector L41. 3) Connect T-adapter.	
Between L41 (Male) ⑤ ~ ⑥				Resistance	200 ~ 400 Ω
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L41. 3) Connect T-adapter.		
			Wiring harness between L73 (Female) ⑦ ~ L41 (Female) ⑤	Resistance	1 Ω and below
3		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.		
			Between L73 (Female) ⑦ ~ body	Resistance	200 ~ 400 Ω

#### Related Circuit Diagram

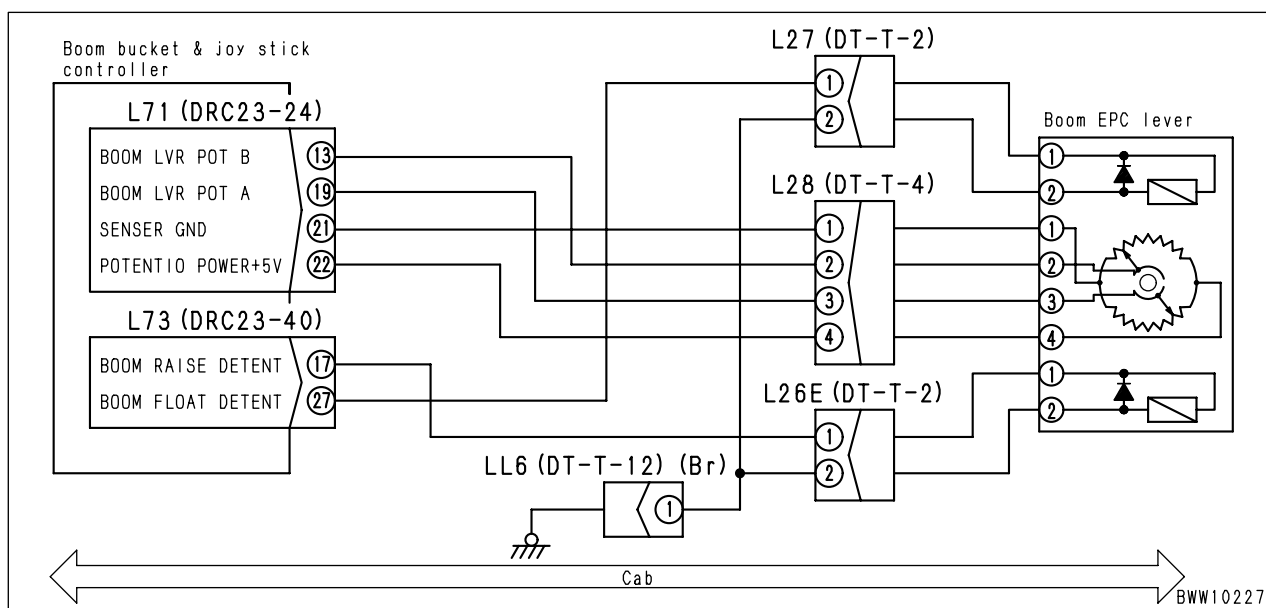


ERROR CODE [DK59L8]

Action Code	Error Code	Controller Code	Trouble	Defective lift arm EPC potentiometer system (Displacement of main and sub circuit)
E03	DK59L8	WRK		
Description Of Trouble	• The input signal for the lift arm EPC lever potentiometer system (Main and sub circuit) is not coincided.			
Controller Reaction	• Stops the lift arm EPC solenoid output and the lift arm EPC lever magnet detent output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42000 and 42001).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective potentiometer ★ Defective installation (Loose and play)	1) Turn starting switch OFF. 2) Disconnect connector L71 and L28. 3) Connect T-adaptor. 4) Turn starting switch ON.		
Between L28 ③ - ①				Lever = Neutral	Voltage	2.4 ~ 2.6 V
				Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V
Between L28 ② - ①				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
				Lever = Neutral	Voltage	2.4 ~ 2.6 V
Between L28 ④ - ①				Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V
		Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V		
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adaptor.			
			Wiring harness between L71 (Female) ⑱ - L28 (Female) ③	Resistance	1 Ω and below	
			Wiring harness between L71 (Female) ⑬ - L28 (Female) ②	Resistance	1 Ω and below	
3		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adaptor. 4) Turn starting switch ON.			
	Between L71 ⑱ - ⑳		Lever = Neutral	Voltage	2.4 ~ 2.6 V	
			Lever = Full stroke at the up side	Voltage	3.9 ~ 4.4 V	
			Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V	
	Between L71 ⑬ - ⑳		Lever = Neutral	Voltage	2.4 ~ 2.6 V	
			Lever = Full stroke at the up side	Voltage	0.6 ~ 1.1 V	
Lever = Full stroke at the up side		Voltage	3.9 ~ 4.4 V			

Related circuit diagram

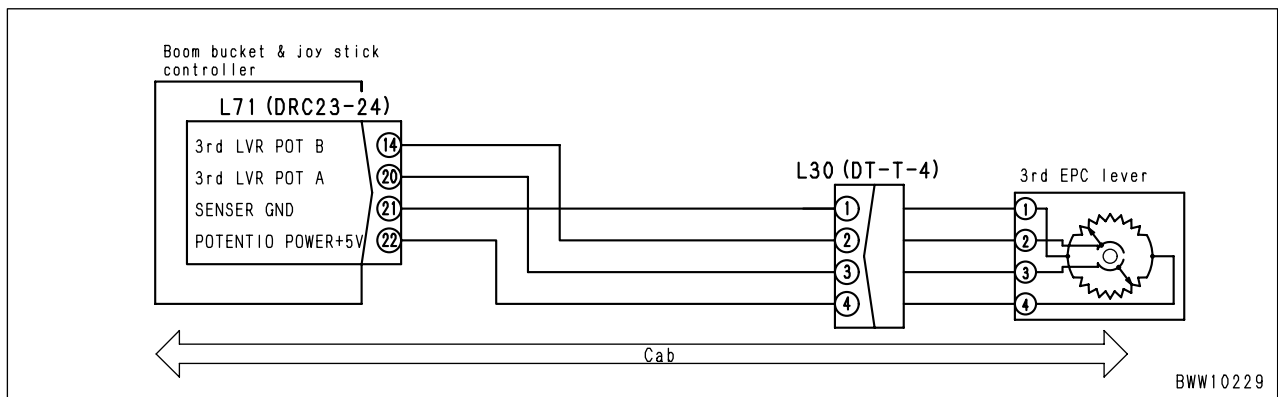


### ERROR CODE [DK5EKY]

Action Code	Error Code	Controller Code	Trouble	Defective 3rd valve EPC lever potentiometer system (Short sub circuit)
E03	DK5EKY	WRK		
Description Of Trouble	<ul style="list-style-type: none"> <li>The electric power supply harness is contacted to the 3rd valve EPC lever potentiometer signal system.</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>Turns off the 3rd valve EPC solenoid output.</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>The 3rd valve cannot be operated.</li> </ul>			
Related Information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 42007).</li> </ul>			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective harness hot short (Contacted to electric power supply harness)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L30. 3) Connect T-adapter. 4) Turn starting switch ON. Between L71 (Female) ⑭/L30 (Female) ② ~ body Voltage 1 V and below	
2		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Connect T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position. Between L71 ⑭ ~ ⑳ Voltage 2.4 ~ 2.6 V		

**Related circuit diagram**

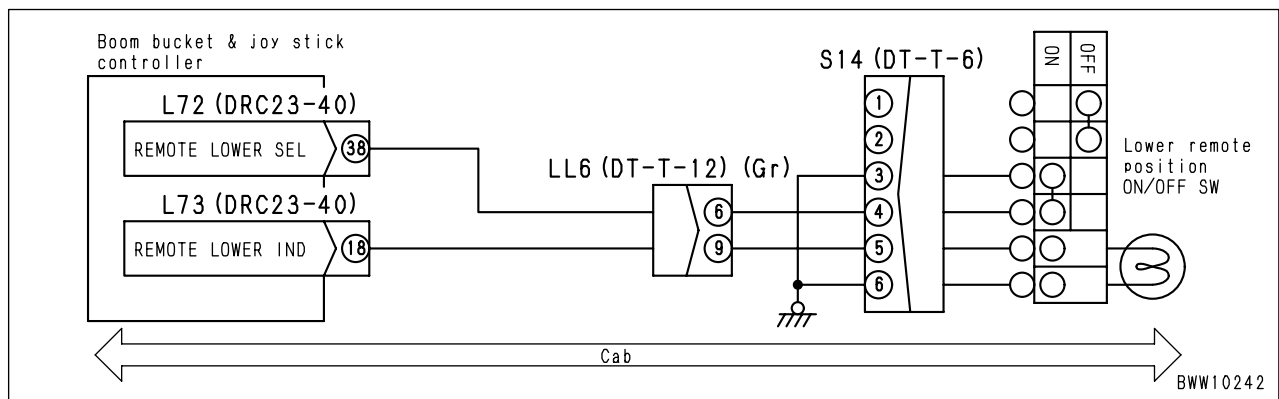


### ERROR CODE [DUM2KB]

Action Code	Error Code	Controller Code	Trouble	Remote positioner LOWER lamp system ground fault
E03	DUM2KB	WRK		
Description Of Trouble	• The remote positioner LOWER lamp system ground fault prevents output to the indicator lamp.			
Controller Reaction	• No reaction.			
Effect on Machine	• The remote positioner LOWER indicator lamp cannot be turned on.			
Related Information	• Can be checked with the monitoring function (Code: 40917).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective remote positioner LOWER indicator lamp	1) Turn starting switch OFF. 2) Disconnect connector S14. 3) Connect T-adapter.	
Between S14 (Male) ⑤ ~ ⑥				Resistance	Approx. 20 Ω
2		Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and S13. 3) Connect T-adapter.		
			Wiring harness between L73 (Female) ⑱, S14 (Female) ⑤ ~ body	Resistance	1 MΩ and above
3		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector SL73. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L73 ⑱ ~ body	When the remote positioner LOWER lamp is ON.	Voltage
	When the remote positioner LOWER lamp is OFF.			Voltage	1 V and below

#### Related circuit diagram

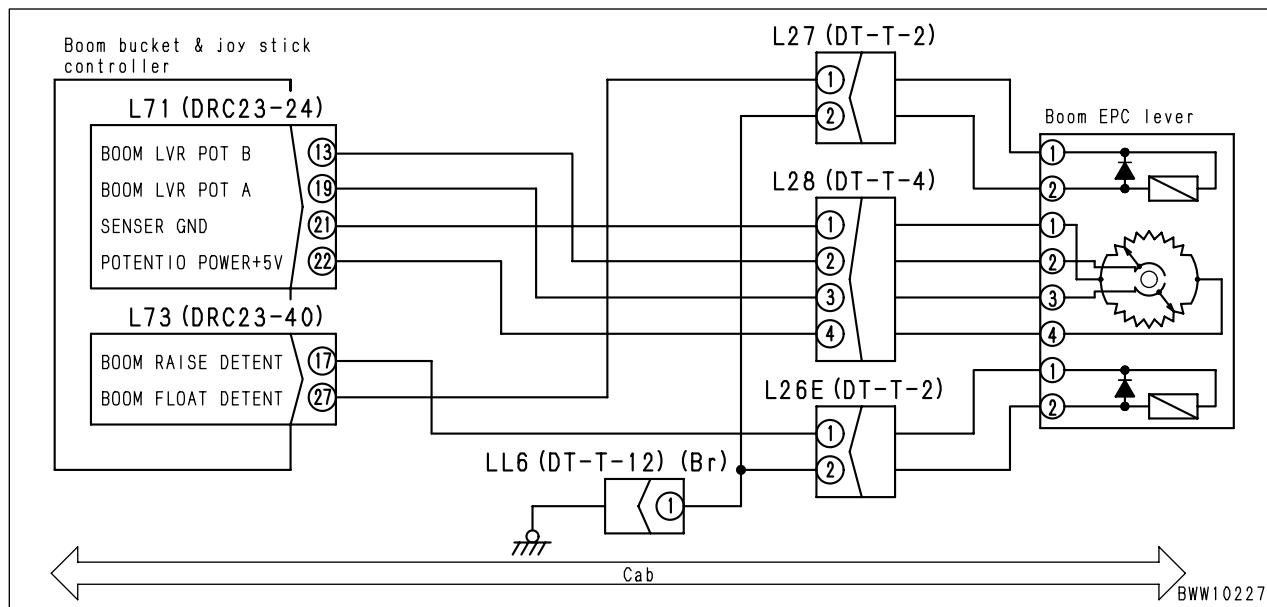


### ERROR CODE [DWN6KB]

Action Code	Error Code	Controller Code	Trouble	Lift arm RAISE magnet detent system ground fault
E01	DWN6KB	WRK		
Description Of Trouble	<ul style="list-style-type: none"> <li>The detent cannot be controlled due to the lift arm RAISE magnet detent system ground fault.</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>Stops output to the magnet detent solenoid.</li> <li>Stops the remote RAISE function.</li> <li>Stops the output of the remote positioner RAISE lamp.</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>The detent does not work but normal operation is possible.</li> </ul>			
Related Information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 40916).</li> </ul>			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective lift arm RAISE magnet detent	1) Turn starting switch OFF. 2) Disconnect connector L26E. 3) Connect T-adaptor.	
Between L26E (Male) ① - ②				Resistance	35 ~ 45 Ω
Wiring harness between L26E (Male) ① - body				Resistance	1 MΩ and above
2		Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L26E. 3) Connect T-adaptor.		
			Wiring harness between L73 (Female) ⑰, L26E (Female) ① ~ body	Resistance	1 MΩ and above
			3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adaptor.
Between L73 (Female) ⑰ ~ body	Resistance	35 ~ 45 Ω			

**Related circuit diagram**

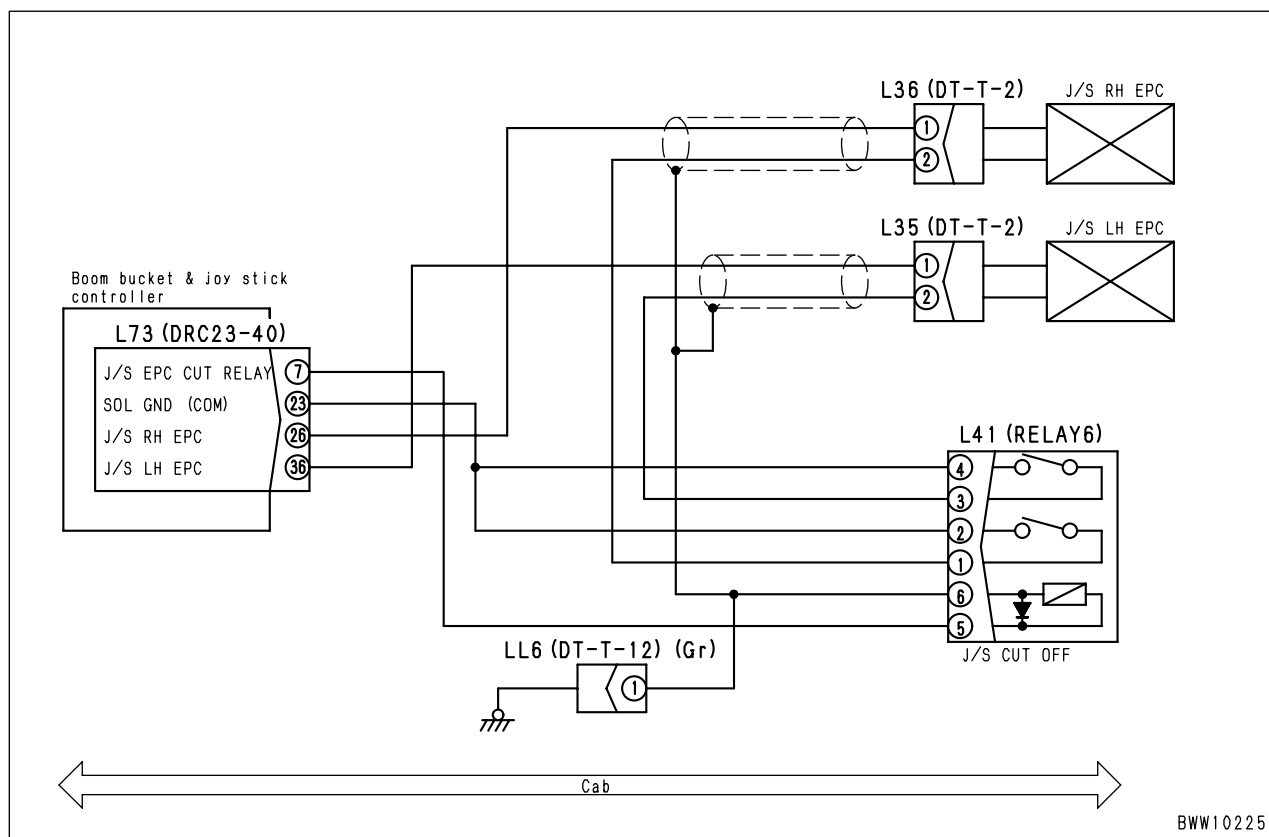


ERROR CODE: [DXHMKB]

Action Code	Error Code	Controller Code	Trouble	Joystick steering left-hand EPC solenoid system ground fault
E03	DXHMKB	WRK		
Description of Trouble	<ul style="list-style-type: none"> <li>Joystick steering left-hand EPC solenoid system ground fault prevents output to the joystick steering left-hand EPC solenoid.</li> </ul>			
Controller Reaction	<ul style="list-style-type: none"> <li>Stops output to the joystick steering left-hand EPC solenoid (Both sides).</li> </ul>			
Effect on Machine	<ul style="list-style-type: none"> <li>Stops output to the joystick steering left-hand EPC solenoid (Both sides).</li> <li>Stops output to the joystick solenoid cutoff relay.</li> </ul>			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting	
	1	Defective joystick steering left-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L3. 3) Connect T-adapter.	Between L35 (Male) ① ~ ②
2	Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L35. 3) Connect T-adapter.	Wiring harness between L73 (Female) ③⑥, L35 (Female) ① ~ body	Resistance 1 MΩ or more
3	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adapter.	Between L73 (Female) ③⑥ ~ L41 (Female) ③	Resistance 10 ~ 15 Ω

Related circuit diagram

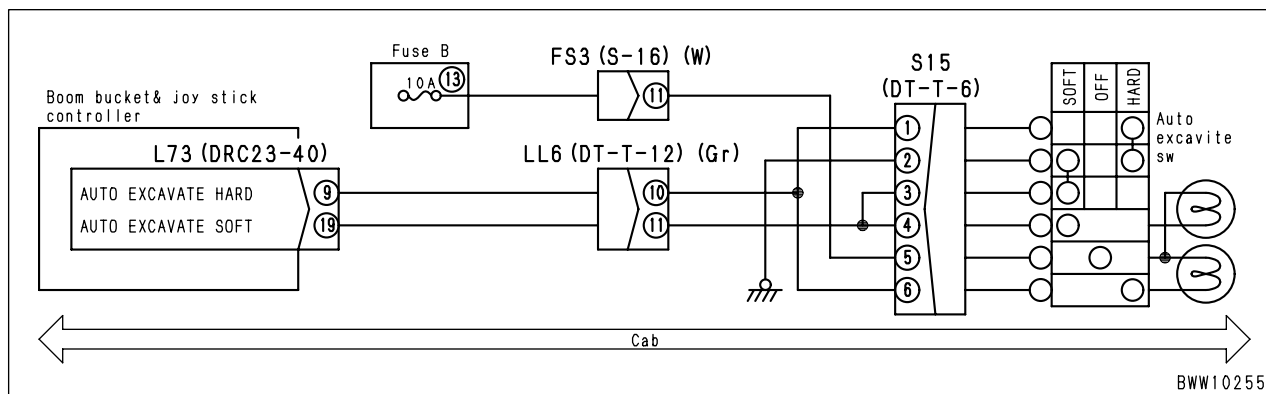


**ACTION CODE: [WRK-8]**

Action Code	Error Code	Controller Code	Trouble	Defective semi-automatic digging HARD selection switch system
WRK-8	—	(WRK)		
Description of Trouble	• The semi-automatic digging HARD control is not available or the semi-automatic digging HARD mode cannot be cancelled due to incorrectly disconnected, grounded or short-circuited semi-automatic digging HARD selection switch system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Semi-automatic digging HARD control is not available or the semi-automatic digging HARD mode cannot be cancelled.			
Related Information	• Can be checked with the monitoring function (Code: 40911_D-IN-12).			

Possible Causes and Standard Values	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 L73, and S15. 3) Connect T-adaptor.		
Wiring harness between L73 (Female) ⑨ - S15 (Female) ①				Resistance	1 Ω and below	
Wiring harness between S15 (Female) ② ~ body				Resistance	1 Ω and below	
2		Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adaptor.			
			Between L73 (Female) ⑨, S15 (Female) ① - body	Resistance	1 MΩ and above	
	FS4 (Female) ⑪, S15 (Female) ⑤ ~ body ★ Fuse A-⑤ blows in this case		Resistance	1 MΩ and above		
3	Hot-shortened wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L73 and S15. 3) Connect T-adaptor. 4) Turn starting switch ON.				
		Between L73 (Female) ⑨, S15 (Female) ① - body	Voltage	1 V and below		
4	Defective semi-automatic digging (HARD)	1) Turn starting switch OFF. 2) Disconnect connector S15. 3) Insert T-adaptor. 4) Turn starting switch ON.				
		Between S15 ① ~ ②	Semi-automatic digging switch (Hardware) = ON	Voltage	1 V and below	
			Semi-automatic digging switch (Hardware) = Other than ON	Voltage	20 ~ 30 V	
5	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L72. 3) Insert T-adaptor. 4) Turn starting switch ON.				
		Between L72 ⑨ ~ body	Semi-automatic digging switch (Hard) = ON	Voltage	1 V and below	
			Semi-automatic digging switch (Hard) = Other than ON	Voltage	20 ~ 30 V	

**Related circuit diagram**

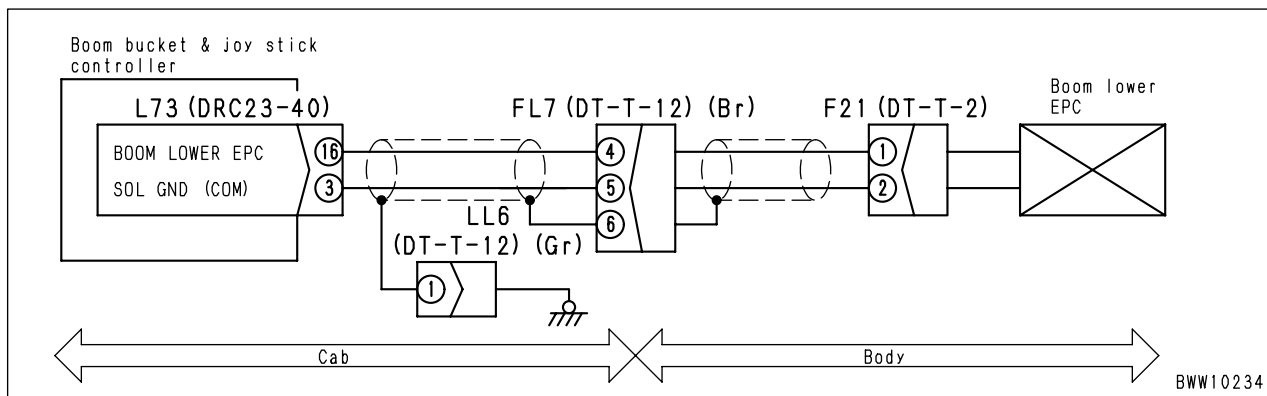


**ACTION CODE: [WRK-18]**

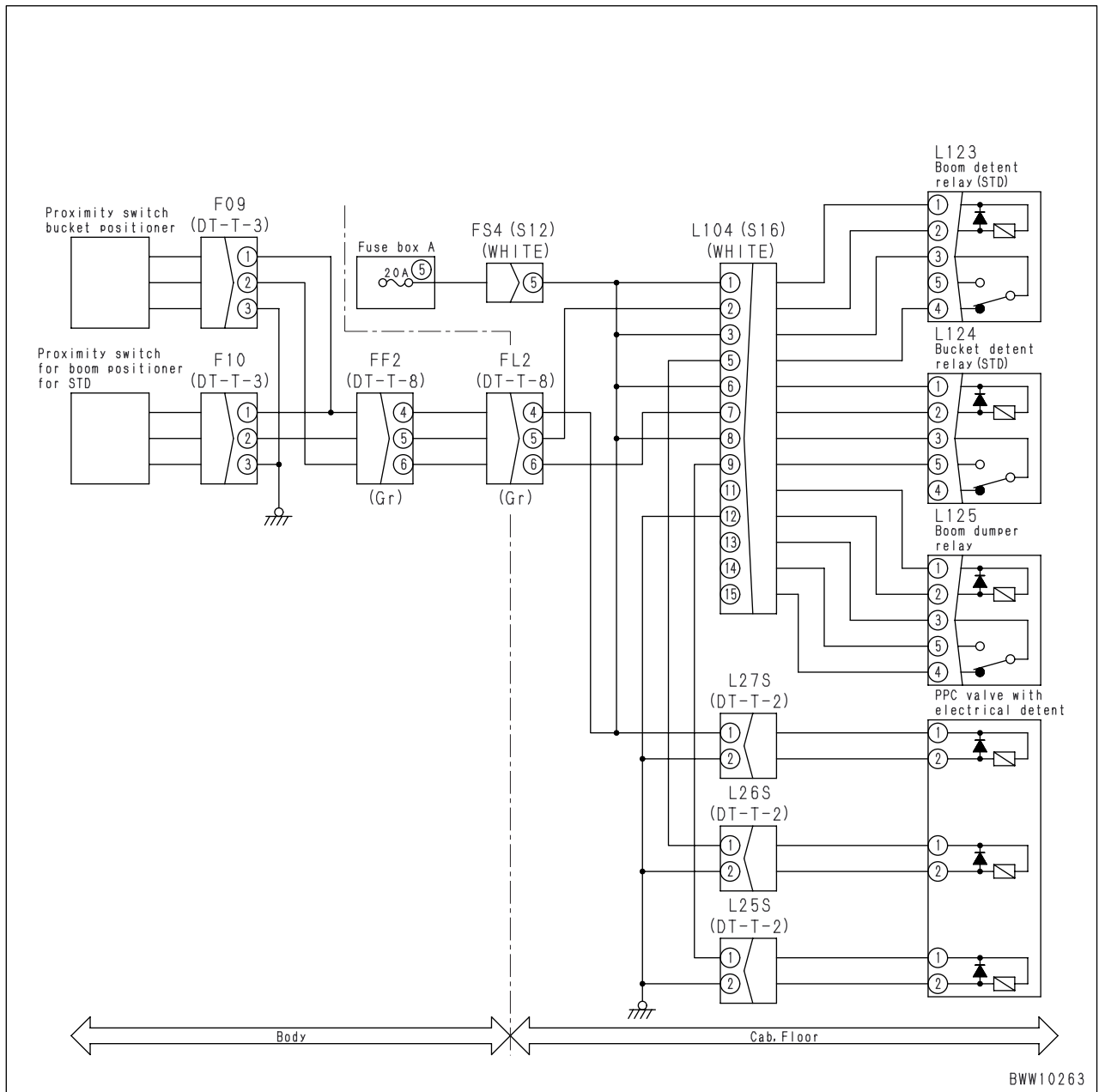
Action Code	Error Code	Controller Code	Trouble	Hot short-circuited lift arm LOWER EPC solenoid system
WRK-18	—	(WRK)		
Description of Trouble	• Lift arm LOWER EPC solenoid gets turned on due to hot short-circuited lift arm LOWER EPC solenoid system.			
Controller Reaction	• No reaction.			
Effect on Machine	• Lift arm lowers in full speed.			
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 F21. 3) Connect T-adapter. 4) Turn starting switch ON. Between L73 (Female) ⑯, F21 (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) ⑯ ~ body Resistance 9 ~ 10.2 Ω		

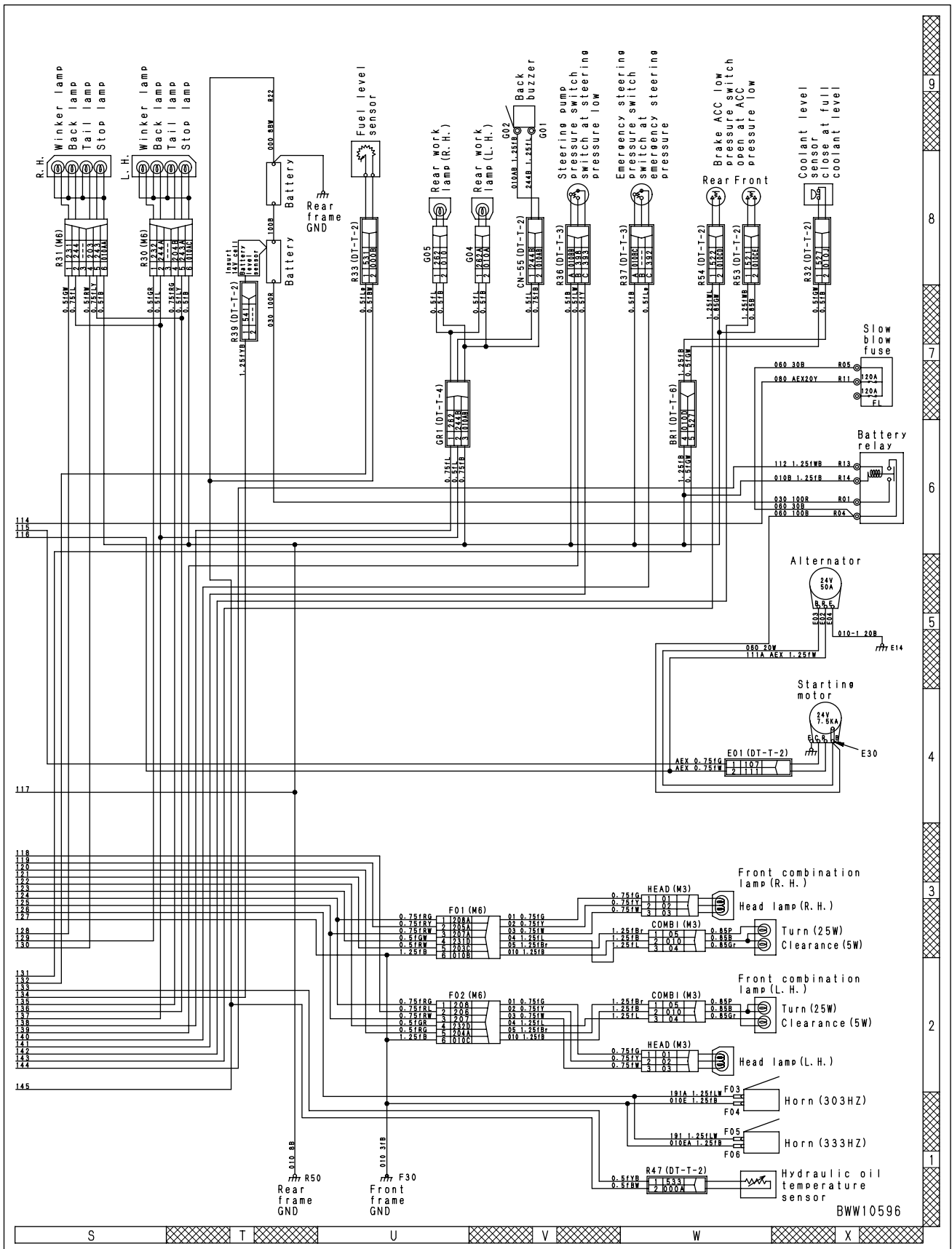
**Related circuit diagram**



Related circuit diagram



Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
R10	Terminal	1	Slow-blow fuse	K-3	E
R11	Terminal	1	Slow-blow fuse	K-2	X-7
R12	Terminal	1	Slow-blow fuse	K-3	E
R13	Terminal	1	Battery relay	L-1	X-6
R14	Terminal	1	Battery relay	L-1	X-6
R15	Terminal	1	Emergency steering relay	J-1	TM
R16	Terminal	1	Emergency steering relay	J-1	TM
R22	Terminal	1	Battery	G-9	T-9
R24	DT-T	2	Diode (Battery relay)	I-1	P-1
R25	DT-T	2	Diode (Battery relay)	I-2	P-1
R26	DT-T	2	Diode (Starting motor)	H-1	P-1
R27	DT-T	2	Diode (Starting motor)	J-2	P-1
R29	DT-T	2	Fan pump EPC	A-6	TM
R30	M	6	Rear combination lamp (Left)	L-5	S-8
R31	M	6	Rear combination lamp (Right)	H-9	S-8
R32	DT-T	2	Coolant level sensor	B-8	X-8
R33	DT-T	2	Fuel level gauge sensor	K-3	U-8
R34	M	2	License lamp	L-6	—
R36	DT-T	3	Steering pump pressure switch	E-1	V-8
R37	DT-T	3	Emergency steering pressure switch	D-1	W-8
R38	DT-T	6	Auto grease controller	—	N-1
R39	DT-T	2	Battery level sensor	L-6	T-7
R43	KES1	2	Front windshield washer	G-1	—
R44	DT-T	2	Diode (Washer)	G-1	—
R45	KES1	2	Rear windshield washer	H-1	—
R46	DT-T	2	Diode (Washer)	G-1	—
R47	DT-T	2	Hydraulic oil temperature sensor	A-6	W-1
R50	Terminal	1	Ground (Rear frame)	I-9	T-1
R51	DT-T	2	Emergency brake switch 1	F-1	TM
R52	DT-T	2	Emergency brake switch 2	F-1	TM
R53	DT-T	2	Front brake accumulator low pressure switch	F-1	W-8
R54	DT-T	2	Rear brake accumulator low pressure switch	F-1	W-8
R55	DT-T	2	Intermediate connector (Rear brake oil temperature)	J-2	—
R56	DT-T	2	Rear brake oil temperature sensor	H-1	—
R63	Terminal	1	Slow-blow fuse	L-2	—
R64	Terminal	1	Ground (Rear frame)	L-5	—
R65	DT-T	6	Cooler automatic tilt motor switch (OPT)	L-4	—
R66	DT-T	2	Cooler automatic tilt motor	H-9	—
R68	Terminal	1	Fuel solenoid relay	I-9	—
R69	Terminal	1	Fuel solenoid relay	I-9	—
R72	DT-T	2	Fuel solenoid relay	K-9	—
REV OUT	DT-T	2	Speed sensor	e-3	TM
S01	DT-T	6	Front working lamp switch	O-1	C-8
S02	DT-T	6	Rear working lamp switch	O-1	C-8
S03	DT-T	6	Transmission cut-off ON/OFF switch	M-4	—
S04	DT-T	6	Right FNR selector switch	—	TM

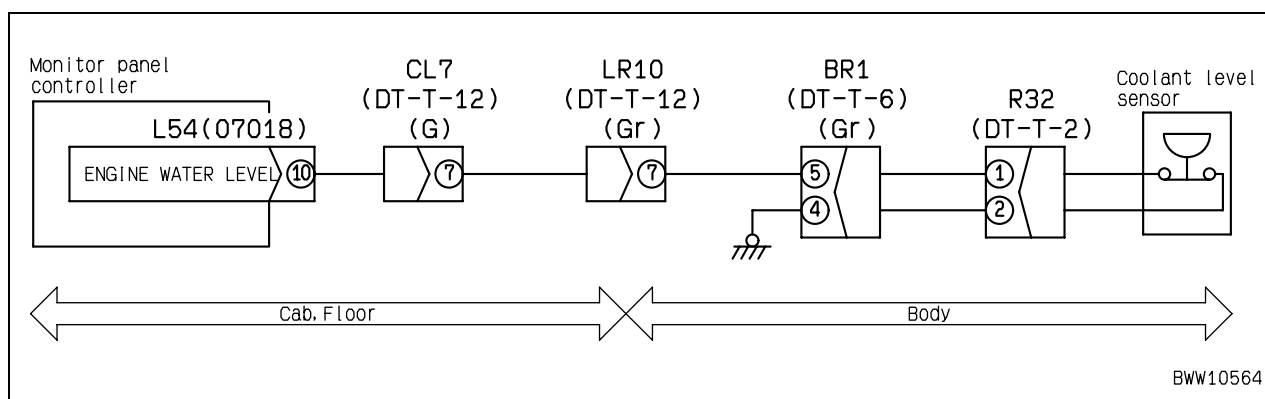


### FAILURE CODE [B@BCZK]

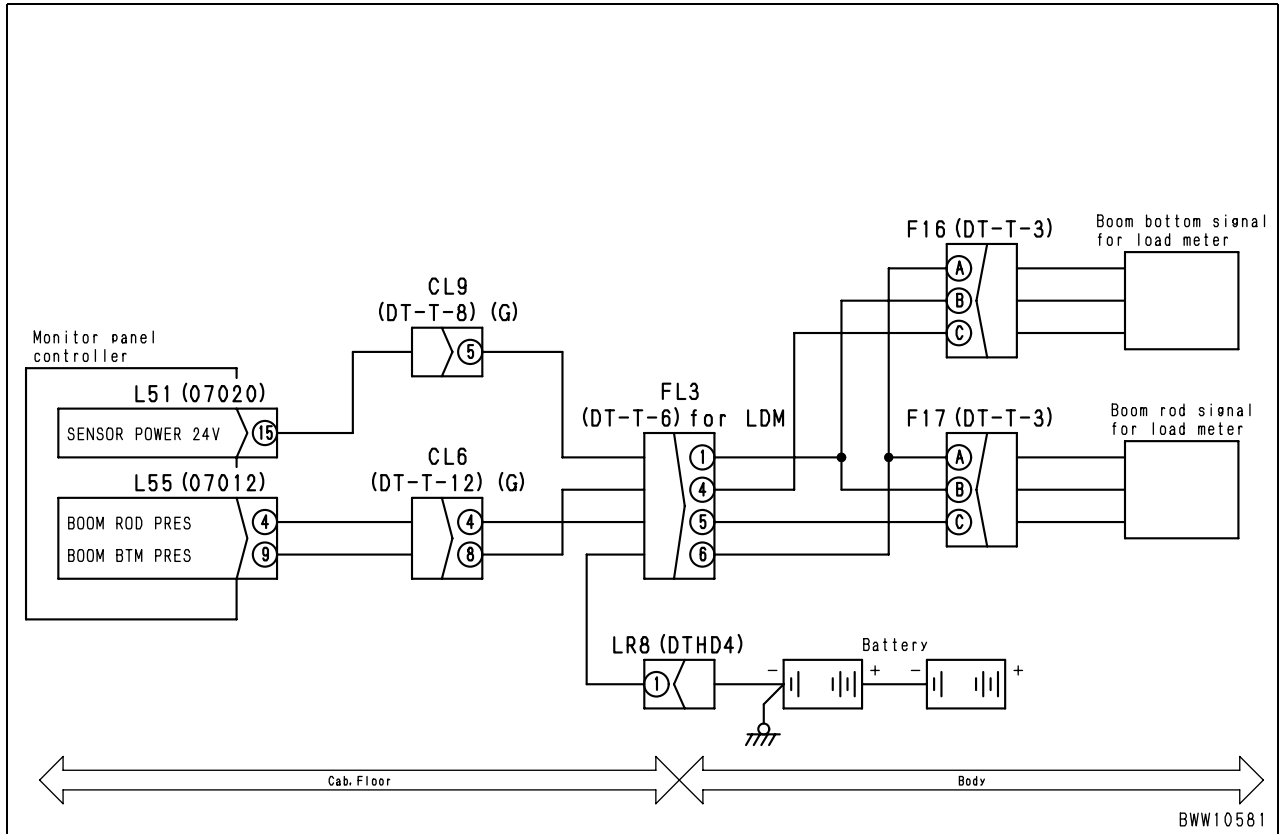
Action code	Failure code	Controller code	Trouble	Alarm indicating low coolant level
E01	B@BCZK	MON		
Description of trouble	<ul style="list-style-type: none"> <li>The coolant level sensor circuit is opened.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>Activates an alarm.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>The coolant level is low (The engine may be damaged).</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 40903, D-IN-27).</li> </ul>			

Possible causes and standard values in normal state	Causes		Standard Value in Normal State and Remarks on Troubleshooting				
	1	Low coolant level	—				
2	Defective coolant level sensor	Between R32 (Male) (1) - (2)	1) Turn starting switch OFF. 2) Disconnect connector R32. 3) Connect t-adapter.		Reserve tank low level and below (abnormal)	Resistance	Min. 1 MΩ
			Reserve tank low level and above (normal)	Resistance	Max. 1 Ω		
3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect connectors L54 and R32. 3) Connect t-adapter.	Wiring harness between L54 (Female) (10) - R32 (Female) (1)		Resistance	Max. 1 Ω	
			4		Defective monitor panel	Between L54 (Female) (10) - body	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adapter.
Reserve tank low level and below (abnormal)	Resistance	Min. 1 MΩ					
Reserve tank low level and above (normal)	Resistance	Max. 1 Ω					

#### Related circuit diagram



Related circuit diagram

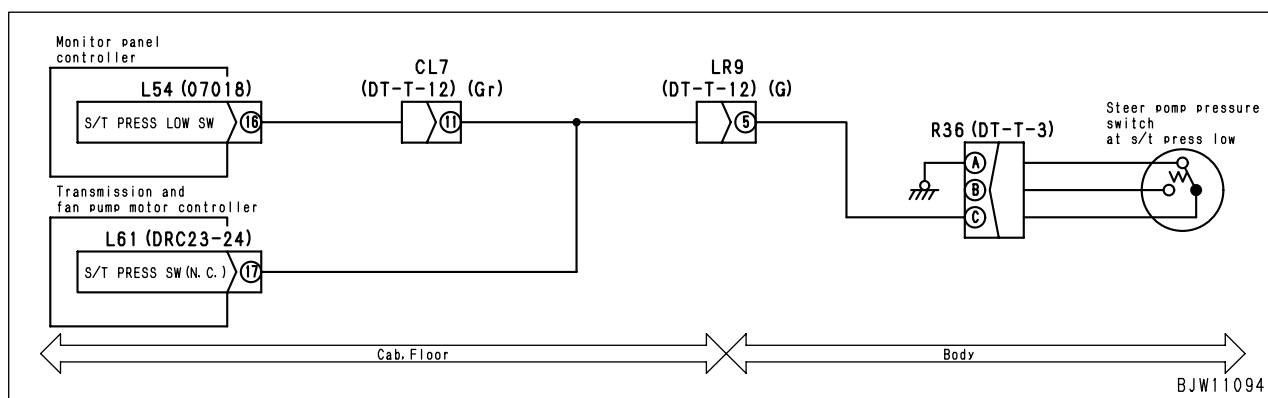


### FAILURE CODE [DDS5L6]

Action code	Failure code	Controller code	Trouble	Decreased steering oil pressure
E03	DDS5L6	MON		
Contents of trouble	<ul style="list-style-type: none"> <li>The steering sensor circuit remains CLOSED when the engine speed is over 500 rpm.</li> </ul>			
Action of monitor panel or controller	<ul style="list-style-type: none"> <li>Activates an alarm.</li> </ul>			
Problem that appears on machine	<ul style="list-style-type: none"> <li>Due to detection of decreased steering oil pressure, the emergency steering pump (Motor) may cause steering control to be selected when the speed is over 1 km/h.</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>Can be verified with the monitoring function (Code: 40904, D-IN-39).</li> </ul>			

Possible causes and standard values in normal state	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	1	Decreased steering oil pressure	—			
2	Faulty steering oil pressure sensor	1) Turn starting switch OFF. 2) Disconnect connector R36. 3) Connect T-adaptor.				
		Between T36 (Male) (C) - (A)	With engine stopped	Resistance	Max. 1 Ω	
			With pressure released to air (For reference purpose)	Resistance	Min. 1 MΩ	
Engine started	Resistance	Min. 1 MΩ				
3	Ground fault in wiring harness	1) Turn starting switch OFF. 2) Disconnect connectors L54, R36 and L61. 3) Connect T-adaptor.				
		Between L54 (Female) (16) /R36 (Female) (C) - body	Resistance	Min. 1 MΩ		
4	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect T-adaptor.				
		Between L54 (Female) (16) - body	Normal temperature (25 °C)	Resistance	35 - 50 kΩ	
			100 °C	Resistance	3.1 - 4.5 kΩ	
Engine started	Resistance	Min. 1 MΩ				

#### Related circuit diagram

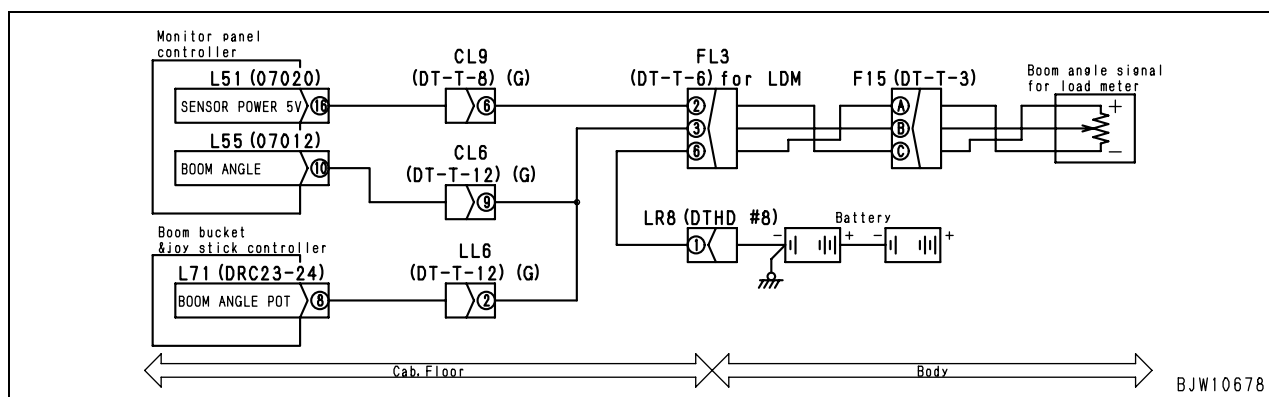


### FAILURE CODE [DKA0KX]

Action code	Failure code	Controller code	Trouble	Lift arm angle sensor failure
E01	DKA0KX	MON		
Contents of trouble	<ul style="list-style-type: none"> <li>The lift arm angle sensor input voltage is less than 1 V or more than 4 V.</li> </ul>			
Action of monitor panel or controller	<ul style="list-style-type: none"> <li>Activates an alarm and disables load display.</li> </ul>			
Problem that appears on machine	<ul style="list-style-type: none"> <li>Activates an alarm and disables load display.</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>This code is applied to the load meter specification.</li> <li>The lift arm angle signal (°) can be verified with the monitoring function (Code: 06001).</li> </ul>			

Possible causes and standard values in normal state	Causes	Standard Value in Normal State and Remarks on Troubleshooting			
		1 Faulty lift arm angle sensor	1) Turn starting switch OFF. 2) Disconnect connector F15. 3) Insert T-adaptor.		
Between F15 (Male) (C) - (A)			Resistance	4 - 6 kΩ	
1) Turn starting switch OFF. 2) Disconnect connector F15. 3) Insert T-adaptor. 4) Turn starting switch ON.					
Between F15 (C) - (A)			Voltage	4.75 - 5.25 V	
Between F15 (B) - (A)			With lift arm fully raised	Voltage	3.5 - 4.0 V
			With lift arm fully lowered	Voltage	1.0 - 2.0 V
2 Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)		1) Turn starting switch OFF. 2) Disconnect connectors L51, L55 and F15 3) Connect T-adaptor.			
		Between L51 (Female) (16) - F15 (Female) (C)	Resistance	Max. 1 Ω	
		Between L55 (Female) (10) - F15 (Female) (B)	Resistance	Max. 1 Ω	
3 Ground fault in wiring harness		1) Turn starting switch OFF. 2) Disconnect connectors L51, L71 and F15.3) Connect T-adaptor.			
		Between L55 (Female) (10) L71 (Female) (8), F15 (Female) (B) - body	Resistance	Min. 1 MΩ	
4 Defective monitor panel		1) Turn starting switch OFF. 2) Disconnect connectors L51 and L55. 3) Insert T-adaptor. 4) Turn starting switch ON.			
	Between L51 (16) - body	Voltage	4.75 - 5.25 V		
	Between L55 (10) - body	With lift arm fully raised	Voltage	3.5 - 4.0 V	
		With lift arm fully lowered	Voltage	1.0 - 2.0 V	

#### Related circuit diagram

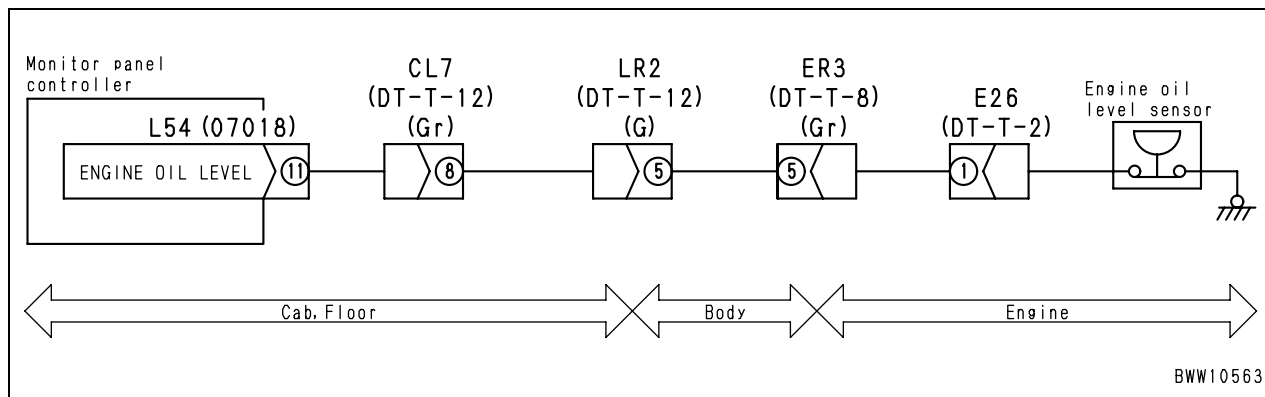


**ACTION CODE [MON-6]**

Action code	Failure code	Controller code	Trouble	The engine oil level warning lamp does not light ON
MON-6	—	(MON)		
Description of trouble	<ul style="list-style-type: none"> <li>The engine oil level sensor circuit is in the CLOSE state.</li> </ul>			
Controller reaction	<ul style="list-style-type: none"> <li>None in particular.</li> </ul>			
Effect on machine	<ul style="list-style-type: none"> <li>The engine oil level warning lamp does not light ON.</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>Can be checked with the monitoring function (Code: 40903, D-IN-29).</li> </ul>			

Possible causes and standard values in normal state	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective engine oil level sensor	1) Turn starting switch OFF. 2) Disconnect connector E26. 3) Connect T-adaptor.		
Between E26 (Male) (1) - body				Oil level normal	Resistance	Max. 1 Ω
			Oil level insufficient (Reduces)	Resistance	Min. 1 MΩ	
2		Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L54 and E26. 3) Connect T-adaptor.			
			Between L54 (Female) (11), E26 (Female) (1) - body		Resistance	Min. 1 MΩ
3		Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L54. 3) Connect t-adaptor.			
	Between L54 (Female) (11) - body		Oil level normal	Resistance	Max. 1 Ω	
			Oil level insufficient (Reduces)	Resistance	Min. 1 MΩ	

**Related circuit diagram**



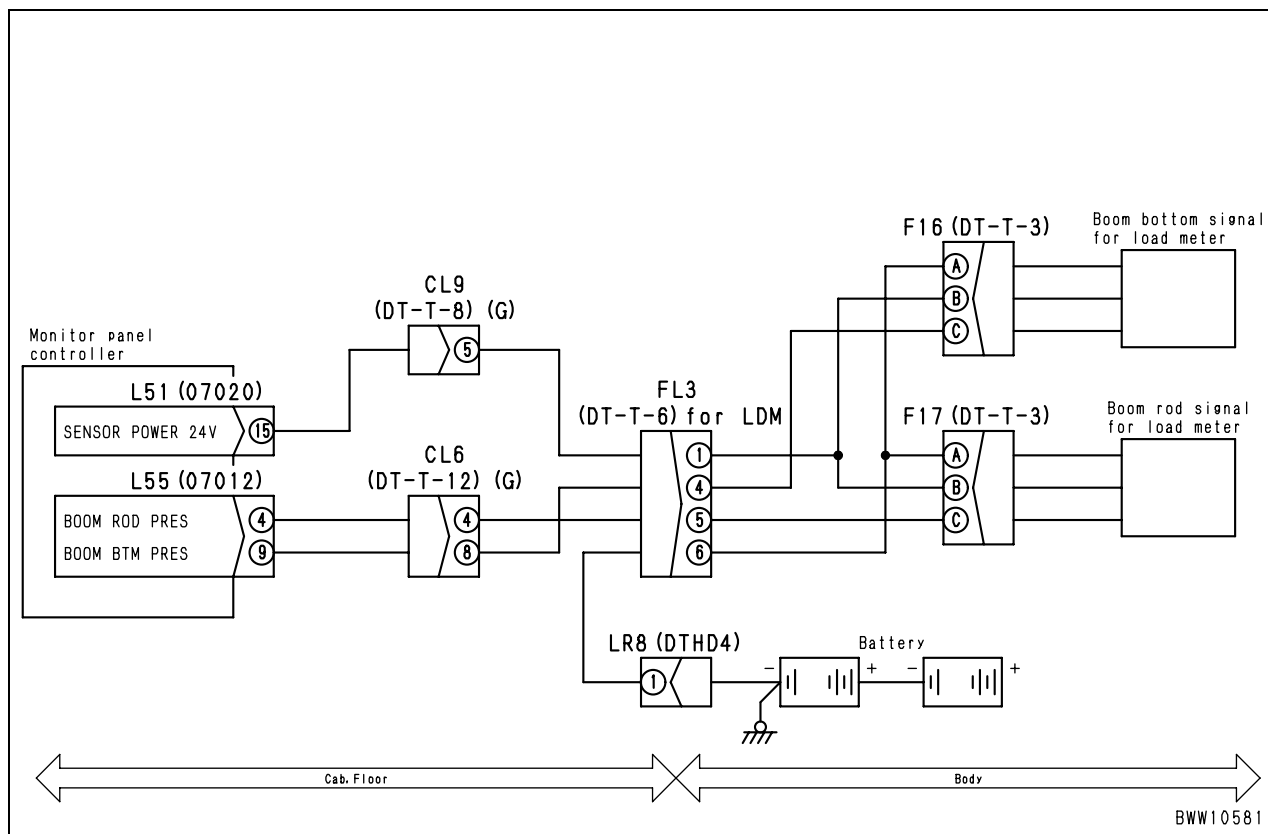
BWW10563

**ACTION CODE [MON-18]**

Action code	Failure code	Controller code	Trouble	Defective bottom pressure sensor (Hot short fault)
MON-18	—	(MON)		
Contents of trouble	<ul style="list-style-type: none"> <li>The input voltage from the bottom pressure sensor is Min. 5.3 V.</li> </ul>			
Action of monitor panel or controller	<ul style="list-style-type: none"> <li>None in particular.</li> </ul>			
Problem that appears on machine	<ul style="list-style-type: none"> <li>The alarm does not function and the load is not displayed.</li> </ul>			
Related information	<ul style="list-style-type: none"> <li>This code is applied to the load meter specification.</li> <li>The bottom pressure signal (0.01 Mpa) can be checked with the monitoring function (Code: 40400).</li> </ul>			

Possible causes and standard values in normal state	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	Possible causes and standard values in normal state	1	Defective lift arm pressure sensor (Bottom side)	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Connect T-adapter. 4) Turn starting switch ON.		
Between F16 (B) - (A)				Voltage	20 - 30 V	
Between F16 (C) - (A)				At running	Voltage	0.7 - 5.3 V
		At atmosphere	Voltage	0.5 - 1.5 V		
2		Hot short in wiring harness	1) Turn starting switch OFF. 2) Disconnect connector F16. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L55 (Female) (9), F16 (Female) (C) - body	Voltage	Max. 1 V	
3	Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51, F16 and F17. 3) Connect T-adapter. 4) Turn starting switch ON.				
		Between L51 (15) - body	Voltage	20 - 30 V		
		Between L55 (9) - body	At running	Voltage	0.7 - 5.3 V	
			At atmosphere	Voltage	0.5 - 1.5 V	

**Related circuit diagram**



**Defective Clutch and ECMV Specifying Method (Check by Failure Code)**

- ★ For the checking method of failure code display, see the paragraph of "Special Functions of Machine Monitor."
- ★ When replacing the ECMV for diagnosis, remove mud and dust around the ECMV completely and clean it, and then tighten the mounting bolt with the specified torque.
- ★ For the following diagnoses, start the engine and select the manual mode:

Table of Applicable Clutches

		Clutch						
		F	R	1st	2nd	3rd	4th	
Gear Speed	N	In the Automatic Mode				●		
		In the Manual Mode			○	○	○	○
	F1	●		●				
	F2	●			●			
	F3	●				●		
	F4	●					●	
	R1		●	●				
	R2		●		●			
	R3		●			●		
R4		●				●		

- ★ When the gear speed is N in the manual mode, the clutch of the gear speed (Marked with O), to which the gear shift lever is set, is ON.
- Even if the gear shift lever is used when the gear speed is N, the clutch position cannot be changed.

Cause											
Transmission						ECMV					
a	b	c	d	e	f	g	h	i	j	k	l
Wear or seizure of F clutch disk or wear of piston seal	Wear or seizure of R clutch disk or wear of piston seal	Wear or seizure of 1st clutch disk or wear of piston seal	Wear or seizure of 2nd clutch disk or wear of piston seal	Wear or seizure of 3rd clutch disk or wear of piston seal	Wear or seizure of 4th clutch disk or wear of piston seal	Defective operation of F clutch ECMV (Fill switch)	Defective operation of R clutch ECMV (Fill switch)	Defective operation of 1st clutch ECMV (Fill switch)	Defective operation of 2nd clutch ECMV (Fill switch)	Defective operation of 3rd clutch ECMV (Fill switch)	Defective operation of 4th clutch ECMV (Fill switch)

No.	Diagnosis	Remedy	Failure Code	X	X	X	X	X	X	X	X	X	X	X
1	① The code is not displayed at R1~R4 but is displayed at F1~F4		15SALI	○							○			
	② When the failure code is 15SALI after the diagnosis in ①, the failure code comes not to be displayed when the F fill switch connector (CN-F.SW) is disconnected. When the failure code is 15SALH, the failure code comes not to be displayed when the ECMV is replaced with any one other than F clutch ECMV		15SALH								○			
2	① The code is not displayed at F1~F4 but is displayed at R1~R4		15SBLI		○							○		
	② When the failure code is 15SBLI after the diagnosis in ①, the failure code comes not to be displayed when the R fill switch connector (CN-R.SW) is disconnected. When the failure code is 15SBLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than R clutch ECMV		15SBLH									○		
3	① The code is not displayed at F2, F3, and F4 but is displayed at F1		15SELI			○							○	
	② When the failure code is 15SELI after the diagnosis in ①, the failure code comes not to be displayed when the 1st fill switch connector (CN-1.SW) is disconnected. When the failure code is 15SELH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 1st clutch ECMV		15SELH										○	
4	① The code is not displayed at F1, F3, and F4 but is displayed at F2		15SFLI				○							○
	② When the failure code is 15SFLI after the diagnosis in ①, the failure code comes not to be displayed when the 2nd fill switch connector (CN-2.SW) is disconnected. When the failure code is 15SFLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 2nd clutch ECMV		15SFLH										○	
5	① The code is not displayed at F1, F2, and F4 but is displayed at F3		15SGLI					○						○
	② When the failure code is 15SGLI after the diagnosis in ①, the failure code comes not to be displayed when the 3rd fill switch connector (CN-3.SW) is disconnected. When the failure code is 15SGLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 3rd clutch ECMV		15SGLH											○
6	① The code is not displayed at F1, F2, and F3 but is displayed at F4		15SHLI						○					○
	② When the failure code is 15SHLI after the diagnosis in ①, the failure code comes not to be displayed when the 4th fill switch connector (CN-4.SW) is disconnected. When the failure code is 15SHLH, the failure code comes not to be displayed when the ECMV is replaced with any one other than the 4th clutch ECMV		15SHLH											○

## H-17 When rising, the Lift arm comes to move slowly at specific height

Inspection before diagnosis

- Deformation of Lift arm cylinder in appearance

Cause

- Expansion of Lift arm cylinder tube or damage inside
- ★ For other abnormal phenomena during Lift arm rise, see "H-16. The Lift arm moves slowly or the Lift arm rising force is insufficient."

## H-18 The Lift arm cylinder cannot hold down the bucket (The bucket rises in the air)

See "H-16. The Lift arm moves slowly or the Lift arm rising force is insufficient."

Inspection before diagnosis

- Is the stroke of the Lift arm control lever appropriate?

Cause

- Defective seat of suction valve on the Lift arm cylinder rod side of work equipment valve
- Oil leak from Lift arm cylinder piston seal

## H-19 Hydraulic drifts of the Lift arm occur often

Ask the operator about the following:

- Have hydraulic drifts come to occur often suddenly? → Wastes pinched in valve or damage of parts
- Have hydraulic drifts come to occur often gradually? → Wear of parts

Inspection before diagnosis

- Is the Lift arm spool at the neutral position? → The spool detent is defective

Diagnosis and Cause

- Does any leaking noise occur inside the Lift arm cylinder when hydraulic drift is measured? → The cylinder packing is defective

## H-20 The Lift arm wobbles during operation

The bucket and the Lift arm moves up and down as the topography goes in digging or leveling with the Lift arm control lever in the "HOLD" position.

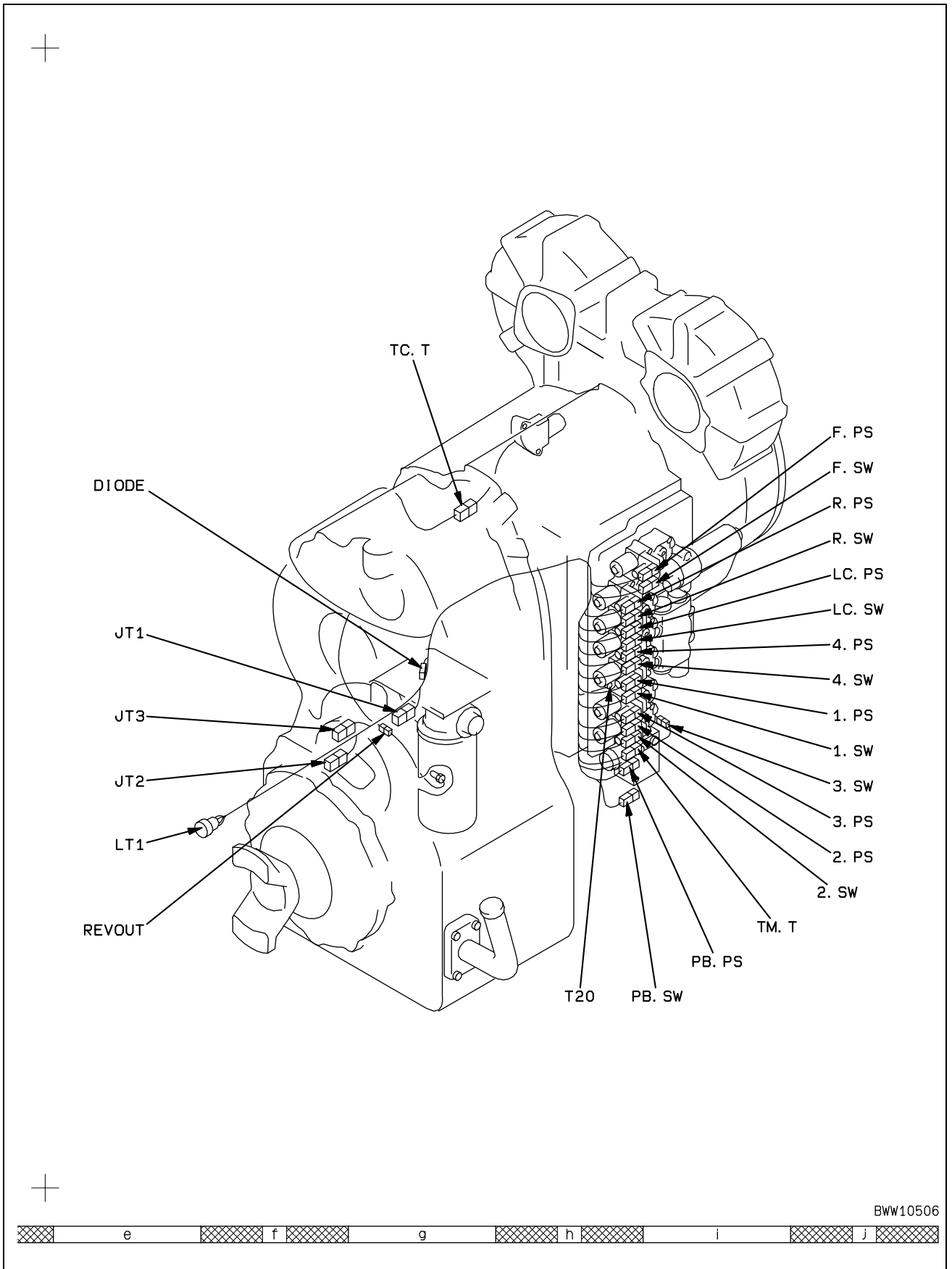
Diagnosis and Cause

Check at first the hydraulic drift and if the Lift arm cylinder can lift the machine

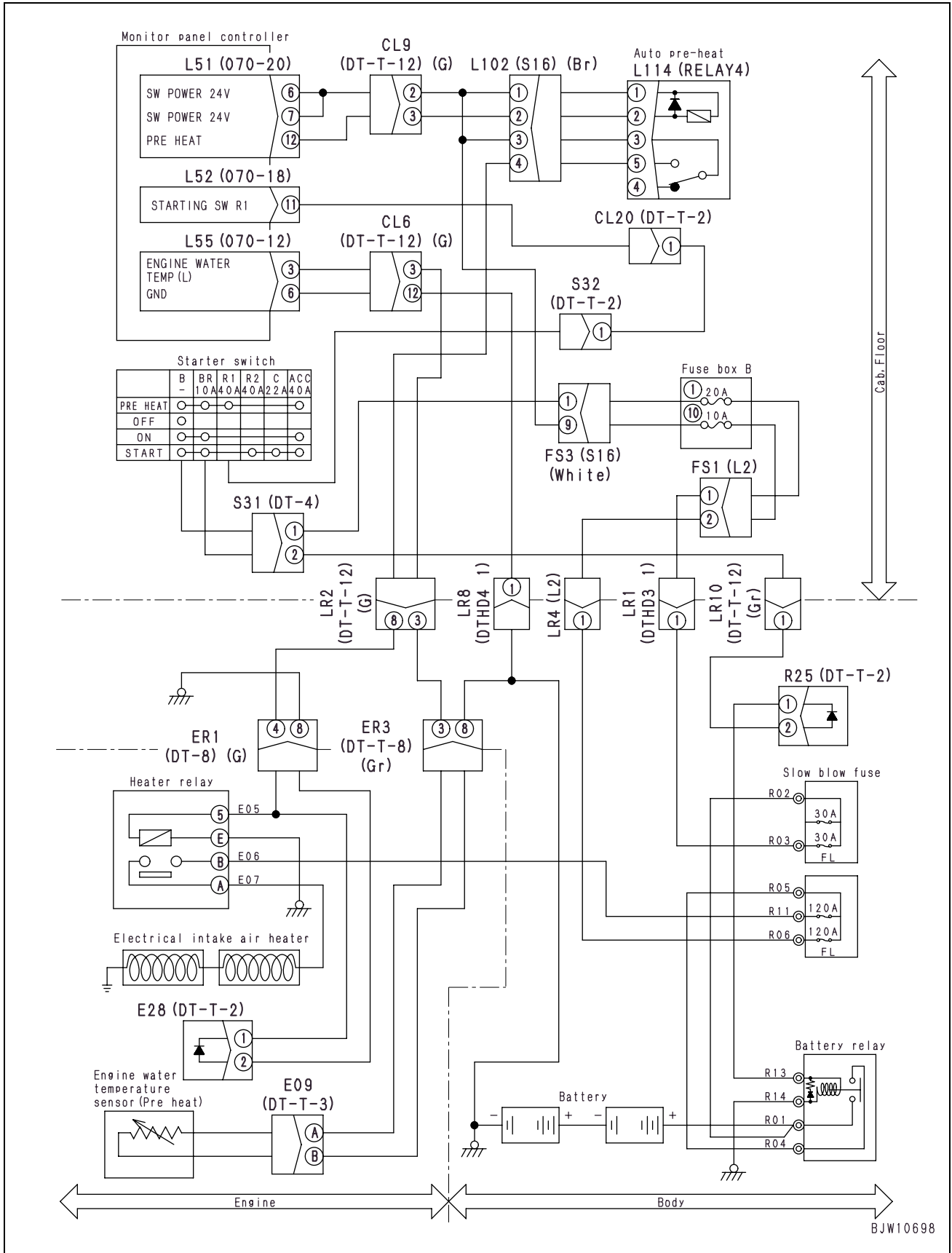
1. When the hydraulic drift is more than the standard value, see "H-19. Hydraulic drifts of the Lift arm occur often."
2. When the Lift arm cylinder cannot lift the machine, see "H-18. The Lift arm cylinder cannot hold down the bucket."
3. When the Lift arm cylinder comes to enable to lift the machine after the Lift arm is operated several times with the normal hydraulic drift and after the lift arm cylinder operates to full stroke → The cause is vacuum generated inside the cylinder

- ★ Frequent hydraulic drifts → The suction valve on the Lift arm cylinder rod side is defective

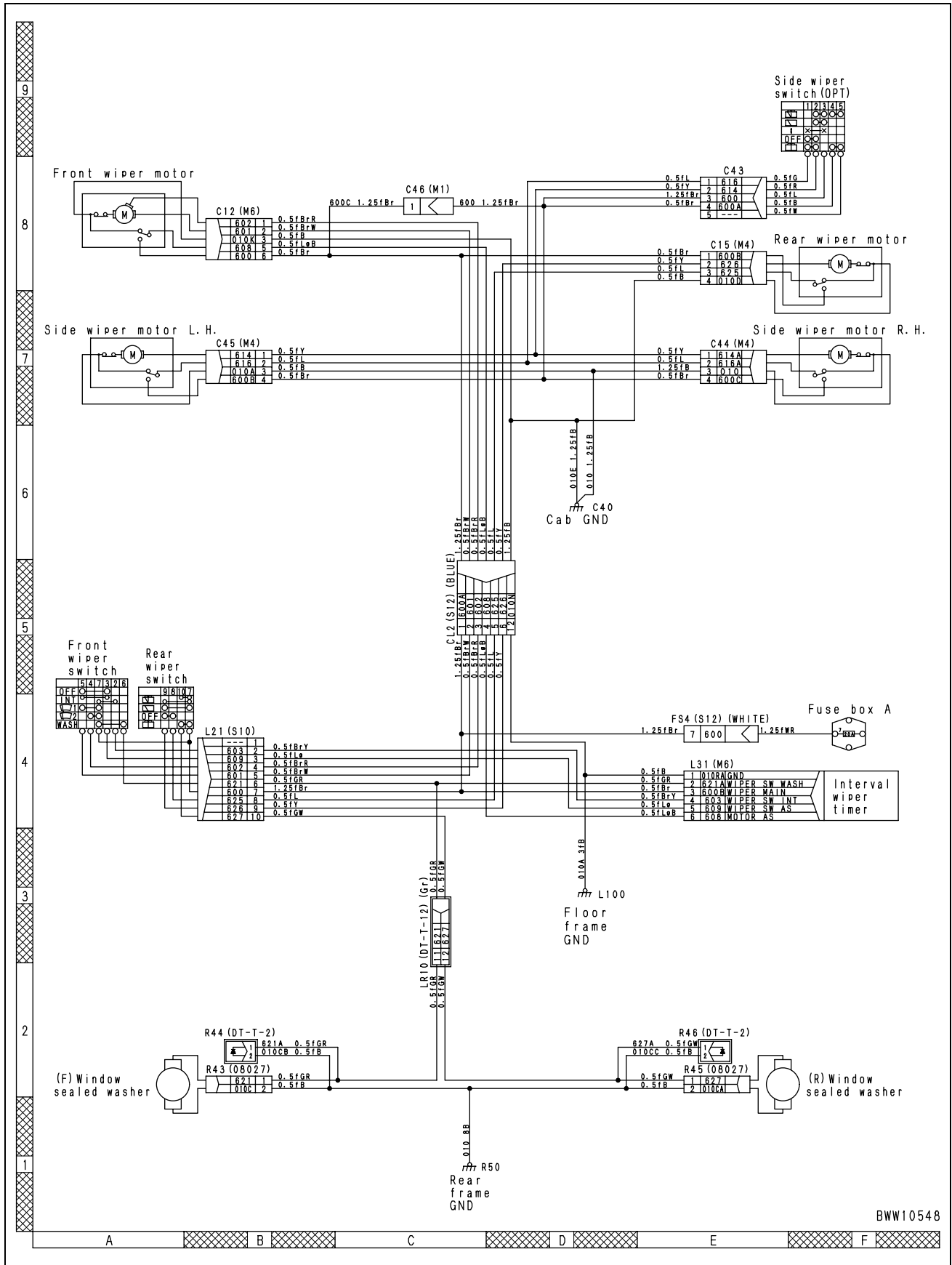
Connector No.	Connector Type	Number of Pins	Installation Name	Address	
				Layout Drawing	System Drawing
E01	DT-T	2	Intermediate connector (Starting motor)	b-1	W-4
E02	Terminal	1	Alternator R	d-3	X-5
E03	Terminal	1	Alternator B	d-3	X-5
E04	Terminal	1	Alternator E	d-3	X-5
E05	Terminal	1	Engine heater relay	c-9	Q-9
E06	Terminal	1	Engine heater relay	a-9	Q-9
E07	Terminal	1	Engine heater relay	a-9	Q-9
E08	DT-T	2	Engine water temperature sensor (Monitor)	c-1	O-8
E09	DT-T	2	Engine water temperature sensor (Preheater)	d-2	O-8
E10	DT-T	2	Air conditioner compressor magnet clutch	d-2	—
E11	DT-T	2	Diode (Air conditioner compressor)	d-4	—
E14	Terminal	1	Ground (Rear frame)	a-5	X-5
E26	DT-T	2	Engine oil level sensor	a-5	P-8
E27	DT-T	2	Engine speed sensor	c-6	TM
E28	DT	2	Diode (Engine heater relay)	c-9	O-8
E29	Terminal	1	Engine oil pressure switch	b-5	P-8
E30	Terminal	1	Starting motor B	b-1	X-4
E31	DT-T	2	Diode	—	E
E32	DT-T	2	Diode (Fuel cut solenoid)	c-6	E
E33	DT-T	2	Dust indicator	b-9	O-8
E34	DT-T	3	Fuel cut solenoid	c-7	—
ER-1	DT-T (G)	8	Intermediate connector (Engine)	Z-2	P-5
ER-3	DT-T (Gr)	8	Intermediate connector (Engine)	a-1	O-5
F01	M	6	Intermediate connector (R.H. Front lamp)	A-5	U-3
F02	M	6	Intermediate connector (L.H. Front lamp)	D-1	U-3
F03	Terminal	1	Horn (303 Hz)	A-1	W-1
F04	Terminal	1	Horn (303 Hz)	A-1	W-1
F05	Terminal	1	Horn (303 Hz)	C-1	W-1
F06	Terminal	1	Horn (303 Hz)	B-1	W-1
F07	DT-T	2	Switching pump cut-off solenoid	C-1	TM
F09	DT-T	3	Bucket positioner proximity switch	A-3	WRK
F10	DT-T	3	Bucket positioner proximity switch (STD)	A-3	WRK
F13	DT-T	2	Lift arm damper solenoid	C-1	TM
F14	DT-T	2	Diode (Damper solenoid)	D-1	TM
F15	DT-T	3	Lift arm angle signal (For load meter)	A-2	M-8
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1	M-8
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1	M-8
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5	WRK
F19	DT-T	3	Bucket positioner proximity switch (For bucket EPC)	A-3	WRK
F20	DT-T	2	Lift arm RAISE EPC	A-2	WRK
F21	DT-T	2	Lift arm LOWER EPC	A-1	WRK
F22	DT-T	2	Bucket CURL EPC	A-1	WRK
F23	DT-T	2	Bucket DUMP EPC	A-1	WRK
F24	DT-T	2	ATT. EXT. EPC (OPT)	A-3	WRK
F25	DT-T	2	ATT. RET. EPC (OPT)	A-2	WRK
F26	DT-T	2	Lift arm EPC cut-off solenoid	B-1	WRK
F27	DT-T	2	Diode (For boom EPC cut-off solenoid)	A-4	WRK



Related circuit diagram



Related circuit diagram

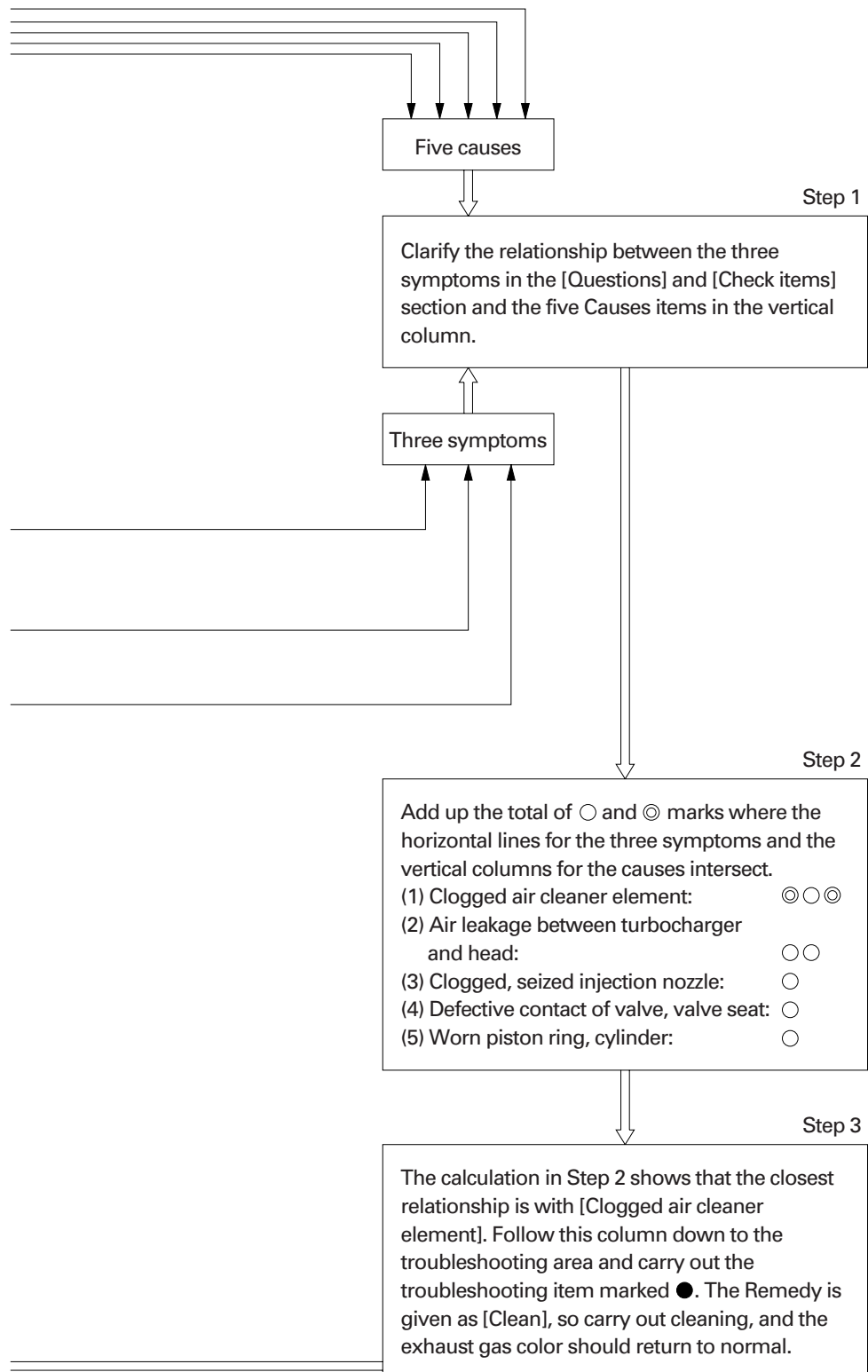


BWW10548

**ACTION CODE: [E-16]**

Action Code	Error Code	Controller Code	Trouble	The turn signal does not blink
E-16	—	—		
Description of Trouble	<ul style="list-style-type: none"> <li>Since a disconnection (Ground fault) occurs in the switch, relay, or harness in the turn signal system, the turn signal does not blink.</li> </ul>			
Controller Reaction	—			
Effect on Machine	<ul style="list-style-type: none"> <li>The turn signal does not blink.</li> </ul>			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Turn signal relay fault	1) Turn starting switch OFF. 2) Disconnect connector L111. 3) Connect T-adapter. 4) Turn starting switch ON.	
Between L111 ④ ~ body (Power)				Voltage	20 ~ 30 V
Between L111 ③ ~ body (Turn signal switch = Neutral)				Voltage	20 ~ 30 V
Between L111 ② ~ body (Turn signal switch = Neutral)				Voltage	20 ~ 30 V
1) Turn starting switch OFF. 2) Disconnect connector L111. 3) Connect T-adapter.					
Between L111 (Male) ③ ~ ④ (Between contacts)				Resistance	1 Ω and below
2		Turn signal switch fault	1) Turn starting switch OFF. 2) Disconnect connector L03. 3) Connect T-adapter. 4) Turn starting switch ON.		
			Between L03 ② ~ body (Turn signal switch: L or R)	Voltage	20 ~ 30 V and 0 V repeated
			Between L03 ③ ~ body (Turn signal switch: R)	Voltage	20 ~ 30 V and 0 V repeated
			Between L03 ④ ~ body (Turn signal switch: L)	Voltage	20 ~ 30 V and 0 V repeated
			1) Turn starting switch OFF. 2) Disconnect connector L03. 3) Connect T-adapter.		
			Between L03 (Male) ② - ③ (Turn signal switch: R)	Resistance	1 Ω and below
3	Flasher unit fault	1) Turn starting switch ON.			
		Between flasher unit pin ③ ~ body	Voltage	20 ~ 30 V	
		Between flasher unit pin ④ ~ body (Turn signal switch L or R)	Voltage	20 ~ 30 V and 0 V repeated	



### S-10 Fuel consumption is excessive

General causes why fuel consumption is excessive

- Leakage of fuel
- Improper condition of fuel injection
- Excessive injection of fuel

		Causes								
		Defective injection pump (excessive injection)	Defective nozzle holder spray	Defective injection pump plunger	External fuel injection timing	Leakage of fuel inside piping, fuel filter	Defective oil seal inside head cover	Defective adjustment of feed pump (piston)	Defective adjustment of fuel control linkage	
Questions	Confirm recent repair history									
	Degree of use of machine	Operated for long period	△	△			△			
	Condition of fuel consumption	More than for other machines of same model	◎		○					
		Gradually increased		○	○					
		Suddenly increased				○	○			
	Exhaust smoke color	Black	◎	○	○				○	
		White					○			
	Seal on injection pump has come off	◎								
	There is irregular combustion		◎							
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low		◎	○						
Match mark on injection pump is misaligned				◎						
Check items	There is external leakage of fuel from engine				◎					
	Engine oil level rises and smells of diesel fuel	○				◎	◎			
	Engine low idle and high idle speeds are high	○							◎	
Troubleshooting	Injection pump measurement shows that injection amount is excessive	●								
	Speed does not change when operation of certain cylinders is stopped		●							
	When control rack is pushed, it is found to be heavy, or does not return			●						
	When check is made using delivery method, injection timing is found to be incorrect				●					
	Remove head cover and inspect directly					●				
	Remove feed pump and inspect directly						●			
	When engine speed is measured, low idle and high idle speeds are found to be high								●	
	Remedy	Adjust	Replace	Replace	Adjust	Correct	Correct	Correct	Adjust	

- ★ After replacing or flushing the hydraulic tank oil, filter element, or strainer, or when removing and installing any hydraulic cylinder, hydraulic pump or any other hydraulic equipment or work equipment piping, always bleed the air as follows after completion of installation.
  1. Run the engine at low idle, and extend and retract the steering, bucket, and lift arm cylinder 4 to 5 times without going to the end of this stroke. (Stop approx. 100 mm before the end of the stroke.)
  2. Operate the steering, bucket, and lift arm cylinders 3 to 4 times to the end of the stroke, then stop the engine and bleed air from the plugs at the top of the hydraulic tank filter.
  3. Raise the engine speed and repeat Step 2. to bleed air. Repeat this procedure until no more air comes out from the plugs.
  4. After completing bleeding the air, tighten the plugs.

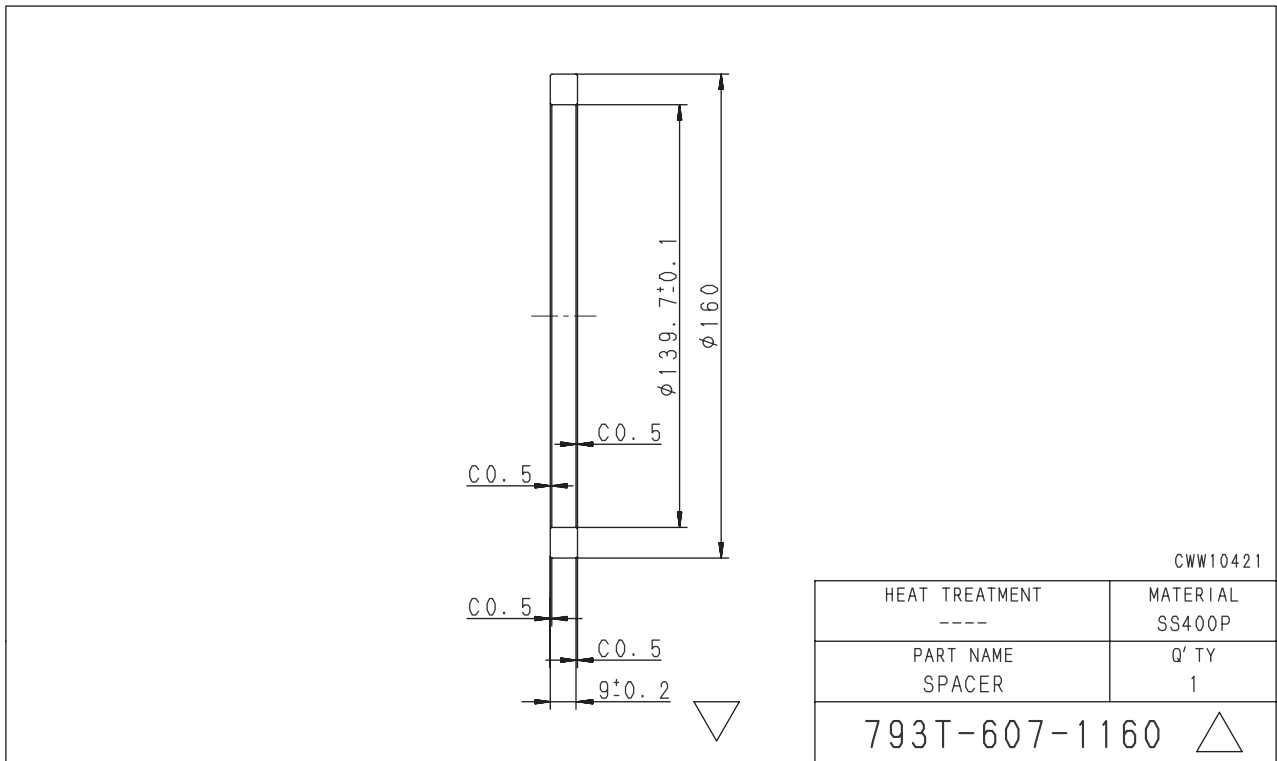


Plug: **11.3 ± 1.5 Nm {1.15 ± 0.15 kgm}**

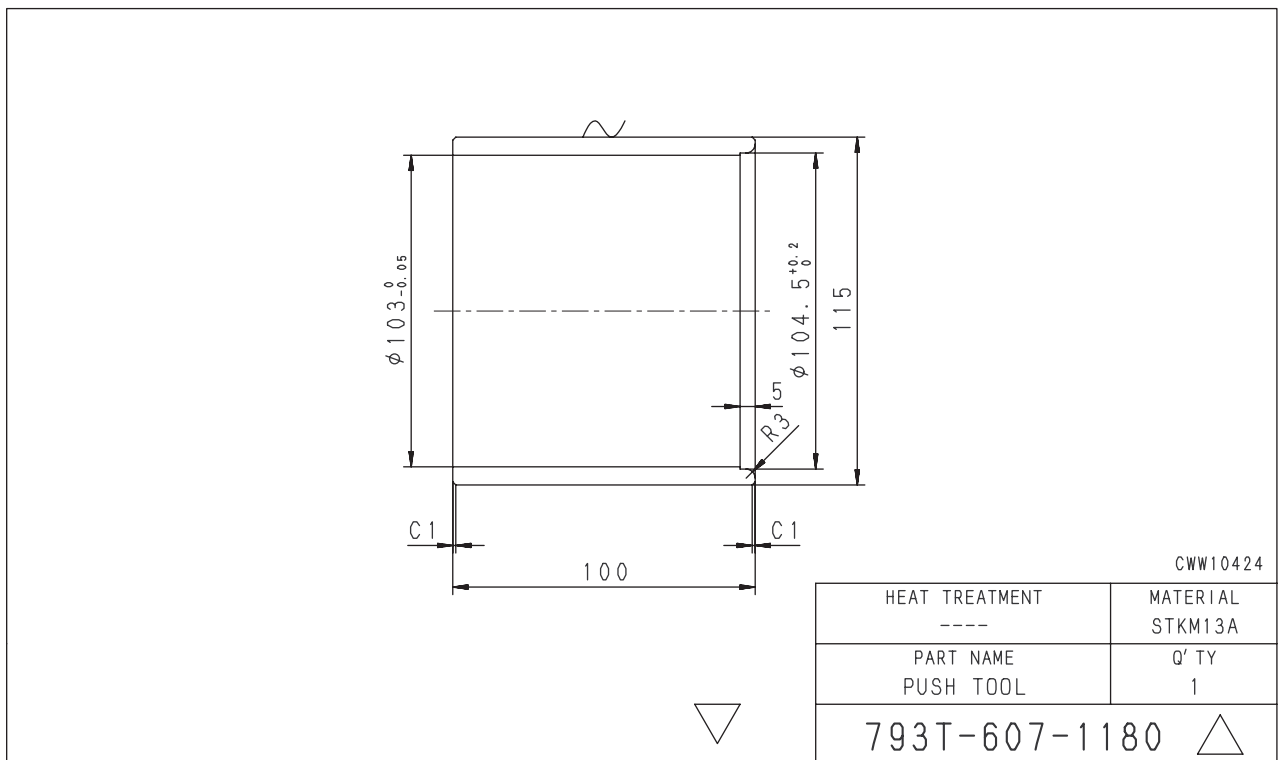
- ★ If the engine is run at high speed from the start, or the cylinders are operated to the end of their stroke, the air inside the cylinder will cause damage to the piston packing.
- ★ After repair or long storage, follow the same procedure.

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

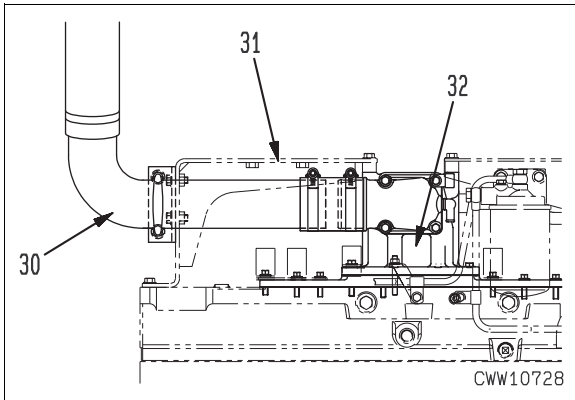
H9 Spacer



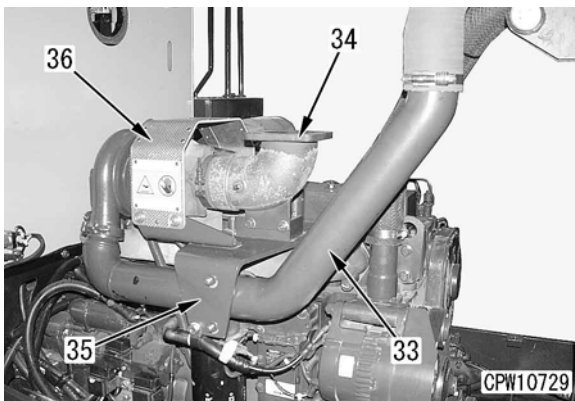
H10 Push tool



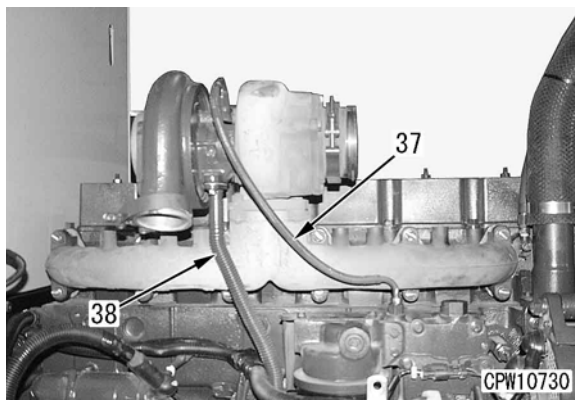
- 6. Disconnect the aftercooler outlet pipe (30). [**\*3**]
- 7. Remove the muffler mounting bracket (31).
- 8. Remove the air intake connector (32).



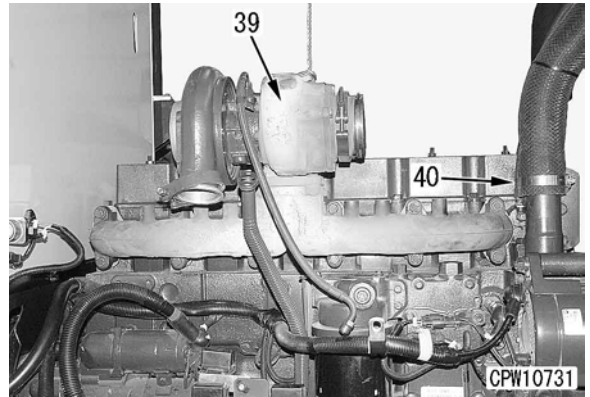
- 9. Disconnect the turbo outlet pipe (33). [**\*4**]
- 10. Remove the exhaust connector (34) and the bracket (35). [**\*5**]
- 11. Remove the heat shielding board (36).



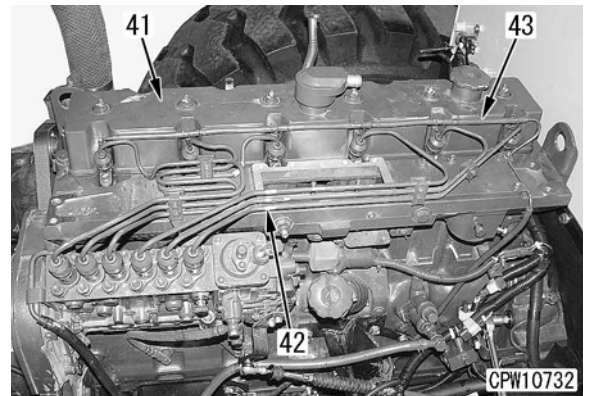
- 12. Disconnect the turbo lubrication hose (37) and the drain tube (38). [**\*6**]



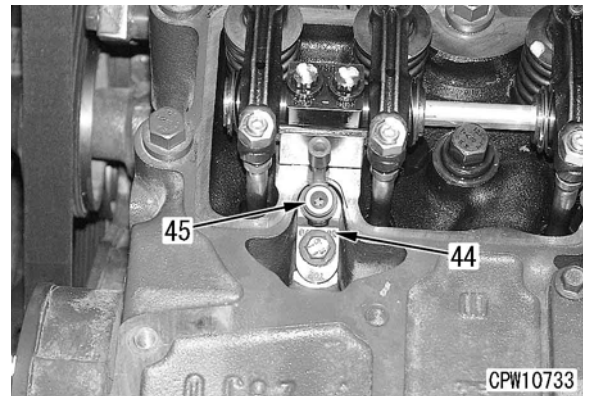
- 13. Remove the turbocharger and exhaust manifold assembly (39). [**\*7**]
- 14. Disconnect the aeration hose (40).



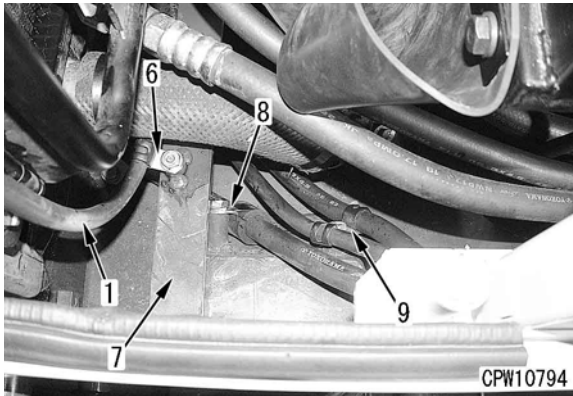
- 15. Remove the head cover (41). [**\*8**]  
★ Before removing it, clean the area around it.
- 16. Disconnect 6 pieces of the high-pressure injection pipe (42). [**\*9**]
- 17. Disconnect the spill hose (43).



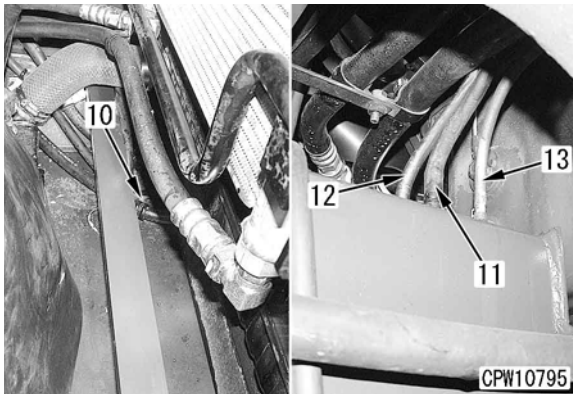
- 18. Remove the holder (44) and then remove the nozzle holder assembly (45). [**\*10**]



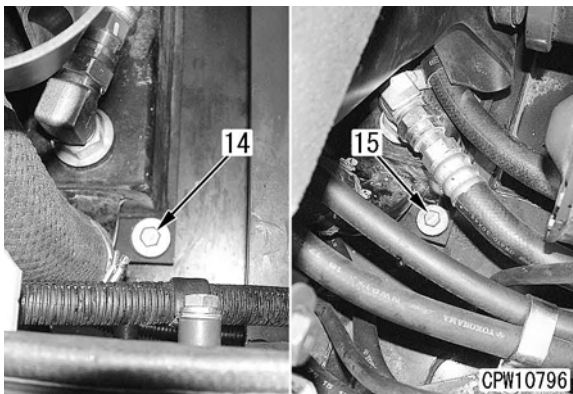
6. Remove the clamp (6) of the fuel tank air bleeding hose (1) from the frame (7).
7. Remove the clamps (8) and (9) of the fan motor hose from the fuel tank.



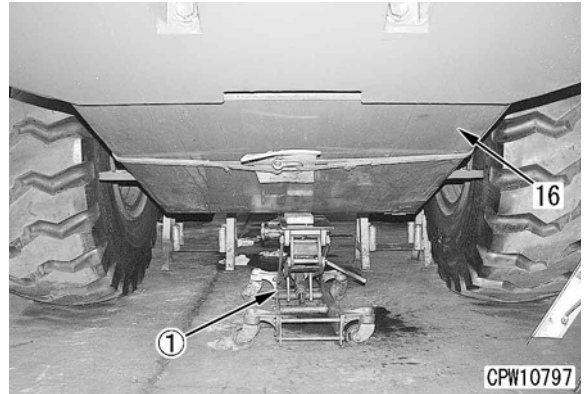
8. Remove the clamp (10) of the fan motor hose from the fuel tank.
  - ★ Around the center on the top of the fuel tank.
9. Disconnect the fuel suction hose (11), return hose (12) and the spill hose (13) from the fuel tank side.



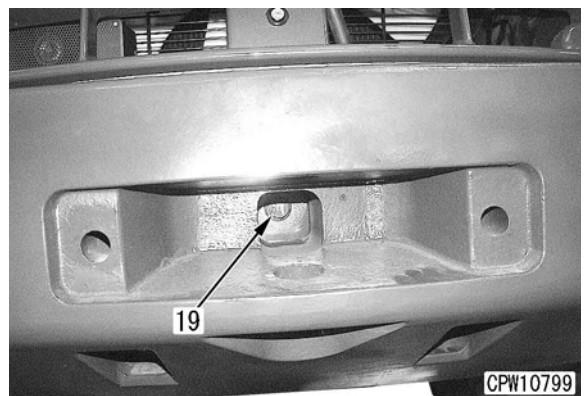
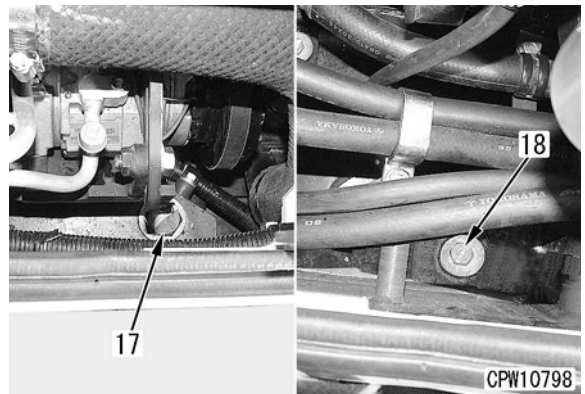
10. Remove the left mounting bolt (14) and the right mounting bolt (15) of the transmission oil cooler from the fuel tank.
  - ★ Keep the cooler body as it is.



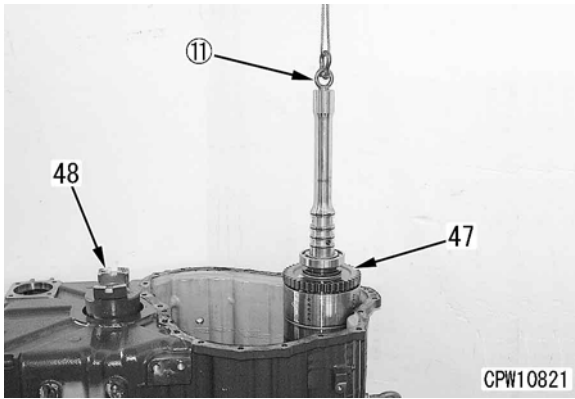
11. Fuel tank assembly
  - 1) Support the front of the fuel tank (16) from below with the transmission jack [1].
  - 2) Sling the rear part of the fuel tank (16).
    - ★ Since the sling is apt to slip backward, prevent it from slipping with bolts.



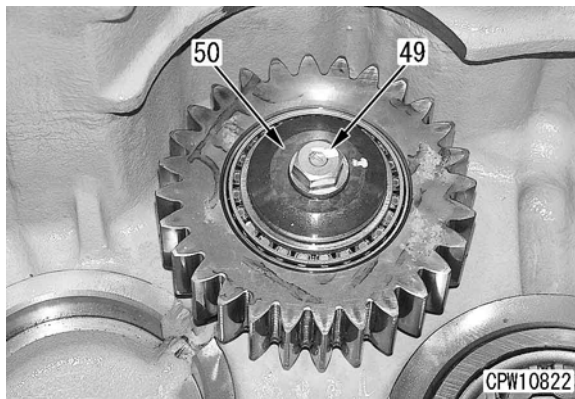
- 3) Remove the left mounting bolt (17), the right mounting bolt (18) and the rear mounting bolt (19) of the fuel tank. [\*1]



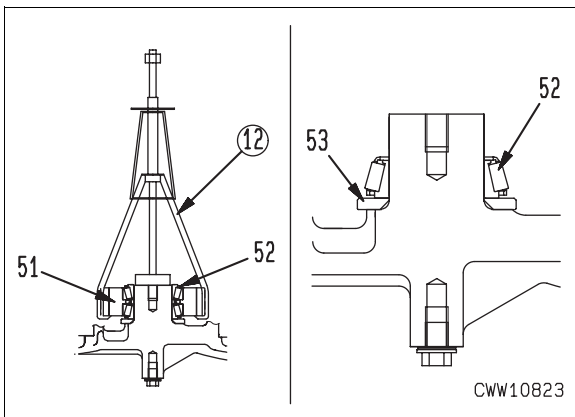
- 13. Yoke  
Remove the yoke (48).



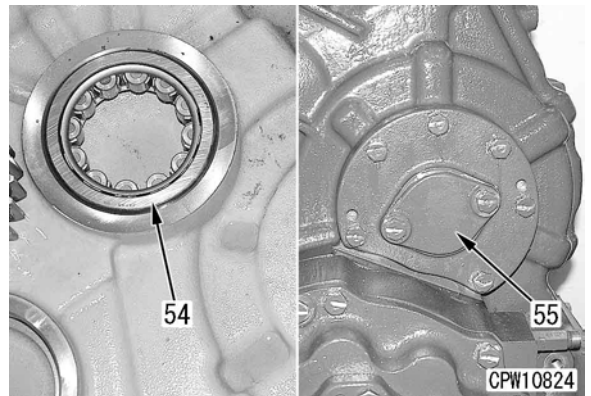
- 14. Reverse idle gear  
1) Remove the bolt (49) and the plate (50).



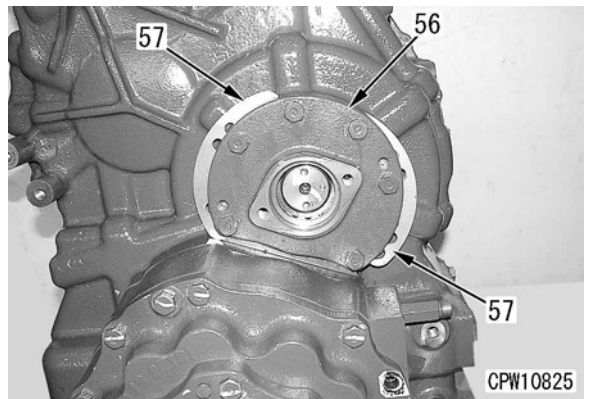
- 2) Use the puller [12] to remove the gear (51) and the bearing (52).
- 3) Remove the bearing (52) and the plate (53).



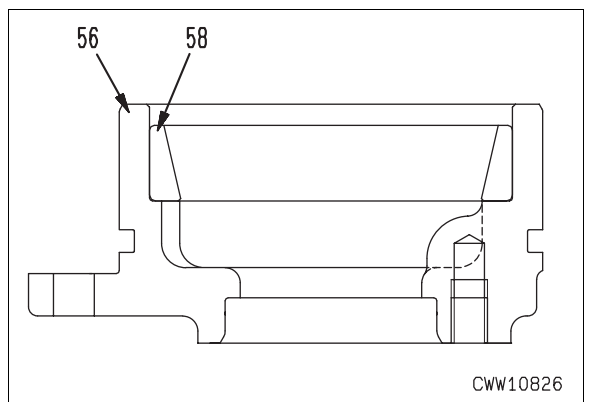
- 15. Bearing (on the 1st speed clutch side)  
Remove the bearing (54).
- 16. Cover (on the 2nd speed clutch side)  
1) Remove the cover (55).



- 2) Use a forcing screw to remove the cover (56).  
★ Check the thickness and the quantity of the shims (57) in advance.



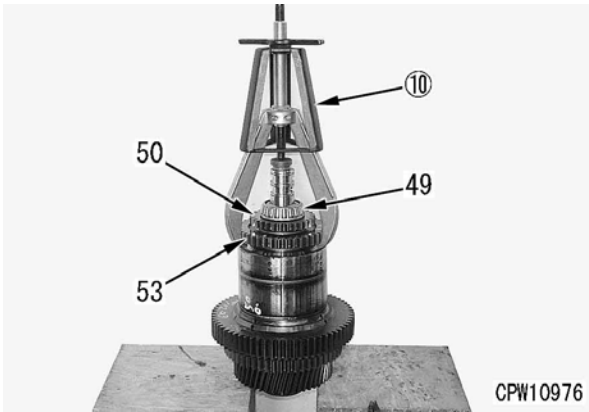
- 3) Remove the outer race (58) from the cover (56).



**DISASSEMBLY OF 2ND AND 3RD CLUTCH PACK [3RD CLUTCH SIDE]**

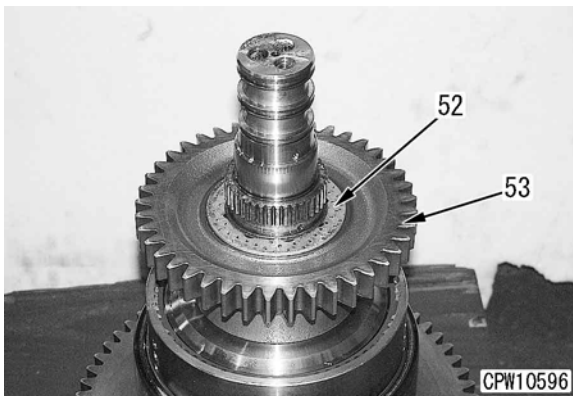
1. Bearing

- 1) Apply puller [10] to 3-spool gear (53) and dismount bearing (49) and 4th gear (50).

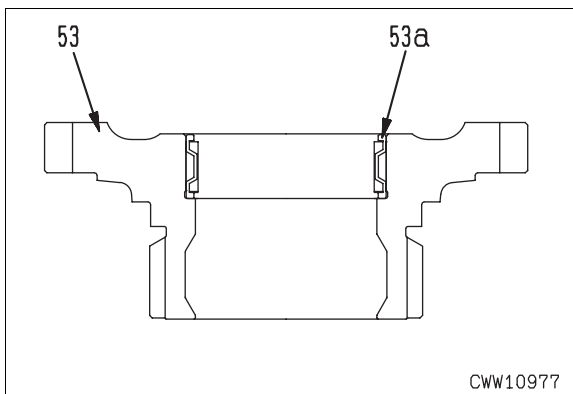


2. 3rd gear

- 1) Dismount thrust washer (52) and 3rd gear (53).

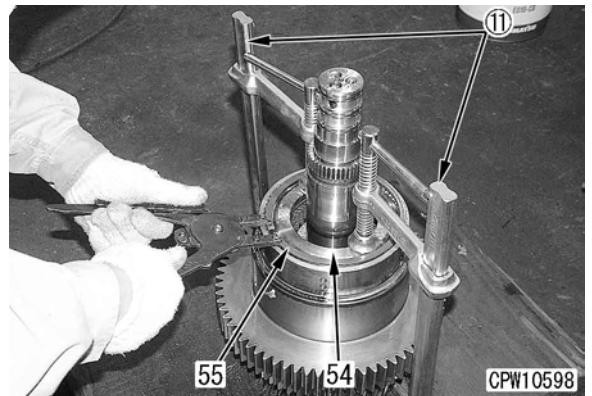


- 2) Dismount needle bearing (53a) from 3-spool gear (53).



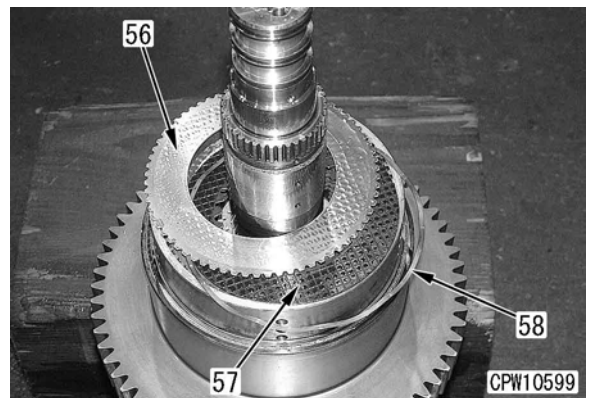
3. End plate

- 1) Use C clamp [11] or the like to press end plate (54) and dismount snap ring (55).
- 2) Dismount end plate (54).



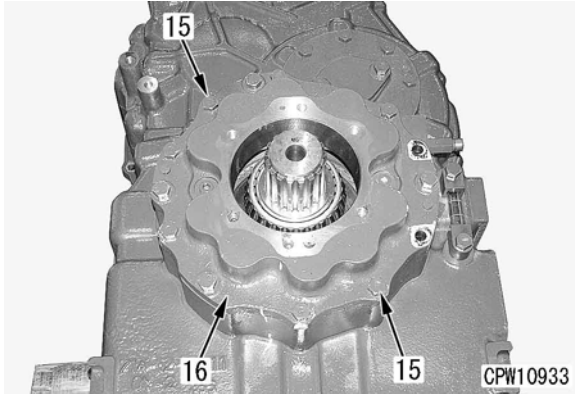
4. Clutch plate

- 1) Dismount plate (56), disc (57) and spring (58) from the housing.



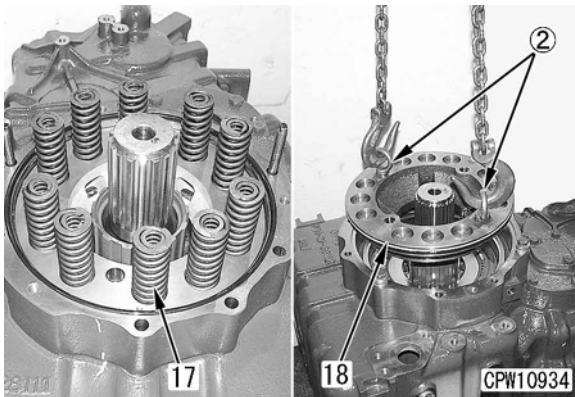
- 2) Dismount thrust washer (58a).

5. Spring cover  
Evenly loosen mounting bolt (15) and dismount cover (16).  
★ Because the mounting bolt is pressed with the brake spring, evenly loosen the total number of mounting bolts.

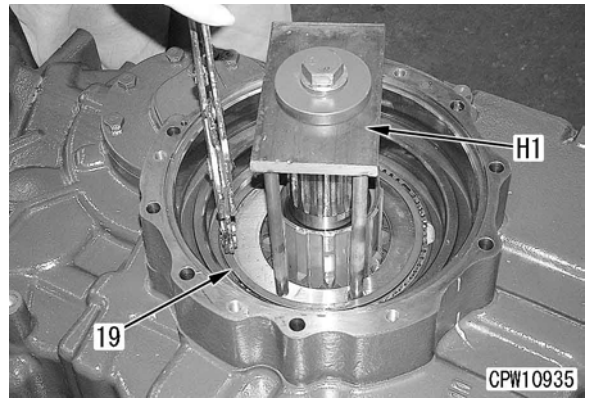


6. Spring  
Dismount spring (17).

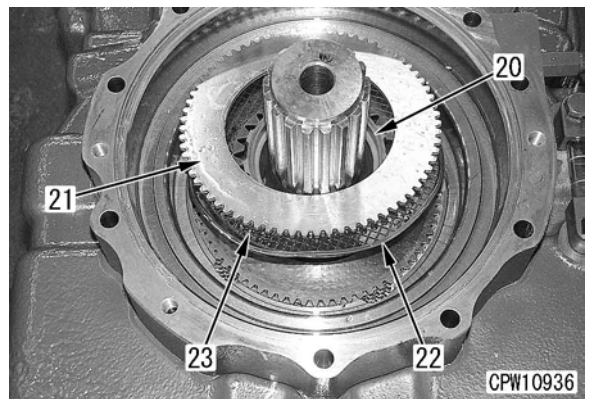
7. Piston  
Use eyebolt [2] to hang and dismount piston (18).



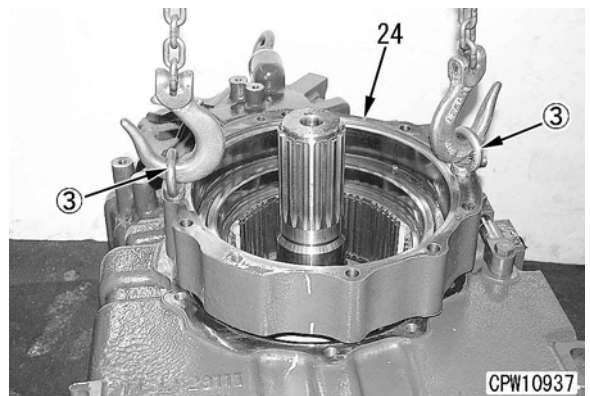
8. Plate, spring, disc  
1) Use tool **H1** to dismount snap spring (19).



- 2) Dismount hub (20).
- 3) Dismount plate (21), spring (22) and disc (23).  
★ Ten plates, nine springs and nine discs.

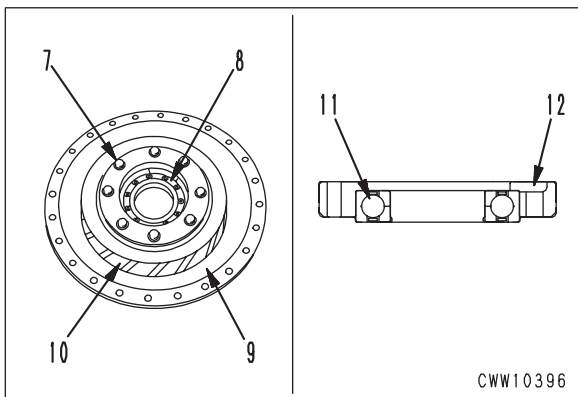


9. Brake housing  
Use eyebolt [3] to hang and dismount brake housing (24).

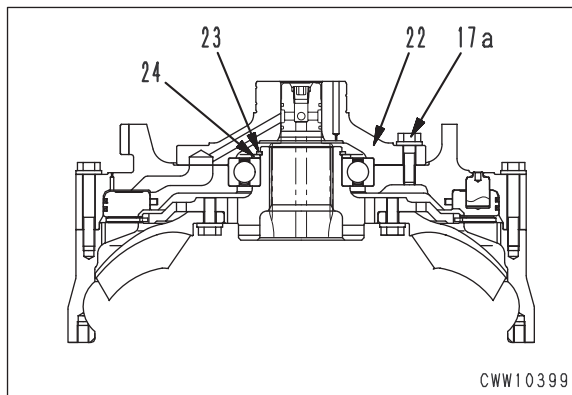


**DISASSEMBLY AND ASSEMBLY TORQUE CONVERTER ASSEMBLY (LOCK-UP SPECIFICATION)**

- iv) Remove mounting bolt (7) and dismount gear (10) and guide and bearing assembly (8) from pump (9).
- v) Dismount bearing (11) from guide (12).

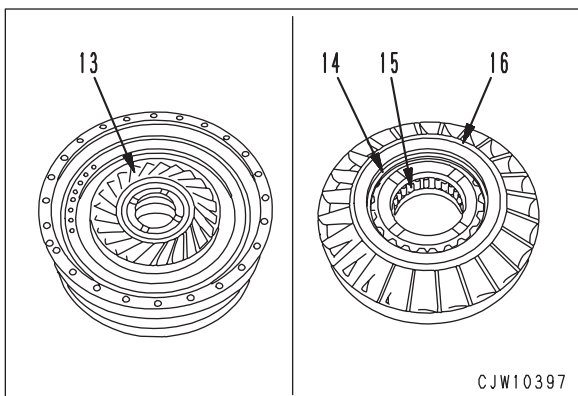


- 4. Disassembly of turbine and case assembly
  - 1) Remove bolt (17a) and dismount pilot (22).
  - 2) Remove snap ring (23) and dismount plate (24).

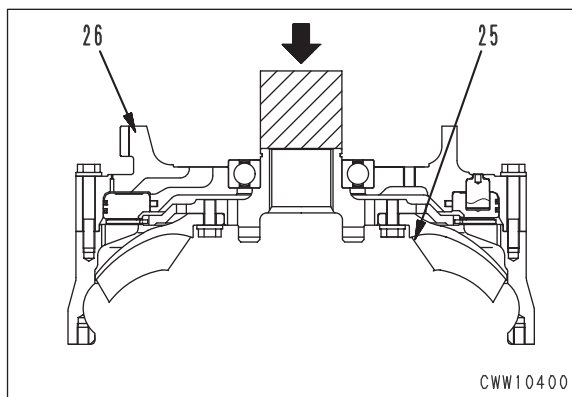


**3. Stator assembly**

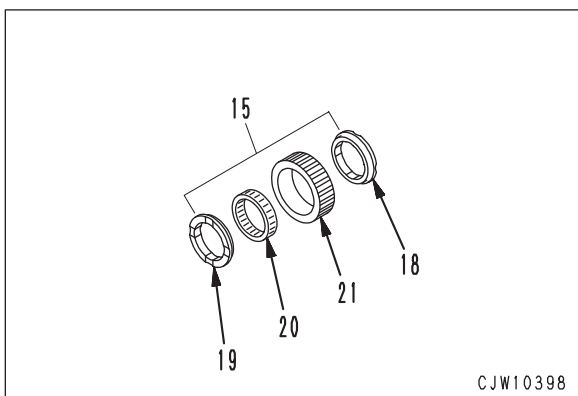
- 1) Dismount stator assembly (13).
- 2) Fine disassembly of stator assembly
  - i) Remove upper and bottom snap rings (14) and dismount race and free wheel assembly (15).



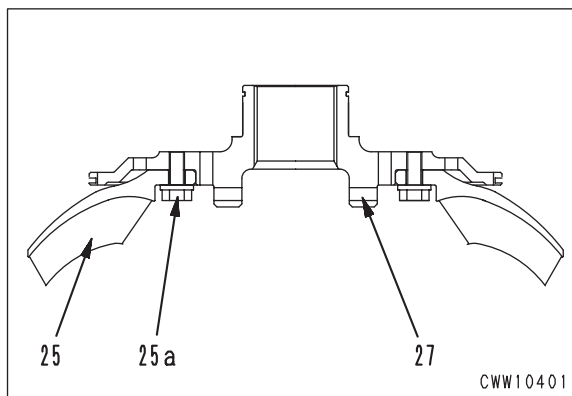
- 3) Press the boss portion of turbine (25) and dismount it from case (26).



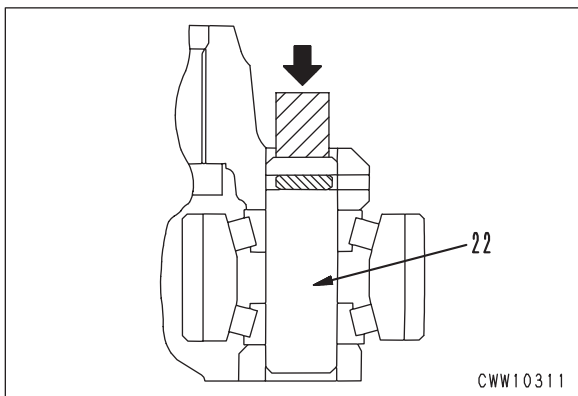
- ii) Remove bushings (18) and (19) from race and free wheel assembly (15) and dismount free wheel (20) from race (21).



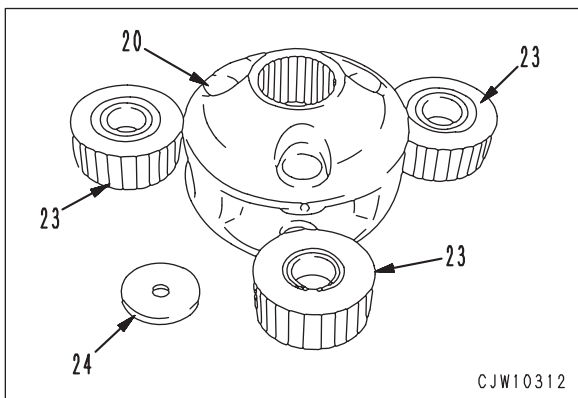
- 4) Remove bolt (25a) and disconnect turbine (25) and boss (27).



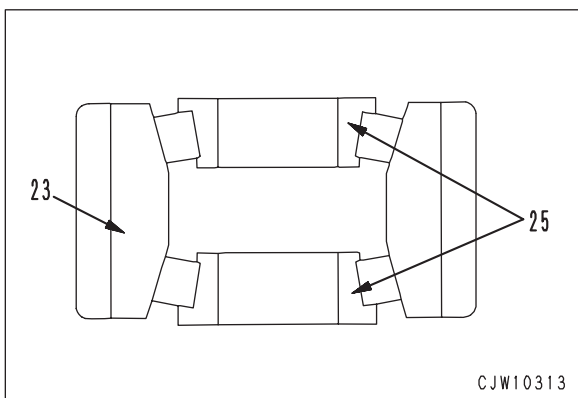
- 2) Use the press to pull out shaft (22).



- 3) Pull out spring pin (21) from planetary carrier (20).
- 4) Dismount pinion gear (23) and spacer (24) from planetary carrier (20).



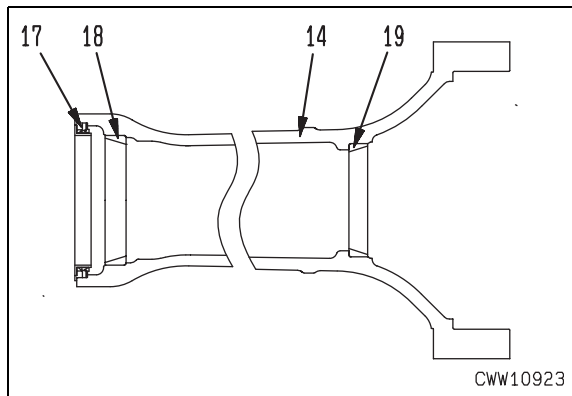
- 5) Dismount bearing (25) from pinion gear (23).



**ASSEMBLY**

**REAR AXLE HOUSING**

1. Axle housing
  - 1) Press-fit bearing outer races (18) and (19) in axle housing (14).



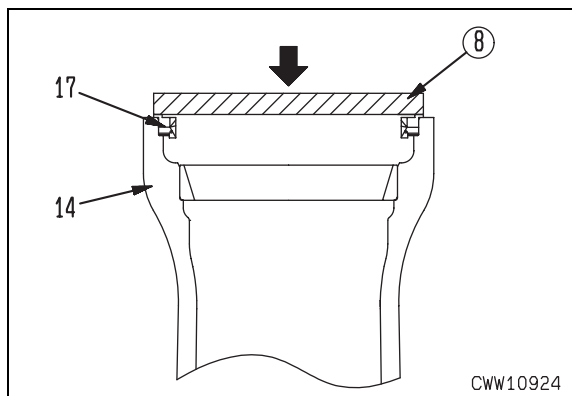
- 2) Use push tool [8] to mount oil seal (17) on housing (14).



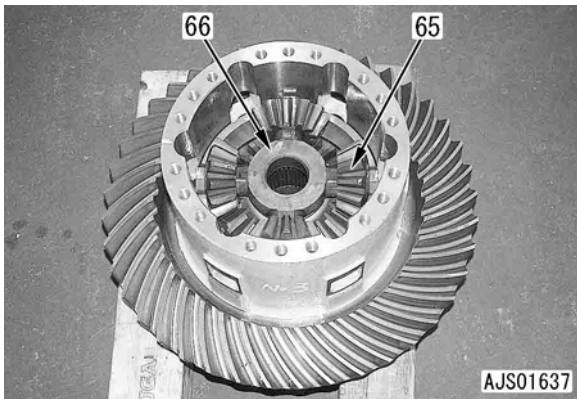
Oil seal lip surface:

**Grease (G2-LI)**

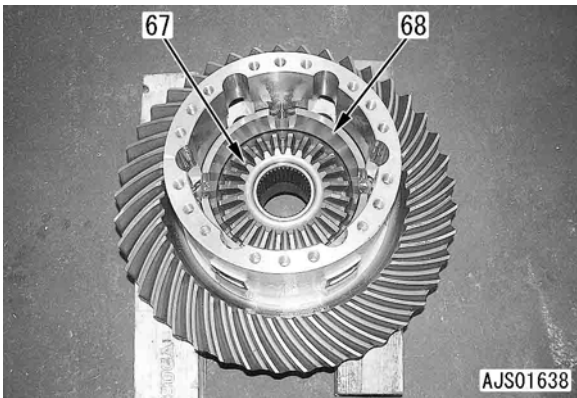
- ★ Make the flange of the oil seal adhere to the housing end surface.
  - Clearance between the flange of the oil seal and the housing surface: Less than 0.2 mm



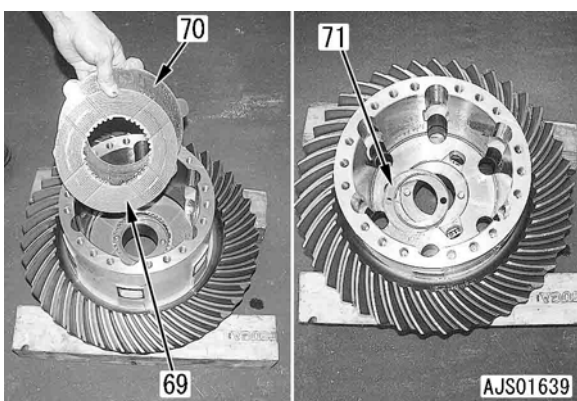
- 4) Remove the pinion gear (65) and spider shaft (66).



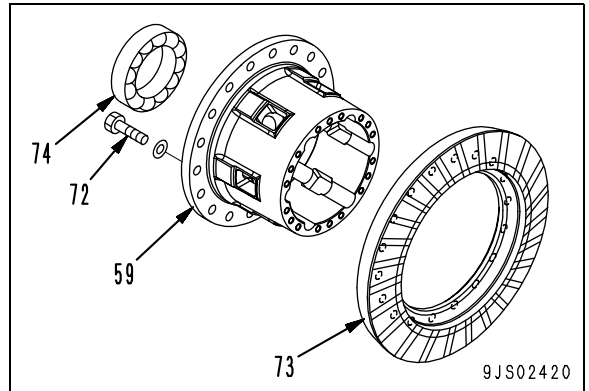
- 5) Remove the side gear (67) and pressure ring (68).



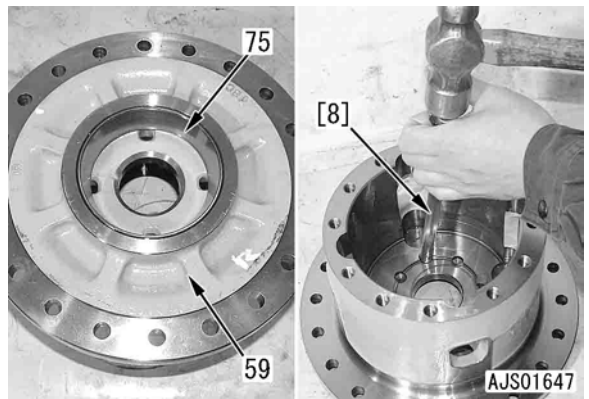
- 6) Remove the 2 disks (69) and 2 plates (70).  
7) Remove the washer (71).



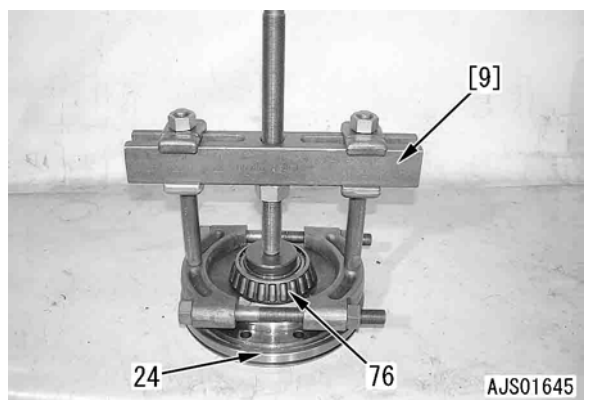
- 8) Reverse the case (59) and remove the bolt (72) to detach the bevel gear (73).  
9) Remove bearing (74). (Front)



- 10) Using push tool [8], remove outer race (75) from inside of case (59). (Rear)



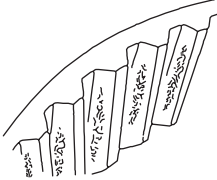
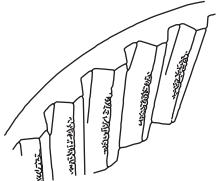
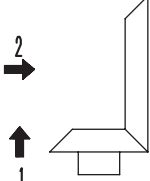
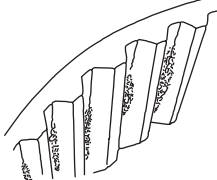
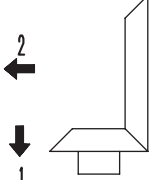

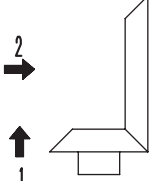
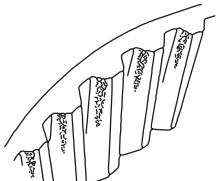
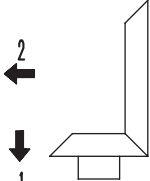
- 11) Using puller [9], remove bearing (76) from bearing carrier (24). (Rear)



9. Tooth contact inspection

Knead the red lead with the spindle oil and coat it on 7 - 8 teeth of the bevel gear. While holding down the bevel gear by hand and braking, turn the pinion gear forward and backward, and inspect the tooth contact.

Follow the procedure to adjust the tooth contact state.

Tooth Contact	Cause	Adjustment
 <p>DEW00910</p>	<p>Correct contact Remain the tow side about 5 mm and confirm that all teeth to the heel side come into contact 50%, centering the pitch line.</p>	<p>To adjust the pinion gear, increase or decrease the gauge shim. To adjust the bevel gear, follow the same procedure as of the back rash.</p>
 <p>DEW00904</p>	<p>The bevel pinion gear is too separate from the gear.</p>	<ol style="list-style-type: none"> <li>1) Decrease the shim from the pinion gear and approach to the bevel gear.</li> <li>2) Separate the bevel gear from the pinion gear and correctly adjust the back rash.</li> </ol>  <p>DEW00908</p>
 <p>DEW00905</p>	<p>The bevel pinion gear is too near the gear.</p>	<ol style="list-style-type: none"> <li>1) Increase the shim of the pinion gear and separate it from the bevel gear.</li> <li>2) Approach the bevel gear to the pinion gear and correctly adjust the back rash.</li> </ol>  <p>DEW00909</p>
 <p>DEW00906</p>	<p>The bevel gear is too near the pinion gear.</p>	<ol style="list-style-type: none"> <li>1) Decrease the shim of the pinion gear and approach it to the bevel gear.</li> <li>2) Separate the bevel gear from the pinion gear and correctly adjust the back rash.</li> </ol>  <p>DEW00908</p>
 <p>DEW00907</p>	<p>The bevel gear is too separate from the pinion gear.</p>	<ol style="list-style-type: none"> <li>1) Increase the shim of the pinion gear and separate it from the bevel gear.</li> <li>2) Approach the bevel gear to the pinion gear and correctly adjust the back rash.</li> </ol>  <p>DEW00909</p>

★ When adjusting the bevel gear in-out state, do not change the total thickness of the left and right by moving the shim.

- 3) Temporarily lift the left ladder and fender assembly (5), and remove the attachment bolts.



Left ladder and fender assembly:

**86 kg**

6. Temporarily lift the right fender assembly step (6), and remove the attachment bolts.



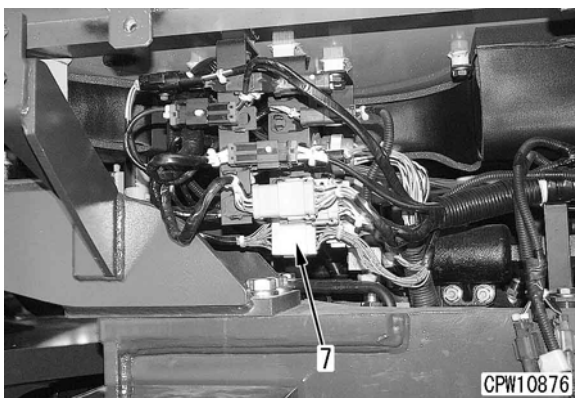
Right ladder and fender assembly:

**50 kg**

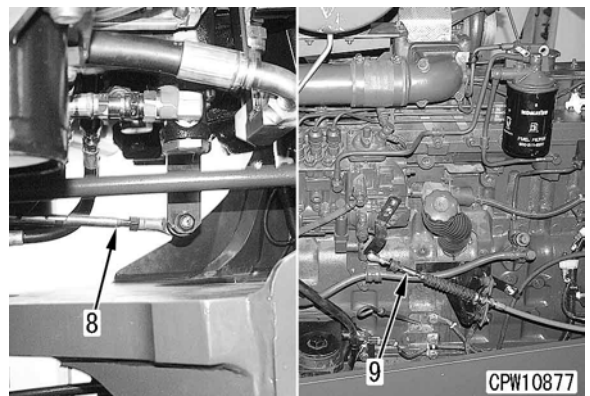


7. Disconnect 11 pairs of wiring connectors (7).

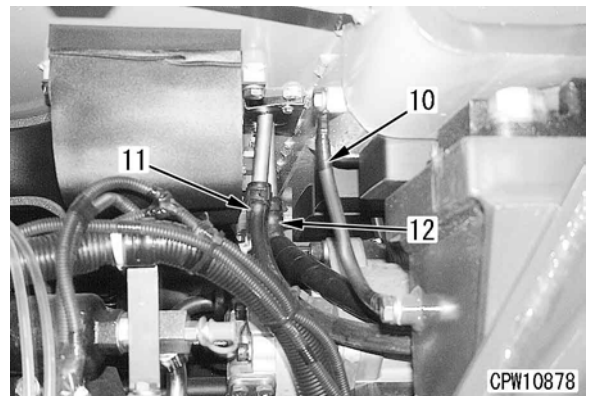
★ Connector numbers: LT1, FL1, FL2, FL3, LR1, LR4, LR5, LR6, LR8, LR9, and LR10.



8. Detach the steering rod (8).
9. Detach the accelerator cable (9) from the injection pump and remove the clamp of the torque converter case.

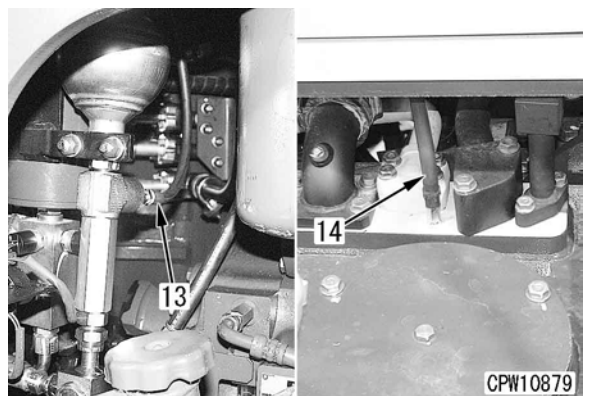


10. Detach the earth harness (10) and car heater hoses (11) and (12).



11. Detach the PPC valve inlet hose (13) and return hose (14).

★ Remove the clamp on the brake accumulator and pull up hose (13) above the floor frame.

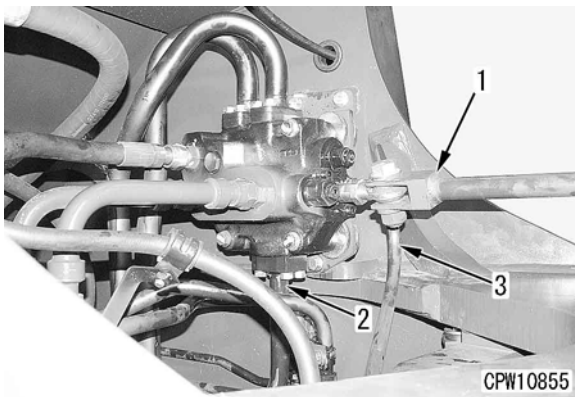


## REMOVAL AND INSTALLATION OF STEERING DEMAND VALVE ASSEMBLY

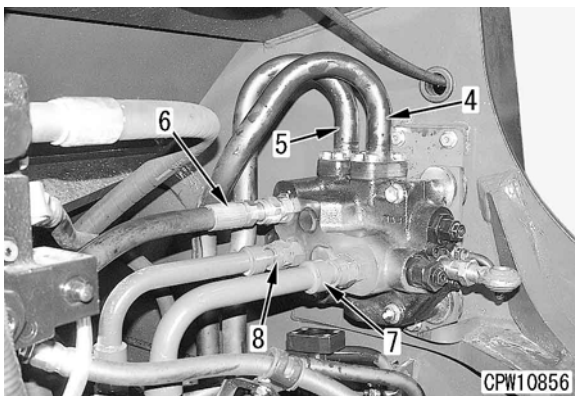
### REMOVAL

**WARNING!** Stop the machine on a level ground, set the safety bar in the frame, and ground the bucket. Then stop the engine, apply the parking brake, and set chocks under the tires.

1. Disconnect the steering rod (1).
2. Detach the return tube (2) and drain hose (3).



3. Detach the steering pump outlet tube (4), switch pump outlet tube (5), work equipment valve hose (6), steering cylinder head tube (7), and bottom tube (8).

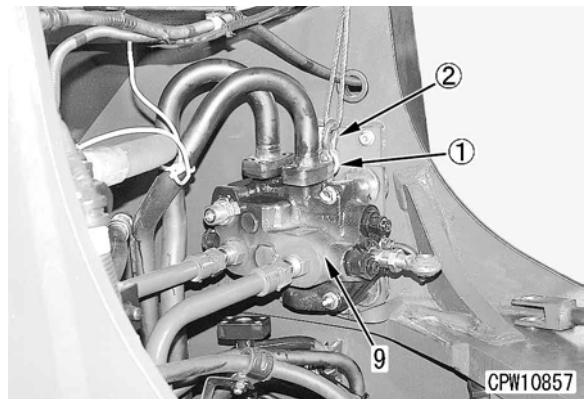


4. Use the lift bolt [1] and shackle [2] to temporarily lift the steering demand valve assembly (9), and remove the plate bolts.



Steering demand valve assembly:

**26 kg**



### INSTALLATION

- Carry out installation in reverse order to removal.
- Filling hydraulic oil  
Pour the hydraulic oil (specified oil) up to the predetermined level.

## REMOVAL AND INSTALLATION OF HYDRAULIC TANK ASSEMBLY

### REMOVAL

**WARNING!** Stop the machine on a level ground, set the safety bar in the frame, and ground the bucket. Then stop the engine, apply the parking brake, and set chocks under the tires.

**WARNING!** Operate the work equipment operation lever 10 times or more to remove the accumulated pressure of the PPC circuit.

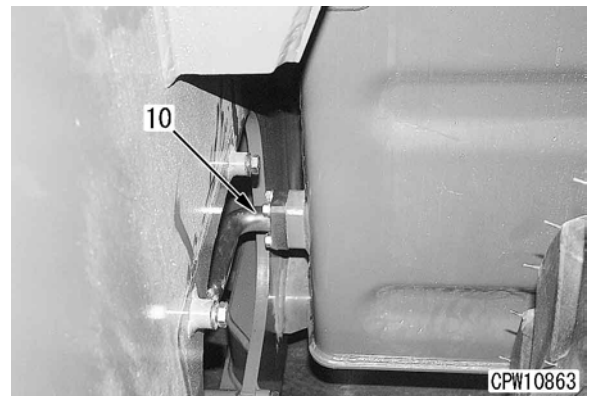
1. Drain the hydraulic tank oil.
2. Right fender step assembly  
Remove the right fender step assembly, referring to item 6 in "Detachment of Cab and Floor Frame Assembly."
3. Remove the cover on the lower right of the cab.
4. Remove the ladder (1) and covers (2) and (3).



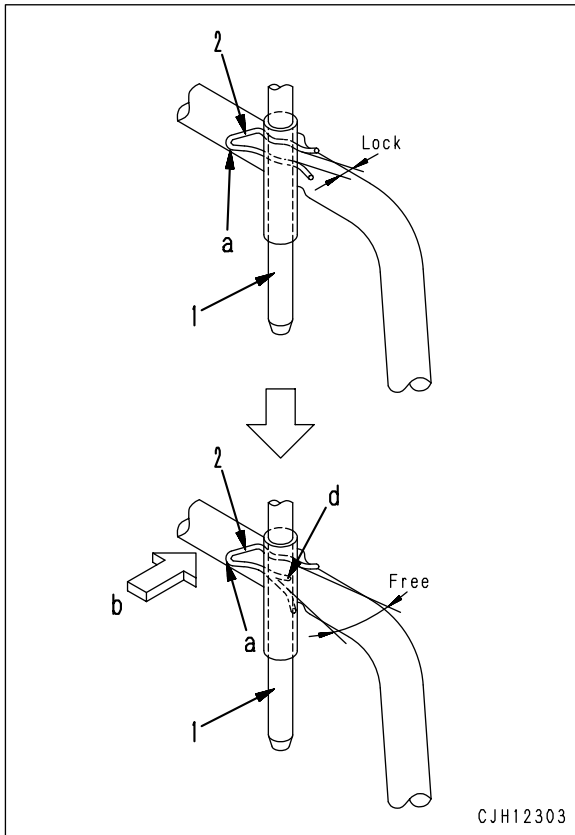
5. Detach the brake valve return tube (4), work machine valve return tube (5), PPC valve return hose (6), and hydraulic oil cooler return tube (7).
6. Detach the work machine pump suction tube (8) and steering switch fan pump suction tube (9).



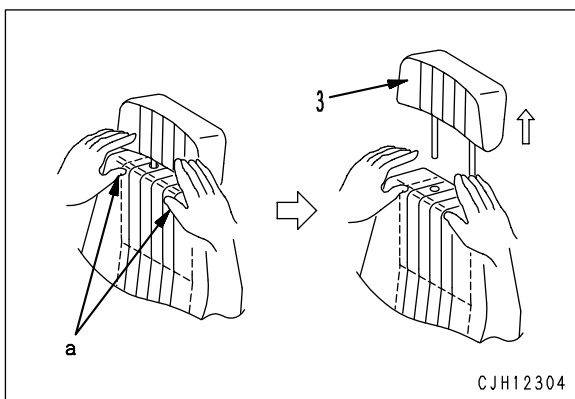
7. Detach the emergency pump suction tube (10).



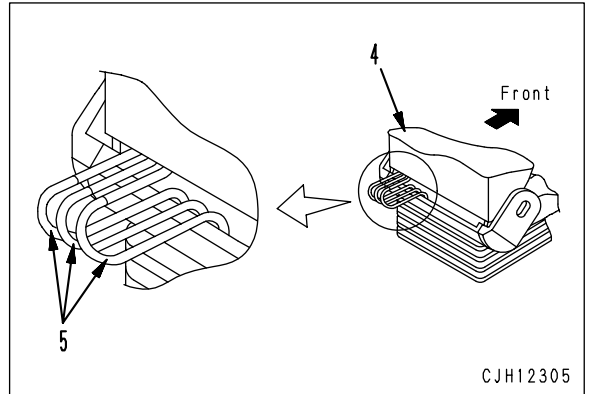
- 2) Apply force (b) to part (a) of each clip (2) in the direction of the arrow to turn the clip and release it from part (d) of headrest stay (1), and then pull out up headrest (3).



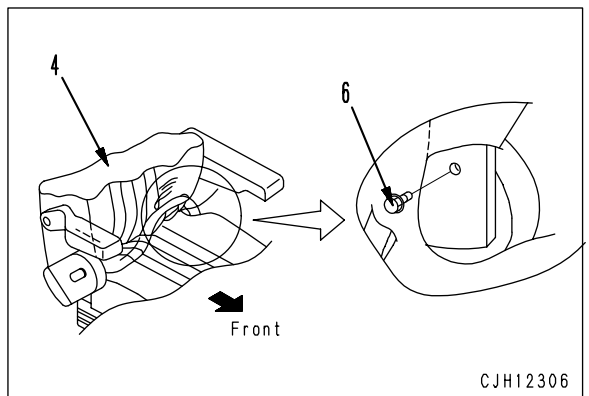
- ★ Pushing in both clips (2) simultaneously, remove headrest (3).



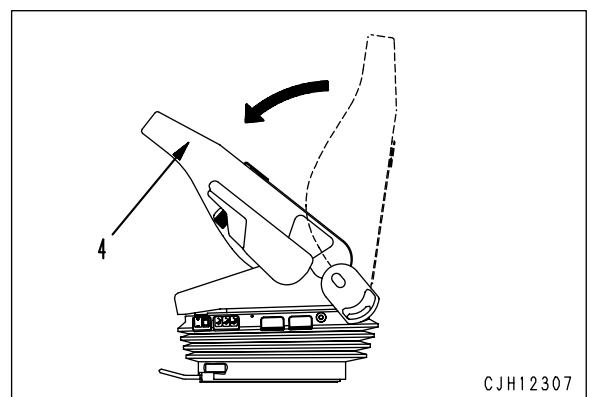
2. Back seat
  - 1) Disconnect 3 air hoses (5) from the rear left of back seat (4).
  - ★ Before disconnecting the air hoses, check their types.



- 2) Remove back seat hinge mounting bolt (6) (M8 bolt).



- 3) Bring back seat (4) down forward.



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