SEN02034-12

Shop Manual

WHEEL LOADER

WA800-3E0
WA900-3E0

SERIAL NUMBERS WA800-70001 and up
WA900-60001

KOMATSU

Handling of electric equipment and hydraulic component

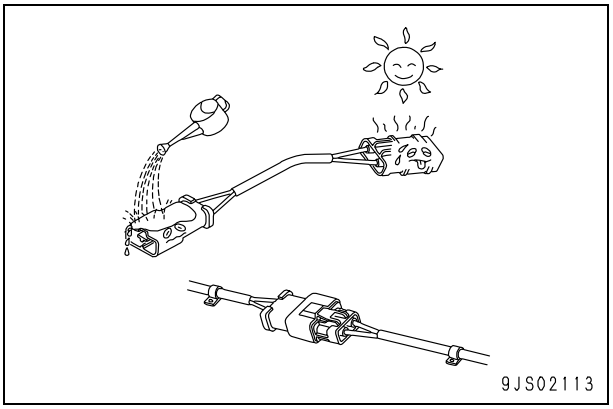
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct “operation“, “maintenance and inspection“, “troubleshooting“, and “repairs” must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it gives sections on “Handling electric equipment” and “Handling hydraulic equipment” (particularly gear oil and hydraulic oil).

Points to remember when handling electric equipment

1. Handling wiring harnesses and connectors

Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protectors or tubes used for protecting the wiring.

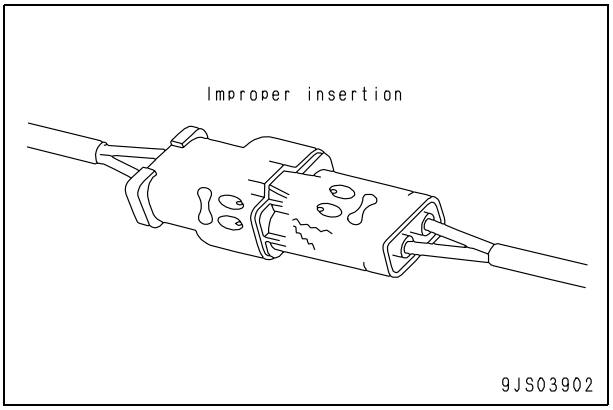
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations, they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.



2. Main failures occurring in wiring harness

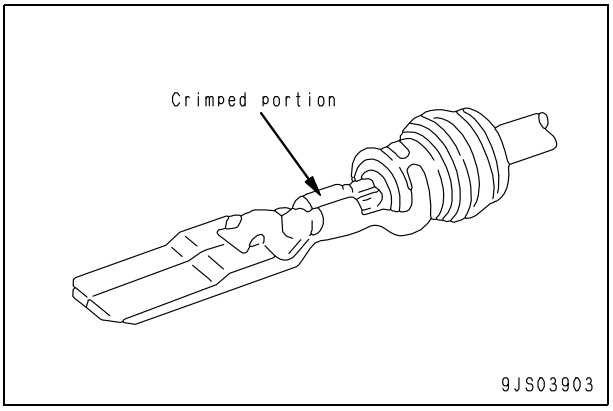
1) Defective contact of connectors (defective contact between male and female)

Problems with defective contact are likely to occur because the male connector is not properly inserted into the female connector, or because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidization of the contact surfaces. The corroded or oxidized contact surfaces may become shiny again (and contact may become normal) by connecting and disconnecting the connector about 10 times.



2) Defective crimping or soldering of connectors

The pins of the male and female connectors are in contact at the crimped terminal or soldered portion, but if there is excessive force brought to bear on the wiring, the plating at the joint will peel and cause improper connection or breakage.



Precautions when carrying out operation

[When carrying out removal or installation (disassembly or assembly) of units, be sure to follow the general precautions given below when carrying out the operation.]

1. Precautions when carrying out removal work

- If the coolant contains antifreeze, dispose of it correctly.
- After disconnecting hoses or tubes, cover them or fit plugs to prevent dirt or dust from entering.
- When draining oil, prepare a container of adequate size to catch the oil.
- Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
- To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors. Do not pull the wires.
- Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
- Check the number and thickness of the shims, and keep in a safe place.
- When raising components, be sure to use lifting equipment of ample strength.
- When using forcing screws to remove any components, tighten the forcing screws uniformly in turn.
- Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.

★ Precautions when handling piping during disassembly
Fit the following plugs into the piping after disconnecting it during disassembly operations.

1) Face seal type hoses and tubes

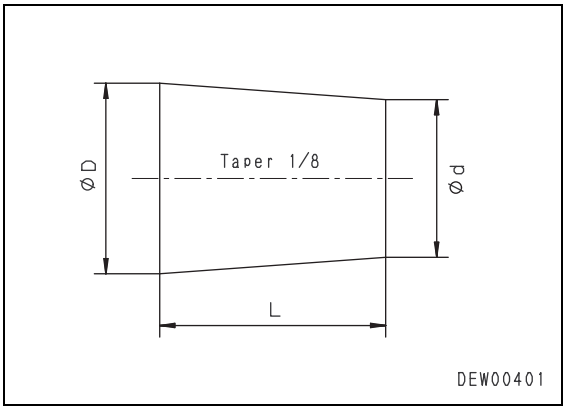
Nominal number	Plug (nut end)	Sleeve nut (elbow end)
02	07376-70210	02789-20210
03	07376-70315	02789-20315
04	07376-70422	02789-20422
05	07376-70522	02789-20522
06	07376-70628	02789-20628
10	07376-71034	07221-21034
12	07376-71234	07221-21234

2) Split flange type hoses and tubes

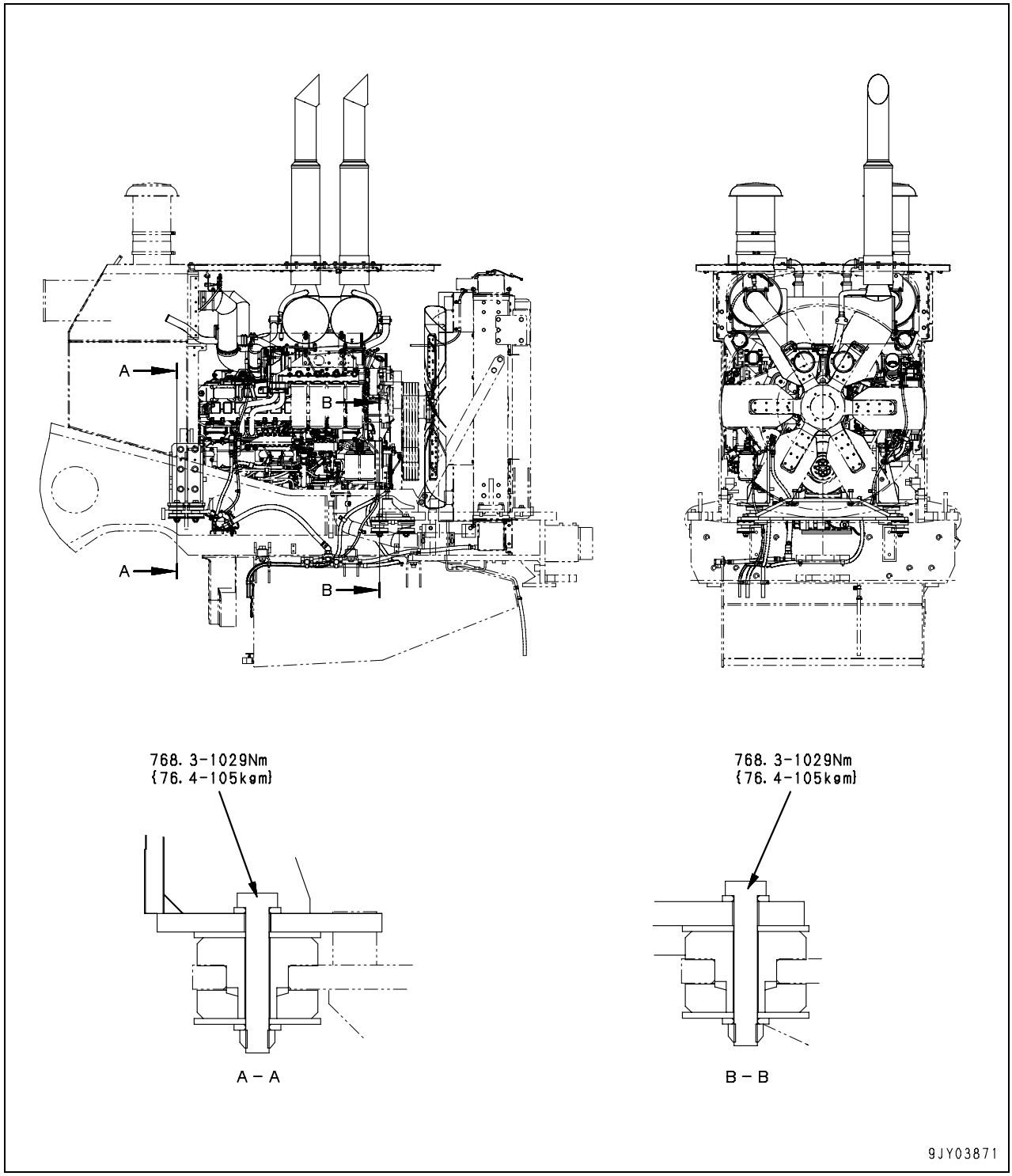
Nominal number	Flange (hose end)	Sleeve head (tube end)	Split flange
04	07379-00400	07378-10400	07371-30400
05	07379-00500	07378-10500	07371-30500

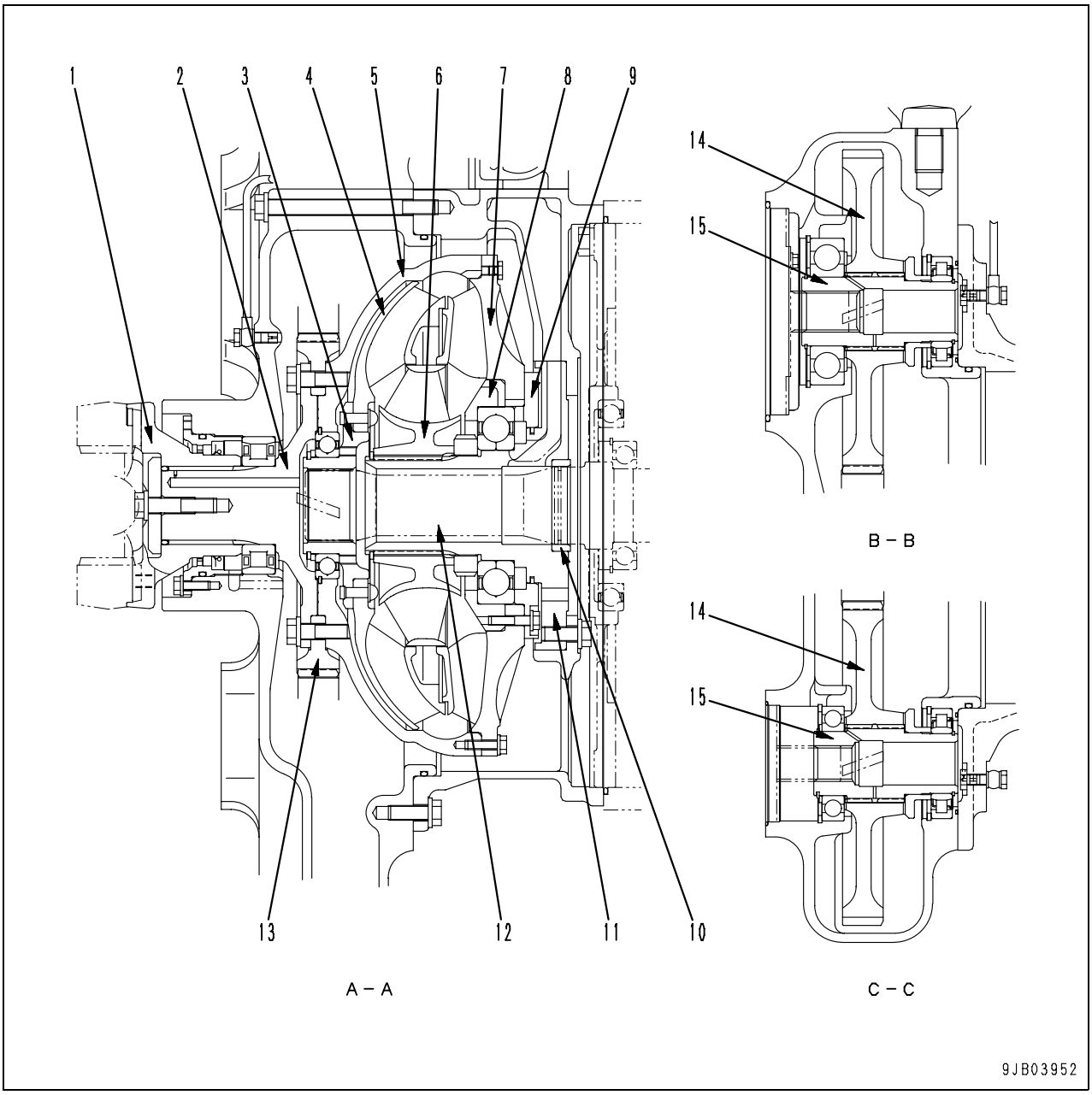
3) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Part Number	Dimensions		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34



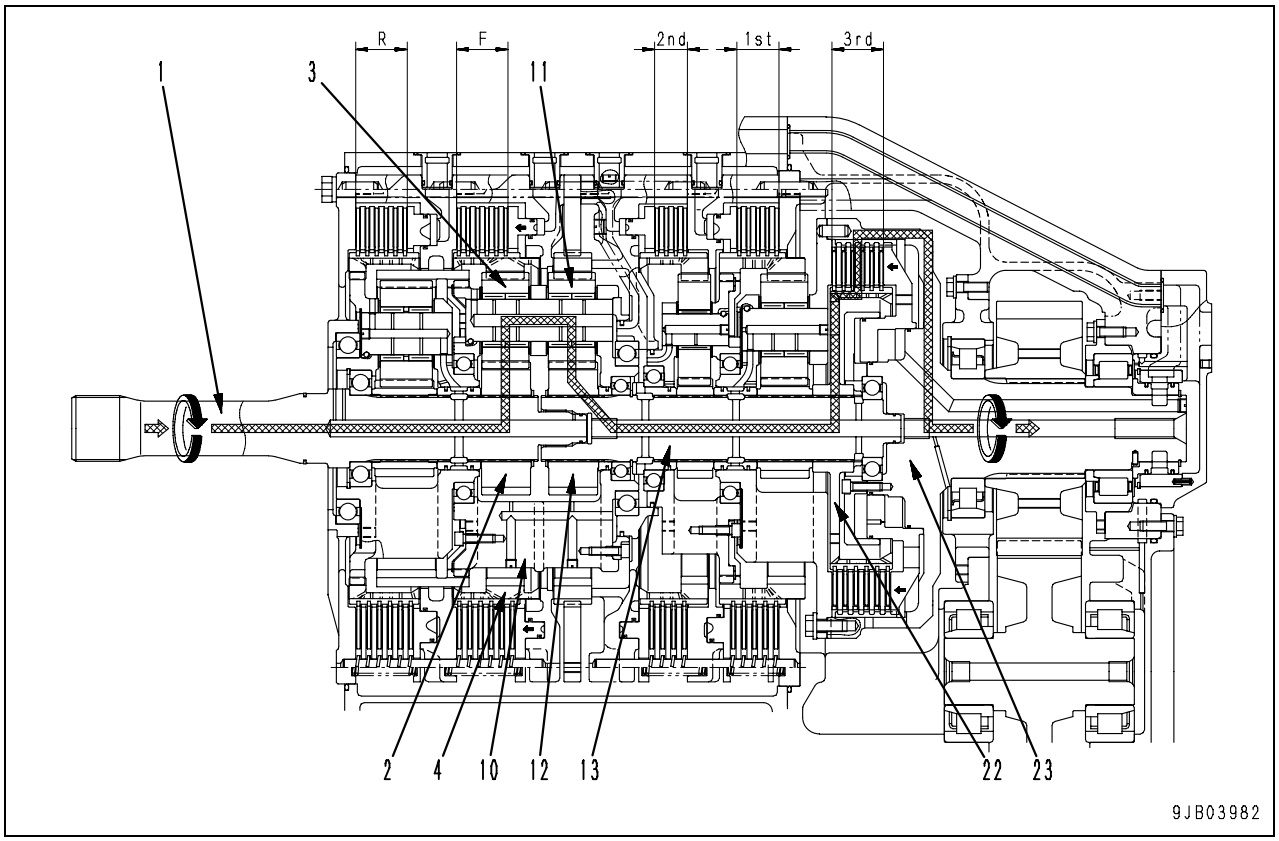
Engine mount





1. Flange
2. Torque converter input shaft
3. Boss
4. Turbine
5. Drive case
6. Stator
7. Pump
8. Guide
9. Retainer
10. Sleeve
11. Stator shaft
12. Transmission input shaft
13. PTO drive gear (Number of teeth: 86)
14. PTO gear (Number of teeth: 81)
15. PTO gear shaft

Forward 3rd gear speed



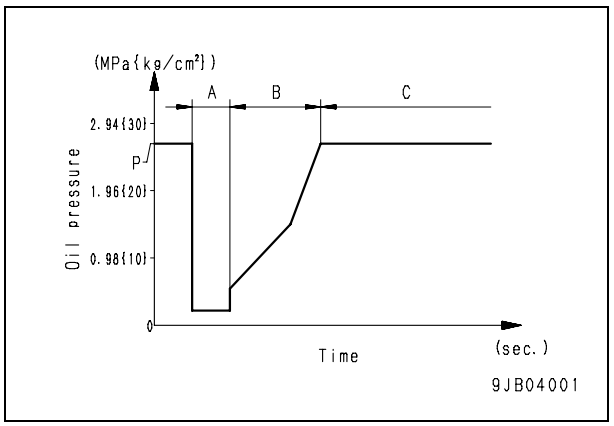
F ring gear (4) of F clutch and 3rd hub (22) of 3rd clutch are fixed hydraulically.

The power from torque converter
↓
Input shaft (1)
↓
F sun gear (2)
↓
F planetary pinion (3)
↓
F carrier (10)
↓
Planetary pinion (11)
↓
Sun gear (12)
↓
Intermediate shaft (13)
↓
3rd hub (22)
↓
3rd clutch
↓
Output shaft (23)

Modulating valve and quick return valve

Outline

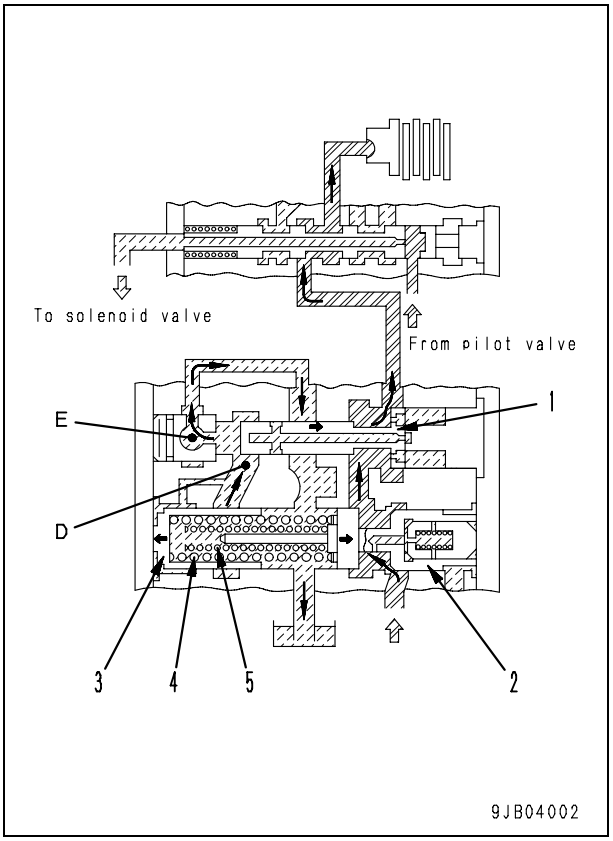
- The modulating valve and quick return valve act together to raise the pressure applied to the clutch piston gradually to the set pressure to engage the clutch smoothly. This reduces the gear shift shocks and prevents generation of peak torque. Accordingly, the operator is less fatigued, the operating comfort is improved, and the durability of the power train is increased.
  Set pressure: 2.65 MPa {27 kg/cm^2}



A. Feeling range
B. Modulating range
C. Oil pressure rise completion range

Operation

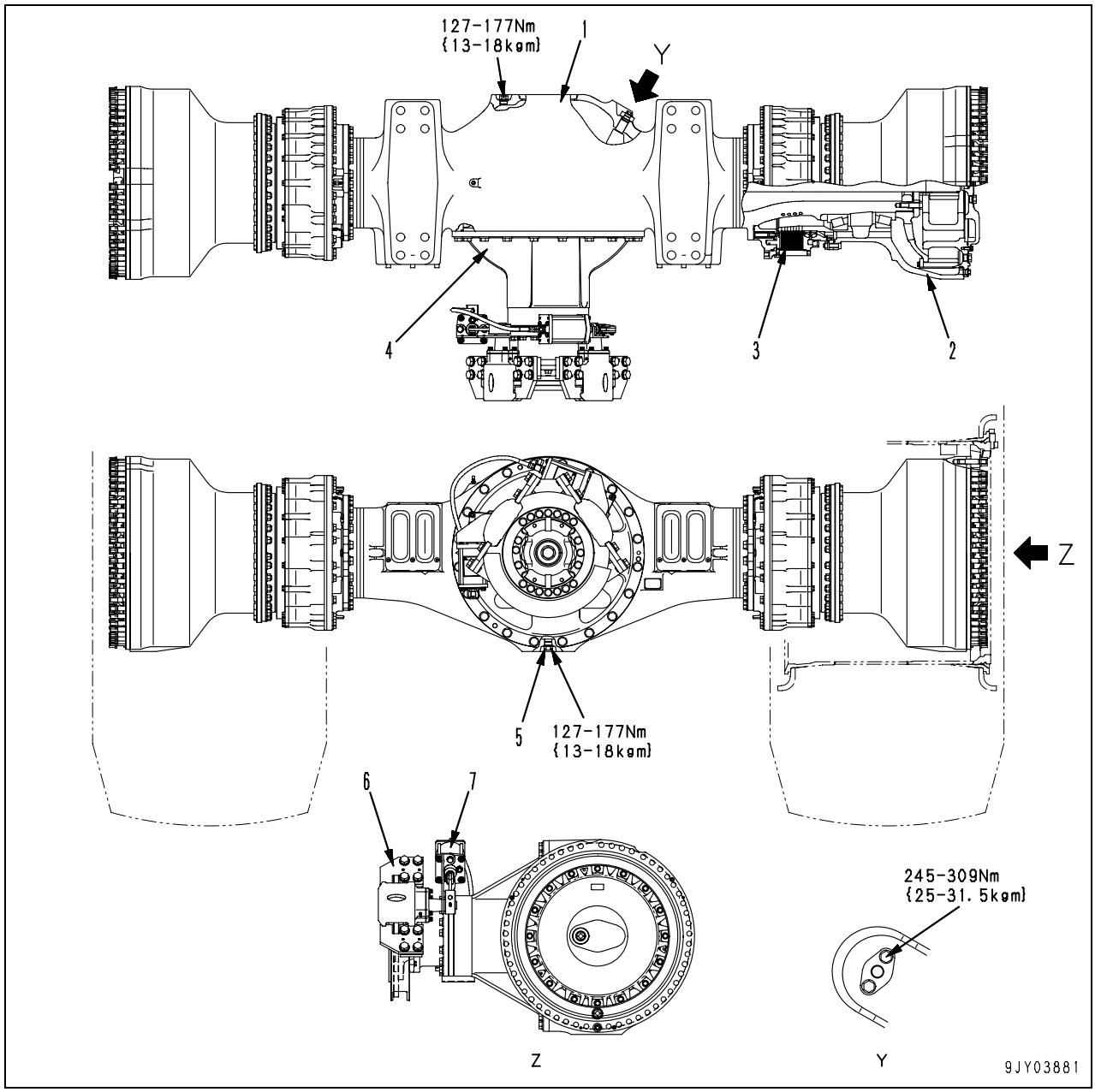
Immediately after shifting gear (Range A in chart)



- If the gear change switch is operated, the oil passage from the pump to the clutch cylinder is opened and the oil flows to the clutch cylinder. At the same time, quick return valve (1) moves to the right and port (D) is connected to port (E) and the back pressure oil supplied to load piston (3) is drained.
- Modulating valve (2) is moved to the right by the reaction forces of springs (4) and (5) and load piston (3) moves to the left.

Axle

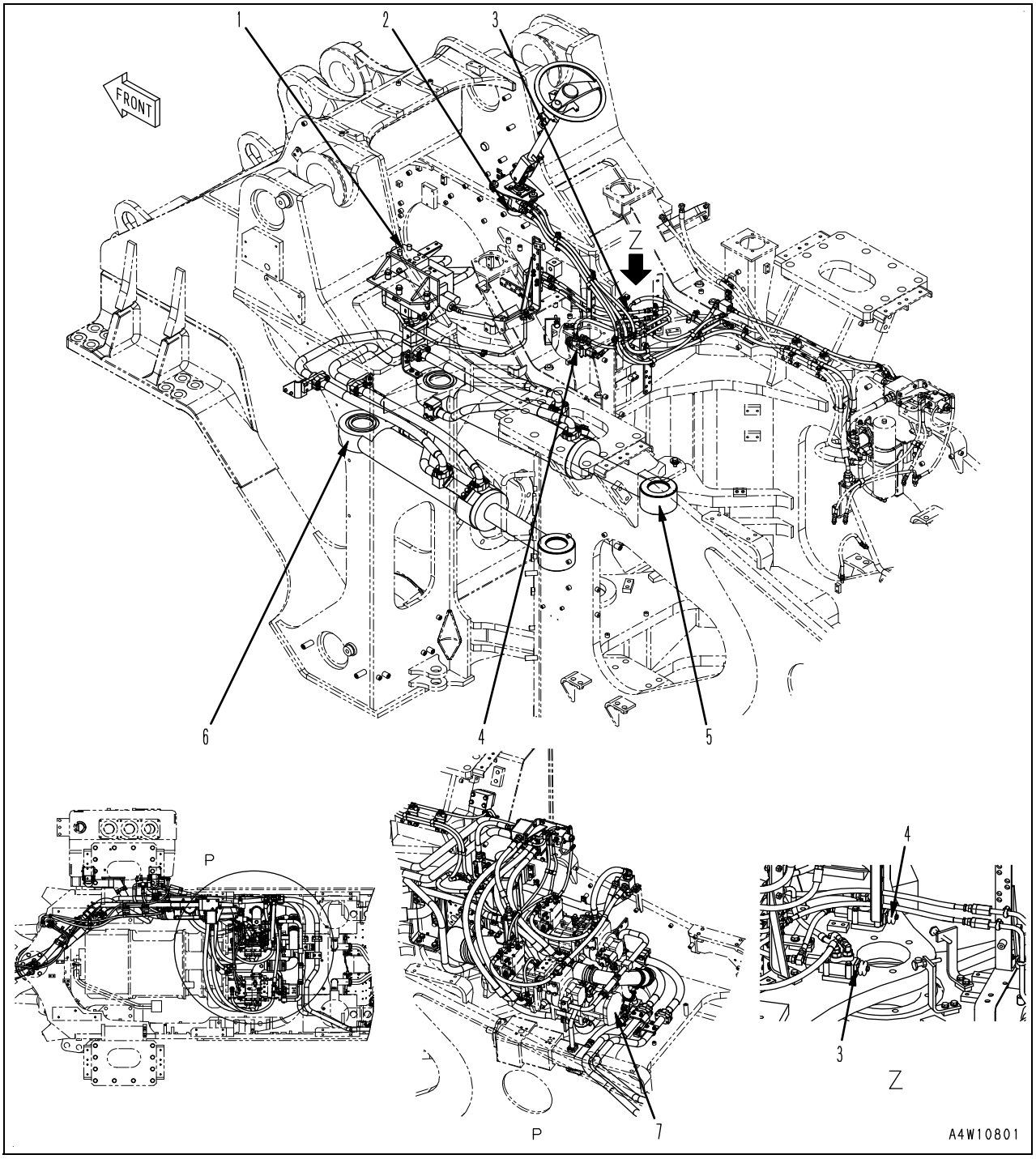
Front axle



1. Front axle
2. Final drive
3. Brake
4. Front differential
5. Drain plug
6. Parking brake
7. Spring cylinder

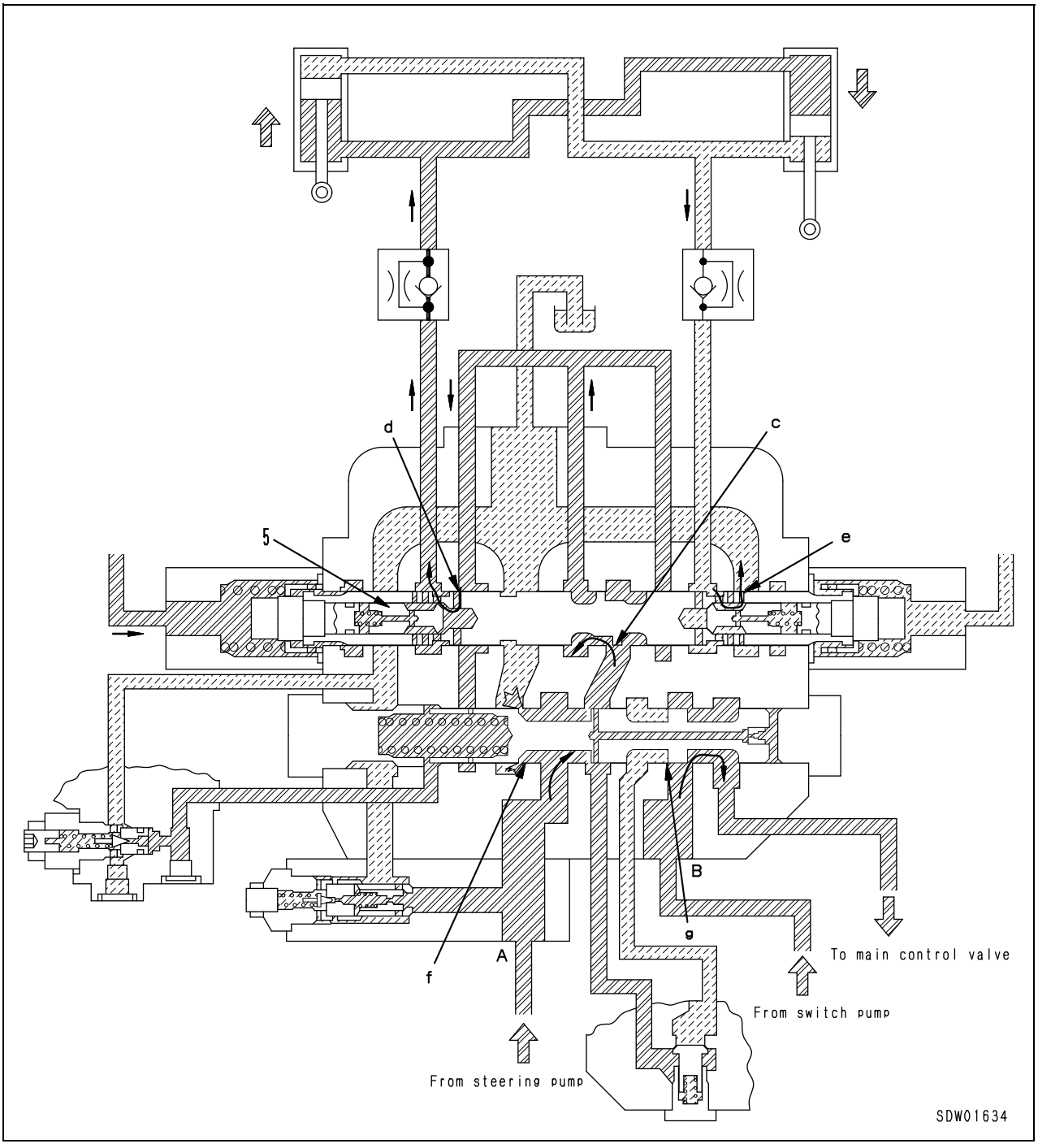
Steering piping

Steering wheel specification



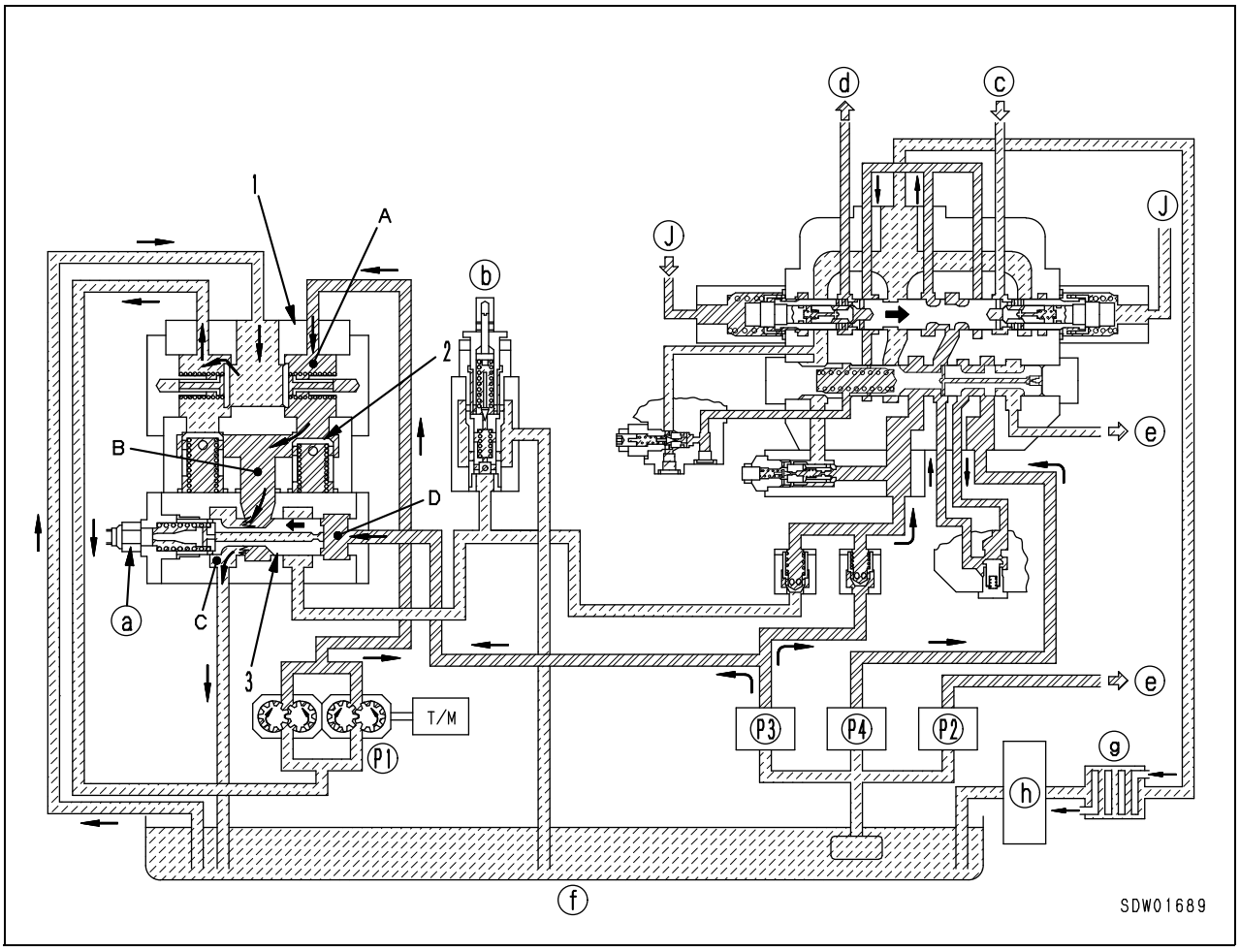
1. Steering valve
2. Steering unit (Orbit-roll valve)
3. Stop valve (Right)
4. Stop valve (Left)
5. Steering cylinder (Right)
6. Steering cylinder (Left)
7. Steering pump

- **Engine running at high speed**



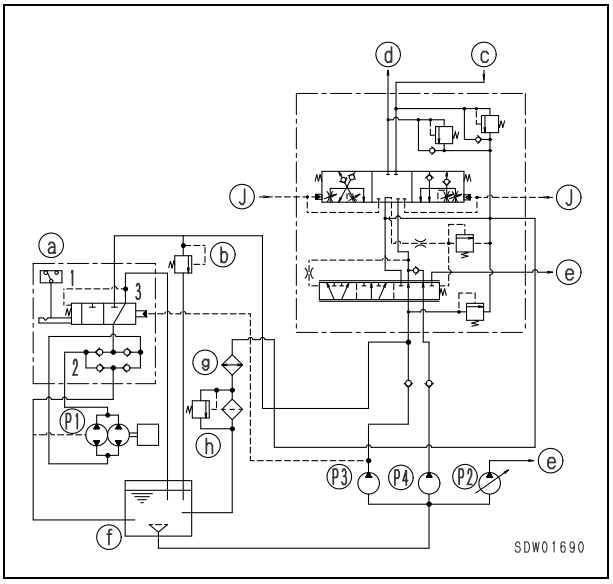
- There is no need for supply of extra oil from the switch pump, so the steering pump pressure rises until notch (g) closes and shuts off the merge passage from port (B).
- The pressure difference on both sides of notch (c) is controlled only by notch (f), and the excess oil from the steering pump is drained from notch (f) to the drain circuit. (At this point, notch (g) is completely closed.)
- The oil from the steering pump passes through notches (c) and (d), pushes load check valve (5), and flows to the cylinder. The return oil from the cylinder passes through notch (e) and flows to the drain circuit.
- Notch (g) is closed, so the oil from the switch pump all flows from port (B) and is sent to the main control valve.

- **Pump, engine working normally**



a. Sensor
b. Relief valve
c. From steering cylinder
d. To steering cylinder
e. To main control valve
f. Hydraulic tank
g. Oil cooler
h. Oil filter
j. From rotary valve

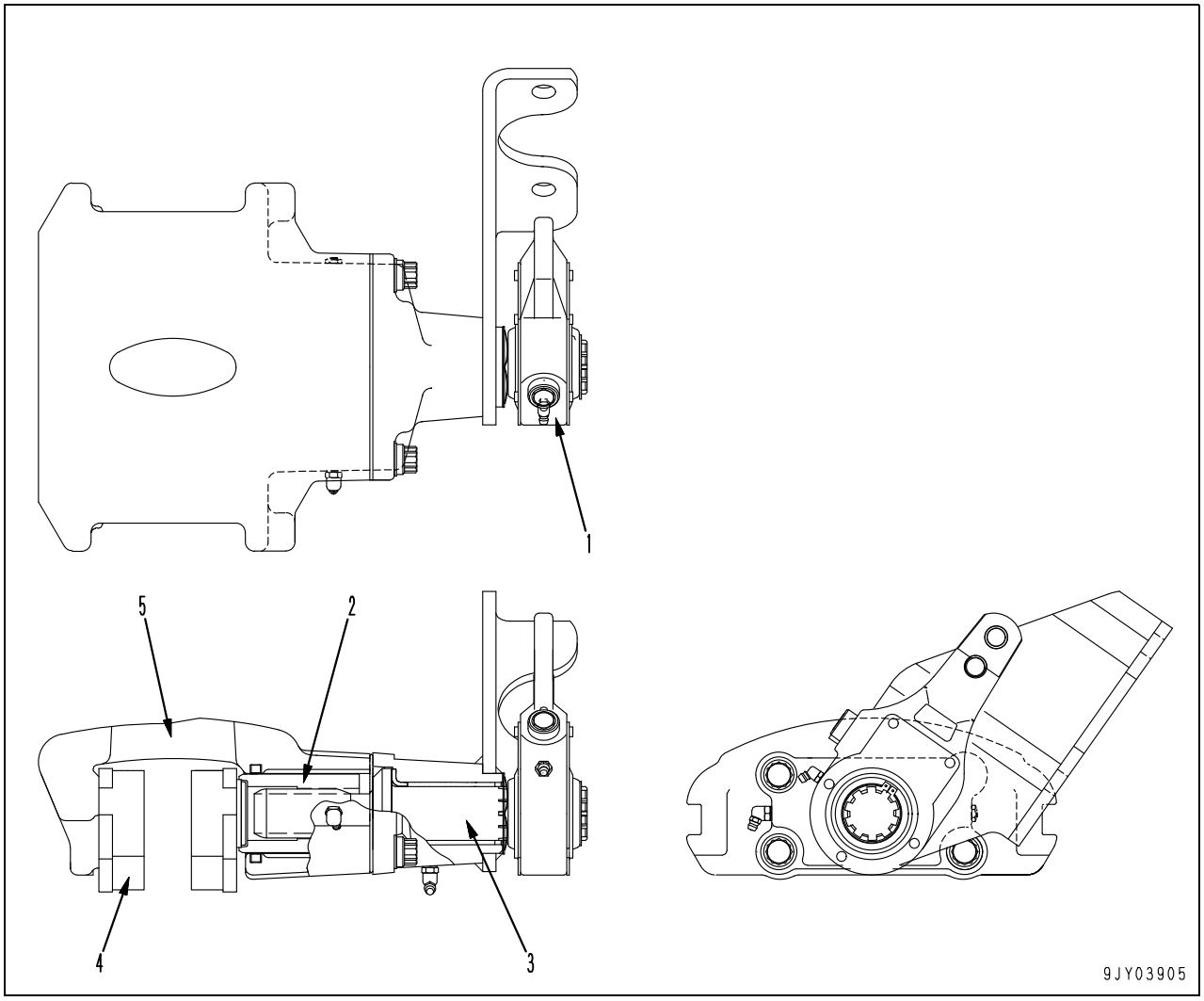
P1. Emergency steering pump
P2. Main pump
P3. Steering pump
P4. Switch pump



Outline

- There are two brake valves installed in parallel under the front of the operator's cab, and these are actuated by depressing the pedal.
- When the right pedal is depressed, oil is sent to the brake cylinder to apply the brakes.
- When the left pedal is depressed, oil is sent to the right pedal to apply the brakes in the same way as when the right pedal is depressed.
  In addition, the left brake pedal operates the transmission cut-off switch to actuate the transmission solenoid valve electrically and set the transmission to neutral.

Parking brake caliper



1. Adjuster
2. Piston
3. Piston shaft
4. Pad
5. Caliper

Outline

- A piston guide is installed to caliper (5). Piston (2) and piston shaft (3) are inserted, and the rotation of piston shaft (3) moves piston (2) in the axial direction to bring pad (4) into tight contact.
- The adjuster (1) is joined by a spline to the spline side of piston shaft (3). Pad (4) is inserted together with caliper (5) into the caliper mounting plate and is held in position.

Brake cooling piping

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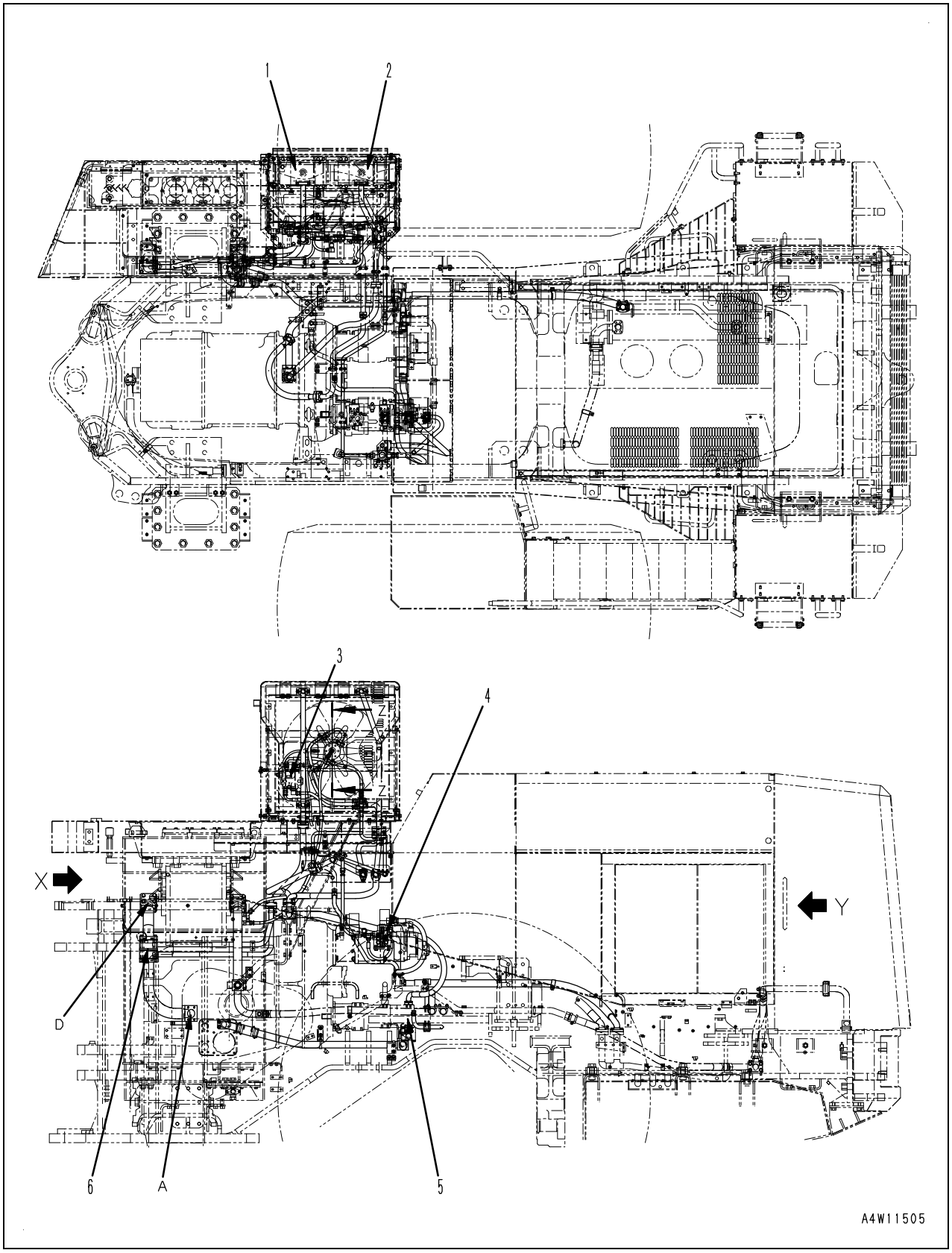

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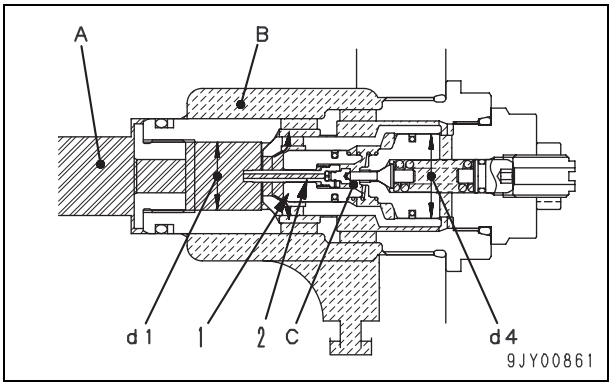
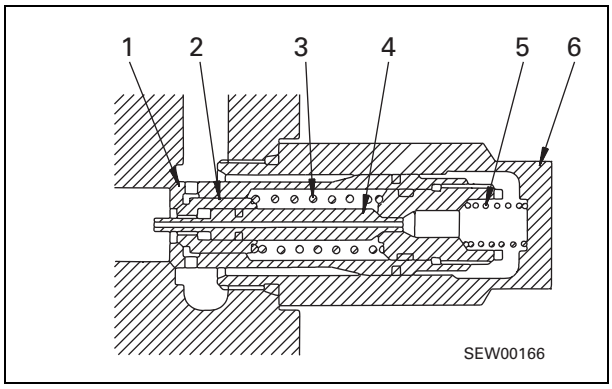
- As the oil flows from (A) to (C) [hole through piston (2)], its pressure lowers. As a result, the pressure in chamber (C) is lower than that in port (A), thus main valve (1) moves to the right.
- Then, the oil flows from port (A) to port (B) and limits the maximum pressure to protect the circuit.



Safety-suction valve



1. Suction valve
2. Main valve
3. Main valve spring
4. Pilot piston
5. Suction valve spring
6. Valve body

Set pressure: 36.8 MPa {375 kg/cm^2}

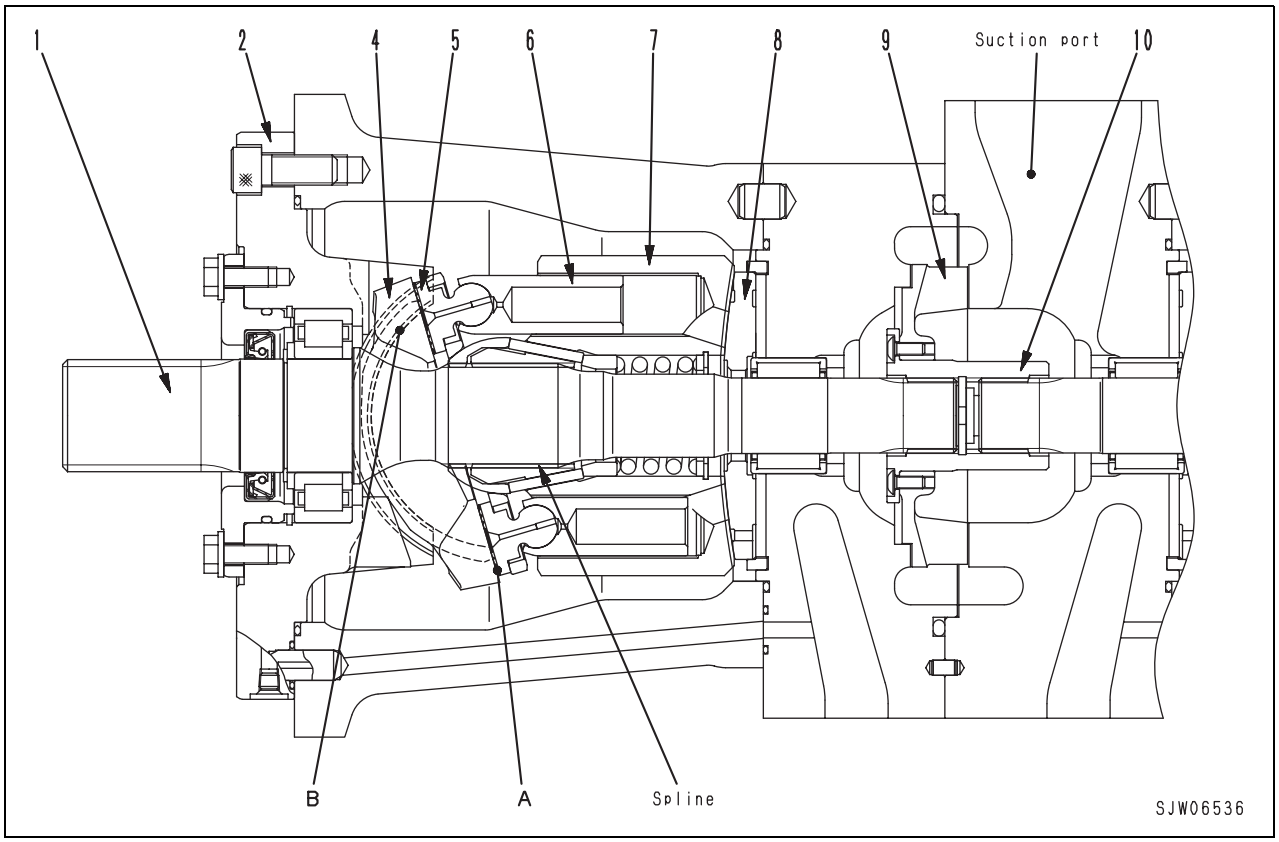
Function

- The safety valve (with suction valve) is in the bucket cylinder circuit in the main valve. If shock causes any abnormally high pressure in the cylinder when the main valve is at neutral, the safety valve (with suction valve) releases the abnormal pressure and protects the cylinder from damage.
- This valve prevents generation of negative pressure in the circuit.

Function

- The engine rotation and torque transmitted to the pump shaft is converted into hydraulic energy, and pressurized oil is discharged according to the load.
- It is possible to change the delivery amount by changing the swash plate angle.

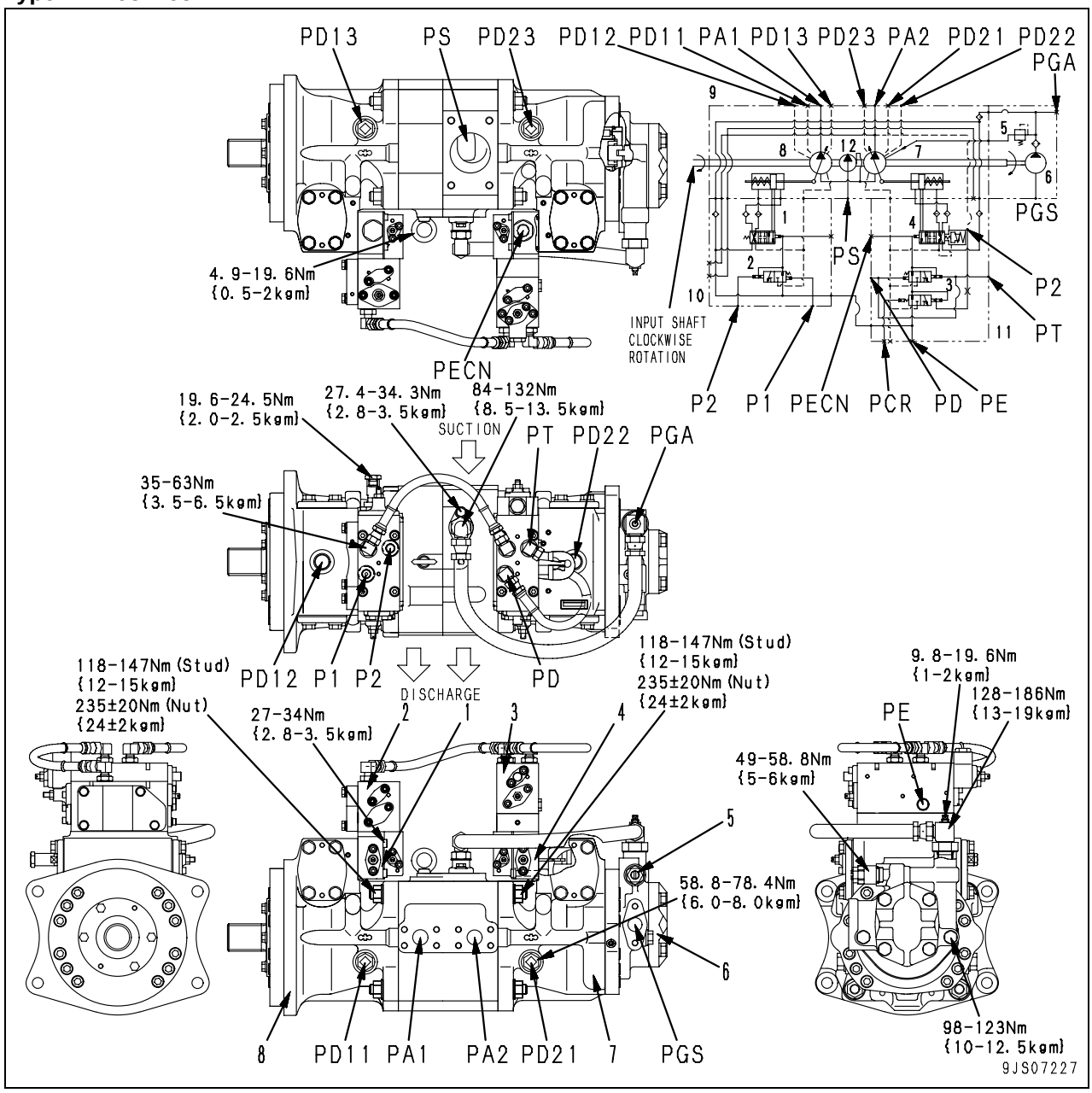
Structure



- Cylinder block (7) is supported to shaft (1) by a spline, and shaft (1) is supported by the front and rear bearings.
- The tip of piston (6) is spherical, and shoe (5) is caulked to it to form one unit. Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has plane surface (A), and shoe (5) is always pressed against this surface while sliding in a circular movement. Rocker cam (4) brings high pressure oil at cylindrical surface (B) with cradle (2), which is secured to the case, and forms a static pressure bearing when it slides.
- Piston (6) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (7).
- Cylinder block (7) seals the pressure oil to valve plate (8) and carries out relative rotation. This surface is designed so that the oil pressure balance is maintained at a suitable level. The oil inside each cylinder chamber of cylinder block (7) is sucked in and discharged through valve plate (8).
- Impeller (9) is connected to shaft (1) through the spline boss (10) and rotates together with the shaft. The oil sucked in through the suction port is sent to the cylinder chamber by centrifugal force to make suction easier.

Switch pump

Type: HPV95 + 95

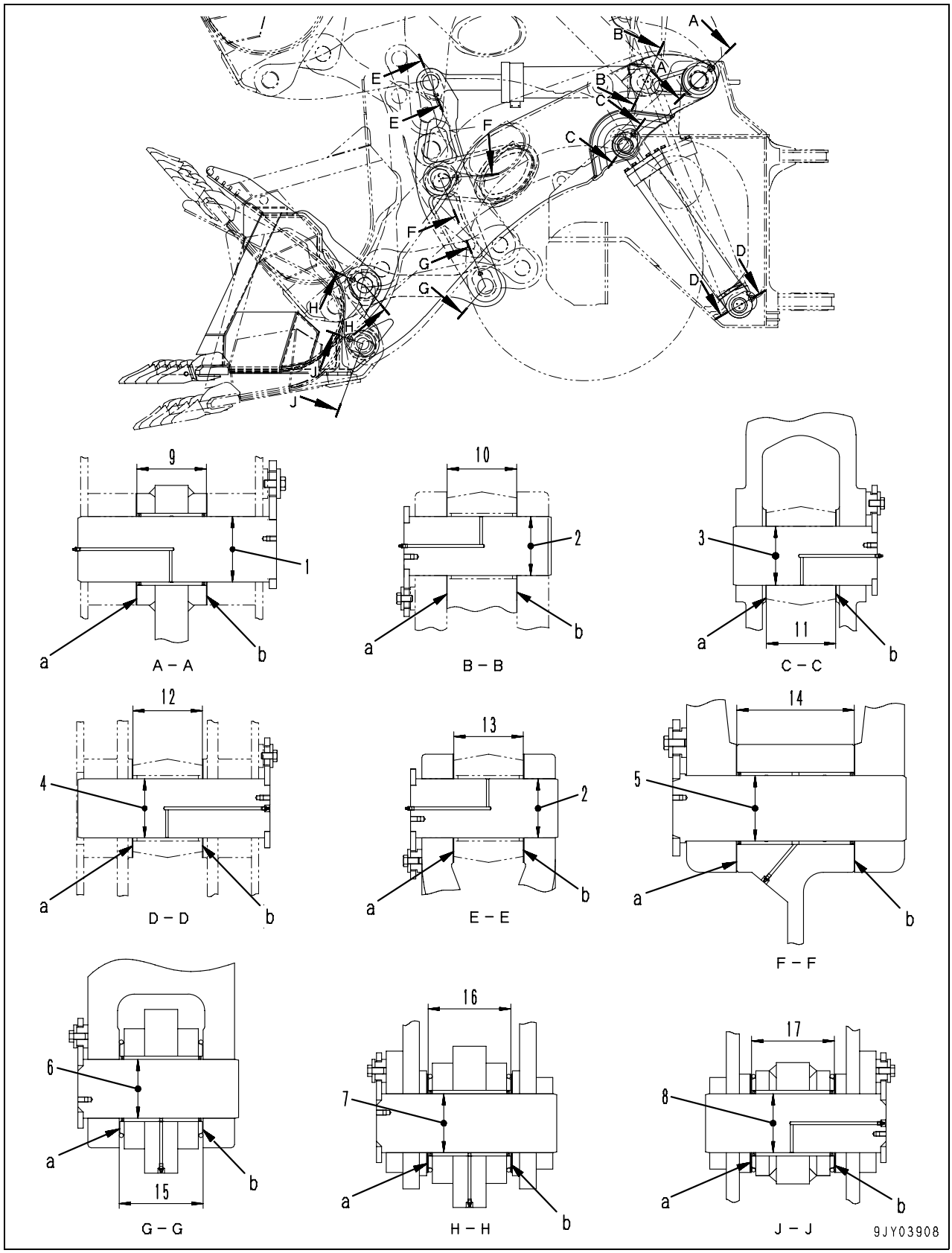


Outline

- This pump consists of 2 variable-displacement swash plate-type piston pumps, 1 impeller pump (installed between the front pump and rear pump), and 1 control pump. For explanation of the operations of the switch pump, control pump, relief valve, ES valve, and servo valve, see the section of the work equipment pump.

Specification

	Switch pump
Type	HPV95 + 95
Rated discharge pressure	34.3 MPa {350 kg/cm^2}
Rated rpm	2120 rpm
Theoretical delivery (front)	97.4 cm^3/rev
Theoretical delivery (rear)	97.4 cm^3/rev
Max. delivery	206.5 + 206.5 ℓ/min


A
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A – A
10
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b
B – B
3
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a
b
C – C
12
4
a
b
D – D
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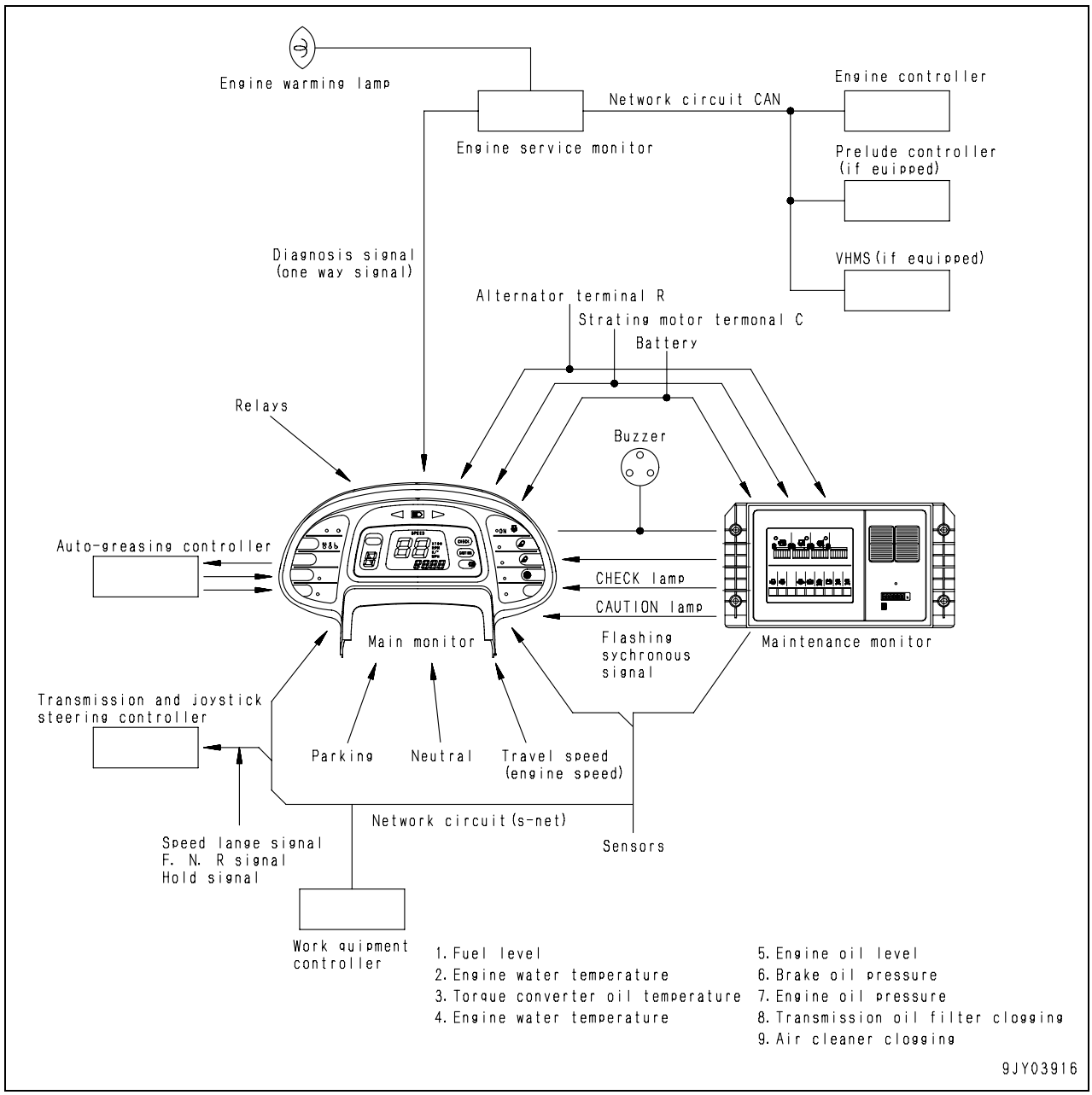
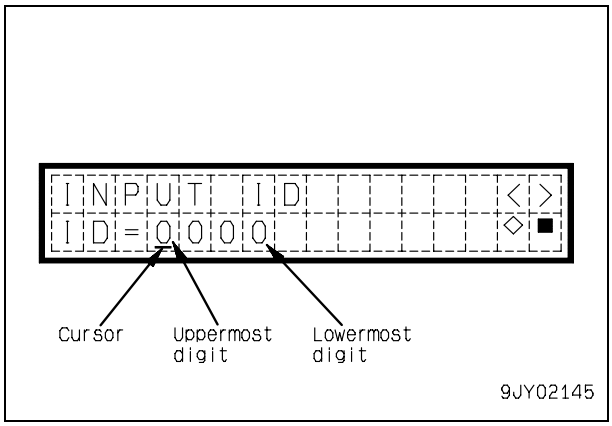
Machine monitor system



Engine service monitor outline service mode

The engine service monitor has the service mode function for the ease of troubleshooting for the controllers (including the engine service monitor itself) on the network. When setting options, etc., use the service mode of the engine service monitor, too.

1. How to set engine service monitor in service mode
   Turn the starting switch of the machine ON and then turn the engine service monitor ON.
   While the character display of the engine service monitor is displaying the ordinary service meter screen or the alarm screen, hold down engine service monitor mode selector switch 1 (■) and mode selector switch 2 (<) simultaneously for 5 seconds, and the screen changes to the service ID input screen.



1) How to input ID
   1] Press the < or > switch. Then, the value at the cursor position increases or decreases at the cursor position. Select a desired value using the ◇ switch.
   2] Completing operations equivalent to 4 digits (1) brings you to the ELECTRIC FAULT screen.
   - ★ If you input an incorrect value, press ■ switch to return the cursor to the highest-order digit, and re-enter values from there.
   - ★ If you press the ■ switch while the cursor is at the highest-order digit, the normal service meter screen or alarm screen is returned.
   - ★ If any switch operation is done at least 60 seconds during the ID input, the normal service meter screen or alarm screen is returned.

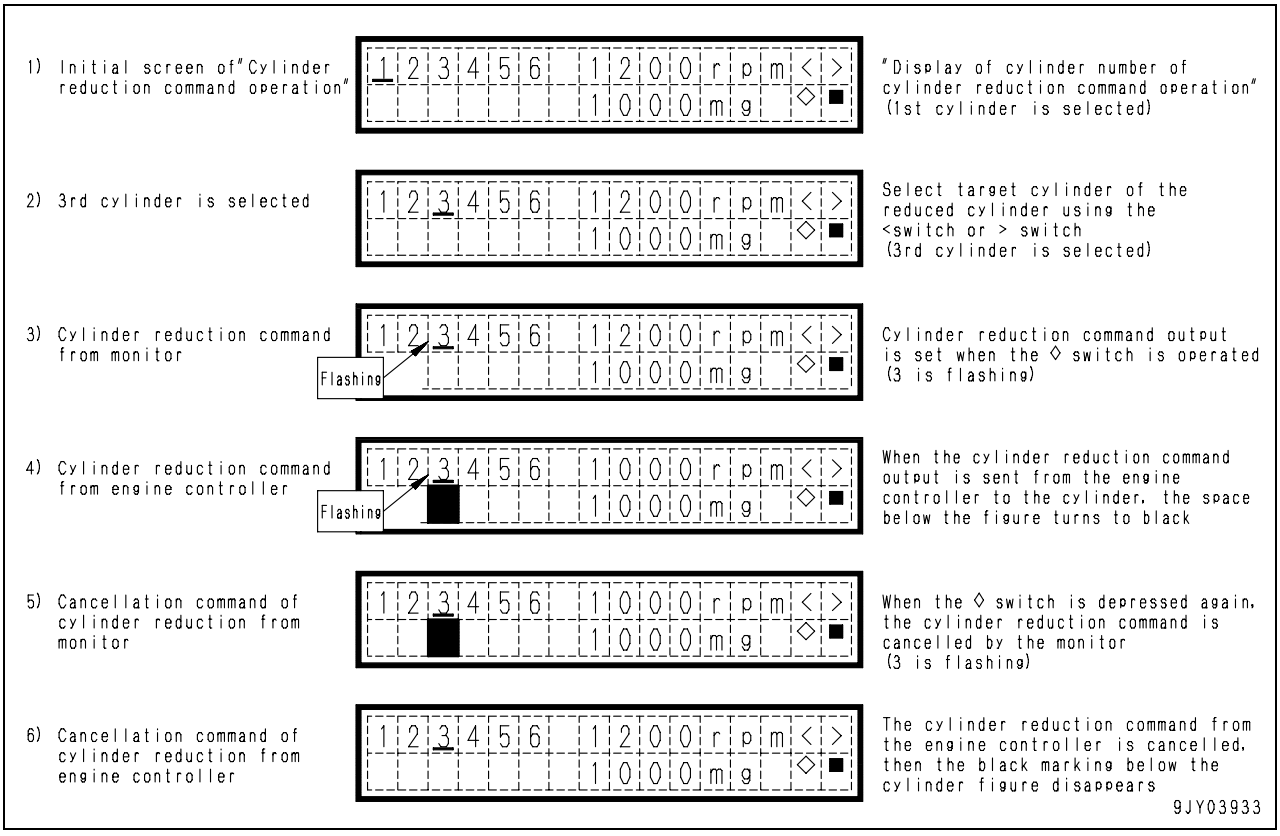
   ID to enter the service mode is “6491”.

   Remarks: If the starting switch is turned OFF in the service mode, the normal service meter screen or alarm screen is returned at the next starting switch ON.

Right bank or left bank cut-off command operation

Each time the > switch is pressed, the cursor moves to the right (Select a cylinder to which the cylinder cut-off command will be output).
Each time the < switch is pressed, the cursor moves to the left (Select a cylinder to which the cylinder cut-off command will be output).
Turn ON/OFF the monitor cylinder cut-off command operation with the ◇ switch. Each time the ◇ switch is pressed, the command is output or reset.
If the ■ switch is pressed, the screen returns to the previous screen and all the cylinder cut-out commands from the monitor are reset.

Example of operation: When 3rd cylinder cut-out command is output



It displays the engine speed [rpm] in upper column and the last injection volume command [mg] in lower column at the same time.

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2. Manual gear shift function

The auto gear shift mode can be stopped by selecting the manual gear shift mode.
In the manual gear shift mode, the gear speed is changed according to the shift-up and shift-down switches.

1) Shift-up/down switch
   Each time the shift-up switch is pressed, the transmission is shifted up from the 1st to 2nd and 3rd gear speed. Each time the shift-down switch is pressed, the transmission is shifted down from the 3rd to 2nd and 1st gear speed. In the manual gear shift mode, all of the “1st, 2nd and 3rd indicators” are turned OFF.
2) When directional selector switch is in “N” position
   If the directional selector switch is in the neutral position, only the gear speed clutch of the transmission operates.
3) When directional selector switch is in “F” or “R” position
   If the directional selector switch is set in the “F” or “R” position, the forward solenoid or reverse solenoid operates.
4) Kick-down function
   Only when the operator applies the kick-down function (turns the kick-down switch “ON”) during travel in the forward 2nd (F2) gear speed, the transmission is shifted down to the 1st gear speed. If the travel direction is changed or the gear is shifted up, the kick-down function is reset.
5) Selection of auto-shift mode or manual shift mode
   1] Gear speed output when auto-shift mode is changed to manual shift mode
      The gear speed before the mode changing operation is kept.
   2] Gear speed output when manual shift mode is changed to auto-shift mode
      The transmission is set to a proper gear speed according to the travel speed before the mode changing operation and using “Table 1 Automatic gear shift change points table, Item 7. Data of selection of F and R”.

10. Self-diagnosis function

The transmission controller constantly monitors the input and output signals of the automatic transmission system, executes self-diagnosis, and displays the result with the LED of the transmission controller.

The transmission controller also transmits the following data to the main monitor.

1) Ordinary display: The output gear speed is displayed with the LED of the transmission controller.
2) Display of failure code: If any trouble is detected, its contents are displayed by the code. For the failure codes, see Table 3 Failure code table.

Table 3 Failure code table

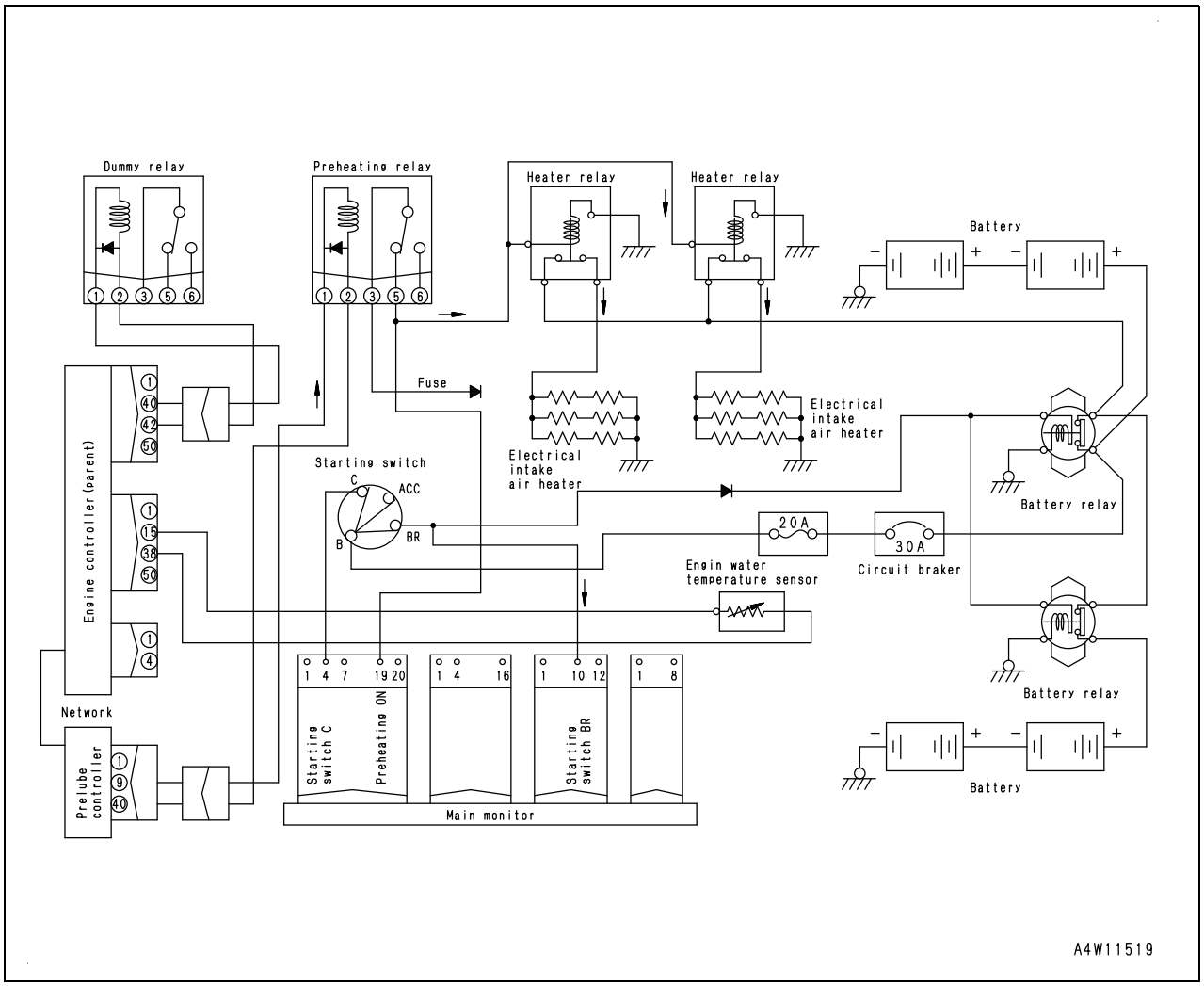
1) Auto/Manual transmission control system

Code	Item	System		Main monitor	Remarks
		Short circuit	Disconnection	Remedy code	
10	Backup lamp relay	○	○	Not set	
11	Not set	—	—	—	—
12	F solenoid	○	○	CALL	
13	R solenoid	○	○	CALL	
14	1st solenoid	○	○	CALL	
15	2nd solenoid	○	○	CALL	
16	3rd solenoid	○	○	CALL	
17	Not set	—	—	—	—
18	Not set	—	—	—	—
19	AJSS directional switch	○	○	E00	
20	Directional switch signal	○	○	CALL	
21	Gear shift signal	○	○	Not set	
22	Travel speed sensor	X	○	E00	
23	Engine speed sensor	X	○	E00	

2) AJSS control system

Code	Item	System		Main monitor remedy code
		Short circuit	Disconnection	
55	Travel speed sensor	○	○	E00
56	Joystick caution buzzer relay	○	○	None
57	Joystick lever angle sensor	○	○	E01 + CALL
58	Shifting of potentiometer signals of AJSS lever angle sensor and frame angle sensor	—	—	E01 + CALL
59	Frame angle sensor	○	○	E01 + CALL
60	AJSS lever lock switch	○	○	E01 + CALL
62	Joystick neutral interlock relay	○	○	E00
63	Joystick basic pressure control EPC solenoid	○	○	E01 + CALL

When equipped the prelube system



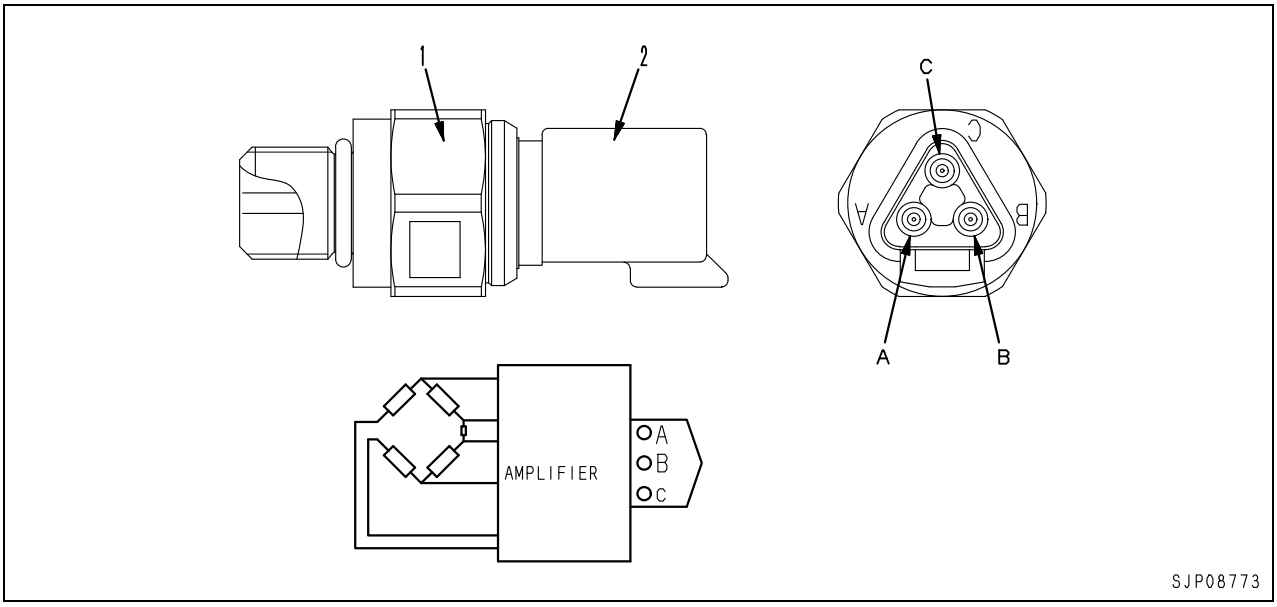
Outline

- To improve the ease of starting in cold areas, an automatic preheating system is installed. This system helps to reduce the preheating time and also automatically sets the preheating time to match the engine coolant temperature when the starting switch is operated.
- When prelube operation is completed automatically, the preheating pilot lamp on the main monitor lights up and preheating is carried out on the intake air for the electrical intake air heater.
  The engine coolant temperature is detected by the coolant temperature sensor, and the preheating time is set by the prelube controller, receiving a signal via network.
- When equipped with the prelube system, preheating time is controlled by prelube controller, not by engine controller.
- While the pilot lamp is lighted up, preheating is being carried out, so the starting switch must be kept at the ON position. If the starting switch is turned to the START position while the pilot lamp is ON, the preheating is canceled.

Operation

- When prelube operation is completed automatically, prelube controller → controller inside main monitor' preheating output → ground.
  The preheating relay coil is excited, so the preheating relay is actuated to actuate the heater relay.
- Current flow from the battery → battery relay → heater relay → electrical intake air heater to carry out preheating. When the preheating output is stopped from the controller, the preheating relay and heater relay are turned OFF and the preheating is completed.

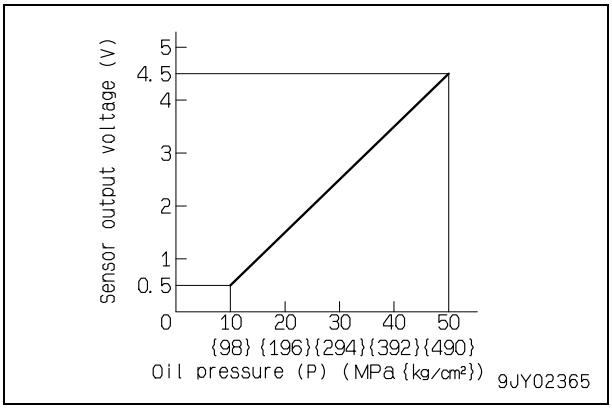
Work equipment pressure sensor
Steering pressure sensor
Rear brake pressure sensor (VHMS (if equipped))
Front brake pressure sensor (VHMS (if equipped))



1. Sensor
2. Connector

Function

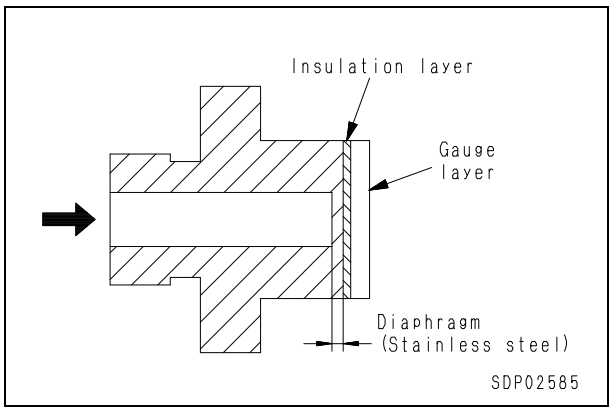
- These sensors convert pump discharge pressure to voltage and transmit to the governor pump controller.



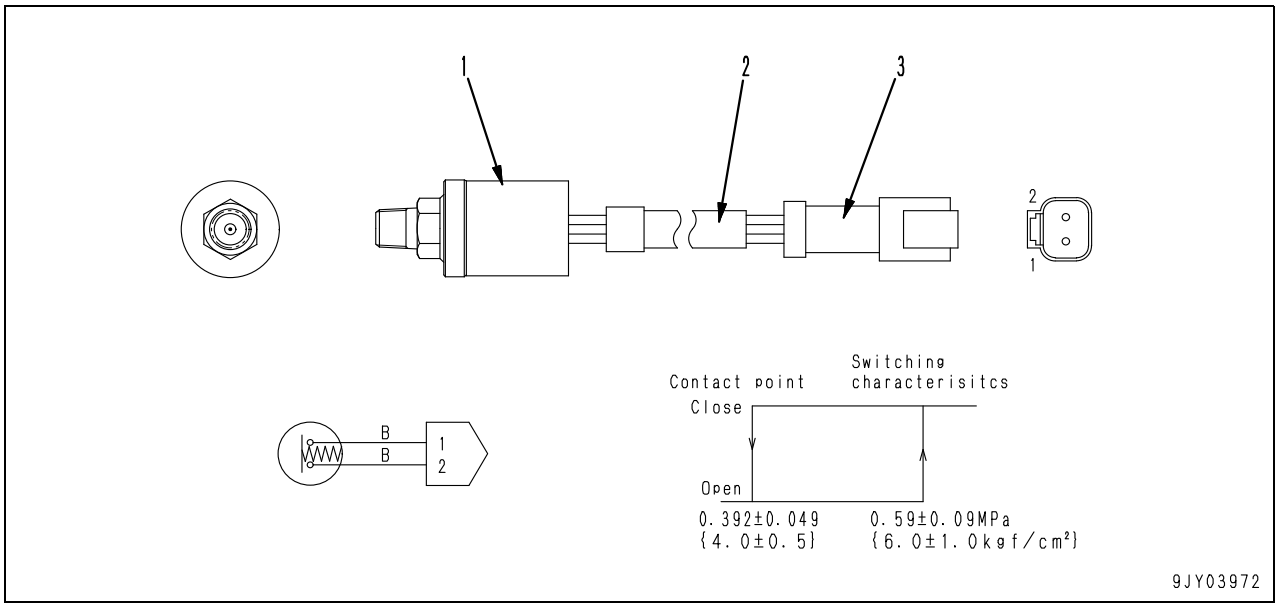
Operation

- When oil pressure led from the pressure input port applies pressure to the diaphragm of oil pressure sensor, the diaphragm is deformed from deflection.
- Gauge layer is installed to the opposite of the diaphragm. Deflection of the diaphragm is converted into output voltage by the resistance of the gauge layer and is sent to the amplifier.
- After amplifying the voltage, the amplifier transmits the voltage to the governor controller.
- Relational expression of pressure P (MPa {kg/cm^2}) and output voltage (V)

$$V = 0.08\ \{0.008\} \times P + 0.5$$



Stop lamp pressure switch

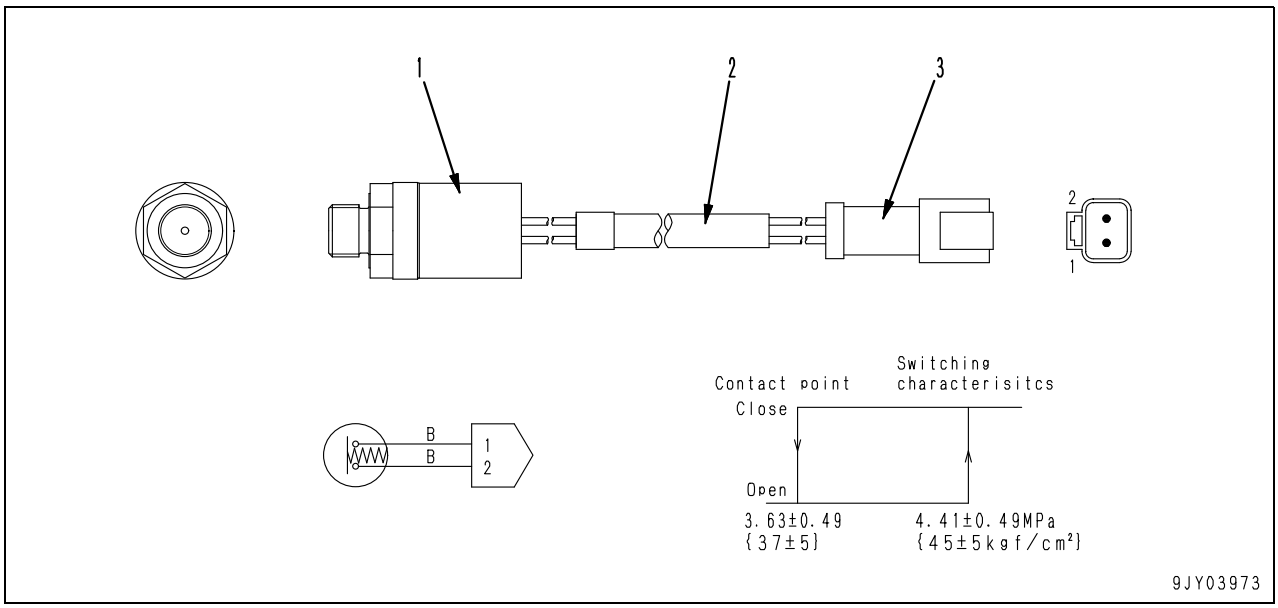


1. Case
2. Tube
3. Connector

Function

- When the foot brake is stepped on and the brake operating pressure is generated, the pressure switch contact is closed, the relay is operated and stop lamp lights up.

Emergency brake pressure switch (rear)
Emergency brake pressure switch (front)



1. Case
2. Tube
3. Connector

Function

- When the brake accumulator pressure lowers, the switch contact opens. Circuit between the parking brake switch and parking brake solenoid is cut off, and the parking brake is tripped to operate.

⚠ When testing, make sure that there are no persons around the testing site.

<table>
<tr><th>System</th><th>Name of component</th><th>Connector No.</th><th>Inspection method</th><th>Judgement table</th><th>Measurement conditions</th></tr>
<tr><td rowspan="5">Main monitor</td><td>Brake accumulator low pressure switch</td><td>BC04 (male)
BC05 (male)
BC06 (male)
BC07 (male)</td><td>Measure resistance</td><td>If the condition is as shown in the table below, it is normal.<table><tr><td>Accumulator pressure: Min. 5.39 ± 0.49 MPa {55 ± 5 kg/cm^2}</td><td rowspan="2">Between (1) – (2)</td><td>Min. 1 MΩ</td></tr><tr><td>Depress brake and lower accumulator pressure to below 4.41 ± 0.49 MPa {45 ± 5 kg/cm^2}</td><td>Max. 1 Ω</td></tr></table></td><td>1) Turn starting switch OFF.
2) Disconnect connectors.
3) Connect T-adapter.</td></tr>
<tr><td>Charge (Alternator)</td><td>L18</td><td>Measure Voltage</td><td>If the condition is as shown in the table below, it is normal.<table><tr><td>Engine running (above half throttle)</td><td rowspan="2">Between (12) – (3)</td><td>28 ± 2 V</td></tr><tr><td>Starting switch ON</td><td>Max. 1 V</td></tr></table></td><td>1) Turn starting switch OFF.
2) Insert T-adapter.
3) Start engine.</td></tr>
<tr><td>Engine oil level sensor</td><td>E05 (male)</td><td>Measure resistance</td><td>If the condition is as shown in the table below, it is normal.<table><tr><td>Engine oil level normal</td><td rowspan="2">Between (1) – chassis</td><td>Max. 1 Ω</td></tr><tr><td>Engine oil level abnormal</td><td>Min. 1 MΩ</td></tr></table></td><td>1) Turn starting switch OFF.
2) Disconnect terminal.</td></tr>
<tr><td>Dust indicator</td><td>R.H. B08 (male)
L.H. B06 (male)</td><td>Check continuity</td><td><table><tr><td>Air cleaner normal</td><td rowspan="2">Between (1) – (2)</td><td>20 – 30 V</td></tr><tr><td>Air cleaner clogged</td><td>Max. 5 V</td></tr></table></td><td>1) Turn starting switch OFF.
2) Insert T-adapter.
3) Start engine.</td></tr>
<tr><td>CHECK lamp and CAUTION lamp</td><td colspan="3">If the condition is as shown in the table below, monitor panel is normal.

Table 1 (CHECK lamp & CAUTION lamp)<table><tr><th>Connector No.</th><th>Monitor item (input connector)</th><th>Measurement</th><th>Display</th><th>Sensor signal input</th></tr><tr><td rowspan="16">L18 (male)</td><td rowspan="2">Engine coolant level ((8) – (3))</td><td rowspan="2">Engine stopped Starting switch ON</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr><tr><td rowspan="2">Engine oil level ((13) – (3))</td><td rowspan="2">Engine stopped Starting switch ON</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr><tr><td rowspan="2">Engine oil pressure ((10) – (3))</td><td rowspan="2">Engine start</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr><tr><td rowspan="2">Brake oil pressure ((11) – (3))</td><td rowspan="2">Engine start</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr><tr><td rowspan="2">Transmission oil filter ((16) – (3))</td><td rowspan="2">Engine start</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr><tr><td rowspan="2">Battery charge ((12) – (3))</td><td rowspan="2">Engine start</td><td>Flashing</td><td>Max. 10 V</td></tr><tr><td>Lighted off</td><td>Min. 12 V</td></tr><tr><td rowspan="2">Air cleaner ((14), (15) – (3))</td><td rowspan="2">Engine start</td><td>Flashing</td><td>15 – 20 V</td></tr><tr><td>Lighted off</td><td>Max. 1 V</td></tr></table></td><td>1) Connect T-adapter.</td></tr>
</table>

Testing/Adjusting item	Sym-bol	Part No.	Part name	Q'ty	Remarks
Troubleshooting for chassis sensors/wiring harnesses	Y	799-601-7140	• S adapter	1	For S8P
		799-601-7150	• S adapter (White)	1	For S10P
		799-601-7160	• S adapter (Blue)	1	For S12P (Does not include 799-601-8000)
		799-601-7180	• AMP040 adapter	1	For A8P (Only 799-601-7400)
		799-601-7190	• AMP040 adapter	1	For A12P (Does not include 799-601-7000 and 799-601-7100)
		799-601-7210	• AMP040 adapter	1	For A16P
		799-601-7220	• AMP040 adapter	1	For A20P
		799-601-7360	Relay adapter	1	For REL-5P
		799-601-7370	Relay adapter	1	For REL-6P
		799-601-7500	T-adapter assembly	1	
		799-601-7510	• 070 adapter	1	For 07-10P
		799-601-7520	• 070 adapter	1	For 07-12P
		799-601-7530	• 070 adapter	1	For 07-14P
		799-601-7540	• 070 adapter	1	For 07-18P
		799-601-7550	• 070 adapter	1	For 07-20P
		799-601-9300	T-adapter assembly	1	
		799-601-9350	• DRC adapter	1	For DRC-40
		799-601-9360	• DRC adapter	1	For DRC-24
Measuring coolant temperature and oil pressure	—	799-101-1502	Digital thermometer	1	–99.9 – 1,299°C
Measuring operating effort and pressing force		79A-264-0021	Push-pull scale	1	
		79A-264-0091	Push-pull scale	1	
Measuring stroke and hydraulic drift	—	Commercially available	Ruler	1	
Measuring work equipment speed	—	Commercially available	Stopwatch	1	
Measuring voltage and resistance	—	Commercially available	Circuit tester	1	

Measuring fuel return rate and leakage

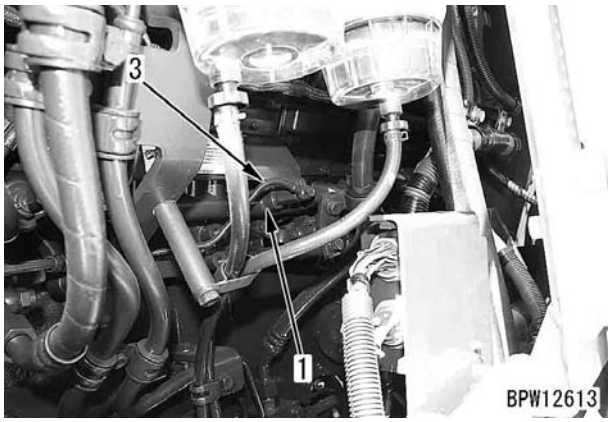
★ Measuring tools for fuel return rate and leakage

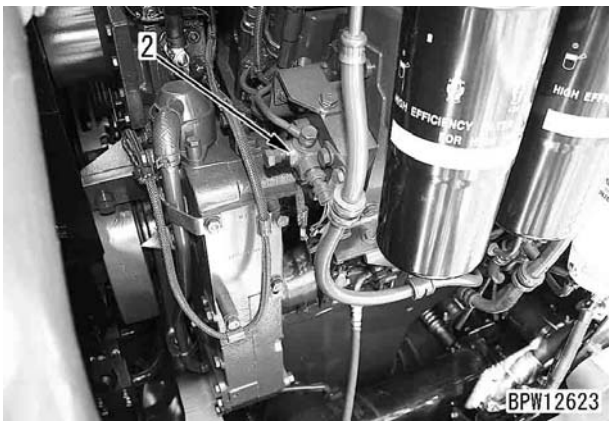
Symbol		Part No.	Part name
J	1	6151-51-8490	Spacer
	2	6141-71-1770	Joint
	3	Commercially available	Hose
	4	Commercially available	Hose
	5	Commercially available	Measuring cylinder
	6	Commercially available	Stopwatch
	7	07376-70315	Plug

★ Prepare an oil (receiving) pan of about 20 ℓ to receive the fuel flowing out during measurement.

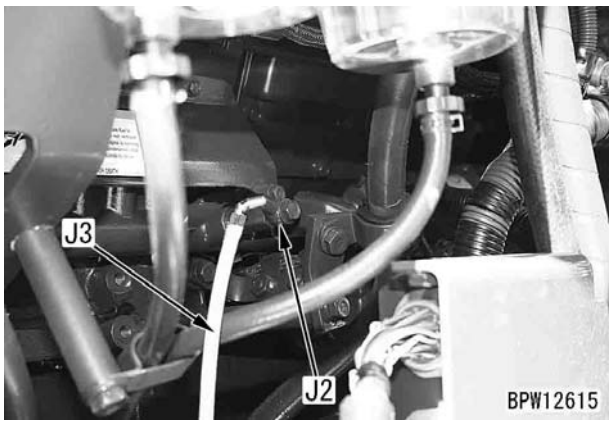
1. Preparation work

1) Remove tube (3) between common rail (1) and block (2).
2) Insert spacer **J1** on block (2) side and tighten the removed joint bolt again.
   ★ Connect the return piping to the fuel tank again.
   ★ Be sure to fit the gaskets to both ends of the spacer.





3) Insert spacer **J2** on common rail (1) side and tighten the removed joint bolt again. Be sure to fit the gaskets to both ends of the spacer.
4) Connect test hose **J3** to the end of joint **J2**.
   ★ Bind the connecting part of the test hose with a wire etc. to prevent it from coming off.
   ★ The above is the preparation work for measuring the leakage from the pressure limiter.



Procedure for operating emergency steering spool when transmission valve fails

Outline

★ The transmission valve is controlled electrically. Therefore, the emergency manual spool is installed to enable the machine to be moved if there is any failure in the electrical system, or in the solenoid valve and spool.

⚠ **The emergency manual spool is for use when failure in the transmission control prevents the machine from being moved. It allows the machine to be moved from a dangerous place to a place where repairs can be carried out safety.**
The emergency manual spool must never be used except when the transmission control has broken down.

⚠ **When operating the emergency manual spool, follow the correct order of operation exactly, and pay full attention to safety when moving the machine.**

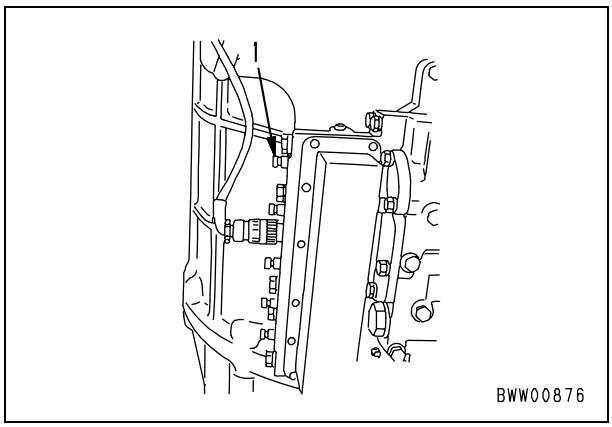
⚠ **To prevent the machine from moving, lower the bucket to the ground, apply the parking brake, and block the wheels.**

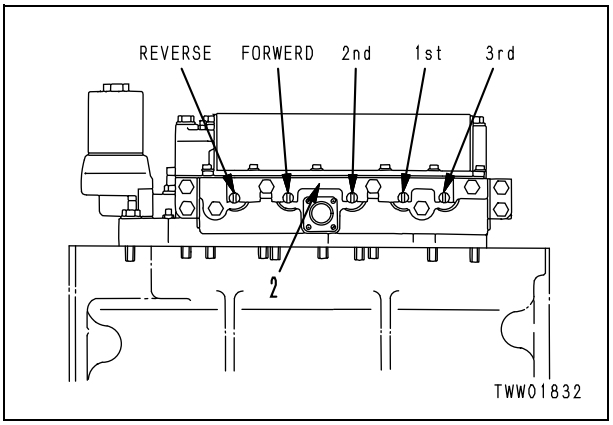
⚠ **Always stop the engine before operating spool.**

Operation

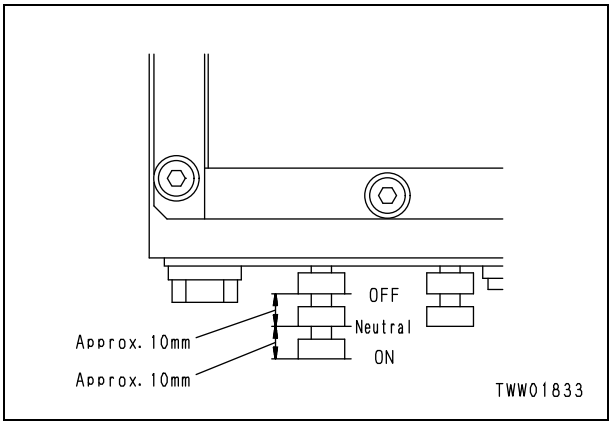
1. Open cover on upper side of transmission.

2. Remove lock plate (2) of emergency manual spool (1) of the transmission valve.
   ★ Simply loosen the mounting bolts to remove the lock plate (2).





3. Decide the direction to move the machine (forward or in reverse), then move the emergency manual spool to the operating position.
   FORWARD: Rotate FORWARD clutch spool and 1st spool counterclockwise, and pull out approx. 10 mm to the operating position.
   REVERSE: Rotate REVERSE clutch spool and 1st spool counterclockwise, and pull out approx. 10 mm to the operating position.



Bleeding air from steering circuit

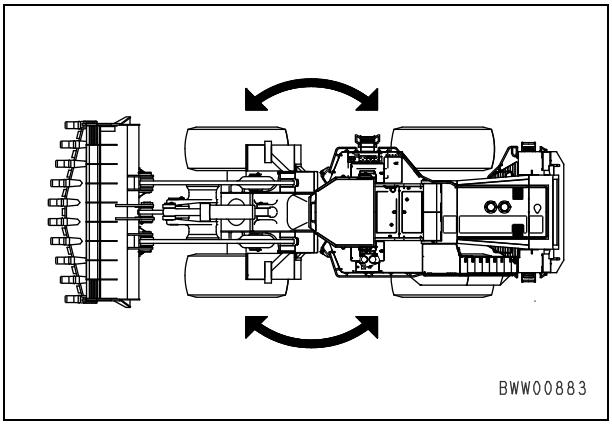
★ Bleed the air from the circuit as follows if the steering valve or steering cylinder have been removed and installed again.

1. Start the engine and run at idle for approx. 5 minutes.

2. Run the engine at low idle and turn 4 – 5 times to the left and right in turn.
   ★ Operate the piston rod to approx. 100 mm before the end of its stroke. Be careful not to relieve the circuit.

3. Repeat Step 2 with the engine at full throttle.

4. Run the engine at low idle and operate the piston to the end of its stroke to relieve the circuit.



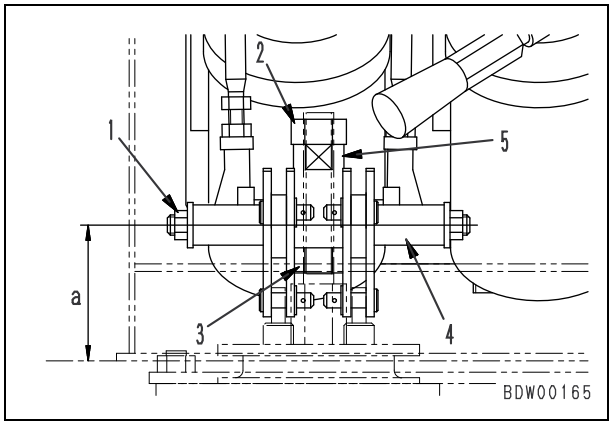
Adjusting PPC valve linkage

1. Remove cover at the bottom of the work equipment control lever.

2. Adjust dimension (a) from nut (1) of the PPC valve linkage to the top surface of the floor.
   - Dimension (a) (target value): 54 mm

3. Loosen nuts (2) and (3), then adjust the installed height of trunnion (5) so that there is no play in lever (4).

4. After adjusting, tighten nuts (2) and (3).



WA800, 900-3E0 Wheel loader

Form No. SEN02156-02

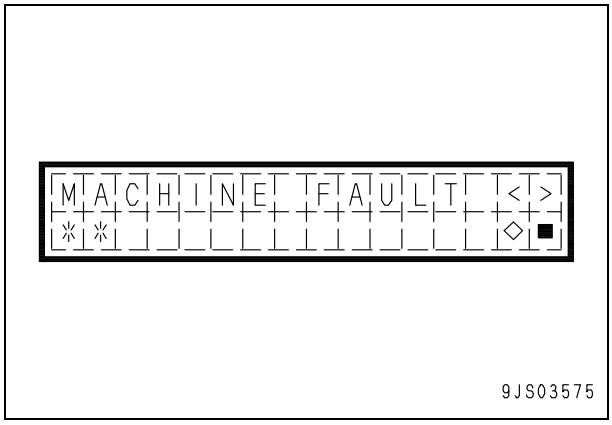
3. Mechanical system fault history display function (MACHINE FAULT)

The machine monitor records the past failures in the mechanical system as the failure codes. The failure codes are displayed from the following operations.

3-1. Selecting the menu

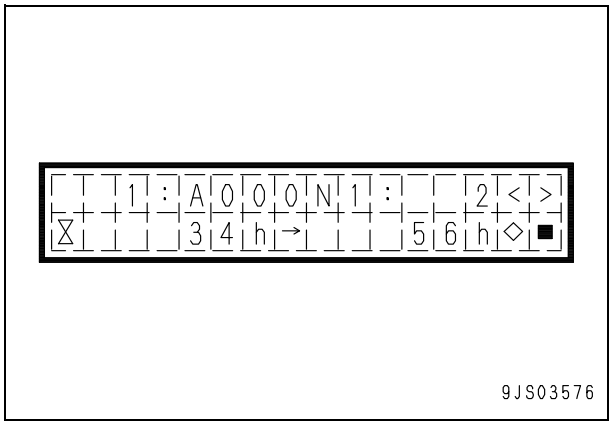
★ Select MACHINE FAULT from the menu screen of Service mode.

★ [**] field displays total number of the fault history currently recorded.



3-2. Displaying fault history

Press [◇] switch while the menu is selected to display the recorded fault history.



3-3. Displayed fault history

The mechanical system fault history display function displays the following information.

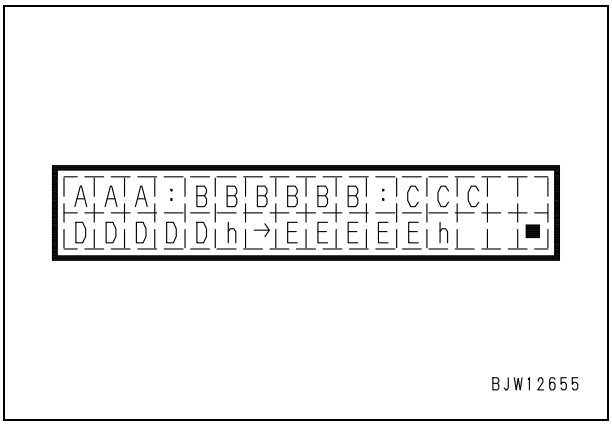
A: Record number
B: Failure code (Location code in four digits + Problem code in two digits)
C: Number of occurrences (number of occurrences of same code in past)
D: Elapsed time 1 (Elapsed time on service meter from the first occurrence)
E: Elapsed time 2 (Elapsed time on service meter from the last occurrence)

★ The code of a failure currently occurring is indicated in flashing.

★ For details of a displayed failure code, see “Failure code list” of the failure code display function.

★ Note that part of the information displayed from the mechanical system fault history display function and the failure code display function is not identical.

★ When the requested fault history is not recorded, [-] is indicated in the display space.



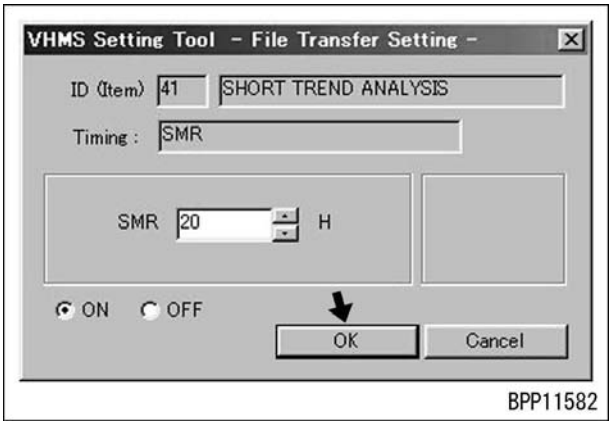
3-4. Switching fault history display

Pressing [<] or [>] switch while a set of fault history is on the screen displays another set of recorded fault history.

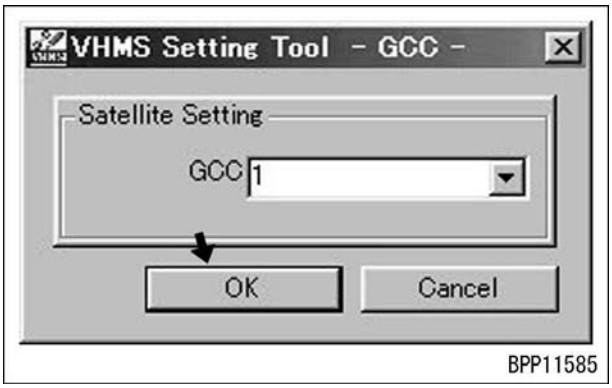
3-5. Deleting fault history (Not available)

The fault history of the mechanical system is not deletable.

9) When modifying the setting of [SHORT TREND ANALYSIS], employ the following procedure.
   1] Select [SHORT TREND ANALYSIS] from the screen and then press [Edit] button in the lower left side of [File Transfer Setting] block to display the setup screen.
   2] Correct the setting and, as it is completed, press [OK] button.
      ★ In the initial setting, enter [20h] to [SMR] and then set the function to ON.

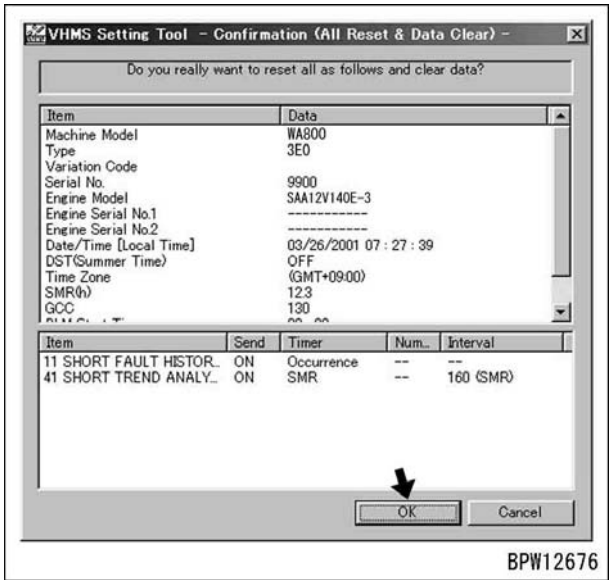


10) When modifying the setting of [Satellite Setting], employ the following procedure.
   1] Press [Edit] button in the [Satellite Setting] block to display the correction screen.
   2] Set the GCC code to the region applied and, as setting is completed, press [OK] button.

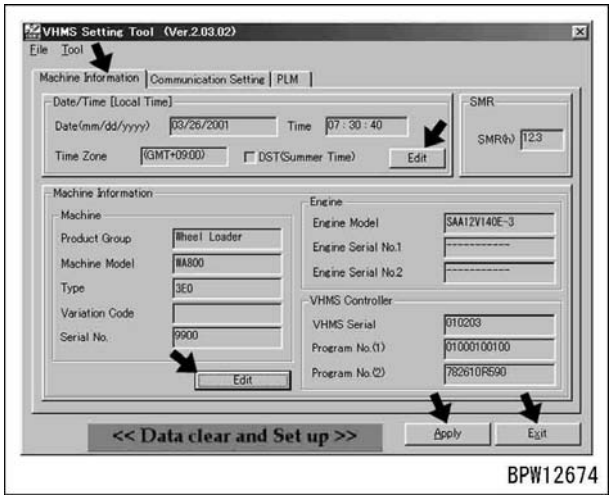


GCC Code	Area	Remarks
1	N.America (*1) C.S.Americas Faroe Islands	*1: Except U.S. Territories in Micronesia and Midway Island
120	Europe (*2) Middle East Asia(*3) Africa Oceania CIS	*2: Except Faroe Islands *3: Except Japan
130	Japan	

11) As every data in [Communication Setting] has been checked and corrected, press [Apply] button to settle the setting.
   ★ As [Apply] button is pressed, a message confirming above setting will appear on the screen. Check the setting again and, if the setting is correct, press [OK] button.



12) As every data in [Machine Information] and [Communication Setting] has been checked and corrected, press [Exit] button to end [VHMS initial setting tool].



[For storage]
VHMS Initial Setting Work Check Sheet

Date of setting:	
DB/branch office name	
Data entered by:	

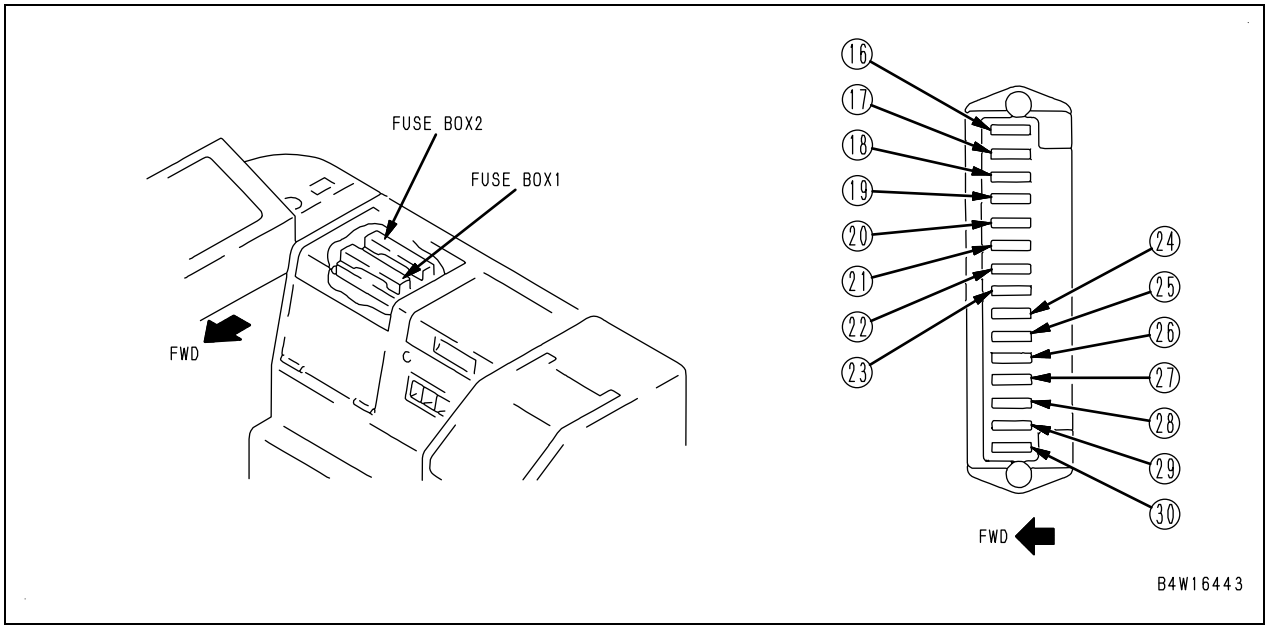
Setup step		Check item	Result	
1	Confirmation of machine body and component nameplates	Model name		
		Serial No.		
		Engine serial No.		
		Transmission controller serial No.		
		VHMS controller serial No.		
2	Connection between PC and VHMS controller	Is the connection secure?	yes	no
3	VHMS controller check for normal operation	Is it operating normally? (Displays counting in ascending-order succeeding to rotation)	yes	no
4	Starting of VHMS initial setting tool	Is “Data Clear and Set up” selected for the setting tool mode?	yes	no
5	Initial setting of VHMS controller (Setting of machine body information) In this step, basic machine body information are set on VHMS controller	Is model name identical with machine body?	yes	no
		Is machine body serial No. correctly entered?	yes	no
		Is engine serial No. correctly entered?	yes	no
		Is today's date entered?	yes	no
		Is current time entered?	yes	no
		Is SMR correctly entered?	yes	no
6	Saving of settings	Is LED (7-segment) turned off?	yes	no
7	Confirmation of VHMS function	Is LED operation normal?	yes	no
8	Execution of quick Pm	Is service mode “SNAPSHOT” turned on and is the switch hit?	yes	no
9	Data storing operation on VHMS	Is LED (7-segment) turned off?	yes	no
10	Download	Is LED operation normal?	yes	no
11	Confirmation of download data	Are all files downloaded?	yes	no
		The time downloaded (Reference wrist watch)	Hour, minute:	
		[Confirmation of data]		
		Is [MFA0] error present in Fault History?	yes	no
		Are SMR and time in Fault History consistent with settings?	yes	no
		Is any data missing in Snap Shot0?	yes	no
12	Data storing operation on VHMS	Is LED (7-segment) turned off?	yes	no

Failure code table

1. Failure code by engine service monitor

Failure codes	Failure contents	Applicable equipment	Action code	History classification	Reference manual
15B0NX	Transmission oil filter: Clogging	VH, MT	—	Electrical system	Troubleshooting by failure code (Display of code) (Part 1) SEN02144-01
AA1ANX	Air cleaner L.H: Clogged	VH, MT	—	Electrical system	
AA1BNX	Air cleaner R.H: Clogged	VH, MT	—	Electrical system	
AB00L4	Alternator: Failure on battery charge circuit (R terminal signal is present and engine is stopped)	PLC	E01	Electrical system	
AB00L6	Alternator: Failure on battery charge circuit (R terminal signal is present and engine is stopped)	ESM	E03	Electrical system	
AB00MA	Alternator: Failure on battery charge circuit (Absence of R terminal signal and detection error)	ESM	E03	Electrical system	
AB00MB	Alternator: Failure on battery charge circuit (Absence of R terminal signal and detection error)	PLC	E01	Electrical system	
AB00MC	Alternator: Failure on battery charge circuit (Absence of R terminal signal and detection error	VH, MT	—	—	
B@BAZK	Engine oil: Oil level low	VH, MT	—	—	
B@BAZG	Engine oil: Low oil pressure	VH, MT	—	—	
B@BCZK b@BCZK	Radiator coolant: Low coolant level	VH, MT	—	—	
B@BDNS	Engine: Overheating	VH, MT	—	—	
B@C6NS	Front brake oil temperature: Overheating	VH, MT	—	—	
B@CENS	Torque converter oil temperature overheating	VH, MT	—	—	
B@JFZG	Brake oil: Low oil pressure	VH, MT	—	—	
CA111	Engine controller (Left bank)	ENG	E03	Electrical system	Troubleshooting by failure code (Display of code) (Part 2) SEN02145-01
CB111	Engine controller (Right bank)	ENG	E03	Electrical system	
CA115	Engine NE/Bkup speed sensor abnormality (Left bank)	ENG	E03	Electrical system	
CB115	Engine NE/Bkup speed sensor abnormality (Right bank)	ENG	E03	Electrical system	
CA122	Charge pressure sensor abnormally high level (Only left bank)	ENG	E03	Electrical system	
CA123	Charge pressure sensor abnormally low level (Only left bank)	ENG	E03	Electrical system	
CA131	Throttle sensor high error (Only left bank)	ENG	E03	Electrical system	
CA132	Throttle sensor low error (Only left bank)	ENG	E03	Electrical system	
CA135	Oil pressure sensor abnormally high level (Only left bank)	ENG	E01	Electrical system	
CA141	Oil pressure sensor abnormally low level (Only left bank)	ENG	E01	Electrical system	
CA144	Coolant temperature sensor abnormally high level (Only left bank)	ENG	E02	Electrical system	
CA145	Coolant temperature sensor abnormally low level (Only left bank)	ENG	E01	Electrical system	
CA153	Charge temperature sensor abnormally high level (Only left bank)	ENG	E01	Electrical system	
CA154	Charge temperature sensor abnormally low level (Only left bank)	ENG	E01	Electrical system	
CA187	Sensor power supply (2) abnormally low level (Left bank)	ENG	E03	Electrical system	
CB187	Sensor power supply (2) abnormally low level (Right bank)	ENG	E03	Electrical system	
CA212	Engine oil temperature sensor abnormally high level (Only left bank)	ENG	E01	Electrical system	
CA213	Engine oil temperature sensor abnormally low level (Only left bank)	ENG	E01	Electrical system	

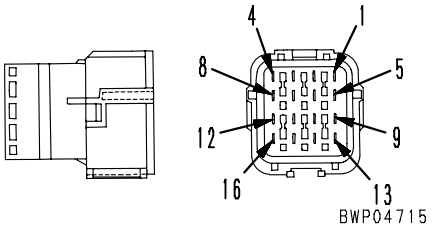
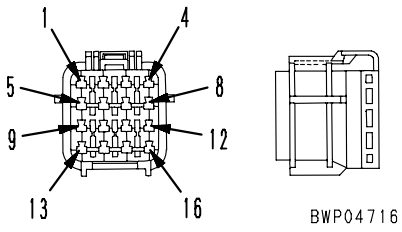
Location and connection table for fuse box 2



★ Numbers in the circle indicate the corresponding fuse numbers shown in the circuit diagram of respective failure codes.

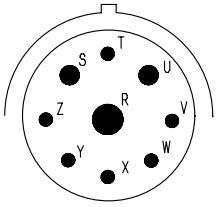
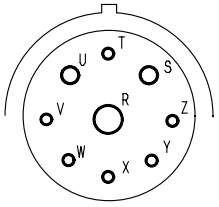
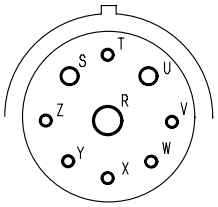
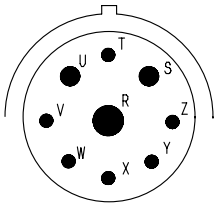
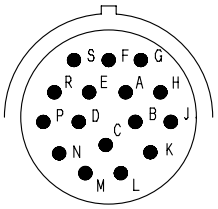
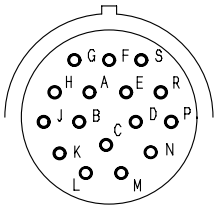
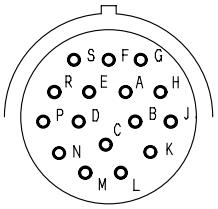
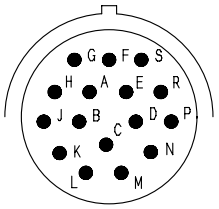
- **Fuse box 2**

Type of power supply	Breaker and fuse output	Fuse No.	Capacity of fuse	Destination of circuit
Switch power supply	SBF1 (80 A)	(16)	20 A	Front working lamp
		(17)	20 A	Rear working lamp
		(18)	30 A	Air conditioner A (Condenser)
		(19)	20 A	Air conditioner B (Blower)
		(20)	20 A	Wiper and washer
		(21)	10 A	Transmission controller
		(22)	10 A	Cigarette lighter and radio
		(23)	30 A	Rear heat-resistant glass
		(24)	20 A	Side working lamp
		(25)	10 A	Auto grease B (if equipped)
		(26)	20 A	Power window L.H.
		(27)	20 A	Power window R.H.
		(28)	10 A	Air suspension seat and active working
		(29)	10 A	Spare 1 DC converter (if equipped)
		(30)	5 A	Engine controller

No. of pins	SWP type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
16	 BWP04715	 BWP04716	799-601-7320
	Part No. : 08055-11681	Part No. : 08055-11691	
—	Terminal part No. : ·Electric wire size: 0.85 ·Grommet: Black ·Q'ty: 20	Terminal part No. : ·Electric wire size: 0.85 ·Grommet: Black ·Q'ty: 20	—
—	Terminal part No. : ·Electric wire size: 1.25 ·Grommet: Red ·Q'ty: 20	Terminal part No. : ·Electric wire size: 1.25 ·Grommet: Red ·Q'ty: 20	—

9JS04892

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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
24-9 (5)	Pin (male terminal)	Socket (female terminal)	799-601-9250
	 BWP05017	 BWP05018	
	Part No. :08191-51201, 08191-51202	Part No. :08191-54101, 08191-54102	
	Socket (female terminal)	Pin (male termial)	799-601-9250
	 BWP05019	 BWP05020	
	Part No. :08191-52201, 08191-52202	Part No. :08191-53101, 08191-53102	
24-16 (6)	Pin (male terminal)	Socket (female terminal)	799-601-9260
	 BWP05021	 BWP05022	
	Part No. :08191-61201, 08191-62202, 08191-61205, 08191-62206	Part No. :08191-64101, 08191-64102, 08191-64105, 08191-64106	
	Socket (female terminal)	Pin (male termial)	799-601-9260
	 BWP05023	 BWP05024	
	Part No. :08191-62201, 08191-62202, 08191-62205, 08191-62206	Part No. :08191-63101, 08191-63102, 08191-63105, 08191-63106	

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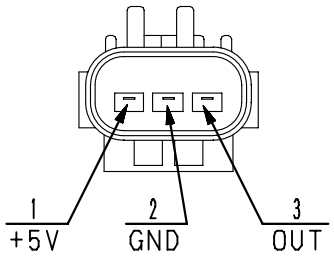
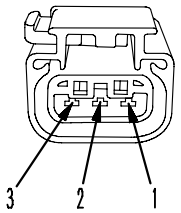
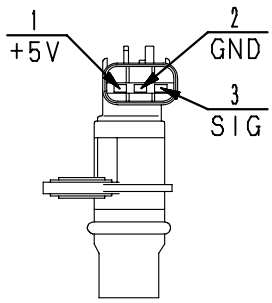
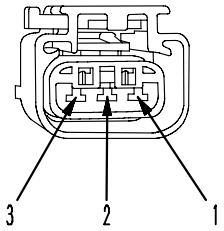
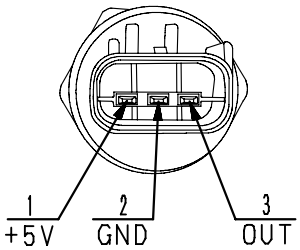
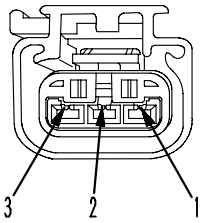
FRAMATOME connector for engine

No. of pins	Ambient pressure sensor (107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
3			799-601-4140 (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

No. of pins	NE speed sensor (95, 107, 114, 125, 140, 170, 12V140 engine) and CAM sensor (95, 107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
3			799-601-4130 (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

No. of pins	EGR gas pressure sensor (125, 140 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
3			799-601-4180 (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

BJH13180

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	4	Defective diode	1) Turn the starting switch OFF. 2) Disconnect D21, then carry out troubleshooting with D21 being turned OFF (measurement in the diode range).			
			Between D21 (male) (3) (+) – (2) (–)	Continuity	Forward direction: The diode has conductivity. Reverse direction: The diode does not have conductivity.	
			Between D21 (male) (1) (+) – (2) (–)	Continuity	Forward direction: The diode has conductivity. Reverse direction: The diode does not have conductivity.	
	5	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn the starting switch OFF. 2) Disconnect D21, B06, VC05 and L18, then carry out troubleshooting with their connection being turned OFF.			
			Between VC05 (female) (1) – D21 (female) (3)		Resistance	Max. 1 Ω
			Between D21 (female) (2) – L79 (female) (3)		Resistance	Max. 1 Ω
			Between FS2 (female) (9) – L79 (female) (1)		Resistance	Max. 1 Ω
			Between B06 (female) (1) – L79 (female) (2)		Resistance	Max. 1 Ω
			Between B06 (female) (2) and chassis ground		Resistance	Max. 1 Ω
			Between L18 (female) (15) – D21 (female) (1)		Resistance	Max. 1 Ω
	6	Grounding fault in wiring harness (Short circuit with ground circuit)	1) Turn the starting switch OFF. 2) Disconnect D21, B06, VC05 and L18, then carry out troubleshooting with their connection being turned OFF.			
			Wiring harness between VC05 (female) (1) – D21 (female) (3) and chassis ground		Resistance	Max. 1 Ω
			Wiring harness between D21 (female) (2) – L79 (female) (3) and chassis ground		Resistance	Max. 1 Ω
			Wiring harness B06 (female) (1) – L79 (female) (2) and chassis ground		Resistance	Max. 1 Ω
			Wiring harness between L18 (female) (15) – D21 (female) (1) and chassis ground		Resistance	Max. 1 Ω
	7	Defective VHMS controller	1) Turn the starting switch OFF. 2) Connect T-branch to connector VC05. 3) Turn starting switch ON.			
			Between VC05 (1) and chassis ground	Air cleaner is normal	Voltage	Max. 1 V
				Clogging on air cleaner	Voltage	20 – 30 V

Failure code [B@BAZK] (Engine oil: Oil level low)

Action code	Failure code	Trouble	Engine oil: Oil level low (VHMS controller system and maintenance monitor system)
—	**B@BAZK**		
Contents of trouble	• The engine oil level switch signal circuit was opened (disconnected from ground wire).		
Action of controller	• Turns on the maintenance caution lamp.		
Problem that appears on machine	• If machine is operated as it is, engine may be seized.		
Related information	• Detection is unavailable when the engine coolant temperature is 60°C or above. • The error is reset when engine is started. • VHMS controller will send the failure code to the engine service monitor. • Low engine oil level is checked with “D-IN-9” of monitoring code: **40945** (Low oil level: 1, Normal: 0).		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Low engine oil level	• Engine oil level is normal			
			★ If engine oil level is low, check surroundings of the engine for leakage of oil before adding oil.			
	2	Defective engine oil level switch	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between E05 (male) (1) – (2)	Engine oil level is normal	Resistance	Max. 1 Ω
				Engine oil level is low	Resistance	Min. 1 MΩ
	3	Defective diode	1) Turn the starting switch OFF. 2) Disconnect D18, then carry out troubleshooting with D18 being turned OFF (measurement in the diode range).			
			Between D18 (female) (3) (+) – (2) (–)	Continuity	Forward direction: The diode has conductivity. Reverse direction: Not conducted	
			Between D18 (female) (1) (+) – (2) (–)	Continuity	Forward direction: Conducted Reverse direction: The diode does not have conductivity.	
	4	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. 2) Disconnect D18, E05, VC05 and L18, then carry out trouble-shooting with their connection being turned OFF.			
			Between VC05 (female) (5) – D18 (female) (3)	Resistance	Max. 1 Ω	
			Between D18 (female) (2) and chassis ground	Resistance	Max. 1 Ω When engine oil level is normal	
			Between L18 (female) (13) – D18 (female) (1)	Resistance	Max. 1 Ω	
	5	Defective VHMS controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting			
			Between VC05 (5) and chassis ground	Engine oil level is normal	Voltage	Max. 1 V
				Engine oil level is low	Voltage	20 – 30 V

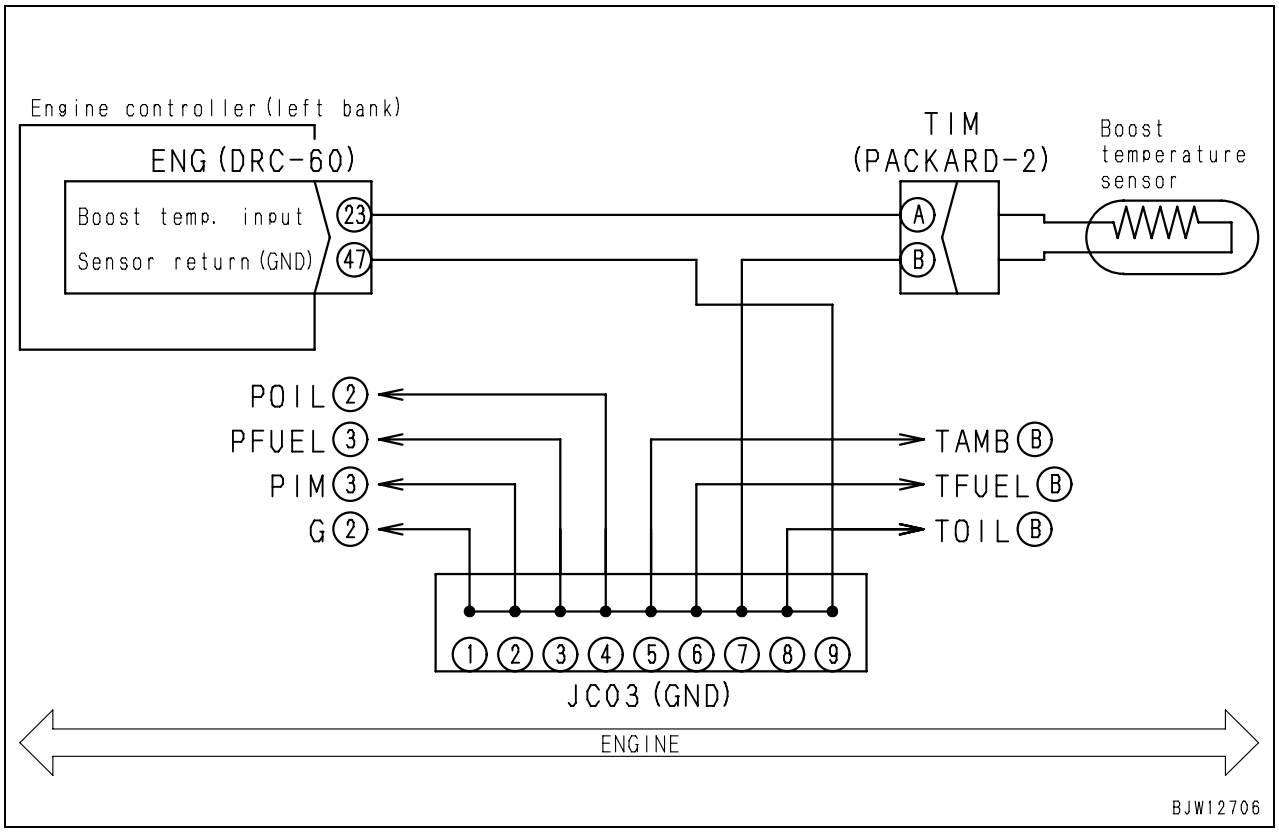
	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	4	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn the starting switch OFF. 2) Disconnect D17, VC05, L18, BC04, BC06 and BC07, then carry out troubleshooting with their connection being turned OFF.		
			Between VC05 (female) (8) – D17 (female) (3)	Resistance	Max. 1 Ω
			Between D17 (female) (2) – BC04 (female) (1)	Resistance	Max. 1 Ω
			Between BC04 (female) (2) – BC05 (female) (1)	Resistance	Max. 1 Ω
			Between BC05 (female) (2) – BC06 (female) (1)	Resistance	Max. 1 Ω
			Between BC06 (female) (2) – BC07 (female) (1)	Resistance	Max. 1 Ω
			Between BC07 (female) (2) and chassis ground	Resistance	Max. 1 Ω
			Between L18 (female) (11) – D17 (female) (1)	Resistance	Max. 1 Ω
	5	Grounding fault in wiring harness (Short circuit with ground circuit)	1) Turn the starting switch OFF. 2) Disconnect D17, VC05, L18, BC04, BC06 and BC07, then carry out troubleshooting with their connection being turned OFF.		
			Between VC05 (female) (8) – D17 (female) (3) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between D17 (female) (2) – BC04 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between BC07 (female) (1), BC06 (female) (1) – BC05 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between L18 (female) (11) – D17 (1) and chassis ground	Resistance	Min. 1 MΩ
	6	Defective VHMS controller	1) Turn the starting switch OFF. 2) Disconnect VC05 and connect T-branch. 3) Start the engine and carry out troubleshooting.		
			Between VC05 (female) (8) and chassis ground	Voltage	Max. 1 V

Failure code [CA123] Charge pressure sensor too low (At left bank only): Excessively low voltage detected

Action code	Failure code	Symptom of failure	Charge pressure sensor too low (At left bank only): Excessively low voltage detected (Engine controller system)
E03	**CA123**		
Failure content	• Excessively low voltage is detected at circuit of charge pressure (boost pressure) sensor.		
Controller's action	• Operate with a fixed charge pressure (boost pressure) (400 kPa {4.1 kg/cm^2}). • Flashes warning lamp and turns on alarm buzzer.		
Symptoms that appear on machine	• Acceleration performance of engine deteriorates.		
General information	• The signal of the charge pressure (boost pressure) can be checked with the monitoring function. (Code: **36500 (kPa) (absolute pressure)**, **36502 (V)**) • Duplication of failure code: turn ON the starting switch.		

Possible causes and the standard values when normal	Cause		Standard values when normal and remarks for troubleshooting
	1	Defective sensor power source circuit	If failure code [**CA187**] is displayed at the same time, carry out troubleshooting for it first.

Circuit diagram related to charge temperature sensor



Failure code [CA238] Abnormal power source for Ne speed sensor (At left bank only): Excessively low voltage detected

Action code	Failure code	Symptom of failure	Abnormal power source for Ne speed sensor (At left bank only): Excessively low voltage detected (Engine controller system)
E03	**CA238**		
Failure content	• Excessively low voltage is detected at Ne speed sensor power supply (5V) circuit.		
Controller's action	• Controls using Bkup speed sensor signal. • Flashes warning lamp and turns on alarm buzzer.		
Symptoms that appear on machine	• Engine stops during operation (when Bkup speed sensor is defective at the same time). • Engine cannot be started while stopping (when Bkup speed sensor is defective at the same time).		
General information			

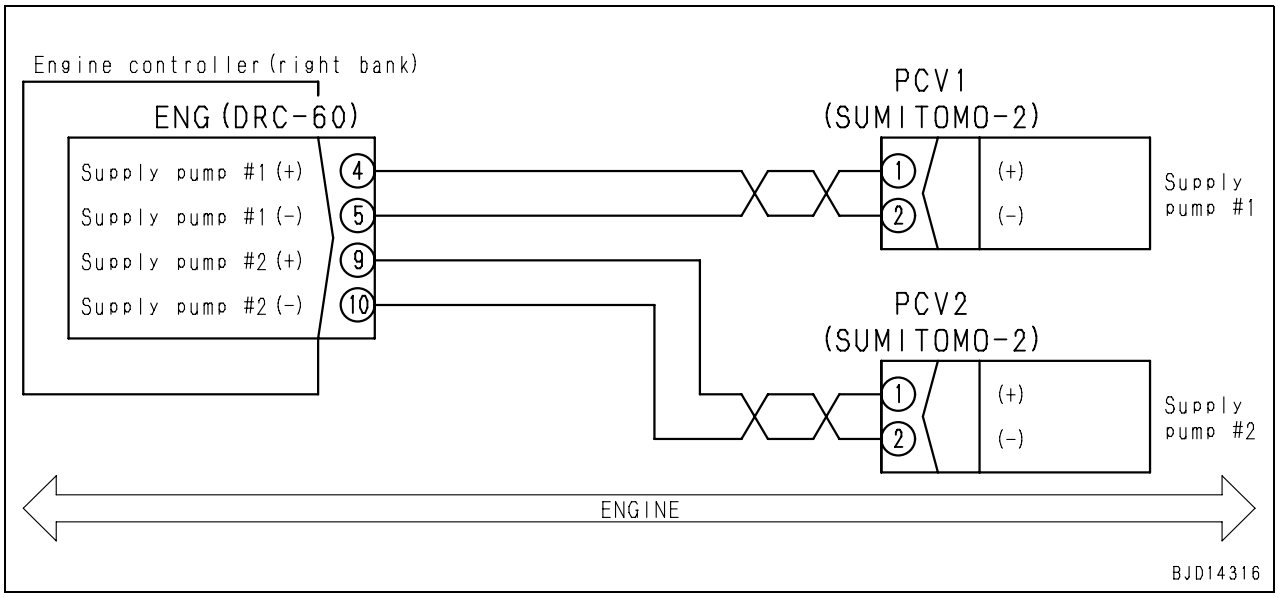
	Cause		Standard values when normal and remarks for troubleshooting			
Possible causes and the standard values when normal	1	Defective Ne speed sensor (internal defect)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Disconnect a device shown on the right. If the failure code disappears, that device is internally defective.	Ne speed sensor	Ne connector	
	2	Disconnection in wiring harness (disconnection or defective contact of connectors)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Wiring harness between left bank ENG (female) (16) – Ne (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between left bank ENG (female) (48) – Ne (female) (2)		Resistance	Max. 1 Ω
	3	Defective harness grounding (contact with ground circuit)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Between ground and wiring harness between left bank ENG (female) (16) – Ne (female) (1)		Resistance	Min. 1 MΩ
			Between ground and wiring harness between left bank ENG (female) (48) – Ne (female) (2)		Resistance	Min. 1 MΩ
	4	Harness short (Harness internal short)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Between wiring harness from left bank ENG (female) (16) to Ne (female) (1) and wiring harness from left bank ENG (female) (48) to Ne (female) (2)		Resistance	Min. 1 MΩ
	5	Defective engine controller	★ Prepare with starting switch OFF and diagnose with starting switch ON.			
			Left bank ENG	Voltage		
			Between (16) – (48)	4.75 – 5.25 V		

Failure code [CB274] PCV2 disconnection (Right bank): Disconnection

Action code	Failure code	Symptom of failure	PCV2 disconnection (Right bank): Disconnection (Engine controller system)
E03	**CB274**		
Failure content	• Disconnection occurred in supply pump PCV2 circuit.		
Controller's action	• Blinks warning lamp and sounds alarm buzzer.		
Symptoms that appear on machine			
General information	• While engine is running, normally pulse voltage of approx. 24 V is supplied to PCV2 (1), but the voltage cannot be measured with a tester because of pulse voltage.		

	Cause		Standard values when normal and remarks for troubleshooting		
Possible causes and the standard values when normal	1	Defective supply pump PCV2 (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			PCV2 (male)	Resistance	
			Between (1) – (2)	2.3 – 5.3 Ω	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (10) – PCV2 (female) (2)	Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (9) – PCV2 (female) (1)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (10) – PCV2 (female) (2)	Resistance	Min. 1 MΩ
	4	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
			Between (9) – (10)	2.3 – 5.3 Ω	
			Between (9), (10) – ground	Min. 1 MΩ	

Circuit diagram related to supply pump PCV2



Failure code [CA332] Injector No. 4 (L/B No.4) system disconnection or short circuit (At left bank): Disconnection, short circuit

Action code	Failure code	Symptom of failure	Injector No. 4 (L/B No.4) system disconnection or short circuit (At left bank): Disconnection, short circuit (Engine controller system)
E03	**CA332**		
Failure content	• A disconnection or short circuit has occurred in injector No. 4 circuit.		
Controller's action	• Flashes warning lamp and turns on alarm buzzer.		
Symptoms that appear on machine	• Output decreases. • Speed is not stable.		
General information	• While engine is running, normally pulse voltage of approx. 70 V is supplied to the positive (+) side of the injector, but the voltage cannot be measured with a tester because of pulse voltage.		

	Cause		Standard values when normal and remarks for troubleshooting			
Possible causes and the standard values when normal	1	Defective injector No. 4 (internal defect)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			CN4 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) and ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (disconnection or defective contact of connectors)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Wiring harness between ENG (female) (56) – CN4 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (58) – CN4 (female) (2)	Resistance	Max. 1 Ω	
	3	Defective harness grounding (contact with ground circuit)	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			Between ground and wiring harness between ENG (female) (56) – CN4 (female) (1)	Resistance	Min. 1 MΩ	
			Between ground and wiring harness between ENG (female) (58) – CN4 (female) (2)	Resistance	Min. 1 MΩ	
	4	Defective another cylinder injector or wiring harness	If multiple failure codes are displayed for injector malfunction, carry out troubleshooting for them, too.			
	5	Defective engine controller	★ Prepare with starting switch OFF and diagnose with starting switch still OFF.			
			ENG (female)	Resistance		
			Between (56) – (58)	0.4 – 1.1 Ω		
			Between (56), (58) and ground	Min. 1 MΩ		

Possible causes and the standard values when normal	Cause		Standard values when normal and remarks for troubleshooting			
	6	Defective engine controller L bank	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			EM1 Between (11) – (32)	Signal name IVS 1	Voltage	See Fig. 1
			EM1 Between (1) – (32)	Signal name IVS 2		
			Between EM1 (22) – (33)		Voltage	4.75 – 5.25 V

Circuit diagram related

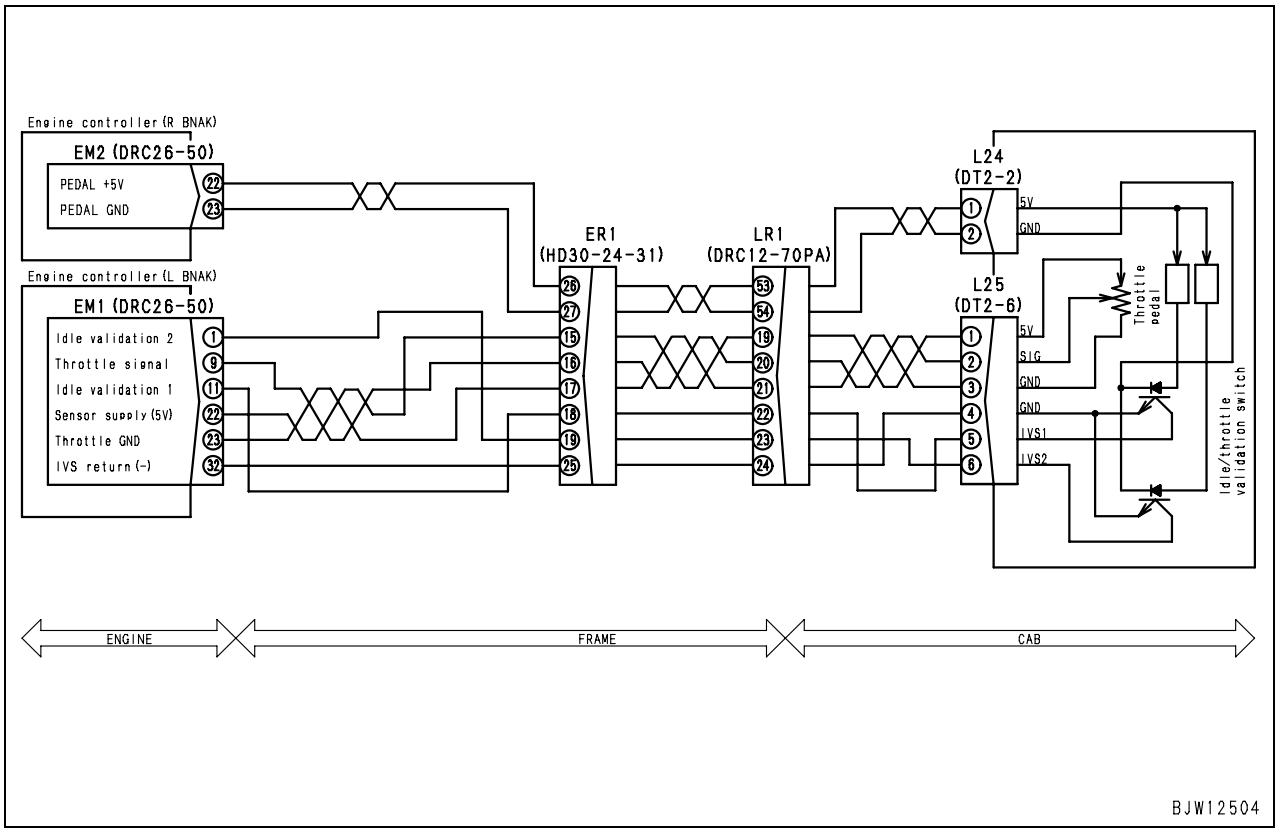
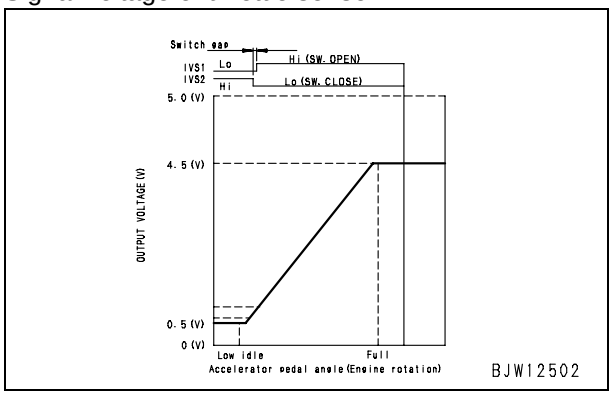


Fig. 1
Signal voltage of throttle sensor



Output voltage (V): Signal name **SIG** ··· pin (2) of L25
Lo: Switch circuit is closed
Hi: Switch circuit is open
Switch gap: Hysterical area of IVS1 and IVS2

Check sheet for no-pressure feed

Model	**WA800-3E0**	Operation No.	
Model and serial No.	#	Date inspected	/ /
Engine		Service meter	h
Engine serial No.	#	Worker's name	

A. Visual inspections		Pass	Fail
1	Fuel leakage to outside		
2	Clogged fuel tank breather		

B. Inspections with monitor panel (failure history, monitoring, and reduced cylinder mode operation)							Pass	Fail
3	Checking failure codes	/ / / /						
4	Checking monitoring information							
	Code	Display item	Condition for inspection	Unit	Standard value (reference value)	Measured value	Pass	Fail
	*1	Engine speed	Low idle	rpm	620 – 700			
			High idle	rpm	2,100 – 2,175			
			Equivalent to rating	rpm	2,000			
	*2	Throttle speed	Low idle	%	0			
			High idle	%	100			
	*3	Command for fuel injection rate	Equivalent to rating	mm^3	—		—	—
	*4	Command for common rail pressure	Equivalent to rating	MPa				
	*5	Fuel pressure in common rail	Equivalent to rating	MPa				
	*6	Command for fuel injection timing	Low idle	CA	—		—	—
			High idle	CA	—		—	—
			Equivalent to rating	CA	—		—	—
	*7	Boost pressure	Equivalent to rating	kPa	—		—	—
	*8	Coolant temperature (high temperature)	Low idle	°C	—		—	—
	*9	Coolant temperature (low temperature)	Low idle	°C	—		—	—
	*10	Fuel temperature	Low idle	°C	—		—	—
5	Checking reduced cylinder mode operation (engine speed)							
	Function	Cut-out cylinder	Condition for inspection	Unit	Standard value (reference value)	Measured value	Pass	Fail
	*11	Cylinder No. 1	Low idle	rpm	—		—	—
		Cylinder No. 2	Low idle	rpm	—		—	—
		Cylinder No. 3	Low idle	rpm	—		—	—
		Cylinder No. 4	Low idle	rpm	—		—	—
		Cylinder No. 5	Low idle	rpm	—		—	—
		Cylinder No. 6	Low idle	rpm	—		—	—

C. Inspection of pressure in fuel circuit		Condition for inspection	Unit	Standard value (reference value)	Measured value	Pass	Fail
6	Pressure in fuel low pressure circuit	At high idle or under the load equivalent to rating (stalling)	MPa {kg/cm^2}	Min. 0.15 {Min. 1.5}			

WHEEL LOADER

WA800-3E0
WA900-3E0

Machine model	Serial number
WA800-3E0	70001 and up
WA900-3E0	60001 and up

40 Troubleshooting

Troubleshooting by failure code (Display of code), Part 4

Failure code [CB1549] Injector #8 (R/B #2) system disconnection/short circuit (Right bank): Disconnection/Short circuit

Action code	Failure code	Symptom of failure	Injector #8 (R/B #2) system disconnection/short circuit (Right bank): Disconnection/Short circuit (Engine controller system)
E03	**CB1549**		
Failure content	• Disconnection or short circuit occurred in injector #8 circuit.		
Controller's action	• Blinks warning lamp and sounds alarm buzzer.		
Symptoms that appear on machine	• Output lowers. • Engine speed is unstable.		
General information	• While engine is running, normally pulse voltage of approx. 70 V is supplied to the positive (+) side of the injector, but the voltage cannot be measured with a tester because of pulse voltage.		

	Cause		Standard values when normal and remarks for troubleshooting			
Possible causes and the standard values when normal	1	Defective injector #8 (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			CN2 (male)	Resistance		
			Between (1) – (2)	0.4 – 1.1 Ω		
			Between (1), (2) – ground	Min. 1 MΩ		
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (54) – CN2 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (51) – CN2 (female) (2)	Resistance	Max. 1 Ω	
	3	Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (54) – CN2 (female) (1)	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (51) – CN2 (female) (2)	Resistance	Min. 1 MΩ	
	4	Defective injector of another cylinder or defective wiring harness	If failure codes of 1 or more injectors are displayed, carry out troubleshooting for them.			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			ENG (female)	Resistance		
			Between (54) – (51)	0.4 – 1.1 Ω		
			Between (54), (51) – ground	Min. 1 MΩ		

Failure code [CA2249] Loss of pressure feed from supply pump (2) (At left bank): Loss of pressure feed detected

Action code	Failure code	Symptom of failure	Loss of pressure feed from supply pump (2) (At left bank): Loss of pressure feed detected (Engine controller system)
E03	**CA2249**		
Failure content	• Loss of pressure feed (level 2) occurred in the common rail circuit.		
Controller's action	• Operates with limited output. • Flashes warning lamp and turns on alarm buzzer.		
Symptoms that appear on machine	• Engine is hard to start. • Exhaust gas color becomes black. • Output decreases.		
General information	• Common rail pressure can be checked with the monitoring function. (Code: **36400 (MPa), 36402 (V)** Common rail pressure (left bank)))		

Possible causes and the standard values when normal	Cause		Standard values when normal and remarks for troubleshooting
	1	Carry out troubleshooting of [**CA559**].	

Failure code [CB2249] Loss of pressure feed from supply pump (2) (At right bank): Loss of pressure feed detected

Action code	Failure code	Symptom of failure	Loss of pressure feed from supply pump (2) (At right bank): Loss of pressure feed detected (Engine controller system)
E03	**CB2249**		
Failure content	• Loss of pressure feed (level 2) occurred in the common rail circuit.		
Controller's action	• Operates with limited output. • Flashes warning lamp and turns on alarm buzzer.		
Symptoms that appear on machine	• Engine is hard to start. • Exhaust gas color becomes black. • Output decreases.		
General information	• Common rail pressure can be checked with the monitoring function. (Code: **36403 (MPa), 36404 (V)** Common rail pressure (right bank))		

Possible causes and the standard values when normal	Cause		Standard values when normal and remarks for troubleshooting
	1	Carry out troubleshooting of [**CB559**].	

Failure code [D1EFKA] (Pre-lubrication start relay output system: Disconnection)

Action code	Failure code	Trouble	Pre-lubrication start relay output system: Disconnection (Pre-lubrication controller system)
E03	**D1EFKA**		
Contents of trouble	• When pre-lubricating engine, pre-lubrication controller first turns the pre-lubrication start relay ON. However, the controller failed to turn the pre-lubrication start relay ON, and it was judged as disconnection (Pre-lubrication start relay (connector PRE5) primary (coil) side: Disconnection).		
Action of controller	• Turns the pre-lubrication relay output OFF. • Turns the preheating relay output OFF. • Turns the engine start relay OFF. • After detecting error, the relay will not reset itself unless starting switch is turned OFF once.		
Problem that appears on machine	• Pre-lubrication disabled • The engine does not start. • Preheating disabled		
Related information	• Engine can be started by bypassing pre-lubrication controller. 1) Disconnect connectors PRE2 and PRE1 from near pre-lubrication controller (in the vicinity of lower front cover of right console). 2) Connect PRE1 female connector and PRE2 male connector. • The output state (ON/OFF) of the pre-lubrication start relay can be checked with the monitoring code: **40974**, "D-OUT-1" (1: ON, 0: OFF).		

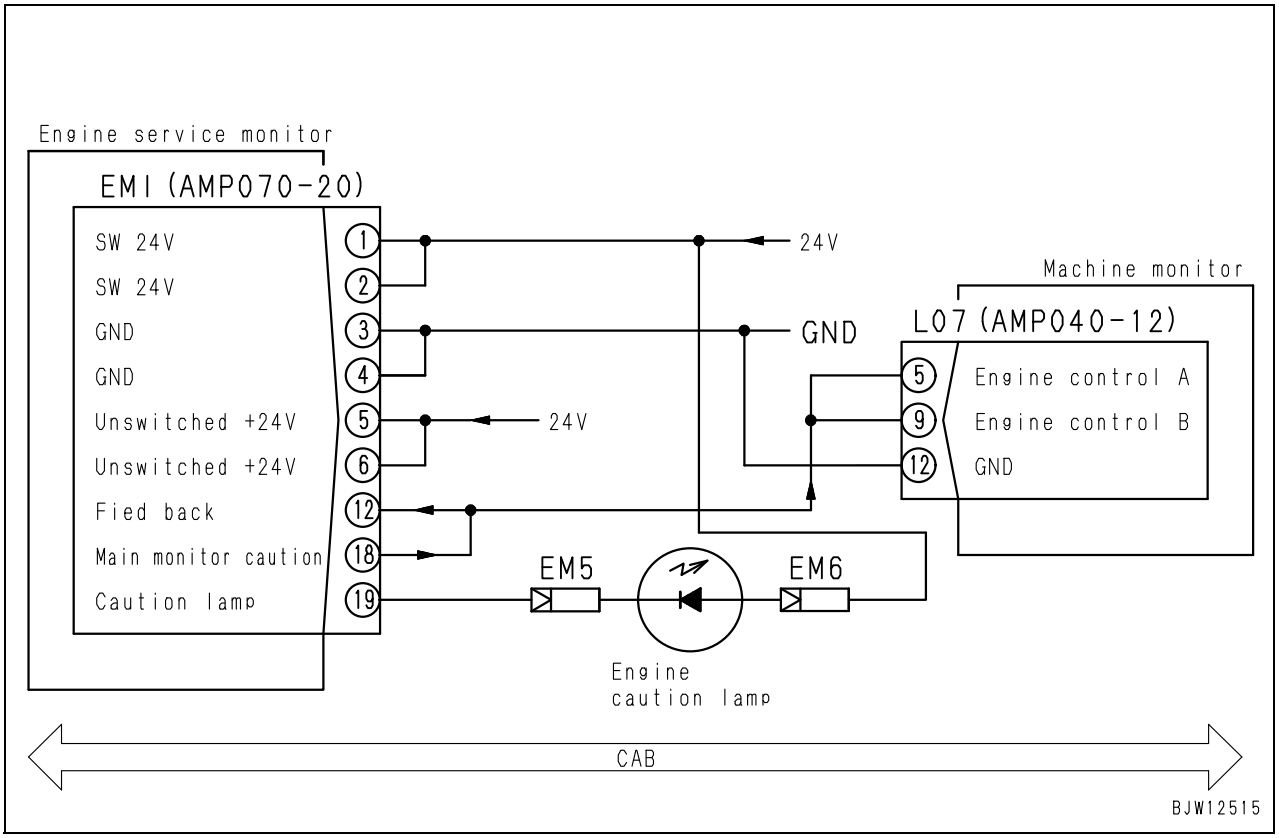
	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective pre-lubrication start relay	1) Turn the starting switch OFF. 2) Disconnect pre-lubrication start relay (PRE5) and carry out troubleshooting.		
			Between pre-lubrication start relay PRE5 (male) (1) – (2)	Resistance	290 Ω ± 10%
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn the starting switch OFF. 2) Disconnect connector PRE6 and carry out troubleshooting.		
			Between PRE6 (female) (19) – (40)	Resistance	290 Ω ± 10%
	3	Defective pre-lubrication controller	If causes 1 – 2 are not detected, pre-lubrication controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Failure code [D5ZSKB] (Machine monitor communication output: Grounding fault)

Action code	Failure code	Trouble	Machine monitor communication output: Grounding fault (Engine service monitor system)
E03	**D5ZSKB**		
Contents of trouble	• Communication was disabled between engine service monitor and machine monitor, and it was judged as grounding fault.		
Action of controller	• Flashes engine caution (warning) lamp.		
Problem that appears on machine	• Engine service monitor information cannot be displayed on machine monitor.		
Related information	• When E03 and E02 occur among the engine controller, pre-lubrication controller and engine service monitor errors, engine service monitor sends pulse signal for 12 seconds ON (0 V) and 6 seconds OFF (24 V) in repetition from connector EM1 (18). • Engine service monitor and machine monitor have feedback signals and they detect the warning signal when it fails to match (detection in 3 sec) their feedback signals. (Engine service monitor feedback signal: EM1 (12): 24 V pullup)		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Ground fault in wiring harness (Contact with ground circuit)	1) Turn the starting switch OFF. 2) Disconnect connector EM1 and carry out troubleshooting.		
			Between EM1 (female) (12) and chassis ground	Resistance	Min. 1 MΩ
	2	Defective engine service monitor	If cause 1 is not detected, engine service monitor may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Related electrical circuit diagram



Failure code [DBB5KP] (or VHMS LED display: "n9" → "04", VHMS controller sensor power supply (5 V): Low output voltage)

Action code	Failure code	Trouble	VHMS sensor power supply (5 V): Low output voltage (VHMS controller system)
–	**DBB5KP**		
Contents of trouble	• The sensor supply voltage (5 V) is out of the normal range (4.5 – 5.5 V).		
Action of controller	• None in particular.		
Problem that appears on machine	• The system may not work properly.		
Related information	• The LED of the VHMS controller displays "n9" → "04".		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect connectors VC01, V22, V23 and V32, then carry out troubleshooting.		
			Between VC01 (female) (4) – V22 (female) (B)	Resis-tance	Max. 1 Ω
			Between V22 (female) (B) – V23 (female) (B)	Resis-tance	Max. 1 Ω
			Between V22 (female) (A) – V23 (female) (A)	Resis-tance	Max. 1 Ω
			Between V22 (female) (A) and chassis ground	Resis-tance	Max. 1 Ω
			Between VC01 (female) (5) – V32 (female) (B)	Resis-tance	Max. 1 Ω
			Between V32 (female) (A) and chassis ground	Resis-tance	Max. 1 Ω
	2	Ground fault in wiring harness (Contact with ground circuit)	1) Turn starting switch OFF. 2) Disconnect connectors VC01, V22, V23 and V32, then carry out troubleshooting.		
			Between VC01 (female) (4) – (11)	Resis-tance	Min. 1 MΩ
			Between VC01 (female) (5) – (11)	Resis-tance	Min. 1 MΩ
	3	Defective brake oil pressure sensor (Internal disconnection or short circuit)	1) Turn starting switch OFF. 2) Disconnect connector V22. 3) Turn starting switch ON and carry out troubleshooting.		
			This failure code will not appear.		
			1) Turn starting switch OFF. 2) Disconnect connector V23. 3) Turn starting switch ON and carry out troubleshooting.		
			This failure code will not appear.		
	4	Defective blow-by pressure sensor (Internal disconnection or short circuit)	1) Turn starting switch OFF. 2) Disconnect connector V32. 3) Turn starting switch ON and carry out troubleshooting.		
			This failure code will not appear.		
	5	Defective VHMS controller	1) Turn starting switch OFF. 2) Disconnect connector VC01 and connect T-branch. 3) Turn starting switch ON and carry out troubleshooting.		
			Between VC01 (female) (4), (5) – (11)	Voltage	4.5 – 5.5 V

Failure code [DGH2KX] (Hydraulic oil temperature sensor: Out of input signal range (short))

Action code	Failure code	Trouble	Hydraulic oil temperature sensor: Out of input signal range (short) (VHMS controller system)
–	**DGH2KX**		
Contents of trouble	• Hydraulic oil temperature sensor signal is out of normal range.		
Action of controller	• None in particular.		
Problem that appears on machine	• Monitor panel hydraulic oil temperature meter may not display data normally.		
Related information	• State of hydraulic oil temperature can be checked with monitoring code: **04407 (°C)**. • Method of reproducing failure code: Turn the starting switch ON or start engine.		

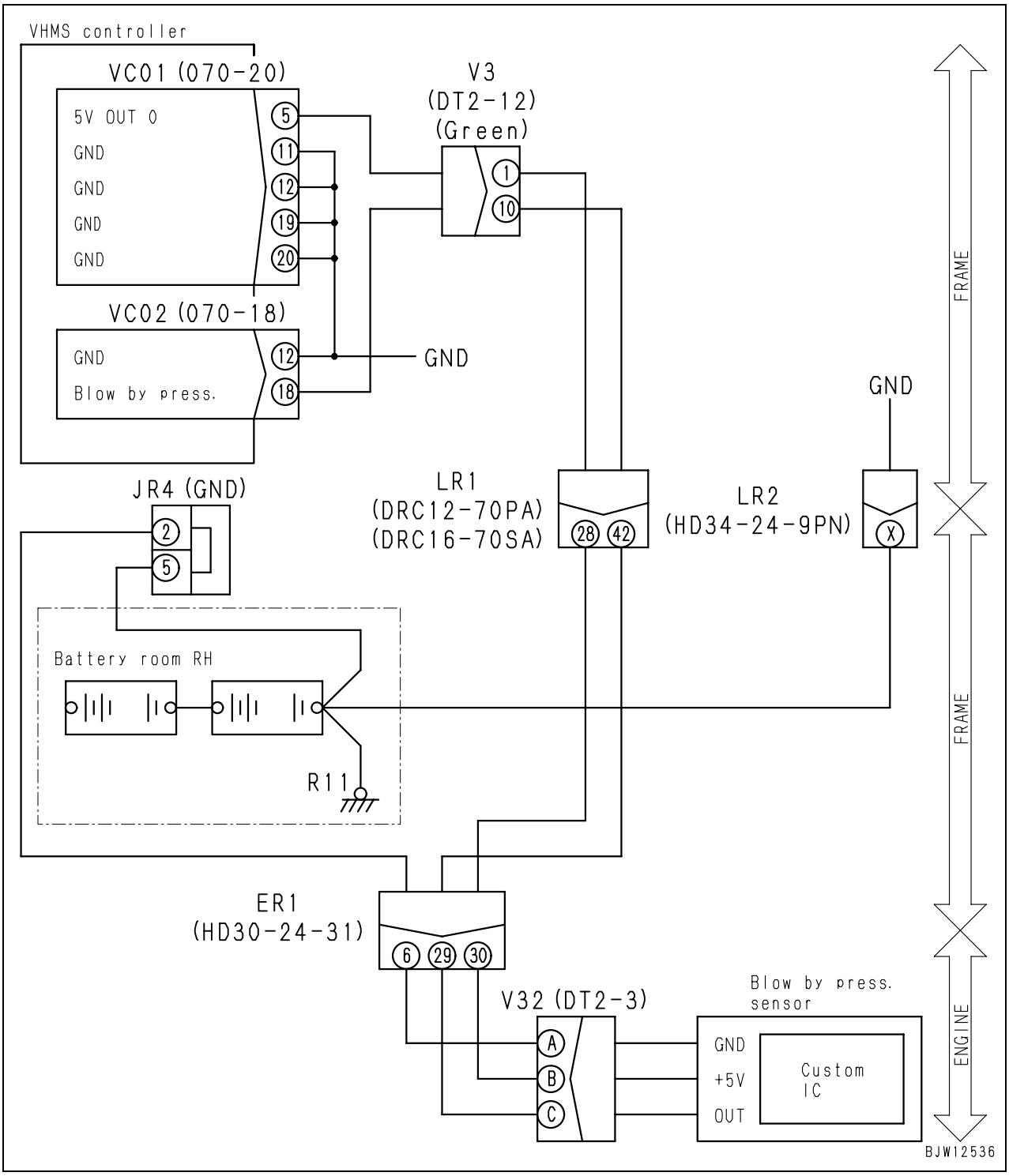
	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			V24 (male)	Resistance	
			Between (1) – (2)	1.6 k – 48 kΩ (130 – 25°C)	
			Between (1) and chassis ground	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector) (Reference)	1) Turn starting switch OFF. 2) Disconnect VC02 and V24 and carry out troubleshooting.		
			Wiring harness between VC02 (female) (11) – V24 (female) (1)	Resis-tance	Max. 1 Ω
			Wiring harness between VC02 (female) (12) – V24 (female) (2)	Resis-tance	Max. 1 Ω
	3	Ground fault in wiring harness (Contact with ground circuit)	1) Turn starting switch OFF. 2) Disconnect VC02 and V24 and carry out troubleshooting.		
			Wiring harness between VC02 (female) (11) – V24 (female) (1) and chassis ground	Resis-tance	Min. 1 MΩ
	4	Defective VHMS controller	1) Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			VC02 (female)	Resistance	
			Between (11) – (12)	1.6 k – 48 kΩ (130 – 25°C)	

Failure code [dGT5KB] (or VHMS LED display: "n3" → "21", L.H. bank exhaust gas temperature sensor system (Rear): Hot short circuit)

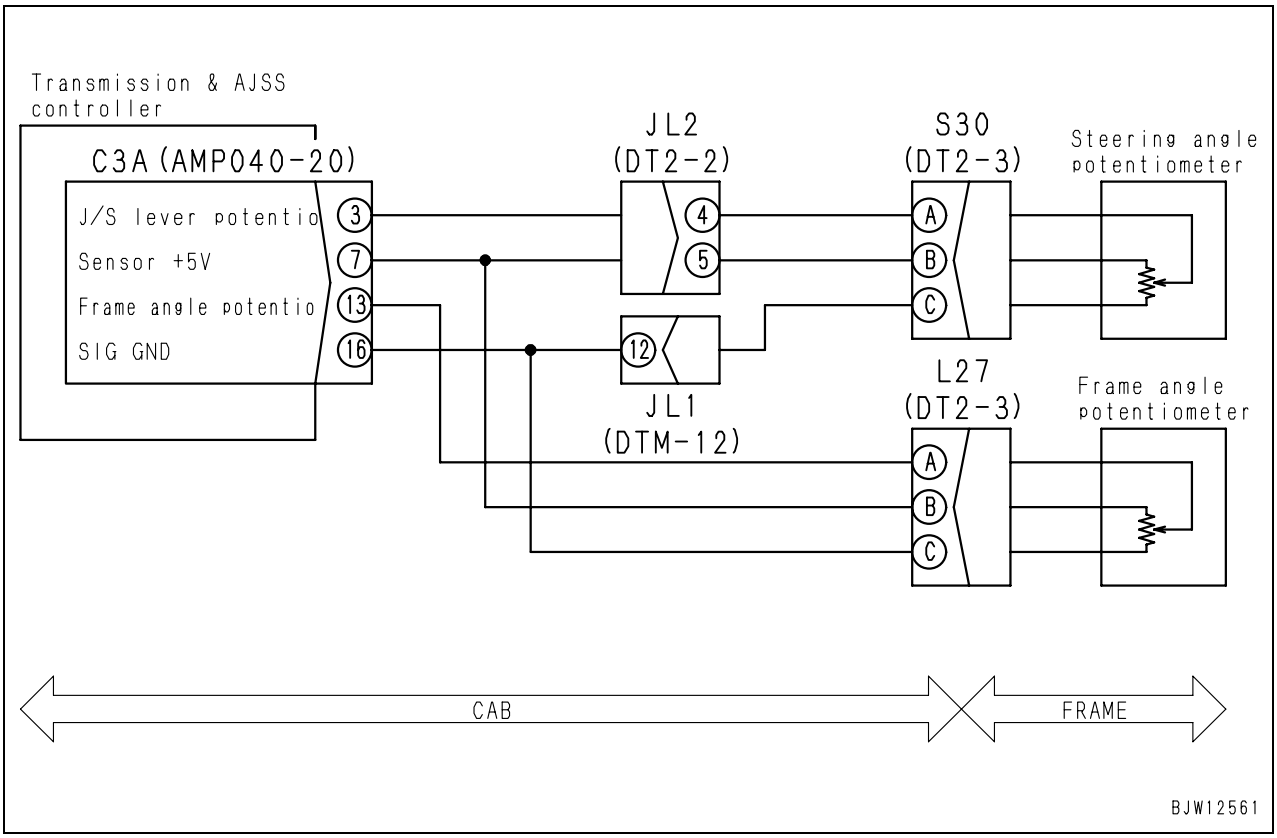
Action code	Failure code	Trouble	L.H. bank exhaust gas temperature sensor system (rear): Hot short circuit (VHMS controller system)
–	**dGT5KB**		
Contents of trouble	• L.H. bank exhaust gas temperature sensor signal voltage is 4.9 V or higher.		
Action of controller	• None in particular.		
Problem that appears on machine	• Monitoring function cannot monitor the L.H. bank exhaust gas temperature.		
Related information	• The LED of the VHMS controller displays "n3" → "21". • 24 V power supply, GND: Refer to failure code [**DBB6KP**].		

	Cause		Standard value in normal state/Remarks on troubleshooting				
Possible causes and standard value in normal state	1	Defective L.H. bank exhaust gas temperature sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.				
			L.H. bank exhaust gas temperature sensor is replaced but condition does not become normal.			Exhaust gas temperature sensor is normal.	
			When L.H. bank exhaust gas temperature sensor is replaced, condition becomes normal.			Exhaust gas temperature sensor is abnormal.	
	2	Defective amplifier for L.H. bank exhaust gas temperature sensor	1) Turn starting switch OFF. 2) Insert T-branch to V41. 3) Turn starting switch ON and carry out troubleshooting. 4) Start engine and carry out troubleshooting.				
			Between V41 (A) – (C)			Voltage	20 – 30 V
			Between V41 (B) – (C)	Before starting engine.	20°C	Voltage	About 0.9 – 1.2 V
				Start engine (no load)	500°C	Voltage	About 2.6 – 3.5 V
	3	Hot short circuit in wiring harness (Contact with 24 V circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.				
			Wiring harness between VC02 (female) (16) – V41 (female) (B) and V41 (female) (A)			Resistance	Min. 1 MΩ
	4	Defective VHMS controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting				
			Between VC01 (2) – (11)			Voltage	20 – 30 V
			1) Turn starting switch OFF. 2) Insert T-branch to VC02. 3) Turn starting switch ON and carry out troubleshooting. 4) Start engine and carry out troubleshooting.				
			VC02	Exhaust temperature		20 – 30 V	
			Between (16) – (12)	Before starting engine.	20°C	About 0.9 – 1.2 V	
				Start engine (no load)	500°C	About 2.6 – 3.5 V	

Related electrical circuit diagram



Related electrical circuit diagram



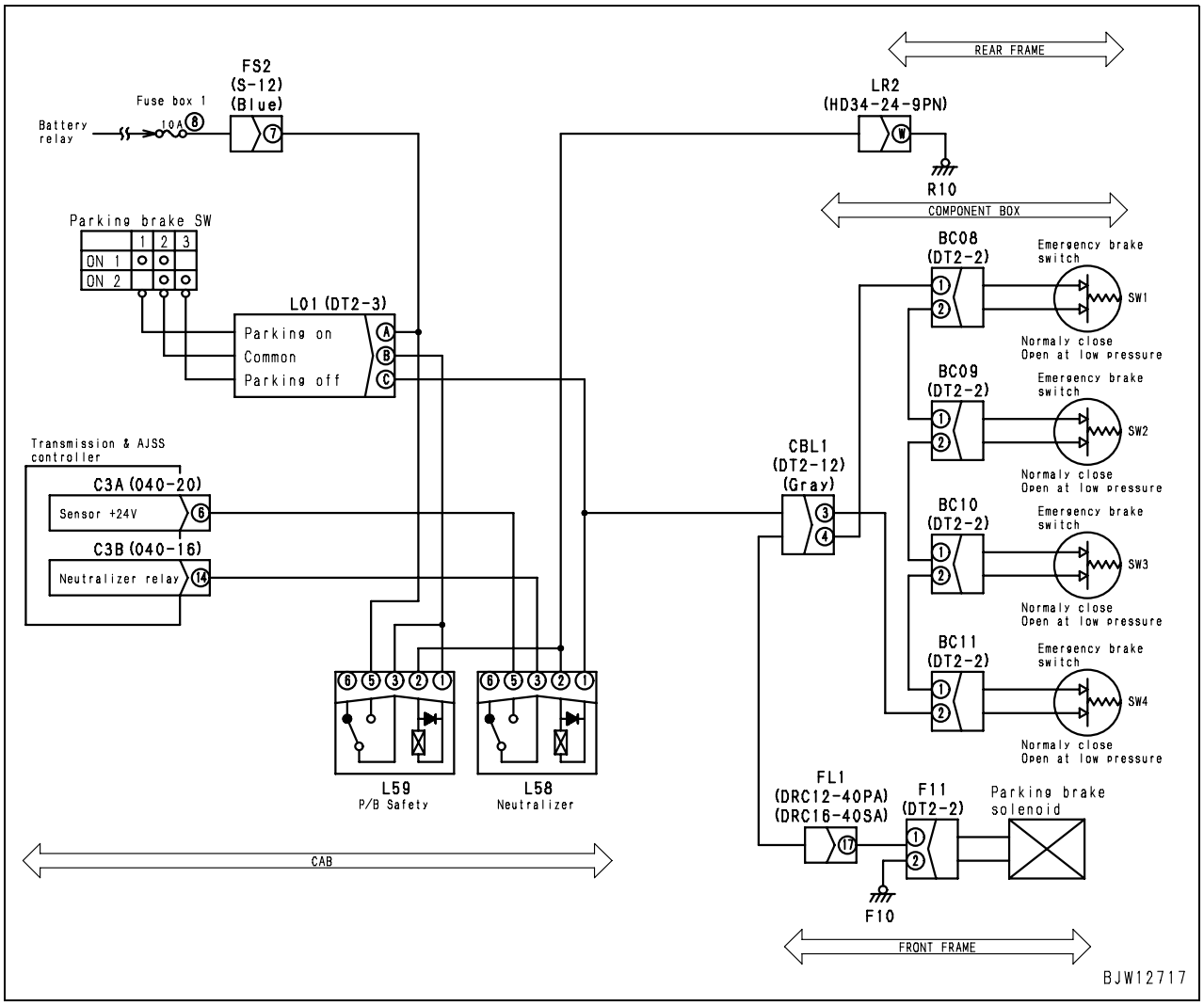
Failure code [DXH7KZ] (or TM & AJSS controller LED display [13], abnormality in R solenoid system: Disconnection, short circuit or hot short circuit)

Action code	Failure code	Trouble	Abnormality in R solenoid system error: Disconnection, short circuit or hot short circuit (Transmission & AJSS controller system)
CALL	**DXH7KZ**		
Contents of trouble	• R solenoid is abnormal (disabled to turn ON or OFF).		
Action of controller	• Neutral (F, R, 1, 2, 3 speed solenoid output: OFF)		
Problem that appears on machine	• Travel disabled		
Related information	• LED indication on transmission & AJSS controller: "13" • Failure code is sent to engine service monitor via VHMS controller.		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective R solenoid	1) Turn starting switch OFF. 2) Disconnect T01 and carry out troubleshooting.			
			Between T01 (C) – (A)	Resis-tance	5 – 15 Ω (Coil resistance)	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect C1. 3) Turn starting switch ON and carry out troubleshooting.			
			Between C1 (female) (9) – (6)	Resis-tance	5 – 15 Ω (Coil resistance)	
			Between C1 (female) (6), (12) and chassis ground (R11)	Resis-tance	Max. 1 Ω	
	3	Ground fault in wiring harness (Contact with ground circuit)	1) Turn starting switch OFF. 2) Disconnect C1 and T01. 3) Turn starting switch OFF and carry out troubleshooting.			
			Between C1 (female) (9) – (6)		Resis-tance	Min. 1 MΩ
	4	Hot short circuit in wiring harness (Contact with power supply circuit)	1) Turn starting switch OFF. 2) Disconnect C1 and T01. 3) Turn the starting switch ON (without starting the engine) and carry out troubleshooting.			
			Between C1 (female) (9) – (6)		Voltage	Max. 1 V
	5	Defective transmission & AJSS controller	1) Turn starting switch OFF. 2) Disconnect C1 and insert T-branch. 3) Turn the starting switch ON (without starting the engine) and carry out troubleshooting.			
			Between C1 (9) – (6)		Voltage	Max. 1 V

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	9	Defective FNR (directional) switch (Internal disconnection or short circuit)	★ Check whether failure code [**DDK3KZ**] or transmission and AJSS controller LED display "20" is displayed. If displayed, carry out troubleshooting of failure code [**DDK3KZ**] first.		
	10	Defective shift up/down switch (Internal disconnection or short circuit)	★ Check whether failure code [**DDK5KZ**] or transmission and AJSS controller LED display "21" is displayed. If displayed, carry out troubleshooting of failure code [**DDK5KZ**] first.		
	11	Defective neutral safety relay (L57) (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L57 (Male)	Resistance	
			Between (1) – (2)	200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch to START and carry out troubleshooting.		
			When neutral safety relay (L57) is replaced with a relay of the same type, if the condition becomes normal, the neutral safety relay is defective.		
	12	Defective steering lever neutral safety relay (L95) (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L95 (Male)	Resistance	
			Between (1) – (2)	200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch to START and carry out troubleshooting.		
			When steering lever neutral safety relay (L95) is replaced with a relay of the same type, if the condition becomes normal, the steering lever neutral safety relay is defective.		
	13	Defective engine start (PRE4) (Internal defect) ★ Only when pre-lubrication controller is equipped	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			PER4 (male)	Resistance	
			Between (1) – (2)	200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch to START and carry out troubleshooting.		
			When engine start relay (PRE4) is replaced with a relay of the same type, if the condition becomes normal, the engine start relay is defective.		
	14	Defective transmission and AJSS controller (power source)	Carry out troubleshooting referring to "E-3 transmission and AJSS controller power source system".		
	15	Defective pre-lubrication controller (power source)	Carry out troubleshooting referring to [**DBG2KK**] and [**DBG3KK**].		
	16	Defective transmission and AJSS controller	1) Turn the starting switch off 2) Disconnect C2 and connect T-branch. 3) Turn starting switch ON. 4) Check that the joystick lever is in the "N" position.		
			Between C2 (8) and chassis ground	Voltage	Max. 1 V
			1) Turn the starting switch OFF. 2) Disconnect C3B and connect T-branch. 3) Turn starting switch ON. 4) Check that the forward-reverse travel switch is in the "N" position and carry out troubleshooting.		
			Between C3B (13) and chassis ground	Voltage	20 – 30 V

Related electrical circuit diagram

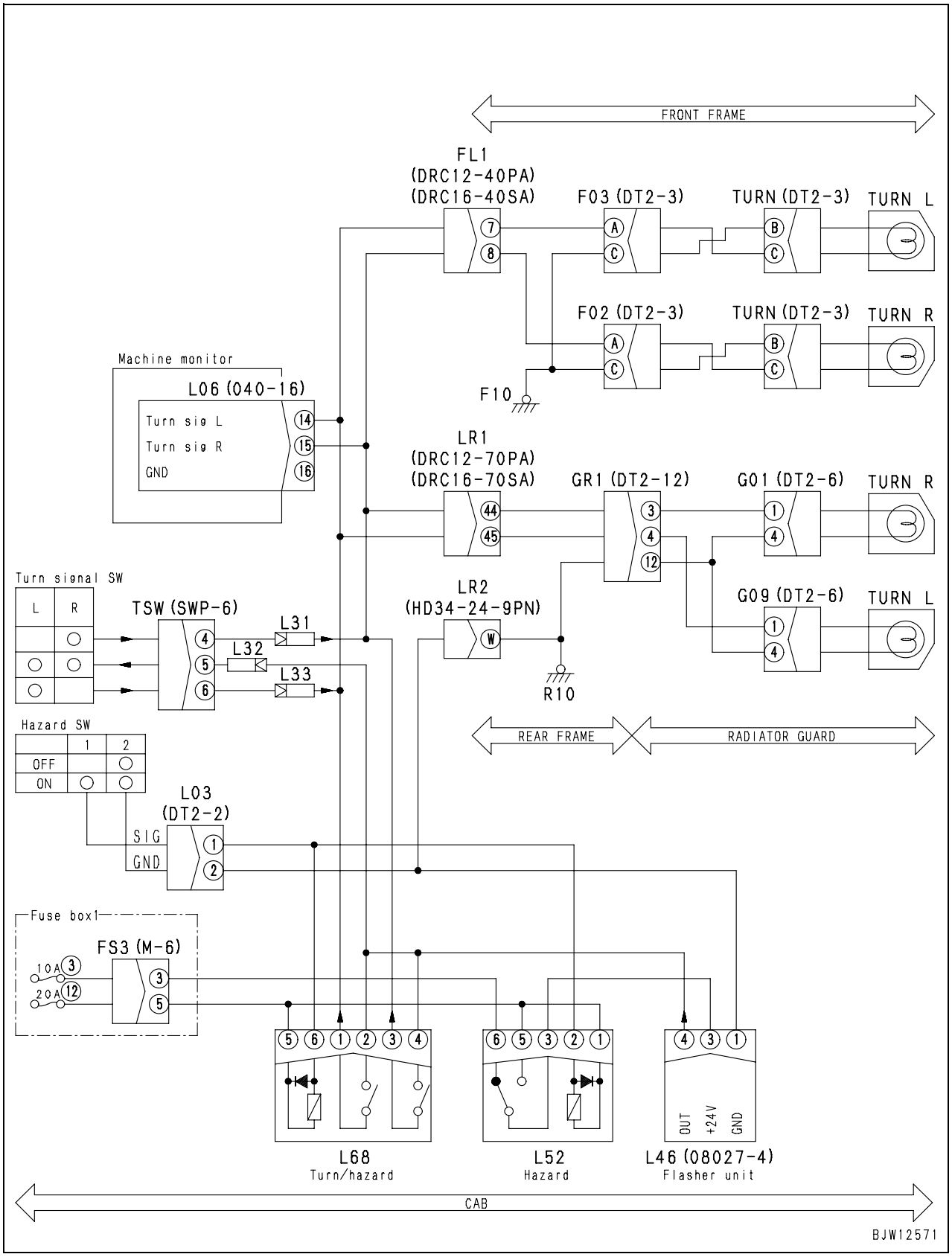


E-11 Defective hold switch

Contents of trouble	• Defective hold switch	1) Defective operation
Related information	• For an error in AJSS shift up/down switch, refer to failure code [**DDK5KZ**]. • For an error in forward-reverse travel switch, refer to failure code [**DDK3KZ**].	

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective hold switch	1) Turn the starting switch OFF. 2) Disconnect L15, turn on and off the hold switch and carry out troubleshooting.			
			ON	Between L15 (male) (3) – (4)	Resistance	Max. 1 Ω
			OFF	Between L15 (male) (3) – (4)	Resistance	Min. 1 MΩ
	2	Defective machine monitor	1) Turn the starting switch OFF. 2) Disconnect L08 and carry out troubleshooting.			
			Between L08 (male) (2), (4) and chassis ground		Resistance	Max. 1 Ω
	3	Defective transmission and AJSS controller	1) Turn the starting switch OFF. 2) Disconnect C5, turn on and off the hold switch and carry out troubleshooting.			
			ON	Between C5 (female) (13) and chassis ground	Resistance	Max. 1 Ω
			OFF	Between C5 (female) (13) and chassis ground	Resistance	Min. 1 MΩ
	4	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn the starting switch OFF. 2) Disconnect L08, C5 and L15, then carry out troubleshooting.			
			Between C5 (female) (13) – L15 (female) (3)		Resistance	Max. 1 Ω
			Between L08 (female) (2), (4) – L15 (female) (4)		Resistance	Max. 1 Ω

Related electrical circuit diagram



H-13 Lift arm moves slowly or does not have sufficient lifting power

Checks before troubleshooting

- Is the travel of the lift arm control lever and also the spool of the work equipment control valve correct?
- Seizure of work equipment linkage bushing. (Does emits abnormal noise)

Fault check

- There is a strong relationship between faults involving lifting force and lifting speed. Such faults appear initially in the form of insufficient lifting speed. Measure the lifting speed of the lift arm when loaded and refer to the “Standard value table” to determine whether or not there is a fault.

No.	Problems / Remedy	Causes							
		Tank – pump		Steering valve	PPC valve		Work equipment control valve		Cylinder
		a	b	c	d	e	f	g	h
		Blockage of suction port of pump or excessive amount of air contained in oil	Faulty hydraulic and switch pump	Defective actuation of demand spool	Defective actuation of relief valve	Defective actuation of spool	Defective actuation of main relief valve and faulty improperly adjusted	Internal damage or worn valve body	Damaged lift arm cylinder piston seal
		C △	△ x	△ x	△ x	△ x	A x	x	△ x
1	Bucket tilt back force and speed are abnormal and lift arm lifting speed is low.	○	○	○			○		
2	Bucket tilt back force and speed are normal but lift arm lifting speed is slow.					○		○	○
3	Some as Item 1 except that lift arm lifting speed becomes particularly low when oil temperature rises.		○						
4	Hydraulic pump emits abnormal noise.	○	○						
5	When the engine is at full, steering action is light and excessively fast.			○					
6	When the engine is at full, steering action is heavy and slow.	○							
7	Cylinder has a large amount of hydraulic drift.							○	○
8	The relief pressure of relief valve of work equipment control valve.				○		○	○	○

S-1 Starting performance is poor

General causes for poor starting performance are
- Defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel (particularly during winter)
- Coolant in exhaust pipe

★ The common rail fuel injection system (CRI) recognizes the fuel injection timing electrically. Accordingly, even if the starting operation is carried out, the engine may not start until the crankshaft revolves 2 turns at maximum. This phenomenon does not indicate a trouble, however.

			Causes													
			Clogged air cleaner element	Defective contact of valve and valve seat	Worn piston ring and cylinder	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter element or strainer	Clogged feed pump gauze filter	Stuck or seized supply pump plunger	Defective injector	Defective intake air heater system	Defective alternator (regulator section)	Defective alternator (generator section)	Defective or deteriorated battery
Questions	Confirm recent repair history														
	Degree of machine operation	Operated for long period	△					△	△						△
	Starting performance	Became worse gradually	○	◎	◎			○	○						
		Engine starts easily when warm										◎			
	Non-specified fuel is being used							○	○	○	○				
	Replacement of filters not carried out according to Operation and Maintenance Manual		◎					◎	◎	○	○				
	Engine oil replenished more frequently				◎										
	When engine is preheated or when temperature is low, preheating monitor does not indicate normally (if monitor is installed)											◎			
	During operation, charge level monitor indicates abnormal charge (if monitor is installed)												◎	◎	
Check items	Dust indicator is red (if indicator is installed)		◎												
	Air breather hole of fuel tank cap is clogged					◎									
	Fuel is leaking from fuel piping						◎								
	When priming pump is operated, it makes no reaction or it is heavy					△	◎	○	○						
	Starting motor cranks engine slowly														◎
	While engine is cranked with starting motor,	Fuel does not flow out if air bleeding plug of fuel filter is removed						◎	◎						
		If spill hose from injector is disconnected, little fuel spills						○		◎					
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low										◎				
	Engine does not pick up smoothly and combustion is irregular		○	○	○	○		○			◎				
	There is hunting from engine (rotation is irregular)					○		○	○						
	Blow-by gas is excessive				◎										
Troubleshooting	Inspect air cleaner directly		●												
	When compression pressure is measured, it is found to be low			●	●										
	When air is bled from fuel system, air comes out						●								
	Inspect fuel filter and strainer directly							●							
	Inspect feed pump gauze filter directly								●						
	Carry out troubleshooting of the failure code for "No-pressure feed by supply pump (*1)"									●					
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change on some cylinders										●				
	When starting switch is turned to HEAT, intake air heater mount does not become warm											●			
	Is voltage 20 – 30 V between alternator terminal B and terminal E with engine at low idle?	Yes											●		
		None												●	
	When specific gravity of electrolyte and voltage of battery are measured, they are low														●
		Remedy	Clean	Correct	Replace	Clean	Correct	Clean	Clean	Replace	Replace	Replace	Replace	Replace	Replace

*1: Failure code [**CA559**], [**CB559**] and failure code [**CA2249**], [**CB2249**]

S-13 Oil level rises (Entry of coolant or fuel)

General causes why oil level rises
- Coolant in oil (milky)
- Fuel in oil (smells diluted diesel fuel)
- ★ If oil is in coolant, carry out troubleshooting for "S-11 Oil is in coolant".

			Causes										
			Broken cylinder head and/or head gasket	Fuel leakage inside head cover	Cracks inside cylinder block	Damaged cylinder liner O-ring and/or hole caused by pitting	Worn or damaged rear oil seal	Broken oil cooler core and/or O-ring	Clogged water pump drain hole (breather hole) and/or defective seal	Defective thermostat seat	Defects in supply pump	Defective seal of auxiliary equipment (pump, compressor)
Questions	Confirm recent repair history											
	Degree of machine operation	Operated for long period				△	△		△			△
	Fuel consumption increasing			◎							◎	
	Coolant replenished more frequently		○							◎		
Check items	There is oil mixed in coolant		○		○	○		◎				
	Oil smells of diesel fuel			◎							◎	
	Oil is milky		○							◎		
	When engine is started, drops of water come from muffler		○									
	When radiator cap is removed and engine is run at low idle, an abnormal number of bubbles appears, or coolant spurts back		◎			○						
	Exhaust smoke is white			○						○		
	Water pump drain hole (breather hole) is clogged								◎			
	When water pump drain hole (breather hole) is cleaned, coolant comes out								◎			
	Oil level in damper chamber of machine is low						◎					
	Oil level in hydraulic tank is low											◎
Troubleshooting	When compression pressure is measured, it is found to be low		●									
	Remove and inspect head cover directly			●								
	Inspect cylinder block and/or liner directly				●	●						
	Inspect rear oil seal directly						●					
	Pressure-tightness test of oil cooler shows there is leakage							●				
	Remove and inspect water pump directly								●			
	Remove and inspect thermostat cover directly									●		
	Remove and inspect supply pump directly										●	
	Inspect seal of auxiliary equipment directly											●
		Remedy	Replace	Correct	Replace	Replace	Correct	Replace	Replace	Correct	Replace	Replace

<table>
<tr><td rowspan="14">Possible causes and standard value in normal state</td><td>Cause</td><td colspan="3">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="13">4</td><td rowspan="13">Defective transmission & AJSS controller</td><td colspan="3">1) Turn the starting switch OFF.
2) Disconnect L05 and L08.
3) Turn the starting switch ON (without starting the engine) and carry out troubleshooting.</td></tr>
<tr><td>Joystick directional switch position</td><td>Measuring point</td><td>Voltage</td></tr>
<tr><td rowspan="3">F</td><td>Between L08 (7) and chassis ground</td><td>20 – 30 V</td></tr>
<tr><td>Between L08 (8) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td>Between L05 (8) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td rowspan="3">N</td><td>Between L08 (7) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td>Between L08 (8) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td>Between L05 (8) and chassis ground</td><td>20 – 30 V</td></tr>
<tr><td rowspan="3">R</td><td>Between L08 (7) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td>Between L08 (8) and chassis ground</td><td>20 – 30 V</td></tr>
<tr><td>Between L05 (8) and chassis ground</td><td>Max. 1 V</td></tr>
<tr><td>5</td><td>Defective communication of S-NET</td><td colspan="3">See "M-19".</td></tr>
</table>

Contents of trouble	• Abnormality in preheating system	2) Preheating system remains operating.
Related information	• Preheating system starts operation when preheat relay L73 is turned ON. • Controller that turns preheat relay L73 ON differs by the system type, but the L73 secondary coil side is same. • E-mode: See "E-2 Preheating system error"	

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Defective preheating relay L73	1) Turn the starting switch OFF. 2) Disconnect L73. 3) Turn starting switch ON and carry out troubleshooting.		
			★ If preheating ends, preheating relay is defective.		
	2	Hot short in wiring harness (Contact with power supply circuit)	★ If preheating does not end in the above cause 1		
			Wiring harness between L73 (female) (5) – L05 (19) – heater relays E10, E12		
	3	Defective machine monitor	1) Turn the starting switch OFF. 2) Disconnect L05 and connect T-branch. 3) Turn starting switch ON and carry out troubleshooting.		
			Between L05 (female) (19) – (3)	Voltage	Voltage 20 – 30 V (preheating time; several tens of seconds)

Related electrical circuit diagram
See 1), M-7

M-12 Abnormality in low idle selection

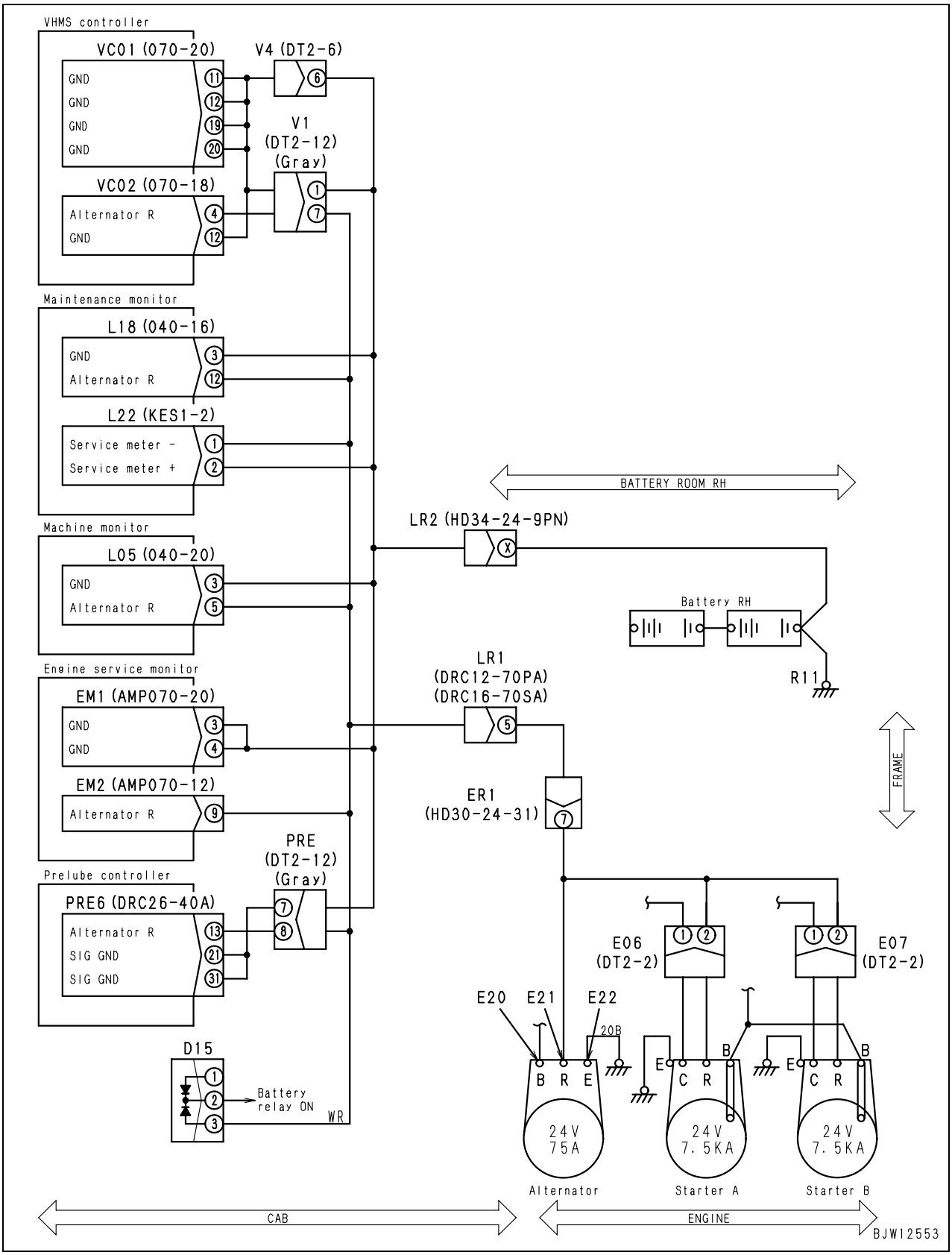
Contents of trouble	• Low idle selection error	1) Even when low idle select switch is turned ON, low idle speed does not rise nor lamp is lit.
Related information		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	1) Turn starting switch ON and carry out troubleshooting. 2) Turn low idle select switch ON.
			Low idle speed rises and the lamp lights up.

Contents of trouble	• Abnormality in low idle selection	2) When low idle select switch is turned ON, the lamp lights up but low idle speed does not rise.
Related information	• Related circuit diagram: See contents of trouble 3).	

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Turn the starting switch OFF. 2) Disconnect L06 and EM1, then carry out troubleshooting.		
			Between L06 (female) (7) – EM1 (4)	Resis-tance	Max. 1 Ω
	2	Ground fault in wiring harness (Contact with ground circuit)	1) Turn the starting switch OFF. 2) Disconnect L06 and EM1, then carry out troubleshooting.		
			Between L06 (female) (7) – EM1 (4) and chassis ground	Resis-tance	Min. 1 MΩ
	3	Defective machine monitor	1) Turn the starting switch OFF. 2) Disconnect L06 and connect T-branch (keep L06 disconnected). 3) Turn starting switch ON. 4) Turn low idle select switch ON and carry out troubleshooting.		
			Between L06 (female) (7) – (16)	Voltage	20 – 30 V
	4	Defective engine controller (L bank)	1) Turn the starting switch OFF. 2) Disconnect EM1 and connect T-branch. 3) Turn starting switch ON. 4) Turn low idle select switch ON and carry out troubleshooting.		
			Between EM1 (4) and chassis ground	Voltage	20 – 30 V

Related electrical circuit diagram



K-3 Work check item flashes upon turning starting switch ON (engine not running)

Contents of trouble	1) Engine oil level indicator flashes.
Related information	• Detection is unavailable when the engine coolant temperature is 60°C or above. • The error is reset when engine is started. • Refer to failure code [**B@BAZK**]. • Low engine oil level can be checked with monitoring code: **40945** "D-IN-9." (1: Low oil level, 0: Normal) • Engine oil level indicator flashes: The engine oil level switch signal circuit was opened (disconnected from ground wire).

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Low engine oil level	• Engine oil level is normal			
			★ If engine oil level is low, check surroundings of the engine for leakage of oil before adding oil.			
	2	Defective engine oil level switch	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between E05 (male) (1) – (2)	Engine oil level is normal	Resistance	Max. 1 Ω
				Engine oil level is low	Resistance	Min. 1 MΩ
	3	Defective diode	1) Turn starting switch OFF. 2) Disconnect D18 and carry out troubleshooting with starting switch OFF. (Measure in the diode range.)			
			Between D18 (male) (3) (+) – (2) (–)	Continuity	Forward direction: Continue Reverse direction: No continuity	
			Between D18 (male) (1) (+) – (2) (–)	Continuity	Forward direction: Continue Reverse direction: No continuity	
	4	Disconnection in wiring harness (Disconnection or defective contact in connector)	1) Prepare with starting switch OFF, then carry out troubleshooting with starting switch OFF. 2) Disconnect D18, E05, VC05 and L18, then carry out troubleshooting with starting switch OFF.			
			Between VC05 (female) (5) – D18 (female) (3)		Resistance	Max. 1 Ω
			Between D18 (female) (2) and chassis ground		Resistance	Max. 1 Ω when engine oil level is normal
			Between L18 (female) (13) – D18 (female) (1)		Resistance	Max. 1 Ω
	5	Defective maintenance monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Between L18 (13) – (3)	Engine oil level is normal	Voltage	Max. 1 V
				Engine oil level is low	Voltage	20 – 30 V

Contents of trouble	5) Air cleaner (L.H.) indicator flashes.
Related information	• Refer to failure code [**AA1ANX**]. • Troubleshooting for air cleaner R.H. clogging is carried out with failure code [**AA1BNX**]. When [**AA1BNX**] is not indicated, replace, for instance, the relay, diode and air cleaner connector with that of the air cleaner R.H. circuit one by one. If, as the result, failure code [**AA1ANX**] is replaced with [**AA1BNX**], you can judge this replaced parts are the cause. • Fuse (10) of fuse box 1 is not broken since air cleaner (L.H.) indicator flashes. • When air cleaner (L.H.) is normal, L18 (15) is connected to ground wire. When clogged: OPEN • Clogging can be checked with monitoring code **40972** "D-IN-17" (1: clogged, 0: normal) • Air cleaner (L.H.) indicator flashes: Air cleaner clogging signal circuit is opened (disconnected from ground wire).

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Air cleaner clogging	Dust indicator is not lit in red	Air cleaner is normal		
			Dust indicator is lit in red	Air cleaner clogging		
	2	Defective dust indicator relay (L79)	1) Turn starting switch OFF. 2) Replace L79 with a normal one. 3) Turn starting switch ON.			
			Confirm whether the normal state is recovered after L79 was replaced.	Normal state is not recovered		Relay (L79) is normal
				Normal state is recovered		Relay (L79) is defective
			1) Turn starting switch OFF. 2) Disconnect connector L79. 3) Independent part check			
			Between L79 (male) (1) – (2)		Resistance	260 – 320 Ω
			Between L79 (male) (3) – (5)		Resistance	Min. 1 MΩ
			Between L79 (male) (3) – (6)		Resistance	Max. 1 Ω
	3	Defective air cleaner clogging sensor	1) Turn starting switch OFF. 2) Disconnect connector B06. 3) Connect T-branch. 4) Turn starting switch ON. ★ Since inside is consisted of electronic circuit, it is impossible to judge by measurement of resistance.			
			Between B06 (1) – (2)	Air cleaner is normal	Voltage	20 – 30 V
				Air cleaner clogging	Voltage	Max. 10 V
	4	Defective diode	1) Turn starting switch OFF. 2) Disconnect D21 and carry out troubleshooting with starting switch OFF (measurement in the diode range)			
			Between D21 (male) (3) (+) – (2)(-)	Continuity	Forward direction: Continue Reverse direction: No continuity	
			Between D21 (male) (1) (+) – (2)(-)	Continuity	Forward direction: Continue Reverse direction: No continuity	

K-10 Night lamp remains lit up

Contents of trouble	• Night lamp remains lit up.
Related information	• Check if the night lamp for machine monitor remains lit up. • Check if small lamp remains lit up.

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective light switch	1) Starting switch OFF and Light switch OFF. 2) Disconnect L02 and carry out troubleshooting.		
			Between L02 (male) (3) – (4)	Resis-tance	Min. 1 MΩ
	2	Defective small lamp relay L67	When replace small lamp relay L67 with other relay and if the sys-tem returns to normal state, small lamp relay is defective.		
	3	Hot short circuit in wiring harness (Contact with 24 V circuit)	1) Starting switch OFF and Light switch OFF. 2) Disconnect L21. 3) Turn starting switch ON and carry out troubleshooting.		
			Between L21 (female) (1) – L05 (16) – FS2 (5) – each small lamp and chassis ground	Voltage	Max. 1 V
	4	Defective maintenance monitor	1) Starting switch OFF and Light switch OFF. 2) Disconnect L21 and connect T-branch to the (female) side. 3) Turn starting switch ON and carry out troubleshooting.		
			Between L21 (female) (1) – (2)	Voltage	Max. 1 V

WHEEL LOADER

WA800-3E0
WA900-3E0

Machine model	Serial number
WA800-3E0	70001 and up
WA900-3E0	60001 and up

40 Troubleshooting

Troubleshooting of remote boom positioner controller system (if equipped) (W-mode)

W-9 Remote positioner RAISE, LOWER LEDs do not light up

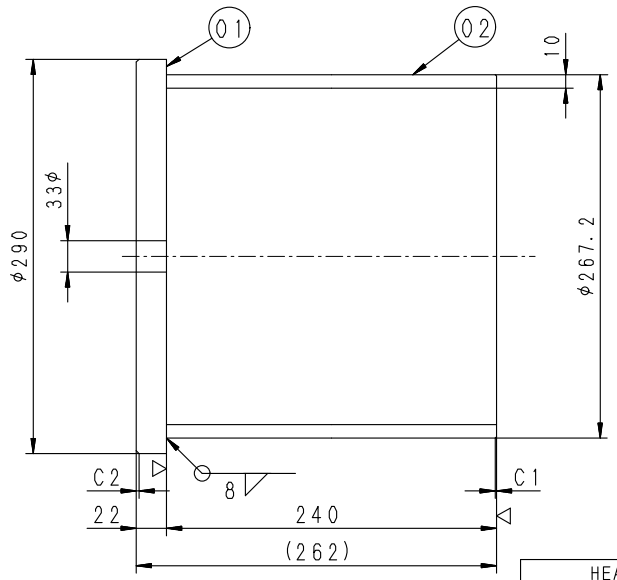
User code	Failure code	Trouble	Remote positioner RAISE, LOWER LEDs do not light up
—	—		
Contents of trouble	• Remote positioner RAISE/LOWER set switch or LED system is abnormal.		
Action of controller	• None in particular.		
Problem that appears on machine	• Remote positioner RAISE, LOWER LEDs do not light up.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective positioner selector switch	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			RB-4 (male)	Switch	Resistance	
			Between (7) – (16)	ON	Max. 1 Ω	
			Between (7) – (16)	OFF	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between RB-2 (female) (4) – RB-4 (female) (7)		Resistance	Max. 1 Ω
			Wiring harness between RB-3 (female) (6) – RB-4 (female) (12)		Resistance	Max. 1 Ω
			Wiring harness between RB-3 (female) (14) – RB-4 (female) (13)		Resistance	Max. 1 Ω
	3	Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between RB-2 (female) (4) – RB-4 (female) (7) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between RB-3 (female) (6) – RB-4 (female) (12) and chassis ground		Resistance	Min. 1 MΩ
			Wiring harness between RB-3 (female) (14) – RB-4 (female) (13) and chassis ground		Resistance	Min. 1 MΩ
	4	Defective wiring harness connector	There may be defect in connections between selector switch, machine wiring harness and work equipment controller. Check those connections directly. • Loosened connector, broken lock, or broken seal • Corroded, bent, broken, pressed-in, or expanded pin • Dampness, dirt and sand, or defecting insulation in connector			
	5	Defective work equipment controller	If causes 1 – 4 are not detected, work equipment controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			

Category	Komatsu code	Part number	Q'ty	Container	Main features and applications
Gasket sealant	LG-9 ThreeBond 1206D	790-129-9310	200 g	Tube	• Used for rough surfaces such as the circle gear top seal which does not need to be clamped, water resistance of the clearance at the welded area, etc. • Can be coated with paint.
	LG-10 ThreeBond 1206E	790-129-9320	200 g	Tube	• Used as lubricant/sealant when the radiator hoses are inserted. • Can be coated with paint.
	LG-11 ThreeBond 1121	790-129-9330	200 g	Tube	• Feature: Can be used together with gaskets. • Used for covers of the transmission case and steering case etc.
	ThreeBond 1211	790-129-9090	100 g	Tube	• Gasket sealant used to repair engine.
Molybdenum disulfide lubricant	LM-P	09940-00040	200 g	Tube	• Used to prevent scuffing and seizure of press-fitted portions, shrink-fitted portions, and threaded portions. • Used to lubricate linkages, bearings, etc.
	—	09995-00250	190 g	Can	• Spray type • Thin molybdenum disulphide films are made on metal surfaces to prevent the metals from scuffing each other. • Applicable for the propeller shaft splines, needle bearings, pins and bolts of various links, etc.
Seizure prevention compound	LC-G NEVER-SEEZ	—	—	Can	• Feature: Seizure and scuffing prevention compound with metallic super-fine-grain, etc. • Used for the mounting bolt in the high temperature area of the exhaust manifold and the turbocharger, etc.
Grease	G2-LI G0-LI *: For cold district	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA-160CNLI SYG0-400LI-A (*) SYG0-160CNLI (*)	Various	Various	• Feature: Lithium grease with extreme pressure lubrication performance. • General purpose type.
	Molybdenum disulfide grease LM-G (G2-M)	SYG2-400M SYG2-400M-A SYGA-16CNM	400 g x 10 400 g x 20 16 kg	Bellows-type container Can	• Used for parts under heavy load. Caution: • Do not apply grease to rolling bearings like swing circle bearings, etc. and spline. • The grease should be applied to work equipment pins at their assembly only, not applied for greasing afterwards.
	Hyper White Grease G2-T, G0-T (*) *: For cold district	SYG2-400T-A SYG2-16CNT SYG0-400T-A (*) SYG0-16CNT (*)	400 g 16 kg	Bellows-type container Can	• Seizure resistance, heat resistance and water resistance higher than molybdenum disulfide grease. • Not conspicuous on machine since color is white.
	Biogrease G2-B, G2-BT (*) *: For use at high temperature and under high load	SYG2-400B SYGA-16CNB SYG2-400BT (*) SYGA-16CNBT (*)	400 g 16 kg	Bellows-type container Can	• Since this grease is decomposed by natural bacteria in short period, it has less effects on micro-organisms, animals, and plants.

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

V2 Sleeve



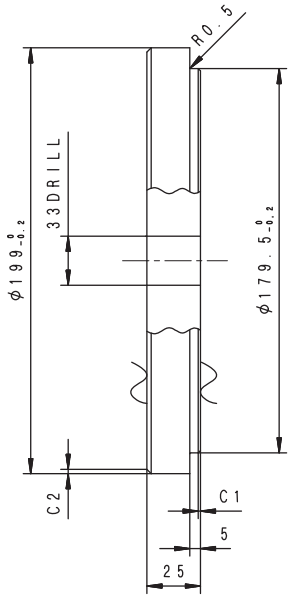
CWW03160

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKES
02	TUBE	STKM13A	1	15.2	φ267.4Xt10
01	PLATE	SS400P	1	11.2	t22-

HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	QTY
SLEEVE	----

793T-870-1130 △

V2 Plate

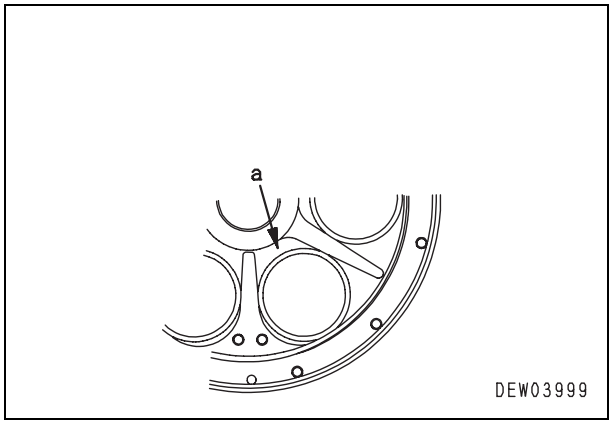


CWW03161

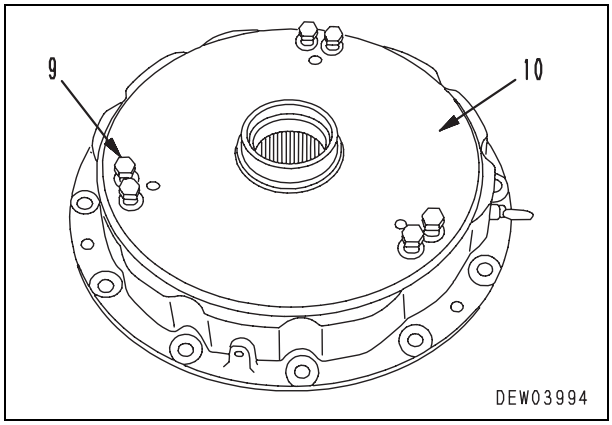
HEAT TREATMENT	MATERIAL
----	SS400P
PART NAME	QTY
PLATE	----

793T-870-1140 △

★ Fill clearance (a) evenly at 6 places with 70 cc grease.

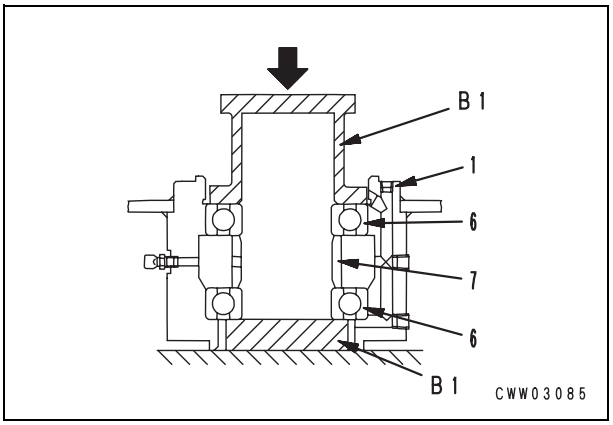


3) Install flange (10), and tighten mounting bolts (9).
   - Contact surface of flange and outer body: **Gasket sealant (LG-4)**
   - Mounting bolt:
     278 ± 31 Nm {28.3 ± 3.2 kgm}

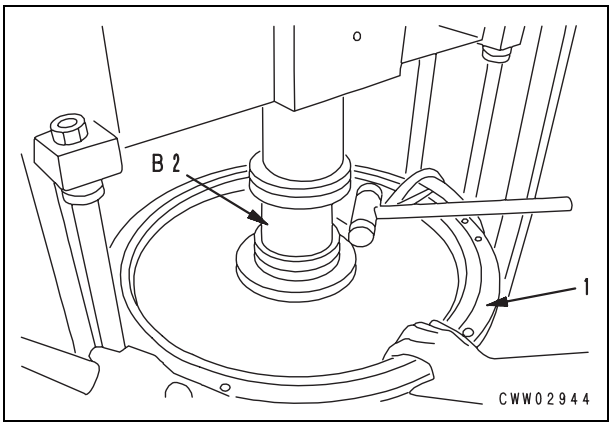


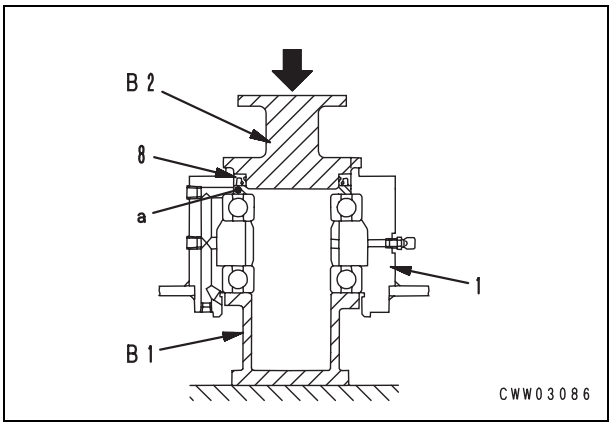
2. Cover

1) Using tool **B1**, press fit bearing (6) and spacer (7) in cover (1).
   - ★ When press fitting the bearing, check that the inside diameter of the spacer and the inside diameter of the bearing are aligned.
   - Outside circumference of bearing outer race:
     Coat with adhesive (LT-2)
   - Bearing: **ENS grease**



2) Using tool **B2**, press fit oil seal (8) in cover (1).
   - ★ Press fit the oil seal so that the lip surface is on the bearing side.
   - ★ Fill clearance (a) between oil seal (8) and the bearing with grease.
   - Clearance (a) between oil seal and bearing: **ENS grease**
     Amount of grease: **80 g**
   - Lip of oil seal: **ENS grease**





Removal and installation of cylinder head assembly

Special tool

Symbol		Part No.	Part name	Necessity	Q'ty	New/Remodel	Sketch
A	1	790-331-1110	Wrench (Angle)	■	1		

Removal

⚠ **Lower the work equipment to the ground and stop the engine. Apply the parking brake and put the blocks under the wheels.**

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

★ This document describes the removal and installation procedures of the right bank cylinder head assembly.

1. Drain the coolant.

Coolant : **337 ℓ**

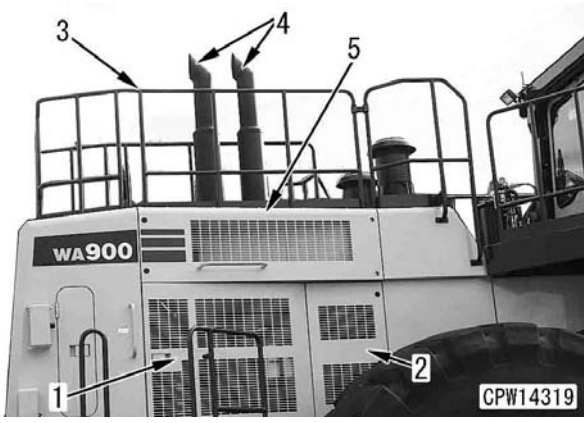
2. Remove L.H. and R.H. doors (1) and cover (2).

3. Remove handrail (3).

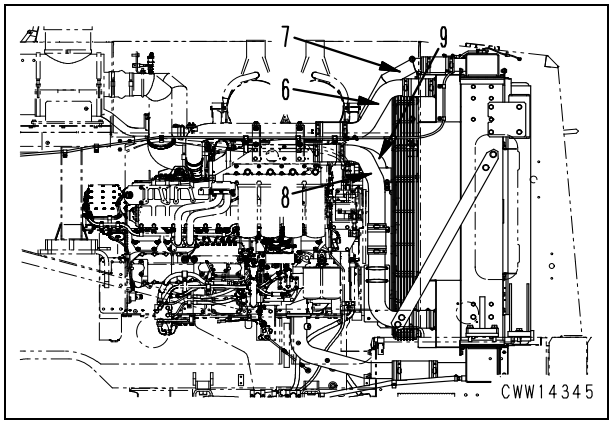
4. Remove muffler (4).

5. Lift and remove hood and side hood assembly (5).

Hood and side hood assembly : **300 kg**



6. Loosen the hose clamps and remove L.H. and R.H. tubes (6), (7), (8) and (9).



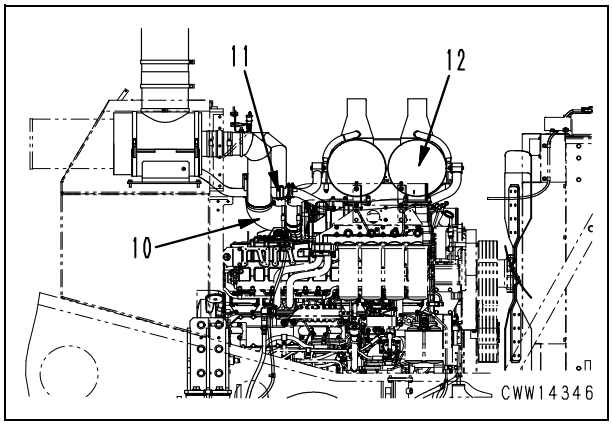
7. Disconnect the engine harness connector from the intake temperature sensor installed to the turbocharger intake pipe.

8. Loosen the clamps between the turbocharger and air cleaner, and remove 2 hoses (10).

9. Remove the muffler drain tube.

10. Disconnect Komaclone tube intermediate hose (11).

11. Remove muffler assembly (12).



Removal and installation of engine front oil seal

Special tools

Symbol		Part No.	Part name	Necessity	Q'ty	New/Remodel	Sketch
A	2	795-931-1100	Seal puller assembly	■	1		
	3	795T-621-1430	Plate	■	1		○
		795T-621-1441	Push tool	■	1		○
		01050-32280	• Bolt	■	3		
		01582-02218	• Nut	■	3		
		01640-22232	• Washer	■	3		

Removal

⚠ **Lower the work equipment completely to the ground and stop the engine.**

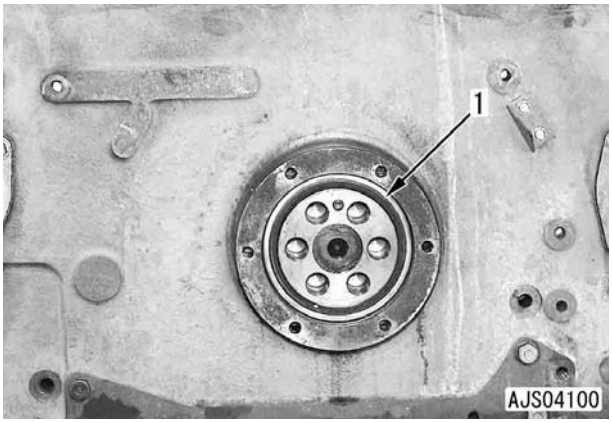
⚠ **Disconnect the cable from the negative (–) terminal of the battery.**

1. Remove the radiator assembly, referring to "Removal and installation of radiator assembly."

2. Remove the damper and crankshaft pulley. [*1]

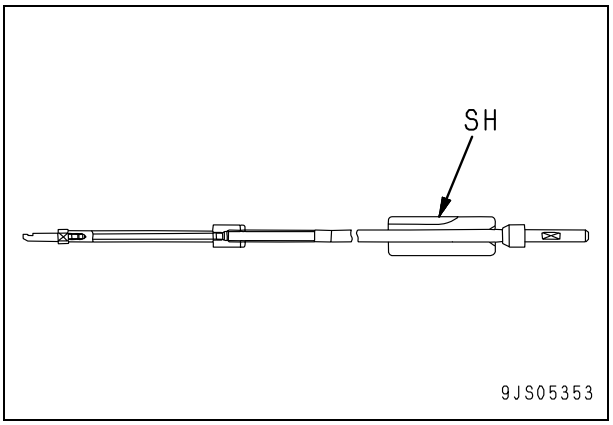
Damper and crankshaft pulley assembly: **75 kg**

3. Remove front oil seal (1) according to the following procedure.

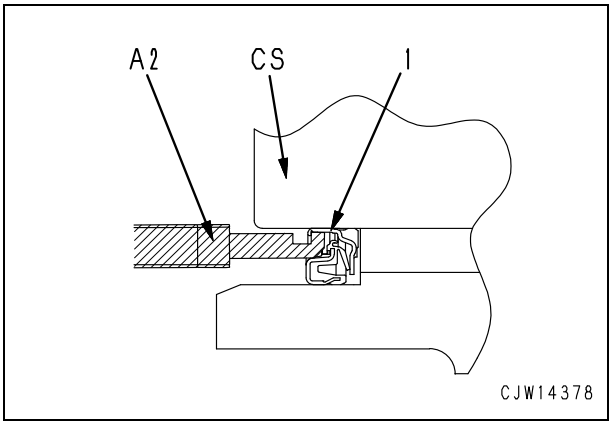


1) Change the end of tool **A2** to the hook type.
2) Hook the hook on the metal ring of front seal (1).
3) Remove the seal with the impact of a slide hammer (SH).

● Tool **A2**



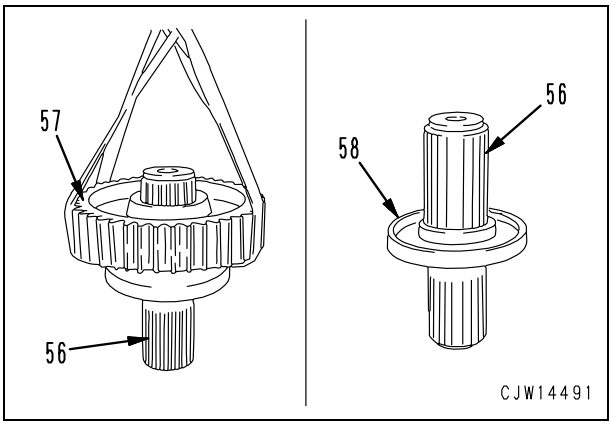
★ CS: Crankshaft



2] Lift off gear (57) from shaft (56).

Gear: **60 kg**

3] Remove spacer (58) from shaft (56).



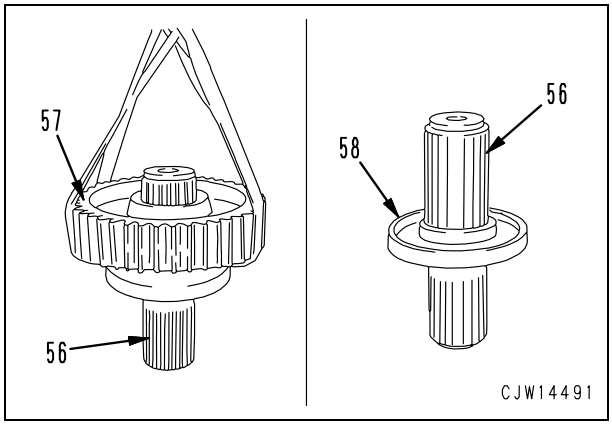
Assembly

1. Transfer output gear and related parts

1) No. 4 gear, shaft assembly

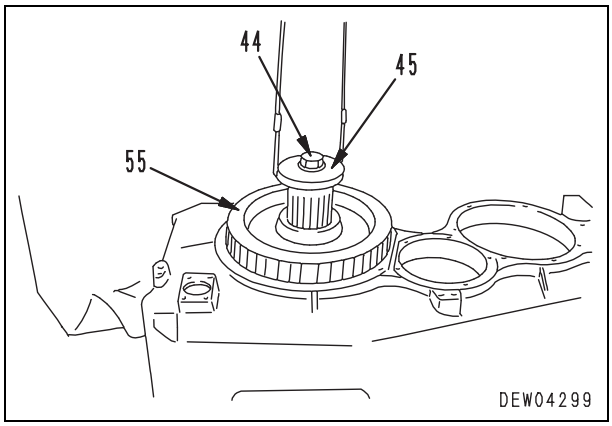
1] Install spacer (58) to shaft (56).

2] Raise gear (57) and install to shaft (56).



3] Using holder (45) and mounting bolts (44), raise No. 4 gear, shaft assembly (55) and install.

★ Support the block under the shaft.



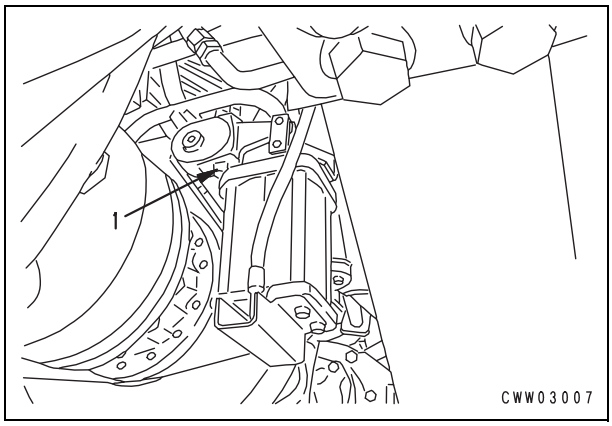
Removal and installation of parking brake pad

Removal

⚠ **Stop the machine on level ground and install the lock bar on the frame. Lower the work equipment to the ground and stop the engine. Then put blocks under the wheels to prevent the machine from moving.**

★ Turn the main switch ON, and release the parking brake.

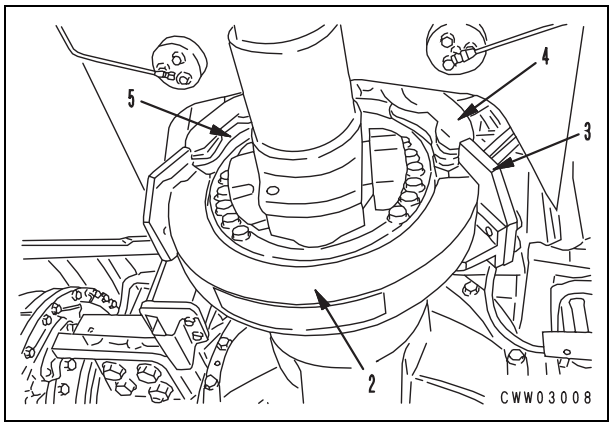
1. Turn adjustment bolt (1) in counterclockwise direction to increase clearance between pad and disc.



2. Remove cover (2). [*1]

3. Loosen mounting bolts of plate (3). [*2]
★ Sling to prevent calipers (4) from falling.

4. Move plate to side carefully so that pad does not fall, then remove pad (5).
★ When removing the front pad, first remove the rear pad and move the calipers to the front, then remove the front pad.
★ Remove the pad of the parking brake calipers on the right side in the same way.



Installation

- Carry out installation in the reverse order to removal.

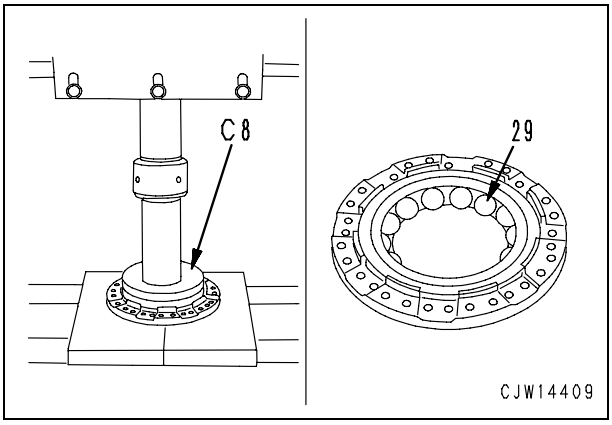
[*1]
Mounting bolt: **Adhesive (LT-2)**
Mounting bolt:
490 – 608 Nm {50 – 62 kgm}

[*2]
Mounting bolt: **Adhesive (LT-2)**
Mounting bolt:
820 – 1,030 Nm {84 – 105 kgm}

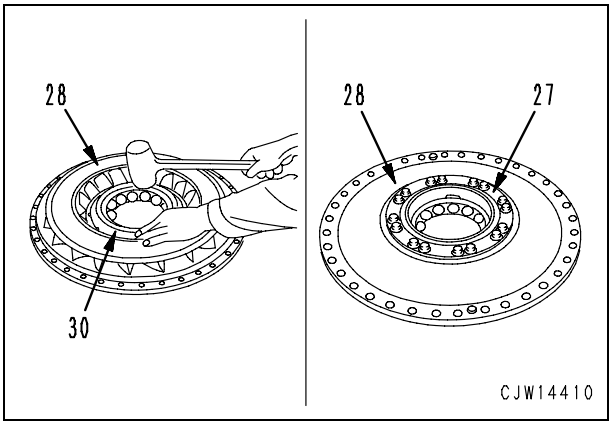
- **Bleeding air**
  Bleed air from the parking brake circuit. For details, see Testing and adjusting, "Bleeding air from each part".

2. Pump assembly

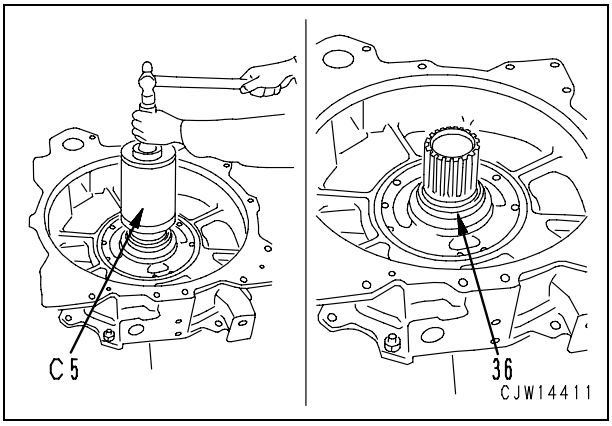
1) Using push tool **C8** (outside diameter: 195 mm), press fit bearing (29) in guide.



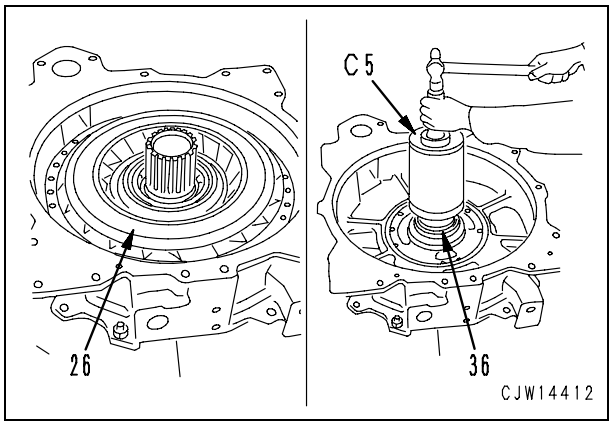
2) Install guide (30) and retainer (27) to pump (28).
   - Mounting bolt: **Adhesive (LT-2)**
   - Mounting bolt: **58.8 – 73.5 Nm {6 – 7.5 kgm}**

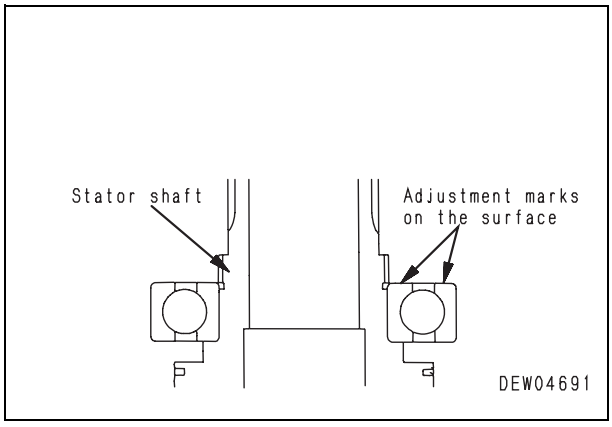


3) Using push tool **C5**, press fit inner race (36) to stator shaft.



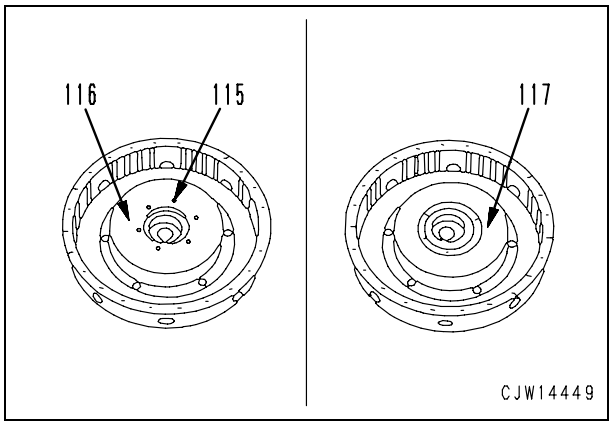
4) Set pump assembly (26) in position, be careful not to damage the seal ring.
   ★ Coat the seal ring with grease (G2-LI), make the amount of protrusion from the shaft uniform, and fix in position.
5) Using push tool **C5**, press fit inner race (36) to stator shaft.
   ★ Be careful to install the inner race facing in the correct direction.
6) Set pump. Be careful not to damage the seal ring while setting pump.
   ★ Coat the seal ring with grease (G2-LI), make the amount of protrusion from the shaft uniform, and fix in position.
7) Using push tool **C5**, press fit inner race (36) to stator shaft.
   ★ Be careful to install inner race facing in the correct direction.





39. Retainer, pressure plate

1) Remove mounting bolts (115), then remove retainer (116).
2) Remove pressure plate (117).

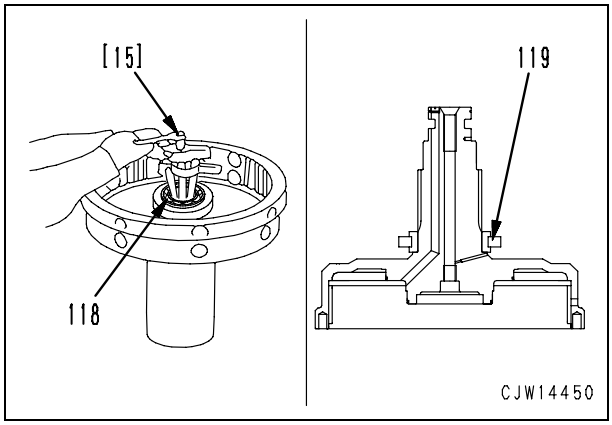


40. Bearing

Using puller [15], remove bearing (118).

41. Bearing

Remove bearing (119).

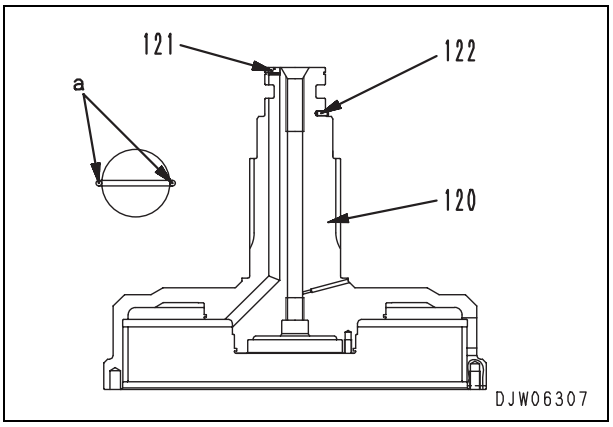


Assembly

★ Precautions when assembling
- Coat the rotating and sliding surfaces of all parts with engine oil (SAE10W) before installing.
- Coat the seal rings and roller bearings with grease (G2-LI), then install them, making sure that they are not off center.
- Align the notches on the discs when installing.
- Check that the snap rings are fitted securely.

★ Clean all parts, and repair any damage.

- Fine assembly of rotating clutch assembly
  ★ Before assembling, coat plug (121) with adhensive (LT-2) and tighten it into shaft (120) until its head is flush with the end of shaft (120) and then bend 2 parts (parts (a)) and install pin (122).



1. Bearing

Heat bearing (119) and install it by shrink fit.
★ Do not heat bearing (119) higher than 120°C.

2. Bearing

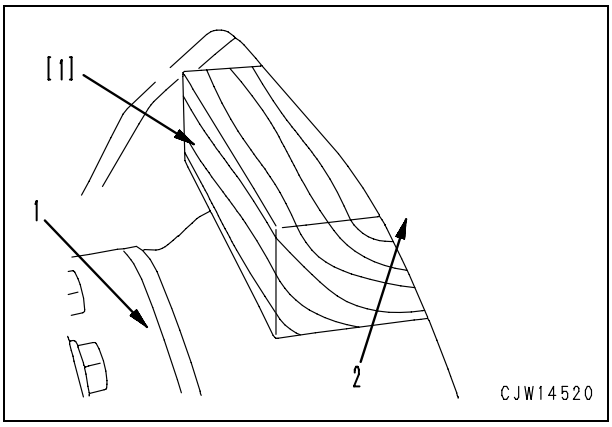
1) Install 2 seal rings to drum (123).
   ★ Install the seal rings so that the grooves face the direction of the figurfe.
2) Press fit bearing (118).

Removal and installation of front axle assembly

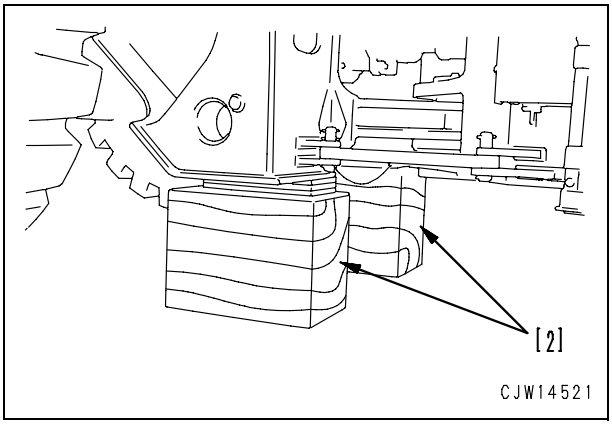
Removal

⚠ **Stop the machine on level ground and install the lock bar on the frame. Lower the work equipment to the ground and stop the engine. Then apply the parking brake and put blocks under the wheels to prevent the machine from moving.**

- Block the rear tires and apply the parking brake securely.
- Insert blocks [1] between the top face (1) of the rear axle housing and frame (2). (both left and right)



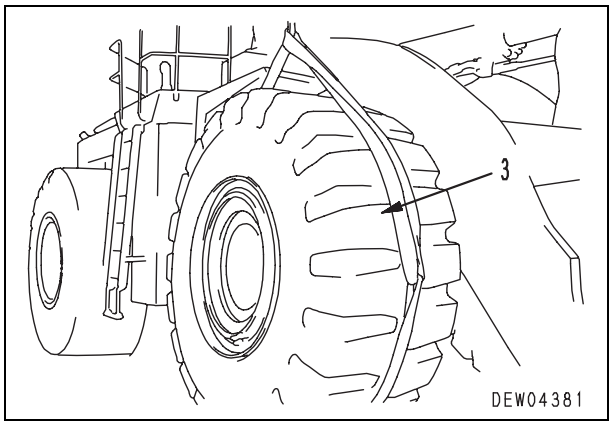
- Jack up the machine and set blocks [2] under the front frame on the left and right.



1. Tires, wheels

Sling left and right tires and wheels (3) temporarily, remove mounting nuts, then lift off.

Tire, wheel: **3,600 kg**



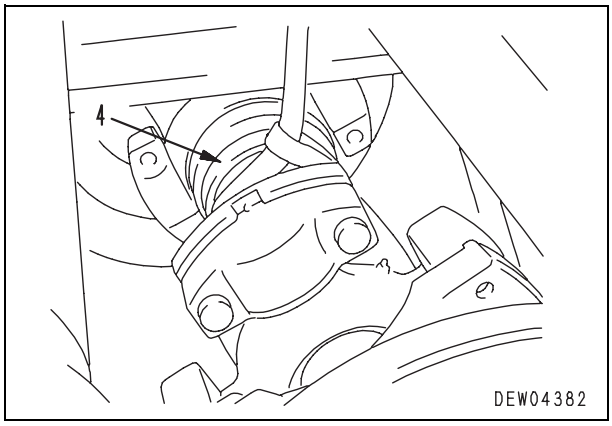
2. Drive shaft

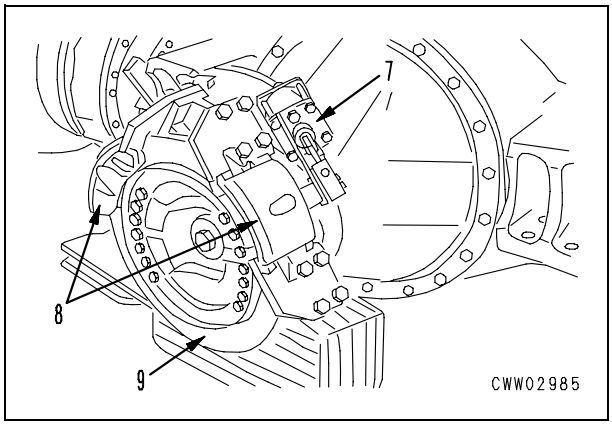
Lift off front drive shaft (4). [*1]

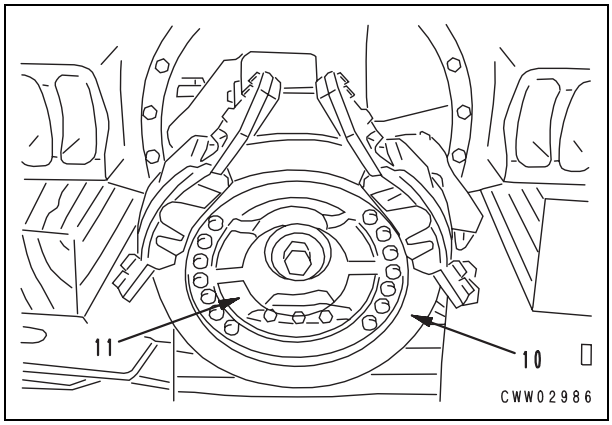
★ Make match marks on the drive shaft coupling to act as a guide when assembling.

★ Move the drive shaft towards the front differential, then move the center support end to the side and remove the pilot portion at the differential end.

Front drive shaft: **180 kg**



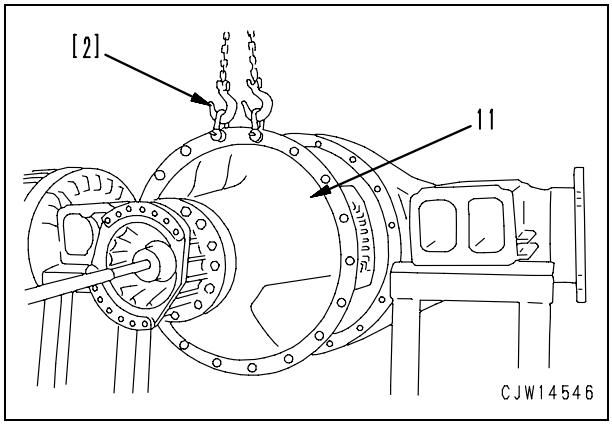




8. Remove mounting bolts, pull out differential assembly (11) slightly, then using lifting hooks [2] adjust balance with bar and remove differential assembly. [*3]

Differential assembly: **1,250 kg** [*4]

⚠ When pulling out the differential assembly, support the bottom of the differential assembly with a garage jack.



Installation

- Carry out installation in the reverse order to removal.

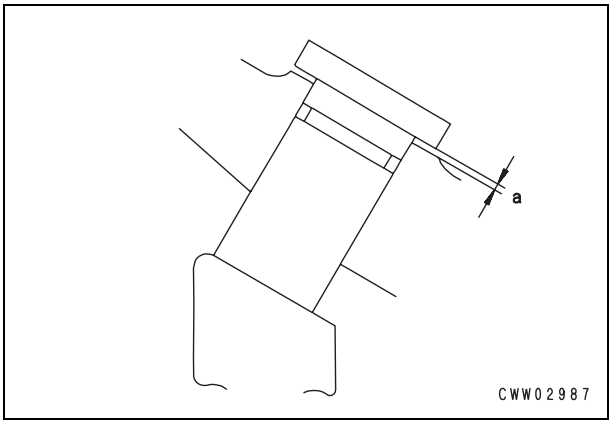
[*1]
Disc mounting bolt: **Adhesive (LT-2)**
Disc mounting bolt:
490 – 608 Nm {50 – 62 kgm}

[*2]
Holder mounting bolt: **Adhesive (LT-2)**
Holder mounting bolt:
2,452 – 3,040 Nm {250 – 310 kgm}

[*3]
Adjustment of shim of shaft

★ Adjust the shim of the shaft when the differential or axle housing is replaced.

1) Install shaft and tighten the mounting bolts evenly, then measure the clearance between the axle housing and shaft.
   ★ Do not assemble shims.
   Mounting bolt:
   3.9 ± 1.0 Nm {0.4 ± 0.1 kgm}
2) Prepare shim having thickness of measured clearance (a) + 0.1 ± 0.05 mm, then insert it.
   ★ Thickness of shim:
   Clearance (a) + (0.1 ± 0.05 mm)
   Mounting bolt:
   245 – 309 Nm {25 – 31 kgm}



[*4]
Mounting bolt: **Adhesive (LT-2)**
Mounting bolt:
824 – 1,030 Nm {84 – 105 kgm}

WA800, 900-3E0 Wheel loader

Form No. SEN02744-01

WHEEL LOADER

WA800-3E0
WA900-3E0

Machine model	Serial number
WA800-3E0	70001 and up
WA900-3E0	60001 and up

50 Disassembly and assembly

Undercarriage and frame

WA800, 900-3E0 Wheel loader
Form No. SEN02746-03

Removal and installation of diverter valve assembly

Removal

⚠ **Lower the work equipment completely to the ground, then put blocks under the wheels to prevent the machine from moving.**

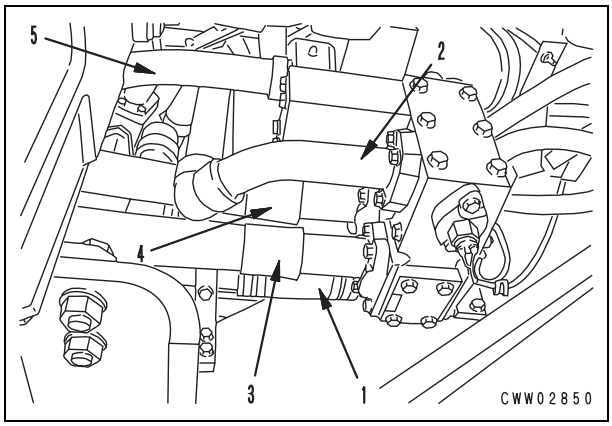
⚠ **Gradually loosen the cap of the hydraulic tank to release the pressure from the tank.**

1. Disconnect hose (1) of the hydraulic tank.

2. Disconnect tube (2) of the steering valve.

3. Disconnect hoses (3) and (4) of the emergency steering pump.

4. Disconnect tube (5) of the hydraulic tank.



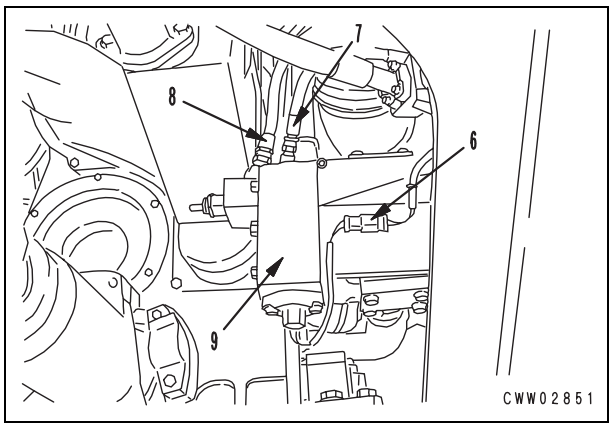
5. Disconnect connector (6) (R01).

6. Disconnect hose (7) of the steering pump.

7. Disconnect hose (8) of the hydraulic tank.

8. Remove the mounting bolt, then remove diverter valve (9).

Diverter valve: **70 kg**



Installation

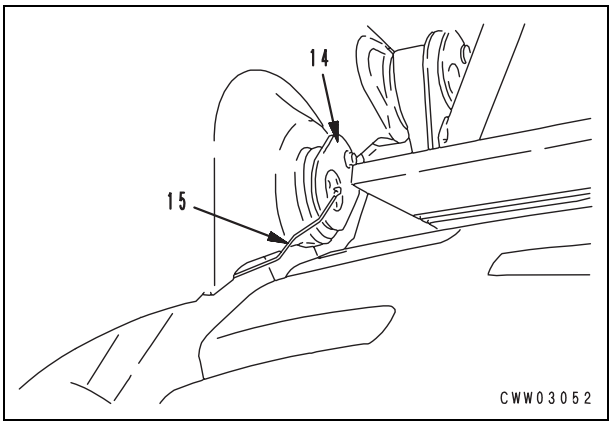
- Carry out installation in the reverse order to removal.

- **Bleeding air**
  Bleed air from the circuit. For details, see Testing and adjusting, "Bleeding air from each portion".

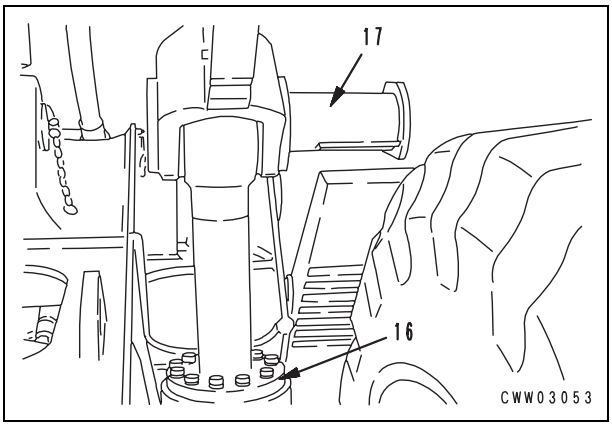
5. Lift cylinder pin

1) Raise the lift arm until pin (14) exceeds the height of the fender, then temporarily sling the lift arm and bell crank.
2) Disconnect grease tube (15) from the mounting pin.

Lift arm and bell crank: **9,600 kg**

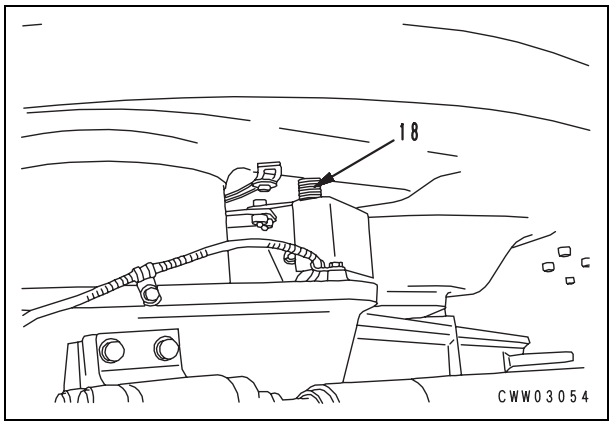


3) Support lift cylinder (16) on the lever block at the rear and remove the lock bolt, then slowly pull the pin out of the cylinder.
   ★ After removing the lift cylinder, insert both mounting pins (17) in the lift arm pinholes and tighten the lock bolts lightly.

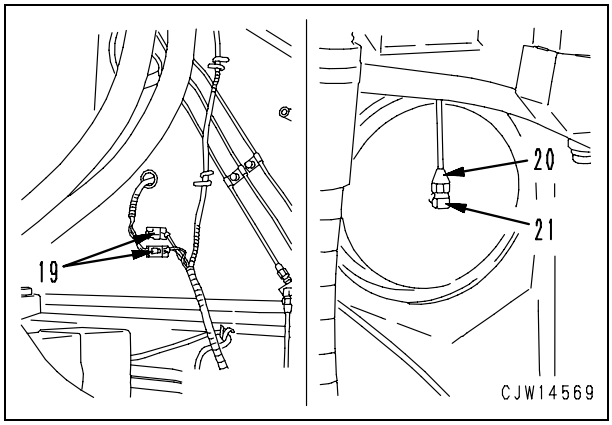


6. Lift arm and bell crank

1) Remove boom kick-out switch (18).
   ★ Remove the cover, then remove the switch.



2) Remove stays for the lights on left and right sides.
   ★ Disconnect connectors (19) (CN-F01, 02, 03, 04) on left and right sides in advance.
3) Disconnect both grease tubes (20) from mounting pins, then remove grease nipple (21).



4) Slowly pull out left and right mounting pins (22), then sling and remove lift arm and bell crank (23).
   ★ If shims are installed between the front frame and lift arm, check its quantity.
   ★ Sling right and left mounting pins and lift them off.

Mounting pin: **160 kg**