

SHOP MANUAL

KOMATSU WA380-5

Machine model Serial number

WA380-5 **60001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- WA380-5 mounts the SAA6D114E-2 engine.
For details of the engine, see the 114 Series Engine Shop Manual.

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HOW TO READ THE SHOP MANUAL

VOLUMES

Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

- Chassis volume:** Issued for every machine model
- Engine volume:** Issued for each engine series
- Electrical volume:** Each issued as one volume to cover all models
- Attachments volume:** Each issued as one volume to cover all models

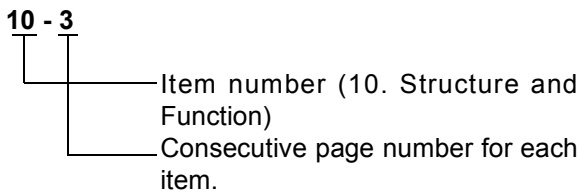
These various volumes are designed to avoid duplicating the same information. Therefore, to deal with all repairs for any model, it is necessary that chassis, engine, electrical and attachment volumes be available.

DISTRIBUTION AND UPDATING

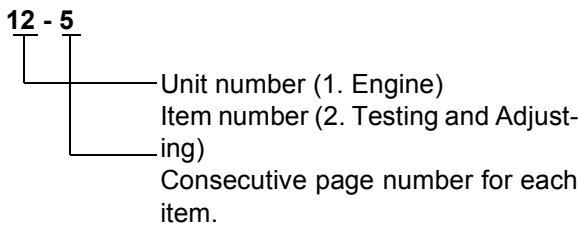
Any additions, amendments or other changes will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

FILING METHOD

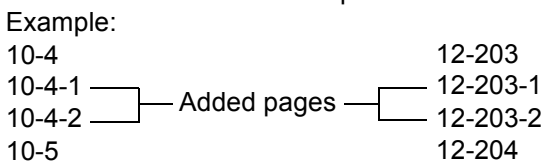
1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number.
Example 1 (Chassis volume):



Example 2 (Engine volume):



3. Additional pages: Additional pages are indicated by a hyphen (-) and number after the page number. File as in the example.



REVISED EDITION MARK

When a manual is revised, an edition mark ((1)(2)(3)....) is recorded on the bottom of the pages.

REVISIONS

Revised pages are shown in the LIST OF REVISED PAGES next to the CONTENTS page.

SYMBOLS

So that the shop manual can be of ample practical use, important safety and quality portions are marked with the following symbols.

Symbol	Item	Remarks
	Safety	Special safety precautions are necessary when performing the work.
	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts of systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants, etc.
	Oil, water	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

Millimeters to Inches

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to Pound

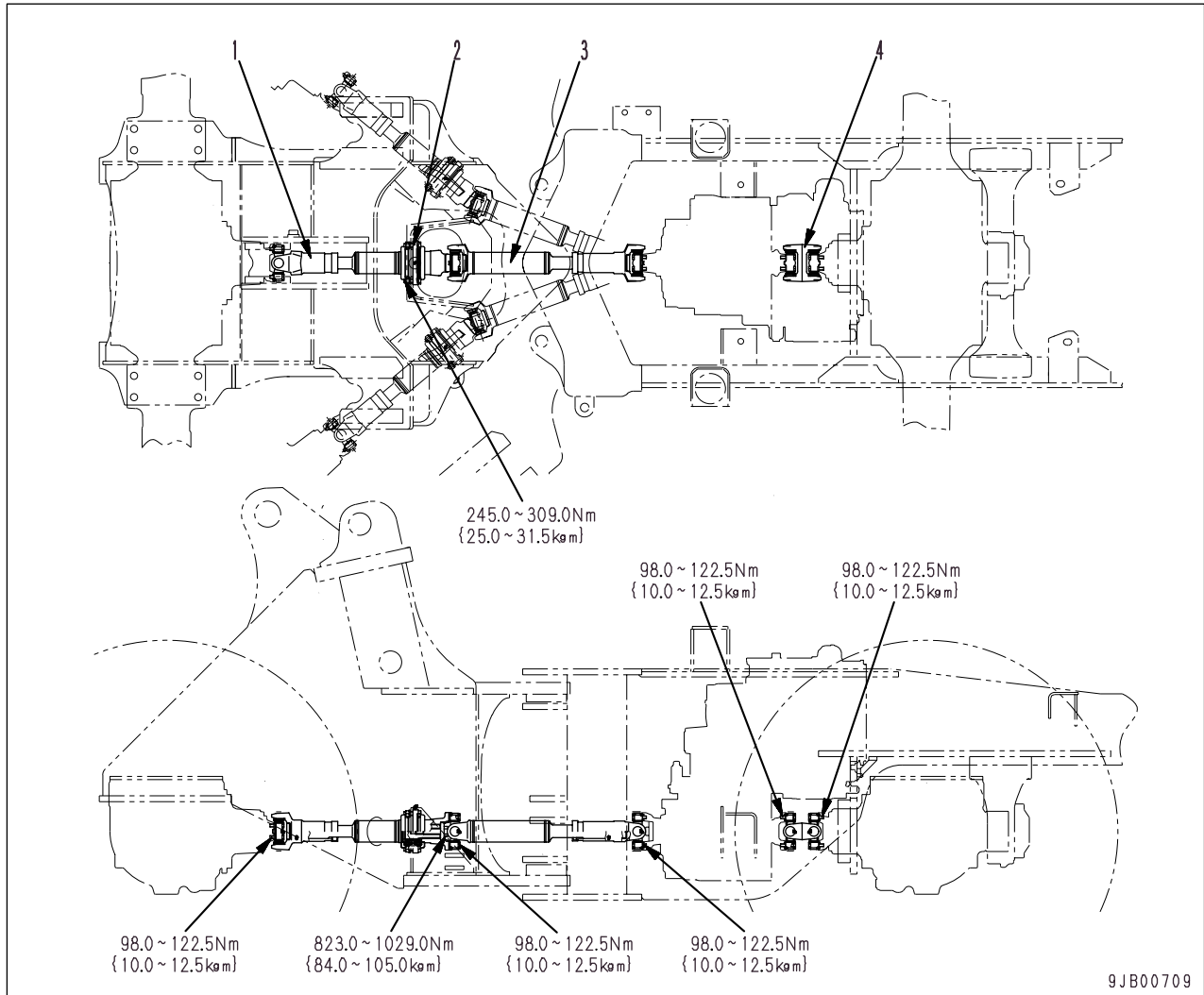
1 kg = 2.2046 lb

	0	1	2	3	4	5	6	7	8	9
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

Machine model		WA380-5	
Serial No.		60001 and up	
Hydraulic system	Control valve	Work equipment control valve <ul style="list-style-type: none"> Type Set pressure 	MPa {kg/cm ² } 20.6 {210}
		Steering valve <ul style="list-style-type: none"> Type Set pressure 	MPa {kg/cm ² } 15.7 {160}
	Motor	Cooling fan motor <ul style="list-style-type: none"> Type 	Fixed displacement piston type
Work equipment	Link type		Single link
	Bucket edge type		Flat blade with top BOC

BOC: Bolt-on cutting edge.

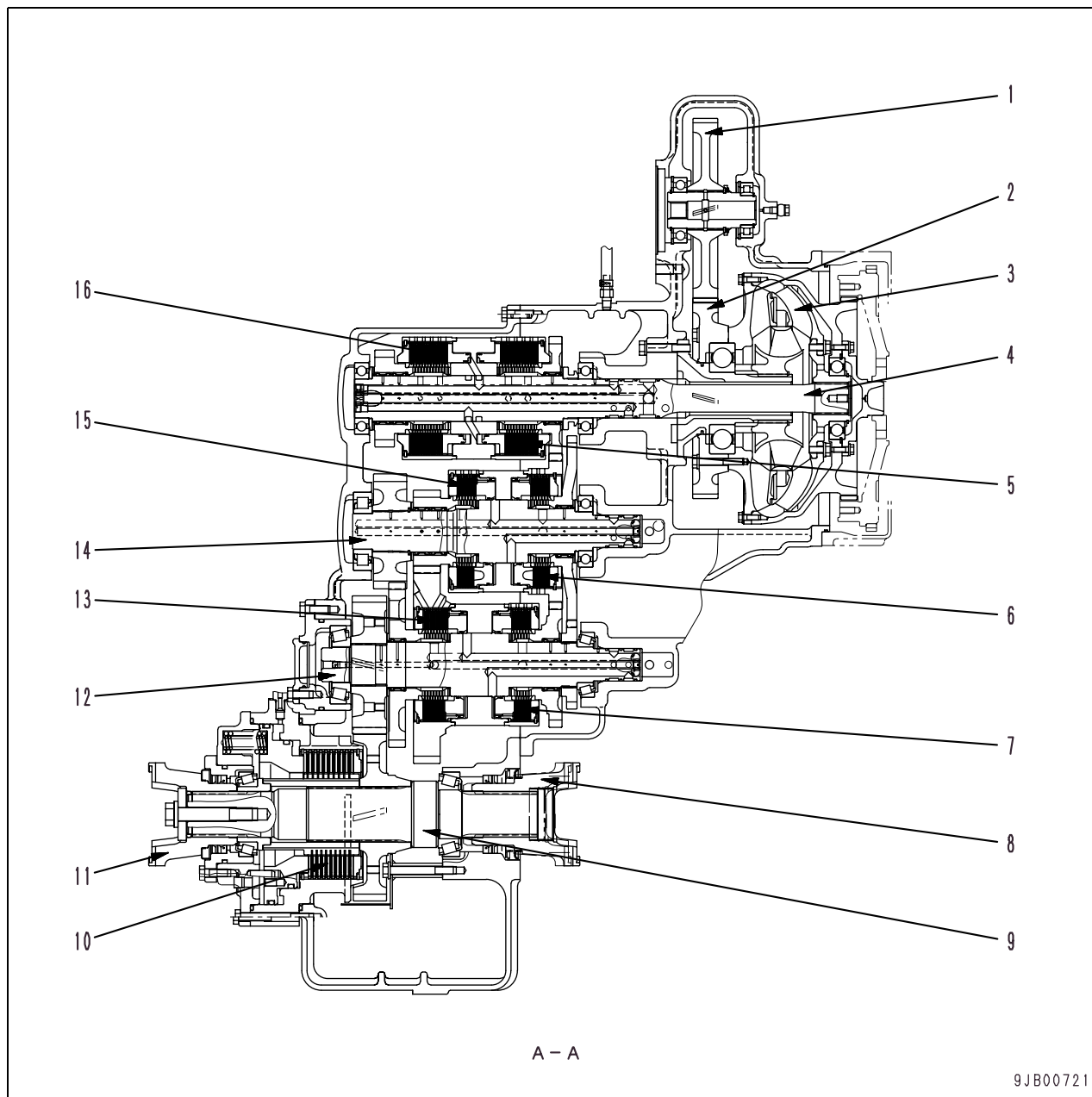
DRIVE SHAFT (PROPELLER SHAFT)



1. Front drive shaft
2. Flange bearing
3. Center drive shaft
4. Rear drive shaft

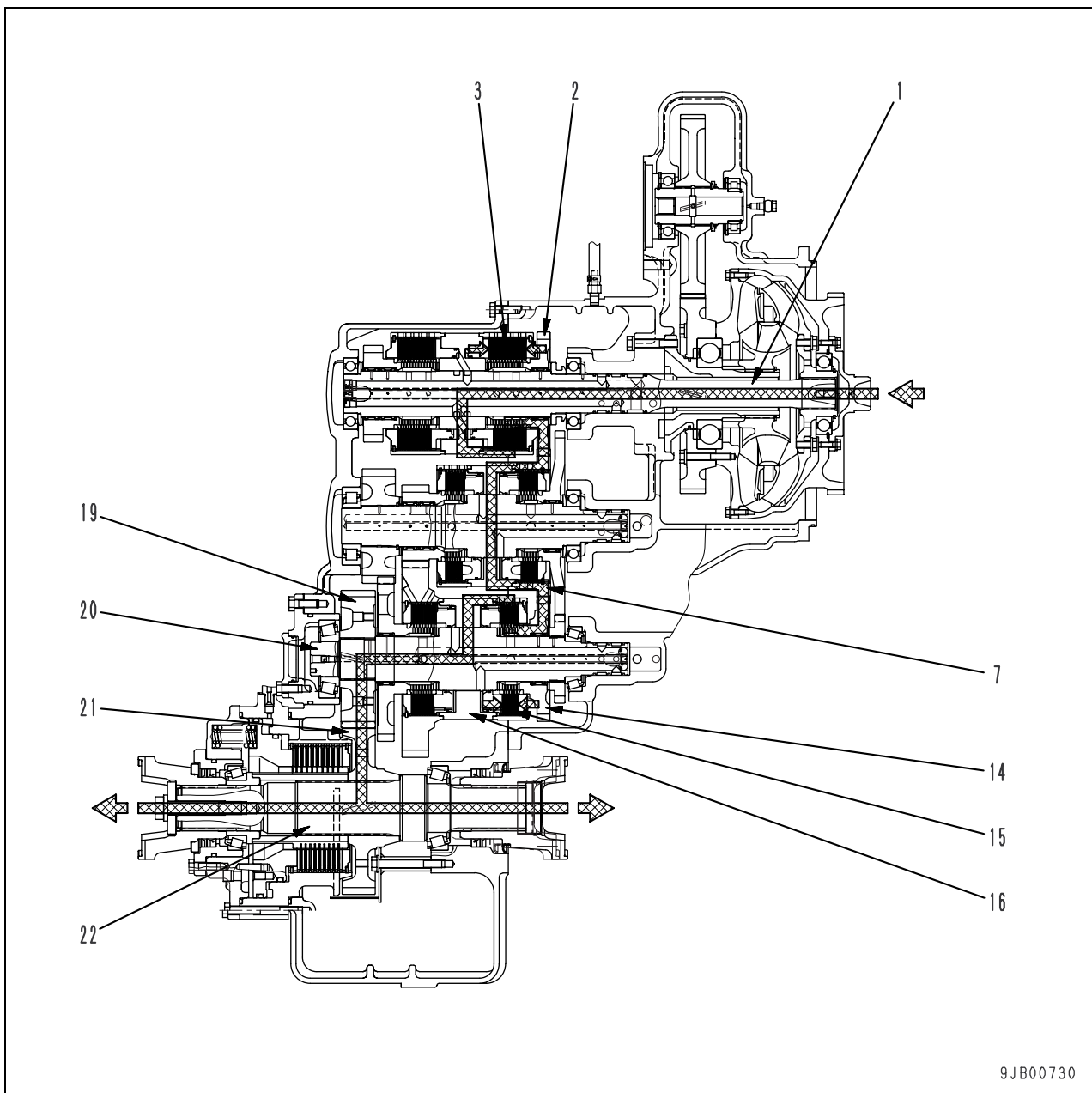
Outline

- The power from the transmission output shaft passes through center drive shaft (3), front drive shaft (1), and rear drive shaft (4), and is transmitted to the front axle and rear axle.
- When the body is articulated, or when the machine is traveling and there is shock from the ground surface, or when there is shock during operations, the position of the transmission and the front and rear axles changes. The transmission is designed so that even if the position of the components changes as a result of such shock, power can be transmitted without damage to any parts. With this design, the drive shafts have universal joints and flange bearings that enable them to handle any changes in the angle and length.



- | | |
|--|--------------------|
| 1. PTO driven gear (Number of teeth: 89) | 9. Output shaft |
| 2. PTO drive gear (Number of teeth: 97) | 10. Parking brake |
| 3. Torque converter | 11. Front coupling |
| 4. Transmission input shaft | 12. Lower shaft |
| 5. F clutch | 13. 2nd clutch |
| 6. 4th clutch | 14. Upper shaft |
| 7. 3rd clutch | 15. 1st clutch |
| 8. Rear coupling | 16. R clutch |

FORWARD 3RD



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Operation

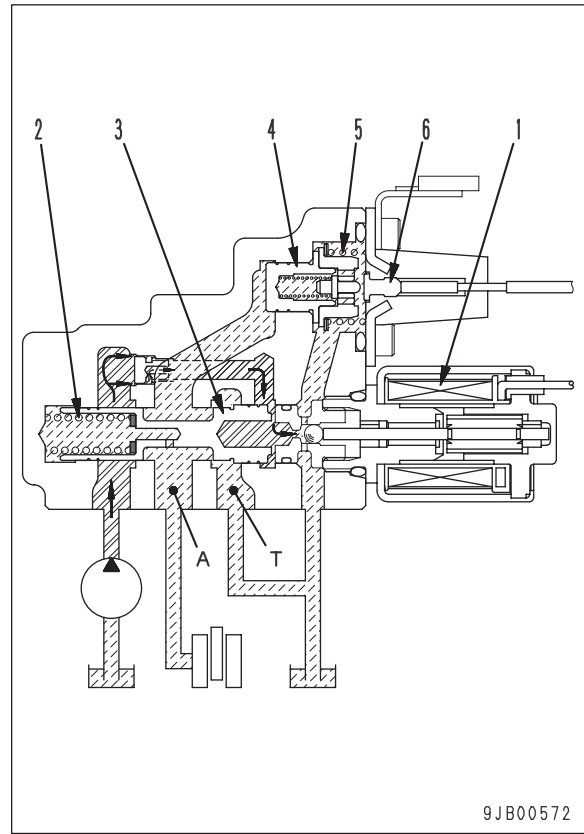
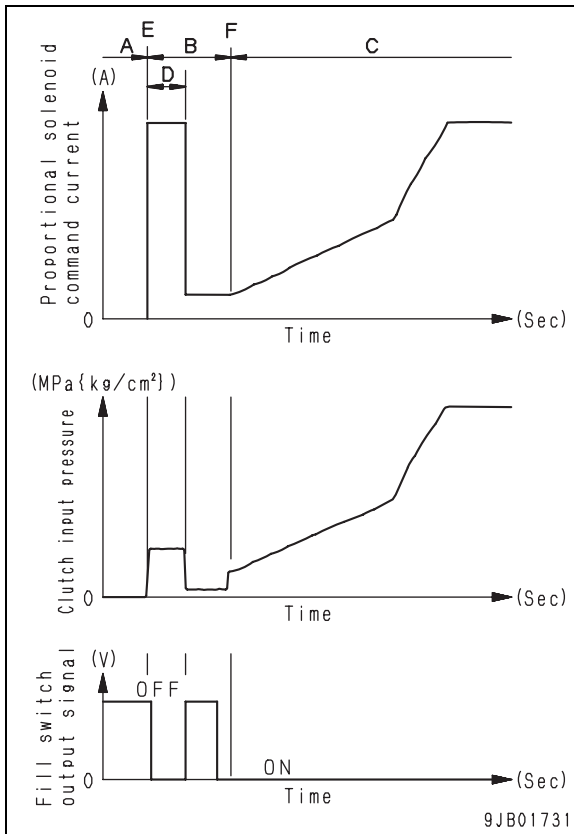
- In the case of FORWARD 3rd, F clutch (3) and 3rd clutch (15) are engaged. The power transmitted from the torque converter to input shaft (1) is transmitted to output shaft (22).
- The clutch discs of F clutch (3) and 3rd clutch (15) are fixed by the hydraulic pressure applied to the clutch piston.
- The power from the torque converter goes from input shaft (1) through F clutch (3) to F gear (2), and is transmitted through 1st-4th cylinder gear (7) to 3rd gear (14).
- 3rd clutch (15) is engaged, so the power transmitted to 3rd gear (14) goes through 3rd clutch (15) and is transmitted to 2nd-3rd cylinder gear (16). From here, it passes through lower shaft (20), output gear (19), and output gear (21), and is transmitted to output shaft (22).

Actuation of ECMV

- The ECMV is controlled by the command current from the controller to the proportional solenoid and the fill switch output signal. The relationship between ECMV proportional solenoid command current and the clutch input pressure and fill switch output signal is as shown in the diagram below.

- Range A: Before shifting gear
(when draining)
- Range B: During filling
- Range C: Pressure adjustment
- Range D: During filling (during trigger)
- Range E: Fill started
- Range F: Fill completed

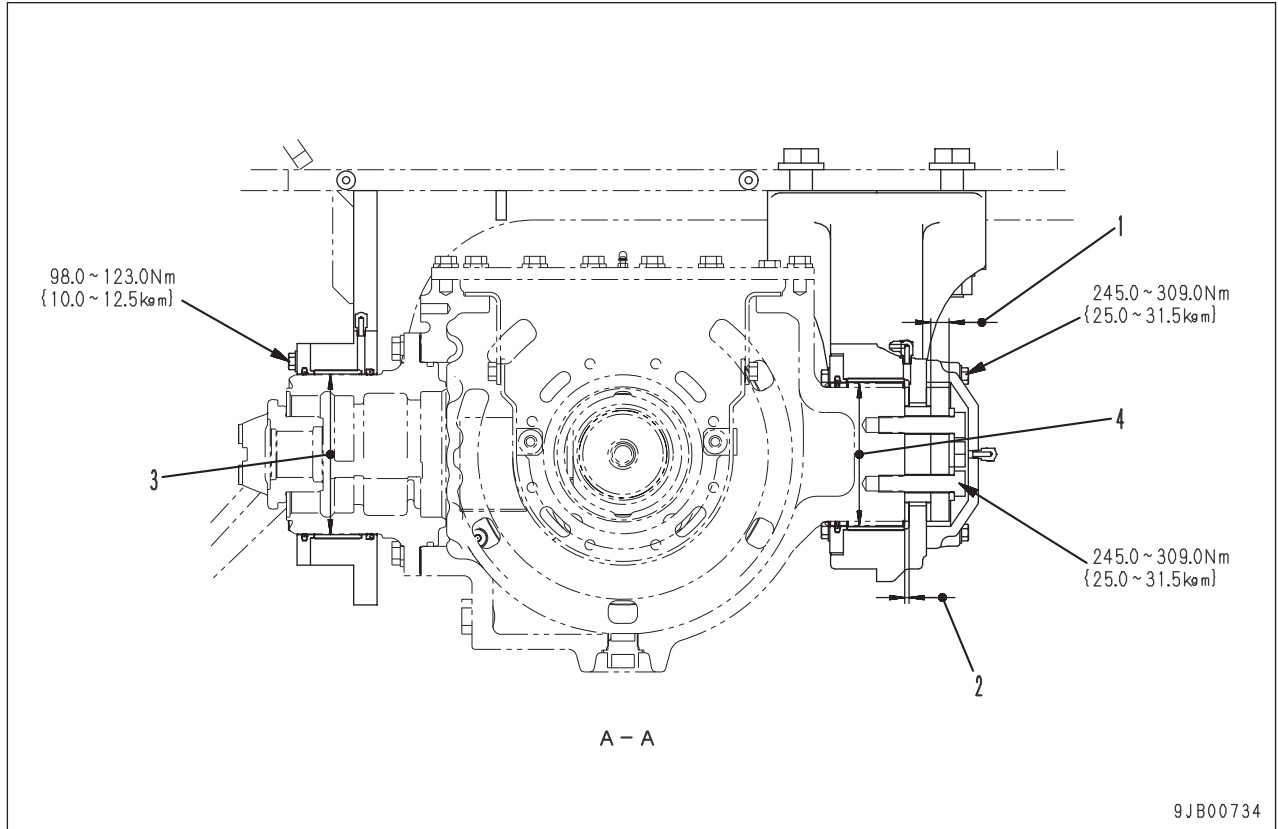
- Before shifting gear (when draining) (range A in graph)
When no current is flowing to proportional solenoid (1), pressure control valve spool (3) drains the oil at clutch port **A** through drain port **T**.
When this happens, there is no hydraulic force acting on oil pressure detection valve spool (4), so fill switch (6) goes OFF.



- ★ The logic is so designed that the controller will not recognize completion of filling even if the fill switch is turned ON in the triggering range (range D).

Unit: mm

No.	Check item	Criteria			Remedy
7	Backlash of differential gear	0.13 - 0.18			Adjust
8	Starting torque of bevel gear	13.7 - 37.2 Nm {1.4 - 3.8 kgm}{At outside surface of bevel gear}			
9	Pinion gear washer thickness	Standard size	Tolerance	Repair limit	Replace
		3	±0.08	2.8	
10	Side gear washer thickness	4	±0.05	3.8	
11	Thickness of shim at differential side bearing carrier	0.3 - 1.25			Adjust
12	Backlash of bevel gear	0.25 - 0.33			
13	End play of pinion gear	0.182			
14	Thickness of shim at differential housing and gauge assembly	1.05 ± 0.35			

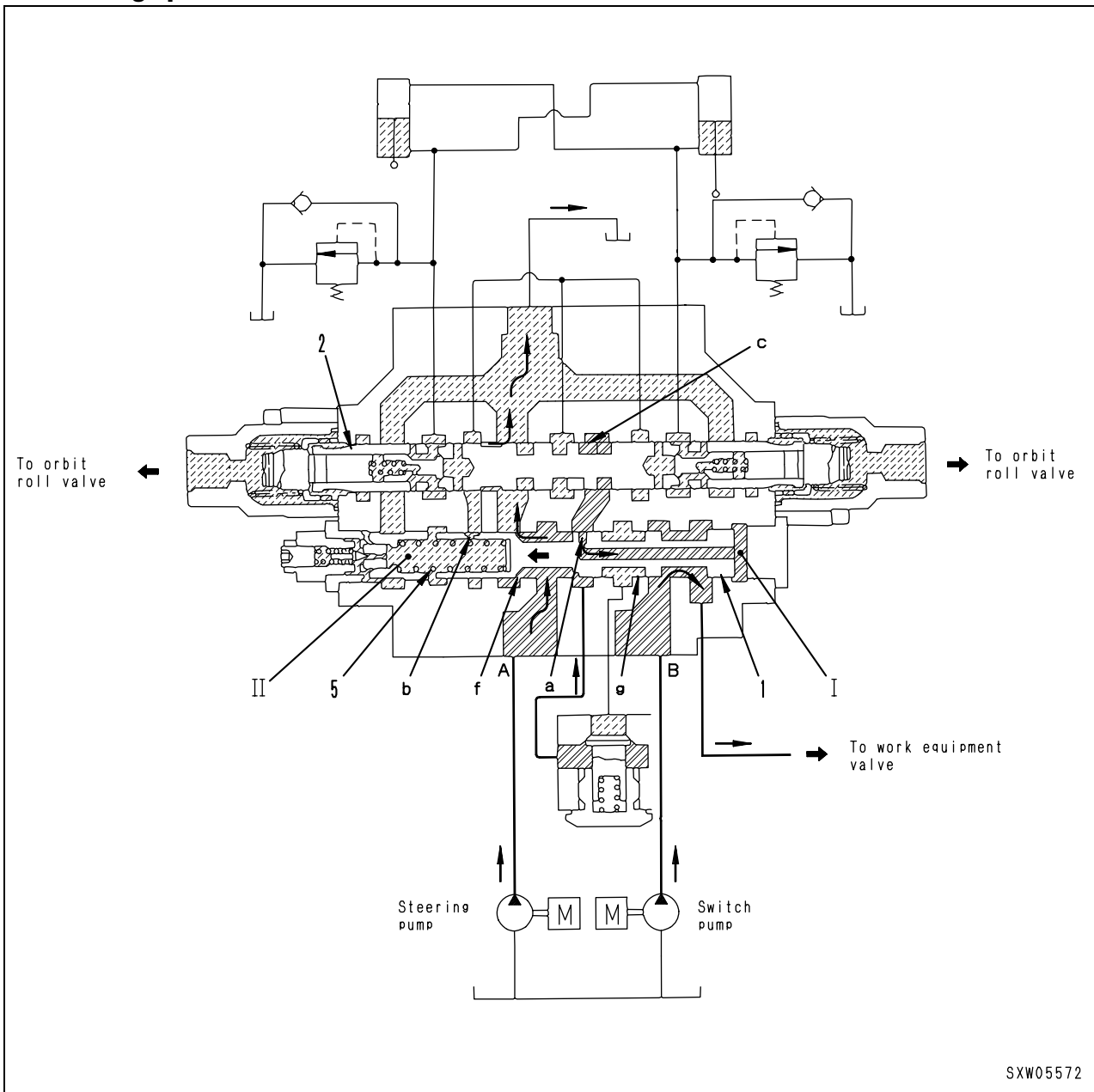


Unit: mm

No.	Check item	Criteria				Remedy	
		Standard size	Tolerance		Repair limit		
1	Thickness of thrust plate	22	±0.5		—	Replace	
		5	+0.3 -0.1		—		
3	Clearance between hole and shaft at front support end	190	Tolerance		Standard clearance		Clearance limit
			Shaft	Hole			
4	Clearance between hole and shaft at rear support end	170	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			

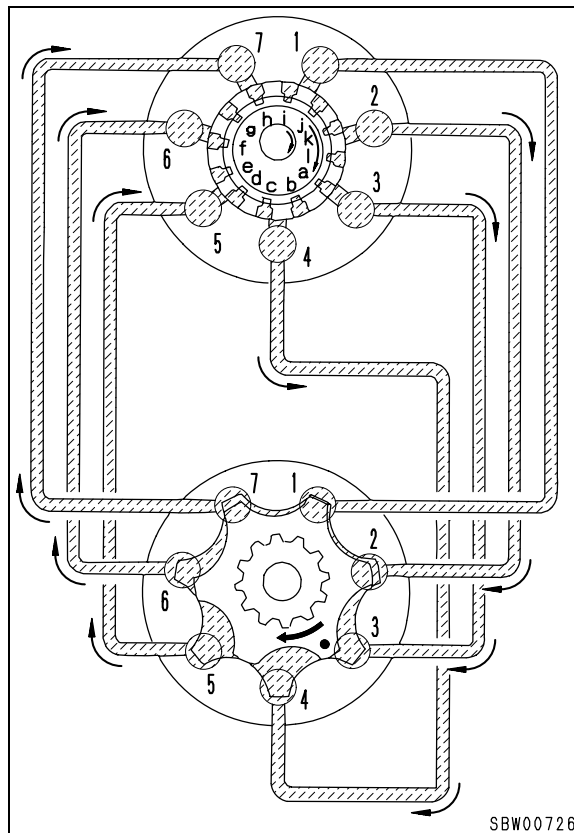
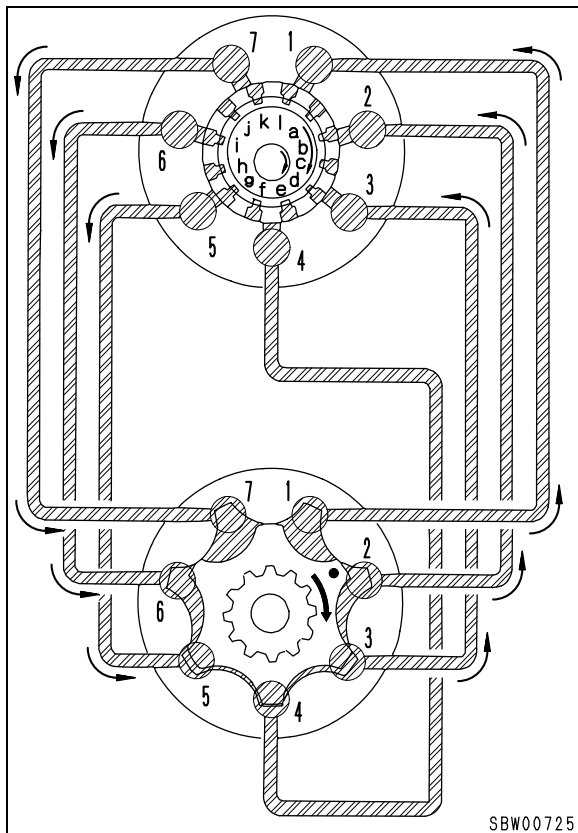
Operation of demand valve

When steering spool is at neutral



- The oil from the steering pump enters port **A**; the oil from the switch pump enters port **B**.
- When steering spool (2) is at neutral, pressure-receiving chamber (II) is connected to the drain circuit through orifice b; in addition, notch c is closed.
- Because notch c is closed, the pressure of the oil at port **A** and port **B** rises, and this pressure passes through orifice a, is taken to pressure-receiving chamber (I) and moves flow control spool (1) to the left in the direction of the arrow (←).
- When the pressure in the pressure-receiving chamber (I) reaches a certain value (set by spring (5)), notch f opens and the oil from the steering pump is relieved to the drain circuit; in addition, notch g closes, so all the flow of oil from the switch pump goes to the main control valve.

CONNECTION BETWEEN HAND PUMP AND SLEEVE



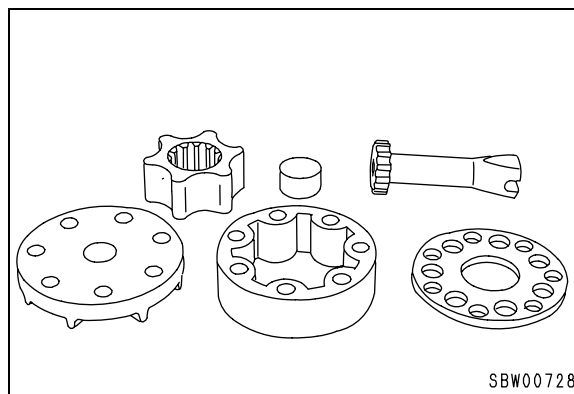
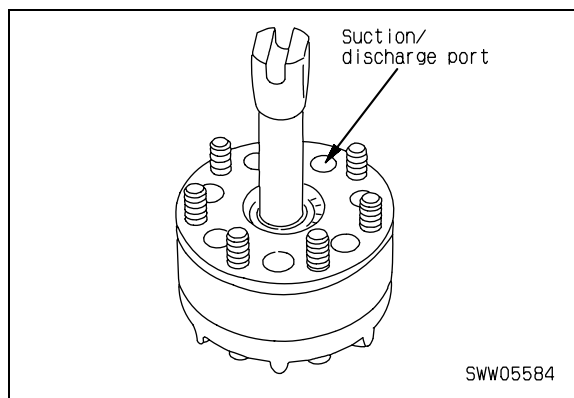
- The diagrams above show the connections with the sleeve ports used to connect the suction and discharge ports of the Girotor.

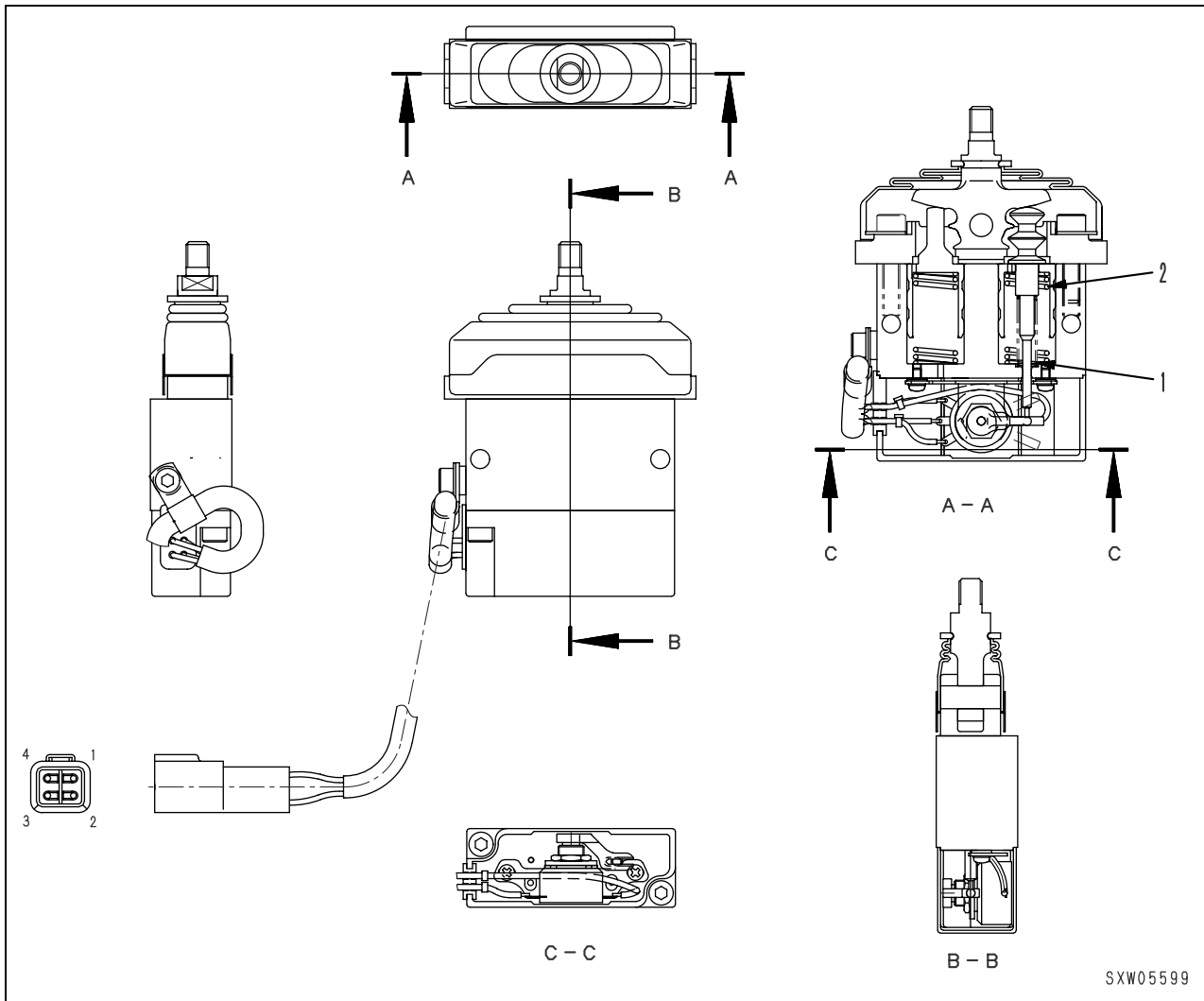
- If the steering wheel has been turned to the right, ports **a, c, e, g, i** and **k** are connected by the vertical grooves in the spool to the pump side. At the same time, ports **b, d, f, h, j,** and **l** are connected to the head end of the left steering cylinder in the same way.

In the condition in Fig.1, ports **1, 2,** and **3** are the discharge ports of the Girotor set. They are connected to ports **l, b,** and **d**, so the oil is sent to the cylinder.

Ports **5, 6,** and **7** are connected and the oil flows in from the pump.

If steering wheel is turned 90°, the condition changes to the condition shown in Fig. 2. In this case, ports **1, 2,** and **3** are the suction ports, and are connected to ports **i, k,** and **c**. Ports **5, 6,** and **7** are the discharge ports, and are connected to ports **d, f,** and **h**.



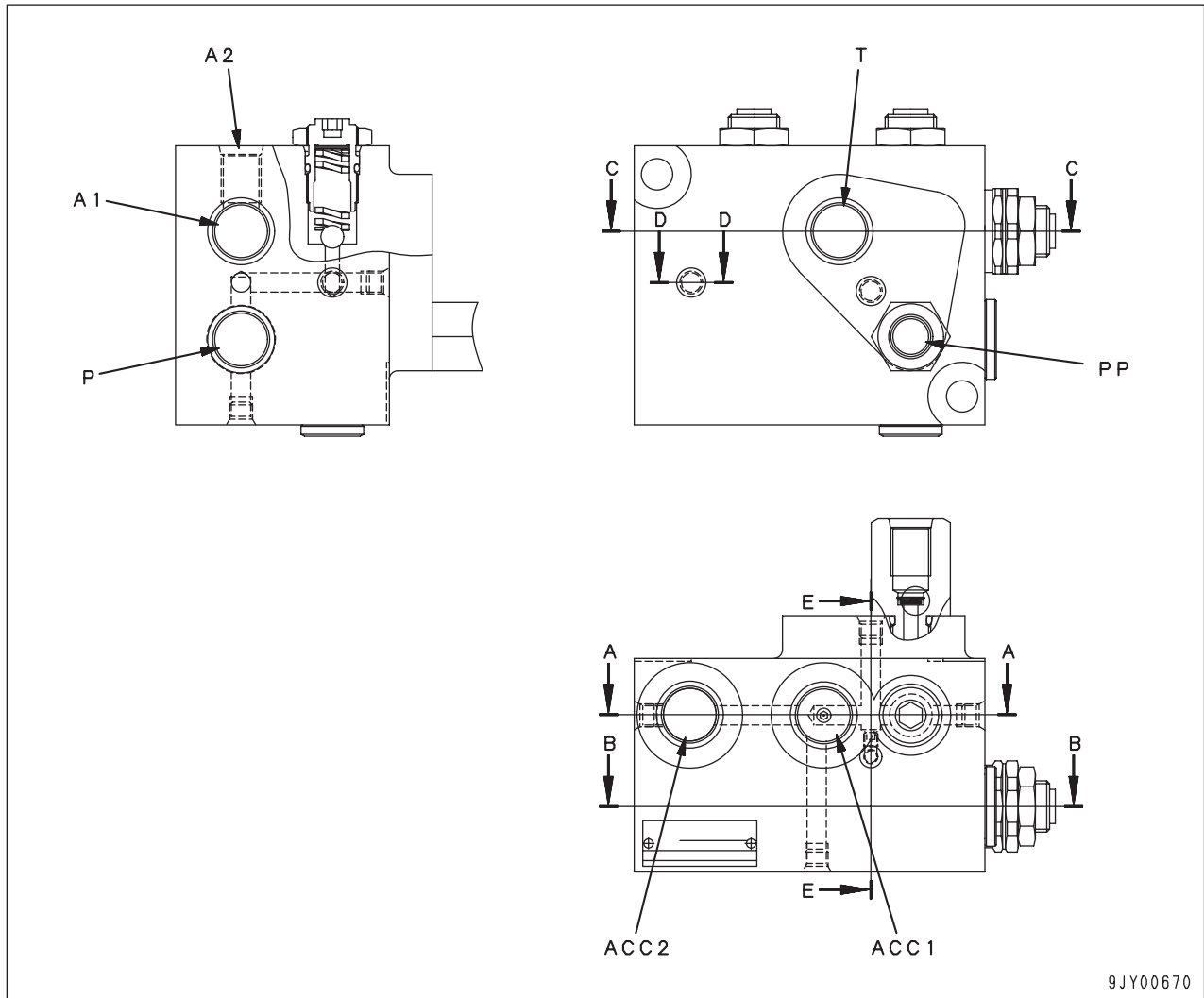


SXW05599

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Spring	Free length	Installed length	Installed load	Free length	Installed load	Replace spring if damaged or deformed
		49 x 7.0	25	5.88 N {0.6 kg}	—	4.71 N {0.48 kg}	
2	Spring	45.8 x 15.5	32	73.5 N {7.5 kg}	—	58.8 N {6.0 kg}	

CHARGE VALVE

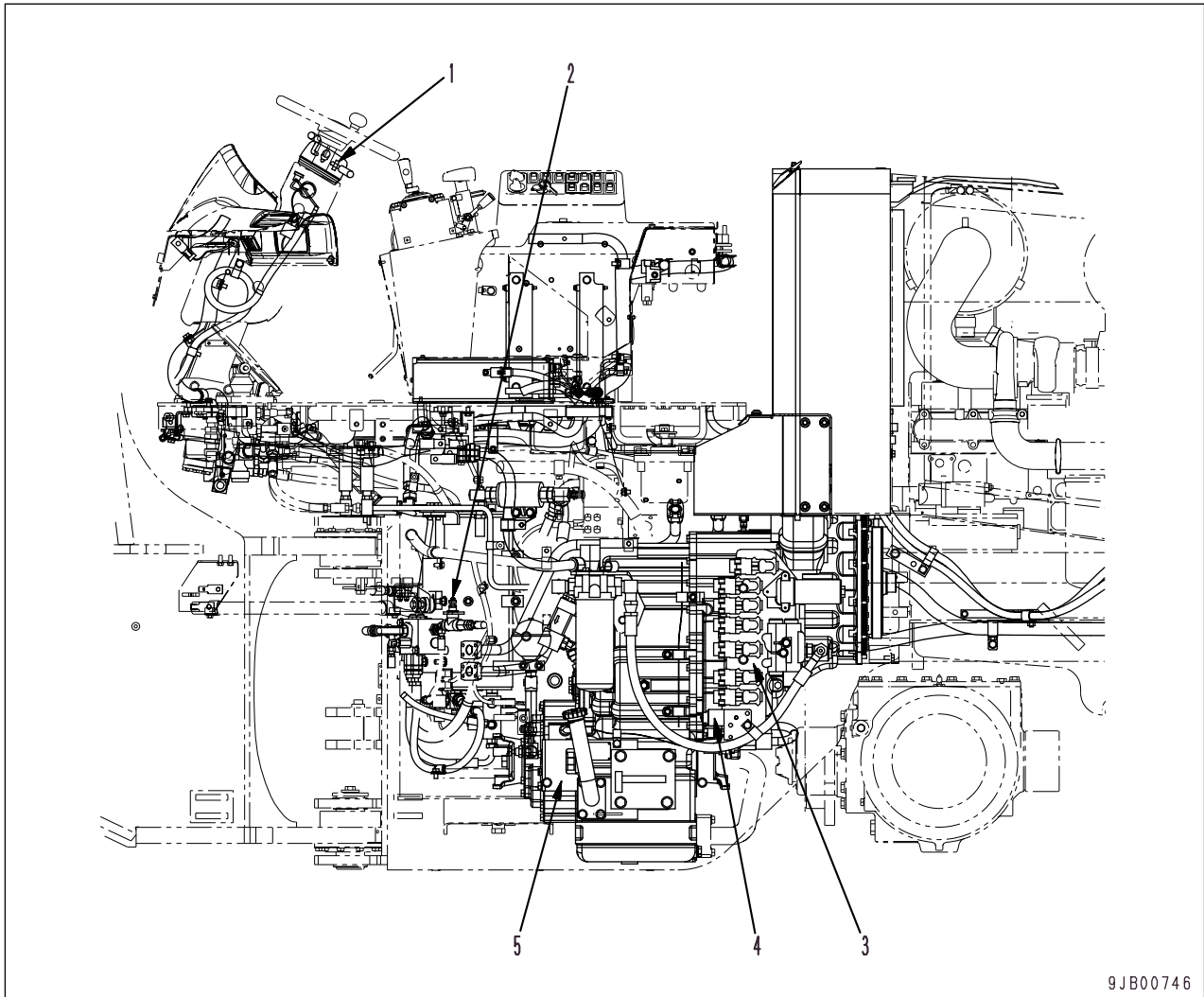


9JY00670

- A1 : To the PPC (*EPC) valve
- A2 : Plug
- ACC1: To the R.H. brake valve PA
- ACC2: To the R.H. brake valve PB
To the L.H. brake valve P
- P : From the pump
- PP : To the accumulator
- T : Drain

* EPC valves are optional parts.

PARKING BRAKE CONTROL



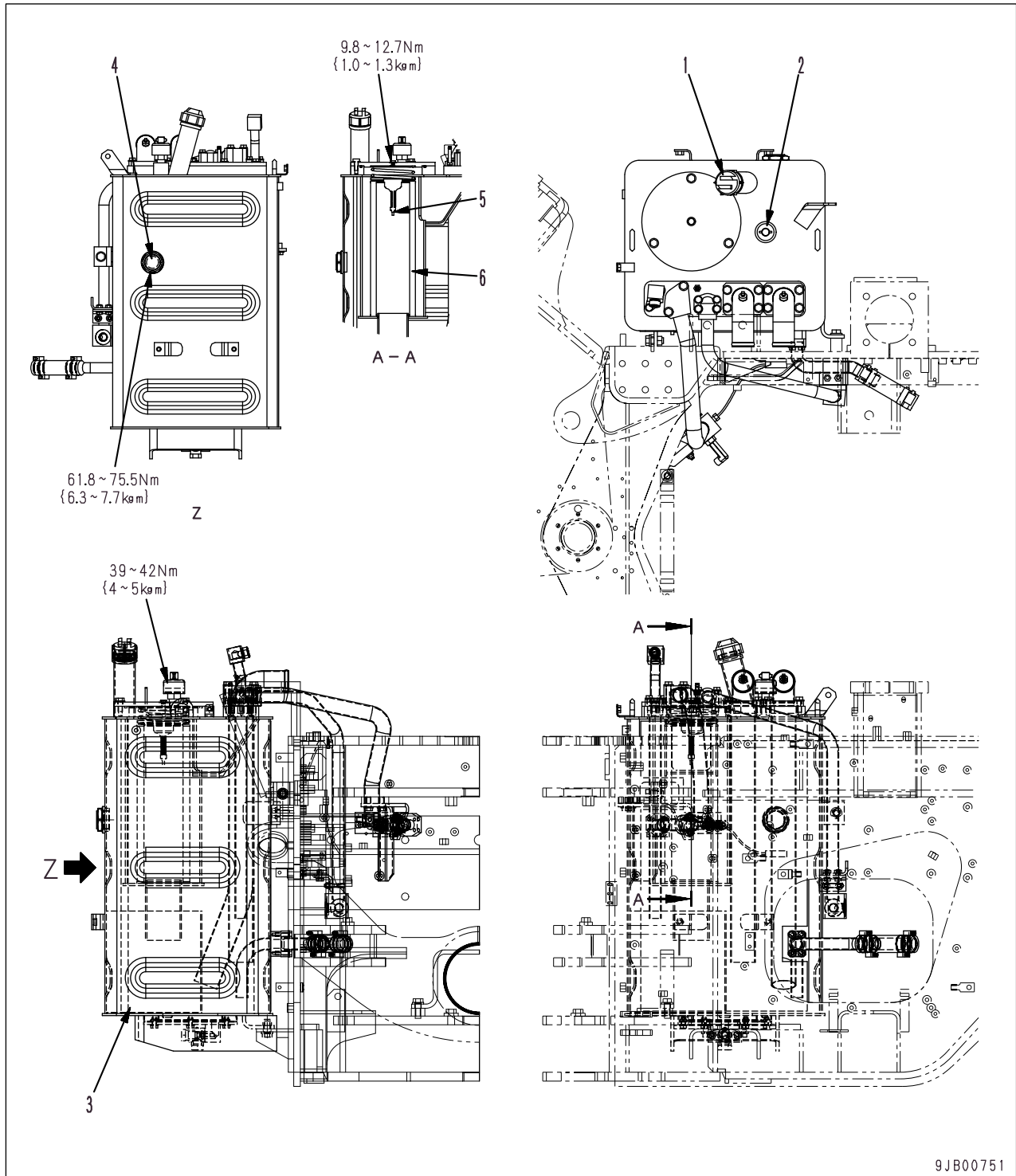
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1. Parking brake switch
2. Parking brake emergency release valve
3. Transmission control valve
4. Parking brake solenoid valve
5. Parking brake

Outline

- The parking brake is a wet-type multiple disc brake built into the transmission. It is installed to the bearing portion of the output shaft. It is applied mechanically by the pushing force of a spring, and is released by hydraulic power.
- When the parking brake switch (1) in the operator's compartment is turned ON, the hydraulic pressure is shut off by parking brake solenoid valve (4) installed to transmission control valve (3), and the parking brake is applied. When the parking brake switch is turned OFF, the parking brake is released by the hydraulic pressure of the cylinder.
- While the parking brake is being applied (when the solenoid is OFF), the signal from the transmission controller to the transmission solenoid valve is cut by the neutralizer signal, and the transmission is held at neutral.
- Parking brake emergency release valve (2) is installed to release the parking brake if it is necessary to move the machine when trouble has occurred in the engine or drive system and the machine remains stopped (the parking brake remains applied).

HYDRAULIC TANK

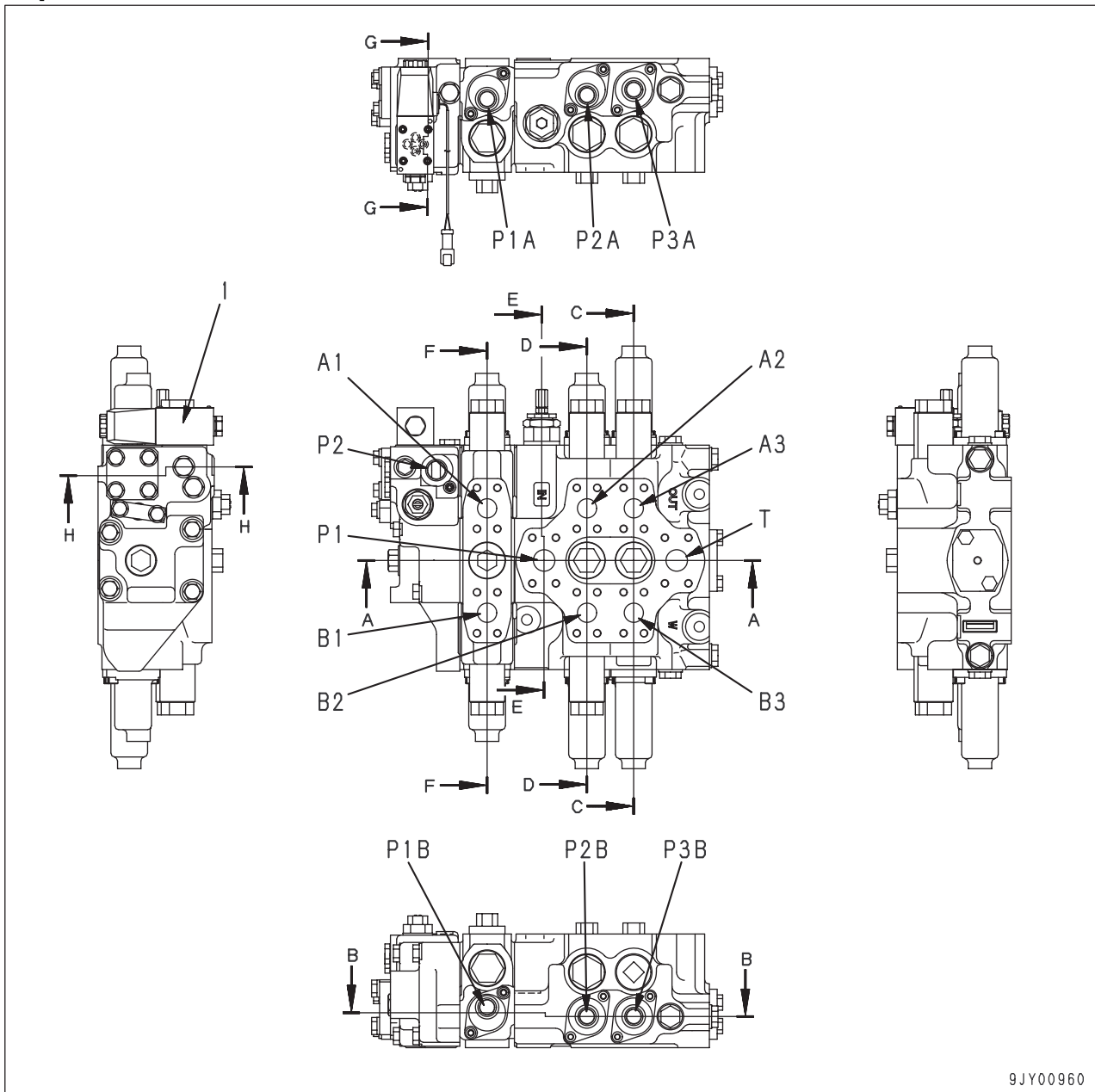


1. Oil filler port
2. Breather
3. Hydraulic oil tank
4. Sight gauge
5. Bypass valve
6. Oil filter

Specifications

Tank capacity (ℓ)	195
Oil quantity inside the tank (ℓ)	129
Bypass valve setting pressure (MPa{kg/cm ² })	0.125 {1.27}

2. 3-spool valve

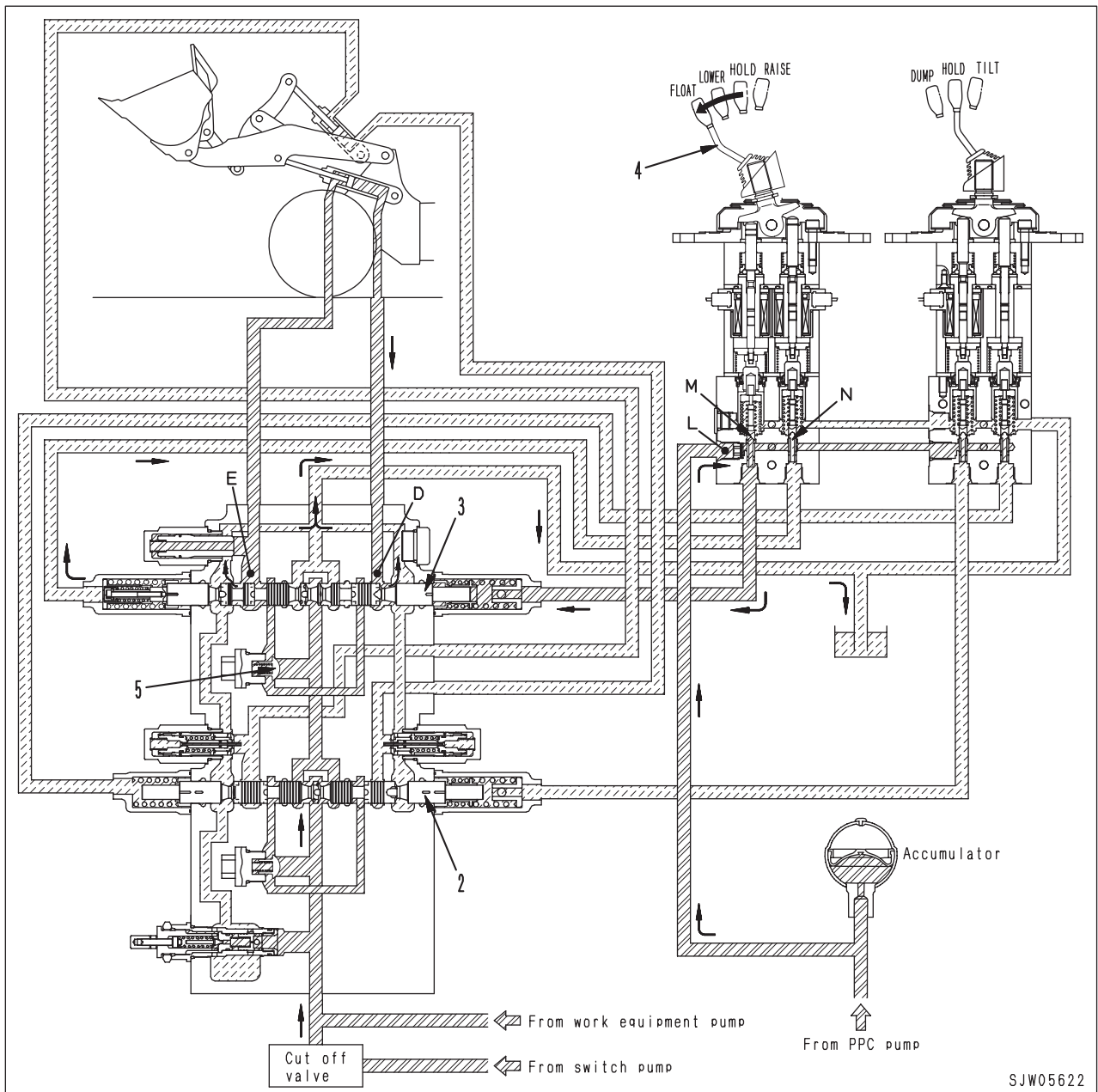


- T : Drain port (To the tank)
- A1: To the attachment cylinder
- A2: To the bucket cylinder head
- A3: To the lift cylinder head
- B1: To the attachment cylinder
- B2: To the bucket cylinder bottom
- B3: To the lift cylinder bottom
- P1: From the work equipment pump

- P2 : From the switch pump (Steering valve)
- P1A: From the attachment PPC valve
- P1B: From the attachment PPC valve
- P2A: From the P1 port of the PPC valve
- P2B: From the P3 port of the PPC valve
- P3A: From the P2 port of the PPC valve
- P3B: From the P4 port of the PPC valve

1. Solenoid valve

(4) FLOAT position of the lift arm spool



Operation

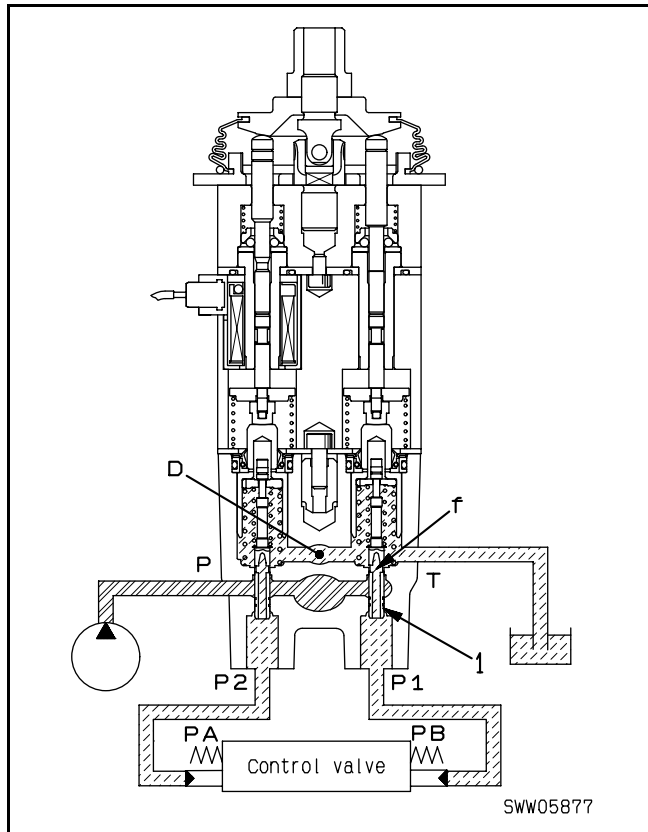
- When the lift arm lever is pushed to the FLOAT position, the lift arm spool (3) further moves from the LOWER position to the FLOAT position.
- The oil coming from the pump passes through the bypass circuit of the bucket spool (2) to flow to the bypass circuit of the lift arm spool (3).
- Because of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

OPERATION

1. At NEUTRAL

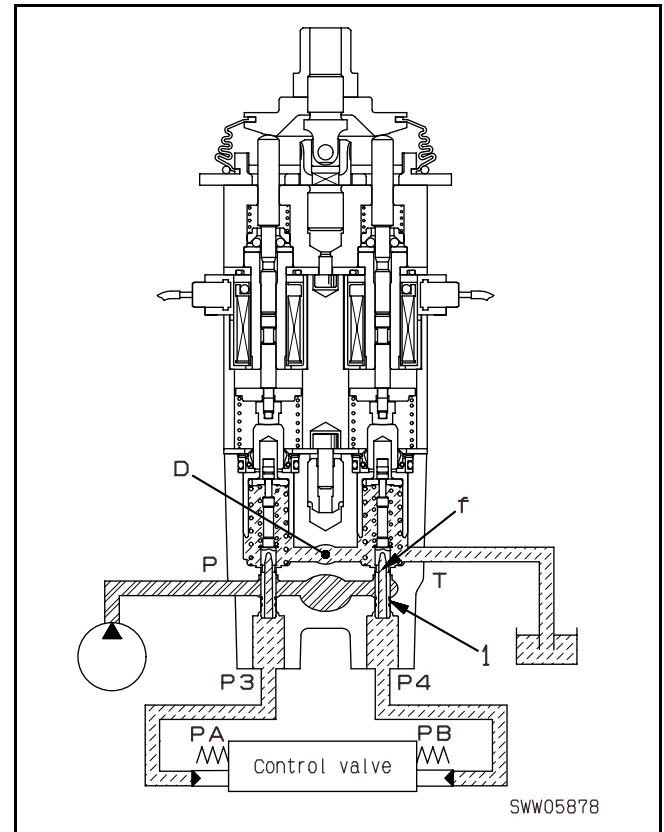
(1) PPC Valve for Bucket

- **PA** and **PB** ports of the control valve for bucket and **P1** and **P2** ports of the PPC valve lead to the drain chamber **D** through the fine control hole **f** of the spool (1).



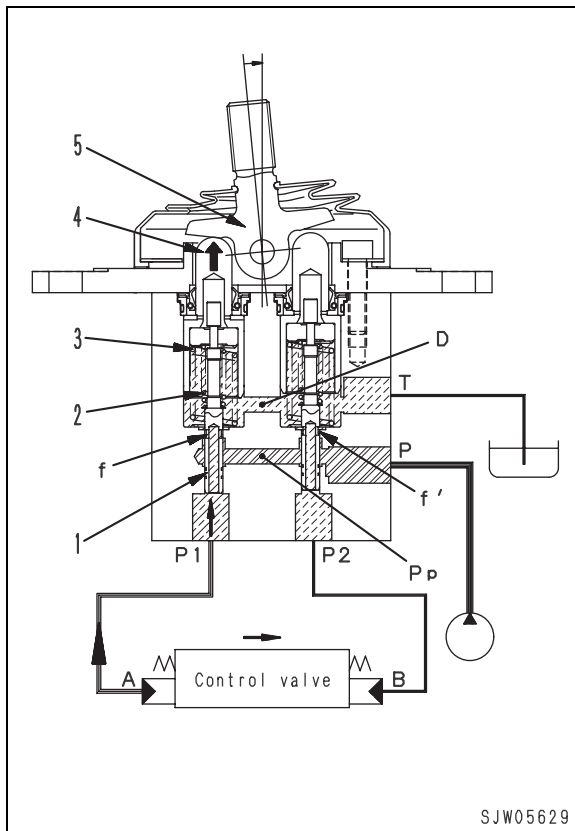
(2) PPC Valve for Lift arm

- **PA** and **PB** ports of the control valve for lift arm and **P3** and **P4** ports of the PPC valve lead to the drain chamber **D** through the fine control hole **f** of the spool (1).



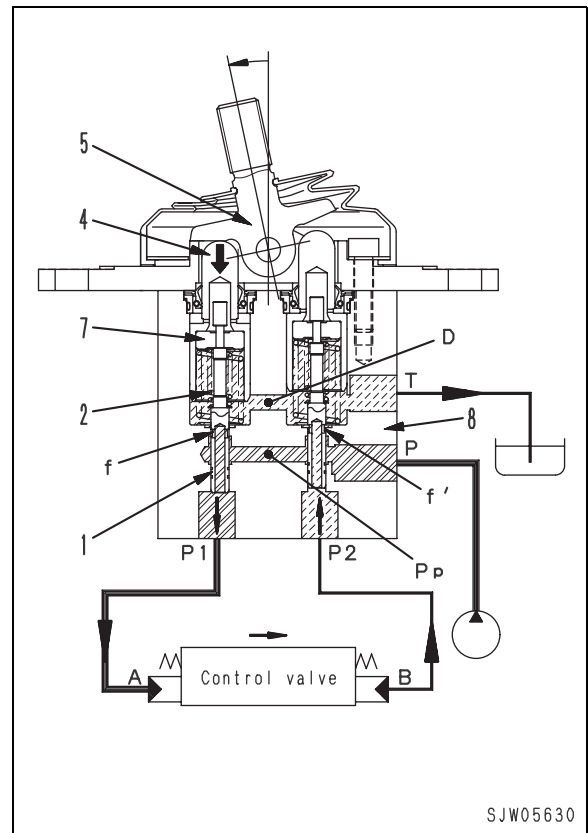
3. At the fine control position (When the control lever is returned)

- When the lever (5) is started to be returned, by the power of the centering spring (3) and by the pressure of the **P1** port, the spool (1) is pushed up. By the above, the fine control hole **f** connects to the drain chamber **D** to release the pressurized oil from the **P1** port.
- In case the pressure of the **P1** port drops excessively, the spool (1) is pushed down by the metering spring (2) and the fine control hole **f** is shut off from the drain chamber **D**, connecting to the drain chamber **D** almost simultaneously to supply the pump pressure **PP** until the pressure of the **P1** port returns to the pressure corresponding to the lever position.
- When the control valve spool returns, the oil in the drain chamber **D** flows through the fine control hole **f'** of the valve which is not moving to be led to the **B** chamber through the **P2** port to refill the oil.

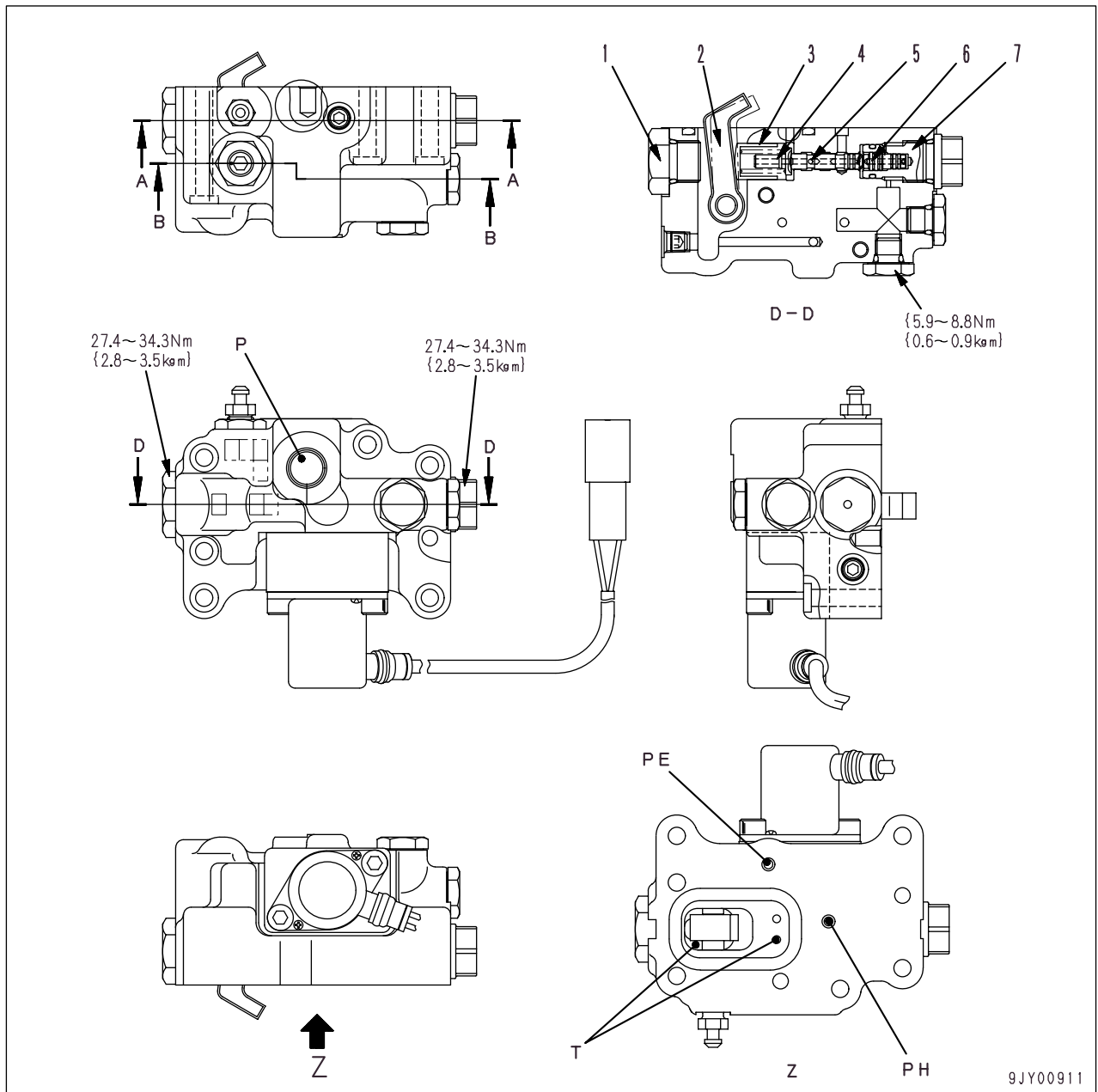


4. At full stroke

- When the lever (5) pushes down the piston (4) and when the retainer pushes down the spool (1), the fine control hole **f** is shut off from the drain chamber **D** and, then, it connects to the pressure chamber **PP** of the pump.
- Therefore, the pilot pressure oil coming from the main pump passes through the fine control hole **f** to be led to the **A** chamber through the **P1** port to push the control valve spool.
- The return oil from the **B** chamber passes through the **P2** port and the fine control hole **f'** to flow into the drain chamber **D**.



SERVO VALVE

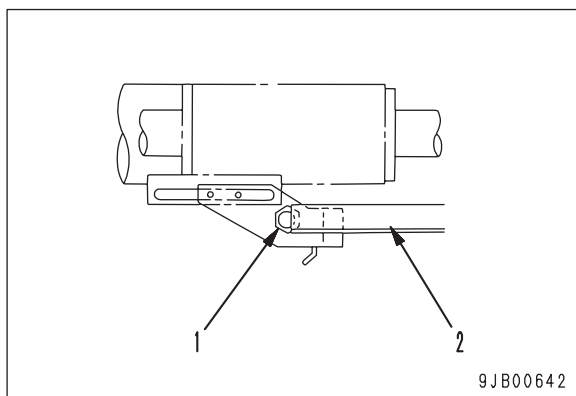


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P : EPC valve main pressure
 T : Drain
 PE: Control piston pressure
 PH: Pump discharge pressure

1. Plug
2. Lever
3. Retainer
4. Seat
5. Spool
6. Piston
7. Sleeve

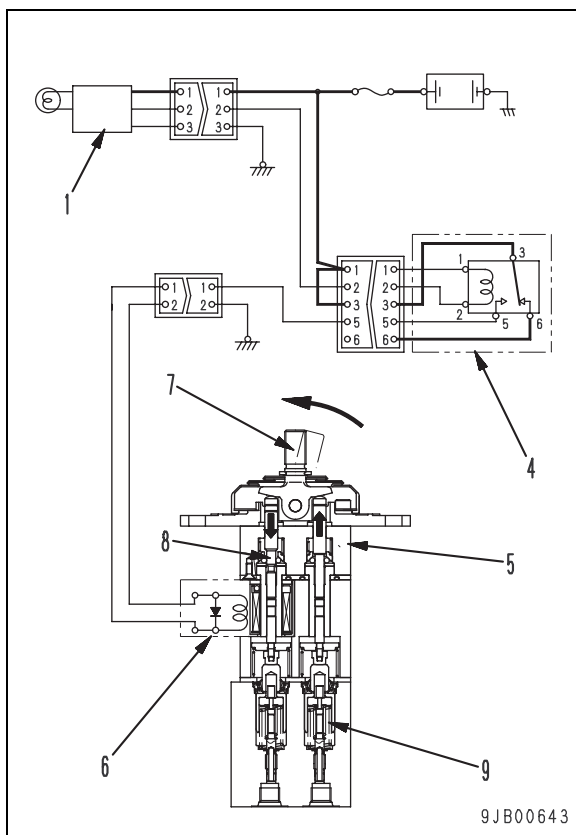
- If the bucket is tilted to the set position of the bucket leveler, or if lever (2) leaves the detection plane of proximity switch (1), the lamp of proximity switch (1) goes off and lift arm kick-out relay (4) is turned off. As a result, the circuit of detent solenoid (6) of PPC valve (5) is turned off and the coil is turned off. Held dump spool (8) receives the reaction force of spring (9) and returns bucket control lever (7) to the NEUTRAL position.



Operation of proximity switch

When part to be detected is apart from detection plane of proximity switch

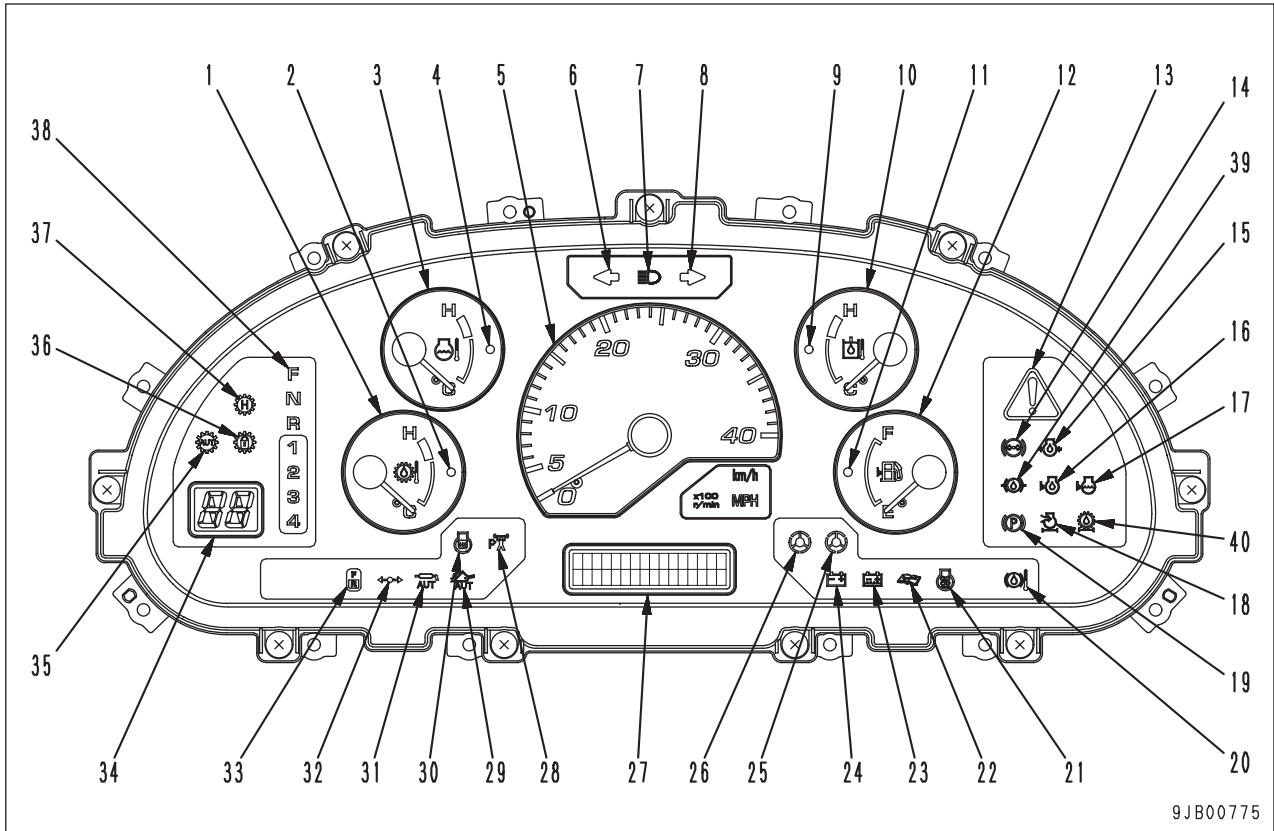
Pilot lamp of proximity switch	ON
Bucket positioner relay switch circuit	ON
PPC valve detent solenoid circuit	ON
PPC valve detent solenoid	ON



When part to be detected is on detection plane of proximity switch

Pilot lamp of proximity switch	OFF
Bucket positioner relay switch circuit	OFF
PPC valve detent solenoid circuit	OFF
PPC valve detent solenoid	OFF

**MACHINE MONITOR
SPEEDMETER SPECIFICATIONS**



9JB00775

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Torque converter oil temperature gauge 2. Torque converter oil temperature caution lamp 3. Engine coolant temperature gauge 4. Engine coolant temperature caution lamp 5. Speedometer or engine tachometer 6. Turn signal pilot lamp (left) 7. Headlamp high beam pilot lamp 8. Turn signal pilot lamp (right) 9. Hydraulic oil temperature caution lamp 10. Hydraulic oil temperature gauge 11. Fuel level caution lamp 12. Fuel gauge 13. Central warning lamp 14. Brake oil pressure caution lamp 15. Engine oil pressure caution lamp 16. Engine oil level caution lamp 17. Radiator coolant level caution lamp 18. Air cleaner clogging caution lamp 19. Parking brake pilot lamp 20. Axle oil temperature caution lamp 21. Cooling fan reverse rotation pilot lamp | <ol style="list-style-type: none"> 22. Maintenance caution lamp 23. Battery electrolyte level caution lamp 24. Battery charge circuit caution lamp 25. Steering oil pressure caution lamp 26. Emergency steering pilot lamp 27. Character display 28. Output mode pilot lamp 29. Semi auto digging pilot lamp 30. Preheating pilot lamp 31. Auto greasing pilot lamp 32. Joystick pilot lamp 33. Directional selector pilot lamp 34. Shift indicator 35. Auto-shift pilot lamp 36. Lockup pilot lamp 37. Shift hold pilot lamp 38. Shift lever position pilot lamp 39. Brake oil level caution lamp 40. Transmission oil filter clogging caution lamp |
|---|--|

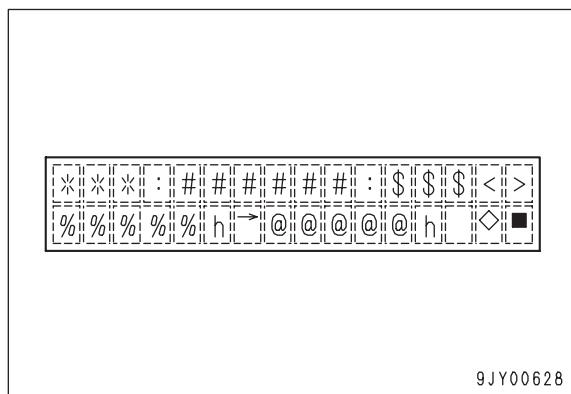
Service mode functions

1. Outline

1) Electric fault history

Use this function to check the electric fault history of respective controllers being memorized by the machine monitor. Regarding the failure code being used in the electric fault history, refer to the Chapter "Troubleshooting". When the fault is repaired and after checking and confirming that normal operation has been restored, delete the fault history.

The electric fault history indications on the character display are as follows.



***: Indicates which sequence number of fault history counting from the top.

#####: Indicates the failure code.

\$\$\$: Indicates the number of times of occurrence of the subject failure code

%%%%: Indicates the elapsed time from the initial occurrence of the same electric fault (the value deducting the service meter value when the electric fault initially occurred from the current service meter value).

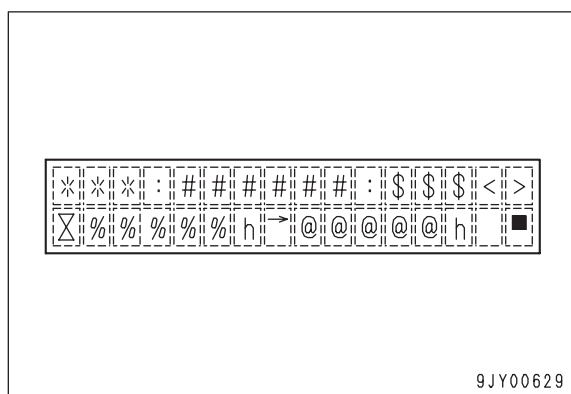
@@@@@: Indicates the elapsed time from last occurrence of the same electric fault (the value deducting the service meter value when the electric fault last occurred from the current service meter value).

When the indication is showing the currently occurring electric fault, the failure code flashes. Up to max. 20 failure codes can be memorized.

2) Machine fault history

Use this function to check the machine fault history of respective controllers being memorized by the machine monitor. Regarding the failure code being used in the machine fault history, refer to the Chapter "Troubleshooting".

The machine fault history indications on the character display are as follows.



***: Indicates which sequence number of fault history counting from the top.

#####: Indicates the failure code.

\$\$\$: Indicates the number of times of occurrence of the subject failure code.

%%%%: Indicates the service meter value at the time of initial occurrence of the same machine fault.

@@@@@: Indicates the service meter value at the time of last occurrence of the same machine fault.

When the indication is showing the currently occurring machine fault, the failure code flashes. As for the failure codes of the machine fault, up to several failure codes can be memorized.

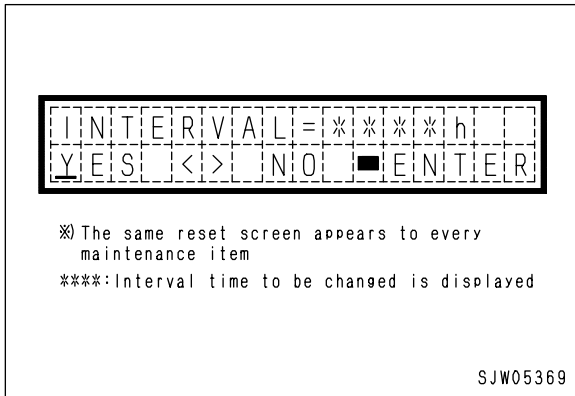
5) Confirming the changed maintenance interval time (fourth layer)

Select YES or NO with the < or > SW.

Cursor () blinks on the selected item. Pressing the ■SW returns the display to the [Select the maintenance items] screen, with the change applied if YES was selected, or not if NO was selected: The default of the cursor is on NO (no change) to prevent resetting by error.

A current fault cannot be cleared. If it was selected, a peep sounds for one second to notify that the operation is cancelled.

If the change of the time-setting was completed, peeps sound (on for 0.1 sec. → off for 0.1 sec. → on for 0.1 sec.) to notify that the operation has been accepted.



The maintenance interval time is set when the machine is shipped as in the following table:

Items	Interval for replacement (h)	Items shown	ID numbers
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG FILT	02
Fuel filter	500	FUEL FILT	03
Corrosion resister	1,000	CORR RES	06
Transmission oil	1,000	TM OIL	12
Transmission oil filter	1,000	TM FILT	13
Hydraulic fluid filter	2,000	HYD FILT	04
Hydraulic oil tank breather element	2,000	HYD BREATH	05
Axle oil	2,000	AXLE OIL	15
Hydraulic fluid	2,000	HYD OIL	10

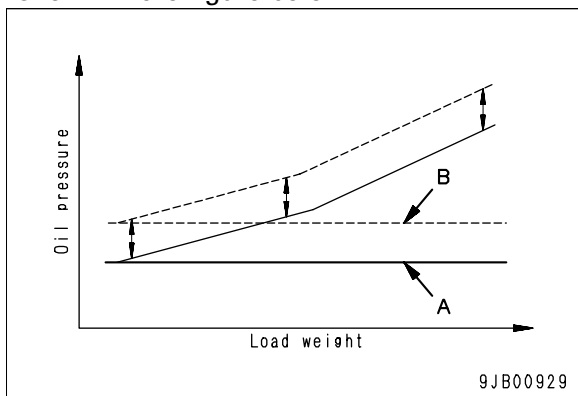
I/O signal	Displayed item	Connector No.	Pin No.	ON/OFF logic
D-IN-31	Remote positioner lower selection switch	L72	38	Switch pressed=ON (GND)/OFF (OPEN)
D-IN-32	No item	L72	28	ON (GND)/OFF (OPEN)
SOL/0-0	Joystick EPC cut relay	L73	7	Output ON (24V)/OFF (GND)
SOL/0-1	Detent lift arm RAISE	L73	17	Output ON (24V)/OFF (GND)
SOL/0-2	Detent lift arm FLOATING	L73	27	Output ON (24V)/OFF (GND)
SOL/0-3	Detent TILT	L73	37	Output ON (24V)/OFF (GND)
SOL/0-4	Work equipment lock solenoid	L73	28	Output ON (24V)/OFF (GND)
SOL/0-5	No item	L73	38	Output ON (24V)/OFF (GND)
D-OUT-1	Remote positioner raise lamp	L73	8	Output ON (24V)/OFF (GND)
D-OUT-2	Remote positioner lower lamp	L73	18	Output ON (24V)/OFF (GND)

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 preset 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.

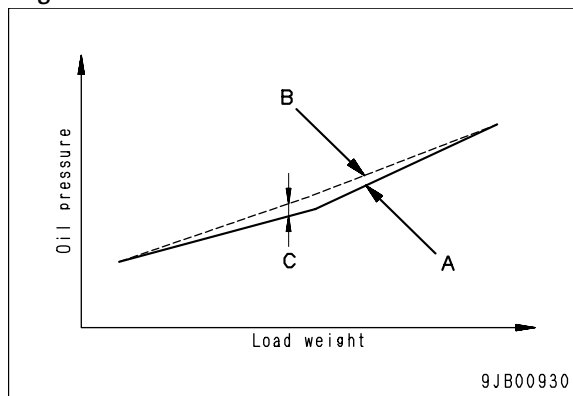
No-load Calibration

- 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.

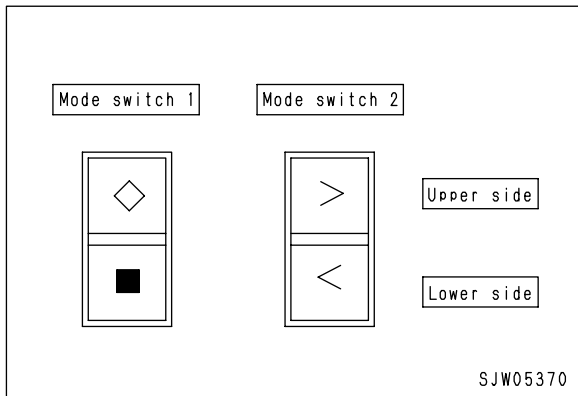
- ★ For how to stop calculation, refer to the paragraph of "Operation of Load Meter" in the Operation and Maintenance Manual.


Correction of position of work equipment EPC lever detent

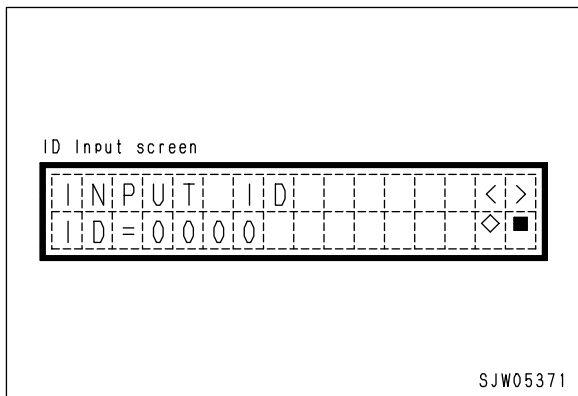
Procedure for correcting position of work equipment EPC lever

Perform the following procedure with the engine stopped

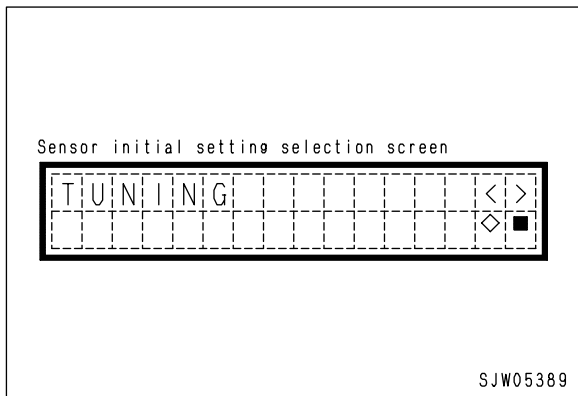
1. Push and hold the  switch and > switch simultaneously for 5 seconds to go to the "Input ID" screen.



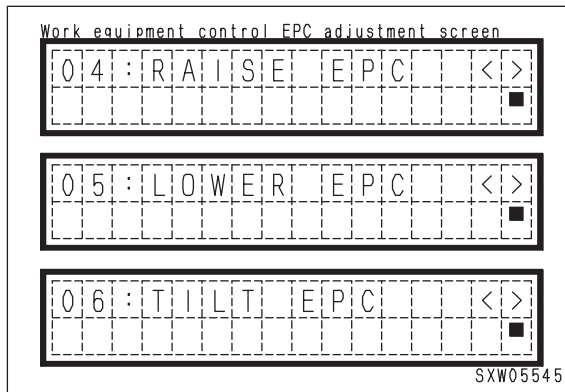
2. Input the ID with the < switch and > switch, then push the  switch to go to the screen for the service person.



3. Display the "Select initial setting of sensors" screen with the < switch and > switch and enter the setting.



4. Display the screen for adjusting items No. 4 — 6 of the work equipment EPC with the < switch and > switch.




Screen for adjusting work equipment EPC

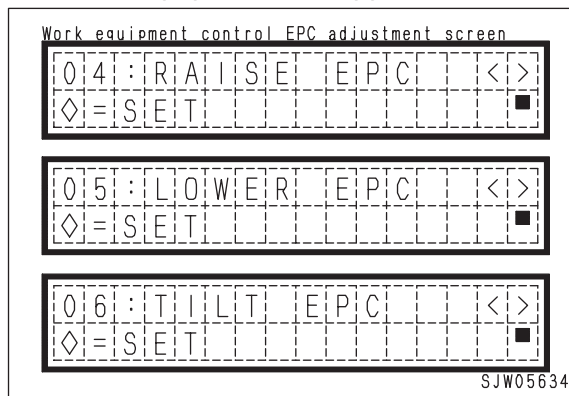
- RAISE lift arm: No. 4
- LOWER lift arm: No. 5
- Tilt bucket: No. 6

Set these items respectively.

Perform this correction procedure when the electric work equipment control lever or work equipment controller is replaced.

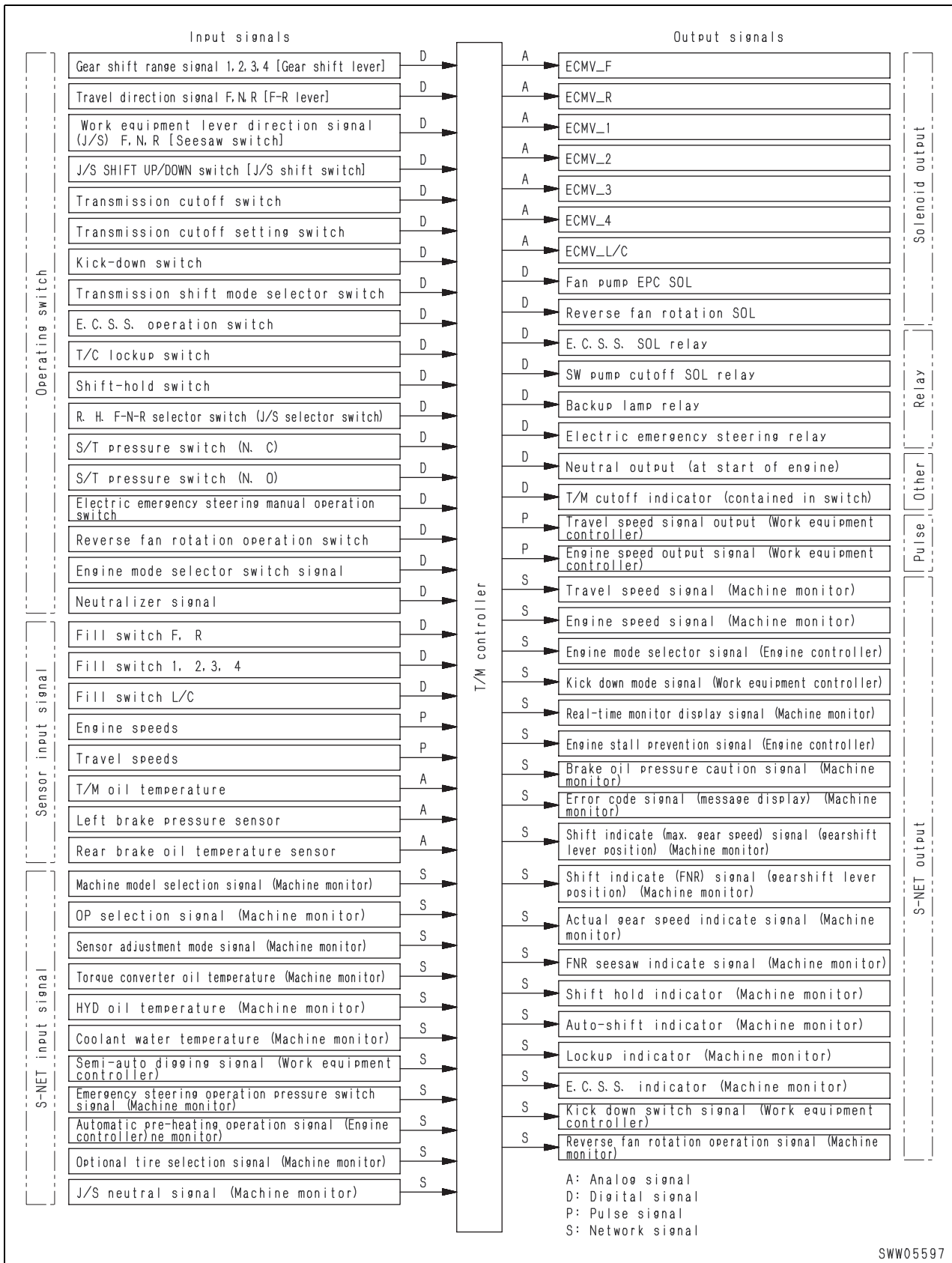
This correction procedure cannot be performed if the ROM No. of the work equipment controller in the real-time monitor is ****R200.

5. Push the  switch and the screen for setting the work equipment EPC appears.



Screen for setting work equipment EPC.

**TRANSMISSION CONTROL SYSTEM
SYSTEM DIAGRAM**



1) Turning on the joystick function

If you turn on Joystick FNR switch after turning on Joystick sprung switch by shifting the armrest for the joystick to the lock position, the joystick function enable signal is entered to the transmission controller.

When you switch the function between the joystick and steering, both the forward-reverse lever on the steering column and Joystick FNR switch on the joystick must be positioned at neutral (N). It is so required from the safety standpoint.

		Joystick FNR switch	Forward-reverse lever	Gearshift lever
When switching is done from steering to joystick	Normal position	N	N	1st to 3rd speeds
	Even resulting from abnormal position	Error is warned	Error is warned	Error is warned
	Correcting approach	Position at N	Position at N	Position at one of 1st to 3rd speeds
When switching is done from joystick to steering	Normal position	N	N	Any position
	Even resulting from abnormal position	Error is warned	Error is warned	—
	Correcting approach	Position at N	Position at N	—

2) Switching between forward and reverse from joystick

If the forward-reverse level on the joystick is at the neutral position in the state of 1) above, switching between forward and reverse becomes available from Joystick FNR switch.

When the forward-reverse level is positioned at F or R, precedence is given to the lever irrespective of the Joystick FNR switch position.

5) Kickdown function

1) Kickdown during manual shift

The kickdown switch can be operated only at the forward 2nd-speed (F2). Operation of the kickdown switch is ignored at other than forward 2nd-speed.

When the directional lever (or FNR switch) is shifted to other than F or the directional lever (or FNR switch) is shifted to R, the gear speed is changed to 2nd-speed.

When the gear shift lever is changed to other than 2nd-speed, the speed is changed to the range corresponding to the lever position.

2) Kickdown during auto-shift

The kickdown switch functions regardless of the directional and gear shift lever positions.

The gear speed shifted by the kickdown switch operation changes according to the travel speed as shown in the following table.

After shifting by kickdown, shift the speed according to the list of normal auto-shift points after the expiration of the time that the speed cannot be shifted or when the directional lever is operated.

Speed range	Travel speed	Speed range after shifting	Time that speed cannot be shifted
2nd-speed	Whole range	1st-speed	5 seconds
3rd-speed	Less than 12.5 km/h	1st-speed	5 seconds
	Less than 12.5 - 25 km/h	2nd-speed	4 seconds
	25 km/h or higher	No shifting (3-speed)	—
4th-speed	Less than 12.5 km/h	1st-speed	5 seconds
	Less than 12.5 - 35 km/h	3rd-speed	4 seconds
	35 km/h or higher	No shifting (4-speed)	—
3rd-speed (at lockup)	Less than 12.5 km/h	1st-speed	5 seconds
	12.5 km/h or higher	3rd-speed (lockup released)	*1
4th-speed (at lockup)	Less than 12.5 km/h	1st-speed	5 seconds
	12.5 km/h or higher	4th-speed (lockup released)	*1

*1: When the lockup is released by kickdown switch operation, lockup must not be applied again until the following conditions occur:

- Change the torque converter lockup switch from OFF to ON temporarily.
- The travel speed less than that with the lockup ON in the list of the auto shift points changes to the speed exceeding it.

6) Shift hold function

The speed at the time when the hold switch was pressed is held and it will not be upshifted even when the travel speed increases or it will not be downshifted even when the travel speed decreases.

When the directional lever, gear shift lever, FNR switch, or kickdown switch is operated, the shift hold function is automatically released.

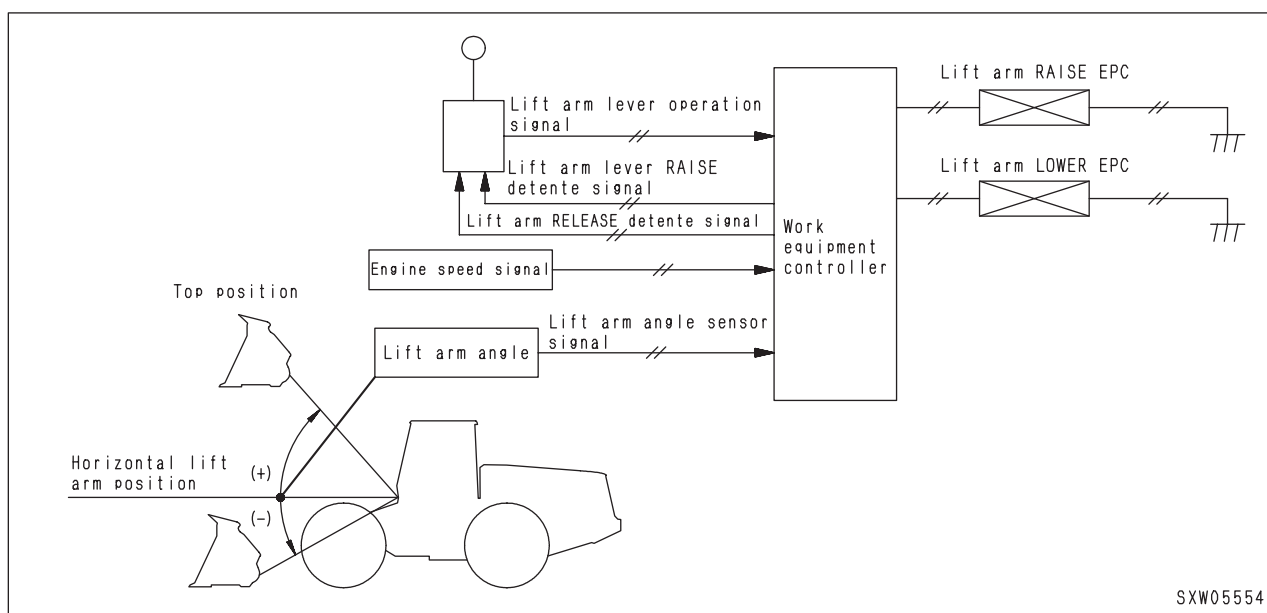
The condition of lockup ON/OFF will not be held.

2) Detent control
Boom kick-out control

- Operating the lift arm lever to reach the RAISE detent range allows a detent-on signal to be output from the work equipment controller.

This enables the lift arm lever to be maintained in the RAISE state even when the lever is released. When the lift arm is raised and an input signal of the lift arm angle sensor approaches the top angle, detent is cancelled and the lift arm stops rising. At this same time, the work equipment controller gradually slows down the lift arm RAISE EPC (referred to as modulation control) to prevent excessive impact from arising upon stoppage of the lift arm motion.

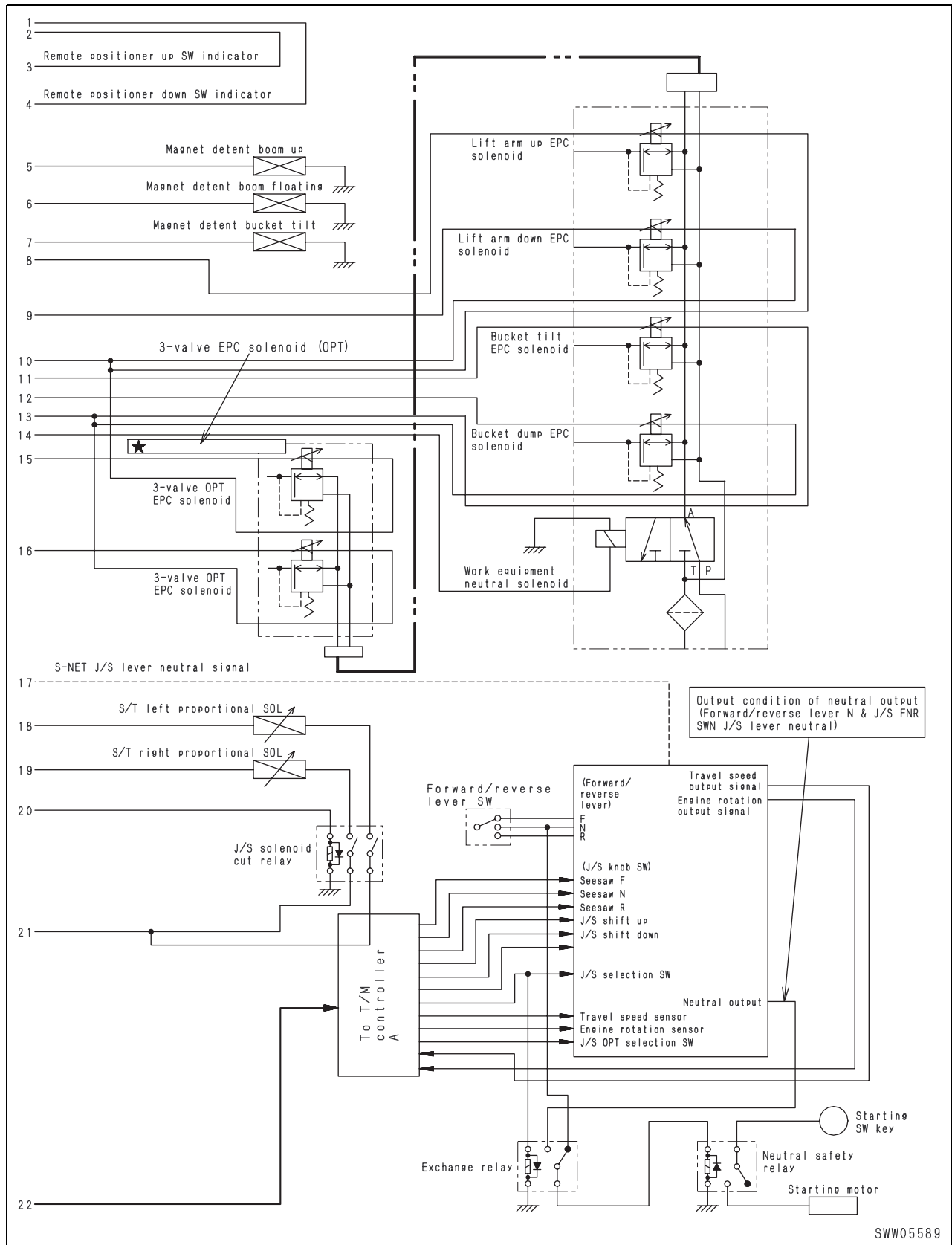
Detent can be cancelled (manually) by operating the work equipment lever toward the neutral position side, in which case, EPC performs ordinary control according to how much the lever was moved.



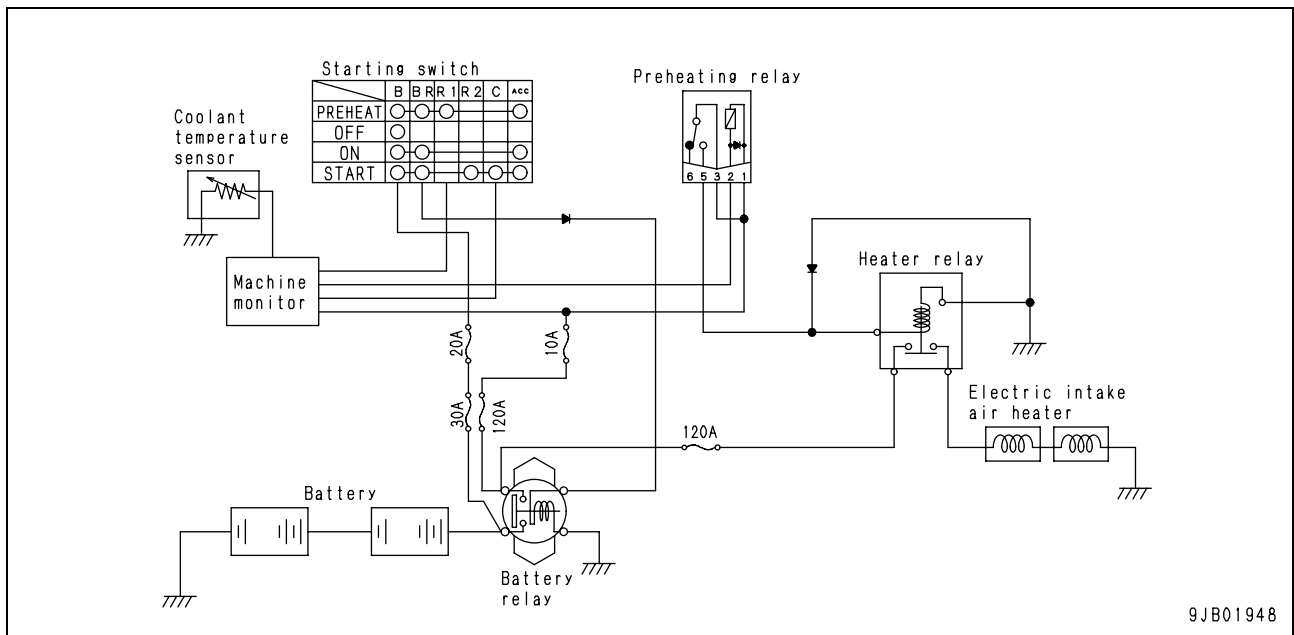
Lift arm releasing function

- Lowering the lift arm lever to allow it to reach the detent range, a detent-on signal is output from the work equipment controller to cause the lift arm lever to be maintained in the LOWER state. At this time, the lift cylinder is released to allow the lift arm to be raised or lowered by external force. Therefore, if this function starts when the lift arm is up in the air, it goes down due to its own weight.

Detent can be cancelled (manually) by operating the work equipment lever toward the neutral position side, in which case, EPC performs ordinary control according to how much the lever was moved.



PREHEATING CIRCUIT



9JB01948

Outline

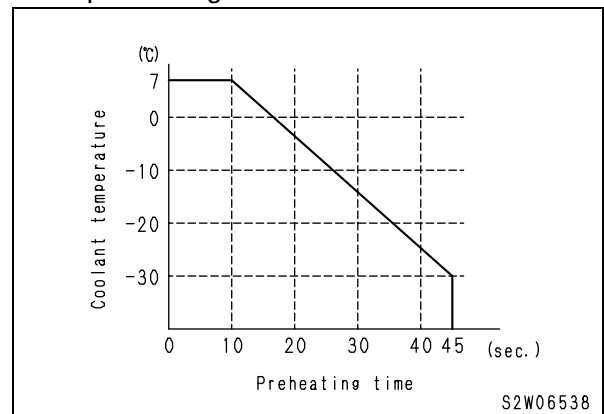
- The automatic preheating system and manual preheating system are installed so that the engine will start easily in a cold district.
- The automatic preheating system shortens the preheating time and sets the preheating time automatically according to the engine coolant temperature when the starting switch is turned to the ON position.
- If the starting switch is turned to the ON position, the preheater pilot lamp of the machine monitor lights up and the ribbon heater preheats the intake air.

The controller built in the machine monitor sets the preheating time according to the coolant temperature measured by the coolant temperature sensor.

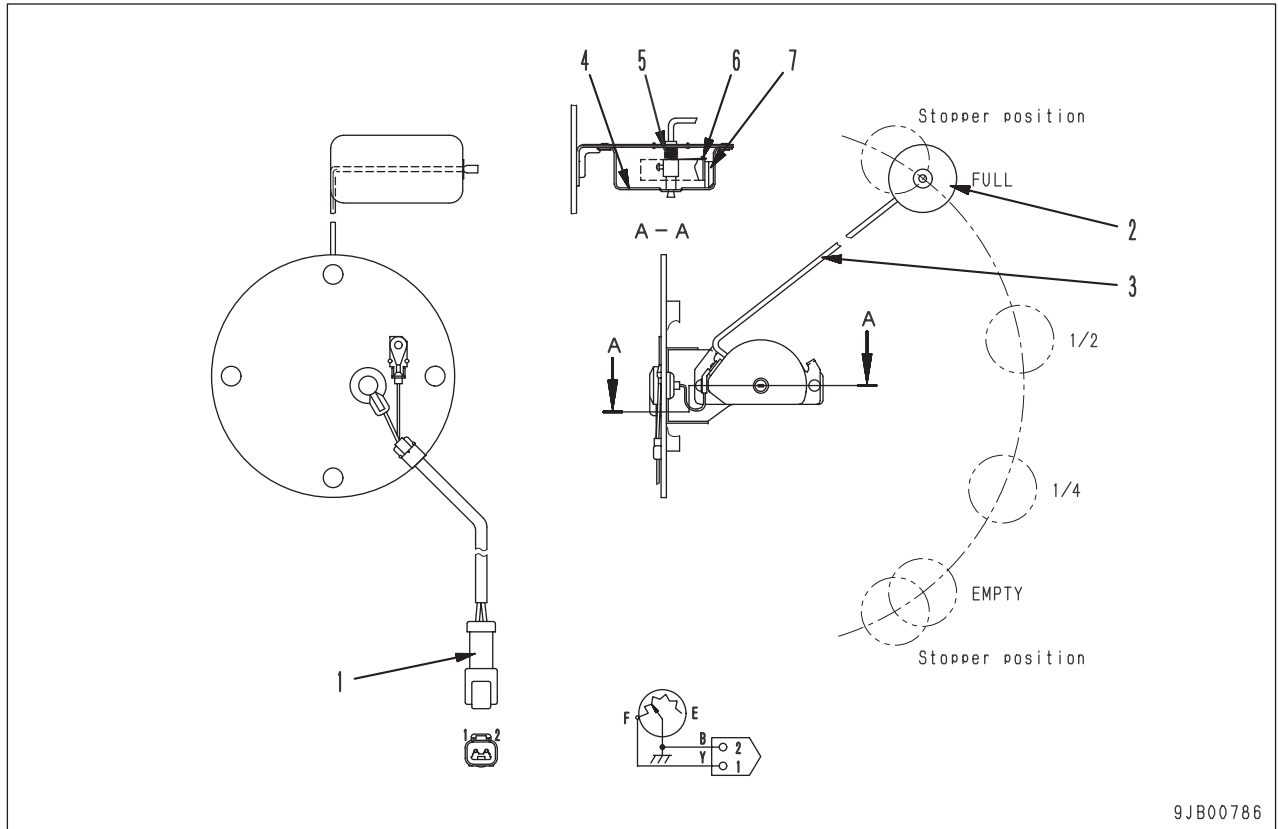
- While the engine is preheated, the preheating pilot lamp of the main monitor keeps lighting up. Keep the starting switch in the ON position during this period. If the starting switch is turned to the START position, preheating is reset.
- With the manual preheating system, the operator can adjust the preheating time manually, regardless of the coolant temperature, by turning the starting switch to the HEAT position.
- If the starting switch is turned to the HEAT position, the preheater pilot lamp of the machine monitor lights up and the ribbon heater preheats the intake air. The operator can set the preheating time manually, regardless of the coolant temperature.

Operation

- When the starting switch is turned to the ON position, the machine monitor starts. If the coolant temperature is 0 - 7°C or below 0°C at this time, the machine monitor connects the preheater relay coil to the ground 6 seconds or immediately after the starting switch is turned to the ON position. Then, the preheater relay operates to operate the heater relay, thus the ribbon heater preheats the engine.
- The preheating time is shown below.



FUEL LEVEL SENSOR

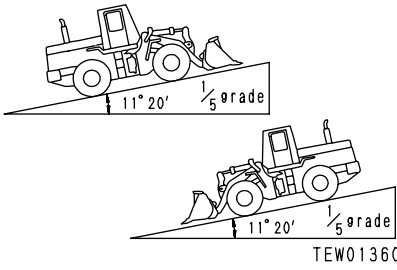


9JB00786

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

Function

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

Machine model				WA380-5	
Category	Item	Measurement Conditions	Unit	Standard Value For New Machine	Service Limit Value
Parking brake	Parking brake inlet pressure	<ul style="list-style-type: none"> Torque converter oil temperature: 60 - 80 °C Engine speed: Low idling 	MPa {kg/cm ² }	Min. 2.27 {Min. 23.1}	Min. 2.27 {Min. 23.1}
	Performance	<ul style="list-style-type: none"> Tire inflation pressure: Specified pressure Flat paved road with 1/5 (11° 20') grade Dry, paved road surface Machine at operating condition 	—	Holds in position	Holds in position
	Disc thickness		mm	3.2 ± 0.08	2.97
PPC	PPC valve basic pressure	<ul style="list-style-type: none"> Hydraulic oil temperature: 45 - 55 °C Engine speed: High idling 	MPa {kg/cm ² }	3.72 ^{+0.2} ₀ {38 ⁺² ₀ }	3.72 ^{+0.2} _{-0.2} {38 ⁺² ₋₂ }
	PPC valve output pressure	<ul style="list-style-type: none"> Hydraulic oil temperature: 45 - 55 °C Engine speed: High idling Control lever operated fully 		3.72 ^{+0.1} _{-0.1} {38 ⁺¹ ₋₁ }	3.72 ^{+0.1} _{-0.2} {38 ⁺¹ ₋₂ }
	Lift arm LOWER			2.2 ± 0.25 {22.5 ± 2.5}	2.2 ± 0.39 {22.5 ± 4}

MEASURING COMPRESSION PRESSURE

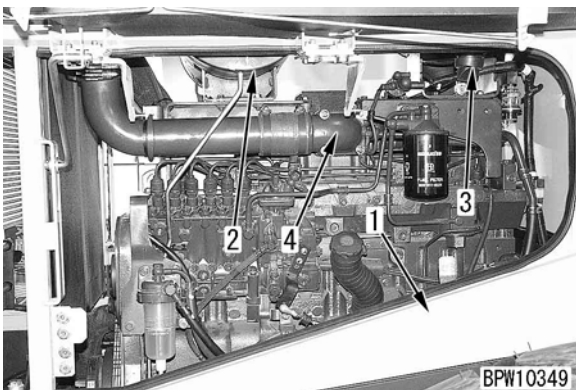
Check tools

Symbol	Part No.	Part Name	Qty	Remarks	
D	1	795-790-3610	Com- pres- sion gauge	1	—
	2	795-790-3710	Adapter	1	—

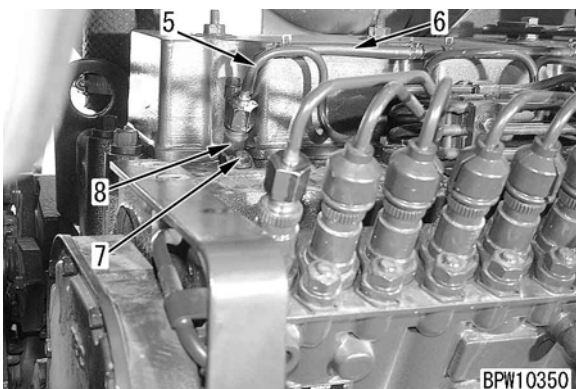


WARNING! When measuring the compression pressure, take care not to get burned with a hot part or caught in a rotary part.

- ★ Measure the compression pressure after the engine is warmed up.
(Engine oil temperature: 40 - 60 °C).
- 1. Adjust the valve clearance correctly. For details, see Adjusting valve clearance.
- 2. Remove engine hood assembly (1), exhaust muffler assembly (2), air intake muffler assembly (3), and air intake manifold (4). For details, see DISASSEMBLY AND ASSEMBLY, Removal and installation of nozzle holder assembly.



- 3. Remove injection tube (5) of the cylinder to be measured and disconnect spill tube (6).
- 4. Remove holder (7) and pull out nozzle assembly (8).
- ★ Take care that foreign matter will not enter the nozzle and cylinder.

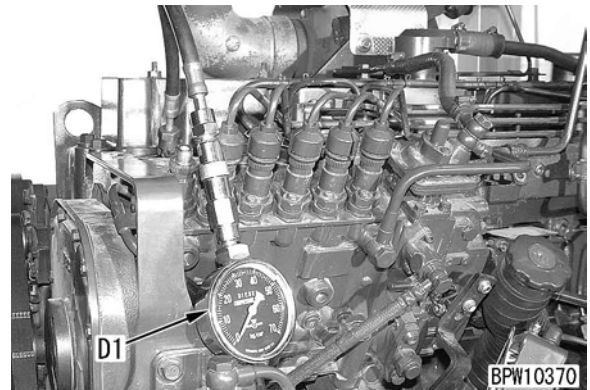


- 5. Install adapter **D2** to the nozzle holder mounting part of the cylinder to be measured and tighten it to the specified torque.

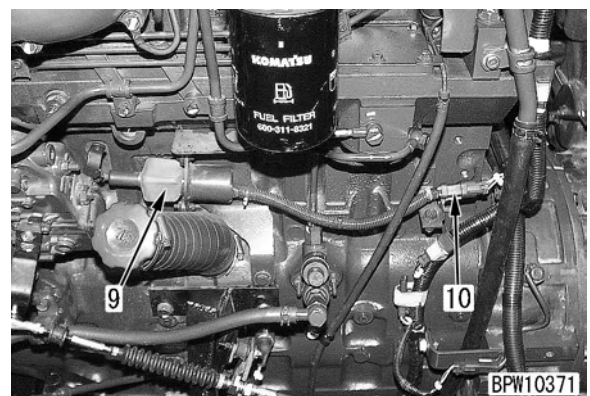


Holder mounting bolt:
23.5 ± 3.9 Nm {2.4 ± 0.4 kgm}

- 6. Connect compression gauge **D1** to the adapter.



- 7. Disconnect connector (10) (CN-E34) of fuel cut solenoid (9) to prevent injection, then revolve the engine with the starting motor and read the pressure after the pressure gauge pointer stops.
 - ★ Apply some oil to the adapter mounting part so that air will not leak.
 - ★ When measuring the compression pressure, check that the engine speed is in the measuring range.
 - ★ After measuring the compression pressure, install the nozzle holder assembly.



TESTING AND ADJUSTING POWER TRAIN OIL PRESSURE

Special tools required

Sym bol	Part No.	Part Name	Qty	Remarks
C1	799-101-5002	Analog hydraulic tester	1 Set	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm ² }
	790-261-1204	Digital hydraulic tester	1 Set	Pressure gauge: 58.8 MPa {600 kg/cm ² }
C2	799-401-2320	Hydraulic gauge	1	Pressure gauge: 1.0 MPa {10 kg/cm ² }
C4	790T-301-1750	T-piece	1	Male/Female R 1/8 See attached drawing.



WARNING! Put block under the tires.

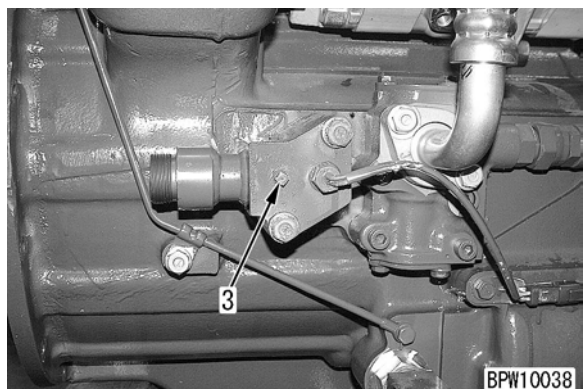
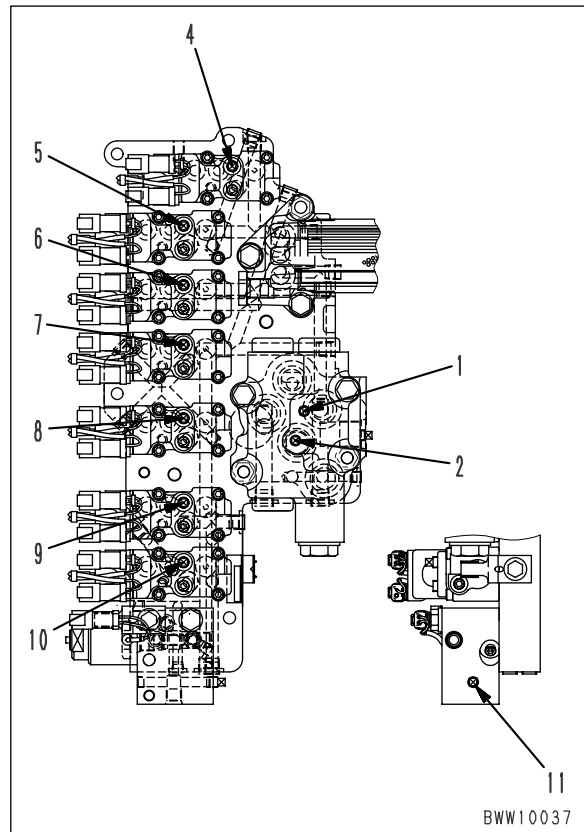


WARNING! Wait for the temperature of the oil to go down before installing or removing the measuring equipment.

- ★ Measure the power train oil pressure under the following conditions.
 - Coolant temperature: Within operating range
 - Power train oil temperature: 60 - 80 °C
 - Remove the cover at the left side of the rear frame.
- ★ Turn the transmission cut-off selector switch OFF and use the left brake.

Oil pressure measuring position and measuring gauges

No.	Measuring Oil Pressure	Gauge MPa {kg/cm ² }
1	Main relief pressure	5.9 {60}
2	Torque converter relief pressure	5.9 {60}
3	Torque converter outlet pressure	0.98 {10}
4	Transmission F clutch pressure	5.9 {60}
5	Transmission R clutch pressure	5.9 {60}
6	Torque converter lock-up clutch pressure	5.9 {60}
7	Transmission 4th clutch pressure	5.9 {60}
8	Transmission 1st clutch pressure	5.9 {60}
9	Transmission 3rd clutch pressure	5.9 {60}
10	Transmission 2nd clutch pressure	5.9 {60}
11	Parking brake pressure	5.9 {60}

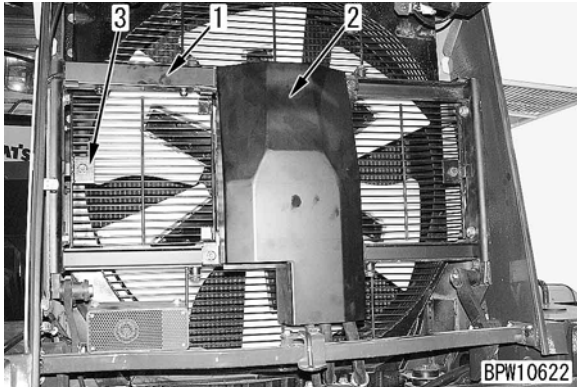


TESTING HYDRAULIC FAN

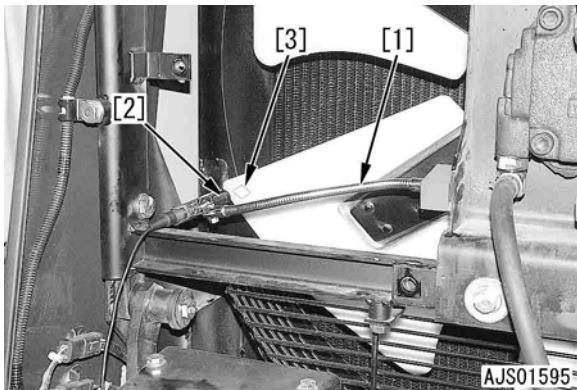
Check tool

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

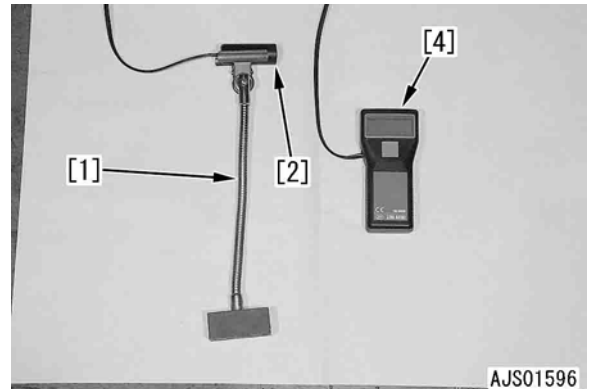
1. Open the radiator grill and remove covers (1), (2), and (3).



2. Install stand [1] and probe [2] of multi-tachometer J.
3. Stick reflector tape [3] to the fan.



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

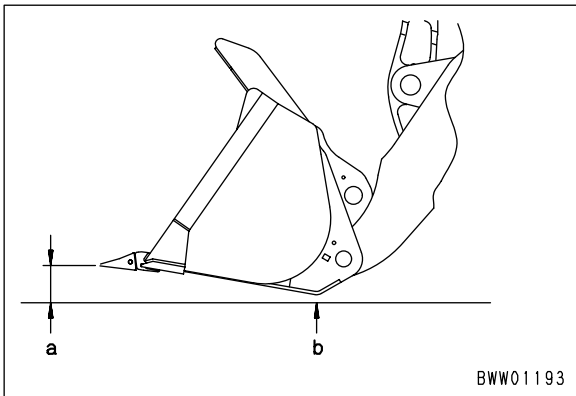


TESTING AND ADJUSTING WORK EQUIPMENT HYDRAULIC PRESSURE

Special tools required

Symbol	Part No.	Part Name	Remarks
C1	799-101-5002	Analog type hydraulic tester	Pressure gauge: 2.5, 5.9, 39.2, 58.8 MPa {25, 60, 400, 600 kg/cm ² }
	790-261-1203	Digital type hydraulic tester	Pressure gauge: 58.8 MPa {600 kg/cm ² }

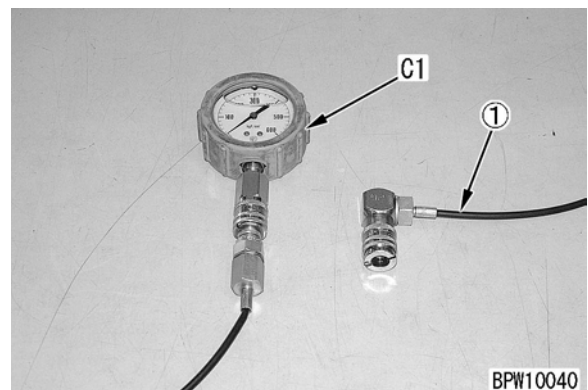
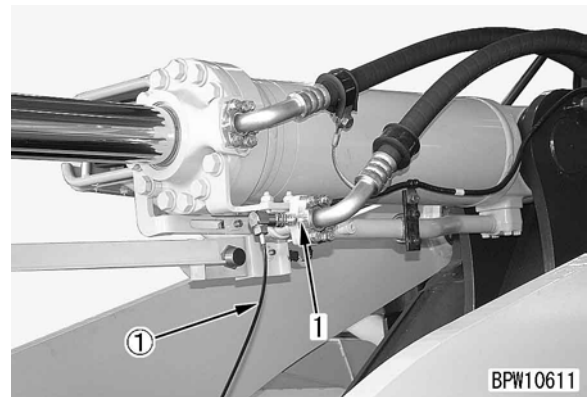
- ★ Hydraulic oil temperature: 45 - 55 °C
- 1. Measuring work equipment relief pressure
 - 1) Raise bucket portion **a** approx. 30 - 50 mm and set portion **b** in contact with the ground.
 - 2) Stop the engine, then operate the work equipment control lever and check that the bottom surface of the bucket (both portion **a** and portion **b** is in contact with the ground.
 - ★ After lowering the bucket to the ground, operate the work equipment control lever several times to release the remaining pressure in the piping.



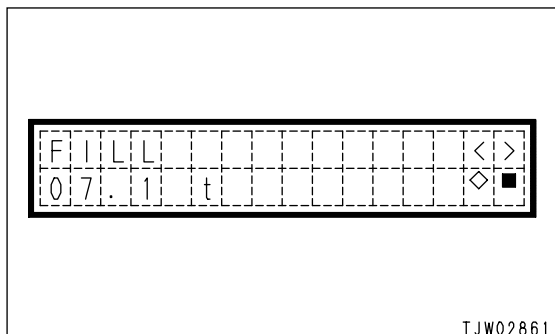
- 3) Connect hose ① to nipple (1) for measuring oil pressure and connect pressure gauge **C1** (39.2 MPa {400 kg/cm²}).
- 4) Start the engine, raise the lift arm approx. 400 mm, run the engine at high idling, tilt the bucket back, then measure the oil pressure when the relief valve is actuated.



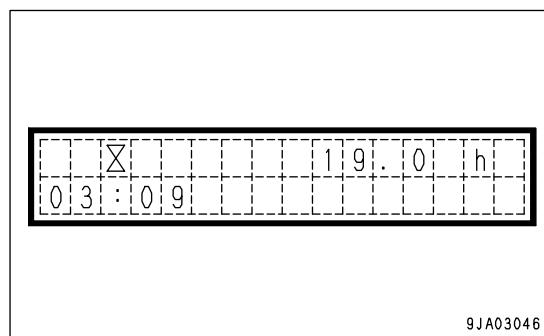
WARNING! After measuring, repeat the procedure used when installing the oil pressure gauge to release the pressure inside the circuit, then remove the oil pressure gauge.



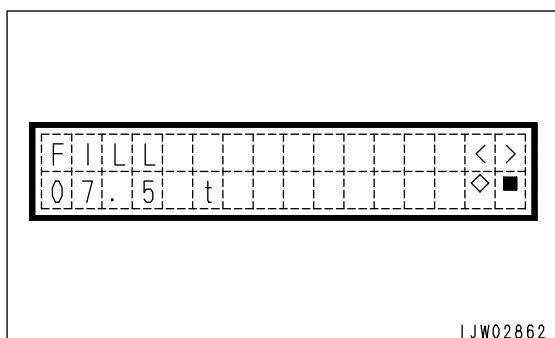
- 13) Input the weight value on the screen for entering targets.
 The weight calculated from the last data appears on the screen. The cursor is now on 10 tons. When changing the last target weight 7.1t to 7.5t (loaded weight at step 7) of this time, input procedure is as follows.



- 17) Press (◇) on monitor panel mode selector switch 1. When the monitor accepts the entry, two short beeps are sounded and calibration for load setting is completed. The display is restored to a normal view of a service meter and clock.



- 14) Since the "10 ton" value is "0," leave it as it is. Press (◇) on monitor panel mode selector switch 1 once. Following confirmation of "0," the cursor moves to 1 ton.
 15) It is not necessary to change the "1 ton" value because it is the same "7" as the display, so press (◇) on monitor panel mode selector switch 1. Following confirmation of "7," the cursor moves to "0.1 ton."
 16) For display of the "0.1 ton" value as "1," select 5 by pressing (>) or (<) on monitor panel mode selector switch 2 and press (◇) on monitor panel mode selector switch 1 once.
 Now "5" has been confirmed and the target weight is set at 7.5 tons.



- Connecting connectors

(1) Check the connector visually.

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

(2) Assemble the connector securely.

Align the position of the connector correctly, then insert it securely.

For connectors with a lock stopper:

Push in the connector until the stopper clicks into position.

(3) Correct any protrusion of the boot and any misalignment of the wiring harness.

For connectors fitted with boots, correct any protrusion of the boot. In addition, if the wiring harness is misaligned, or the clamp is out of position, adjust it to its correct position.

- ★ When blowing with dry air, there is danger that the oil in the air may cause improper contact, so clean with properly filtered air.

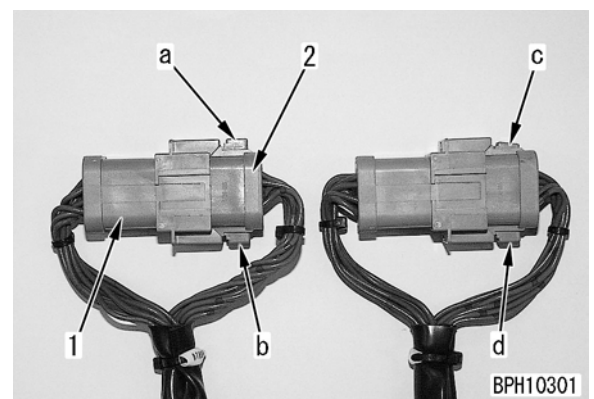
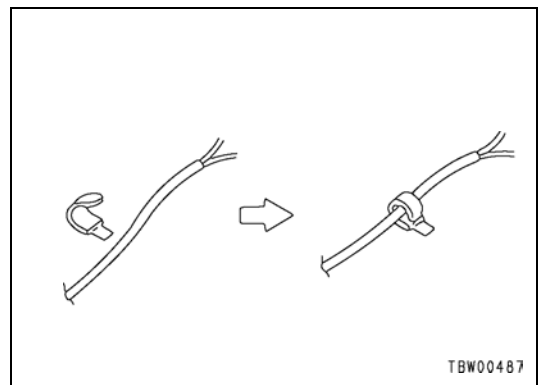
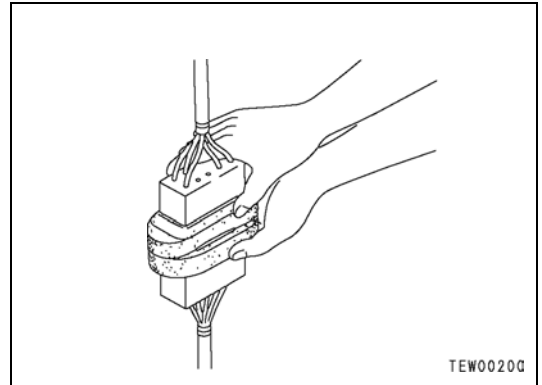
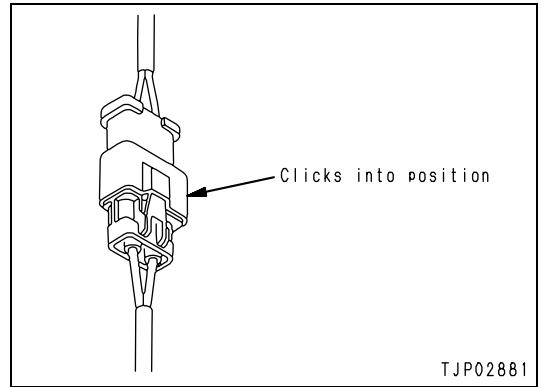
(4) When the wiring harness clamp of the connector has been removed, always return it to its original condition and check that there is no looseness of the clamp.

- Connecting connectors (DT type connector)

Since the DT 8-pole and 12-pole DT type connectors have 2 latches respectively, push them in until they click 2 times.

1. Male connector, 2. Female connector

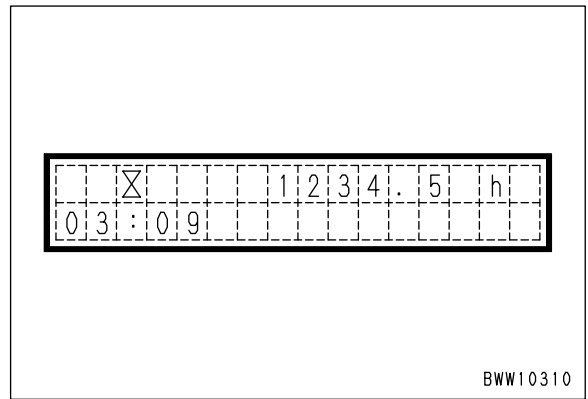
- Normal locking state (Horizontal) : a, b, d
- Incomplete locking state (Diagonal) : c



Operation and displays for operator mode

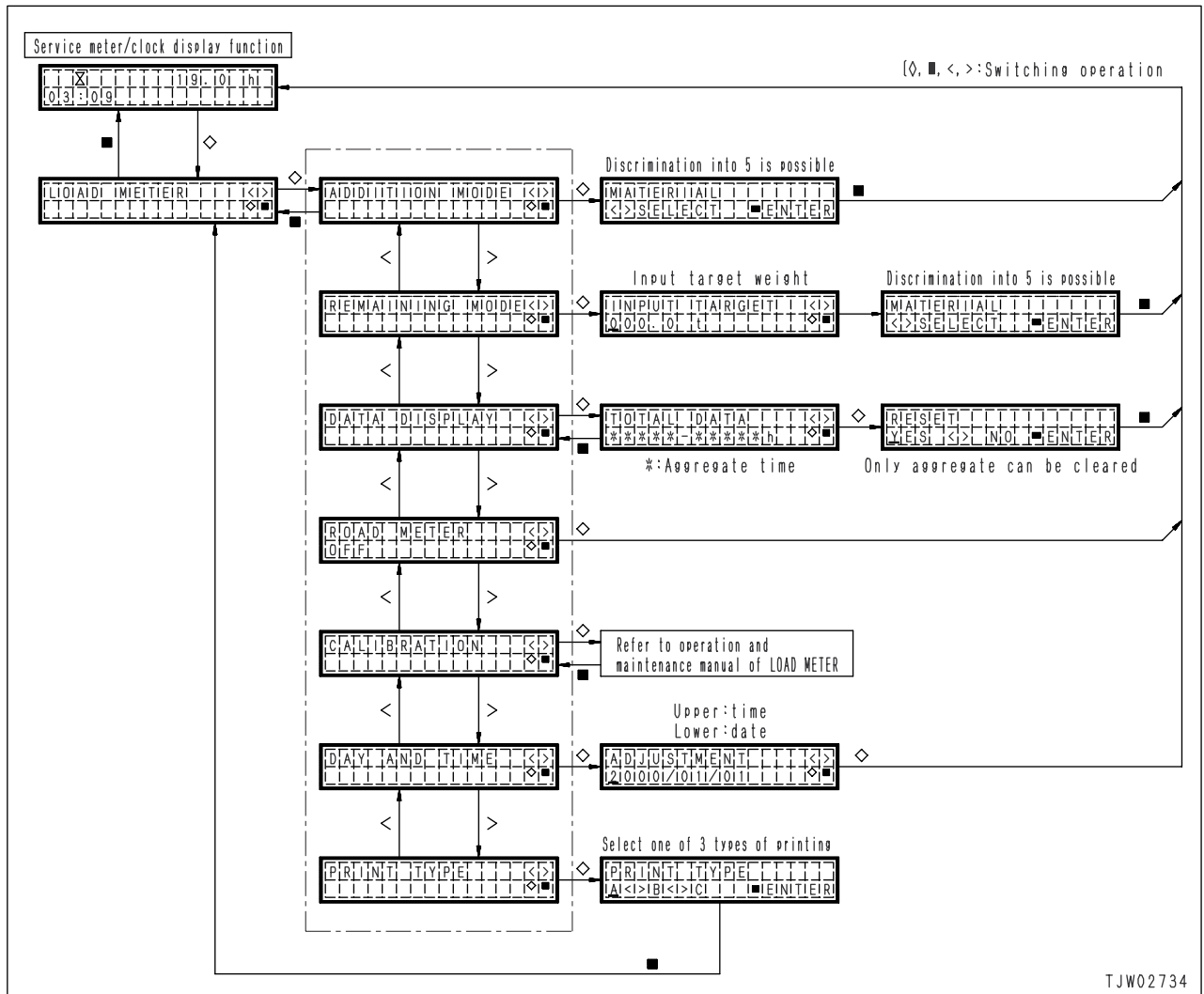
1. Service meter, time display function
When the starting switch is turned ON, the top line shows the service meter and the bottom line shows the time.

- The time display function is only on the load meter specification machine.



BWW10310

2. Load meter function



TJW02734

★ For details, see the "OPERATION AND MAINTENANCE MANUAL, Handling Load Meter".

11. Electrical system trouble data display function (ELECTRIC FAULT)

The monitor retains the data for problems that occurred in the electrical system in the past as failure codes. They can be displayed as follows.

1) Menu selection

Select the display function for ELECTRIC FAULT trouble data on the menu screen of Service Mode 1.

- ★ The total number of trouble data items recorded in memory is displayed in the [**] portion. (Recorded up to a maximum of 20 items)

2) Trouble data display

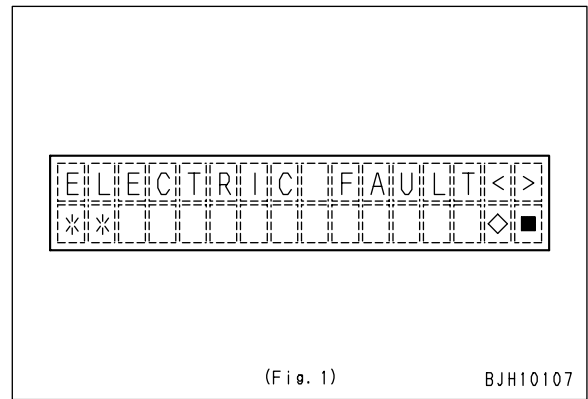
With the menu selected, press the [◊] button and display the trouble data recorded in memory.

- [◊] button: Run menu

3) Displayed trouble data

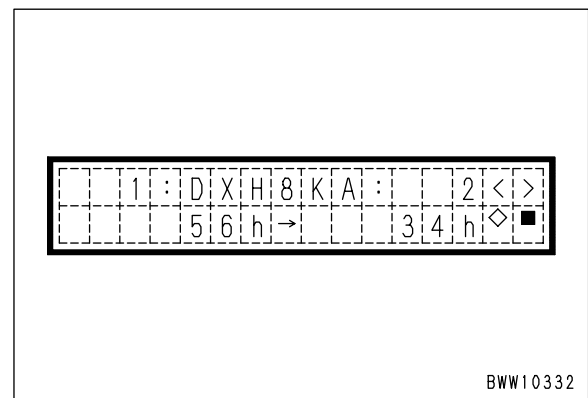
With the display function for trouble data of the electrical system, the following data can be displayed.

- A: Record number
- B: Failure code (4-digit location code + 2 digit problem code)
- C: Number of occurrences (number of occurrences of same code in past)
- D: Elapsed time 1 (time elapsed on service meter since first occurrence)
- E: Elapsed time 2 (time elapsed on service meter since last occurrence)
- ★ Failure codes for problems that are still existing are shown on a flashing display.
- ★ For details of the failure codes displayed, see FAILURE CODE TABLE in the explanation for the failure code display function.
- ★ Note that with the trouble data display function and failure code display function for the electrical system, the displayed data are partially different.
- ★ If no trouble data are recorded, [-] is displayed on the display portion.

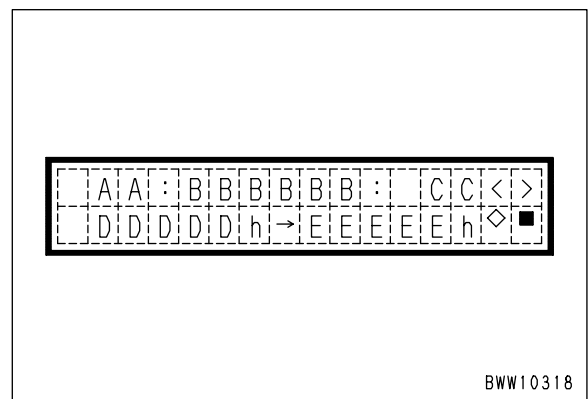


(Fig. 1)

BJH10107



BWW10332



BWW10318

Transmission controller				
No.	Monitoring Code	Input/ Output Signal	Display Item	Content of ON/OFF Switch
1	40905	D-IN-0	Steering pressure switch (N.O.)	Pressure normal(exists)ON=(GND)/OFF(OPEN)
		D-IN-1	Steering pressure switch (N.C.)	Pressure normal(lowered)ON=(GND)/OFF(OPEN)
		D-IN-2	Transmission cut-off switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-3	Transmission cut-off set switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-4	E.C.S.S. selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-5	Lock-up selector switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-6	Kick-down switch	Switch pressed = ON(GND)/OFF(OPEN)
		D-IN-7	Engine power mode	Power mode = ON(GND) /(OPEN)
2	40906	D-IN-8	Shift range 1st	1st = ON(24V)/OFF(OPEN)
		D-IN-9	Shift range 2nd	2nd = ON(24V)/OFF(OPEN)
		D-IN-10	Shift range 3rd	3rd = ON(24V)/OFF(OPEN)
		D-IN-11	Shift range 4th	4th = ON(24V)/OFF(OPEN)
		D-IN-12	Joystick shift up	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-13	Joystick shift down	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-14	Electric emergency steering manual switch	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-15	Starting switch output	Starting motor started = ON(GND)/OFF(OPEN)
3	40907	D-IN-16	Right FNR (Joystick) selector switch	Switch pressed = ON(24V)/OFF(OPEN)
		D-IN-17	Right seesaw switch & joystick FORWARD	FORWARD = ON(24V)/OFF(OPEN)
		D-IN-18	Right seesaw switch & joystick Neutral	NEUTRAL = ON(24V)/OFF(OPEN)
		D-IN-19	Right seesaw switch & joystick REVERSE	REVERSE = ON(24V)/OFF(OPEN)
		D-IN-20	Direction lever FORWARD	FORWARD = ON(24V)/OFF(OPEN)
		D-IN-21	Direction lever Neutral	NEUTRAL = ON(24V)/OFF(OPEN)
		D-IN-22	Direction lever REVERSE	REVERSE = ON(24V)/OFF(OPEN)
		D-IN-23	Neutralizer (Parking brake) signal	Parking switch ON = ON(24V)/OFF(OPEN)
4	40908	D-IN-24	F clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-25	R clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-26	1st clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-27	2nd clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-28	3rd clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-29	4th clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-30	Lock-up clutch fill switch	Fill switch ON = ON(GND)/OFF(OPEN)
		D-IN-31	Shift hold switch	Switch pressed = ON(GND)/OFF(OPEN)
5	40915	D-OUT-0	Backup lamp relay	Output ON (24V)/OFF(GND)
		D-OUT-1	Transmission cut-off indicator	Output ON (24V)/OFF(GND)
6	40914	SOL/O-0	Electric emergency steering relay	Output ON (24V)/OFF(GND)
		SOL/O-1	E.C.S.S. relay	Output ON (24V)/OFF(GND)
		SOL/O-2	Switch pump cut-off	Output ON (24V)/OFF(GND)
		SOL/O-3	Neutral output	Output ON (24V)/OFF(GND)
		SOL/O-4	Fan pump reverse rotation solenoid	Output ON (24V)/OFF(GND)
		SOL/O-5	Fan pump neutral solenoid	Output ON (24V)/OFF(GND)

5. Method of using troubleshooting table (TM mode, WRK mode, MON mode, E mode)

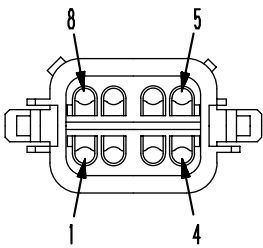
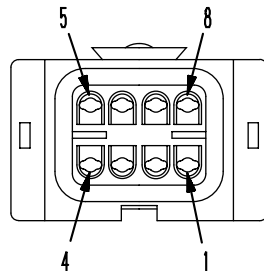
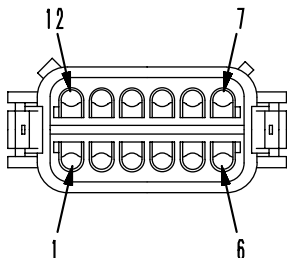
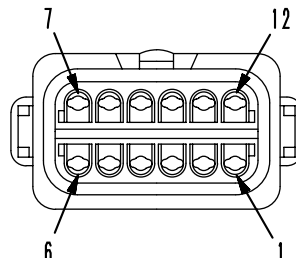
Action Code	Failure Code	Controller Code	Trouble	Trouble displayed in trouble data
Panel display	Panel display	Panel display		
Description of Trouble	<ul style="list-style-type: none"> Condition when monitor panel or controller detected trouble. 			
Controller Reaction	<ul style="list-style-type: none"> Action to take to protect system or equipment when monitor or controller detected trouble. 			
Effect on Machine	<ul style="list-style-type: none"> Condition that appeared as problem on machine when action (given above) was taken by monitor panel or controller. 			
Related Information	<ul style="list-style-type: none"> Information related to troubleshooting or error that occurred. 			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting
	1	Probable cause when trouble occurred (the numbers are index numbers and do not indicate the order of priority)	<Data to fill in> <ul style="list-style-type: none"> Normal standard values used to judge probable cause Remarks regarding decision-making <Condition when wiring harness is defective> <ul style="list-style-type: none"> Disconnection There is defective connection of connector or disconnection in wiring harness Short circuit with ground Wiring harness not wired to ground (GND) circuit is in contact with ground (GND) circuit Hot short Wiring harness not wired to power supply (24 V) circuit is in contact with power supply (24 V) circuit <Points to remember when troubleshooting> ① Method of displaying connector No. and handling T-adapter Unless there is special instruction, insert or connect the T-adapter as follows <ul style="list-style-type: none"> If there is no indication for the male or female terminal of the connector No., disconnect the connector and insert the T-adapter in both the male and female terminals If there is indication for the male or female terminal of the connector No., disconnect the connector and connect the T-adapter to only the terminal indicated (either the male terminal or female terminal) <Points to remember when troubleshooting> ② Given order for pin numbers and handling tester lead Unless there is a special instruction, connect tester (+) lead and (-) lead as follows to carry out troubleshooting <ul style="list-style-type: none"> Connect the (+) lead to the wiring harness for the pin No. given first Connect the (-) lead to the wiring harness for the pin No. given last
	2		
	3		
	4		
	5		

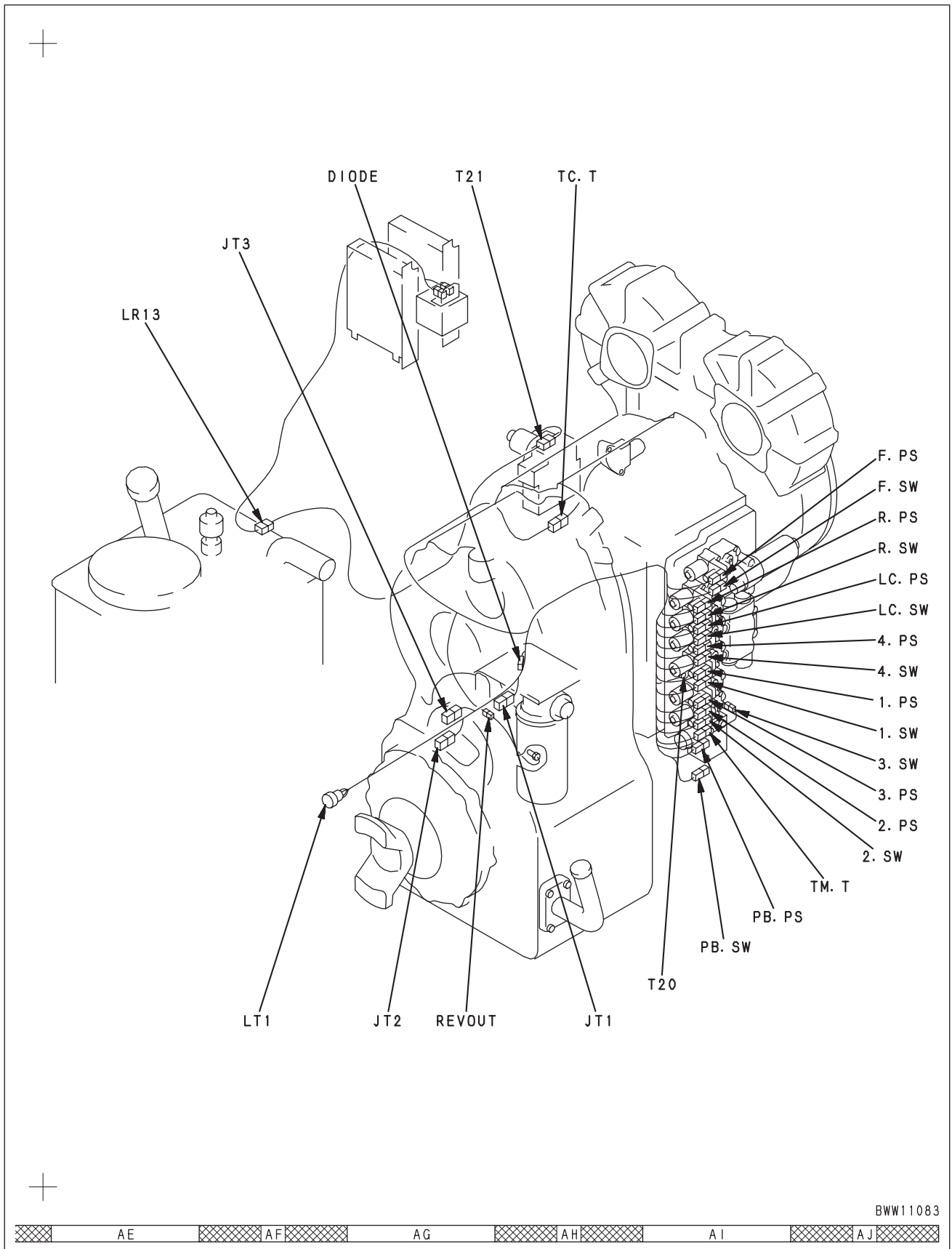
Number of Pins	AMP040 Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
8	<p>BWP04751</p>	<p>BWP04752</p>	799-601-7180
	—	Housing part number: 79A-222-3430 (Quantity: 5 pieces)	
12	<p>BWP04753</p>	<p>BWP04754</p>	799-601-7190
	—	Housing part number: 79A-222-3440 (Quantity: 5 pieces)	
16	<p>BWP04755</p>	<p>BWP04756</p>	799-601-7210
	—	Housing part number: 79A-222-3450 (Quantity: 5 pieces)	
20	<p>BWP04757</p>	<p>BWP04758</p>	799-601-7220
	—	Housing part number: 79A-222-3460 (Quantity: 5 pieces)	

★ Terminal part number: 79A-222-3470 (for all numbers of pins).

[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 <Alpha>@ (normal type) 08192-2820 <Alpha>@ (fine wire type)	Part number: 08192-1810 <Alpha>@ (normal type) 08192-2810 <Alpha>@ (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 <Alpha>@ (normal type) 08192-2920 <Alpha>@ (fine wire type)	Part number: 08192-1910 <Alpha>@ (normal type) 08192-2910 <Alpha>@ (fine wire type)	

Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-1	B-3	K-3	C-3	
CL20	DT-T	2	Intermediate connector (Monitor panel controller)	N-2				C-5
CN55	DT-T	2	Intermediate connector (Backup buzzer)	K-8	P-2		V-8	
COMBI	M	3	Front combination lamp (Right)	A-6			W-3	
COMBI	M	3	Front combination lamp (Left)	E-1			W-2	
DIODE	DT-T	2	Diode (Parking brake solenoid)	AG-8	P-8			
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	I-9	K-6	K-5	
E01	DT-T	2	Intermediate connector (Starting motor)	AB-1			W-4	B-1
E02	Terminal	1	Alternator R	AD-3			X-5	
E03	Terminal	1	Alternator B	AD-3			X-5	
E04	Terminal	1	Alternator E	AD-3			X-5	
E05	Terminal	1	Engine heater relay	AC-9			Q-9	E-4
E06	Terminal	1	Engine heater relay	AA-9			Q-9	F-4
E07	Terminal	1	Engine heater relay	Z-9			Q-9	F-4
E08	DT-T	2	Engine coolant temperature sensor (Monitor)	AC-1			O-8	
E09	DT-T	2	Engine coolant temperature sensor (Preheater)	AD-2			O-8	B-2
E10	DT-T	2	Air conditioner compressor magnet clutch	AD-2				
E11	DT-T	2	Diode (Air conditioner compressor)	AD-4				
E14	Terminal	1	Ground (Rear frame)	AB-5			X-5	A-1
E26	DT-T	2	Engine oil level sensor	AA-5			P-8	
E27	DT-T	2	Engine speed sensor	AC-6	L-8			
E28	DT	2	Diode (Engine heater relay)	AC-9			O-8	B-2
E29	Terminal	1	Engine oil pressure switch	AB-5			P-8	
E30	Terminal	1	Starting motor B	AB-1			X-4	
E31	DT-T	2	Diode	AC-7				B-3
E32	DT-T	2	Diode (Fuel cut solenoid)	AB-6				B-3
E33	DT-T	2	Dust indicator	AB-9			P-8	
E34	DT-T	3	Fuel cut solenoid	AC-7				B-2
E36	Terminal	1	Air compressor magnetic clutch	Y-5				
ER-1	DT-T (G)	8	Intermediate connector (Engine)	Z-2			P-5	D-3
ER-3	DT-T (Gr)	8	Intermediate connector (Engine)	AA-1	K-7		O-5	D-3
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-2	
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	R-8			
F09	DT-T	3	Bucket positioner proximity switch	A-3		Q-7		B-3
F10	DT-T	3	Bucket positioner proximity switch (Standard)	A-3		Q-6		B-3
F13	DT-T	2	Lift arm damper solenoid	C-1	R-8			
F14	DT-T	2	Diode (Damper solenoid)	D-1	R-7			
F15	DT-T	3	Lift arm angle signal (For load meter)	A-2		B-3	M-8	
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1		B-3	M-8	
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1		B-3	M-8	



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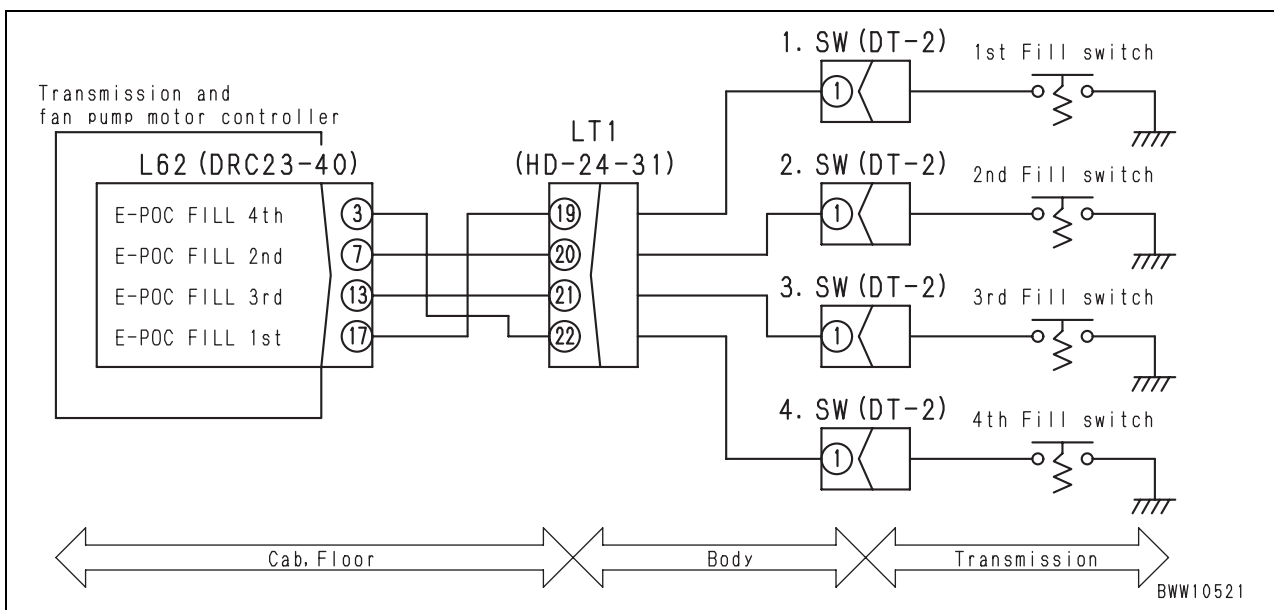
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FAILURE CODE [15SFL1]

Action Code	Failure Code	Controller Code	Trouble	2nd_ECMV fill switch system short-circuited
E03	15SFL1	TM		
Description of Trouble	<ul style="list-style-type: none"> • A 2nd_ECMV fill switch signal is input when 2nd_ECMV is OFF. 			
Controller Reaction	<ul style="list-style-type: none"> • Assumes that the 2nd_ECMV fill switch signal is on and turns speed clutch output OFF. 			
Effect on Machine	<ul style="list-style-type: none"> • No travel. 			
Related Information	<ul style="list-style-type: none"> • Can be checked with the monitoring function (Code: 40908, D-IN-27). 			

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

Related circuit diagram

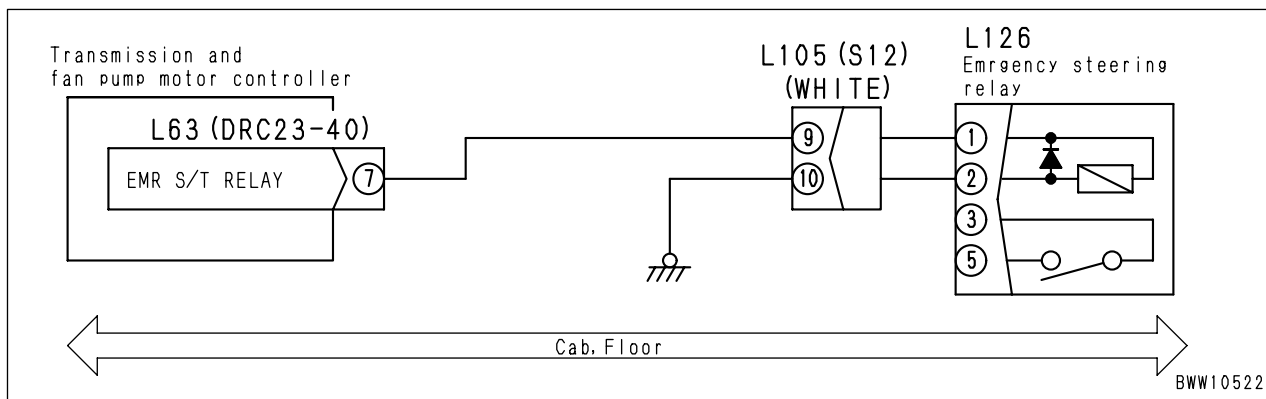


FAILURE CODE [D150KB]

Action Code	Failure Code	Controller Code	Trouble	Emergency steering relay output system grounded
E03	D150KB	TM		
Description of Trouble	<ul style="list-style-type: none"> No signal is output to the emergency steering relay due to disconnection. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The electric emergency steering motor does not rotate. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
	Possible Causes and Standard Values	1	Defective emergency steering relay (L126)	1) Turn starting switch OFF 10 or more seconds after starting engine. 2) Replace relay. 3) Turn starting switch ON (at self-check).		
This Failure code (D150KB) issued				Relay L126 is not defective		
This Failure code (D150KB) not issued				Relay L126 is defective		
1) Turn starting switch OFF. 2) Disconnect connector L105. 3) Connect T-adapter.						
		Between L105 (Male) ⑨ - ⑩	Resistance	200 - 400 Ω		
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and L105. 3) Connect T-adapter.			
	Wiring harness between L63 (Female) ⑦ - L105 (Female) ⑨		Resistance	1 MΩ and above		
	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adapter.					
3	Defective transmission and fan pump motor controller	Between L63 (Female) ⑦ - body			Resistance	200 - 400 Ω

Related circuit diagram

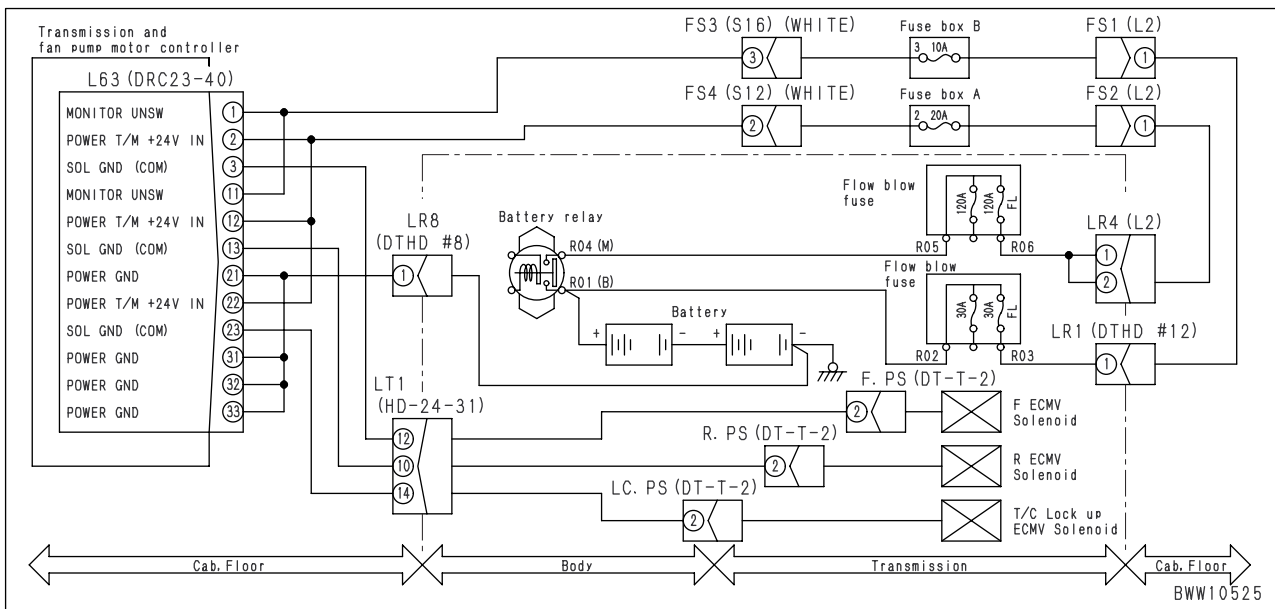


FAILURE CODE [DAQ0KK]

Action Code	Failure Code	Controller Code	Trouble	Controller power supply voltage lowered
—	DAQ0KK	TM		
Description of Trouble	<ul style="list-style-type: none"> The controller power supply voltage is lowered. 			
Controller Reaction	<ul style="list-style-type: none"> Cannot detect input signals properly. 			
Effect on Machine	<ul style="list-style-type: none"> Normal operation is disabled. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
		1	Wiring harness discontinuity (Disconnection or defective contact)	Turn starting switch OFF. 2) Disconnect connectors L63 and FS3. 3) Connect T-adaptor.		
Wiring harness between L63 (Female) ①/⑩ - FS3 (Female) ③				Resistance	1 Ω and below	
Between L63 (Female) ②/③/⑩/⑩ - body.				Resistance	1 Ω and below	
2		Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connector L63 and FS3. 3) Connect T-adaptor.			
			Between L63 (Female) ①/⑩/FS3 (Female) ③ - body	Resistance	1 MΩ and above	
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 ①/⑩ - body		Constant (NSW) power supply	Voltage	20 - 30 V	

Related circuit diagram

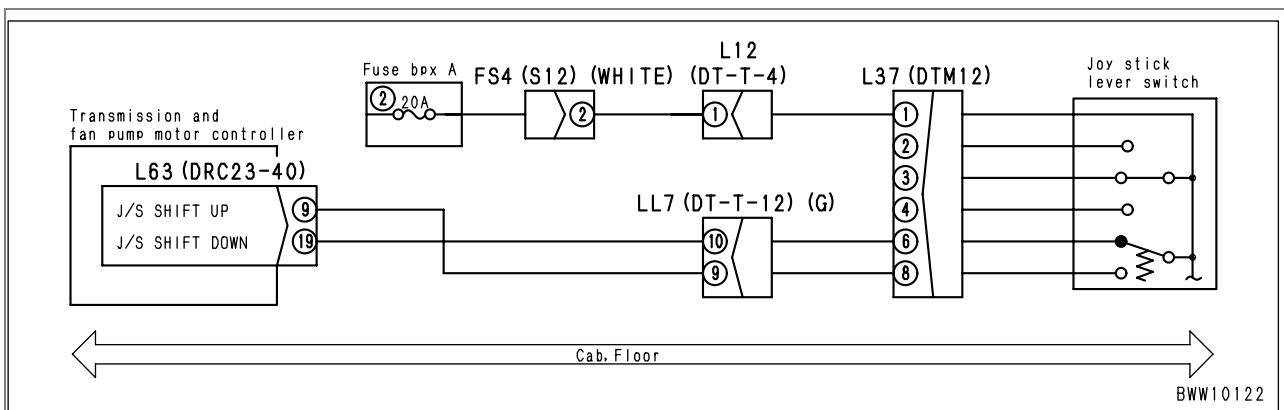


FAILURE CODE [DDK5LD]

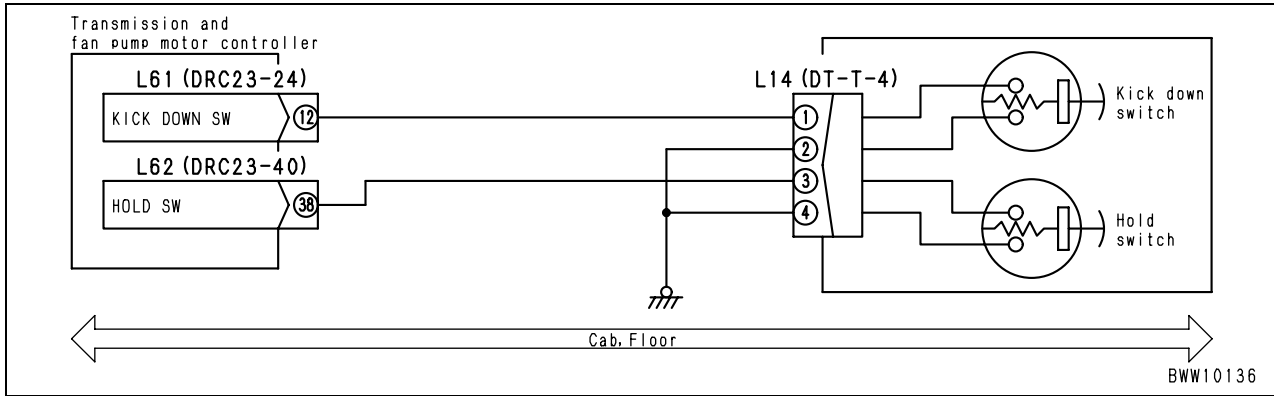
Action Code	Failure Code	Controller Code	Trouble	Hot short in joystick SHIFT_UP/SHIFT_DOWN switch
E03	DDK5LD	TM		
Description of Trouble	<ul style="list-style-type: none"> Joystick SHIFT_UP/SHIFT_DOWN switch signal is input for 30 seconds continuously. 			
Controller Reaction	<ul style="list-style-type: none"> Ignores input signal. 			
Effect on Machine	<ul style="list-style-type: none"> Gear is shifted up or down once, then it cannot be shifted up or down with the joystick SHIFT_UP or SHIFT_DOWN switch. Operate can shift gear in auto shift mode or steering wheel mode. 			
Related Information	<ul style="list-style-type: none"> This failure can be checked with monitoring function (Code: 40906, D-IN-12, DIN-13). 			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
		1	Hot short in wiring harness (Contact with 24-V wiring harness)	1) Turn starting switch OFF. 2) Disconnect L63 and L37. 3) Connect T-adapter. 4) Turn starting switch ON.		
Between L63 (female) ⑨, L37 (female) ⑧ - chassis ground				Voltage	1 V and below	
Between L63 (female) ⑱, L37 (female) ⑥ - chassis ground				Voltage	1 V and below	
2		Defective joystick SHIFT_UP/SHIFT_DOWN switch	1) Turn starting switch OFF. 2) Disconnect connector L37. 3) Connect T-adapter.			
			Between L37 (Male) ⑧ - ①	When switch is at SHIFT_UP	Resistance	1 Ω and below
				When switch is not at above position	Resistance	1 MΩ and above
			Between L37 (Male) ⑥ - ①	When switch is at SHIFT_DOWN	Resistance	1 Ω and below
When switch is not at above position		Resistance		1 MΩ and above		
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between L63 ⑨ - chassis ground	When switch is at SHIFT_UP	Voltage	20 - 30 V
				When switch is not at above position	Voltage	1 V and below
			Between N63 ⑱ - chassis ground	When switch is at SHIFT_DOWN	Voltage	20 - 30 V
	When switch is not at above position			Voltage	1 V and below	

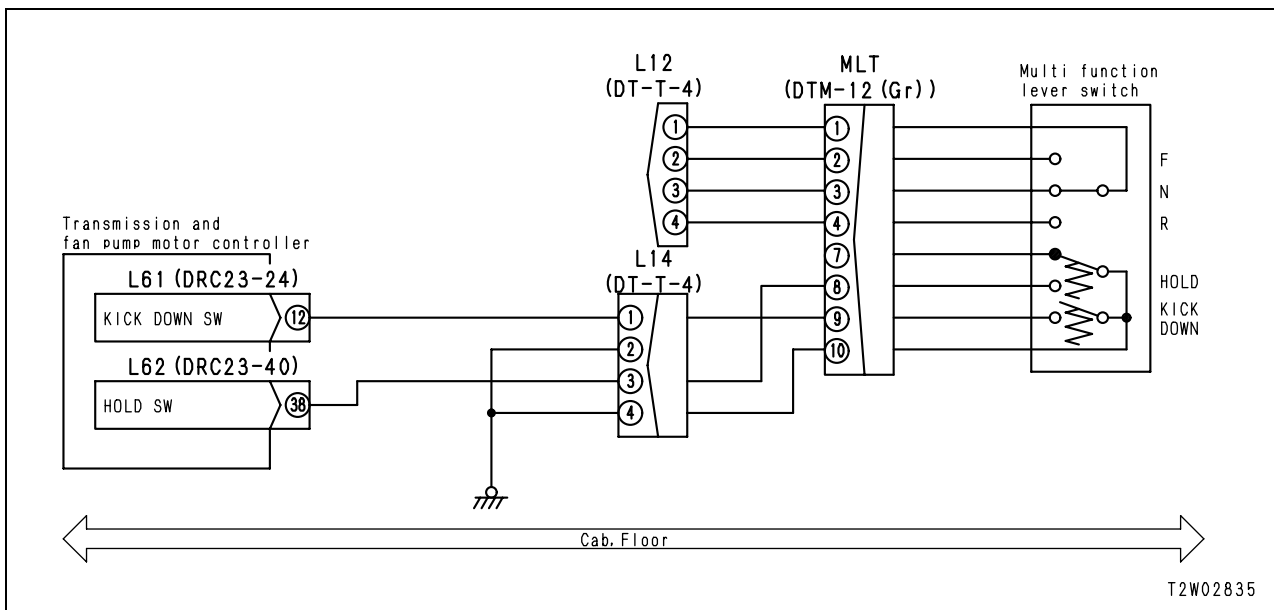
Related circuit diagram



Related circuit diagram
For standard



When multi function mono lever mounted

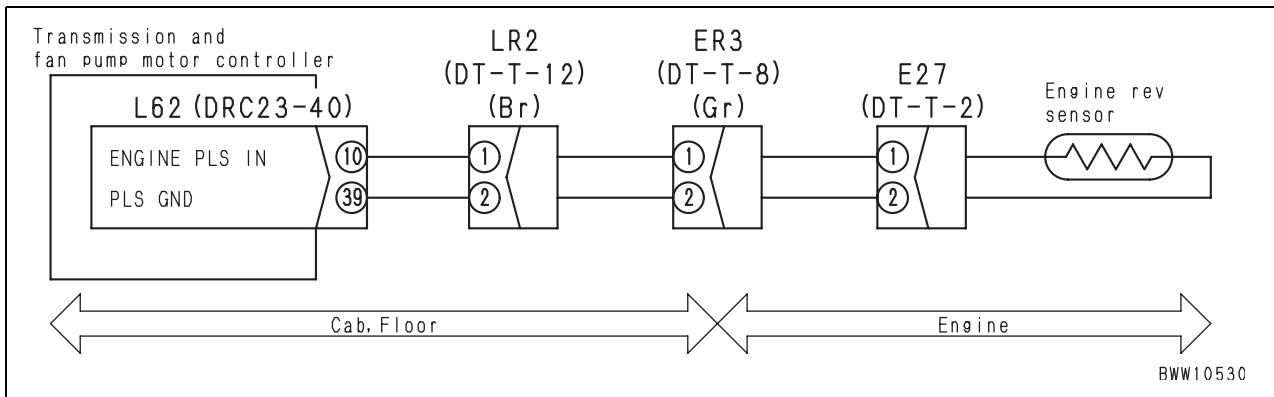


FAILURE CODE [DLE2KA]

Action Code	Failure Code	Controller Code	Trouble	Engine revolution sensor system discontinuity
E03	DLE2KA	TM		
Description of Trouble	<ul style="list-style-type: none"> Due to discontinuity of the engine revolution sensor system, no engine speed signal can be input. 			
Controller Reaction	<ul style="list-style-type: none"> Cannot detect engine speed. (Assumes that engine speed is 2,100 rpm.) 			
Effect on Machine	<ul style="list-style-type: none"> Gear shift shock may occur. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
		1	Wiring harness discontinuity (Disconnection or defective connector contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and E27. 3) Connect T-adaptor.	
Wiring harness between L62 (Female) ⑩ - E27 (Female) ①				Resistance	1 Ω or below
Wiring harness between L62 (Female) ⑳ - E27 (Female) ②				Resistance	1 Ω or below
2		Defective engine revolution sensor	1) Turn starting switch OFF. 2) Disconnect connector E27. 3) Connect T-adaptor.		
			Between E27 (Male) ① - ②	Resistance	500 - 1,000 Ω
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L62. 3) Connect T-adaptor. 4) Turn starting switch ON.		
	Between L62 ⑩ - ⑳		Voltage (Measured in AC range)	0.5 V or above	

Related circuit diagram

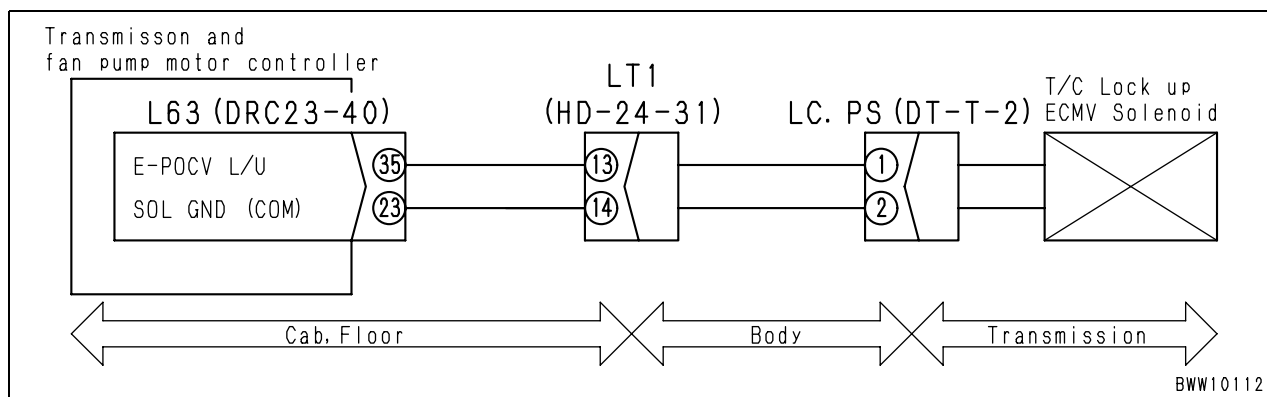


FAILURE CODE [DXH1KB]

Action Code	Failure Code	Controller Code	Trouble	Lock-up clutch _ECMV solenoid system short-circuiting
E01	DXH1KB	TM		
Description of Trouble	<ul style="list-style-type: none"> Due to short-circuiting of the lock-up clutch ECMV solenoid system, no output goes to the lock-up clutch _ECMV. 			
Controller Reaction	<ul style="list-style-type: none"> Turns output to the lock-up clutch ECMV solenoid OFF. 			
Effect on Machine	<ul style="list-style-type: none"> The lock-up clutch cannot be engaged. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
		1	Defective lock-up clutch ECMV	1) Turn starting switch OFF. 2) Disconnect connector LC.PS. 3) Connect T-adaptor.	
Between LC.PS (Male) ① - ②				Resistance	5 - 15 Ω
2		Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L63 and LC.PS. 3) Connect T-adaptor.		
			Wiring harness between L63 (Female) ⑳/LC.PS (Female) ① - body	Resistance	1 MΩ or above
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adaptor.		
			Between L63 (Female) ⑳ - ⑬	Resistance	5 - 15 Ω

Related circuit diagram

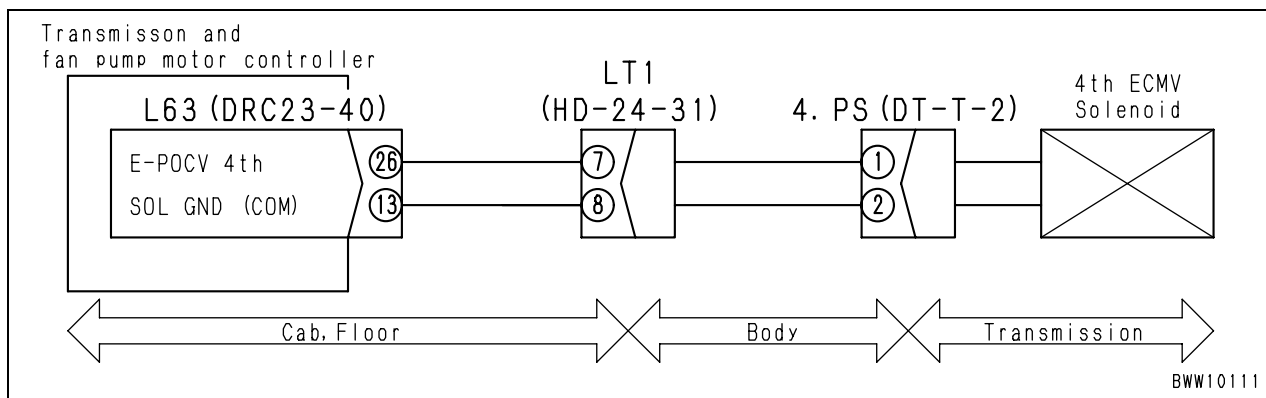


FAILURE CODE [DXHHKA]

Action Code	Failure Code	Controller Code	Trouble	4th_ECMV solenoid system discontinuity
E03	DXHHKA	TM		
Description of Trouble	<ul style="list-style-type: none"> Due to discontinuity of the 4th_ECMV solenoid system, no output goes to the 4th_ECMV. 			
Controller Reaction	<ul style="list-style-type: none"> No action. 			
Effect on Machine	<ul style="list-style-type: none"> "4th" cannot be engaged. (Traveling in other passes is possible.) 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting		
		1	Defective R_ECMV	1) Turn starting switch OFF. 2) Disconnect connector 4th.PS. 3) Connect T-adaptor.	
Between 4.PS (Male) ① - ②				Resistance	5 - 15 Ω
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and F.PS. 3) Connect T-adaptor.		
			Wiring harness between L63 (Female) ②⑥ - 4.PS (Female) ①	Resistance	1 Ω or below
			Wiring harness between L63 (Female) ①③ - 4.PS (Female) ②	Resistance	1 Ω or below
3		Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L63. 3) Connect T-adaptor.		
	Between L63 (Female) ②⑥ - ①③		Resistance	5 - 15 Ω	

Related circuit diagram



TROUBLESHOOTING CODE [TM-4]

Troubleshooting code	Failure Code	Controller Code	Trouble	Neutralizer signal (Parking brake switch signal) system failure
TM-4	—	(TM)		
Description of Trouble	<ul style="list-style-type: none"> Due to failure of the neutralizer signal (Parking brake switch signal) system, always the neutral state is ON (Failure associated with hot short-circuiting) or FR operation is performed while the parking brake is operated and traveling occurs with the brake engaged (Failure associated with discontinuity). 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The neutralizer cannot be controlled, or it is always operating. 			
Related Information	<ul style="list-style-type: none"> Parking brake input switch signal can be checked with the monitoring function (Code: 40907, D-IN-23). 			

Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
		1	Defective parking brake switch	1) Turn starting switch OFF. 2) Disconnect connector L01. 3) Connect T-adapter.		
Between L01 (Male) ① - ③				Parking brake switch = ON	Resistance	1 Ω or below
				Parking brake switch = OFF	Resistance	1 MΩ or above
Between L01 (Male) ② - ③				Parking brake switch = ON	Resistance	1 MΩ or above
				Parking brake switch = OFF	Resistance	1 Ω or below
Between L01 (Male) ① - ②		Always	Resistance	1 MΩ or above		
2		Defective parking brake solenoid	1) Turn starting switch OFF. 2) Disconnect connectors PB and PS. 3) Connect T-adapter.			
			Between PB.PS (Male) ① - ②	Resistance	10 - 40 Ω	
			Between PB.PS (Female) ② - body	Resistance	1 Ω or below	
			Between PB.PS (Male) ①/② - body	Resistance	1 Ω or below	
3		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L62 and L01. 3) Connect T-adapter.			
			Wiring harness between L62 (Female) ⑥ - L01 (Female) ②	Resistance	1 Ω or below	
4		Wiring harness hot short-circuiting (Contacting 24-V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L62, L01, and PB.PS. 3) Connect T-adapter. 4) Turn starting switch ON.			
			Between L62 (Female) ⑥/L01 (Female) ② {PB.PS (Female) ①} - body	Voltage	1 V or below	
5		Defective diode (DIODE)	1) Turn starting switch OFF. 2) Disconnect connector DIODE. 3) Connect T-adapter.			
			Between DIODE (Male) ② - ①	To be measured from ② side in diode range.	Continuity	Positive
				To be measured from ① side in diode range.	Continuity	None
			★ Replacing DIODE can also correct this failure.			
6		Wiring harness ground fault - In this case, the fuse blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L62, L01 and PB.PS. 3) Connect T-adapter.			
			Between L62 (Female) ⑥/L01 (Female) ② {PB.PS (Female) ①} - body	Resistance	1 MΩ or above	

TROUBLESHOOTING CODE [TM-11]

Troubleshooting code	Failure Code	Controller Code	Trouble	Starting switch "C" (IGN_C) signal system failure
TM-11	—	(TM)		
Description of Trouble	• After the engine started, discontinuity or ground fault occurred in the "C" terminal signal input circuit of the starting switch.			
Controller Reaction	• No reaction.			
Effect on Machine	• The engine cannot be started. (Ground fault causes fuse B-1 to blow out, resulting in disabling the starting switch.)			
Related Information	• Terminal input signal (0/1) of the starting switch "C" (IGN "C") can be checked with the monitoring function (Code: 40906,D-IN-15).			

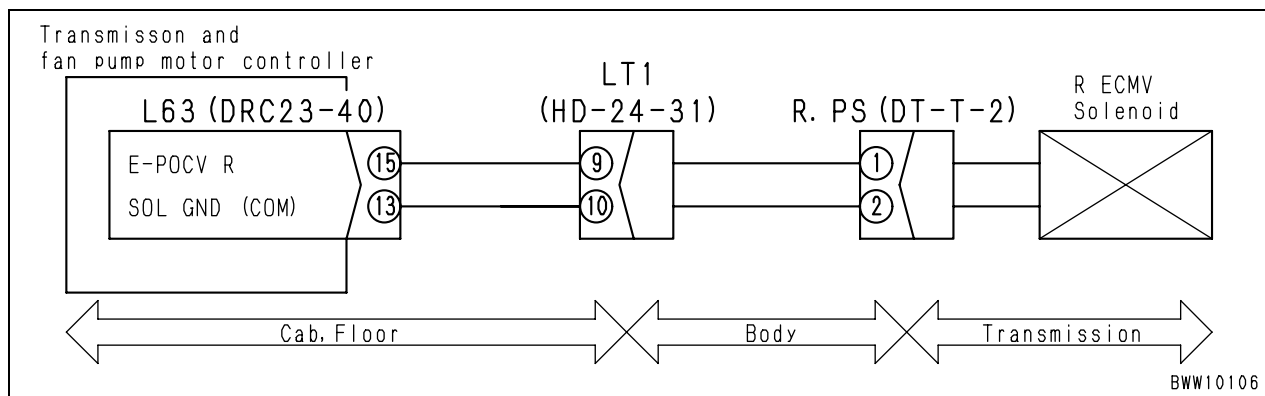
Possible Causes and Standard Values	Causes		Standard Values in Normal State and Remarks on Troubleshooting			
	1	Defective starting (Ignition key) switch	1) Turn starting switch OFF. 2) Disconnect connector S31. 3) Connect T-adapter.			
			Between S31 (Male) ① - ③	Starting switch = "C" (at starting)	Resistance	1 Ω or below
				Other than above	Resistance	1 MΩ or above
	2	Defective diode R26	1) Turn starting switch OFF. 2) Disconnect connector R26. 3) Connect T-adapter.			
			Between R26 (Male) ① - ② ★ To be measured from ② side in diode range.		Continuity	Positive
			★ Replacing R26 can also correct this failure.			
	3	Defective diode R27	1) Turn starting switch OFF. 2) Disconnect connector R27. 3) Connect T-adapter.			
			Between R27 (Male) ① - ② ★ To be measured from ② side in diode range.		Continuity	Positive
			★ Replacing R27 can also correct this failure.			
4	Defective neutral safety relay (L116)	1) Turn starting switch OFF. 2) Disconnect connector L116. 3) Connect T-adapter.				
		Between L116 (Male) ③ - ⑤	Relay = ON	Resistance	1 Ω or below	
			Relay = OFF	Resistance	1 MΩ or above	
5	Defective starting motor	★ Perform separate inspection.				
6	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S31. 3) Connect T-adapter.				
		Wiring harness between L63 (Female) ⑨ - L102 (Female) ⑭		Resistance	1 Ω or below	
		Between L102 (Female) ⑬ - S31 (Female) ③		Resistance	1 Ω or below	
7	Wiring harness hot short-circuiting (Contacting 24-V harness)	1) Turn starting switch OFF. 2) Disconnect connectors L63 and S31. 3) Connect T-adapter.				
		Between L63 (Female) ⑨/L102 (Female) ⑭ - body		Voltage	1 V or below	
		Between L102 (Female) ⑬/S31 (Female) ③ - body		Voltage	1 V or below	
8	Wiring harness ground fault *In this case, fuse A-2 blows out when the switch is operated.	1) Turn starting switch OFF. 2) Disconnect connectors L63, S31, E01, L81 and L52. 3) Connect T-adapter.				
		Between L63 (Female) ⑨/L102 (Female) ⑭ - body		Resistance	1 MΩ or above	
		Between L102 (Female) ⑬/S31 (Female) ③ - body		Resistance	1 MΩ or above	
9	Defective transmission and fan pump motor controller	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect T-adapter. 4) Turn starting switch ON.				
		Between L63 ⑨ and body	Starting switch = "C" (at starting)	Voltage	20 - 30 V	
			Other than above	Voltage	1 V or below	

TROUBLESHOOTING CODE [TM-21]

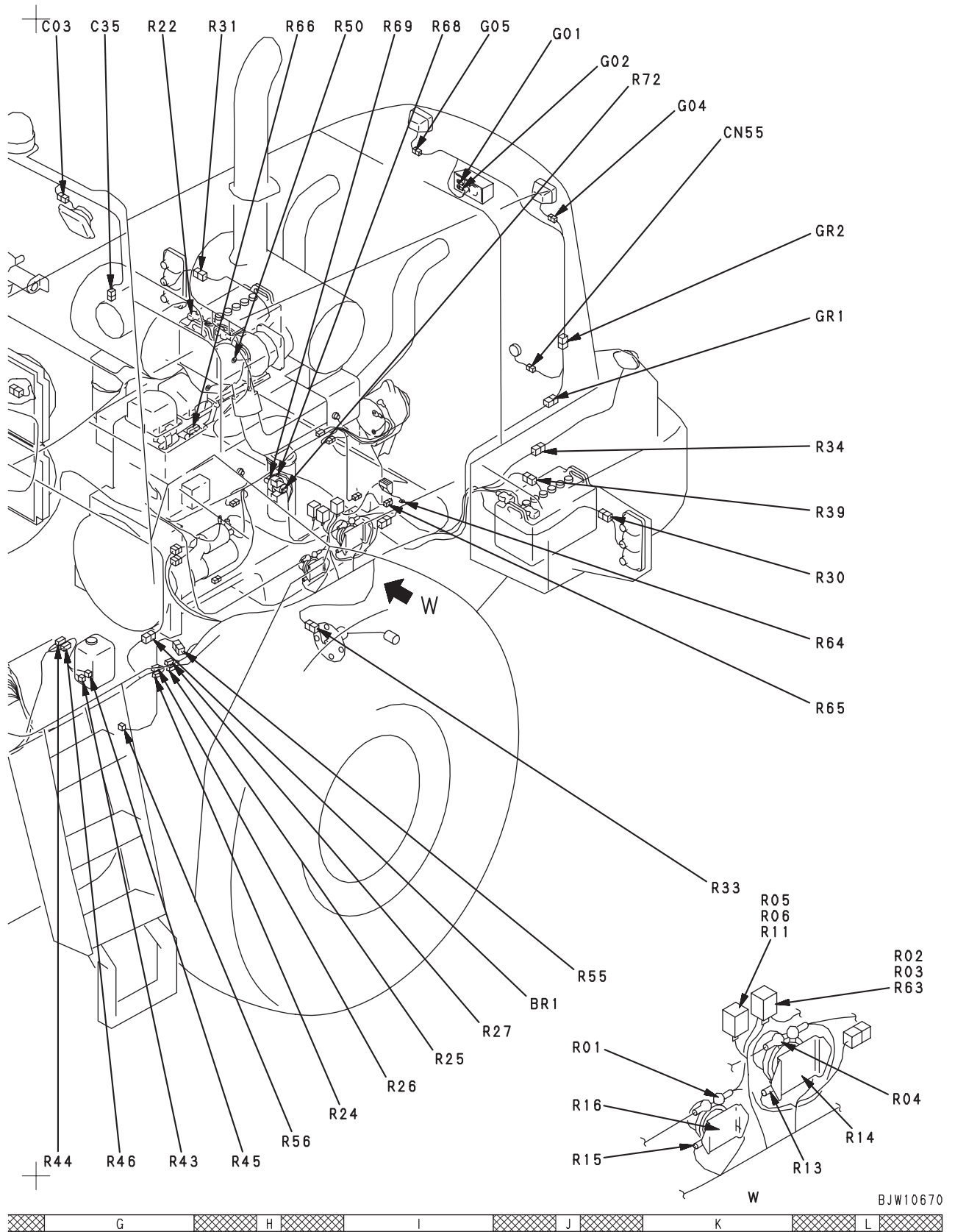
Troubleshooting code	Failure Code	Controller Code	Trouble	RECMV solenoid system hot short-circuiting
TM-21	—	—		
Description of Trouble	<ul style="list-style-type: none"> Due to a failure of the RECMV solenoid system, RECMV is turned ON without DIR is turned to "R." 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The transmission may be damaged. Traveling may be disabled. 			
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 R.P.S. 3) Connect T-adapter. 4) Turn starting switch ON.	Between L63 (Female) ⑮ R.P.S (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.

Related circuit diagram



Failure Code [DK5FKM]	(Joystick steering EPC lever neutral system caution) is displayed	20-548
Failure Code [DK5FL8]	(Defective joystick steering EPC lever potentiometer system input signal (deviation of positional signals of main and sub-circuits)) is displayed	20-549
Failure Code [DG5GKA]	(Defective joystick steering EPC lever potentiometer system (disconnection or ground fault of sub-circuit)) is displayed	20-550
Failure Code [DK5GKY]	(Defective joystick steering EPC lever potentiometer system (sub-circuit short circuit)) is displayed	20-551
Failure Code [DKA0KA]	(Defective lift arm angle sensor system (disconnection or ground fault)) is displayed	20-552
Failure Code [DKA0KY]	(Defective lift arm angle sensor system (short circuit) is displayed	20-553
Failure Code [DLE2LC]	(Defective engine speed sensor system) is displayed	20-554
Failure Code [DLT3LC]	(Defective transmission output axis speed sensor system (disconnected)) is displayed	20-555
Failure Code [DUM1KB]	(Remote positioner RAISE lamp system ground fault) is displayed	20-556
Failure Code [DUM2KB]	(Remote positioner LOWER lamp system ground fault) is displayed	20-557
Failure Code [DW4PKA]	(Disconnected lift arm RAISE EPC solenoid system) is displayed	20-558
Failure Code [DW4PKB]	(Lift arm RAISE EPC solenoid system ground fault) is displayed	20-559
Failure Code [DW4QKA]	(Disconnected lift arm LOWER EPC solenoid system) is displayed	20-560
Failure Code [DW4QKB]	(Lift arm LOWER EPC solenoid system ground fault) is displayed	20-561
Failure Code [DW4RKA]	(Disconnected bucket TILT EPC solenoid sytem) is displayed	20-562
Failure Code [DW4RKB]	(Bucket TILT EPC solenoid sytem ground fault) is displayed	20-563
Failure Code [DW4SKA]	(Bucket DUMP EPC solenoid sytem disconnection) is displayed	20-564
Failure Code [DW4SKB]	(Bucket DUMP EPC solenoid sytem ground fault) is displayed	20-565
Failure Code [DWM1KA]	(Work equipment neutral lock solenoid system disconnection) is displayed	20-566
Failure Code [DWM1KB]	(Work equipment neutral lock solenoid system ground fault) is displayed	20-567
Failure Code [DWN6KA]	(Lift arm RAISE magnet detent system disconnection) is displayed	20-568
Failure Code [DWN6KB]	(Lift arm RAISE magnet detent system ground fault) is displayed	20-569
Failure Code [DWN7KA]	(Lift arm FLOATING magnet detent system disconnection) is displayed	20-570
Failure Code [DWN7KB]	(Lift arm FLOATING magnet detent system ground fault) is displayed	20-571
Failure Code [DWN8KA]	(Bucket TILT magnet detent system disconnection) is displayed	20-572
Failure Code [DWN8KB]	(Bucket TILT magnet detent system failure (power supply system ground fault)) is displayed	20-573
Failure Code [DXHJKA]	(3rd valve extension EPC solenoid system disconnection) is displayed	20-574
Failure Code [DXHJKB]	(3rd valve extension EPC solenoid system ground fault) is displayed	20-575
Failure Code [DXHKKA]	(3rd valve retraction EPC solenoid system disconnection) is displayed	20-576
Failure Code [DXHKKB]	(3rd valve retraction EPC solenoid system ground fault) is displayed	20-577
Failure Code [DXHLKA]	(Joystick steering right-hand EPC solenoid system disconnection) is displayed	20-578
Failure Code [DXHLKB]	(Joystick steering right-hand EPC solenoid system ground fault) is displayed	20-579
Failure Code [DXHMKA]	(Joystick steering left-hand EPC solenoid system disconnection) is displayed	20-580
Failure Code [DXHMKB]	(Joystick steering left-hand EPC solenoid system ground fault) is displayed	20-581
Troubleshooting Code [WRK-1]	Defective lift arm lock switch system	20-582
Troubleshooting Code [WRK-2]	Defective remote positioner RAISE setting switch system	20-583
Troubleshooting Code [WRK-3]	Defective remote positioner LOWER setting switch system	20-584
Troubleshooting Code [WRK-4]	Defective remote positioner RAISE selection switch system	20-586
Troubleshooting Code [WRK-5]	Defective remote positioner LOWER ON/OFF switch system	20-588
Troubleshooting Code [WRK-6]	Defective bucket cylinder proximity switch system	20-590
Troubleshooting Code [WRK-7]	Defective bucket cylinder full stroke detection switch system	20-592
Troubleshooting Code [WRK-8]	Defective semi-automatic digging HARD selection switch system	20-593
Troubleshooting Code [WRK-9]	Defective semi-automatic digging SOFT selection switch system	20-594
Troubleshooting Code [WRK-10]	Defective joystick ON/OFF switch system	20-596
Troubleshooting Code [WRK-11]	Defective joystick steering speed Hi/Lo switch system	20-598
Troubleshooting Code [WRK-12]	Defective joystick solenoid cut relay output system	20-599

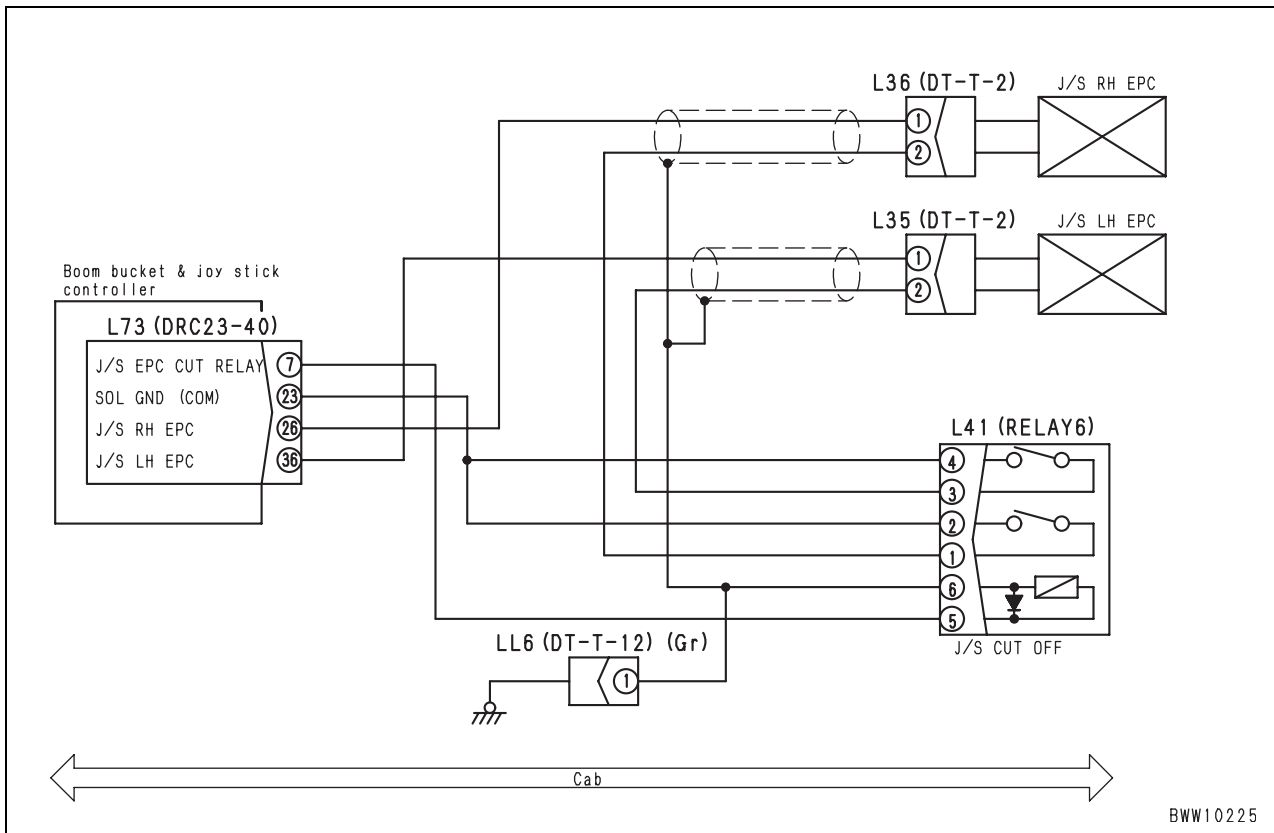


FAILURE CODE [D193KB]

Action Code	Failure Code	Controller Code	Trouble	The joystick solenoid cut relay output system is grounded properly
E03	D193KB	WRK		
Description of Trouble	<ul style="list-style-type: none"> The joystick solenoid cut relay output system is grounded properly. 			
Controller Reaction	<ul style="list-style-type: none"> Stops joystick solenoid cut relay and joystick solenoid output. 			
Effect on Machine	<ul style="list-style-type: none"> The joystick steering cannot be operated. 			
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-adaptor.	
Between L41 (Male) ⑤ - ⑥				Resistance	200 - 400 Ω
2		Wiring harness ground fault (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L41. 3) Connect T-adaptor.		
			Wiring harness between L73 (Female) ⑦/ L41 (Female) ⑤ - 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) ⑦ - body	Resistance	200 - 400 Ω

Related circuit diagram



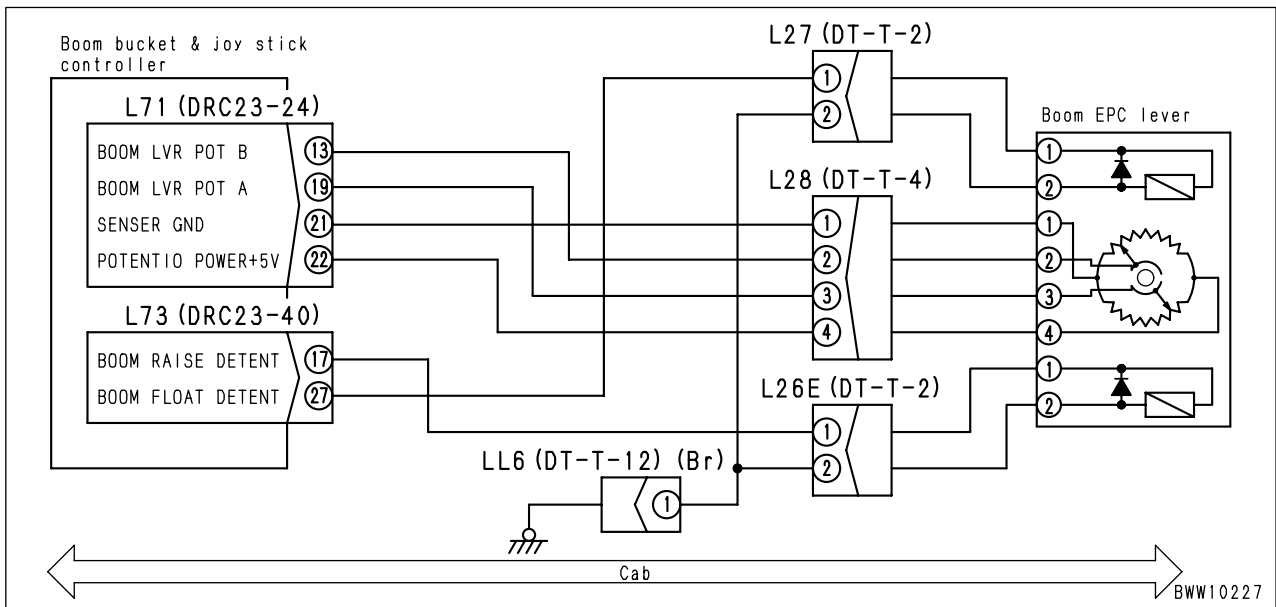
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FAILURE CODE [DK5AKA]

Action Code	Failure Code	Controller Code	Trouble	Defective lift arm EPC lever potentiometer system (Disconnection of main) (Disconnection, ground of sub)
E03	DK5AKA	WRK		
Description Of Trouble	• Defective lift arm EPC lever potentiometer system (Main circuit discontinuity) (Sub circuit discontinuity or ground fault).			
Controller Reaction	• Stops the lift arm EPC solenoid output.			
Effect on Machine	• The lift arm cannot be operated.			
Related Information	• Can be checked with the monitoring function (Code: 42001).			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adapter.	
Wiring harness between L71 (Female) ⑬ - L28 (Female) ②				Resistance	1 Ω and below
2		Wiring harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L71 and L28. 3) Connect T-adapter.		
			Between L71 (Female) ⑬/L28 (Female) ② - body	Resistance	1 MΩ and above
3	Defective potentiometer	1) Turn starting switch OFF. 2) Disconnect connector L04. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.			
		Between L28 ② - ①	Voltage	2.4 - 2.6 V	
4	Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L71. 3) Insert T-adapter. 4) Turn starting switch ON. 5) Set lever to neutral position.			
		Between L71 ⑬ - ②	Voltage	2.4 - 2.6 V	

Related circuit diagram

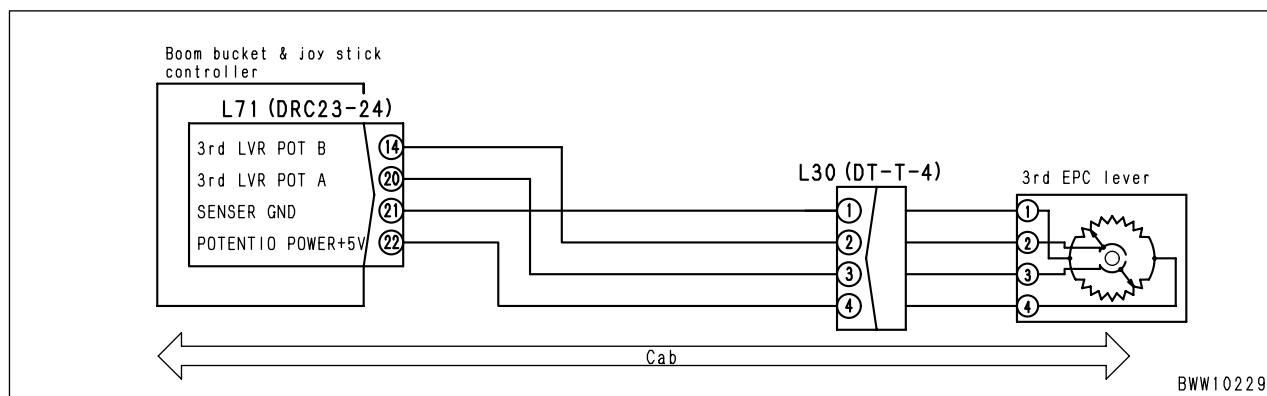


FAILURE CODE [DK5EKY]

Action Code	Failure 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"> The electric power supply harness is contacted to the 3rd valve EPC lever potentiometer signal system. 			
Controller Reaction	<ul style="list-style-type: none"> Turns off the 3rd valve EPC solenoid output. 			
Effect on Machine	<ul style="list-style-type: none"> The 3rd valve cannot be operated. 			
Related Information	<ul style="list-style-type: none"> Can be checked with the monitoring function (Code: 42007). 			

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-adaptor. 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-adaptor. 4) Turn starting switch ON. 5) Set lever to neutral position.		
			Between L71 ⑭ - ⑳	Voltage	2.4 - 2.6 V

Related circuit diagram

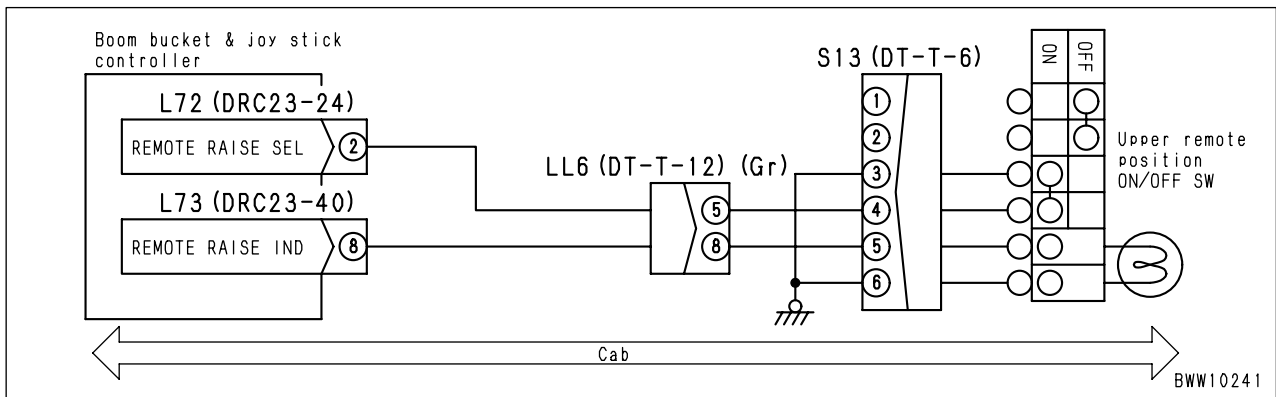


FAILURE CODE [DUM1KB]

Action Code	Failure Code	Controller Code	Trouble	Remote positioner RAISE lamp system ground fault
E03	DUM1KB	WRK		
Description Of Trouble	<ul style="list-style-type: none"> The remote positioner RAISE lamp system ground fault prevents output to the indicator lamp. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The remote positioner RAISE indicator lamp cannot be turned on. 			
Related Information	<ul style="list-style-type: none"> 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 RAISE indicator lamp	1) Turn starting switch OFF. 2) Disconnect connector S13. 3) Connect T-adaptor.		
Between S13 (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-adaptor.			
			Wiring harness between L73 (Female) ⑧, S13 (Female) ⑤ - body	Resistance	1 MΩ and above	
3		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adaptor. 4) Turn starting switch ON.			
			Between L73 ⑧ - body	When the remote positioner RAISE lamp is ON.	Voltage	17 - 30 V
	When the remote positioner RAISE lamp is OFF.			Voltage	1 V and below	

Related circuit diagram

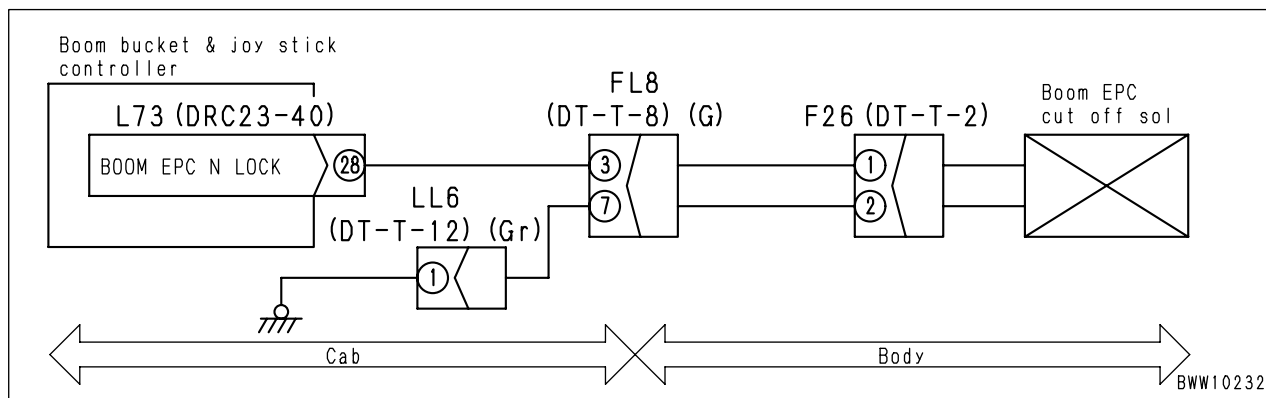


FAILURE CODE [DWM1KB]

Action Code	Failure Code	Controller Code	Trouble	Work equipment neutral lock solenoid system ground fault
E01	DWM1KB	WRK		
Description Of Trouble	<ul style="list-style-type: none"> Work equipment neutral lock solenoid power supply system ground fault. 			
Controller Reaction	<ul style="list-style-type: none"> Stops output to the neutral lock solenoid. 			
Effect on Machine	<ul style="list-style-type: none"> Normal operation is possible (Does not affect the lock lever). 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective neutral lock solenoid (Ground fault)	1) Turn starting switch OFF. 2) Disconnect connector F26. 3) Connect T-adapter. 4) Connect the connector. 5) Turn starting switch ON.	
Between F26 (Male) ① - ②				Resistance	35 - 45 Ω
Between F26 (Male) ① - body				Resistance	1 MΩ and above
2		Wiring harness ground fault or defective short circuit	1) Turn starting switch OFF. 2) Disconnect connectors L73 and F26. 3) Connect T-adapter.		
			Wiring harness between L73 (Female) ⑳, F26 (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-adapter.
Between L73 (Female) ⑳ - body	Resistance	1 MΩ and above			

Related circuit diagram

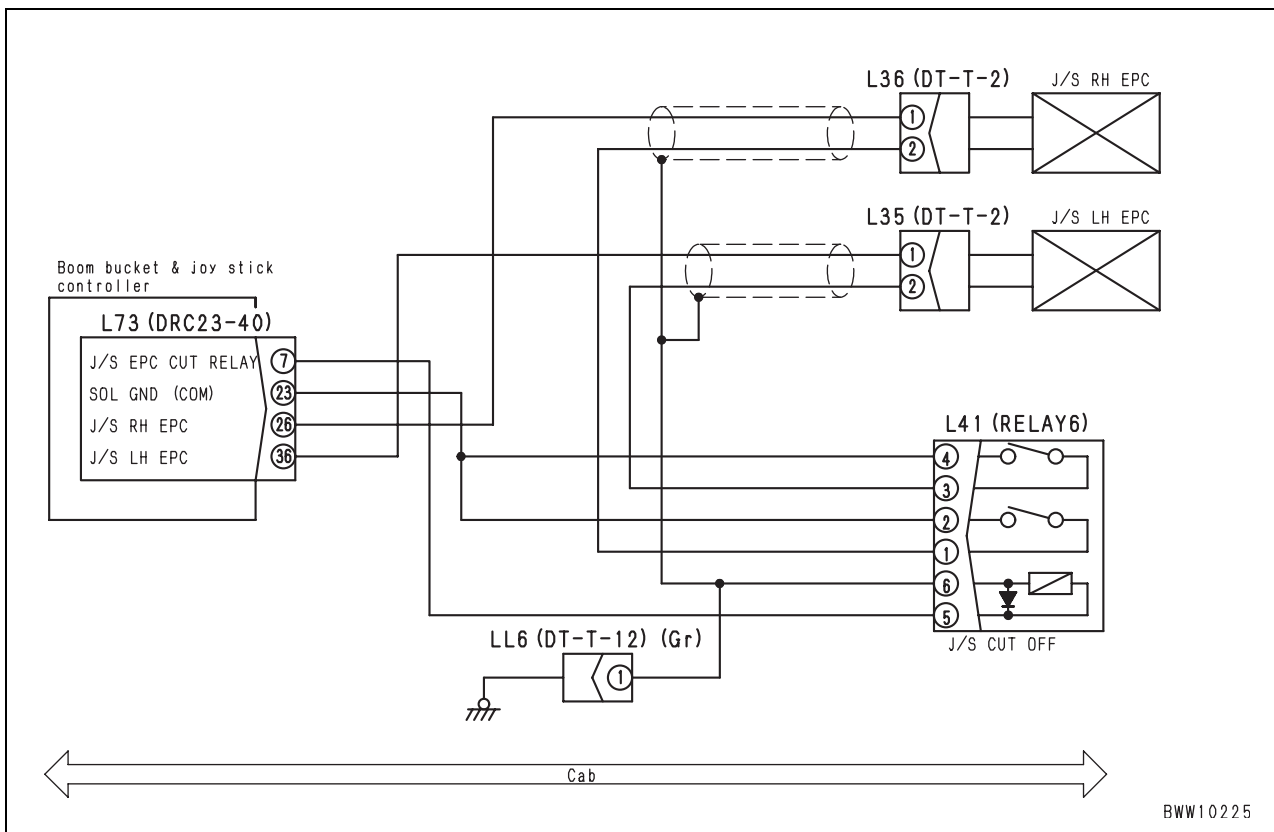


FAILURE CODE: [DXHLKA]

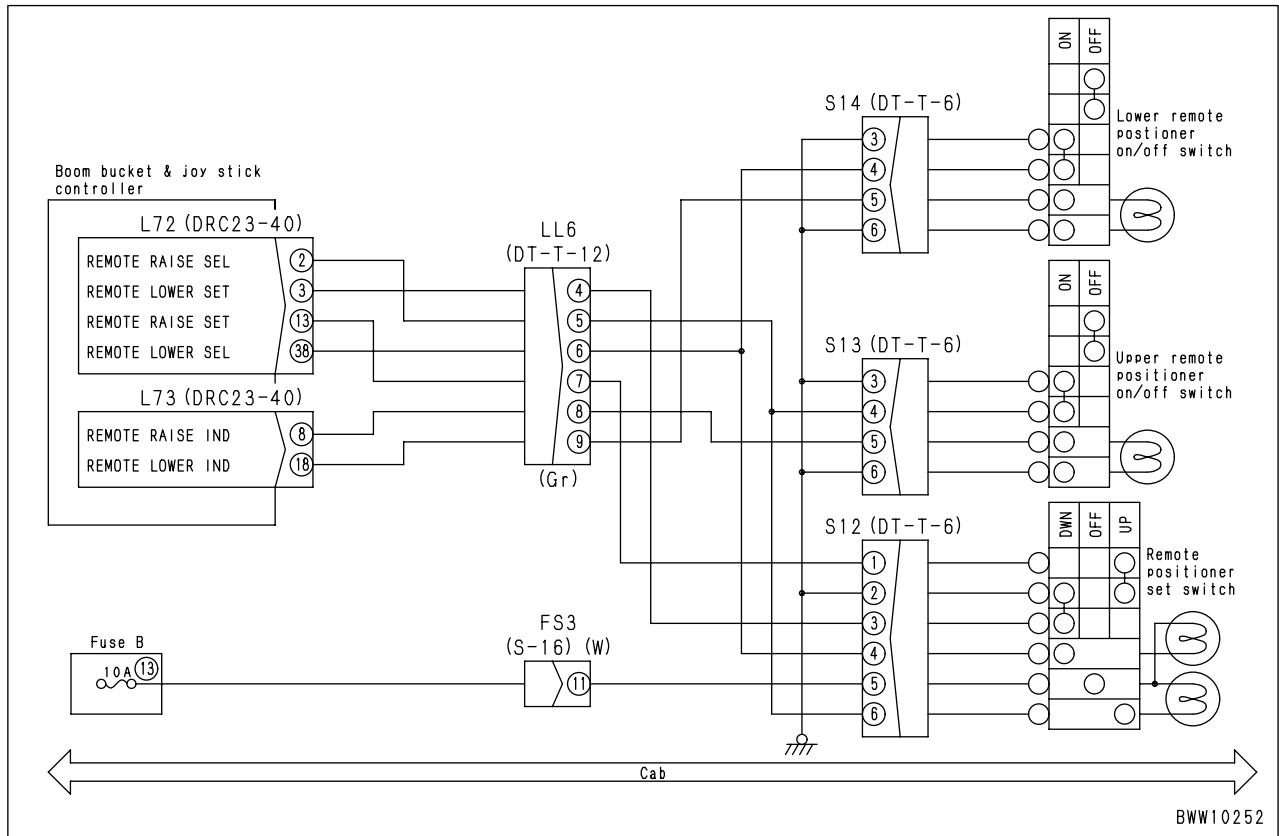
Action Code	Failure Code	Controller Code	Trouble	Joystick steering right-hand EPC solenoid system disconnection
E03	DXHLKA	WRK		
Description of Trouble	<ul style="list-style-type: none"> Joystick steering right-hand EPC solenoid system disconnection prevents output to the joystick steering right-hand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

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Defective joystick steering right-hand EPC solenoid	1) Turn starting switch OFF. 2) Disconnect connector L36. 3) Connect T-adaptor.	
Between L36 (Male) ① - ②				Resistance	10 - 15 Ω
Between L36 (Male) ① - body				Resistance	1 MΩ or more
2		Wiring harness discontinuity (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L73 and L36. 3) Connect T-adaptor.		
			Wiring harness between L73 (Female) ⑳ - L36 (Female) ①	Resistance	1 Ω or below
			Wiring harness between L36 (Female) ② - L41 (Female) ①	Resistance	1 Ω or below
			Wiring harness between L36 (Female) ② - body	Resistance	1 Ω or below
3		Defective work equipment controller	1) Turn starting switch OFF. 2) Disconnect connector L73. 3) Connect T-adaptor.		
			Between L73 (Female) ⑳ - L41 (Female) ①	Resistance	10 - 15 Ω

Related circuit diagram



Related circuit diagram

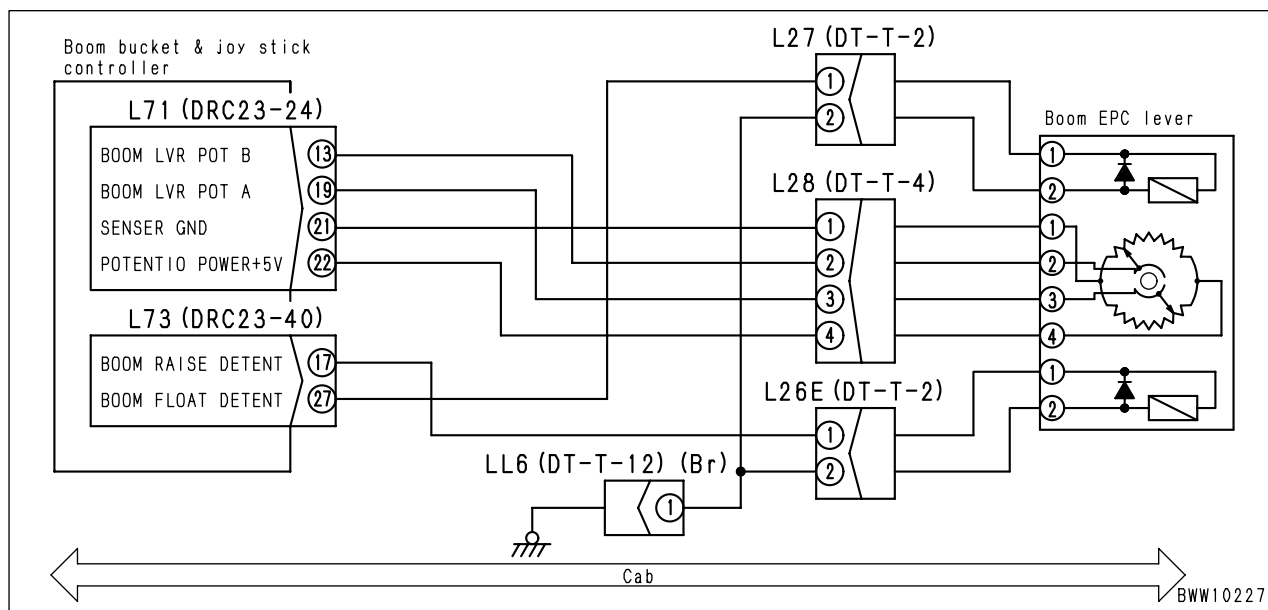


TROUBLESHOOTING CODE: [WRK-14]

Troubleshooting Code	Failure Code	Controller Code	Trouble	Hot short-circuited lift arm FLOATING magnet detent output system
WRK-14	—	(WRK)		
Description of Trouble	<ul style="list-style-type: none"> FLOATING detent cannot be cancelled due to short-circuited lift arm FLOATING magnet detent output system. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> RAISE detent left turned ON. Normal operation is possible excluding automatic cancel of detent. 			
Related Information	—			

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

Related circuit diagram

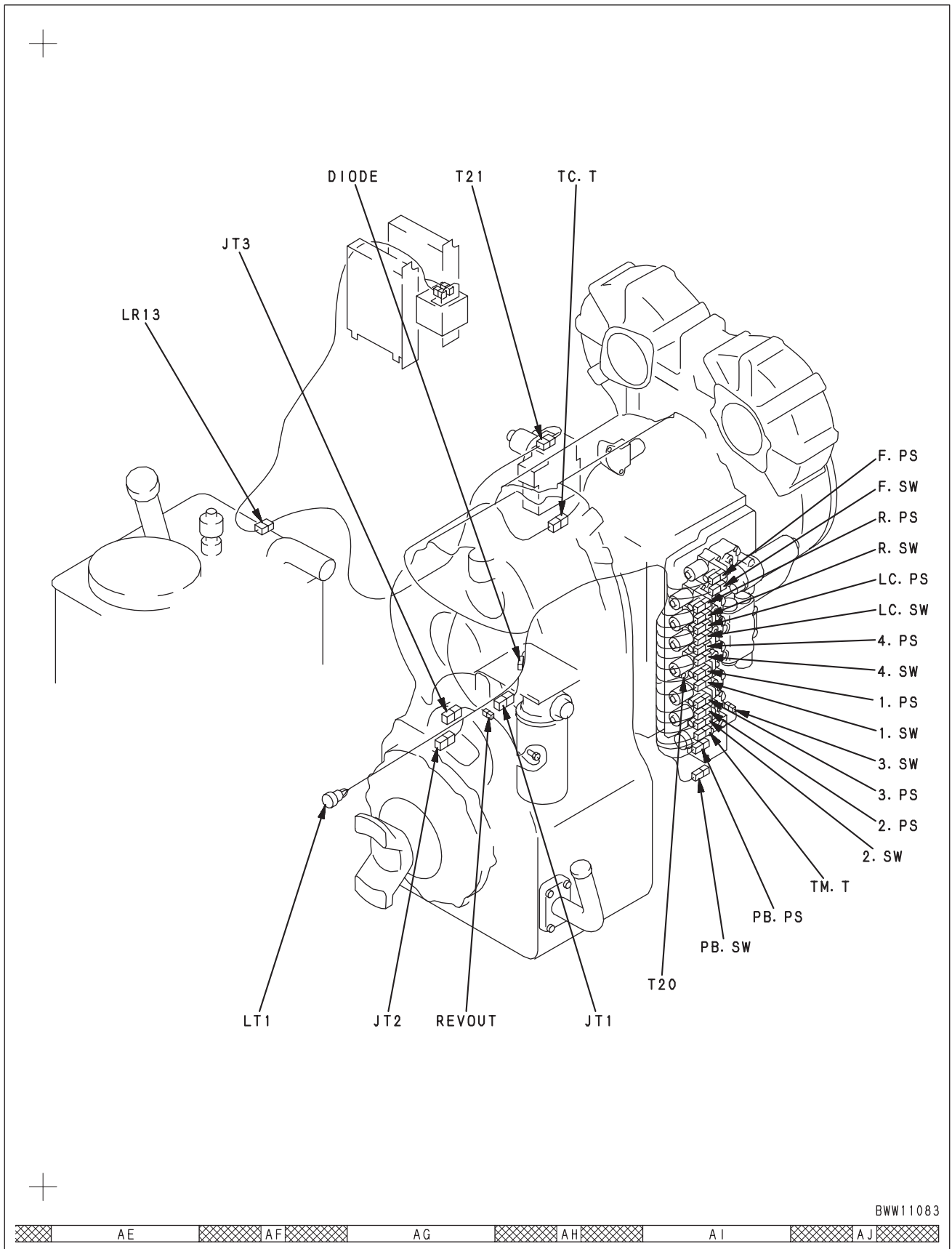


TROUBLESHOOTING CODE: [WRK-25]

Troubleshooting Code	Failure Code	Controller Code	Trouble	Defective bucket positioner, boom kick-out and FLOATING holding function
WRK-25	—	—		
Description of Trouble	<ul style="list-style-type: none"> Bucket positioner, boom kick-out and lift arm FLOATING holding functions do not function due to proximity switch and PPC detent circuit power supply system ground fault. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> Bucket positioner, boom kick-out and FLOATING holding do not function. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting		
		1	Wiring harness ground fault ★ Fuse A-5 blows in this case	1) Turn starting switch OFF. 2) Disconnect connector FS4, L104, L27S, (LL5), F9 and F10. 3) Connect T-adapter.	
Between FS4 (Female) ⑤ - body				Resistance	1 MΩ and above
2		Relay sub-wiring harness ground fault ★ Fuse A-5 blows in this case	1) Turn starting switch OFF. 2) Disconnect connector L104. 3) Disconnect relays L123, L124. 4) Connect T-adapter		
			Between L104 (Male) ① - ②, ⑦, ⑫ - body	Resistance	1 MΩ and above
			Between L104 (Male) ③ - ②, ⑦, ⑫ - body	Resistance	1 MΩ and above
			Between L104 (Male) ⑥ - ②, ⑦, ⑫ - body	Resistance	1 MΩ and above
3		Relay ground fault ★ Fuse A-5 blows in this case	1) Turn starting switch OFF. 2) Disconnect connectors L104. 3) Connect T-adapter. ★ In case 2 items are normal		
			Between L104 (Male) ① - ②	Resistance	1 MΩ and above
			Between L104 (Male) ⑥ - ⑦	Resistance	1 MΩ and above
4		Proximity switch ground fault ★ Fuse A-5 blows at switch operation in this case	1) Turn starting switch OFF. 2) Disconnect connectors F9 and F10. 1. Connect T-adapter.		
			Between F09 (Male) ① - ②, ③ - body	Resistance	1 MΩ and above
			Between F10 (Male) ① - ②, ③ - body	Resistance	1 MΩ and above

Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
CL10	DT-T (Gr)	8	Intermediate connector (Monitor panel controller)	O-1	B-3	K-3	C-3	
CL20	DT-T	2	Intermediate connector (Monitor panel controller)	N-2				C-5
CN55	DT-T	2	Intermediate connector (Backup buzzer)	K-8	P-2		V-8	
COMBI	M	3	Front combination lamp (Right)	A-6			W-3	
COMBI	M	3	Front combination lamp (Left)	E-1			W-2	
DIODE	DT-T	2	Diode (Parking brake solenoid)	AG-8	P-8			
DL	DT-T (Gr)	12	Connector (S-NET)	U-8	I-9	K-6	K-5	
E01	DT-T	2	Intermediate connector (Starting motor)	AB-1			W-4	B-1
E02	Terminal	1	Alternator R	AD-3			X-5	
E03	Terminal	1	Alternator B	AD-3			X-5	
E04	Terminal	1	Alternator E	AD-3			X-5	
E05	Terminal	1	Engine heater relay	AC-9			Q-9	E-4
E06	Terminal	1	Engine heater relay	AA-9			Q-9	F-4
E07	Terminal	1	Engine heater relay	Z-9			Q-9	F-4
E08	DT-T	2	Engine coolant temperature sensor (Monitor)	AC-1			O-8	
E09	DT-T	2	Engine coolant temperature sensor (Preheater)	AD-2			O-8	B-2
E10	DT-T	2	Air conditioner compressor magnet clutch	AD-2				
E11	DT-T	2	Diode (Air conditioner compressor)	AD-4				
E14	Terminal	1	Ground (Rear frame)	AB-5			X-5	A-1
E26	DT-T	2	Engine oil level sensor	AA-5			P-8	
E27	DT-T	2	Engine speed sensor	AC-6	L-8			
E28	DT	2	Diode (Engine heater relay)	AC-9			O-8	B-2
E29	Terminal	1	Engine oil pressure switch	AB-5			P-8	
E30	Terminal	1	Starting motor B	AB-1			X-4	
E31	DT-T	2	Diode	AC-7				B-3
E32	DT-T	2	Diode (Fuel cut solenoid)	AB-6				B-3
E33	DT-T	2	Dust indicator	AB-9			P-8	
E34	DT-T	3	Fuel cut solenoid	AC-7				B-2
E36	Terminal	1	Air compressor magnetic clutch	Y-5				
ER-1	DT-T (G)	8	Intermediate connector (Engine)	Z-2			P-5	D-3
ER-3	DT-T (Gr)	8	Intermediate connector (Engine)	AA-1	K-7		O-5	D-3
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-2	
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	R-8			
F09	DT-T	3	Bucket positioner proximity switch	A-3		Q-7		B-3
F10	DT-T	3	Bucket positioner proximity switch (Standard)	A-3		Q-6		B-3
F13	DT-T	2	Lift arm damper solenoid	C-1	R-8			
F14	DT-T	2	Diode (Damper solenoid)	D-1	R-7			
F15	DT-T	3	Lift arm angle signal (For load meter)	A-2		B-3	M-8	
F16	DT-T	3	Lift arm bottom signal (For load meter)	B-1		B-3	M-8	
F17	DT-T	3	Lift arm rod signal (For load meter)	B-1		B-3	M-8	

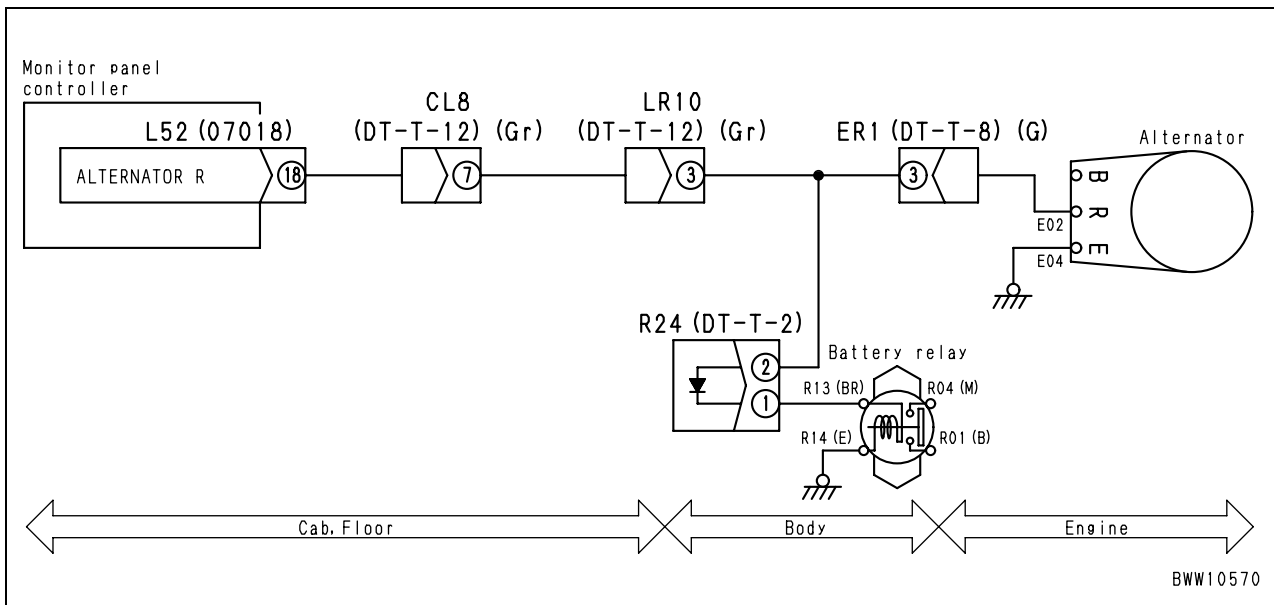


FAILURE CODE [AB00L6]

Action Code	Failure Code	Controller Code	Trouble	Defective battery charging circuit (Alternator terminal R signal detected when engine stopped)
E03	AB00L6	MON		
Description of Trouble	<ul style="list-style-type: none"> The alternator terminal R input voltage is 12 V or higher before the engine started. 			
Controller Reaction	<ul style="list-style-type: none"> Triggers an alarm. 			
Effect on Machine	<ul style="list-style-type: none"> The engine cannot be started. The service meter increases simply by key-on. 			
Related Information	<ul style="list-style-type: none"> Can be checked with the monitoring function (Code: 04302). 			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective alternator	Between alternator terminal R (E02) - body	Engine started (Throttle 1/2 or more)	Voltage
				Engine stopped	Voltage	1 V or below
2		Wiring harness hot-shortcd incorrectly	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter.			
			Wiring harness between connector L52 (Female) ⑱ ER1 (Female) ③ - alternator terminal R (E02)	Voltage	1 V or below	
3		Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Insert t-adapter.			
			Between L52 ⑱ - body	Engine started (Throttle 1/2 or more)	Voltage	27.5 - 29.5 V
				Engine stopped	Voltage	1 V or below
			4	Defective diode R24	1) Turn starting switch OFF. 2) Disconnect connectors L52, ER1 and alternator terminal R. 3) Connect t-adapter. 4) Turn starting switch ON.	
Wiring harness between connector L52 (Female) ⑱, ER1 (Female) ③ - alternator terminal R (E02)	Voltage	1 V or below				

Related circuit diagram

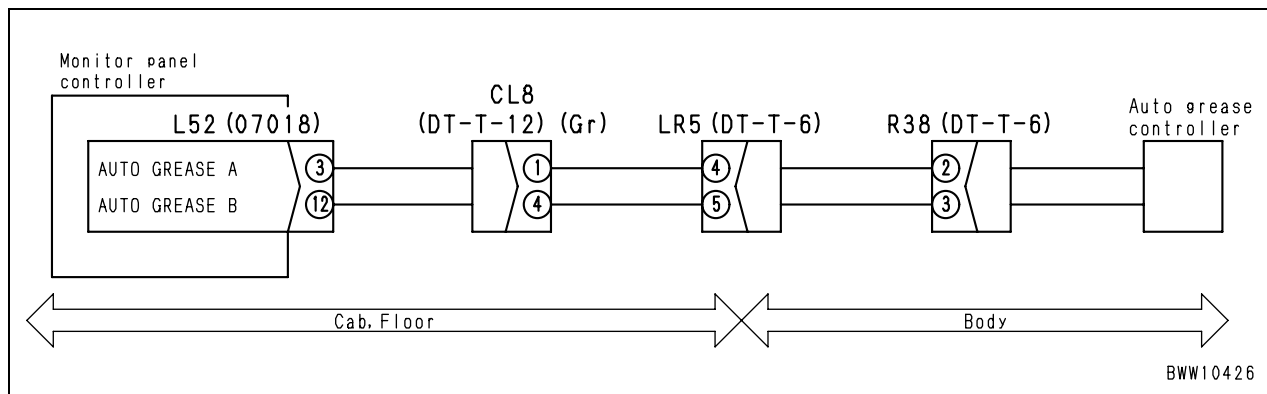


FAILURE CODE [DA80L4]

Action Code	Failure Code	Controller Code	Trouble	Auto grease input is abnormal.
E01	DA80L4	MON		
Description of Trouble	<ul style="list-style-type: none"> The auto grease sensor input circuits A and B "open" or "close" at the same time. 			
Controller Reaction	<ul style="list-style-type: none"> Alarm sounds. 			
Effect on Machine	<ul style="list-style-type: none"> Auto greasing state, abnormal state and tank empty state cannot be checked. 			
Related Information	<ul style="list-style-type: none"> The monitoring function (Code 40900, D-IN-45) can check the auto grease input signals (2 systems, O/1). 			

Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting				
	Possible Causes and Standard Values	1 Disconnection of harness (disconnection, defective contact)	1) Starting switch OFF. 2) Disconnect the connectors L52 and R38 3) Connect a T-adaptor.			
Harnesses between L52 (female) ③ and R38 (female) ②.			Voltage	1 V or less		
Harnesses between L52 (female) ⑫ and R38 (female) ③.			Voltage	1 V or less		
2 Hot short-circuit of harness		1) Starting switch OFF. 2) Disconnect the connectors L52 and R38 3) Connect a T-adaptor.				
		Among L52 (female) ③, R38 (female) ② - body.	Voltage	1 V or less		
		Among L52 (female) ⑫, R38 (female) ③ - body.	Voltage	1 V or less		
3 Defective auto grease controller		1) Starting switch OFF. 2) Disconnect the connectors L52 and R38. 3) Insert a T-adaptor. 4) Disconnect the connector. 5) Starting switch ON.				
		Between R38 ② - body.	When the auto grease operates.	Voltage	1 V or less	
			When the auto grease does not operate (the tank is empty).	Voltage	20 - 30 V	
		Between R38 ③ - body	When the auto grease operates.	Voltage	20 - 30 V	
			When the auto grease does not operate (the tank is empty).	Voltage	1 V or less	
		★ When the above is normal, refer to the Auto Grease System Troubleshooting for the check.				
4 Defective monitor panel		1) Starting switch OFF. 2) Disconnect the connectors L52 and R38. 3) Insert a T-adaptor. 4) Starting switch ON.				
		Between L52 ③ - body.	When the auto grease operates.	Voltage	1 V or less	
			When the auto grease does not operate (the tank is empty).	Voltage	20 - 30 V	
		Between L52 ⑫ - body	When the auto grease operates.	Voltage	20 - 30 V	
	When the auto grease does not operate (the tank is empty).		Voltage	1 V or less		
	★ When the above is normal, refer to the Auto Grease System Troubleshooting for the check.					

Related circuit diagram



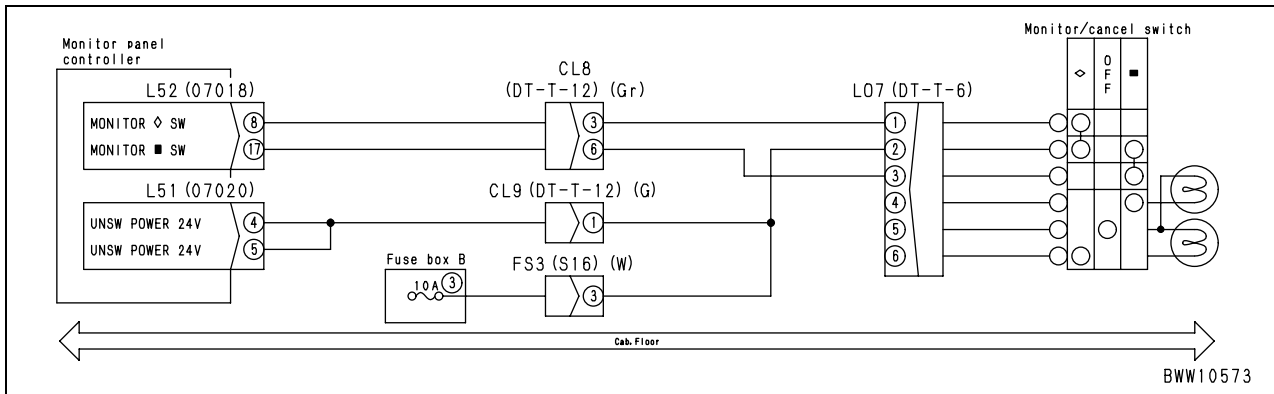
BWW10426

FAILURE CODE [DD15LD]

Action Code	Failure Code	Controller Code	Trouble	Monitor panel mode selector switch 1 [■] (Panel SW1) input error
E01	DD15LD	MON		
Description of Trouble	<ul style="list-style-type: none"> The monitor panel mode selector switch 1 [■] (Panel SW1) input circuit remains closed for more than one minute. 			
Controller Reaction	<ul style="list-style-type: none"> Activates an alarm. 			
Effect on Machine	<ul style="list-style-type: none"> The monitor does not work (Service mode cannot be activated). 			
Related Information	<ul style="list-style-type: none"> The input signal (0 or 1) of the monitor panel mode selector switch 1 : (Panel SW1) can be verified with the monitoring function (Code: 40901, D-IN-15). Since switch is faulty, the monitoring function may not be activated. 			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
	Possible Causes and Standard Values	1	Faulty monitor panel mode selector switch 1 [■]	1) Turn starting switch OFF. 2) Disconnect connector L07. 3) Connect T-adaptor.		
Between L07 (Female) ② - ③				When monitor panel mode selector switch 1 [■] is turned ON	Resistance	1 Ω and below
				Other than above	Resistance	1 MΩ and above
2		Wiring harness hot-short	1) Turn starting switch OFF. 2) Disconnect connectors L52 and L07. 3) Connect T-adaptor. 4) Turn starting switch ON.			
			Between L52 (Female) ⑰/L07 (Female) ③ - body		Voltage	1 V or less
3		Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L52. 3) Connect t-adaptor. 4) Turn starting switch ON.			
	Between L52 (Female) ⑰ - body		When monitor panel mode selector switch 1 [■] is turned ON	Voltage	20 - 30 V	
			Other than above	Voltage	1 V and below	

Related circuit diagram

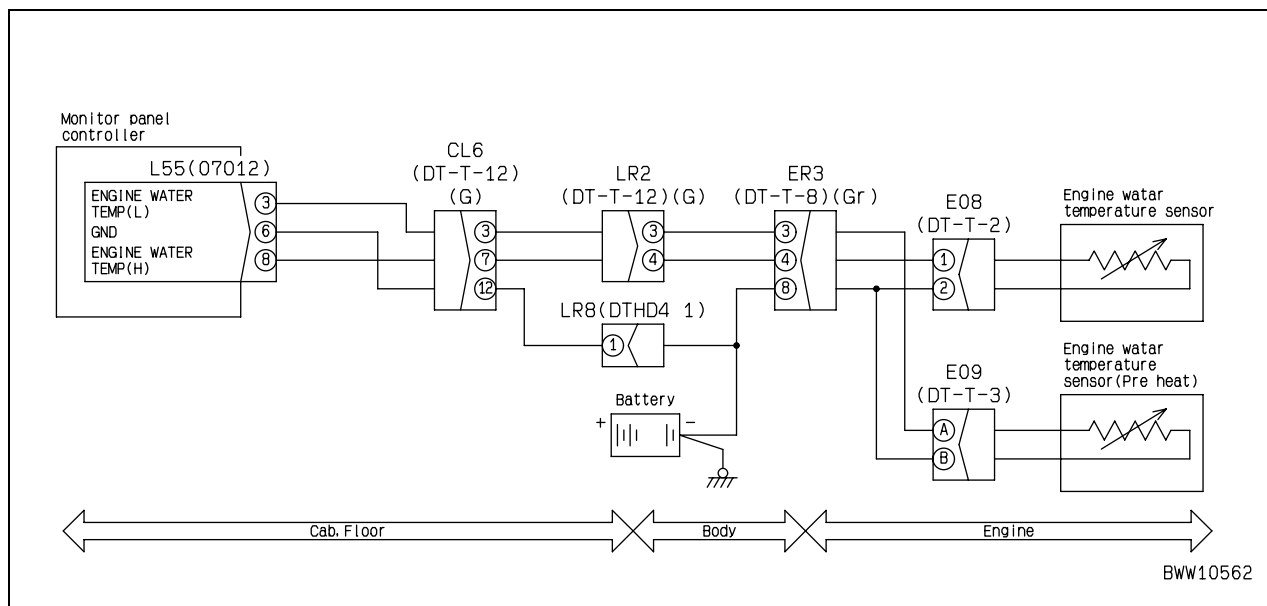


FAILURE CODE [DGE3L6]

Action Code	Failure Code	Controller Code	Trouble	Abnormal connection of engine coolant temperature (low temperature) sensor system.
E01	DGE3L6	MON		
Description of Trouble	<ul style="list-style-type: none"> Engine coolant temperature (low temperature) sensor signals are not input. 			
Controller Reaction	<ul style="list-style-type: none"> It operates for normal control. 			
Effect on Machine	<ul style="list-style-type: none"> The machine does not start smoothly at low temperature. 			
Related Information	<ul style="list-style-type: none"> The monitoring function (Code : 04104) is useful for check. 			

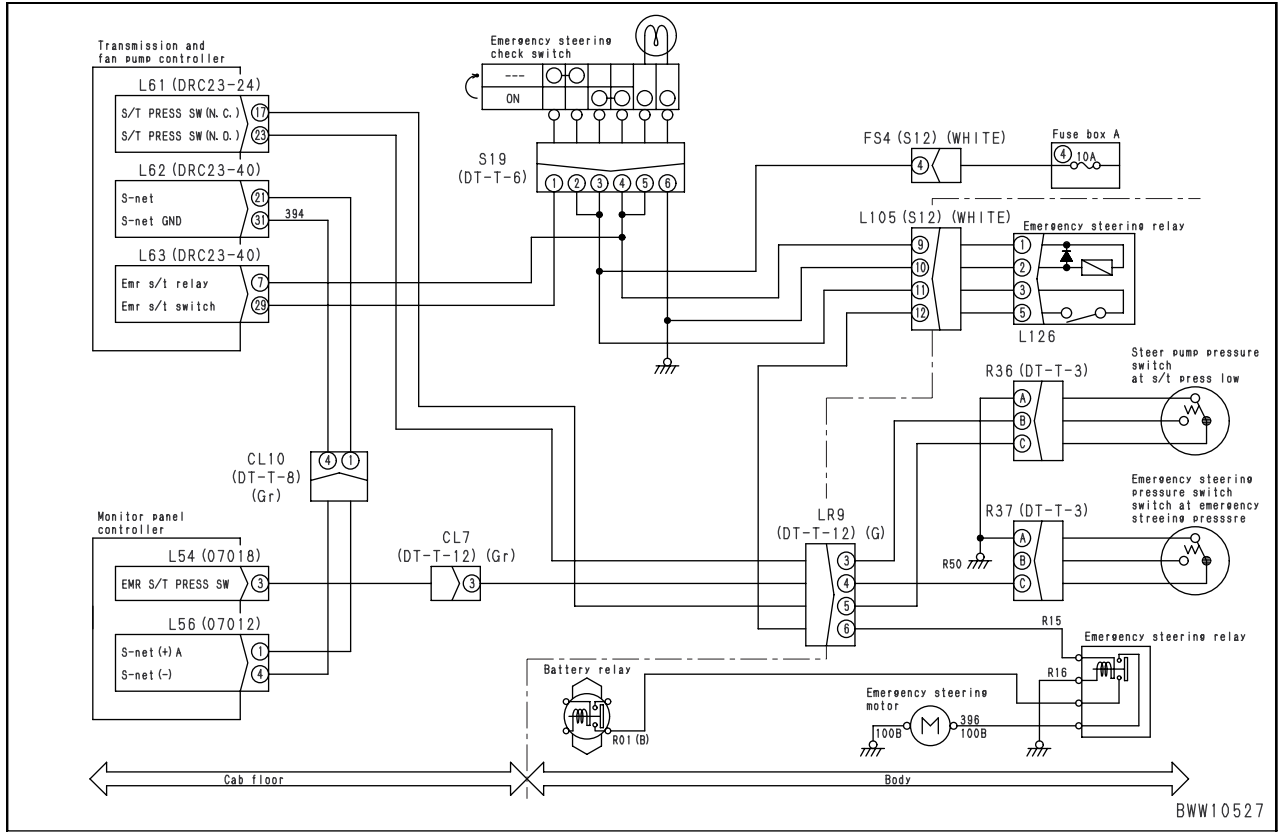
Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting			
		1 Defective engine coolant temperature (low temperature) sensor	1) Starting switch OFF. 2) Disconnect the connector E09. 3) Connect a T-adaptor.		
Between E09 (male) ① - ②			10 °C	Resistance	9 kΩ approx.
			100 °C	Resistance	0.3 kΩ approx.
2 Disconnection of harness (disconnection, defective contact)		1) Starting switch OFF 2) Disconnect the connectors L55 and E09. 3) Connect a T-adaptor.			
		Harness between L55 (female) ③ - E09 (female) ①.	Resistance	1 Ω and below	
		Harness between L55 (female) ③ - E09 (female) ②.	Resistance	1 Ω and below	
3 Ground fault of harness		1) Starting switch OFF. 2) Disconnect L82 and TWL. 3) Insert a T-adaptor.			
		Among L55 (female) ③, E09 (female) ① and machine body.	Resistance	1 MΩ and above	
4 Defective monitor panel	1) Starting switch OFF. 2) Disconnect the connector L55. 3) Connect a T-adaptor.				
	Between L55 (female) ③ - ⑥	10 °C	Resistance	9 kΩ approx.	
		100 °C	Resistance	0.3 kΩ approx.	

Related circuit diagram



Possible Causes and Standard Values	Causes	Standard Value in Normal State and Remarks on Troubleshooting		
	11	Faulty emergency steering actuating relay	1) Turn starting switch OFF. 2) Disconnect connectors R15 and R16 and two power supply wires (100B).	Resistance

Related circuit diagram

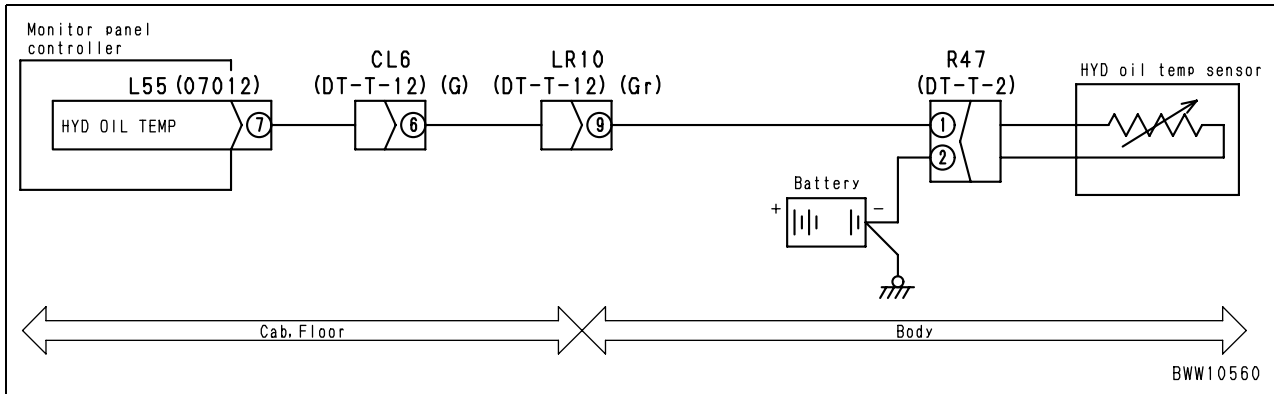


TROUBLESHOOTING CODE [MON-9]

Troubleshooting Code	Failure Code	Controller Code	Trouble	The hydraulic oil temperature caution lamp does not light ON After the engine starts, the hydraulic oil temperature gauge does not rise
MON-9	—	(MON)		
Description of Trouble	<ul style="list-style-type: none"> The hydraulic oil temperature sensor circuit is always in the OPEN state. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The hydraulic oil temperature caution lamp does not light ON. After the engine starts, the hydraulic oil temperature gauge does not rise. 			
Related Information	<ul style="list-style-type: none"> Can be checked with the monitoring function (Code: 04401). 			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective hydraulic oil temperature sensor	1) Turn starting switch OFF. 2) Disconnect connector R47. 3) Connect T-adapter.		
Between R47 (Male) ① - ②				Normal temperature (25 °C)	Resistance	35 - 50 kΩ
100 °C				Resistance	3.1 - 4.5 kΩ	
2		Harness disconnection (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Disconnect connectors L55 and R47. 3) Connect T-adapter.			
			Between L55 (Female) ⑦ - R47 (Female) ①	Resistance	1 Ω and below	
3		Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L55. 3) Connect T-adapter.			
	Between L55 (Female) ⑦ - body		Normal temperature (25 °C)	Resistance	35 - 50 kΩ	
	100 °C		Resistance	3.1 - 4.5 kΩ		

Related circuit diagram

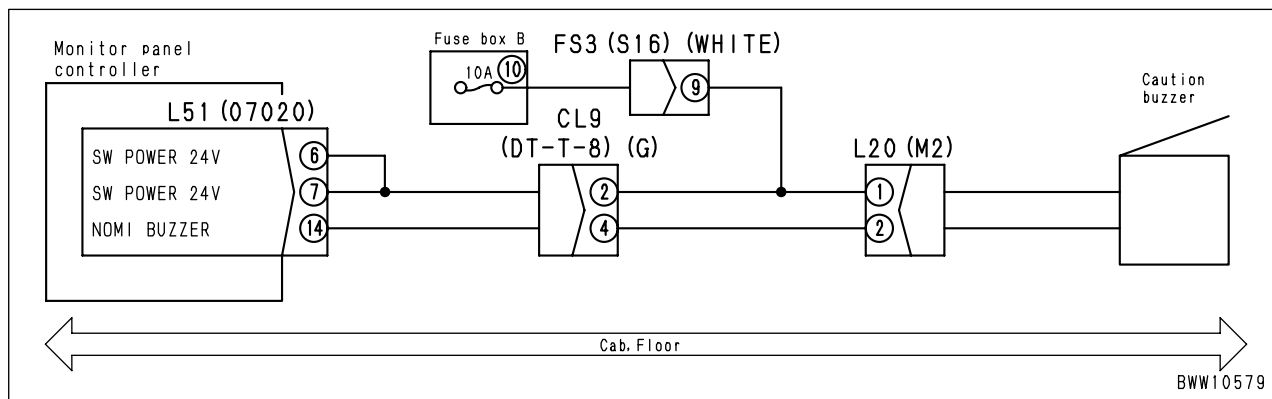


TROUBLESHOOTING CODE [MON-20]

Troubleshooting Code	Failure Code	Controller Code	Trouble	The alarm buzzer does not sound or stop. (Disconnection in alarm buzzer output system, or ground fault)
MON-20	—	(MON)		
Description of Trouble	<ul style="list-style-type: none"> A disconnection or ground fault occurs in the alarm buzzer output circuit. 			
Controller Reaction	<ul style="list-style-type: none"> No reaction. 			
Effect on Machine	<ul style="list-style-type: none"> The alarm buzzer does not sound or stop. 			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective alarm buzzer	1) Turn starting switch OFF. 2) Disconnect connector L20. 3) Connect T-adaptor. 4) Connect connector L20. 5) 5 sec. lapsed after the starting switch was turned ON.		
L20 ② to body earth				The alarm buzzer sounds	Alarm buzzer normal	
				The alarm buzzer does not sound.	Alarm buzzer abnormal	
2				Harness disconnection (Disconnection or contact fault)	1) Turn starting switch OFF. 2) Disconnect connectors FS3 and L20. 3) Connect T-adaptor.	
		Harness between L51 (Female) ⑭ - L20 (Female) ②			Resistance	1 Ω and below
		Harness between FS3 (Female) ⑨ - L20 (Female) ①			Resistance	1 Ω and below
3		Harness ground fault	1) Turn starting switch OFF. 2) Disconnect connectors L51, FS3, and L20. 3) Connect T-adaptor.			
			Between L51 (Female) ⑭, L20 (Female) ② - body		Resistance	1 MΩ and above
			Between FS3 (Female) ⑨ and L51 (Female) ⑥, ⑦, L20 (Female) ① and body ★ In this case, fuse B-⑨ blows, and the monitor does not start.		Resistance	1 MΩ and above
4		Defective monitor panel	1) Turn starting switch OFF. 2) Disconnect connector L51. 3) Connect T-adaptor.			
			Between L51 ⑭ - body	Turn starting switch ON.	Voltage	20 - 30 V
	For 2 sec. after the starting switch was turned ON. (The alarm buzzer sounds.)			Voltage	1 V and below	
	For 1 sec. after 2 sec. lapsed after the starting switch was turned ON. (The alarm buzzer does not sound.)			Voltage	17 - 30 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		15SAL1	○						○				
	② When the failure code is 15SAL1 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		15SBL1		○						○			
	② When the failure code is 15SBL1 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		15SEL1			○						○		
	② When the failure code is 15SEL1 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		15SFL1				○						○	
	② When the failure code is 15SFL1 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		15SGL1					○						○
	② When the failure code is 15SGL1 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		15SHL1						○					○
	② When the failure code is 15SHL1 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-21 When the control lever is switched from "HOLD" to "RAISE," the Lift arm falls temporarily

Check of Phenomenon

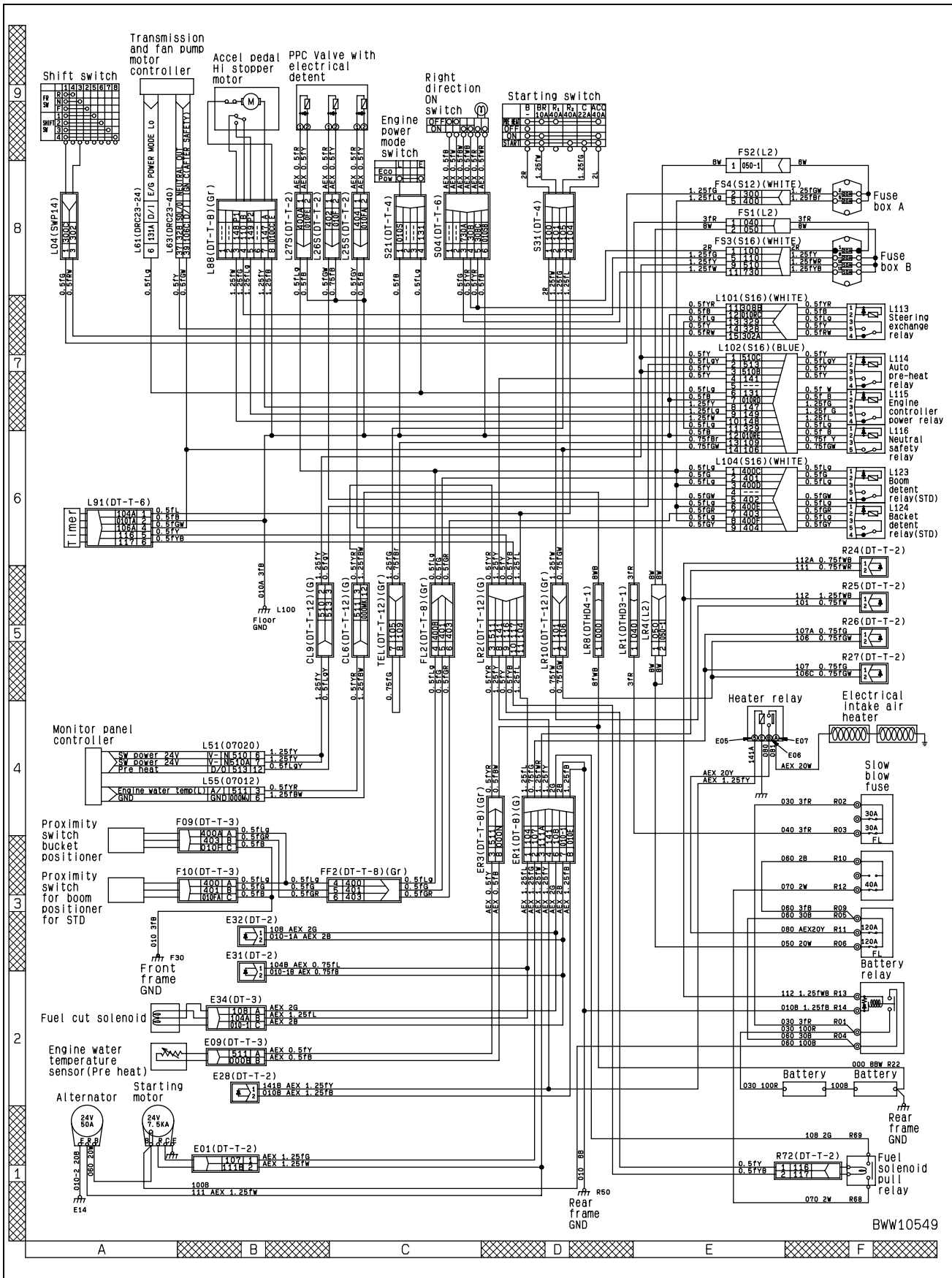
- When the control lever is switched from "HOLD" to "RAISE" gradually at low idling of the engine, the Lift arm falls temporarily due to its own weight. When the control lever is completely set to "RAISE," the Lift arm returns to normal.

Cause

- Improper adhesion of Lift arm spool check valve of the work equipment valve

Connector No.	Connector Type	Number of Pins	Installation Name	Address				
				Layout Drawing	System Drawing			
					TM	WRK	MON	E
F18	DT-T	3	Lift arm angle sensor (For boom EPC)	A-5		H-8		
F19	DT-T	3	Bucket positioner proximity switch (For bucket EPC)	A-3		H-8		
F20	DT-T	2	Lift arm RAISE EPC	A-2	Q-4	G-8		
F21	DT-T	2	Lift arm LOWER EPC	A-1		G-8		
F22	DT-T	2	Bucket CURL EPC	A-1		G-8		
F23	DT-T	2	Bucket DUMP EPC	A-1		G-8		
F24	DT-T	2	ATT. EXT. EPC (If equipped)	A-3		I-8		
F25	DT-T	2	ATT. RET. EPC (If equipped)	A-2		I-8		
F26	DT-T	2	Lift arm EPC cut-off solenoid	B-1		H-8		
F27	DT-T	2	Diode (For boom EPC cut-off solenoid)	A-4		H-7		
F30	Terminal	1	Ground (Front frame)	C-1	Q-4	P-5	U-1	A-3
FF1	S	10	Intermediate connector (Front lamp)	E-1			N-3	
FF2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	D-1	K-4	N-6		C-3
FL1	S	12	Intermediate connector (Front lamp)	W-1	J-3		K-3	
FL2	DT-T (Gr)	8	Intermediate connector (Work equipment sensor)	W-1	I-4	K-6		C-5
FL3	DT-T	6	Intermediate connector (Load meter)	X-2		E-3	K-6	
FL7	DT-T (Br)	12	Intermediate connector (Work equipment solenoid)	N-2		E-7		
FL8	DT-T (G)	8	Intermediate connector (Work equipment solenoid)	N-2		E-6		
FL9	DT-T	6	Intermediate connector (3rd lever solenoid)	N-2		E-5		
FS1	L	2	Intermediate connector (Fuse box)	W-7	C-1			E-8
FS2	L	2	Intermediate connector (Fuse box)	V-7	C-1			E-8
FS3	S (W)	16	Intermediate connector (Fuse box)	V-8	C-1	K-7	G-8	E-8
FS4	S (W)	12	Intermediate connector (Fuse box)	V-8	B-1	K-7	G-8	E-8
FS5	M	6	Intermediate connector (Fuse box)	V-7			G-8	
FS6	Plug	1	Intermediate connector (Fuse box)	V-8				
FS7	Plug	1	Intermediate connector (Fuse box)	W-7				
F.PS	DT-T	2	Transmission F clutch solenoid	AJ-6	N-8			
F.SW	DT	2	Transmission F clutch fill switch	AJ-6	P-8			
G01	Terminal	1	Backup buzzer	J-9	Q-2		V-9	
G02	Terminal	1	Backup buzzer	J-9	Q-2		V-9	
G04	M	2	Rear working lamp (Left)	K-8			V-8	
G05	M	2	Rear working lamp (Right)	J-9			U-8	
GR1	DT-T	4	Intermediate connector (Fan reverse solenoid, rear working lamp)	L-7	O-4		U-6	
GR2	DT-T	2	Fan reverse solenoid	L-7	Q-4			
HEAD	M	3	Head lamp (Right)	A-6			W-3	
HEAD	M	3	Head lamp (Left)				W-2	
JT1	DT-T (B)	8	Centralized connector (Ground)	AH-2	R-7		Q-7	
JT2	DT-T (B)	8	Centralized connector (Shield)	AG-2	R-6			
JT3	DT-T	6	Centralized connector	AF-8	R-5			
L01	SWP	6	Parking brake switch	M-5	B-7			
L02	SWP	6	Dimmer switch, light switch	M-5			B-1	
L03	SWP	6	Turn signal and hazard switch	M-6			B-1	
L04	SWP	14	Shift switch	M-3	B-6			A-8
L05	DT-T	2	Horn switch	M-5			E-8	
L07	DT-T	6	Machine monitor switch (Mode/Cancel selector switch)	Q-1			B-8	

ELECTRICAL SYSTEM DIAGRAM



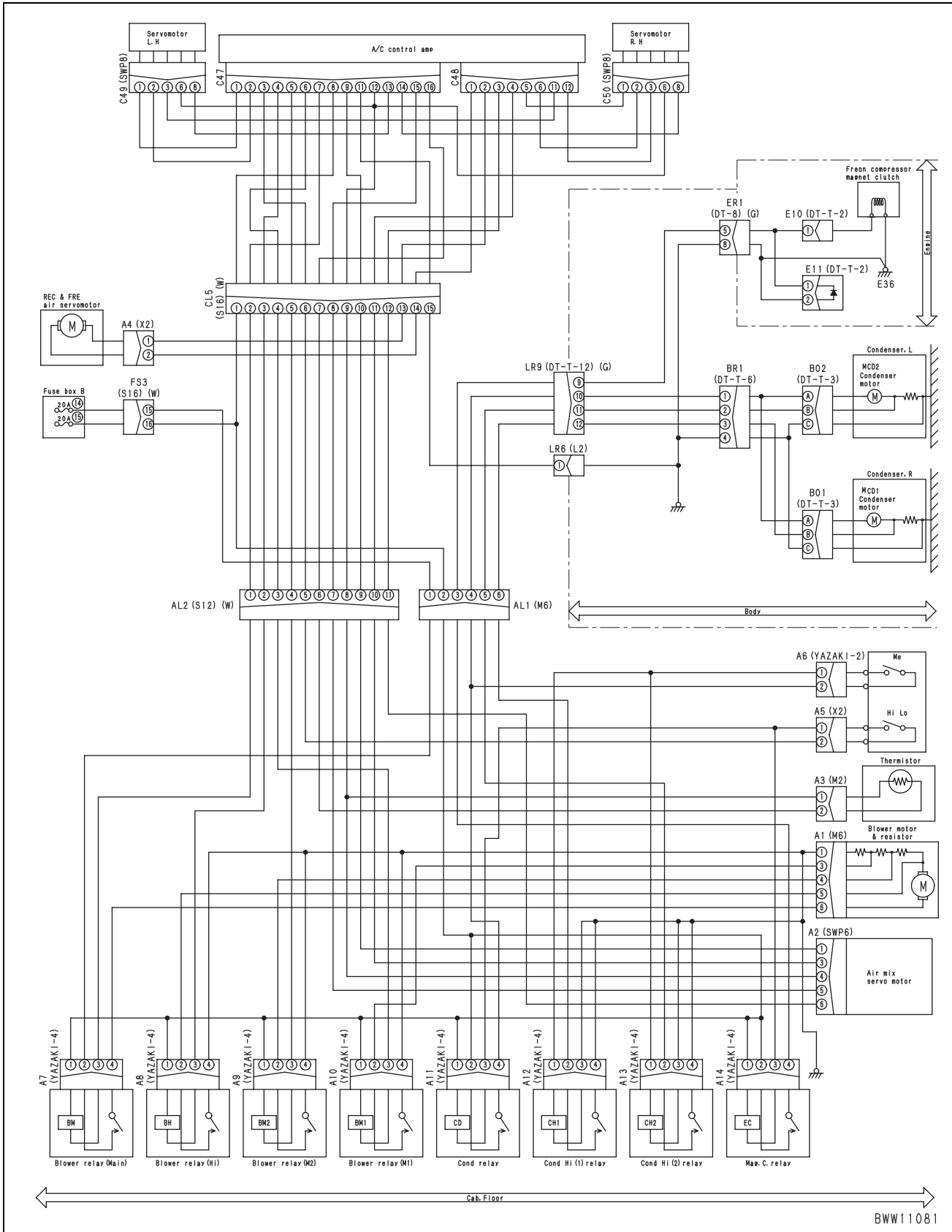
TROUBLESHOOTING CODE: [E-4]

Troubleshooting Code	Failure Code	Controller Code	Trouble	The engine power modes cannot be selected.
E-4	—	—		
Description of Trouble	The engine power mode system is out of order, and the power modes cannot be selected.			
Controller Reaction	—			
Effect on Machine	The engine power modes cannot be selected.			
Related Information	—			

Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting			
		1	Defective power mode selector switch	1) Starting switch OFF. 2) Disconnect the connector S21. 3) Connect a T-adaptor. ★ Solid part check		
Between S01 (male) ① and ④				In the economy mode	Resistance	1 MΩ and above
				In the power mode	Resistance	1 Ω and below
2		Defective power mode selector relay	1) Starting switch OFF. 2) Replace L115 with any other relay. 3) Starting switch "ON."			
			It returned to normal.		The power mode selector relay is out of order.	
			It does not return to normal.		The power mode selector relay is normal.	
3		Disconnection of harness	1) Starting switch OFF. 2) Disconnect the connectors S21, L102, L88, L61 and FS33. 3) Connect a T-adaptor.			
			Harness between S21 (female) ④, L61 (female) ⑥ and L102 (female) ⑦	Resistance	1 Ω and below	
			Harness between S21 (female) ① and machine body	Resistance	1 Ω and below	
			Harness between L102 (female) ⑨ and L88 (female) ⑤	Resistance	1 Ω and below	
			★ In the above three cases, the power mode cannot be selected.			
			Harness between FS3 (female) ⑤ and L88 (female) ④, L102 (female) ⑥	Resistance	1 Ω and below	
			Harness between L88 (female) ③ and L102 (female) ⑩	Resistance	1 Ω and below	
			★ In the above two cases, the economy mode cannot be selected.			
			Harness between L88 (female) ⑧ and machine body	Resistance	1 Ω and below	
			Harness between L88 (female) ⑦ and L102 (female) ⑧	Resistance	1 Ω and below	
★ In the above two cases, the economy mode cannot be changed to the power mode, and the power mode cannot be changed to the economy mode.						
4		Ground fault of harness	1) Starting switch OFF. 2) Disconnect the connectors S21, L102 and L61. 3) Connect a T-adaptor.			
			Among S21 (female) ④, L61 (female) ⑥, L102 (female) ⑦ and machine body	Resistance	1 MΩ and above	
			Among L88 (female) ③, L102 (female) ⑩ and machine body	Resistance	1 MΩ and above	
	★ In the above two cases, the economy mode cannot be selected.					
	Among FS3 (female) ⑤, L88 (female) ④, L102 (female) ⑥ and machine body		Resistance	1 MΩ and above		
	★ In the above case, the fuse B-⑥ will be blown.					
	Among L88 (female) ⑦, L102 (female) ⑧ and machine body		Resistance	1 MΩ and above		
★ In the above two cases, the economy mode cannot be changed to the power mode, and the power mode cannot be changed to the economy mode.						

Troubleshooting Code	Failure Code	Controller Code	Trouble	The headlamp (Lo beam) does not light on			
E-9	—	—					
Possible Causes and Standard Values	Causes		Standard Value in Normal State and Remarks on Troubleshooting				
	3	Harness disconnection or ground fault ★ Fuses A-1, A-12, and A-13 blow at occurrence of a ground fault.	1) Turn starting switch OFF. 2) Disconnect connectors L02, FS4, FS5, left HEAD and right HEAD. 3) Connect T-adapter.				
			Harness between L02 (Female) ① - FS4 (Female) ⑪	Resistance	1 Ω and below		
			Between L02 (Female) ① - FS4 (Female) ⑪ harness - body	Resistance	1 MΩ and above		
			Harness between L02 (Female) ② - FS5 (Female) ④	Resistance	1 Ω and below		
			Between L02 (Female) ② - FS5 (Female) ④ harness - body	Resistance	1 MΩ and above		
			Harness between FS5 (Female) ⑤ - right HEAD (Female) ②	Resistance	1 Ω and below		
			Between FS5 (Female) ⑤ - right HEAD (Female) ② harness - body	Resistance	1 MΩ and above		
			Harness between FS5 (Female) ⑥ - left HEAD (Female) ②	Resistance	1 Ω and below		
			Between FS5 (Female) ⑥ - left HEAD ② harness - body	Resistance	1 MΩ and above		
			Harness between L02 (Female) ④ - right HEAD (Female) ①	Resistance	1 Ω and below		
			Between L02 (Female) ④ - right HEAD (Female) ① harness - body	Resistance	1 MΩ and above		
			Harness between L02 (Female) ④ - left HEAD (Female) ①	Resistance	1 Ω and below		
			Between L02 (Female) ④ - left HEAD (Female) ① harness - body	Resistance	1 MΩ and above		
			Harness between FS5 (Male) ④ - ⑤ (Including fuse A-13)	Resistance	1 Ω and below		
			Between FS5 (Male) ④ - ⑤ harness - body	Resistance	1 MΩ and above		
			Harness between FS5 (Male) ④ - ⑥ (Including fuse A-12)	Resistance	1 Ω and below		
			Between FS5 (Male) ④ - ⑥ harness - body	Resistance	1 MΩ and above		
Between L02 (Female) ⑥ - body	Resistance	1 Ω and below					

Related circuit diagram



S-4 Engine stops during operations

General causes why engine stops during operations

- Seized parts inside engine
- Insufficient supply of fuel
- Overheating
 - ★ If the engine is overheating and the engine stops, carry out troubleshooting for overheating.
(See S-14 Coolant temperature becomes too high)
- Failure in power train
 - ★ If the engine stops because of a failure in the power train, carry out troubleshooting for the chassis.

Causes	
Broken, seized piston, connecting rod	
Broken, seized crankshaft bearing	
Broken dynamic valve system (valve, rocker lever, etc.)	
Broken, seized gear train	
Broken pump auxiliary equipment	
Insufficient fuel in tank	
Clogged fuel filter, strainer	
Clogged feed pump, strainer	
Broken, seized feed pump strainer	
Clogged, leaking fuel pump piston	
Clogged air breather hole in fuel tank	
Defective injection pump (rack, plunger stuck)	
Failure in power train	

Questions		Troubleshooting of chassis												
Confirm recent repair history														
Degree of use of machine	Operated for long period								△	△				
Condition when engine stopped	Abnormal noise was heard and engine stopped suddenly	◎	◎	◎	◎	◎	◎				○		○	◎
	Engine overheated and stopped	◎	○			○								
	Engine stopped slowly						◎	○	○				○	
	There was hunting and engine stopped						◎	○	○				○	
Replacement of filters has not been carried out according to Operation Manual								◎	◎					
Non-specified fuel is being used								○	○	○			○	
Fuel level lamp lights up								◎						
Fuel tank is found to be empty								◎						
When feed pump is operated, operation is too light or too heavy									○	○		◎		
Mud is stuck to fuel tank cap												◎		
Engine rotates, but stops when power train is operated													◎	
When it is attempted to turn by hand using barring tool	Does not turn at all	◎	◎											
	Turns in opposite direction			◎										
	Moves amount of backlash				◎	◎								
	Shaft does not turn						◎							
Rust and water are found when fuel tank is drained								◎	◎					
Metal particles are found when oil is drained		◎	◎					○	○					
Troubleshooting		Troubleshooting of chassis												
Remove oil pan and inspect directly		●	●											
Remove head cover and inspect directly				●										
When gear train is inspected, it does not turn					●									
Rotates when pump auxiliary equipment is removed						●								
When fuel filter, strainer are inspected directly, they are found to be clogged								●						
When feed pump strainer is inspected directly, it is found to be clogged									●					
Inspect feed pump directly										●				
When control rack is pushed, it is found to be heavy, or does not return													●	
Remedy		Replace	Replace	Replace	Replace	Replace	Add	Clean	Clean	Replace	Replace	Correct	Clean	Replace

S-15 Abnormal noise is made

★ Judge if the noise is an internal noise or an external noise.

General causes why abnormal noise is made

- Abnormality due to defective parts
- Abnormal combustion
- Air sucked in from intake system

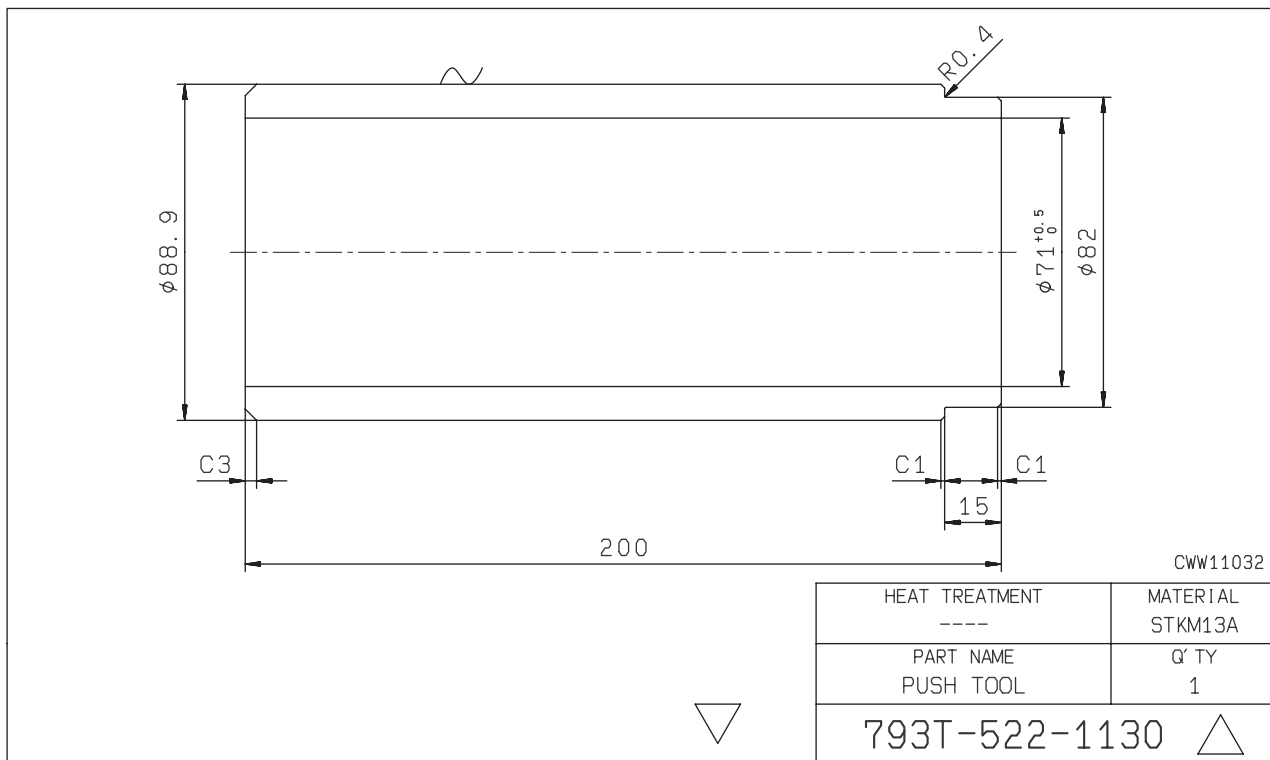
Causes									
Excessive wear of piston ring, cylinder liner									
Seized turbocharger, interference									
Missing, seized bushing									
Clogged, seized injection nozzle									
Defective injection pump									
Deformed fan, fan belt interference									
Defective injection pump (rack, plunger seized)									
Broken adjustment of valve clearance									
Improper gear train backlash									
Leakage of air between turbocharger and cylinder head									
Defect inside muffler (dividing board out of position)									

Questions										
	Confirm recent repair history									
Degree of use of machine	Operated for long period	△								
Condition of abnormal noise	Gradually occurred	○					○			
	Suddenly occurred		○	○					○	
Non-specified fuel is being used				○	○					
Engine oil must be added more frequently		◎								
Color of exhaust gas	Blue under light load	◎								
	Black		◎				○		○	
Metal particles are found in oil filter		◎	◎							
Blow-by gas is excessive		◎								
Noise of interference is heard from around turbocharger		◎								
Engine pickup is poor and combustion is abnormal				◎						
When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low				◎	○					
Seal on injection pump has come off						◎				
Abnormal noise is loud when accelerating engine				○	○	○	○		○	
Clanging sound is heard from around cylinder head							◎	◎		
Leakage of air between turbocharger and cylinder head, loose clamp									◎	
Vibrating noise is heard from around muffler										◎

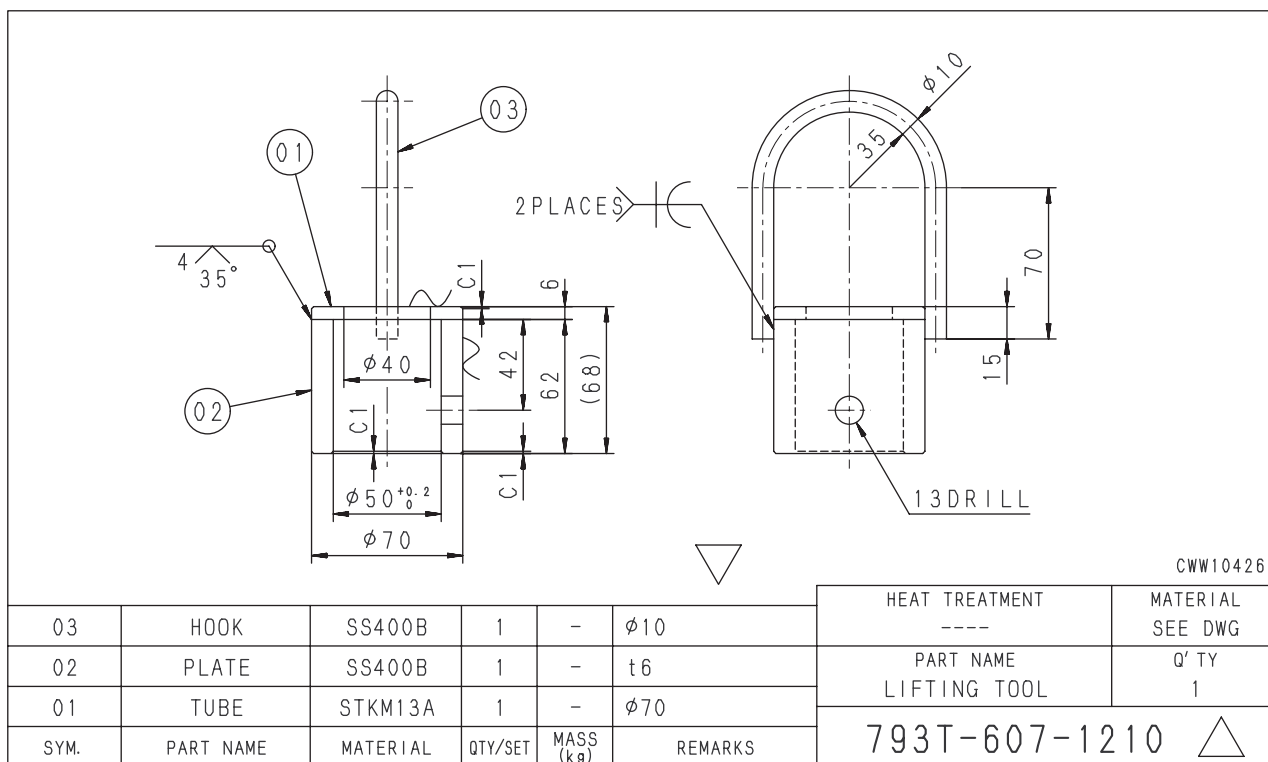
Troubleshooting												
	When compression pressure is measured, it is found to be low	●										
	When turbocharger is rotated by hand, it is found to be heavy		●									
	Remove gear cover and inspect directly			●					●			
	Speed does not change when operation of certain cylinders is stopped				●							
	When control rack is pushed, it is found to be heavy, or does not return					●						
	Injection pump test shows that injection amount is incorrect						●					
	Fan is deformed, belt is loose							●				
	When valve clearance is checked, it is found to be outside standard value								●			
	Remove cylinder head cover and inspect directly									●		
	When muffler is removed, abnormal noise disappears										●	
Remedy	Replace	Replace	Replace	Replace	Correct	Replace	Correct	Replace	Correct	Replace	Replace	Replace

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

D5 Push tool

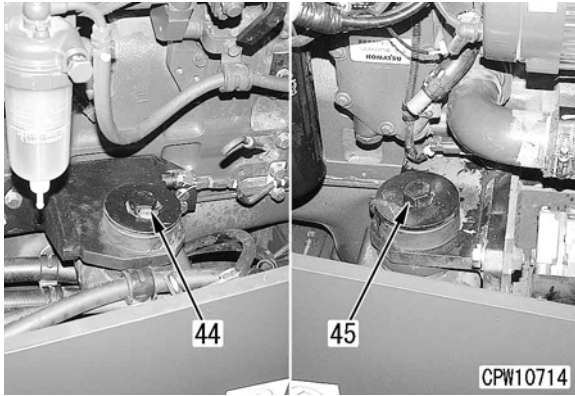


F2 Lifting tool



21. Engine assembly

- 1) Use a lever block to sling the engine assembly.
- 2) Remove the engine mounting bolts (44) and (45).
 - ★ Hold the nuts for the lower side to prevent them from turning together. [*4]

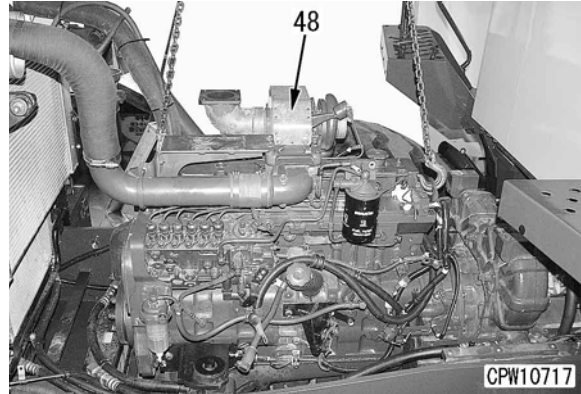


- 6) Remove the engine assembly (48) from the torque converter by adjusting the lifting height and angle with the lever block and the crane.

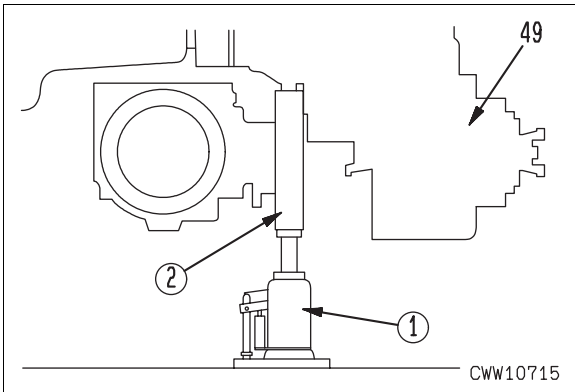


Engine assembly: 820 kg

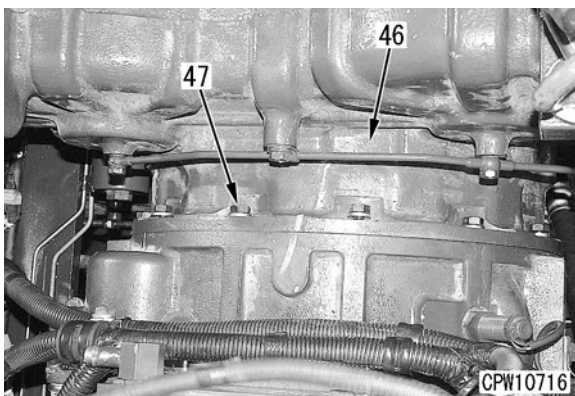
[*5]



- 3) Use the hydraulic jack [1] and the block [2] to support the torque converter side of the torque converter and transmission assembly.



- 4) Remove the flywheel case (46) and 12 pieces of the mounting bolts (47) on the torque converter side.
- 5) Turn the drain tube of the engine oil pan aside until it comes to the fuel tank.



INSTALLATION

- Carry out the installation in the reverse order to removal.

[*1]

- Fill the air conditioner with gas (R134a).

[*2]

- See the paragraph of "Adjustment of Accelerator Pedal" in Testing and Adjusting engine speed.

[*3]

- Bleed air from the fuel system.

[*4]

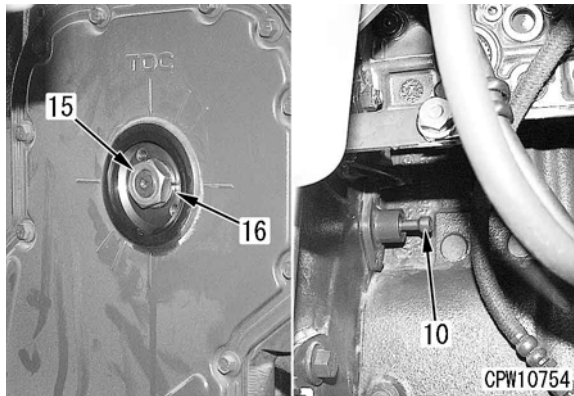


Mounting bolt:
490 - 608 Nm {50 - 62 kgm}

[*5]

- ★ Check that an o-ring is nested in the torque converter housing.
- ★ Adjust the height of the pilot cover very carefully so that it enters the hole of the flywheel smoothly. Never insert it in the hole by force.
- Coolant supply
Feed coolant up to the neck of the radiator. Start the engine to circulate coolant and check the coolant level in the reservoir tank.
- Oil supply
Feed engine oil (designated one) up to the specified level.


- 5) Set the washer (16) in and tighten the nut (15) temporarily.
 - ★ Attach the washer and the nut carefully so that they do not drop in the case.
 - ★ Tighten the nut temporarily by applying the torque of about:
 - 50 Nm {4.9 kgm}, disengage the timing pin and tighten the nut by applying the specified torque.
- 6) Disengage the timing pin (10).



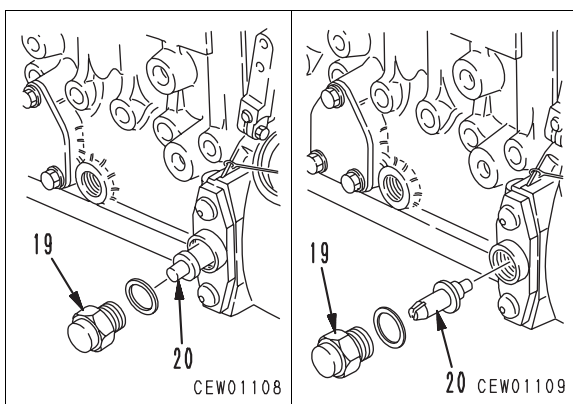
- 7) Remove the plug (19), reverse the position of the timing pin (20) to set it in and attach the plug to the injection pump.

 Plug: 14.7 Nm {1.5 kgm}

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

 Nut: 178 ± 13 Nm { 18.2 ± 1.3 kgm}

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



- Bleed air from the fuel system.

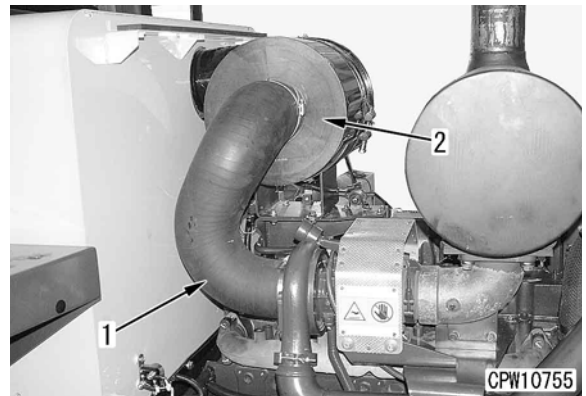
REMOVAL AND INSTALLATION OF NOZZLE HOLDER ASSEMBLY

REMOVAL



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

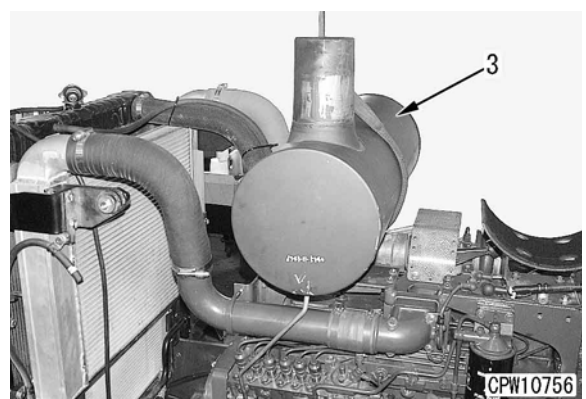
1. Engine hood assembly
See Paragraph 2 of "Removal of Cylinder Head Assembly" and remove the engine hood assembly.
2. Disconnect the dust indicator hose and the air intake hose (1), and remove the air cleaner assembly (2). [*1]



3. Remove the muffler assembly (3).

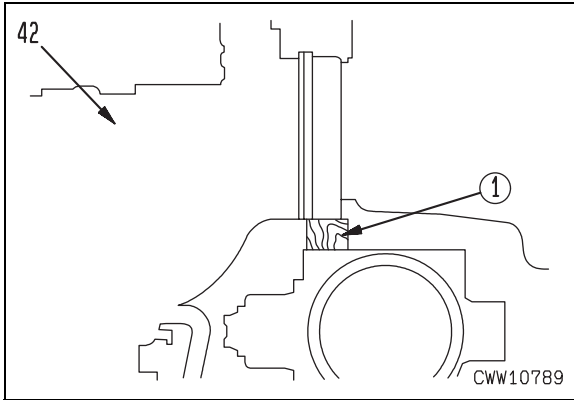


Muffler assembly: 36 kg

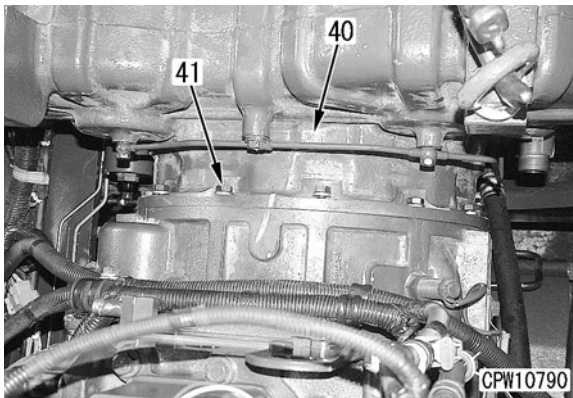


4. Air cleaner bracket
 - 1) Remove the dust indicator sensor connector (4).
 - 2) Disconnect the ground wiring harness (5), and remove the heater relay (6).
 - 3) Remove the clamps (8) and (9) of the breather hose (7) from the bracket (11).


- 4) Lift the torque converter and transmission assembly (42) 100 mm or so, place the block [1] between the engine flywheel case and the rear axle and hold the engine rear portion.

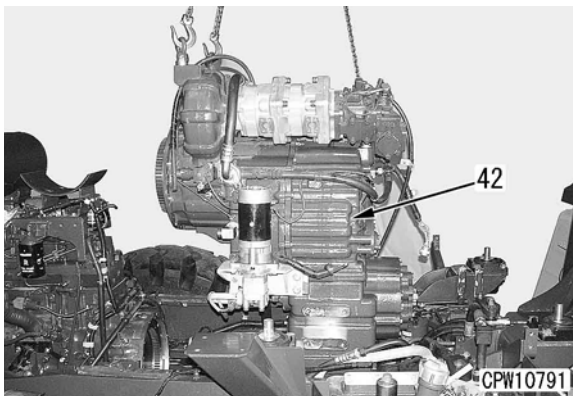


- 5) Remove 12 pieces of the mounting bolts (41) of the flywheel case (40) and on the torque converter side.



- 6) Pull out and remove the torque converter and transmission assembly (42) from the flywheel. [*6]

 Torque converter and transmission assembly: 910 kg



INSTALLATION


- Carry out installation in the reverse order to removal.

[*1]


- Fill the air conditioner with gas (R134a).

[*2] [*3]


- ★ When installing the coupling and the drive shaft, check that the spider cap key is perfectly nested in the key slot of the counter yoke, and tighten the bolts.

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

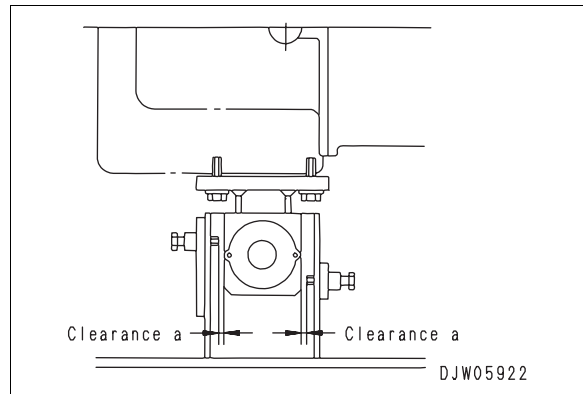
[*4]

 Mounting bolt:
490 - 608 Nm {50 - 62 kgm}

[*5]

 Mounting bolt:
490 - 608 Nm {50 - 62 kgm}

- ★ In order to position the transmission, tighten the mounting bolts so that the clearance **a** with the adjustment screw becomes even.



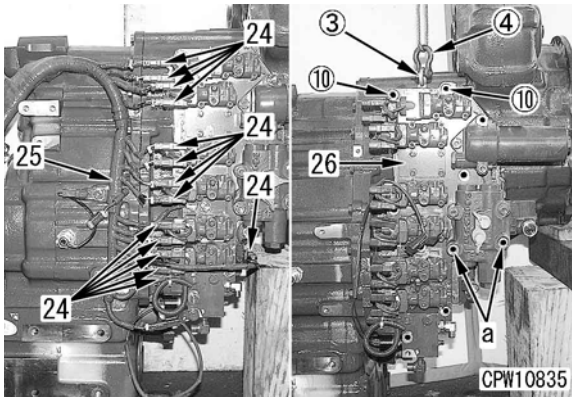
[*6]

- ★ Check that an o-ring is set in the torque converter housing.
- ★ Adjust the height carefully so that the pilot cover enters the flywheel hole smoothly, and never assemble them by force.

BLEEDING AIR OF BRAKE CIRCUIT

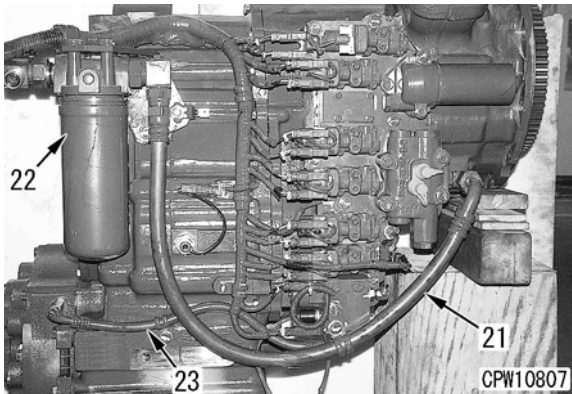
- After completing the installation, see the paragraph of "Bleeding Air of Brake Circuit" in Inspection and Adjustment to bleed air of the brake circuit.
- Oil supply
Supply hydraulic oil (the designated one) up to the specified level. Supply transmission oil (the designated oil) up to the specified level.

- 3) Attach the wiring harness assembly (25) and connect 16 sets of the connector (24).




13. Filter and brake hose

- 1) Connect the brake hose (23).
- 2) Attach the filter (22) and connect the hose (21).

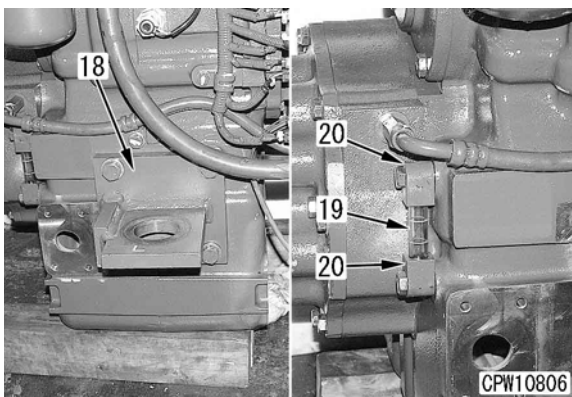


14. Transmission mount and level gauge

- 1) Attach the level gauge (19).
 - ★ Fix the upper and lower holders (20) with a wrench so that they do not rotate, and tighten the bolts.


 Mounting bolt:
12.7 - 13.7 Nm {1.3 - 1.4 kgm}

- 2) Attach the left transmission mount (18).





15. Pipes

- 1) Attach the nipple (17) and connect the tube (16).

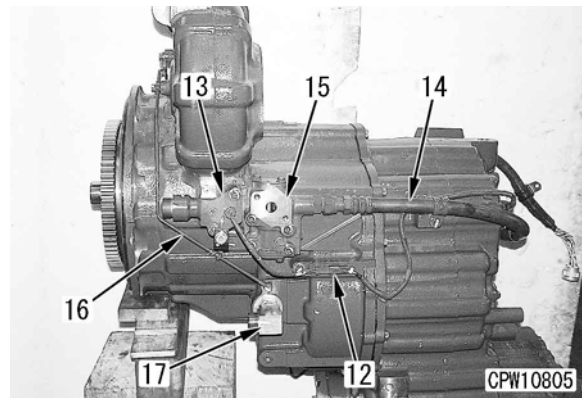
 Mounting bolt:
9.8 - 12.7 Nm {1.0 - 1.3 kgm}

- 2) Attach the front control valve (15) and connect the hose (14).

 Mounting bolt:
Adhesive (LT-2)

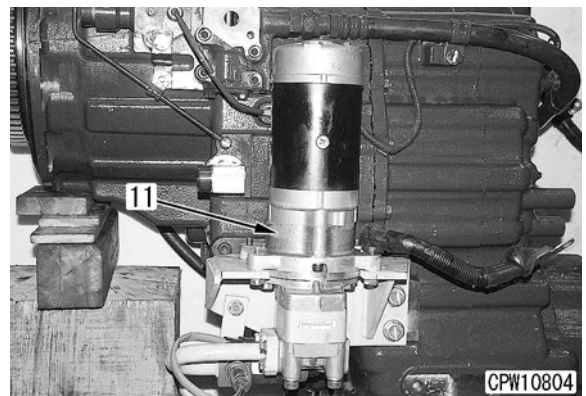
 Mounting bolt:
29.4 - 39.2 Nm {3 - 4 kgm}

- 3) Attach the block (13), and connect the mounting connector (12).




16. Emergency steering pump assembly

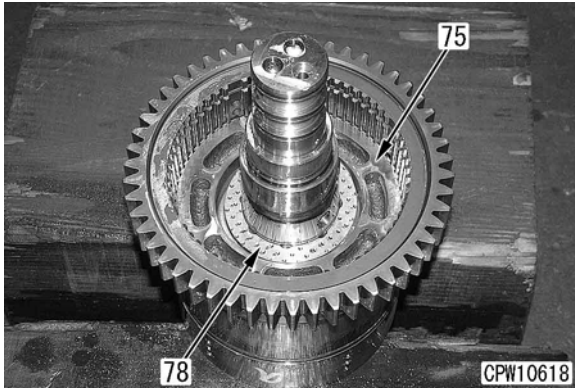
Install the emergency steering pump assembly (11).



2. 4th side piston
 - 1) Mount 4th side piston (75).
 - ★ Take care not to damage the piston seal.

 Contact surface of piston seal:
Transmission oil

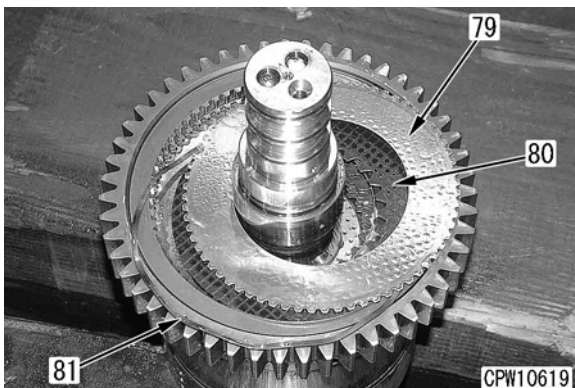
- 2) Mount thrust washer (78).



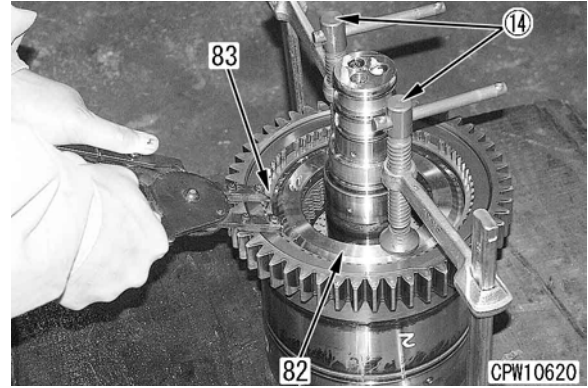
3. Clutch plate

Alternately assemble plate (79), disc (80) and spring (81) in this order.

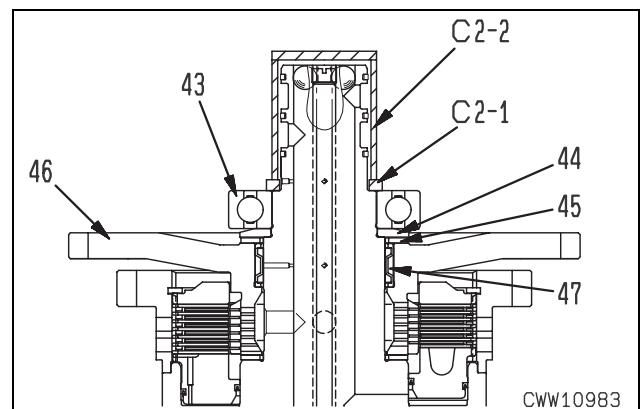
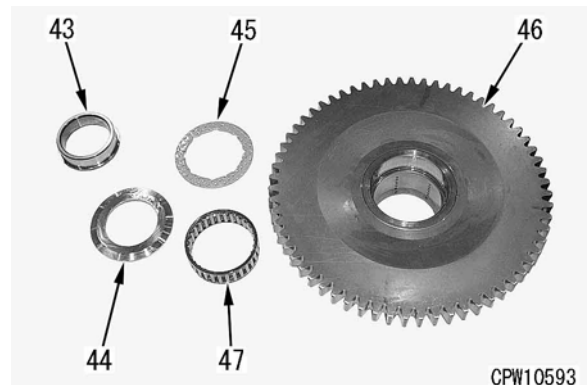
 - ★ Assemble disc (80) after having immersed it in clean transmission oil for two minutes or more.
 - ★ Take care so that spring (81) and disc (80) will not overlap.
 - ★ Carefully assemble the plate (79) and the spring (81) so that they will not bite into the ring groove of the clutch housing.



4. End plate
 - 1) Mount end plate (82).
 - 2) Use C clamp [14] or the like to press end plate (82) and mount snap ring (83).
 - ★ Check that snap ring (83) is correctly inserted in the groove.

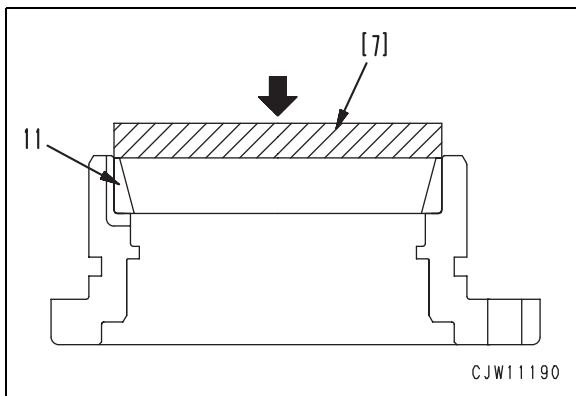


5. 4th gear, bearing
 - 1) Assemble needle bearing (47) in the 4th gear (46) and mount it fitting the internal gear of the disc.
 - 2) Mount thrust washer (45) and spacer (44), then use tools **C2-1** and **C2-2** to press-fit bearing (43).




9. Gauge assembly

- 1) Use push tool [7] to mount outer race (11) on the gauge.



2) Mount gauge assembly (7).


★ Do not install the shim.

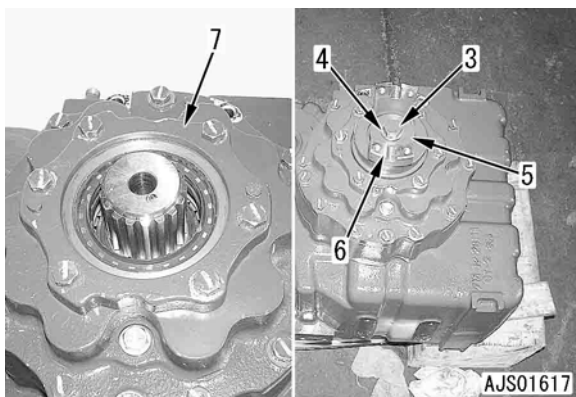
 Mounting bolt:
9.8 ± 0.98 {1 ± 0.1 kgm}

★ When adjusting the shim after installing the coupling, tighten the bolts permanently.

10. Coupling (front drive)


- 1) Mount coupling (6).
- 2) Attach holder (5) and washer (4) and tighten bolt (3).

 Mounting bolt:
490 - 608 Nm {50 - 62 kgm}




11. Adjusting rotation torque of output shaft with shim

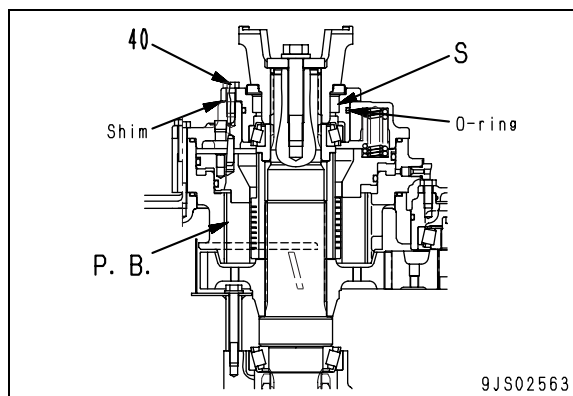
- 1) Tighten 6 cage mounting bolts (40) temporarily without setting the shim.

 9.8 ± 0.98 Nm {1 ± 0.1 kgm}

- 2) Rotate the shaft to the right by 10 turns and to the left by 10 turns, and then check the tightening torque.
- 3) If the tightening torque has changed, repeat 1) and 2).
- 4) When the tightening torque does not change any more, insert the shim and tighten 6 cage mounting bolts (40) to the specified torque.


 Cage mounting bolt (40):
98 - 123 Nm {10 - 12.5 kgm}


- 5) Adjust the shim thickness so that the rotation torque of the shaft becomes 0.49 - 0.98 Nm {0.05 - 0.1kgm}.
- 6) Make sure that there is no looseness after the shim is adjusted.
 - ★ Perform the above adjustment while parking brake **P.B.** is not installed.
 - ★ Perform the above adjustment while the dust seal and oil seal **S** are not installed.
 - ★ Replace O-ring (Part No. 07000 - 15140).

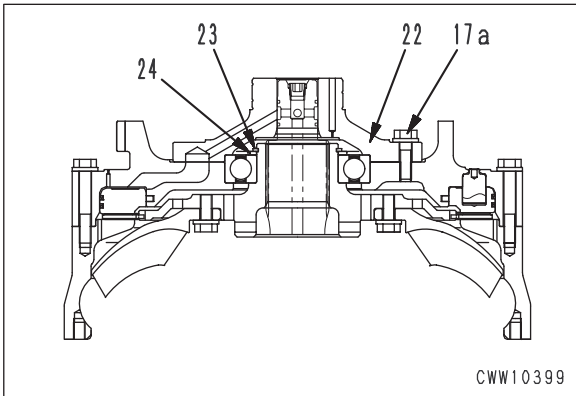


DISASSEMBLY AND ASSEMBLY TORQUE CONVERTER ASSEMBLY (LOCK-UP SPECIFICATION)

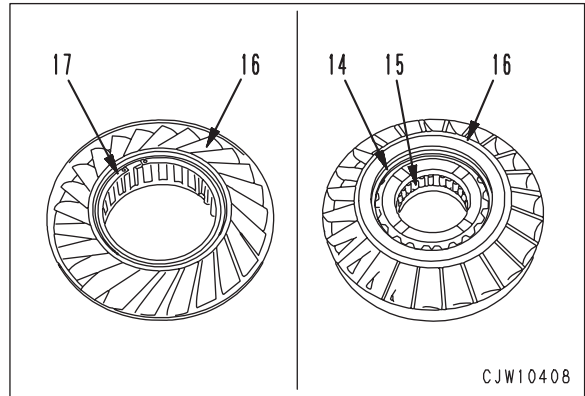
- 6. Plate, snap ring
Assemble spacer (24) and mount snap ring (23).
- 7. Pilot
Mount pilot (22) and tighten bolt (17a).

 Mounting bolt:
Adhesive (LT-2)

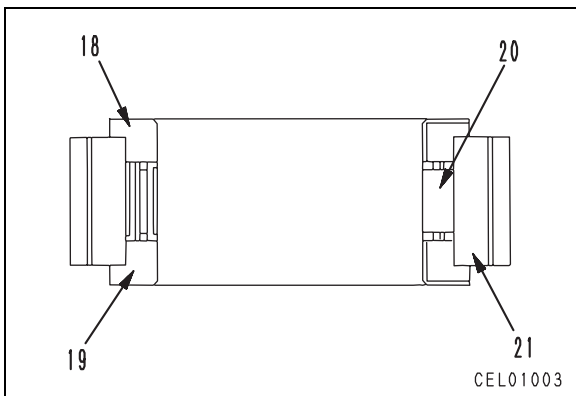
 Mounting bolt:
58.8 - 73.5 Nm {6.0 - 7.5 kgm}



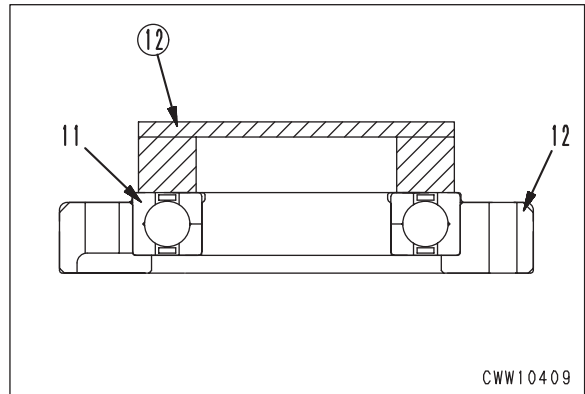
- ii) Mount snap ring (17) on stator (16).
- iii) Attach race free wheel association (15) to stator (16) and mount snap ring (14).




- 8. Stator assembly
 - 1) Fine assembly of stator association
 - i) Assemble free wheel (20) in race (21) and mount bushings (18) and (19) using an expansion fit.
 - ★ Coat the sliding surface of the bushing and free wheel with engine oil.
 - ★ Take care not to damage the sprag of the free wheel.
 - ★ Assemble the free wheel facing the arrow mark displayed on the cage end surface to the turbine side (input side).




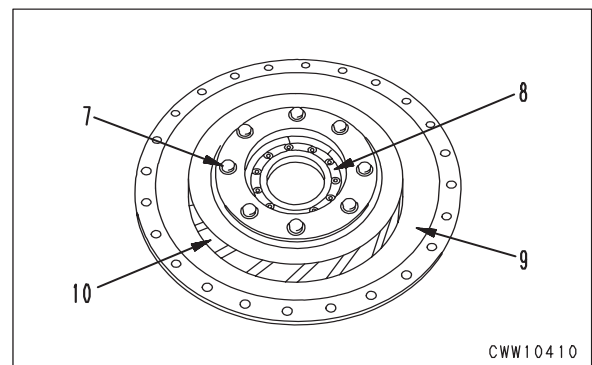
- 9. Stator shaft and pump assembly
 - 1) Fine assembly of stator shaft pump assembly
 - i) Use push tool [12] to press-fit bearing (11) in guide (12).
 - ★ After having press-fit the bearing, drop the engine oil by 6 cc and rotate the bearing ten times.



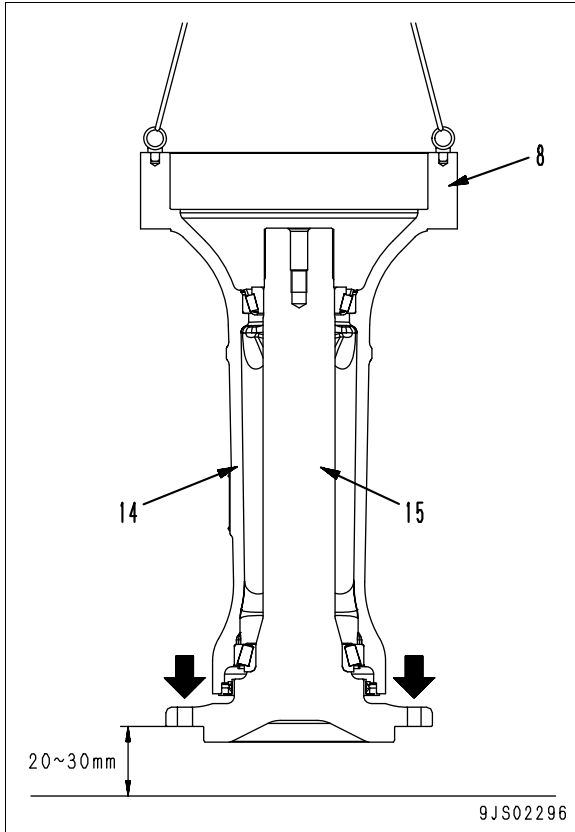
- ii) Set guide bearing assembly (8) and gear (10) in pump (9) and tighten mounting bolt (7).

 Mounting bolt:
Adhesive (LT-2)

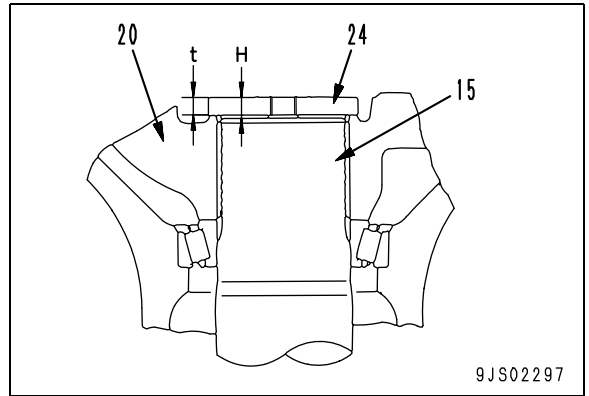
 Mounting bolt:
58.8 - 73.5 Nm {6.0 - 7.5 kgm}



- 2) Hold 2 parts axle shaft and housing assembly (8) and sling it by 20 - 30 mm, as you installed the axle housing.
- 3) Rotating axle shaft (15), hit the flange with a copper hammer in the direction of the arrow several times to drive out axle shaft (15).
- 4) Adjust the turning force to the standard value according to step 1).

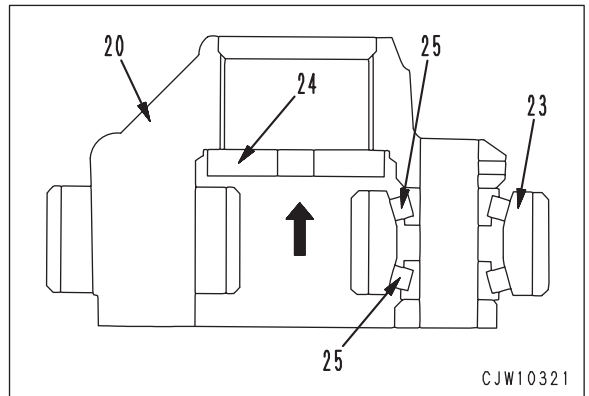


- 7) Dismount planetary carrier (20) and spacer (24) after having determined the shim.



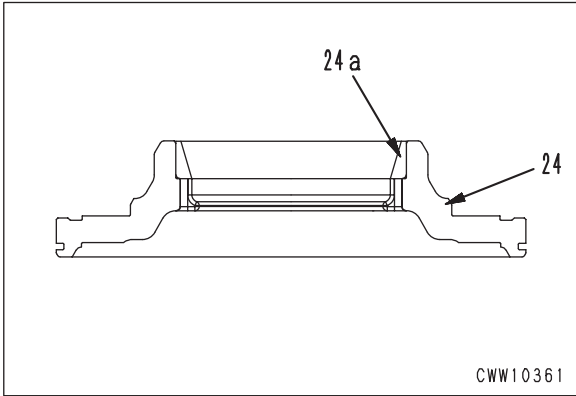
4. Planetary carrier

- 1) Previously assemble spacer (24) in planetary carrier (20).
 - ★ Assemble the spacer from the brake housing side.
- 2) Assemble bearing (25) in gear (23) and lift spacer (24), then assemble gear (23).

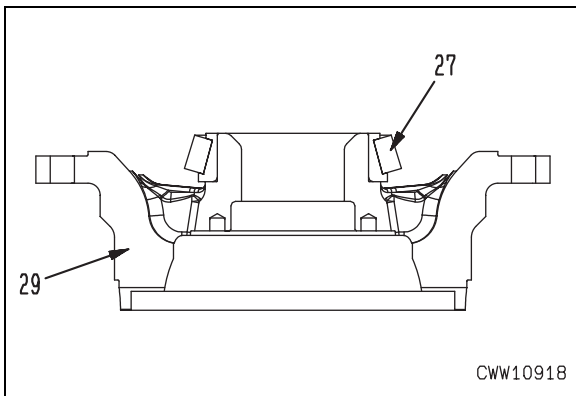


- 5) Install planetary carrier (20) to the spline of axle shaft (15) without the gear and place spacer (24).
 - ★ Just place spacer (24) on planetary carrier (20). Do not tighten the bolt.
- 6) Use a depth micrometer to measure the distance **H** from the end surface of spacer (24) to the axle shaft end surface. Assume the value in which the thickness **t** of spacer (24) is subtracted from **H** is (**H - t**).
 - Thickness of shim = $(H - t) + 0.05$
0

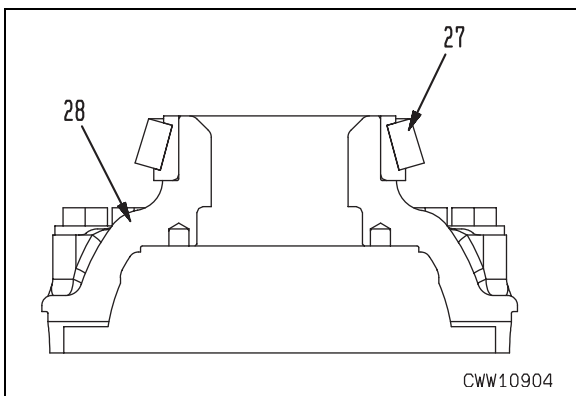
3. Detailed assembly of differential carrier assembly (standard spec.)
- ★ Assemble the parts on the left and right according to the identification determined at disassembly.
- 1) Press the bearing outer race (24a) in the bearing carriers (24) on the left and right until it reaches the carriers.



- 2) Press the bearing (27) in the flange half (29).



- 3) Press the bearing (27) in the plane half (28).



- 4) Put the bevel gear (43) on the block [6], turning down the gear side.
- 5) Attach the guide bolt [7] to the bevel gear (43).
- 6) Lift the flange half (29), attach it to the bevel gear (43), and fasten the bevel gear attachment bolt (42).



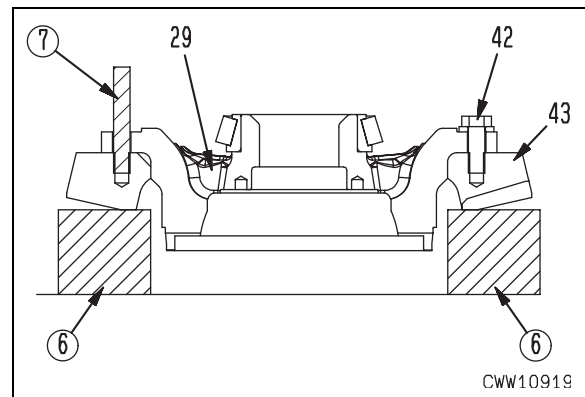
Attachment bolt:

Adhesive (LT-2)

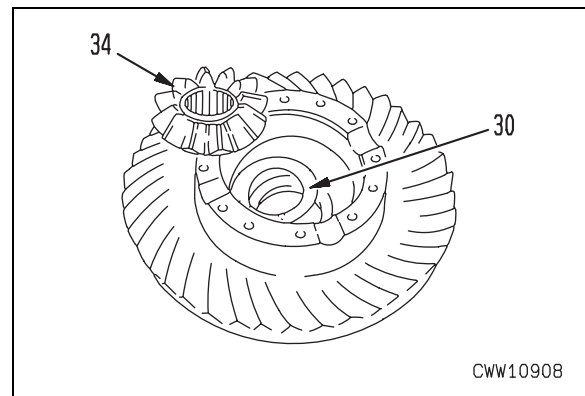


Attachment bolt:

157 - 196 Nm {16 - 20 kgm}



- 7) Attach the thrust washer (30) and side gear (34).



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