

Shop Manual

WHEEL LOADER

WA470 -8

SERIAL NUMBERS

100001 and up

H55051 and up

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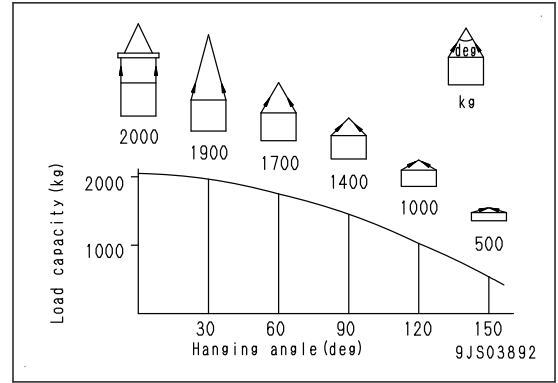


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REMARK

When slinging a load with 2 or more ropes, the force subjected to each rope increases with the hanging angle. The figure below shows the variation of allowable load in kN {kg} when slinging is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1000 kg} vertically, at various hanging angles. When the 2 ropes sling a load vertically, they can sling up to 2000 kg of total weight. This weight is reduced to 1000 kg when the 2 ropes make a hanging angle of 120°. If the 2 ropes sling a 2000 kg load at a hanging angle of 150°, each rope is subjected to a force as large as 39.2 kN {4000 kg}.



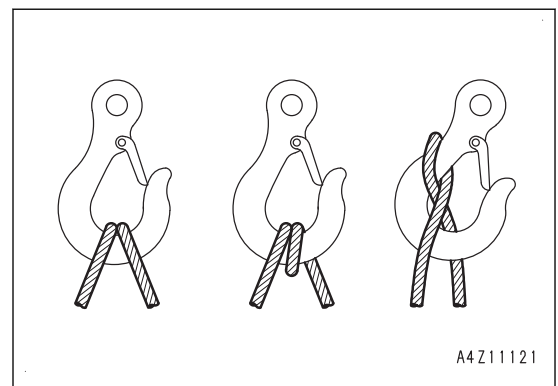
- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle part of the hook.

⚠ Do not use hooks if it does not have a latch system.

⚠ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting.

REMARK

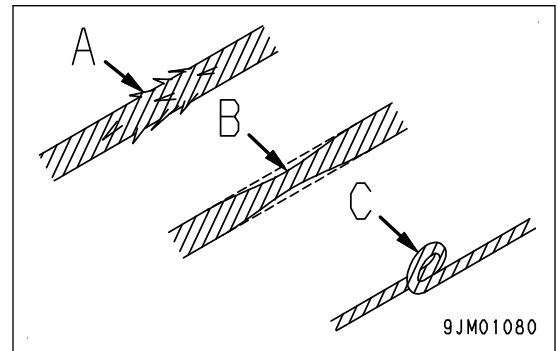
The strength of the hook is maximum at its central part.



- Never use a wire rope which has breaks in strands (A), reduced diameter (B), or kinks (C). There is a danger that the rope may break during the towing operation.

Precautions for slinging up

- Wind in the crane slowly until wire ropes are stretched. When settling the wire ropes with the hand, do not grasp them but press them from above. If you grasp them, your fingers may be caught.
- After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.



- If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
- Do not lift up the load at an angle.

Precautions for slinging down

- When slinging down a load, stop it temporarily at 30 cm above the floor, and then lower it slowly.
- Check that the load is stable, and then remove the sling.
- Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

Precautions for using mobile crane

REMARK

Read Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

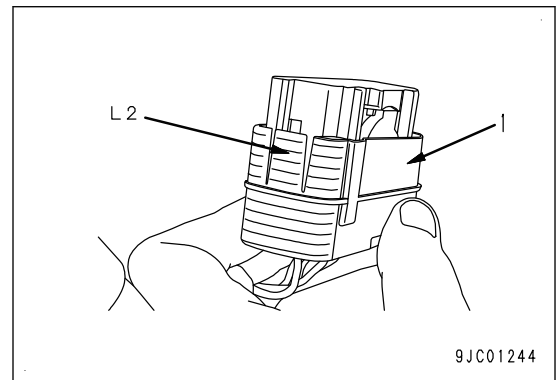
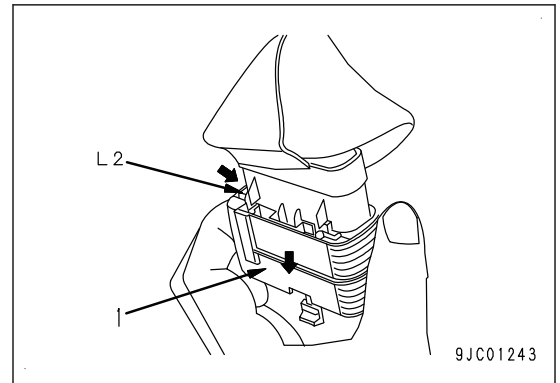
Precautions for using overhead traveling crane

⚠ When raising a heavy component (heavier than 25 kg), use a hoist or crane.

2. While pressing lock (L2), pull out connector (1).

REMARK

Lock (L2) is located behind connector (1) in the figure.

**Method for connecting slide lock type connector (FRAMATOME-24)**

Insert it straight until it clicks.

Item	Unit	WA470-8
Fuel consumption ratio at rated horsepower	g/kWh {g/HPH}	220 {164}
Max. speed with no load	min ⁻¹ {rpm}	2170±50 {2170±50}
Min. speed with no load		800 (+50/0) {800 (+50/0)}
Starting motor	-	24 V, 7.5 kW
Alternator	-	24 V, 90 A
Battery (*3)	-	12 V, 136 Ah x 2

*1: Indicates the value of engine only (without cooling fan).

*2: Indicates the value at the minimum cooling fan speed.

*3: The battery capacity (Ah) is indicated in the 5-hour rate.

REMARK

The engine rated horsepower is indicated in the net value and gross value. Gross denotes the rated horsepower measured on the basic engine unit. While, net denotes the value measured of an engine under the condition essentially the same as that when it is installed on a machine.

- Rated horsepower (net) when cooling fan is rotating at maximum speed is as the following.
194 kW {260 HP} /2000 min⁻¹ {2000 rpm}

Power train

Torque converter	-	3-element, 1-stage, 2-phase
Type		
Transmission	-	Multiple shaft type, power shift type, helical and spur gear constant mesh type, multiple disc type, hydraulic type, and modulation type
Type		
Number of speeds		
Reduction gear system	-	Spiral bevel gear type, oil bath lubrication type
Type		
Differential	-	Spur bevel gear type
Type		
Final drive	-	Planet gear, 1-stage reduction type, oil bath lubrication type
Type		

Axle

Axle type	-	Front and rear wheel drive	
Drive wheel			
Front wheel			Frame fixed type, semi floating type
Rear wheel			Center pin support type, semi floating type

Tire

Size	-	26.5R25☆☆
Rim size		22.00-25WTB

*1: Elapsed time of each stage describes an accumulated time advancing to the next stage after starting "Warning" stage. Final Inducement is not cleared till abnormality is repaired.

*2: These failure codes are displayed on "Current Abnormality" in the operator mode, or "Abnormality Record" in the service mode. The failure code shown here is an example of failure code which is displayed on the machine monitor when an abnormality occurs. For the failure codes, see TROUBLESHOOTING, "TROUBLESHOOTING POINTS FOR UREA SCR SYSTEM".

*3: The failure code which starts with CB may be displayed for the machine equipped with aftertreatment devices branching off to 2 lines.

*4: These failure codes are displayed on "Current Abnormality" in the operator mode, or "Abnormality Record" in the service mode.






*5: These percentages show a torque reduction ratio from the full torque curve, and a speed reduction ratio from the rated speed.

*6: Construction equipment with crawler

*7: Construction equipment with wheel

INDUCEMENT STRATEGY WHEN ABNORMALITY IS FOUND IN THE KDPF SYSTEM BY THE UREA SCR SYSTEM DEVICES (FOR EUROPEAN UNION)

- The Inducement strategy is different if Inducement is triggered by abnormalities in KDPF. It has 4 levels totally which is the same as that, but it has different display on the machine monitor, and engine power deration (torque lowering ratio is 25% or more) and alarm starts from "Warning".
- The table shows warning indications and engine power derations by each Inducement strategy status.

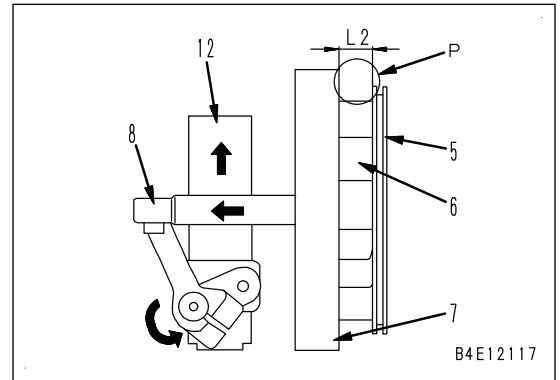
Status	Elapsed time (*1)	Machine monitor					Engine deration (*5)
		Message of SCR Information	Caution lamp (Action level)	Tone of audible alert	Failure code for abnormality (*2),(*3)	Failure code for Inducement strategy status (*4)	
1 Warning	5 hours	1: Please inspect and maintain SCR system.	Red  APP14418 Red  APP14414	Long intermittently	CA4151 CB4151	No indication	Torque: over 25%
2 Continuous Warning (Warning 2)	10 hours	2: Without treatment, engine power will be derated.	Red  APP14418 Yellow  APP14417 Red  APP14414	Triplet (*6) Short intermittently (*7)	CA4151 CB4151	AS00R2 (Warning 2 (SCR Device Abnormality))	Torque: over 25%

When nozzle ring is “open”

1. During high speed operation (rotation), exhaust gas inlet passage (P) is wide (L2).
2. As the engine speed increases and the turbine inlet pressure (exhaust gas pressure) increases exhaust gas inlet passage (P) is widened (L2) so that the exhaust gas acts on turbine impeller (11) efficiently.

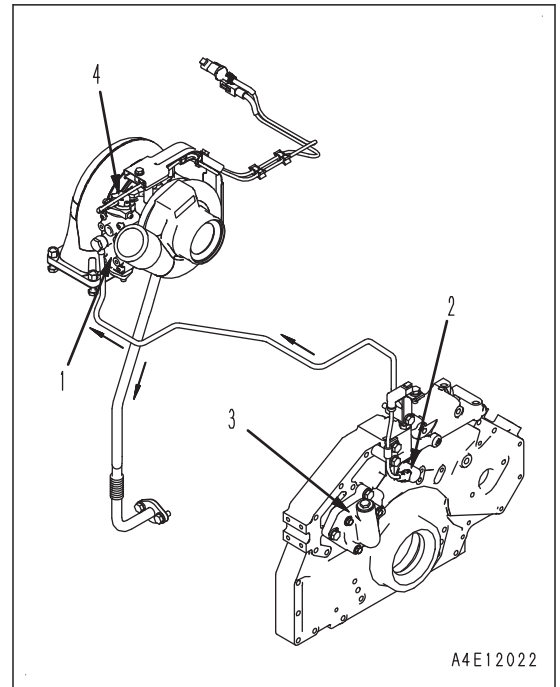
REMARK

- Nozzle ring (7), vanes (6), and push rod (8) are all-in-one unit, and it slides only and does not rotate.
- Hydraulic actuator (3) is equipped with VGT position sensor. VGT position sensor is calibrated together with the variable mechanism of VGT and the result is written in the memory in VGT position sensor. Accordingly, if any of hydraulic actuator (3), VGT position sensor, and VGT unit fails, whole VGT must be replaced.



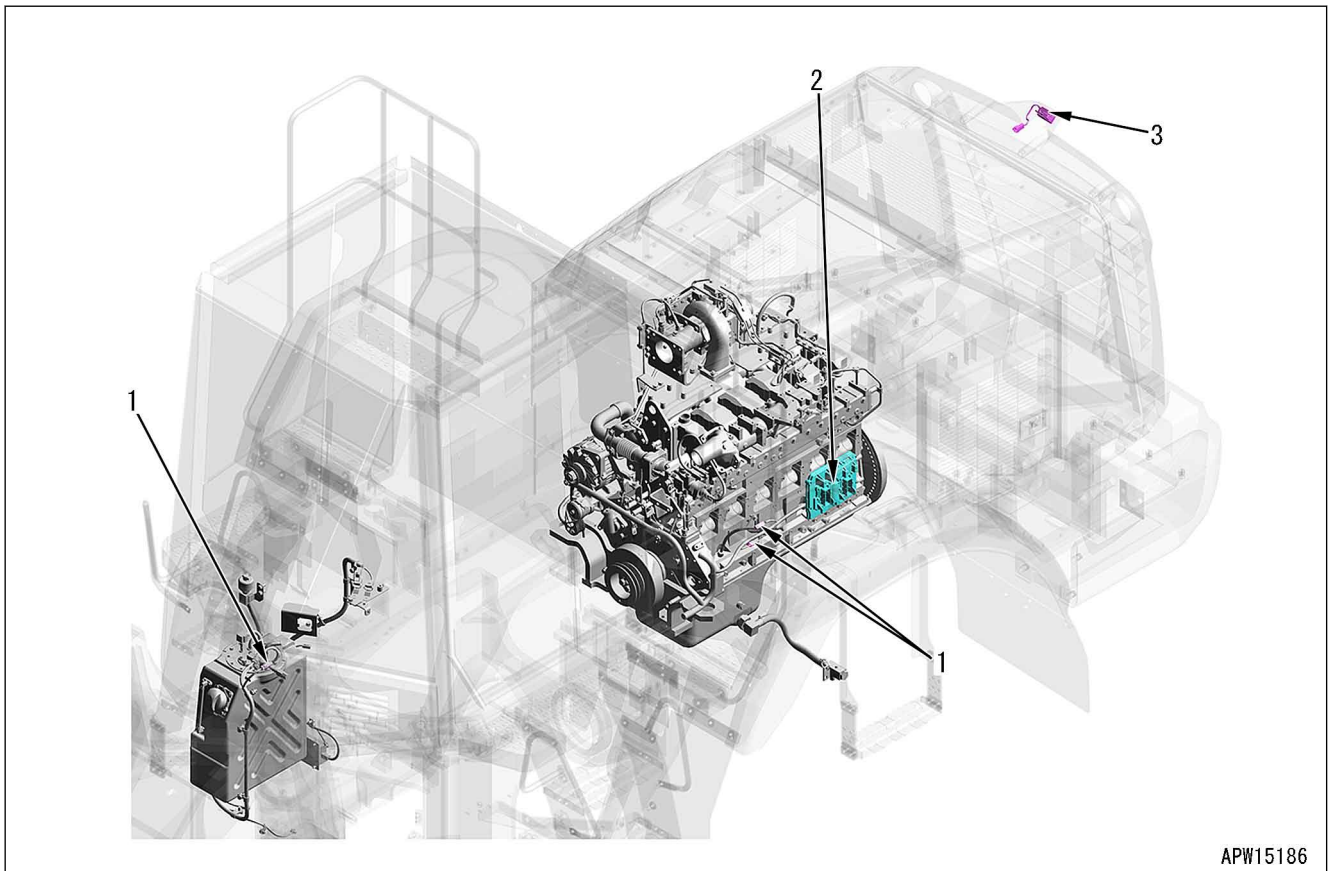
Operation of hydraulic actuator

1. Hydraulic actuator (1) is controlled by EPC valve (2) installed to the front cover and driven hydraulically.
2. The hydraulic pressure supplied by engine boost oil pump (3) is used for this purpose.
3. The position of hydraulic actuator (1) is fed back to engine controller by the signals from VGT position sensor (4).



CONTROL SYSTEM

LAYOUT DRAWING OF CONTROL SYSTEM



APW15186

1: CAN terminating resistor

3: Rearview camera

2: Engine controller

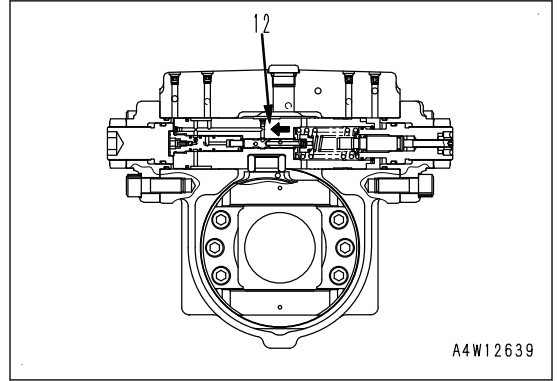
Pin No.	Signal name	Input and output signals
14	(*1)	-
15	Directional lever (R)	Input
16	Starting switch C signal	Input
17	ECMV fill switch 1st	Input
18	(*1)	-
19	Backup lamp relay	Output
20	Transmission output shaft speed sensor	Input
21	(*1)	-
22	CAN-L (KOMNET/c)	Input and output
23	CAN-L (KOMNET/r)	Input and output
24	External starting signal	Input
25	Directional lever (N)	Input
26	Directional selector switch (R)	Input
27	Directional selector switch actuation switch	Input
28	Transmission cut-off switch built-in indicator	Input
29	Pulse GND	-
30	Cooling fan speed sensor	Input
31	(*1)	-
32	CAN-H (KOMNET/c)	Input and output
33	CAN-H (KOMNET/r)	Input and output
34	(*1)	-
35	Directional lever (F)	Input
36	Directional selector switch (N)	Input
37	ECSS switch	Input
38	Torque converter lockup switch	Input
39	Pulse GND	-
40	Transmission input speed sensor	Input

*1: Never connect these pins. It may cause malfunction or failure.

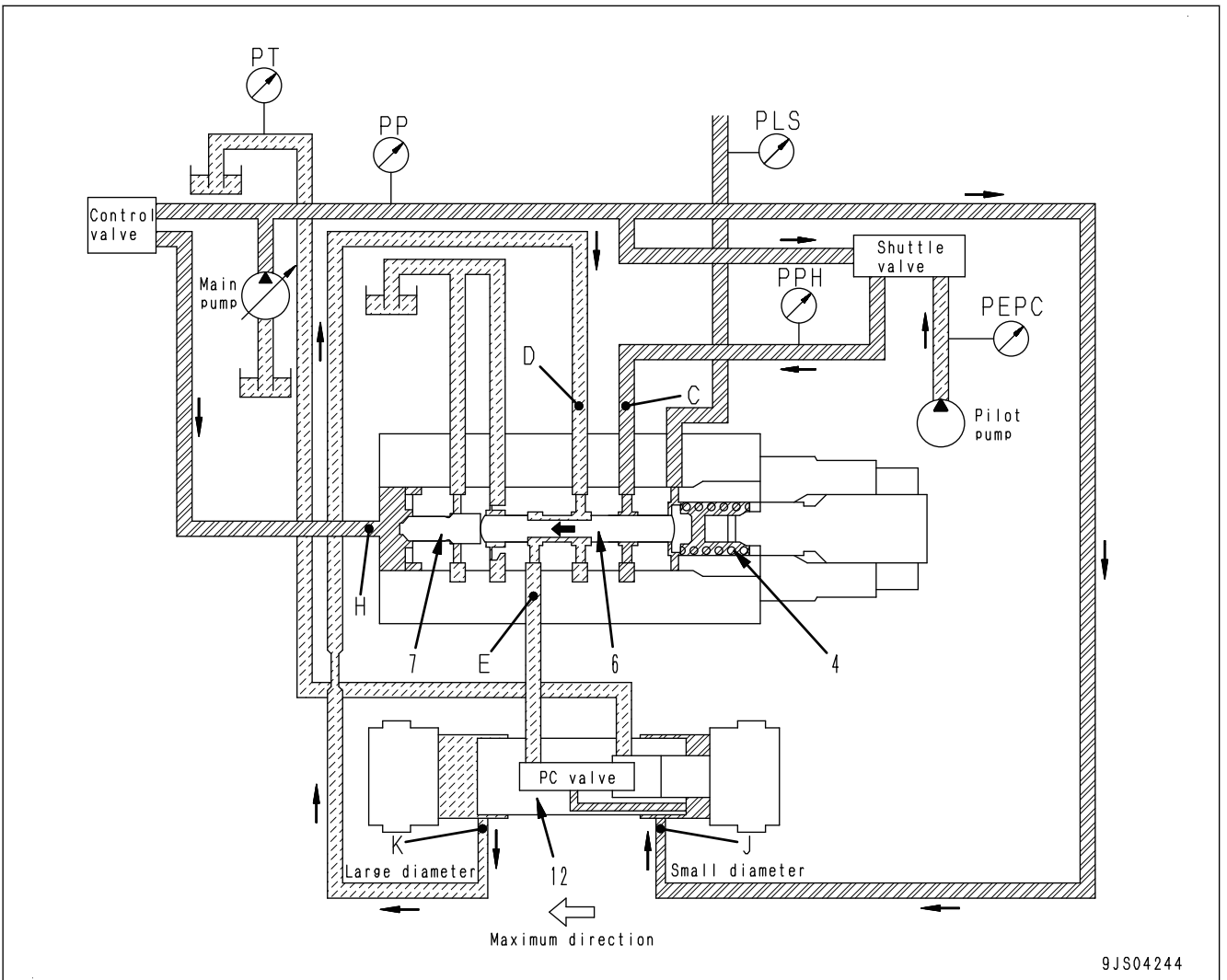
DEUTSCH-40P(2) "L63"

Pin No.	Signal name	Input and output signals
1	Continuous power supply (24 V)	Input
2	Power supply (24 V)	Input
3	GND (solenoid)	-
4	Battery relay	Output
5	ECMV R	Output
6	ECMV 3rd	Output
7	(*1)	-

- It moves in the direction which makes the swash plate angle minimum corresponding to the area difference of servo piston (12).

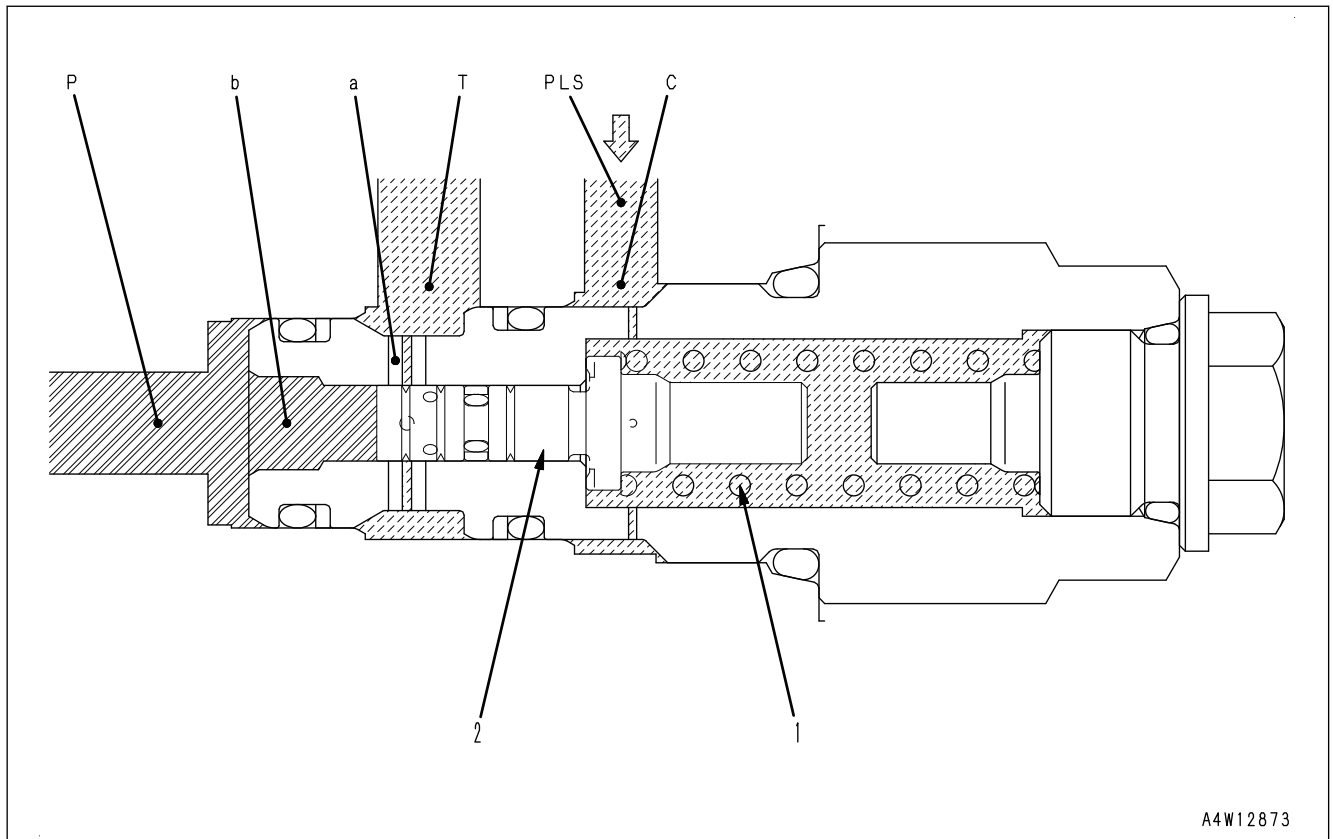


Operation in direction to increase pump discharged volume



- When the difference between pump discharge pressure (PP) and LS pressure (PLS), or LS differential pressure (ΔPLS), decreases (for example, when the opening of the control valve increases and pump discharge pressure (PP) decreases), the combined force of LS pressure (PLS) and force of spring (4) pushes spool (6) to the left.
- As spool (6) moves, port (D) is connected to port (E) and connected to PC valve.
- Since PC valve is connected to the drain port, the pressure between circuits (D) and (K) becomes drain pressure (PT). (The operation of PC valve is explained later.)

FUNCTION OF UNLOAD VALVE OF CONTROL VALVE

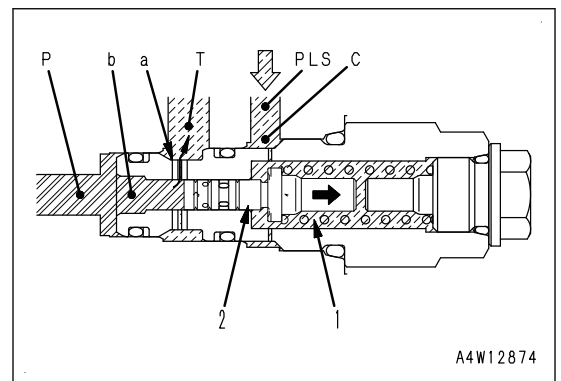


- Drains the discharged volume corresponding to the portion of the minimum pump swash plate angle while all control valves are in hold.
- Pump pressure becomes equal to the corresponding set load of spring (1) in the valve (this pressure is set as P1).
- Since LS pressure is drained through LS bypass valve, LS pressure \approx Tank pressure \approx 0 MPa {0 kg/cm²} .

OPERATION OF UNLOAD VALVE OF CONTROL VALVE

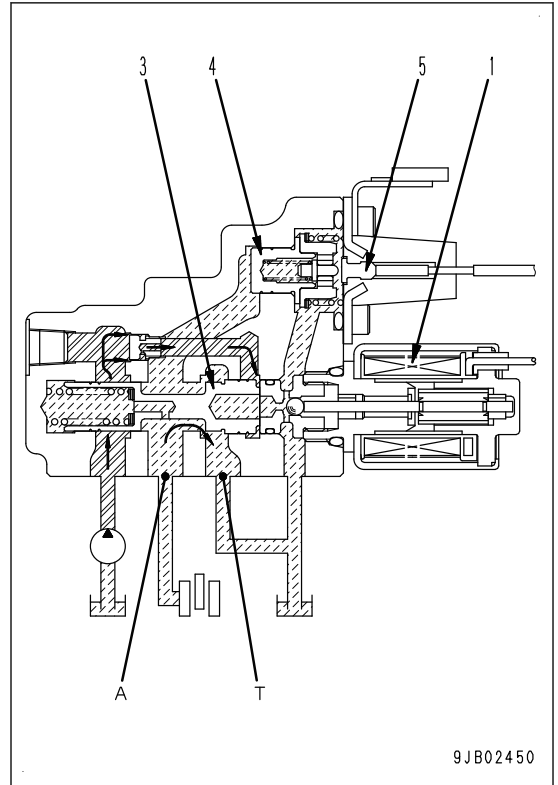
When unload valve is actuated

1. The pressure of pump circuit (P) is applied to the end of valve (2).
2. Since the control valve is in neutral, the pressure in LS circuit (PLS) is 0 MPa {0 kg/cm²} .
3. The pressurized oil of pump circuit (P) stops at valve (2), and the pressure increases as no relief is available.
4. If this pressure becomes larger than the force of spring (1), valve (2) moves to the right.
5. Port (b) and tank circuit (T) are connected, and the pressure of the pump is transmitted to the tank circuit (T).
6. Since the pump discharged pressure - LS circuit pressure during unloading is larger than the pump LS control pressure, the signal to minimize the pump swash plate angle is outputted.
7. During operation (an work within a scope of discharged volume by a minimum swash plate angle), the discharged pressure for the portion of minimum pump swash plate angle is set to LS pressure + P1 pressure.
8. LS control differential pressure (Δ PLS) of discharged volume by minimum swash plate angle will be P1 pressure.



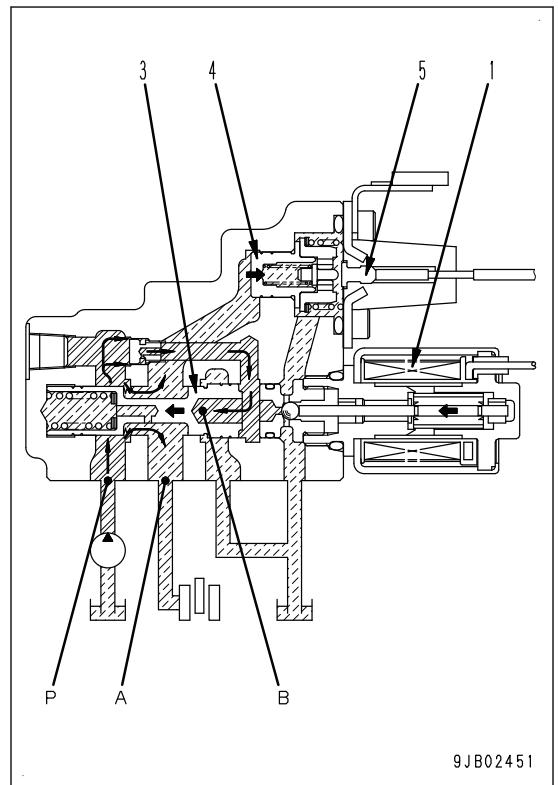
- Since parking brake circuit employs the safety mechanism, parking brake is kept applied even if starting switch is turned from "OFF" position to "ON" position. Accordingly, when the starting switch is turned to "ON" position, the transmission is always set in neutral, regardless of state of directional lever and gear shift lever.

Fill switch (5) does not operate at this time since the oil pressure is not applied to pressure sensor valve (4).



Operation while being filled

- When the current flows in proportional solenoid (1) with no oil in the clutch, the oil pressure force equal to the solenoid force acts on chamber (B) and pushes pressure control valve (3) to the left. As a result, pump port (P) and clutch port (A) are connected and oil starts to fill the clutch. When the clutch is filled with oil, pressure detection valve (4) activates fill switch (5).



Operation when adjusting the pressure

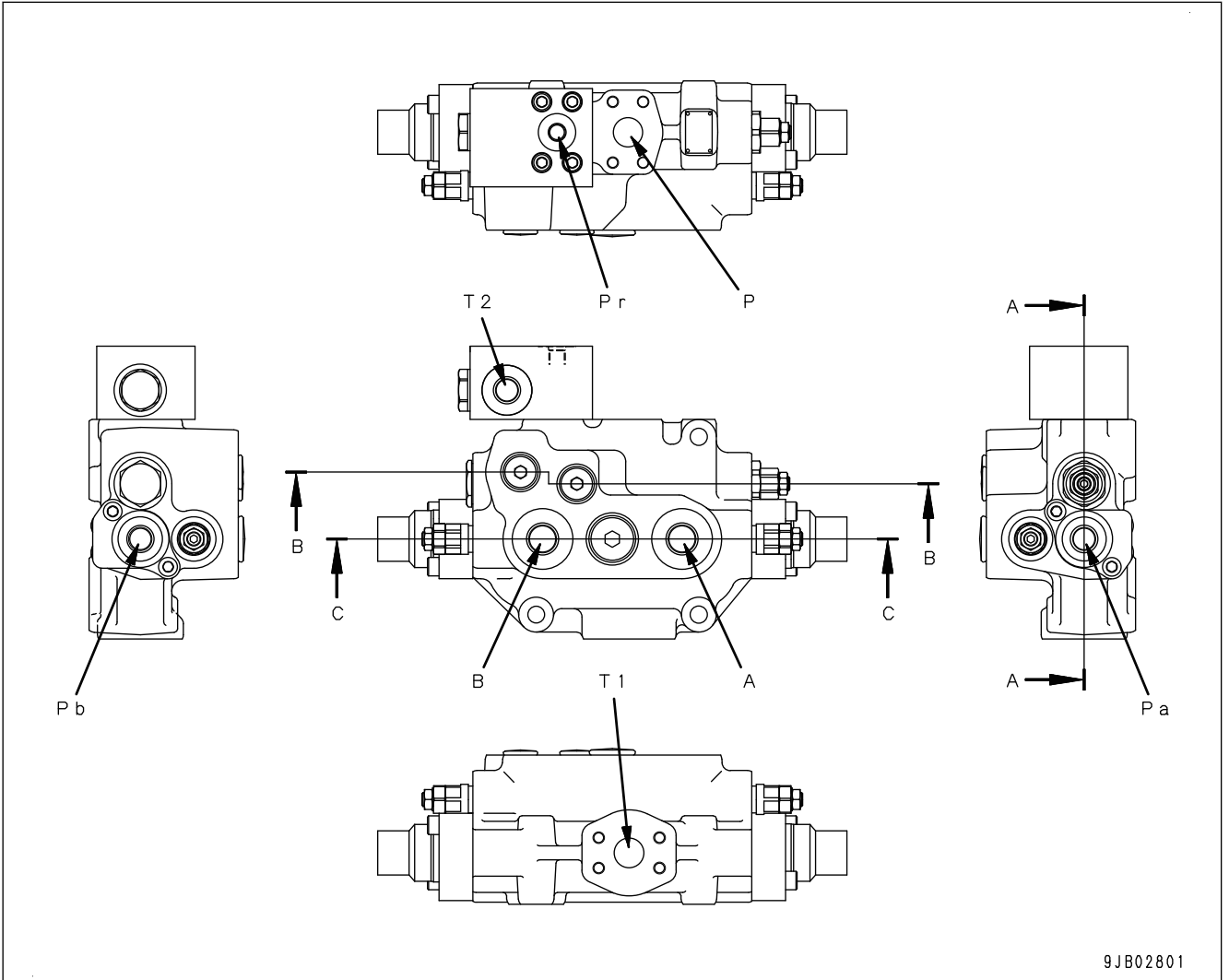
	Work equipment control lever state when work equipment lock switch is operated	Controller	Operation of ECSS	Controller Output			Movement of machine	
		Recognizes	ECSS SW signal (Transmission controller input)	Work equipment lock solenoid valve	Work equipment lock indicator		Work equipment de-tent of work equipment EPC	Hydraulic pressure
					Switch	Monitor		
Lock → Unlock (switch operation)	Work equipment control lever is not in NEUTRAL	Being locked	ECSS SW = OFF	ON (24 V)	ON (lights up)	ON (lights up)	OFF (no output)	Cut (work equipment and ECSS stop)
			ECSS SW = ON	OFF (OPEN)				Only ECSS operates
Lock → Unlock (switch operation)	Work equipment lever is in NEUTRAL	Unlock	-	OFF (OPEN)	OFF (light goes out)	OFF (light goes out)	Outputs corresponding to lever operation	Operation
Being unlocked (no switch operation)	-	Unlock	-	OFF (OPEN)	OFF (light goes out)	OFF (light goes out)	Outputs corresponding to lever operation	Operation
Unlock → Lock (Switch operation)	-	Being locked	ECSS SW = OFF	ON (24 V)	ON (lights up)	ON (lights up) + * Pop-up	OFF (no output)	Cut (work equipment and ECSS stop)
			ECSS SW = ON	OFF (OPEN)				Only ECSS operates

* If the operator locked the work equipment with the switch operation, pop-up display appears on the machine monitor.

STEERING VALVE

STRUCTURE OF STEERING VALVE

General view



9JB02801

P: From steering pump

Pr: To steering pump port P1L

Pa: From stop valve (L.H.)

Pb: From stop valve (R.H.)

A: To steering cylinder

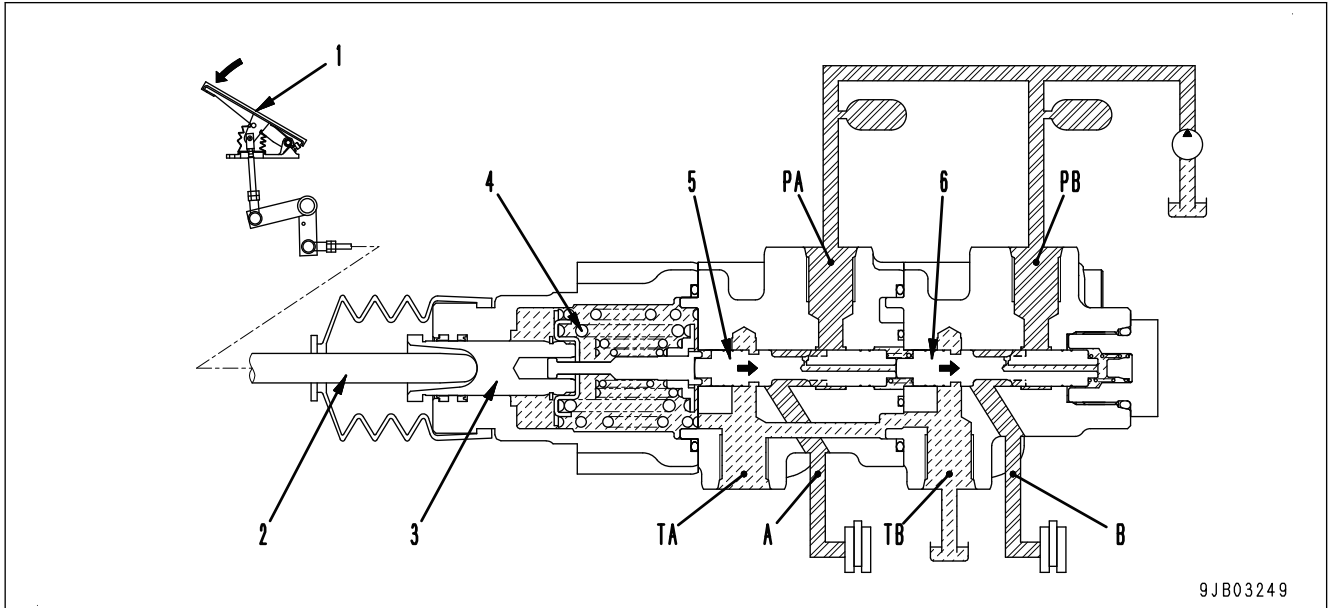
B: To steering cylinder

T1: Drain

T2: Drain

OPERATION OF BRAKE VALVE

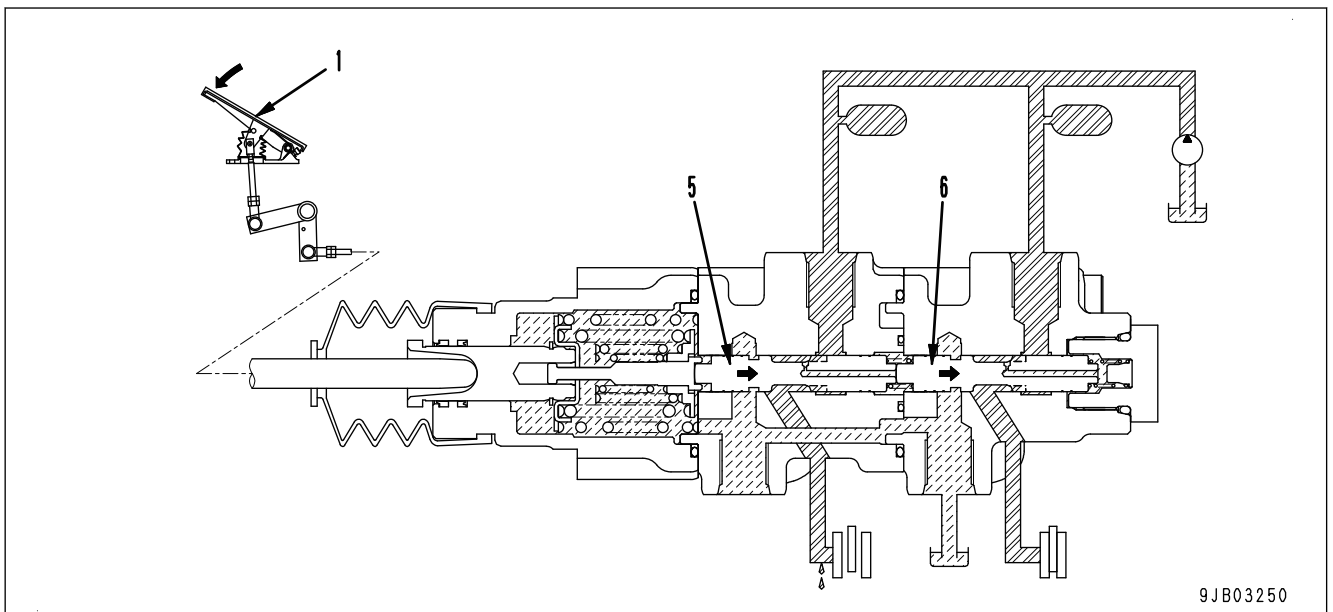
When brake pedal is depressed



1. Brake pedal (1) depressing effort is transmitted to spool (5) through rod (2), piston (3) and spring (4).
2. When spool (5) is pushed to the right, it closes the connection between port (TA) and (A), the oil from the pump flows through the accumulator into port (PA), it further flows through port (A) into rear brake piston, and operates the rear brake.
3. At the same time when spool (5) is moved to the right, spool (6) is also moved to the right to close port (TB). Then, the oil from the pump flows through the accumulator to port (PB) and further flows through port (B) to the front piston and operates the front brake.

When brake is operated on one side

(When 1 brake has trouble)



1. Even if the front brake or rear brake systems has trouble such as oil leakage and only either of them operates, the depressing force of brake pedal (1) mechanically moves spools (5) and (6) to the right. Thus, the oil from the pump is normally supplied to the brake piston working normally, enabling it to continue the operation. The brake, therefore, is capable of stopping the machine as needed to ensure the intended safety level.

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
TOPS	Tip-Over Protective Structure	Cab and canopy	This is a protective structure that intended to protect the operator wearing seat belt from suffering injury which may be caused if the cab is crushed when the machine tips over. (Roll-over protective structure of hydraulic excavator) This performance is standardized as ISO 12117.
TWV	2-Way Valve	Hydraulic system	This is a solenoid valve that switches over direction of flow.
VGT	Variable Geometry Turbocharger	Engine	This is a turbocharger on which the cross-section area of the exhaust passage is variable.
VHPC	Variable Horse Power Control	Engine control	This is a function that finely controls the maximum output of the machine so that high work efficiency and low fuel consumption rate are both achieved.

*1: Code for applicable machine model

D: Bulldozer

HD: Dump truck

HM: Articulate dump truck

PC: Hydraulic excavator

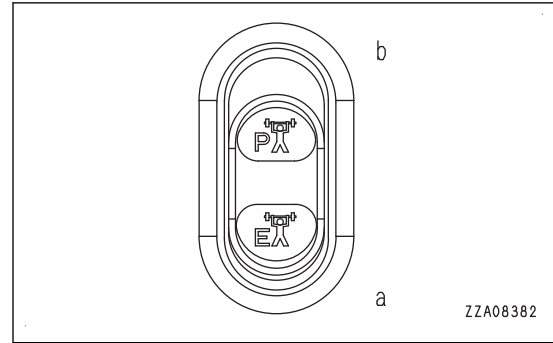
WA: Wheel loader

List of abbreviations used in the circuit diagrams

Abbreviation	Actual word spelled out
A/C	Air Conditioner
A/D	Analogue-to-Digital
A/M	Air Mix Damper
ACC	Accessory
ADD	Additional
AUX	Auxiliary
BR	Battery Relay
CW	Clockwise
CCW	Counter Clockwise
ECU	Electronic Control Unit
ECM	Electronic Control Module
ENG	Engine
EXGND	External Ground
F.G.	Frame Ground
GND	Ground
IMA	Inlet Metering Actuator
NC	No Connection

Equipment name	Procedure, measuring location, criteria, and remarks			
Brake oil temperature sensor (rear)	1. Turn the starting switch to OFF position 2. Disconnect connector R60, and connect T-adapter to male side			
	Resistance	Between R60 (male) (1) and (2)	Rear brake oil temperature: 25 °C	42.7 kΩ
			Rear brake oil temperature: 30 °C	35.13 kΩ
			Rear brake oil temperature: 80 °C	6.556 kΩ
			Rear brake oil temperature: 90 °C	4.925 kΩ
Rear brake oil temperature: 100 °C			3.75 kΩ	
Torque converter oil temperature sensor	1. Turn the starting switch to OFF position 2. Disconnect connector TC.T, and connect T-adapter to male side			
	Resistance	Between TC.T (male) (1) and (2)	Oil temperature: 25 °C (normal temperature)	35 to 50 kΩ
Oil temperature: 100 °C			3.1 to 4.5 kΩ	
Loader pump pressure sensor	1. Turn the starting switch to OFF position 2. Insert T-adapter into connector F10 3. Start the engine			
	Voltage	Between F10 (C) and (A)	Loader pump pressure: Continuous	0.50 to 4.40 V
			Loader pump pressure: at Neutral	0.50 to 0.90 V
Loader pump pressure: At bucket tilt relief			2.97 to 3.39 V	
Boom cylinder bottom pressure sensor	1. Turn the starting switch to OFF position 2. Insert T-adapter into connector F12 3. Start engine, and move lever to boom RAISE to perform troubleshooting			
	Voltage	Between F12 (C) and (A)	Continuous	0.50 to 4.40 V
			Boom: At Neutral	0.50 to 0.90 V
Boom cylinder bottom: Hydraulic relief			2.80 to 3.20 V	

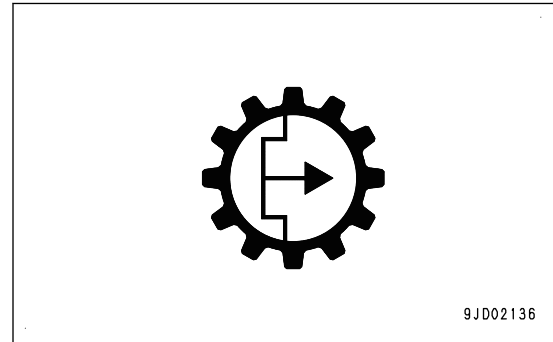
3. Select the power mode by the power mode selector switch.
 - E mode: Select (a).
 - P mode: Select (b).



4. Turn off the transmission cut-off function, and depress the left brake pedal securely.

REMARK

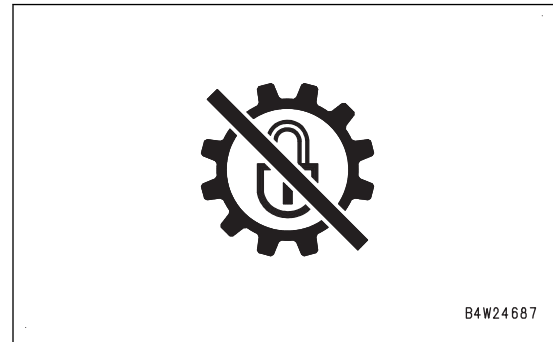
When the transmission cut-off function is turned off, the pilot lamp of the monitor and switch go off.



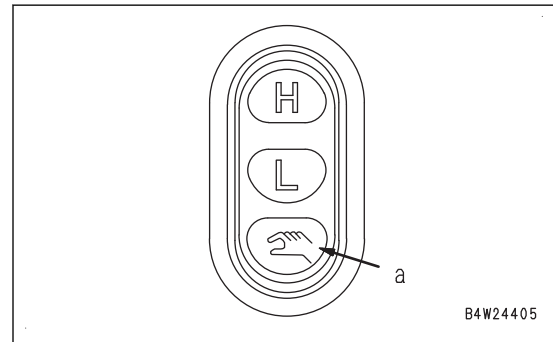
5. Turn off the torque converter lockup function.

REMARK

When the torque converter lockup function is turned off, the pilot lamp in the figure lights up on the monitor.



6. Set transmission shift mode selector switch to MANUAL position (a).
7. While keeping the directional lever or directional selector switch in NEUTRAL (N), set the gear speed switch to 4th (4th speed).
8. Set the parking brake switch to OFF (RELEASE) position.
9. While depressing the left brake pedal, set the directional lever or directional selector switch to FORWARD (F) or REVERSE (R) position.



10. Gradually depress the accelerator pedal, and measure engine speed when the accelerator pedal is depressed to the full stroke.

▲ Keep depressing the brake pedal securely.

NOTICE

Do not keep stalling torque converter for more than 20 seconds. Take care that torque converter oil temperature does not exceed 120 °C.

REMARK

Measure the engine speed with torque converter stalled 2 or 3 times.
For standard values, see STANDARD VALUE TABLE, "STANDARD VALUE TABLE FOR ENGINE".

Method for testing engine speed at hydraulic stall

1. Start the engine.

HANDLE CYLINDER CUT-OUT MODE OPERATION

The cylinder cutout mode operation means to run the engine with the fuel injectors of one or more cylinders disabled electrically to reduce the number of active cylinders. The purposes and effects of cylinder cutout mode operation are as follows.

- Cylinder cutout mode operation is used to find out a cylinder which does not output power normally (or, combustion in it is abnormal).
- If the engine speed and output do not change from the normal operation (all-cylinder operation) when a cylinder is cutout with the cylinder cutout mode operation, that cylinder has a failure. The possible failures are as follows.
 - Compression gas leakage from cylinder head gasket area
 - Defective injection
 - Defective piston, piston ring or cylinder liner
 - Defective valve mechanism (valve operating system)
 - Defective electrical system
- Common rail fuel injection system individually controls the injector of each cylinder electronically , so the cylinder cutout test can be performed easily by the simple operations of the switches compared with the mechanical fuel injection system. So, the defective cylinder can be found out easily.

- Check that “0” of “Test State” is flashing.

REMARK

Flashing of “0” indicates “Waiting for the start (default)”, and test can be performed. Display other than “0” appears, follow “Parameter list of test state”.

- Press UP switch (10) to start “AdBlue/DEF Line Heater Relay 1 Test”.

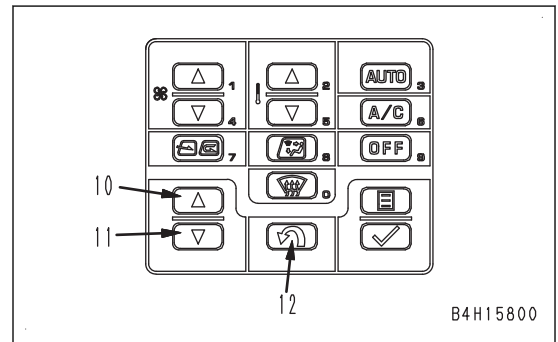
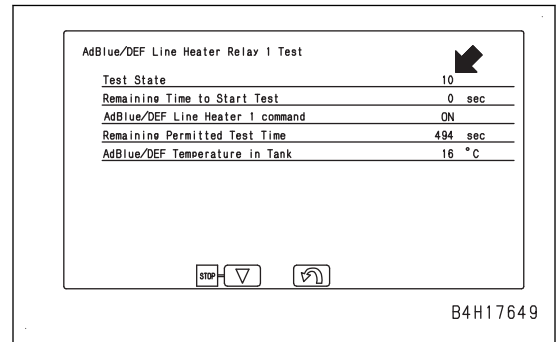
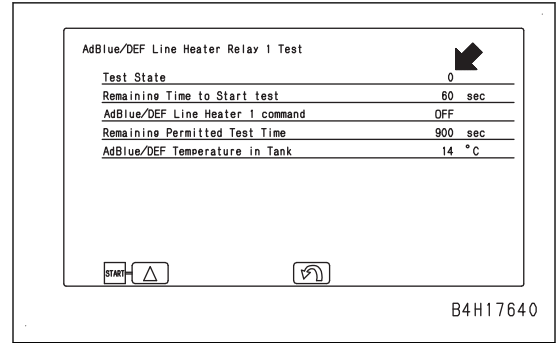
UP switch (10): Starts “AdBlue/DEF Line Heater Relay 1 Test”.

DOWN switch (11): Stops “AdBlue/DEF Line Heater Relay 1 Test”. (When “STOP” is displayed.)

RETURN switch (12): Returns the display to the “SCR Service Test” screen

NOTICE

- If “Test State” does not change to “10” and test does not start even by pressing UP switch (10), turn starting switch to OFF position once, and repeat the testing procedure from step 5.
- If you turn starting switch to OFF position by mistake during test, do not turn starting switch to ON position immediately. Check that system operating lamp is off, and turn starting switch to ON position again after engine controller shuts down.
- If KOMNET communication error has not continued for more than 1 second, engine controller is unable to detect error, the test may be continued although the machine monitor does not continue the test (standard screen). In that case, turn the starting switch to OFF position once, and then system operating lamp goes out, and the engine controller shuts down to reset the test.



REMARK

- Display of “Test State” changes to flashing of “10”, and display of “Remaining Time to Start Test” is counted down from “60” to “0 sec”, and when it reaches to “0 sec”, the power is supplied automatically.
- When the display of “Test State” shows the number between “11” to “41”, follow “Parameter list of test state”.
- When the display of “Remaining Time to Start Test” becomes “0 sec”, “Line Heater 1 Command” is “ON” and voltage will be outputted to the heater relay.
- The test stops automatically in the elapsed time of 16 minutes after UP switch (10) is pressed.

- Measure the voltage between pin 1 and pin 2.

REMARK

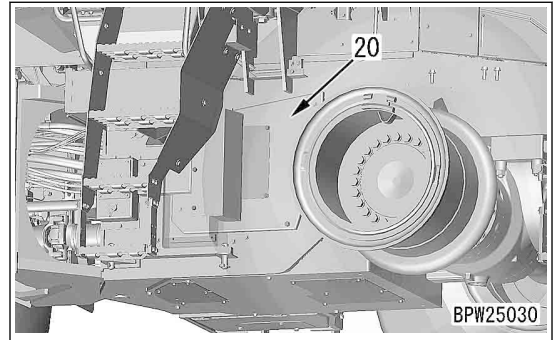
- If an abnormality occurs during measurement, failure codes [CA3713], [CA5115], [CA3562], and [CA3563] are displayed. If these failure codes are displayed, perform troubleshooting.
- If 24.5±1.5 V is measured within 900 seconds of “Remaining Permitted Test Time”, you can finish the measurement by pressing DOWN switch (11).

For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.

- (For North America)



- (For European Union)

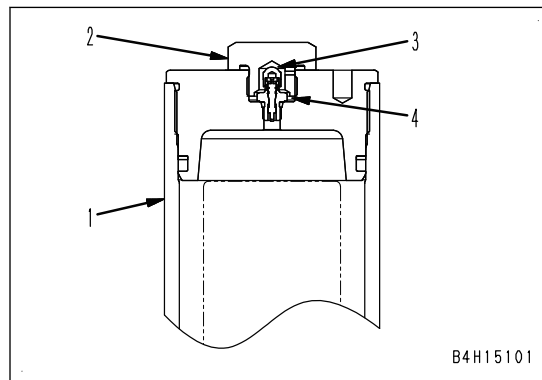


1. Stop the engine, depress the brake pedal repeatedly until the reaction force is not detected to completely release the oil pressure from the brake circuit.

REMARK

As a guide, by depressing the brake pedal approximately 30 times, the reaction force of the brake pedal is not detected and the oil pressure is released.

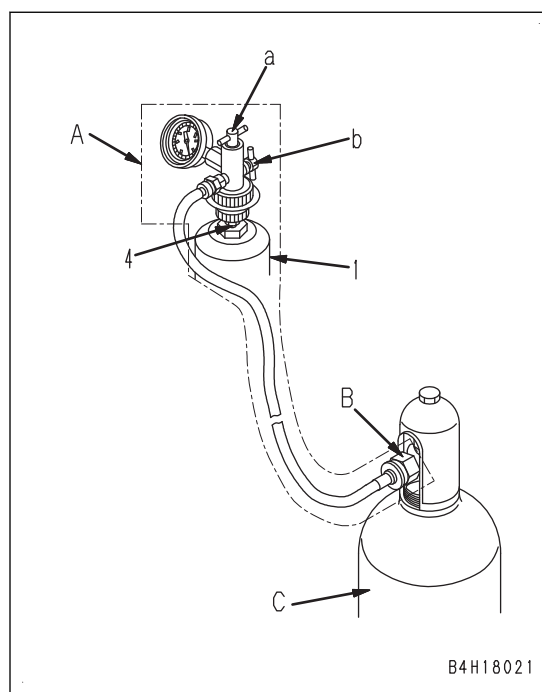
2. Remove plug (2) and cap (3) from accumulator (1).



B4H15101

3. Connect gas charging tool A and nitrogen gas cylinder C to gas valve (4) of accumulator (1) according to the following procedure.

- 1) Turn handle (a) of gas charging tool A counterclockwise until it stops.
- 2) Turn handle (b) counterclockwise for opening.
- 3) Install the extension attached to gas charging tool A to gas valve (4) of accumulator (1), and then connect the gas charging tool.
- 4) Connect gas charging tool A and nitrogen gas cylinder C.



B4H18021

REMARK

- 2 types of threads in Japan, W22-14 threads (male thread A type) and W23-14 threads (female thread B type), are available for the nitrogen gas cylinder. When using a cylinder with W23-14 threads (female thread B type), connect the hose by using the adapter. (The adapter is an accessory of gas charging tool A.)
- Connect the hose by using nipple B depending on the specification of the nitrogen gas cylinder.

4. Slightly open the valve of nitrogen gas cylinder C, and release the gas at approximately 0.19 to 0.29 MPa {2 to 3 kg/cm²}.
5. The nitrogen gas starts to discharge from handle (b). Turn handle (b) clockwise for closing.
6. Slowly turn handle (a) clockwise, and gradually open valve (4) of accumulator (1).

NOTICE

Do not turn handle (a) excessively, otherwise it damages the accumulator valve core and gas may leak. Operate handle (a) carefully.

7. Open the valve of nitrogen gas cylinder C additionally, and fill the accumulator with the nitrogen gas.
8. Close the valve of the nitrogen gas cylinder C occasionally in the middle of the work, and check the nitrogen gas pressure in the accumulator.

REMARK

For the nitrogen gas pressure testing procedure, see "METHOD FOR TESTING ACCUMULATOR NITROGEN GAS PRESSURE".

TEST COOLING FAN CIRCUIT OIL PRESSURE

Tools for testing cooling fan circuit oil pressure

Symbol	Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1
	1	799-101-5120	Gauge	1 Pressure range: 40 MPa
	2	799-101-5130	Gauge	1 Pressure range: 6 MPa
B	790-261-1205	Digital hydraulic tester	1	Pressure range: 70 MPa
C	799-101-5220	Nipple	1	Size: M10×1.25 mm
D	07002-11023	O-ring	1	

⚠ Place the machine on a level ground, lower the work equipment to the ground, set the parking brake switch in PARKING (P) position and work equipment lock switch in LOCK position, and stop the engine.

⚠ Chock the tires to prevent the machine from moving.

⚠ Loosen the hydraulic tank oil filler cap slowly to release the pressure in the tank.

Check this item under the following conditions.

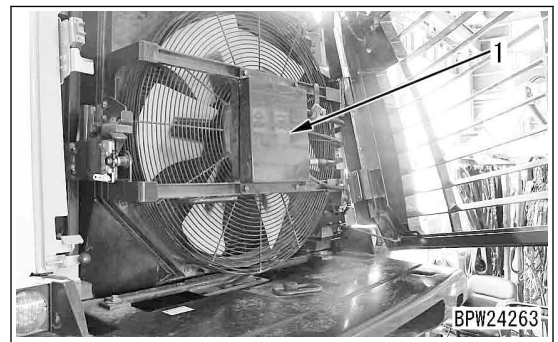
- “Fan 100% speed adjustment” mode
- Hydraulic oil temperature: 45 to 55 °C

For checking the cooling fan circuit oil pressure to perform troubleshooting or others, refer to this section.

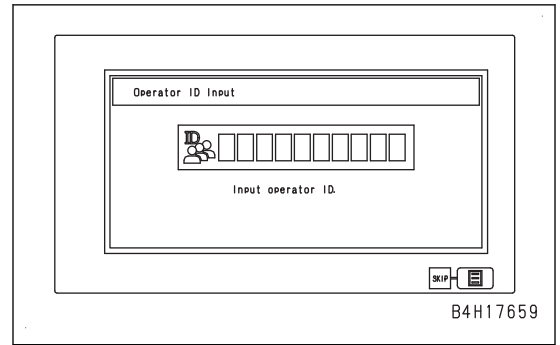
METHOD FOR TESTING COOLING FAN CIRCUIT OIL PRESSURE

Method for testing cooling fan drive pressure

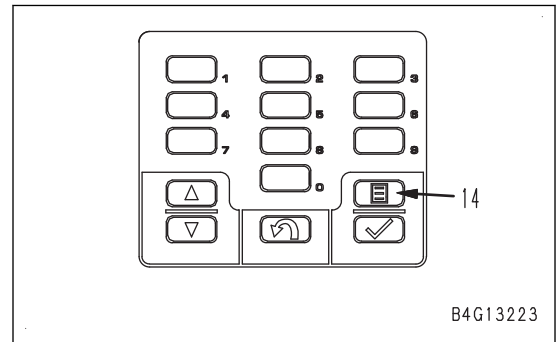
1. Open the radiator grille.
2. Remove cover (1).



- Confirm that the identification of the technician is not necessary with the administrator of the machine before starting. By doing this, the switch operation is not necessary when turning the starting switch to ON position. Input the ID, and pressing the menu switch (14), and check before starting screen appears.



B4H17659



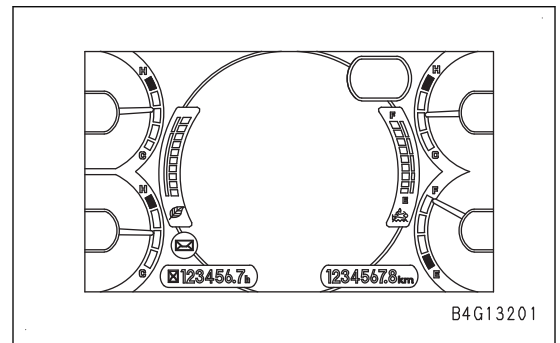
B4G13223

CHECKING FUNCTION BY LCD (LIQUID CRYSTAL DISPLAY)

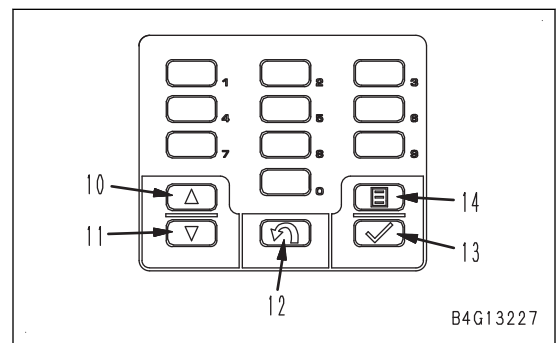
While the standard screen is displayed, if switches on the switch panel are operated in the following manner, the entire LCD screen turns white.

Switch operation: Press UP switch (10) while pressing DOWN switch (11) and release UP switch (10) first.

- If there is a display error in the LCD, only that part is indicated in black.
- To return to the former screen, press any one of the switches (10) to (14).



B4G13201

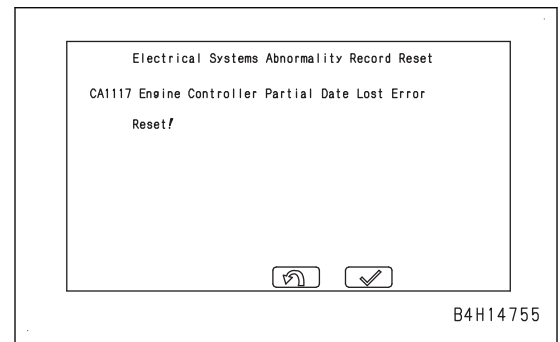


B4G13227

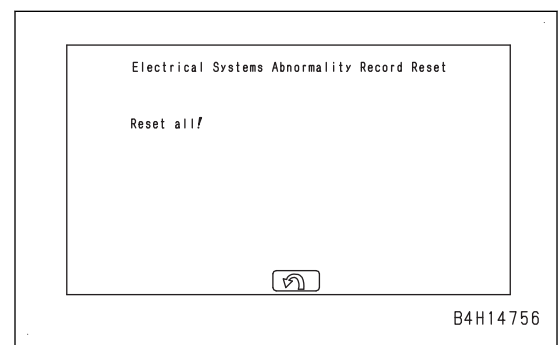
4. After the screen to notify the completion of the deletion is displayed and then “Electrical Sys Abnormality Record” (deleting mode) screen is displayed, the deletion of the selected abnormality record is completed.

REMARK

- This is the screen displayed when the deletion of a selected abnormality record is completed.



- This is the screen displayed when the deletion of all abnormality records is completed.

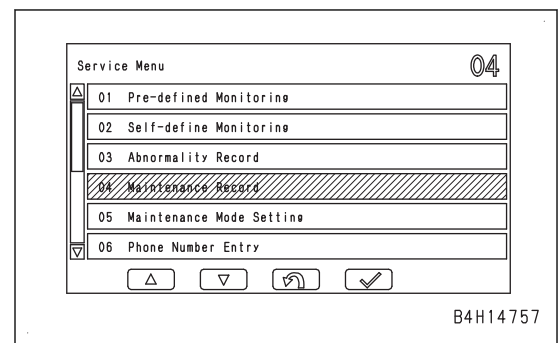


METHOD FOR CONFIRMING MAINTENANCE RECORD

The machine monitor records the maintenance information of the filters, oils, etc., which are displayed and checked by the following operations.

When the maintenance is performed, if the data are reset in the operator mode, the number of the times of maintenance is recorded here.

1. Select “Maintenance Record” on “Service Menu” screen.



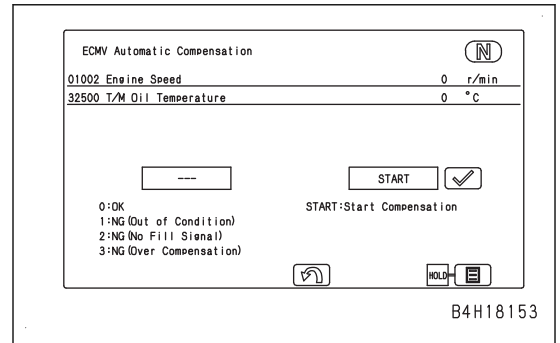
ADJUSTMENT MENU

METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (ECMV AUTOMATIC COMPENSATION)

Adjustment menu is used to check the various settings of the machine or to adjust those value.

“ECMV Automatic Compensation” function corrects the differences in operational feeling due to the individual character of ECMV to a certain level through the transmission controller.

For the adjustment method on this Adjustment menu, see the section “METHOD FOR ADJUSTING TRANSMISSION ECMV CURRENT”.

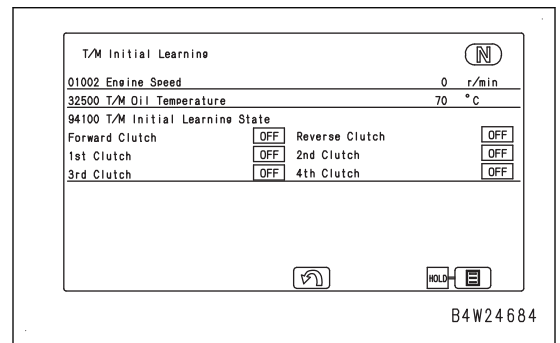


METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (T/M INITIAL LEARNING)

Adjustment menu is used to check the various settings of the machine or to adjust the value.

“T/M Initial Learning Reset” function is used to self-adjust the change in wear of the transmission clutch to assure a constant gear shift feeling via the transmission controller.

For the adjustment method on this Adjustment menu, see the section “METHOD FOR SETTING AND RESETTING TRANSMISSION INITIAL LEARNING”.

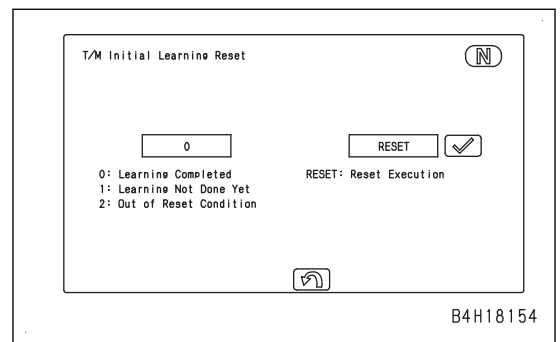


METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (T/M INITIAL LEARNING RESET)

Adjustment menu is used to check the various settings of the machine or to adjust the value.

“T/M Initial Learning Reset” function is used to initialize the initial learning data of the transmission via the transmission controller.

For the adjustment method on this Adjustment menu, see the section “METHOD FOR SETTING AND RESETTING TRANSMISSION INITIAL LEARNING”.



METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (T/M SHIFT POINT)

- This function is used to change the shift point by adding a correction amount to be set to the shift point when the transmission shift mode selector switch is in position “L”. However, only the shift point adjustment amount for automatic kickdown to the 1st gear speed is applied to position “H”.
- The correction amount is set to “0” when the machine is shipped.
- Although the shift point depends on the engine mode, the correction amount set with this function is always applied, regardless of the engine mode.

3. If no-injection cranking (no fuel injection on every cylinder) is enabled, "No-injection cranking is possible. Please turn the key off after no-injection ends." is displayed on the screen. Crank the engine with the starting motor.

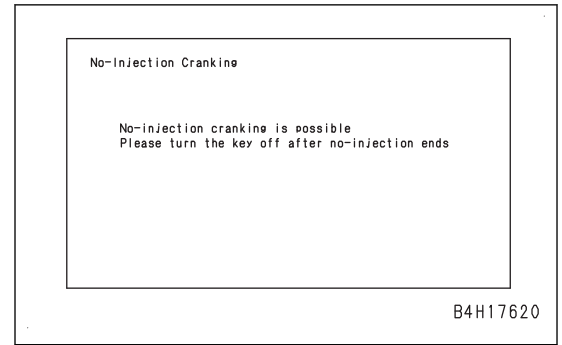
NOTICE

Do not crank the engine for 20 seconds or longer to protect the starting motor.

REMARK

While the screen is changing to the screen as shown in the figure, the screen of "Under preparation." is displayed.

4. After the cranking is completed, turn the starting switch to OFF position.
You cannot change the screen described above to another screen.



40 TROUBLESHOOTING

No.	Item	Criteria	Remedy
5	Check battery electrolyte level	Between H and L	Refill or replace
6	Check wiring harness for discoloration, burnt areas and cover peeling	-	Repair or replace
7	Check for coming off of wiring harness clamp and sagging of wiring harness	-	Repair
8	Check grounding	-	Repair
9	Check for loose connector and damaged lock	-	Repair or replace
10	Check connector pin for corrosion, bends and deformation	-	Repair or replace
11	Check connector for entering of water and foreign material	-	Dry, clean or replace
12	Check wiring harness for open or short circuit	-	Repair or replace
13	Check fuse for blowing out and corrosion	-	Replace
14	Check alternator voltage (when engine speed is medium or higher)	27.5 to 29.5 V after few minutes of operation	Replace
15	Check battery relay operation sound (when starting switch is turned to ON or OFF position)	-	Replace
16	Check and clean rear view camera	-	Clean or repair

Exterior

No.	Item	Criteria	Remedy
1	Check undercarriage	-	Repair
2	Check handrails and steps	-	Repair
3	Check mirrors	-	Clean or repair

Interior

No.	Item	Criteria	Remedy
1	Check gauges and monitors	-	Clean or replace
2	Check seat belt	-	Repair

PROCEDURE FOR TESTING AND TROUBLESHOOTING

Classification of troubleshooting

Mode	Content
Display of code	Troubleshooting by failure code
E mode	Troubleshooting of electrical system
H mode	Troubleshooting of hydraulic and mechanical systems
S mode	Troubleshooting of engine

If a symptom which is assumed to be a failure occurs on the machine, go to the corresponding troubleshooting section.

- If action level and failure code are displayed on the standard screen of the machine monitor, perform the troubleshooting for the corresponding [Display of code] corresponding to the displayed failure code.

REMARK

If multiple failure codes are displayed simultaneously, all the codes are displayed repeatedly in order. Note down all the codes.

- If action level and failure code are not displayed on the standard screen of the machine monitor, check mechanical system failure code and electrical system failure code with abnormality record function of the machine monitor.
 - If a failure code is displayed, perform troubleshooting for the corresponding [Display of code] corresponding to the failure code.
 - If an electrical system failure code is displayed, delete all the codes once and reproduce them, and then see if the failure is still detected.

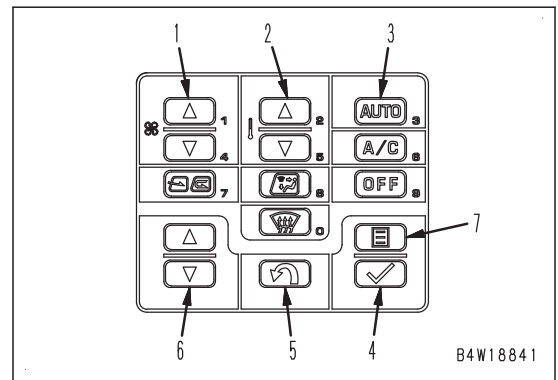
REMARK

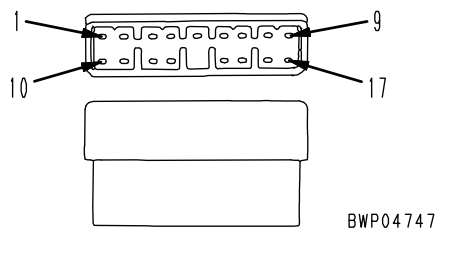
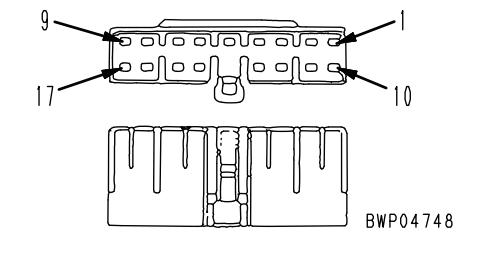
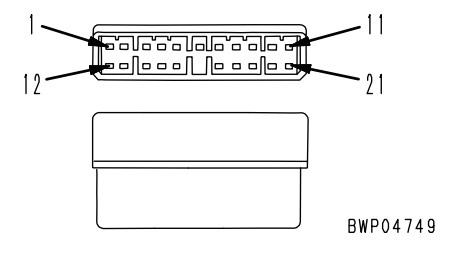
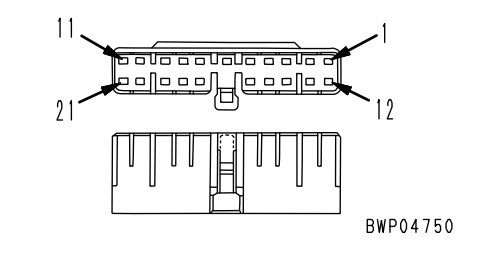
A failure code of the mechanical system cannot be deleted.

- If no failure code is found in the abnormality record, a failure that the machine cannot find out by itself may have occurred in the electrical system or hydraulic and mechanical system. In this case, check a symptom which is assumed to be a failure again and select the same phenomenon from the table of “Symptom and troubleshooting numbers”, and then perform troubleshooting corresponding to that phenomenon in the [E mode], [H mode] or [S mode].

After repairing the failure, clear all the failure codes in the electrical system abnormality record according to the following procedures.

1. While pressing triangle switch (6) on the panel switch at the standard screen, press numeric keys [1]→[2]→[3] in order, then “Service Menu” screen appears.
 - (4) is the ENTER switch/ (check mark).
 - (5) is the RETURN switch/
 - (7) is the MENU switch/ (to clear all).
2. On “Service Menu” screen, press triangle switch (6) twice in the panel switch section, and select “03 Abnormality Record”.



No. of pins	MIC type connector		Testing connection use special tool Part No.
	Male (female housing)	Female (male housing)	
17	 <p>BWP04747</p>	 <p>BWP04748</p>	799-601-2730 (T-adapter)
	Body part No. : 79A-222-2730 (Q' ty:2)	Body part No. : 79A-222-2720 (Q' ty:2)	
21	 <p>BWP04749</p>	 <p>BWP04750</p>	799-601-2740 (T-adapter)
	Body part No. : 79A-222-2750 (Q' ty:2)	Body part No. : 79A-222-2740 (Q' ty:2)	
	Terminal part No. : 79A-222-2770 (Q' ty:50)	Terminal part No. : 79A-222-2760 (Q' ty:50)	

B4D18197

Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
DAFQKR	CAN 2 Defective Communication (Monitor)	KOM-TRAX	—	Electrical system	
DAQ0KK	Main Power Voltage Low Error (T/M Controller)	TM	L03	Electrical system	
DAQ0KT	Read Only Memory Abnormality (T/M Controller)	TM	L01	Electrical system	
DAQ0MC	T/M Controller Malfunction	TM	—	Electrical system	
DAQ1KA	Key SW ACC Signal Open Circuit (T/M Controller)	TM	L03	Electrical system	
DAQ2KK	Solenoid Power Voltage Low Error (T/M Controller)	TM	L03	Electrical system	
DAQ4KB	Self-holding Relay Output Ground Fault (T/M Controller)	TM	L01	Electrical system	
DAQ9KQ	Model Selection Signal Mismatch (T/M Controller)	TM	L03	Electrical system	
DAQLKA	System Operating Lamp Open Circuit (T/M Controller)	TM	—	Electrical system	
DAQLKB	System Operating Lamp Short Circuit (T/M Controller)	TM	—	Electrical system	
DAQQKR	CAN2 Defective Communication (T/M Controller)	MON	L03	Electrical system	
DAQRKR	CAN1 Defective Communication (T/M Controller)	MON	L03	Electrical system	
DAQRMA	Option Selection Mismatch (T/M Controller)	TM	L03	Electrical system	
DAZ9KQ	Model Selection Signal Mismatch (A/C)	MON	—	Electrical system	
DAZQKR	CAN 2 Defective Communication (A/C ECU)	MON	L01	Electrical system	
DB2QKR	CAN 2 Defective Communication (Engine Controller)	MON	L03	Electrical system	
DB2RKR	CAN 1 Defective Communication (Engine Controller)	MON	L03	Electrical system	
DB90KK	Main Power Voltage Low Error (W/E Controller)	WE	L03	Electrical system	
DB90KT	Read Only Memory Abnormality (W/E Controller)	WE	L01	Electrical system	
DB90MC	W/E Controller Malfunction	WE	—	Electrical system	
DB91KA	Key SW ACC Signal Open Circuit (W/E Controller)	WE	L03	Electrical system	
DB92KK	Solenoid Power Voltage Low Error (W/E Controller)	WE	L03	Electrical system	

No.	Cause	Procedure, measuring location, criteria and remarks			
3	Defective auto idle stop parking brake relay	<ul style="list-style-type: none"> When failure code [D1E6KA] or [D1E6KB] or [D1E6KY] is displayed, perform troubleshooting for it first. <ol style="list-style-type: none"> Turn the starting switch to OFF position. Replace relay L133 with horn relay L119. Start the engine and drive the machine. 			
		Judgment by replacement of parking brake relay (L133)	Machine becomes normal.	Relay L133 is defective.	
			Machine does not become normal.	Relay L133 is normal.	
4	Defective parking brake switch	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector S_FA, and connect T-adaptor to male side. Start the engine. 			
		Resistance	Between S_FA (male) (3) and (4)	Parking brake switch: RELEASE	Max. 1 Ω
				Parking brake switch: PARKING	Min. 1 MΩ
			Between S_FA (male) (5) and (6)	Parking brake switch: RELEASE	Min. 1 MΩ
				Parking brake switch: PARKING	Max. 1 Ω
5	Defective parking brake pressure switch	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector PB.SW, and connect T-adaptor to male side. Start the engine. 			
		Resistance	Between PB.SW (male) (1) and (2)	Parking brake switch: RELEASE	Max. 1 Ω
				Parking brake switch: PARKING	Min. 1 MΩ
6	Open circuit, short circuit, ground fault, hot short circuit in wiring harness, or defective monitor controller	<ul style="list-style-type: none"> Parking brake pressure switch line <ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector PB.SW, and connect T-adaptor to female side. Turn the starting switch to ON position. <p>REMARK Shake the wiring harness by hand while measuring the voltage. If the voltage becomes 0 V at certain place while shaking, wiring harness has open circuit near that place.</p>			
		Voltage	Between PB.SW (female) (1) and (2)	Min. 10 V	

FAILURE CODE [A1U0N4]

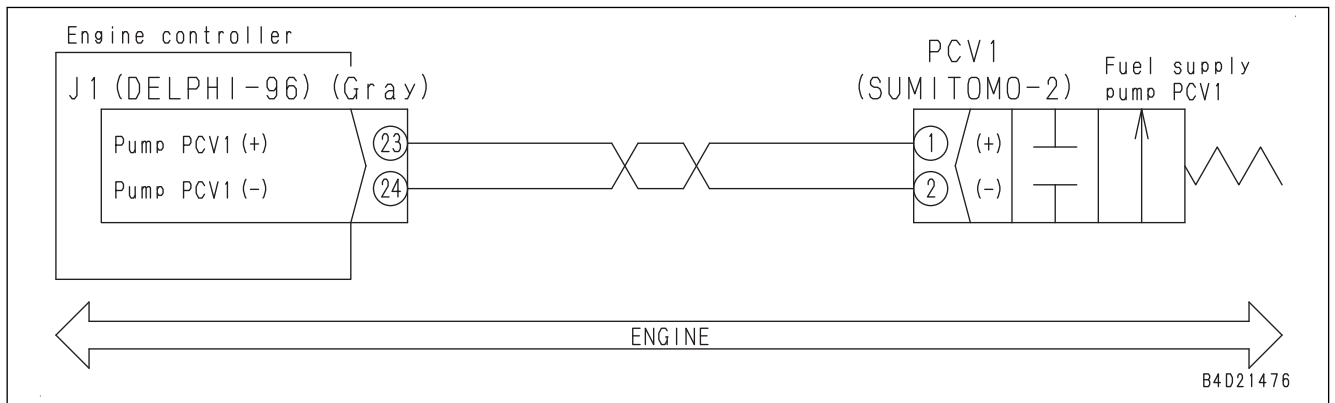
Action level	Failure code	Failure	Hydrocarbon Desorb Request 2 (Engine controller system)
L03	A1U0N4		
Details of failure	Unburned fuel remains in KDPF because engine has been running at low idle speed or low load for a long time.		
Action of controller	Requests an operator to perform manual stationary regeneration (fuel drying). Or informs manual stationary regeneration (fuel drying) is in progress.		
Phenomenon on machine	Same phenomenon as automatic regeneration occurs. (When the machine is in a safe condition, machine controls the engine speed to stay up around 1000 rpm.)		
Related information	<p>⚠ KDPF and KDOC become hot (Min. 500 °C). Be careful not to get burned.</p> <ul style="list-style-type: none"> • Temperature detected by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) • Temperature detected by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) • Temperature detected by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) • KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when at low idle speed (KDPF regeneration is not executed) are approximately 100 to 250 °C, and difference between these temperatures are approximately 10 °C. (KDOC inlet temperature > KDOC outlet temperature > KDPF outlet temperature) • When manual stationary regeneration is performed due to the guidance of monitor displaying failure code [A1U0N3] or [A1U0N4], fuel dosing is disabled. Accordingly, each temperature of KDOC inlet, KDOC outlet, and KDPF outlet reaches to approximately 250 to 400 °C. • When manual stationary regeneration except above is in progress, KDOC inlet temperature is approximately 250 to 400 °C, and KDOC outlet temperature and KDPF outlet temperature are approximately 450 to 600 °C. • If there is a significant difference between KDOC inlet temperature and KDOC outlet temperature when KDPF is completely cooled or engine is running at engine low idle speed (without regenerating KDPF), replace KDOC inlet temperature sensor or KDOC outlet temperature sensor, whichever is suspected to be defective, judging from KDPF outlet temperature. • The KDOC inlet temperature sensor, the KDOC outlet temperature sensor, and the KDPF outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • After completion of repair, check that this failure code and failure code [A1U0N3] are cleared by the following procedure. Procedure: Turn starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Manual stationary regeneration performed (to dry KDPF)	Follow the instruction on the monitor to perform manual stationary regeneration. If this failure code is cleared after this, repair work is complete.	

FAILURE CODE [CA131]

Action level	Failure code	Failure	Throttle Sensor High Error (Engine controller system)
L03	CA131		
Detail of failure	A high voltage occurs in throttle sensor signal circuit.		
Action of controller	Set accelerator pedal position 0 % with accelerator pedal OFF and fixed value with accelerator pedal ON, and run the engine.		
Phenomenon on machine	Full throttle is not achieved.		
Related information	<ul style="list-style-type: none"> Input voltage from throttle sensor can be checked with monitoring function. (Code: 03000) Throttle position detected by throttle sensor can be checked with monitoring function. (Code: 31701) After repairing, check if the failure code is cleared by the following procedure. Method: Turn the starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it.			
2	Defective throttle sensor power supply system	If failure code [CA2185] is also displayed, perform troubleshooting for it first.			
3	Short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position Disconnect connectors J2 and PD, and connect T-adapter to either female side. 			
		Resistance	Between J2 (female) (10) and (9), or between PD (female) (1) and (2)	Min. 1 MΩ	
4	Hot short circuit in wiring harness (contact with 24 V circuit)	<ol style="list-style-type: none"> Turn the starting switch to OFF position Disconnect connector PD and connect T-adapter to female side. Turn the starting switch to ON position 			
		Voltage	Between PD (female) (2) and ground	Max. 1 V	
5	Defective accelerator pedal (throttle sensor)	<ol style="list-style-type: none"> Turn the starting switch to OFF position Insert T-adapter into connector PD Turn the starting switch to ON position Depress the accelerator pedal and perform troubleshooting. 			
		Voltage	Between PD (2) and (3)	Depress the accelerator pedal.	3.7 to 4.0 V
				When releasing the accelerator pedal	0.5 to 0.8 V

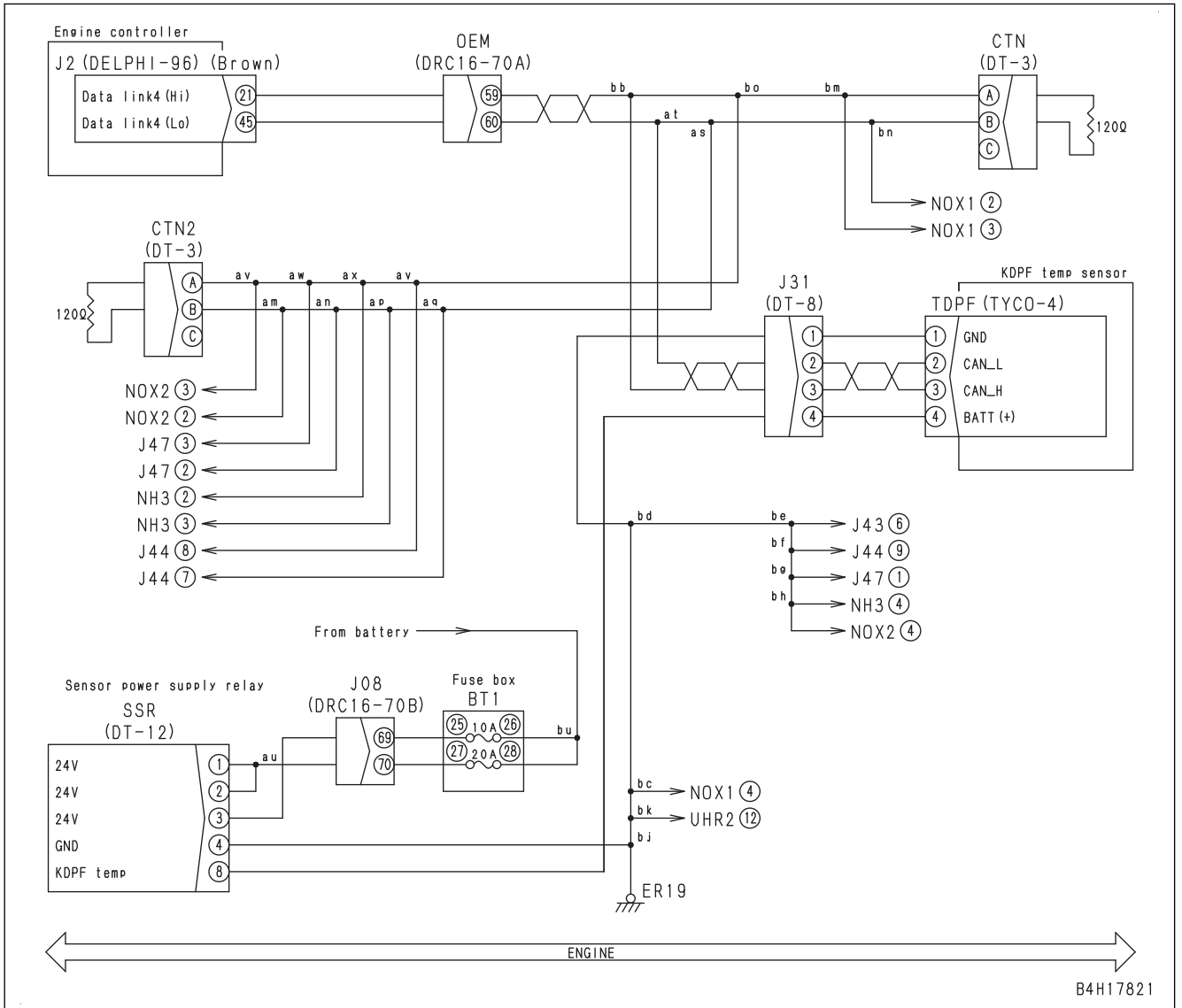
Circuit diagram related to IMV/PCV1



FAILURE CODE [CA442]

Action level	Failure code	Failure	Battery voltage high error (Engine controller system)
L04	CA442		
Detail of failure	High voltage (Min. 36 V) occurs in power supply circuit of controller.		
Action of controller	Operates at fixed value (approximately 36 V) of battery voltage.		
Phenomenon on machine	Engine runs normally. However, engine may be stopped during operation or stopped engine may not be started.		
Related information	<ul style="list-style-type: none"> • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Battery voltage of engine controller can be checked by monitoring function. (Code: 03203) 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective engine controller power supply system	Perform troubleshooting for failure code [CA441].	

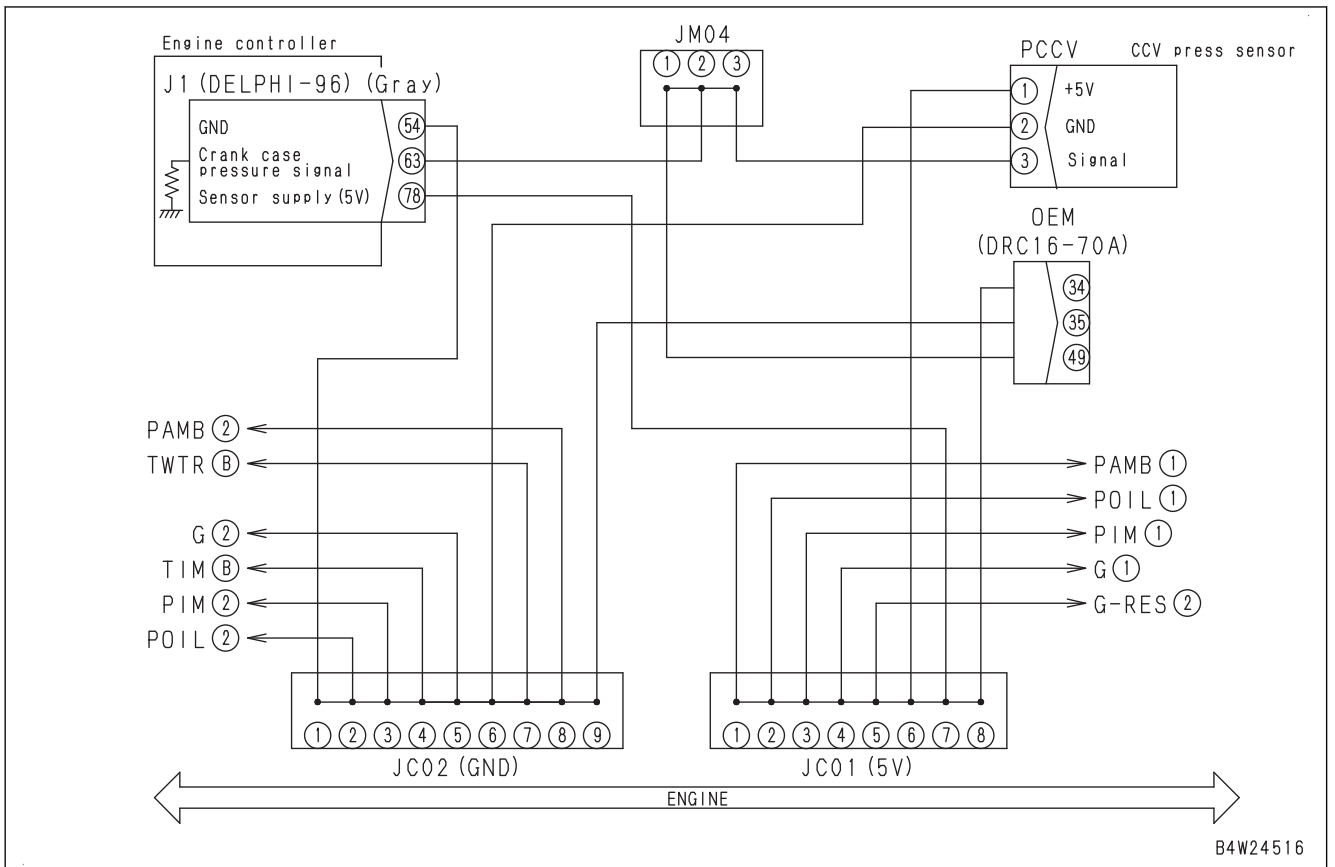
Circuit diagram related to KDOC temperature sensor



B4H17821

No.	Cause	Procedure, measuring location, criteria and remarks			
7	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)			
		Reference 1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector J1. 3. Turn starting switch to ON position.			
		Voltage	Between J1 (63) and (54)	Sensor output	0.3 to 4.7 V

Circuit diagram related to crankcase pressure sensor

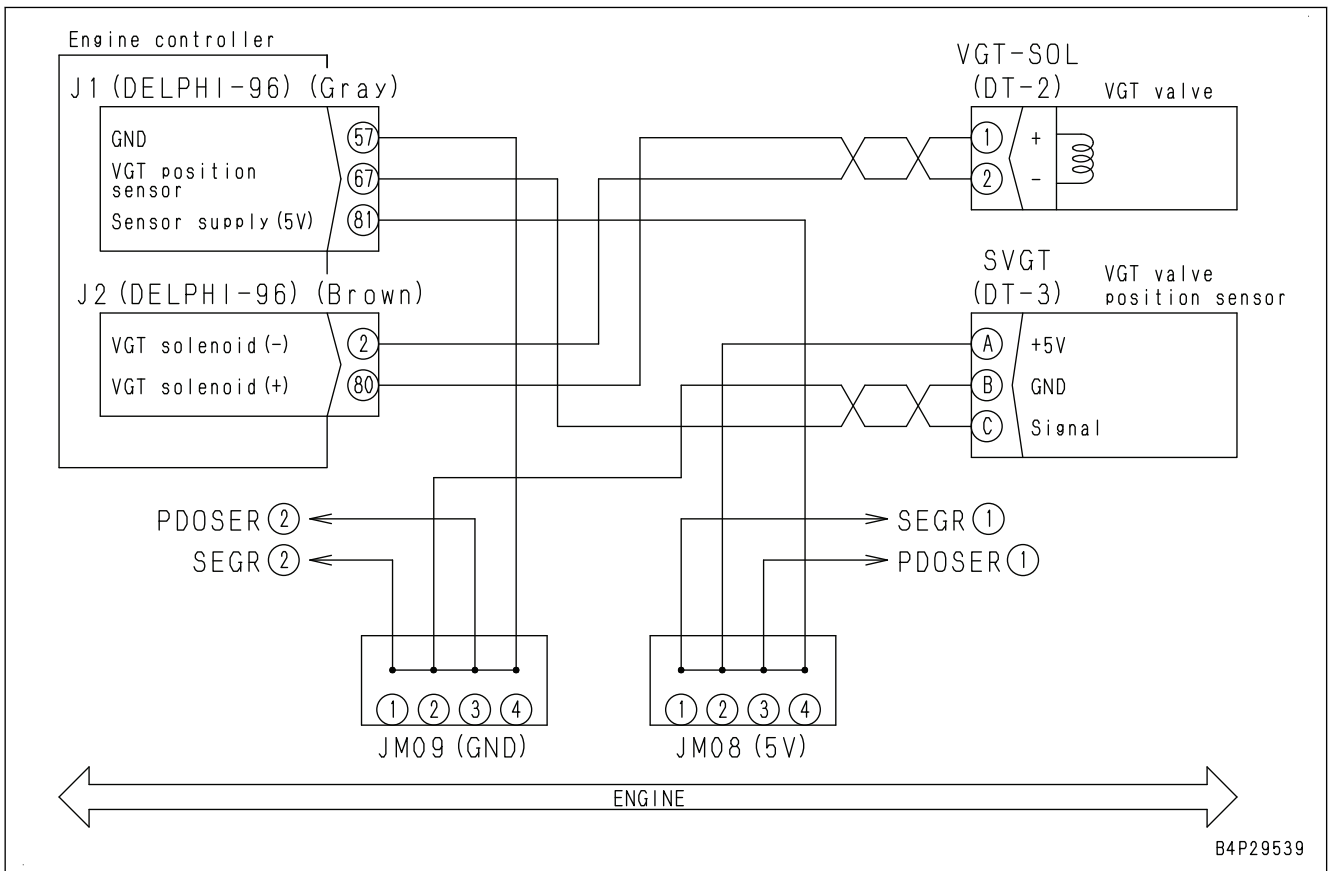


FAILURE CODE [CA1963]

Action level	Failure code	Failure	Fuel Doser Solenoid 1 Servo Error (Engine controller system)
L03	CA1963		
Details of failure	Pressure in dosing fuel pressure sensor is lower than threshold value even when fuel doser solenoid valve 1 (shut off valve) is ON.		
Action of controller	Regeneration control stops.		
Phenomenon on machine	<ul style="list-style-type: none"> Automatic regeneration is not performed. Manual stationary regeneration cannot be performed. 		
Related information	<p>⚠ Exhaust connector and KDPF become hot (Min. 500 °C). Be careful not to get burn injury.</p> <ul style="list-style-type: none"> Signal voltage from dosing fuel pressure sensor can be checked by monitoring function. (Code: 47601 (V)) Pressure in dosing fuel pressure sensor can be checked by monitoring function. (Code: 47600 (kPa)) Ambient pressure in ambient pressure sensor can be checked by monitoring function. (Code: 37400 (kPa)) After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine and observe for 3 minutes. <p>Method of clearing failure code</p> <p>Turn starting switch from OFF to ON position to start engine. Run engine at low idle speed for approximately 3 minutes, repair is completed when this failure code is canceled.</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	<ol style="list-style-type: none"> See descriptions of wiring harness and connectors in “c: Electrical equipment” in “Checks before troubleshooting” of “Related information on troubleshooting”, and check it. Start engine. <p>If this failure code is cleared, wiring harness connector is defective.</p>
2	Defective dosing fuel solenoid valve 1 (shut-off valve)	If failure code [CA1923], [CA1924], or [CA1925] is displayed, perform troubleshooting for [CA1923], [CA1924], or [CA1925] first.
3	Defective dosing fuel solenoid valve 2 (drain valve) system	If failure code [CA2732] or [CA2733] is displayed, perform troubleshooting for [CA2732] or [CA2733] first.
4	Defective doser fuel pressure sensor system	If failure code [CA1927] or [CA1928] is displayed, perform troubleshooting for [CA1927] or [CA1928] first.
5	Defective fuel supply pump system	If failure code [CA559] is also displayed, perform troubleshooting for [CA559] first.

CIRCUIT DIAGRAM (VGT VALVE SOLENOID)



FAILURE CODE [CA3134]

Action level	Failure code	Failure	KDPF Outlet Pressure Sensor Low Error (Engine controller system)
L03	CA3134		
Detail of failure	Low voltage is generated in signal circuit of KDPF outlet pressure sensor.		
Action of controller	Sets KDPF outlet pressure sensor value to an estimated value (gauge pressure) and continues operation (operates at 0 kPa (gauge pressure) if other failure codes appear at the same time).		
Phenomenon on machine	None		
Related information	<p>⚠ Since KDPF is heated to 500 °C or above, be careful not to get burned.</p> <ul style="list-style-type: none"> • KDPF differential pressure sensor and KDPF outlet pressure sensor are integrated. • If failure code [CA1696] is not displayed but failure code [CA1881] is on screen, sensor connector is probably disconnected or 5 V line probably has open circuit (defective contact of connector). • This failure code is displayed if sensor connector is disconnected. • Signal voltage from KDPF outlet pressure sensor can be checked by monitoring function. (Code: 47001 (V)) • Differential pressure detected by KDPF outlet pressure sensor can be checked by monitoring function. (Code: 47000 (kPa)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position.		
		If this failure code is cleared, wiring harness connector is defective.		
2	Defective sensor power supply system	If failure code [CA1695] or [CA1696] is displayed, perform troubleshooting for [CA1695] or [CA1696] first.		
		1. Turn starting switch to OFF position. 2. Disconnect connector PDPF and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between PDPF (female) (4) and (1)	4.75 to 5.25 V
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors J2 and PDPF, and connect T-adapters to each female side.		
		Resistance	If failure code is still displayed after above checks on cause 2, this check is not required. Between J2 (female) (32) and PDPF (female) (1)	Max. 1 Ω
			If failure code is still displayed after above checks on cause 2, this check is not required. Between J2 (female) (8) and PDPF (female) (4)	Max. 1 Ω
			Between J2 (female) (41) and PDPF (female) (2)	Max. 1 Ω

FAILURE CODE [CA3239]

Action level	Failure code	Failure	AdBlue/DEF Line Heater 2 Voltage High Error (Engine controller system)
L01	CA3239		
Detail of failure	High voltage error is detected in signal circuit of AdBlue/DEF line heater 2 (on high-temperature pressure).		
Action of controller	None in particular		
Phenomenon on machine	AdBlue/DEF line stops thawing. NOx emission increases because AdBlue/DEF injection is disabled at low temperature.		
Related information	<ul style="list-style-type: none"> The AdBlue/DEF line heater 2 operates in AdBlue/DEF supply system thawing, warning, or implementation of AdBlue/DEF line heater relay 2 test. The AdBlue/DEF line heater 2 is operated by the AdBlue/DEF line heater relay 2 in the AdBlue/DEF heater relay. This failure code is detected only when the AdBlue/DEF line heater 2 is OFF. If the connectors of all heaters connected to the AdBlue/DEF line heater 2 are disconnected, this failure code is displayed. After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	<ol style="list-style-type: none"> See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check them. Turn the starting switch to ON position. 		
		If this failure code is not displayed, the wiring harness connector is defective.		
2	Open circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors J2,UHR1 and UHA1, and connect the T-adaptor to each female side. 		
		Resistance	Between J2 (female) (38) and UHR1 (female) (9)	Max. 1 Ω
			Between UHR1 (female) (12) and ground	Max. 1 Ω
			Between UHR1 (female) (1) and UHR1 (female) (4)	Max. 1 Ω
			Between UHR1 (female) (2) and ground	Max. 1 Ω
3	Hot short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors J2,UHR1 and UHA1, and connect the T-adaptor to each female side. Turn the starting switch to ON position. 		
		Voltage	Between ground and J2 (female) (38) or UHR1 (female) (9)	Max. 3 V
			Between ground and UHR1 (female) (4) or UHA1 (female) (1)	Max. 3 V
4	Defective AdBlue/DEF line heater	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connector UHA1, and connect T-adaptor to male side. 		
		Resistance	Between UHA1 (male) (1) and (2)	5 to 40 Ω

No.	Cause	Procedure, measuring location, criteria and remarks
3	Defective intake air system	Check intake air system hoses, clamps, and tubes for damage and loosening. Repair as necessary.
4	Defective injector	Perform cylinder cutout mode operation to identify disabled cylinder (see "TESTING AND ADJUSTING", "HANDLING CYLINDER CUTOUT MODE OPERATION").
5	Oil leakage to turbocharger exhaust connector	<ol style="list-style-type: none"> 1. Remove turbocharger exhaust connector. 2. Check inside of turbocharger exhaust connector for adhesion of oil and fuel. <p>NOTICE</p> <ul style="list-style-type: none"> • If oil or fuel is found, visually check for oil leaks from EGR valve and turbocharger. Repair abnormality, if any. • Wipe off oil or fuel sticking to piping.
6	Oil leakage into exhaust connector or duct to KDPF	<p>Check the exhaust system between the turbocharger and KDPF to check for oil or fuel flow into KDPF.</p> <ul style="list-style-type: none"> • Wipe stained oil or fuel off clean, if any. • If there is a trace of oil or fuel flowing into KDPF, check for KDPF and clean or replace it as necessary.
7	KDOC outlet temperature sensor installation error	<p>For details, see "Chapter 50 DISASSEMBLY AND ASSEMBLY", "REMOVE AND INSTALL KDPF ASSEMBLY" and "DISASSEMBLE AND ASSEMBLE OF KDPF ASSEMBLY". Repair as necessary.</p> <p>For details, see "REMOVE AND INSTALL KDPF ASSEMBLY", and "DISASSEMBLE AND ASSEMBLE OF KDPF ASSEMBLY" in Chapter 50 DISASSEMBLY AND ASSEMBLY. Repair as necessary.</p>
8	Defective KDPF temperature sensor	<ol style="list-style-type: none"> 1. Perform "Loaded Diagnostics Operation To Confirm Failure Correction". 2. If the failure code displays after performing the preceding troubleshooting, replace the KDPF temperature sensor. 3. Perform "Loaded Diagnostics Operation To Confirm Failure Correction".
9	Defective engine controller	If this failure code is kept displayed, or is displayed again after above checks are performed, engine controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)

Loaded Diagnostics Operation To Confirm Failure Correction

Perform the procedure below to check that the repair is completed.

(Make sure that this failure code is cleared after this procedure.)

REMARK

If this failure code is displayed during "Loaded Diagnostics Operation To Confirm Failure Correction", return to troubleshooting.

⚠ Place the machine on a level ground, set the parking brake switch to "ON" position, and chock the tires.

1. Turn the starting switch to ON position.
2. Clear this failure code by "Engine Controller Active Fault Clear" from "SERVICE MODE" of the machine monitor.
3. Turn the starting switch to OFF position, and shut down the engine controller.
4. Turn the starting switch to ON position, and start the engine.
5. Run the engine at low idle speed for approximately 1 minute.
6. Stall torque converter continuously as described below with accelerator pedal position 100 % for approximately 60 seconds.
 - 1) Set transmission cut-off switch to "OFF" position and depress left brake pedal securely.

FAILURE CODE [CA3568]

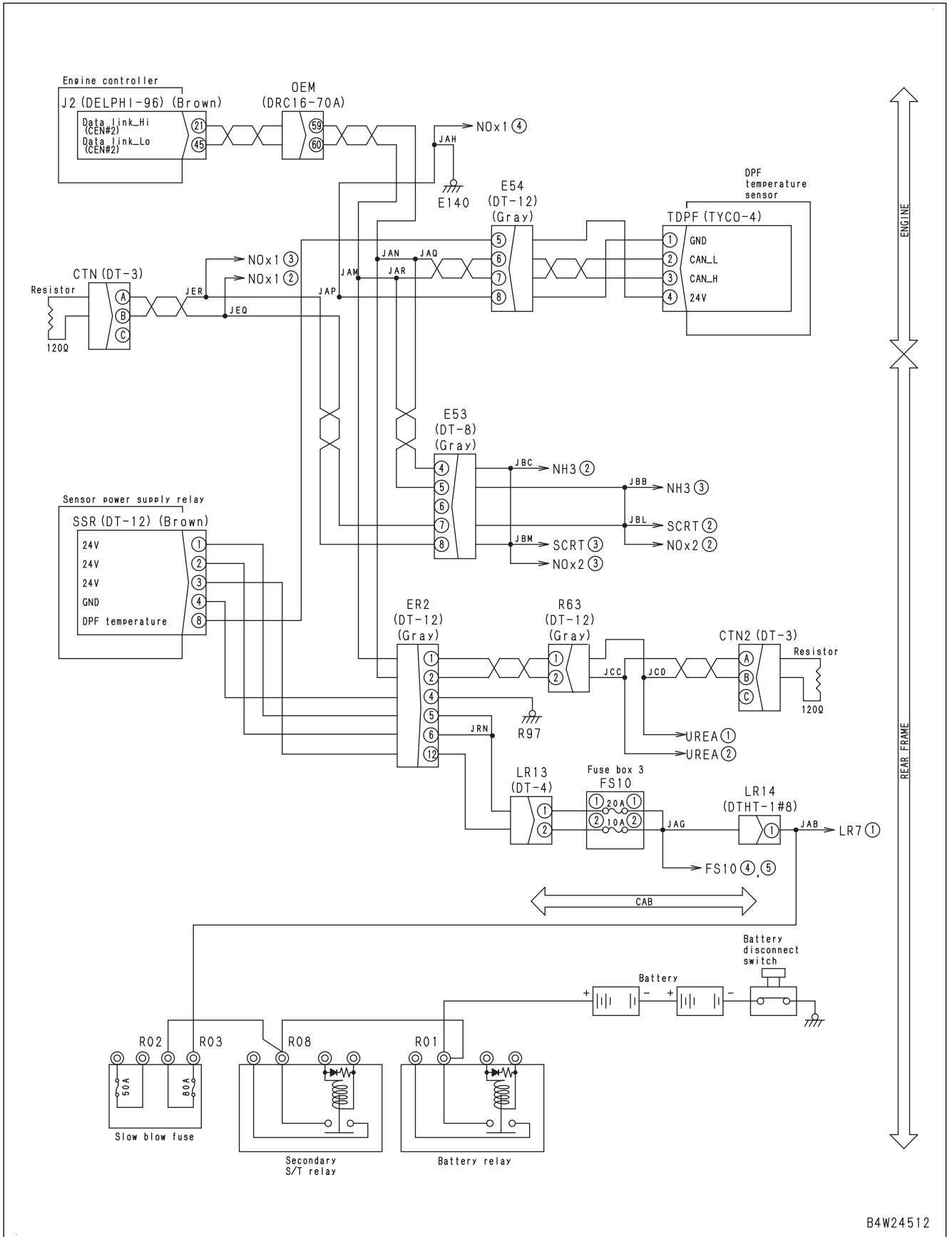
Action level	Failure code	Failure	AdBlue/DEF Injector Malfunction (Engine controller system)
L01	CA3568		
Detail of failure	The AdBlue/DEF injector or AdBlue/DEF pressure hose is clogged or the AdBlue/DEF injector nozzle is sticking open.		
Action of controller	<ul style="list-style-type: none"> • Advances to Inducement strategy. • The AdBlue/DEF pump stops in the case of the AdBlue/DEF injector opening stick. 		
Phenomenon on machine	<ul style="list-style-type: none"> • NOx emission increases because AdBlue/DEF injection is disabled. • Engine power deration according to inducement strategy. 		

FAILURE CODE [CA3911]

Action level	Failure code	Failure	SCR NH3 Sensor Datalink Timeout Error (Engine controller system)
L01	CA3911		
Detail of failure	The engine controller does not receive ammonia sensor data due to a communication error with the ammonia sensor.		
Action of controller	<ul style="list-style-type: none"> • Uses AdBlue/DEF injection control without using the ammonia sensor. • Advances to Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> • NOx emission may increase or ammonia may be exhausted because AdBlue/DEF injection works inappropriately. • Engine output is reduced based on inducement strategy. • Ammonia concentration is undetectable. 		
Related information	<p>⚠ SCR assembly, the sensor installation piping, and the sensor probe become hot (Min. 400 °C). Be careful not to get burned.</p> <p>⚠ Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.</p> <ul style="list-style-type: none"> • The ammonia sensor is separated from the sensor controller and communicated via CAN with the engine controller along with other sensors. • This failure code is displayed if the sensor controller's connector or a smart sensor (power supply) relay connector is disconnected. • CAN communication failure codes related to engine sensors include [CA2771], [CA3232], [CA3868], [CA3911], [CA4151], and [CA4152]. If all of these failure codes are displayed, a defect in any of the 6 sensors, a defective smart sensor power supply relay/relay system, or a ground fault, short circuit, or hot short circuit in wiring harness (CAN communication line) can be suspected. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	Perform checks on causes 1 to 10 for failure code [CA2771].		
2	Open circuit and short circuit in wiring harness (broken or short-circuited communication line)	<ul style="list-style-type: none"> • Communication line <p>As CAN terminating resistors of 120 ohm are connected in parallel, therefore, when circuit resistance is measured at connector of CAN communication, if combined resistance is 60 ohm, there is no open circuit.</p> <ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position. 3. Disconnect connectors J2 and NH3 and connect T-adapters to each female side. 		
		Resistance	Between NH3 (female) (2) and (3)	Approx. 60 Ω
			Between J2 (female) (21) and (45)	Approx. 60 Ω

Circuit diagram related to KDOC/KDPF temperature sensor



B4W24512

No.	Cause	Procedure, measuring location, criteria and remarks
10	Defective engine controller	<ol style="list-style-type: none"> 1. If the failure code persists after the above checks, replace the engine controller. 2. Performing "Loaded Diagnostics Operation To Clear Failure Code".
		If the failure code disappeared, the engine controller may be defective.

Loaded Diagnostics Operation To Clear Failure Code

Perform the procedure below to check that the repair is completed.

(Make sure that this failure code is cleared after this procedure.)

⚠ Place the machine on a level ground, set the parking brake switch to "ON" position, and chock the tires.

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position, and start the engine.
3. Run the engine at low idle speed for approximately 1 minute.
4. Set "Power Mode" to "P".
5. Set the speed of cooling fan to the maximum speed. For details, see "TEST COOLING FAN SPEED".
6. While depressing the brake pedal, depress the accelerator pedal gradually to 100 %, and continuously operate bucket TILT relief for 25 minutes.

NOTICE

- Check that monitoring code: 19300 "SCR Temperature" is Min. 290 °C and monitoring code: 19202 "Turbo Outlet NOx Corrected" is Min. 120 ppm on "Pre-defined Monitoring" screen.
- Be careful that torque converter oil does not overheat.

7. Run the engine at high idle speed for 5 minutes.
8. Check that monitoring code 19300 "SCR Temperature" is approximately 250 °C on "Pre-defined Monitoring" screen.
9. Repeat high idle speed run under no load for 5 minutes and dump body LOWER relief for 3 minutes for 5 times.

NOTICE

Be careful that torque converter oil does not overheat.

10. Check that this failure code is cleared.

REMARK

- If this failure code is cleared, repair is completed.
- If this failure code is not cleared, return to troubleshooting.

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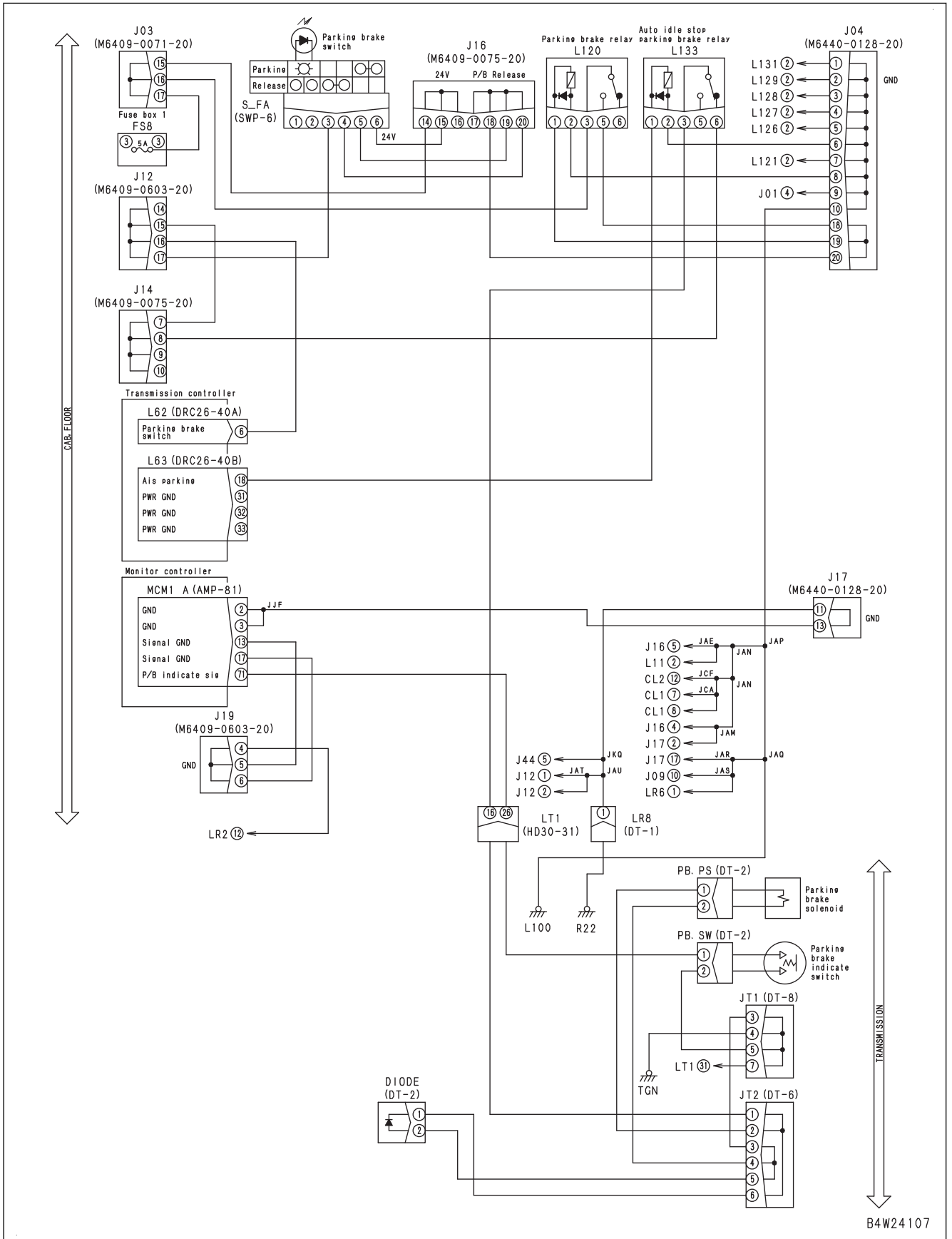
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FAILURE CODE [D150KB]

Action level	Failure code	Failure	Secondary Steering Motor Relay Output Ground Fault (Work equipment controller system)
L03	D150KB		
Detail of failure	When controller drives primary circuit (coil) of secondary steering relay (L126), large current flows.		
Action of controller	<ul style="list-style-type: none"> Stops driving secondary steering relay (L126). Makes centralized warning lamp light up and alarm buzzer sound. Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Phenomenon on machine	<ul style="list-style-type: none"> Automatic secondary steering does not work. Self-check of secondary steering ends abnormally. 		
Related information	<ul style="list-style-type: none"> When the starting switch is turned to ON position, controller drives secondary steering relay to check secondary steering motor. This failure code detects failure in primary (coil side) circuit of secondary steering relay, but does not detect failure in secondary (contact side) circuit. Output state (ON/OFF) to secondary steering relay can be checked with monitoring function. (Code: 03708) After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective secondary steering relay (L126)	1. Turn the starting switch to OFF position. 2. Disconnect connector L126, and connect T-adaptor to male side.	
		Resistance	Between L126 (male) (1) and (2) 200 to 400 Ω
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors L72 and L126, and connect T-adaptor to either female side.	
		Resistance	Between ground and L72 (female) (8) or L126 (female) (1) Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors L72 and L126, and connect T-adaptor to female side of L126.	
		Resistance	Between L126 (female) (1) and (2) Min. 1 MΩ
4	Defective work equipment controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

Circuit diagram related to parking brake relay



B4W24107

FAILURE CODE [DAQ0KK]

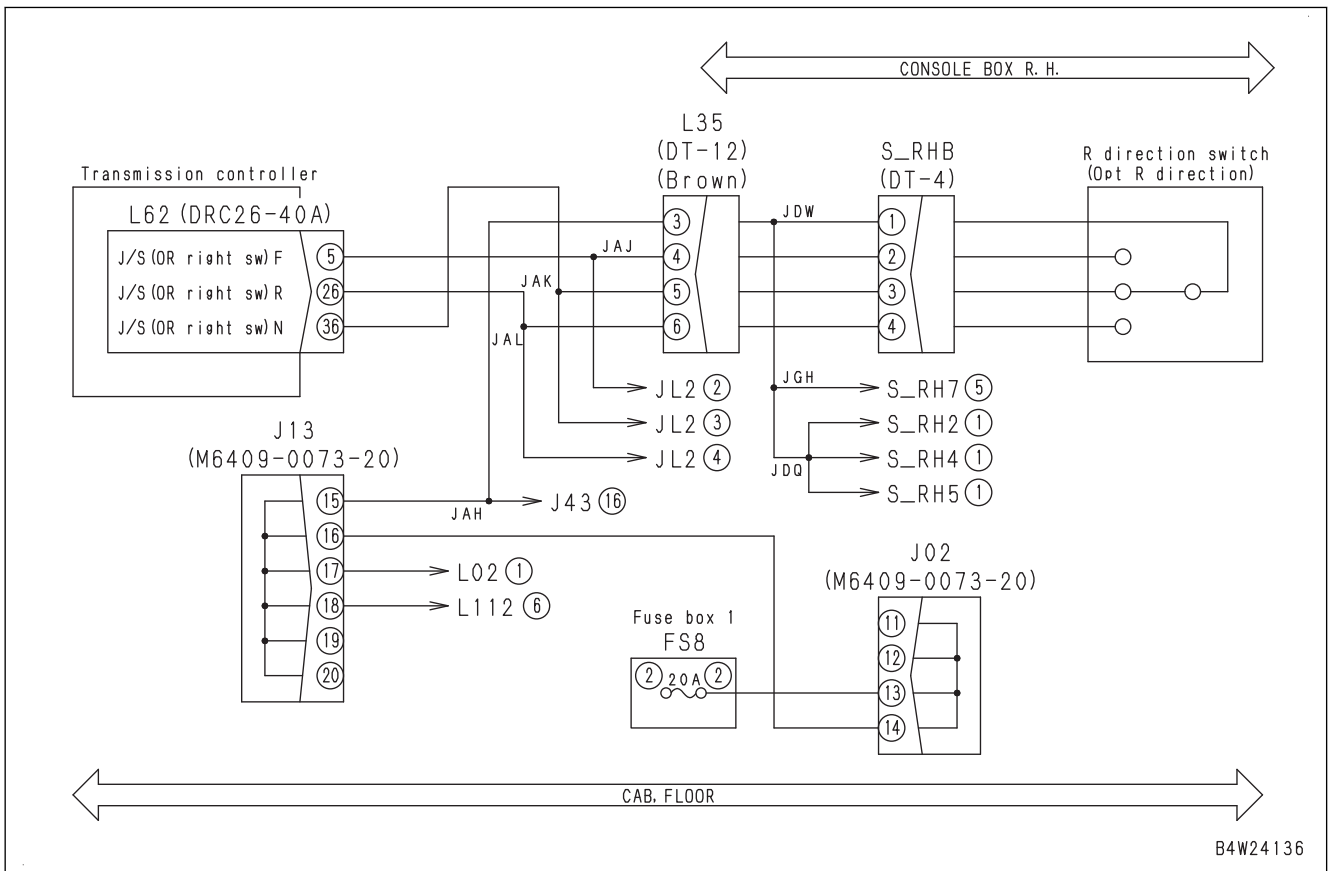
Action level	Failure code	Failure	Main Power Voltage Low Error (Transmission controller) (Transmission controller system)
L03	DAQ0KK		
Detail of failure	<ul style="list-style-type: none"> Transmission Controller Continuous Power Supply (Battery Direct Power Supply)Voltage Low Error Continuous power supply voltage (power supply directly connected to battery) is 18 V or below while engine speed is 500 rpm and above. 		
Action of controller	<ul style="list-style-type: none"> Cannot detect input signals properly. Makes centralized warning lamp light up and alarm buzzer sound. Stops driving all devices other than fan pump relay (comes into neutral state). Even if cause of failure disappears, machine does not become normal until directional (FNR) lever or R.H. directional selector (FNR) switch is set to N (neutral) position. 		
Phenomenon on machine	<ul style="list-style-type: none"> Machine cannot travel (transmission is left in neutral). Fan runs at its maximum speed and may be damaged. Secondary steering does not work properly. Fan changes its rotating direction to normal while fan is rotating in reverse. 		
Related information	<ul style="list-style-type: none"> If fuse No.5 in fuse box 2 is blown out, failure codes [DAQQKR] and [DAQRKR] are displayed, After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective battery	Check battery voltage and specific gravity of battery electrolyte.		
		Voltage	Battery voltage	Min. 24 V
		Specific gravity	Specific gravity of battery electrolyte	Min. 1.26
2	Defective slow-blow fuse	If slow-blow fuse (R02) is burnt out, circuit probably has ground fault, etc. (See check on cause of wiring harness ground fault.)		
3	Defective fuse	If fuse is blown out, circuit probably has ground fault, etc. (See check on cause 4.)		

FAILURE CODE [DB90KT]

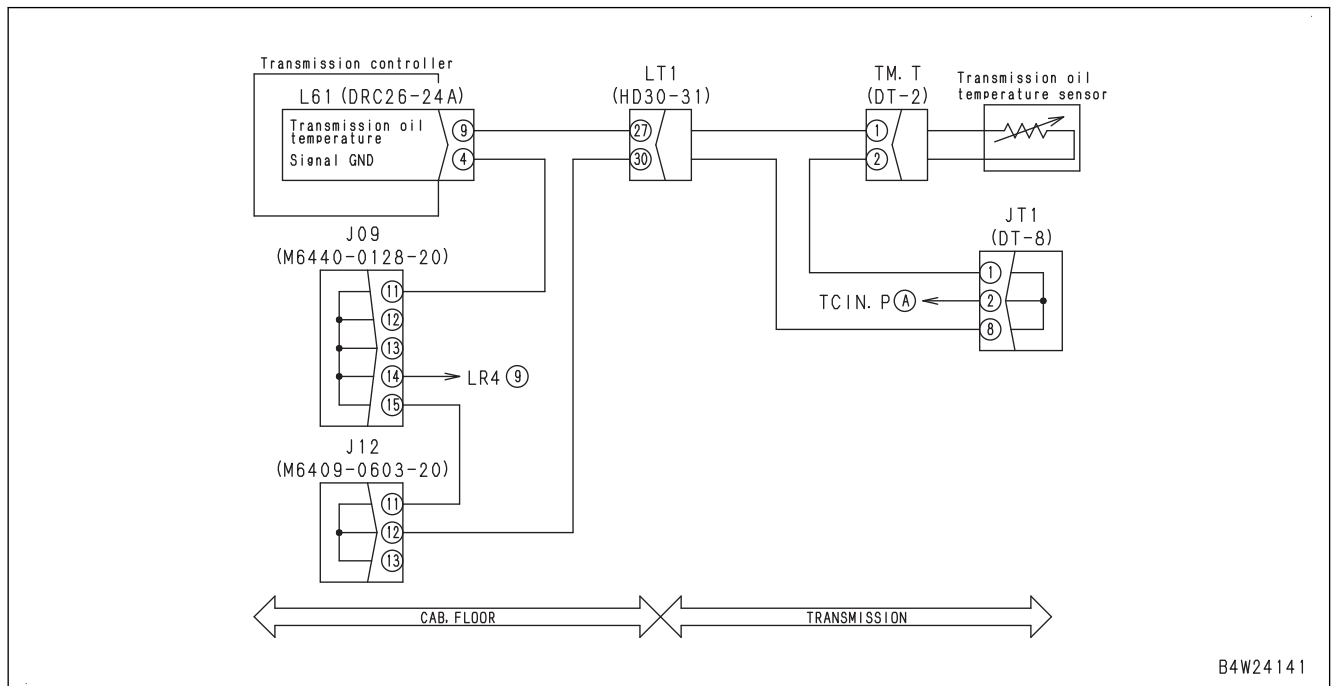
Action level	Failure code	Failure	Read Only Memory Abnormality (Work equipment controller) (Work equipment controller system)
L01	DB90KT		
Detail of failure	Action of controller in which non-volatile memory is abnormal		
Action of controller	<ul style="list-style-type: none"> Controls option settings and internal adjustment values with the default value. Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Phenomenon on machine	<ul style="list-style-type: none"> An incorrect error detection may occur. The machine performance drops as abnormal data is used for control. 		
Related information	<ul style="list-style-type: none"> After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective work equipment controller	Since this is an internal failure, troubleshooting cannot be performed. Replace work equipment controller.	

Circuit diagram related to directional selector switch



No.	Cause	Procedure, measuring location, criteria and remarks			
3	Open or short circuit in wiring harness	REMARK If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connector L61, and connect T-adapter to female side. REMARK *1: If it is different from the resistant value measured in check on cause 1, wiring harness is defective.			
		Resistance	Between L61 (female) (9) and (4)	Transmission oil temperature 25 °C (normal temperature)	35 to 50 kΩ
				Transmission oil temperature 100 °C	3.1 to 4.5 kΩ
4	Open circuit in wiring harness (wire breakage or defective contact)	REMARK If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connector L61, and connect T-adapter to female side. 3. Disconnect connector TM.T, and connect T-adapter to female side.			
		Resistance	Between L61 (female) (4) and TM.T (female) (2)	Max. 1 Ω	
			Between L61 (female) (9) and TM.T (female) (1)	Max. 1 Ω	
5	Defective transmission controller	If no failure is found by preceding checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)			

Circuit diagram related to transmission oil temperature sensor



B4W24141

FAILURE CODE [DHT7KX]

Action level	Failure code	Failure	Torque Converter Oil Pressure Sensor Input Signal Out of Range (Outlet) (Transmission controller system)
L01	DHT7KX		
Detail of failure	Voltage of signal circuit of torque converter output oil pressure sensor is 0.5 V or below or 4.5 V and above.		
Action of controller	Controls torque converter output oil pressure by fixing it to set pressure stored in controller.		
Phenomenon on machine	Large shocks are made when lockup clutch is engaged.		
Related information	<ul style="list-style-type: none"> Input voltage from torque converter output oil pressure sensor can be checked with monitoring function. (Code: 32604) Oil pressure detected by torque converter output oil pressure sensor can be checked with monitoring function. (Code: 32603) After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective sensor power supply system	If failure code [DBE6KX] is displayed, perform troubleshooting for that first.		
		<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector R91, and connect T-adapter to female side. Turn the starting switch to ON position. 		
		REMARK If power supply voltage is abnormal, go to check on cause 5.		
	Voltage	Between R91 (female) (B) and (A)	Power supply input	20 to 30 V
2	Ground fault in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connectors L61 and R91, and connect T-adapter to either female side. 		
		Resistance	Between ground and L61 (female) (1) or R91 (female) (C)	
3	Hot short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector R91, and connect T-adapter to female side. Turn the starting switch to ON position. 		
		Voltage	Between R91 (female) (C) and ground	
4	Defective torque converter oil pressure sensor	REMARK Replace sensor to check if failure code is cleared.		
		<ol style="list-style-type: none"> Turn the starting switch to OFF position. Insert T-adapter into connector R91. Turn the starting switch to ON position. 		
	Voltage	Between R91 (C) and (A)		0.9 to 5.1 V

No.	Cause	Procedure, measuring location, criteria and remarks			
2	Defective boom lever potentiometer (internal open circuit or short circuit)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector L28A, and connect T-adapter to male side. 			
		Resistance	Between L28A (male) (1) and ground	Min. 1 MΩ	
			Between L28A (male) (2) and ground	Min. 1 MΩ	
			Between L28A (male) (3) and ground	Min. 1 MΩ	
			Between L28A (male) (4) and ground	Min. 1 MΩ	
		<p>REMARK</p> <ul style="list-style-type: none"> Voltage is measured with wiring harness connected. Accordingly, if the voltage is abnormal, the wiring harness may be defective. Check that the wiring harness is not defective, and then judge whether the potentiometer is defective or not. <ol style="list-style-type: none"> Turn the starting switch to OFF position. Insert T-adapter into connector L28A. Set work equipment lock switch to LOCK position. Turn the starting switch to ON position. Operate boom lever to perform troubleshooting. 			
		Voltage	Between L28A (4) and (2)	Boom lever: NEUTRAL	2.38 to 2.62 V
Boom lever: RAISE operation (before detent)	0.96 to 1.62 V				
Boom lever: RAISE operation (at detent position)	0.60 to 1.10 V				
Boom lever: LOWER operation (before detent)	3.38 to 4.04 V				
Boom lever: FLOAT operation	3.90 to 4.40 V				
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connectors L71 and L28A and connect T-adapters to each female side. 			
		Resistance	<p>REMARK</p> <p>If power supply voltage in check on cause 1 is normal, this check is not required.</p> <p>Between L71 (female) (22) and L28A (female) (1)</p>		Max. 1 Ω
			<p>REMARK</p> <p>If power supply voltage in check on cause 1 is normal, this check is not required.</p> <p>Between L71 (female) (4) and L28A (female) (2)</p>		Max. 1 Ω
		Between L71 (female) (2) and L28A (female) (4)		Max. 1 Ω	

No.	Cause	Procedure, measuring location, criteria and remarks			
4	Ground fault in wiring harness (contact with ground circuit)	REMARK If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connectors L71, L72, and L30, and connect T-adapters to female side of L71 and L72.			
		Resistance	Between L72 (female) (35) and L71 (female) (4) or ground	Min. 1 MΩ	
			Between L72 (female) (25) and L71 (female) (4) or ground	Min. 1 MΩ	
5	Hot short circuit in wiring harness	REMARK If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connector L30, and connect T-adapter to female side. 3. Turn the starting switch to ON position.			
		Voltage	Between L30 (female) (3) and ground	Max. 1 V	
			Between L30 (female) (4) and ground	Max. 1 V	
6	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective. <ul style="list-style-type: none"> • Reference 1. Turn the starting switch to OFF position. 2. Insert T-adapter into connectors L71 and L72. 3. Turn the starting switch to ON position. 4. Perform troubleshooting while operating 3rd spool control lever.			
		Voltage	Between L71 (22) and (4)	3rd spool (for attachment) lever: Continuous	4.8 to 5.2 V
			Between L72 (35) and L71 (4)	3rd spool (for attachment) lever: NEUTRAL	2.38 to 2.62 V
				3rd spool (for attachment) lever: EXTEND operation to stroke end	3.90 to 4.40 V
		3rd spool (for attachment) lever: RETRACT operation to stroke end		0.60 to 1.10 V	
		Between L72 (25) and L71 (4)	3rd spool (for attachment) lever: NEUTRAL	2.38 to 2.62 V	
			3rd spool (for attachment) lever: EXTEND operation to stroke end	3.90 to 4.40 V	
			3rd spool (for attachment) lever: RETRACT operation to stroke end	0.60 to 1.10 V	

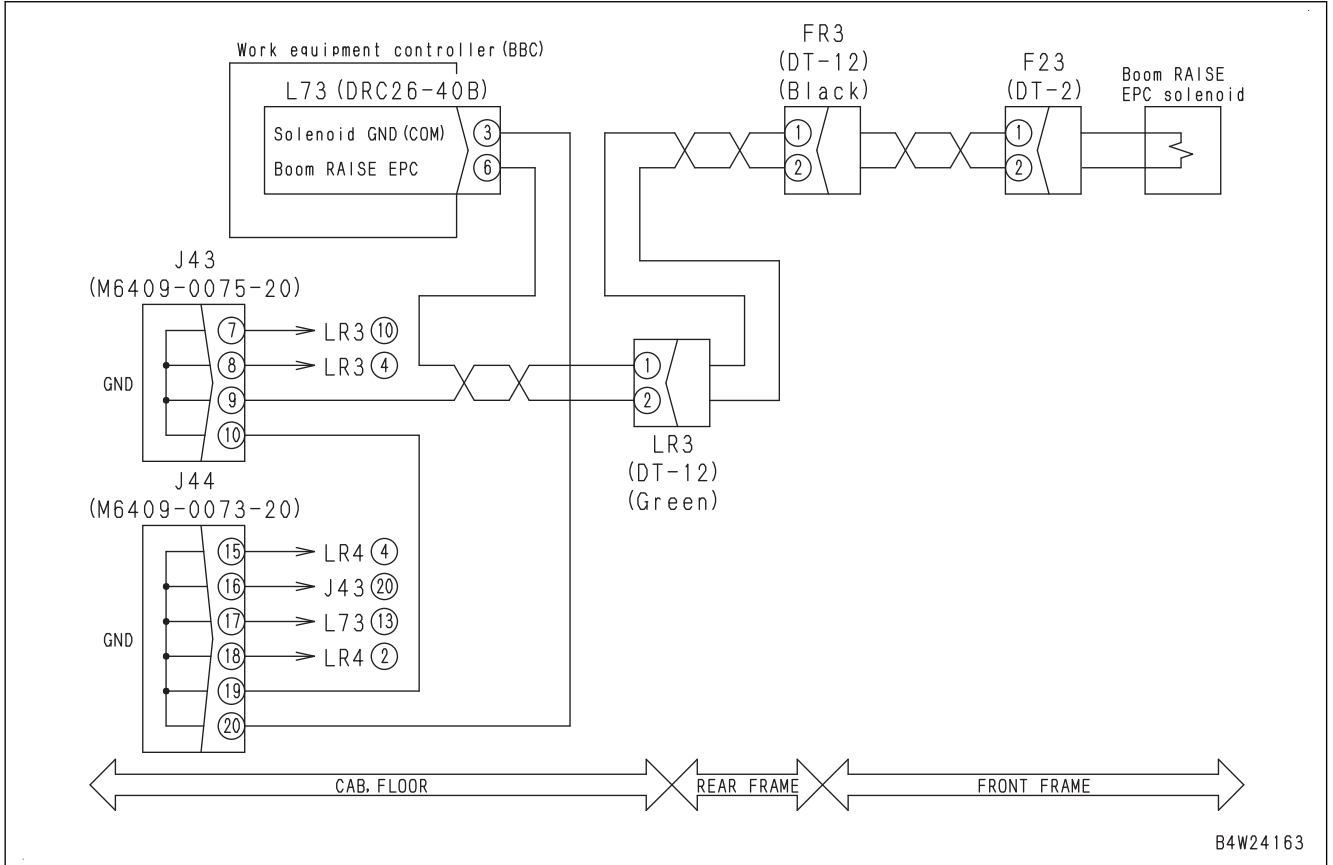
FAILURE CODE [DKA1KY]

Action level	Failure code	Failure	Bucket Angle Sensor Hot Short Circuit (Work equipment controller system)
L01	DKA1KY		
Detail of failure	Due to hot short circuit in bucket angle sensor system, bucket angle sensor signal voltage is higher than the normal range. (Bucket angle sensor signal voltage 4.8 V and above)		
Action of controller	<ul style="list-style-type: none"> Judges that bell crank angle is large. Disables bucket positioner function. Disables semi-auto digging function. Disables bucket detent. If cause of failure disappears, machine becomes normal by itself. 		
Phenomenon on machine	<ul style="list-style-type: none"> Bucket positioner function is defective (bucket does not stop). Semi-auto digging system malfunctions (does not work). Komatsu SmartLoader Logic function is defective. (Since engine control is not optimized, fuel consumption gets worse.) 		
Related information	<ul style="list-style-type: none"> Output voltage from bucket angle sensor can be checked with monitoring function. (Code: 55601) Output angle of bucket angle sensor can be checked with monitoring function. (Code: 55600) After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

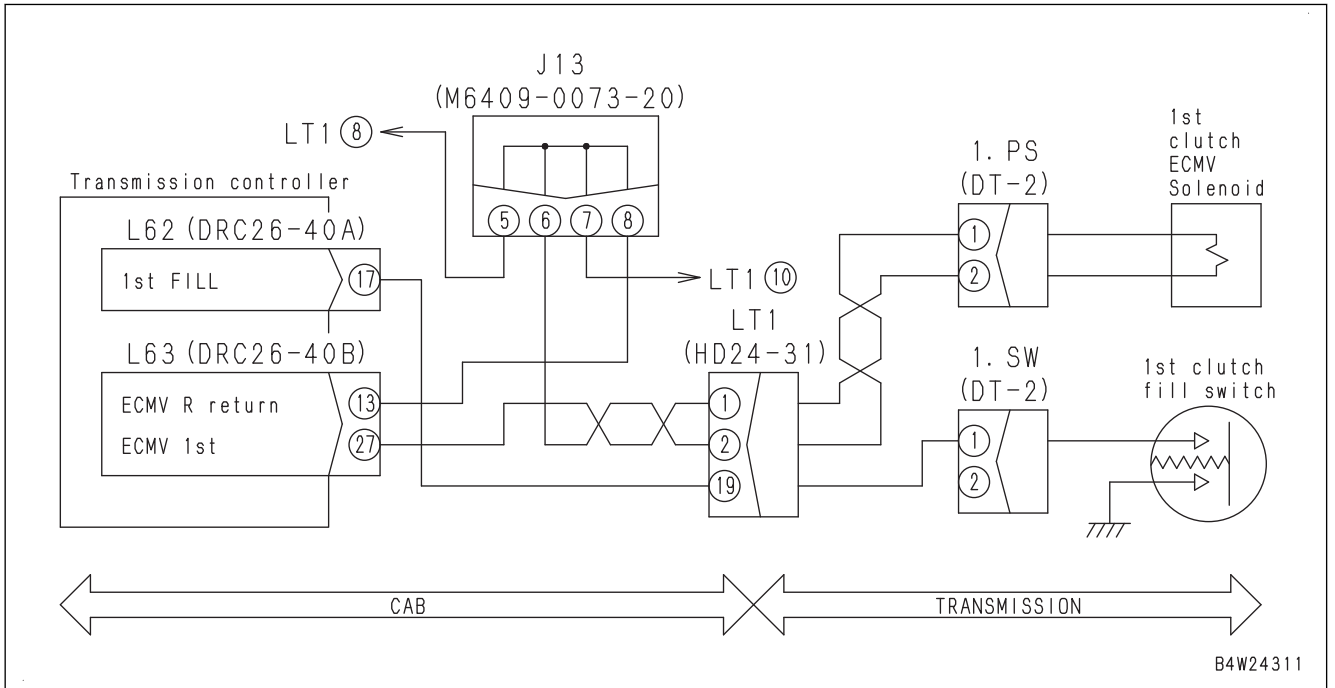
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor power supply system	If failure code [DB95KX] is also displayed, perform troubleshooting for it first.			
		<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector F32, and connect T-adaptor to female side. Turn the starting switch to ON position. 			
		<p>REMARK</p> <p>If power supply voltage is abnormal, proceed to check on cause 3 and after.</p> <table border="1"> <tr> <td>Voltage</td> <td>Between F32 (female) (C) and (A)</td> <td>4.8 to 5.2 V</td> </tr> </table>			Voltage
Voltage	Between F32 (female) (C) and (A)	4.8 to 5.2 V			

No.	Cause	Procedure, measuring location, criteria and remarks
5	Defective work equipment controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to boom RAISE EPC solenoid

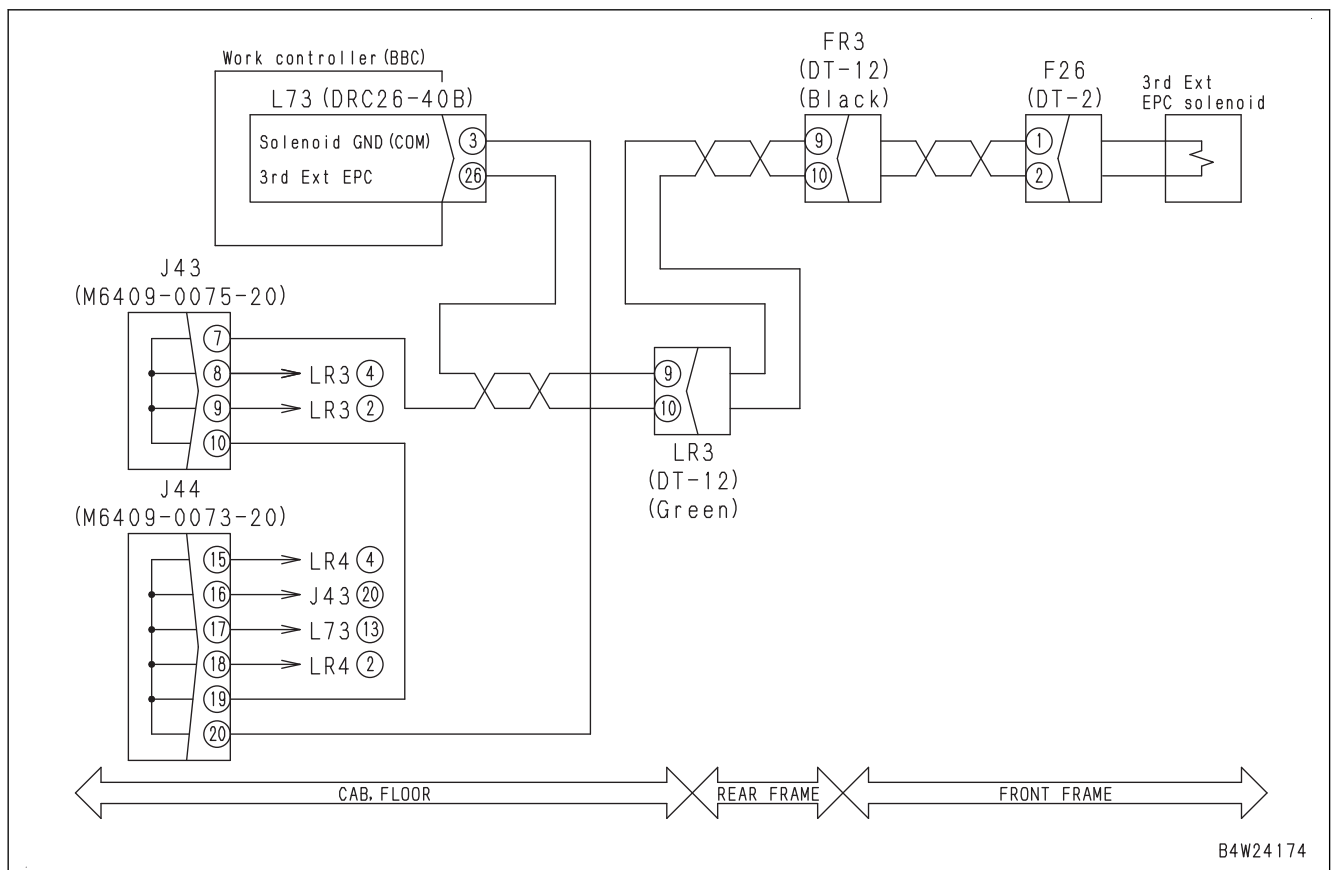


Circuit diagram related to 1st clutch



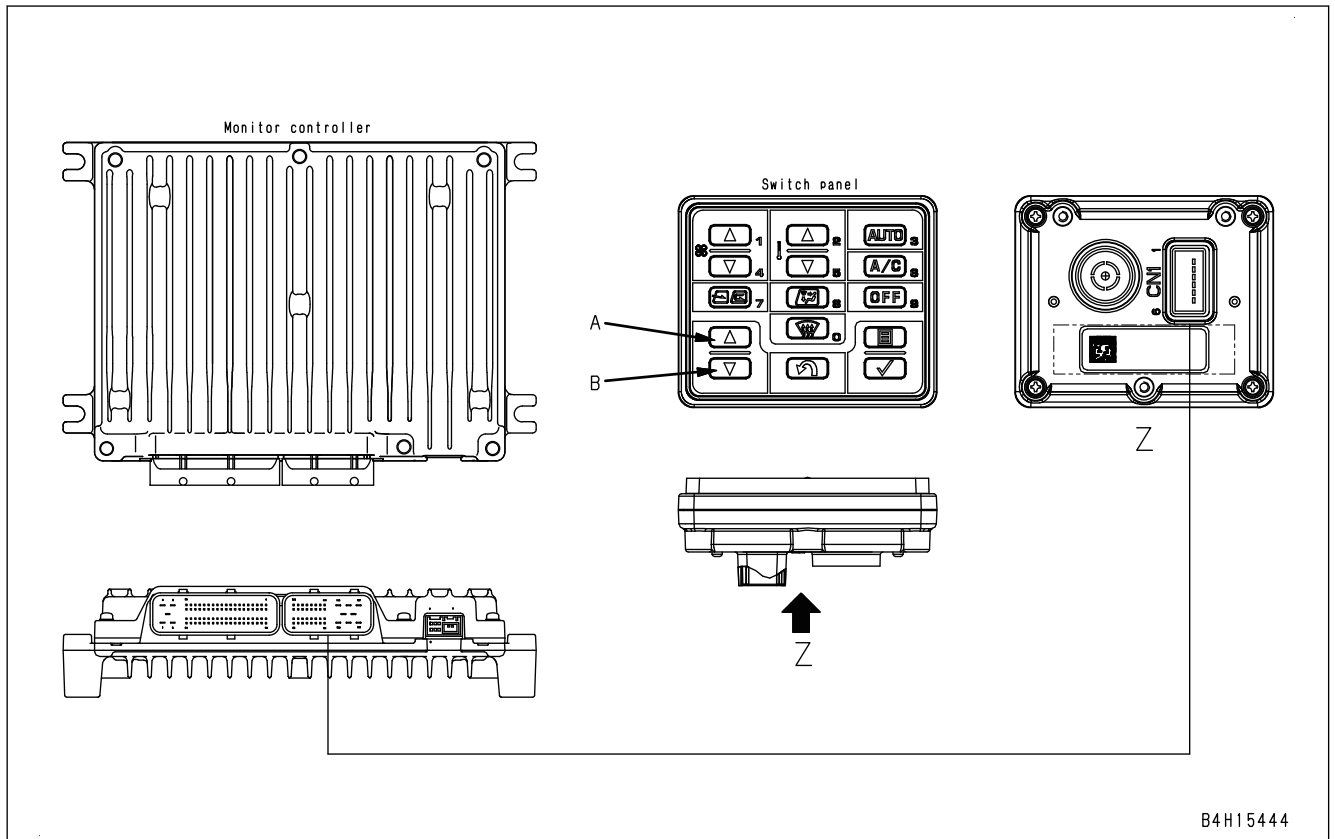
No.	Cause	Procedure, measuring location, criteria and remarks		
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	REMARK If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connectors L73 and F26 and connect T-adapters to each female side.		
		Resistance	Between L73 (female) (3) and F26 (female) (2)	Max. 1 Ω
			Between L73 (female) (26) and F26 (female) (1)	Max. 1 Ω
5	Defective work equipment controller	If no failure is found by preceding checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to 3rd spool EXPAND EPC solenoid



No.	Cause	Procedure, measuring location, criteria and remarks		
8	Defective battery relay system	<ol style="list-style-type: none"> Turn the starting switch to ON position (connect ACC). If battery relay operation sound is not heard, go to checks on cause 18 and after. 		
9	Defective starting switch, defective directional (FNR) lever switch, defective neutral safety relay L116, neutral holding relay L121, personal code relay L113, battery relay, or wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Remove fuse No.6 (30A) in fuse box FS9. (This is to prevent the engine from starting during checks.) Insert T-adapter into connector E01. Turn the starting switch to START position and hold it (2 persons required for this work). When the voltage is normal, go to troubleshooting for input of prohibition of output to transmission controller and after. 		
		Voltage	Between E01 (1) and ground	20 to 30 V
10	Defective alternator (internal short circuit)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Insert T-adapter into connector E01. Turn the starting switch to ON position. 		
		Voltage	Between E01 (female) (2) and ground	Max. 1 V
11	Defective starting motor (internal defect)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Insert T-adapter into connector E01. Turn the starting switch to START position. 		
		Voltage	Between starting motor terminal B and ground	Power supply 20 to 30 V
			Between E01 (1) and ground	Input for starting 20 to 30 V
			Between E01 (2) and ground	Input for charging Max. 1 V
12	Input of output inhibition to transmission controller	<p>If no failure is found by check on defective battery relay system, this check is not required.</p> <ol style="list-style-type: none"> Check that directional (FNR) lever and R.H. directional selector (FNR) switch are in NEUTRAL position. Turn the starting switch to OFF position. Disconnect the connector L62, and connect T-adapter to female side. Turn the starting switch to ON position (connect ACC). 		
		Voltage	Between L63 (female) (25) and ground	20 to 30 V
			Between L63 (female) (36) and ground	20 to 30 V
13	Defective transmission controller	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connector D12. Insert T-adapter into the connector L63. Turn the starting switch to ON position. <p>Check that directional (FNR) lever and R.H. directional selector (FNR) switch are in NEUTRAL position.</p>		
		Voltage	Between L63 (female) (8) and ground	20 to 30 V

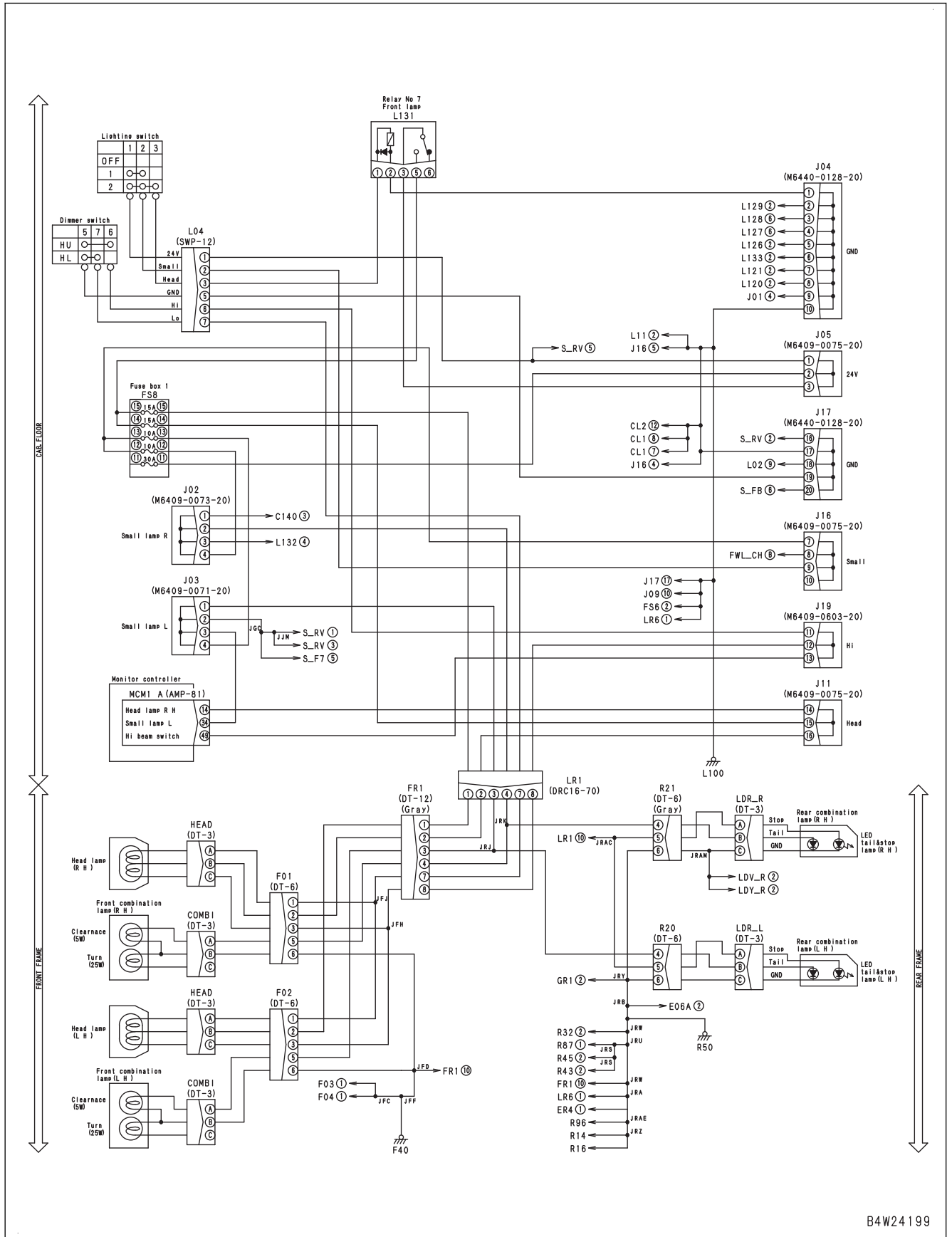
Wiring harness between monitor controller and switch panel of machine monitor



E-27 TORQUE CONVERTER OIL TEMPERATURE GAUGE DOES NOT INCREASE, OR TORQUE CONVERTER OIL TEMPERATURE CAUTION LAMP DOES NOT LIGHT UP

Failure	Torque converter oil temperature gauge does not increase, or torque converter oil temperature caution lamp does not light up.	
Related information	<ul style="list-style-type: none"> • If any failure code is displayed, perform troubleshooting for that failure code first. ([DGT1KA], [DGT1KB]) • Even when the torque converter oil temperature increases, the indication of torque converter oil temperature gauge does not increase. • Even when the torque converter oil temperature increases to 120 °C and above, the torque converter oil temperature caution lamp does not light up. • Input state (oil temperature) from torque converter oil temperature sensor can be checked with monitoring function. (Code: 32100) • Input state (voltage) from torque converter oil temperature sensor can be checked with monitoring function. (Code: 32101) 	
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective torque converter oil temperature gauge system	Perform failure code [DGT1KA].

Circuit diagram related to headlamp, clearance lamp, and tail lamp



B4W24 199

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Open circuit in wiring harness (wire breakage or defective contact of connector)	Power supply for relay 1. Turn the starting switch to OFF position. 2. Disconnect connector L111, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between L111 (female) (6) and ground	20 to 30 V
		1. Turn the starting switch to OFF position. 2. Disconnect connectors L04, L19, LDY_R, LDY_L, and COMBI (right and left), and connect T-adapters to each female side.		
		Resistance	Between L04 (female) (10) and LDY_R (female) (1)	Max. 1 Ω
			Between L04 (female) (10) and R.H. COMBI (female) (C)	Max. 1 Ω
			Between L04 (female) (11) and LDY_L (female) (1)	Max. 1 Ω
Between L04 (female) (11) and L.H. COMBI (female) (C)	Max. 1 Ω			
Between L04 (female) (9) and L19 (female) (4)	Max. 1 Ω			
7	Ground fault in wiring harness (contact with GND circuit)	1. Turn the starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Disconnect connectors L04, L111, LDY_R, LDY_L, and COMBI (right and left), and connect T-adapters to each female side. 4. Disconnect R06A terminal. 5. Remove fuses -8 to 10, and fuses-12 to 14 in fuse box 2 (FS9). 6. Remove fuses -1 to 11 in fuse box 1 (FS8). REMARK Replace fuse-11 in fuse box 2 (FS9) if it is blown out.		
		Resistance	Between ground and L111 (female) (6) or R06A (wiring harness side)	Min. 1 MΩ
			Between ground and each of L04 (female) (10), LDY_R (female) (1), and R.H. COMBI (female) (C)	Min. 1 MΩ
			Between ground and each of L04 (female) (11), LDY_L (female) (1), and L.H. COMBI (female) (C)	Min. 1 MΩ
8	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors L04, LDY_R, LDY_L, and COMBI (right and left), and connect T-adapter to either female side. 3. Turn the starting switch to ON position.		
		Voltage	Between ground and each of L04 (female) (10), LDY_R (female) (1), and R.H. COMBI (female) (C)	Max. 1 V
			Between ground and each of L04 (female) (11), LDY_L (female) (1), and L.H. COMBI (female) (C)	Max. 1 V

TROUBLESHOOTING FOR HYDRAULIC AND MECHANICAL SYSTEMS (H MODE)

INFORMATION MENTIONED IN TROUBLESHOOTING TABLE (H MODE)

The following information is summarized in the troubleshooting table. Before performing troubleshooting, understand that information fully.

Failure	Failure symptom that appears on machine
Related information	Information on occurred failure or troubleshooting

No.	Cause	Procedure, measuring location, criteria, and remarks
1	Probable cause of failure (Each number is serial number, not priority sequence.)	<Contents of description> <ul style="list-style-type: none"> • Criteria to determine probable causes • Remarks for determination of probable cause
2		
3		
4		
5		

H-8 MACHINE DOES NOT TURN (FOR STEERING WHEEL SPEC)

Failure	Machine does not swing.
Related information	<ul style="list-style-type: none"> • Check that oil level in hydraulic tank is normal. • Check that frame lock bar is removed. • Check that steering shaft is not damaged. • Check that steering stop valve is properly adjusted. • Steering pump pressure can be checked with monitoring. (Code: 95302) • Radiator fan speed can be checked with monitoring. (Code: 10009)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective PTO	If machine turns neither right nor left and there are malfunction of work equipment or cooling fan, power take off may be defective. Disassemble the power take off and check it.			
2	Air sucked in on suction side of steering pump	Check suction side piping for cracks, etc.			
3	Defective strainer of steering pump	Check steering pump strainer for clogging.			
4	Defective pressure reducing valve of accumulator charge valve	Measure it referring to TESTING AND ADJUSTING.			
		Control circuit pressure of work equipment EPC (EPC source pressure)	3.72 ± 0.2 MPa {38 ± 2.0 kg/cm ² }		
		Control circuit pressure of work equipment EPC (EPC source pressure) is source pressure of Orbitrol.			
5	Defective Orbitrol	Measure it referring to TESTING AND ADJUSTING.			
		Orbitrol outlet pressure	Pressure is applied during operation.		
6	Defective relief valve of steering valve	Be ready with engine stopped, then perform troubleshooting with engine at low idle.			
		Steering control oil pressure	Steering wheel	NEUTRAL	1.15 to 1.55 MPa {11.7 to 15.3 kg/cm ² }
7	Defective steering main relief valve	Measure it referring to TESTING AND ADJUSTING.			
		Steering main relief pressure	24.5 (+1.23/-2.45) MPa {250 (+12.5/-25) kg/cm ² }		
8	Defective flow control spool	<ul style="list-style-type: none"> • If the oil pressure is abnormally high by the check on defect of steering main relief valve, malfunction of flow control spool is suspected. • Check that the spool is not stuck. 			
9	Defective steering spool	<ul style="list-style-type: none"> • If the measured oil pressure in check on defective steering main relief valve is normal, and oil pressure is not applied to the steering cylinder during steering operation, malfunction of steering spool is suspected. • Check that the spool is not stuck. 			

H-30 HYDRAULIC DRIFT OF BUCKET IS LARGE

Failure	Hydraulic drift of bucket is large.
Related information	<p>⚠ Release remaining pressure from the work equipment circuit. For details, see TESTING AND ADJUSTING, “METHOD FOR RELEASING REMAINING PRESSURE FROM WORK EQUIPMENT CIRCUIT”.</p> <p>⚠ Pressure may not be released even if releasing pressure from the work equipment circuit is performed, so be careful.</p> <ul style="list-style-type: none"> If any failure code is displayed, perform troubleshooting for that failure code first. ([DK5BKA],[DK5BL8],[DW4SKY]) Work equipment pump pressure can be checked with monitoring. (Code: 94700)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective safety valve at bucket control valve tilt back side	Be ready with engine stopped, then perform troubleshooting with engine at high idle. (For measuring procedure, see TESTING AND ADJUSTING, “MEASURE WORK EQUIPMENT OIL PRESSURE”.)			
		Relief pressure	Bucket cylinder	Relieving at tilt back side	32.4 (+1.8/-4.4) MPa {330 (+18/-45) kg/cm ² }
		<ul style="list-style-type: none"> If relief pressure is low at only bucket tilt back side, malfunction of safety valve at tilt back side is suspected. It cannot be adjusted when it is installed to the machine. Replace it as an assembly. 			
2	Defective sealing of main spool in bucket control valve	Raise the boom and disconnect hydraulic hose at head side of bucket cylinder. If oil does not flow out of cylinder and cylinder drifts hydraulically, sealing of spool may be defective. Check the main spool in bucket control valve.			
3	Defective bucket cylinder	Measure it referring to TESTING AND ADJUSTING.			
		Raise the boom and disconnect hydraulic hose at the bucket cylinder head side. If oil flows out from cylinder, cylinder piston ring may be defective. Disassemble the bucket cylinder and check it.			

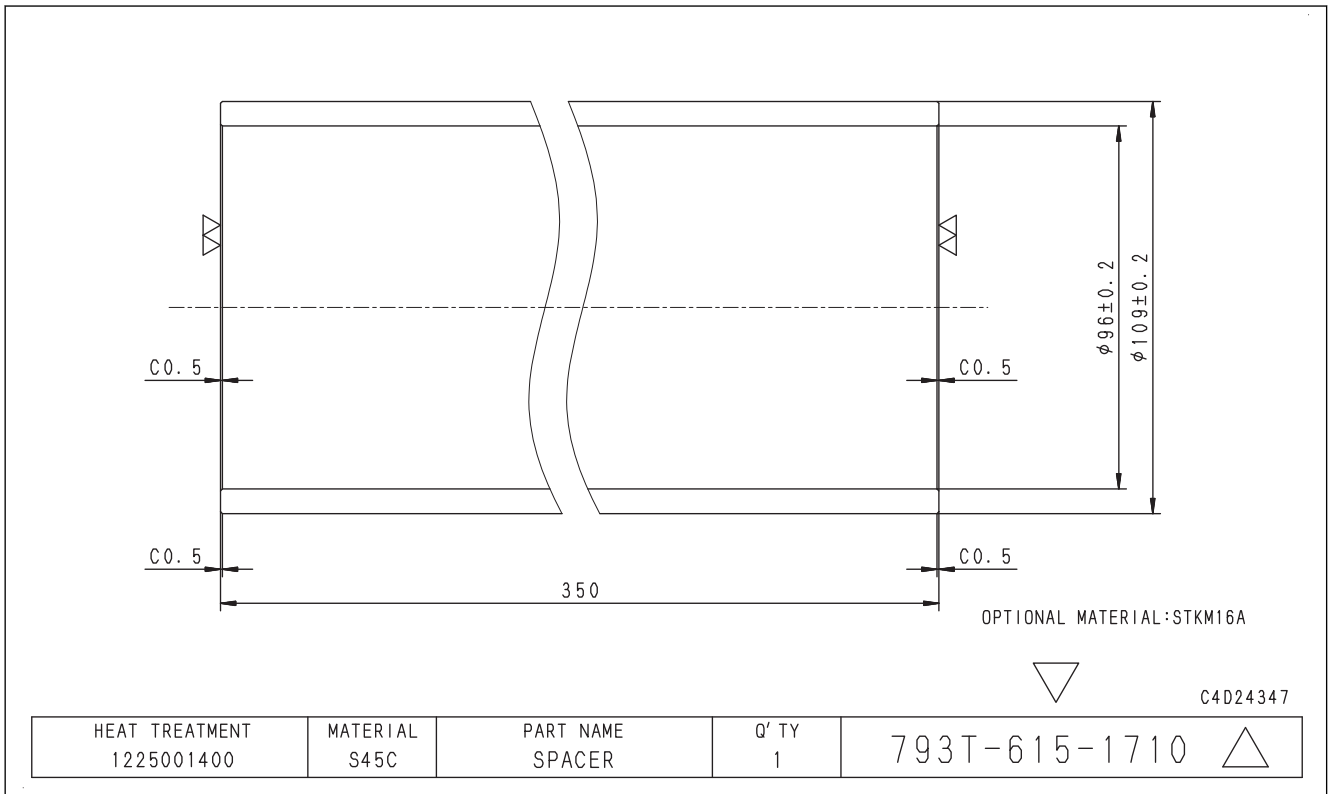
S-18 UNUSUAL NOISE IS HEARD

Failure	Unusual noise is heard.
Related information	<ul style="list-style-type: none"> • Check place of sound source, inside or outside, then perform troubleshooting. • While engine is not warmed up sufficiently, it is operated in warm-up mode and it generates a little larger sound. This is not abnormal. • When engine is accelerated, it is set in acceleration mode and it generates a little larger sound for approximately 3 to 5 seconds. This is not abnormal. • If any failure code is displayed, perform troubleshooting for that code first.

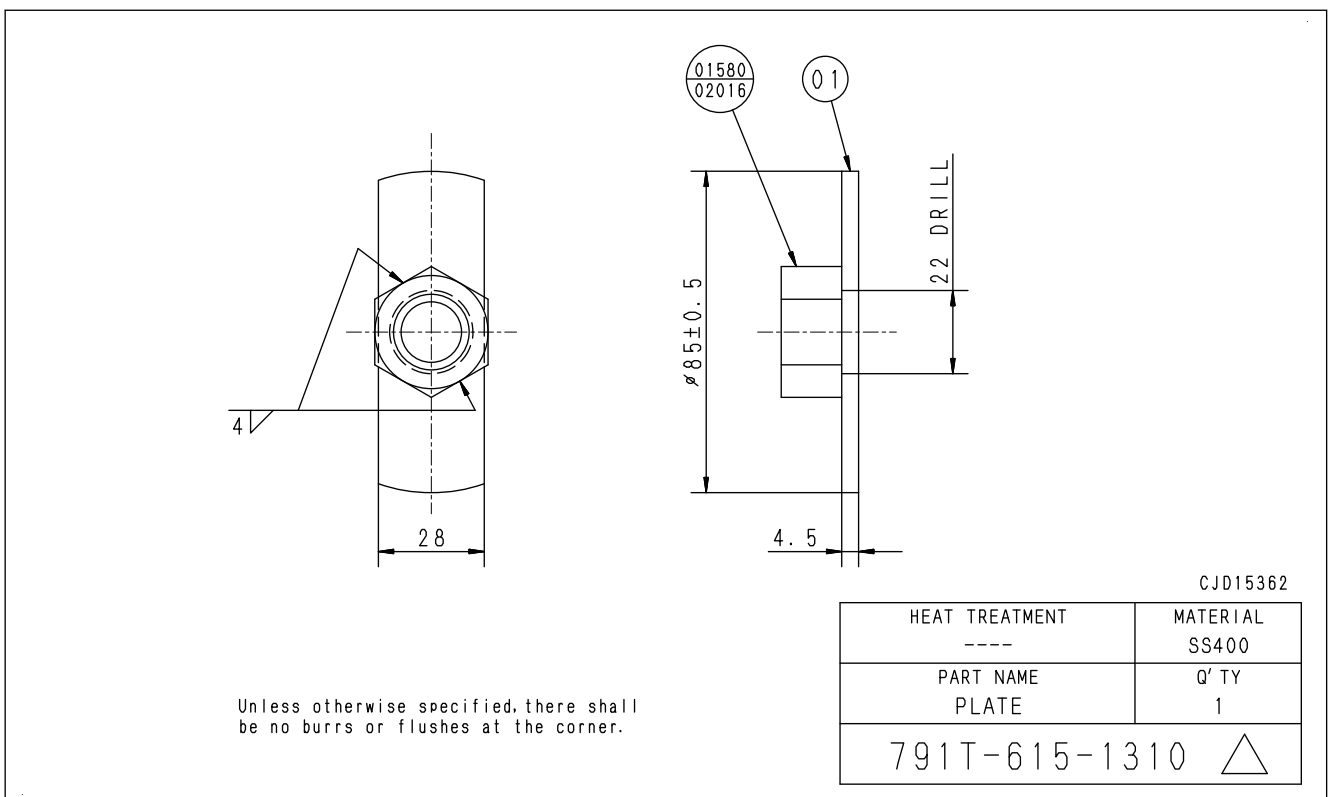
No.	Cause	Point to check, remarks	Remedy
1	Gas leakage from each part of the piping	<ul style="list-style-type: none"> • Gas leakage from following parts; between cylinder head and exhaust manifold, piping between exhaust manifold and VGT, piping between VGT outlet and KDPF • Gas leakage from EGR piping or air intake piping 	Problematic portions repair or replacement
2	Vibration of exhaust piping and exhaust bellows	Confirm the presence of vibration by visual check	Check and retighten piping fixed bracket
3	Seizure, damage, and unusual noise from VGT	Check if VGT shaft can rotate (by manually moving the VGT's blade axially and vertically).	VGT replacement
4	KDPF broken internally	Check internal KDPF.	KDPF cleaning or replacement
5	Defective injector	<ul style="list-style-type: none"> • Some cylinder is found to be cool when exhaust manifolds are touched by hand immediately after engine is started. • Perform cylinder cutout mode operation to identify cylinder that does not change in speed (see "TESTING AND ADJUSTING", "HANDLING CYLINDER CUTOFF MODE OPERATION"). 	Replace injector.
6	Defective valve clearance	Check valve clearance (Reference: See Testing and adjusting, "Testing and adjusting valve clearance").	Valve clearance adjustment
7	Seizure of pin bushing, front bearing, or main bearing	Check inside of oil pan for metallic powder.	Damaged parts repair or replacement
8	Worn piston ring or cylinder liner	<ol style="list-style-type: none"> 1. If metal particles are found in oil pan or oil filter, overhaul engine and check piston rings and cylinder liners. 2. Measure pressure (See Standard value table) (Reference: See Testing and adjusting, "Testing compression pressure") 	Replace piston ring or cylinder liner.
9	Broken valve or rocker arm	Overhaul engine and check valve and rocker arm parts.	Valve or rocker arm replacement
10	Broken peripheral parts of idler gear	Overhaul engine and inspect idler gear parts.	Idler gear replacement

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
ICT	Information and Communication Technology	Communication and electronic control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump fuel discharged volume. (Same as IMV)
IMU	Inertial Measurement Unit	Engine	This is a device to detect the angle (or angular velocity) and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This is a valve that adjusts the fuel intake amount at the pump inlet in order to control the supply pump combustion discharged volume. (Same as IMA)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This is a mechanism that burns the blowby gas again by separating oil from blowby gas and returning it to the intake side. It primarily consists of filters.
KCSF	Komatsu Catalyzed Soot Filter	Engine	This is a filter that captures soot in exhaust gas. It is built in to KDPF.
KDOC	Komatsu Diesel Oxidation Catalyst	Engine	This is a catalyst that is used for purifying exhaust gas. It is built in to KDPF or assembled with the muffler.
KDPF	Komatsu Diesel Particulate Filter	Engine	This is a component that is used to purify the exhaust gas. KDOC (catalyst) and KCSF (filter to capture soot) are built-in it. It is installed instead of the conventional muffler.
KTCS	Komatsu Traction Control System	Travel and brake (HM)	This is a function that performs braking with the optimum force and recovers the driving force of the wheels by actuating the inter-axle differential lock when the wheels runs idle while the machine travels on the soft ground.
LCD	Liquid Crystal Display	Machine monitor	This is an image display equipment such as a monitor in which the liquid crystal elements are assembled.
LED	Light Emitting Diode	Electronic parts	This is a semiconductor element that emits light when the voltage is applied in forward direction.
LIN	Local Interconnect Network	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
LS	Load Sensing	Hydraulic system	This is a function that detects differential pressure of pump, and controls discharged volume corresponding to load.
LVDS	Low Voltage Differential Signaling	Communication and electronic control	This is one of communication standards that are used in the network on the machine.
MAF	Mass Air Flow	Engine	This indicates engine intake air flow. This is not used independently but is used as combined with sensor. Mass air flow sensor can be called as MAF sensor.

793T-615-1710: Spacer



791T-615-1310: Plate



- Check that part (d) (2 mm from the tip-end) is free from steps (fatigue) which can be felt by your fingernail.


If the fuel high-pressure pipe has any defect, replace it with a new one otherwise fuel may leak.

15. Finger-tighten the sleeve nuts of fuel high-pressure pipe (32) to install it.

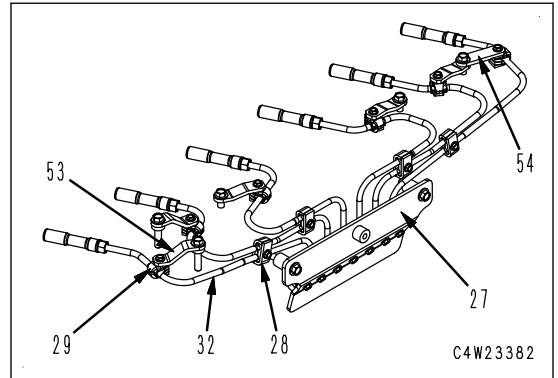
REMARK

Loosen all the clamps of the fuel high-pressure pipe.

16. Tighten the sleeve nut of fuel high-pressure pipe (32) to the specified torque.

 Sleeve nut (both ends):
39.2 to 44.1 Nm {4 to 4.5 kgm}

17. Install fuel spray prevention caps (30) and (31) to each fuel high-pressure pipe.



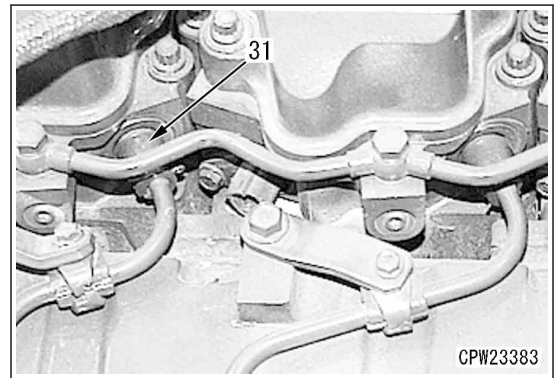
NOTICE

The notch should face in the following direction when installing.


- Fuel spray prevention cap (31): Downward
- Fuel spray prevention cap (30): Cylinder block side

18. Finger-tighten all the following clamps and brackets to install them.

- Clamps (29) (6 pieces)
- Brackets (53) (5 pieces)
- Brackets (54) and (27)




19. Fasten clamp (29) to the specified torque.

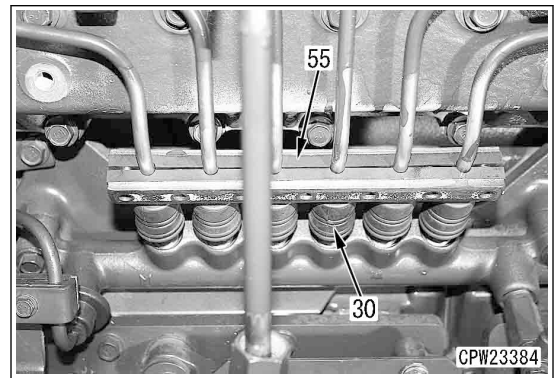
 Mounting bolt:
11.8 to 14.7 Nm {1.2 to 1.5 kgm}

20. Install brackets (53) and (54) by tightening the mounting bolts to the specified torque.

21. Finger-fasten clamps (28) (4 pieces) to install them.


22. Finger-fasten clamp (55) to bracket (27), and then fasten it to the specified torque.

 Mounting bolt:
11.8 to 14.7 Nm {1.2 to 1.5 kgm}



23. Install brackets (27) by tightening the mounting bolts to the specified torque.

24. Fasten clamp (28) to the specified torque.

 Mounting bolt:
11.8 to 14.7 Nm {1.2 to 1.5 kgm}

REMOVE AND INSTALL EGR VALVE ASSEMBLY

- ⚠ Park the machine on a level ground, and set parking brake switch to the ON position.
- ⚠ Set the frame lock bar to the LOCK position, and chock the wheels.
- ⚠ Lower the work equipment to the ground, and set the work equipment lock switch to LOCK.
- ⚠ Turn the starting switch to OFF position to stop the engine.
- ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)

METHOD FOR REMOVING EGR VALVE ASSEMBLY

Engine hood assembly

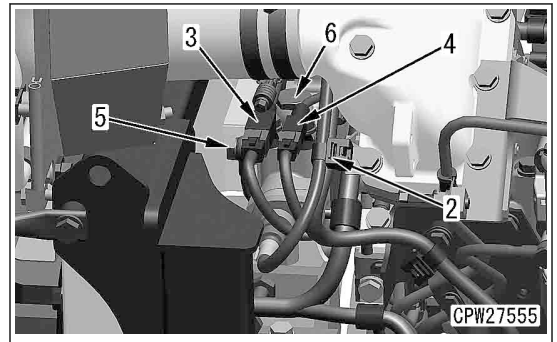
1. Remove the engine hood assembly. For details, see "REMOVE AND INSTALL ENGINE HOOD ASSEMBLY".

KDPF and SCR assembly

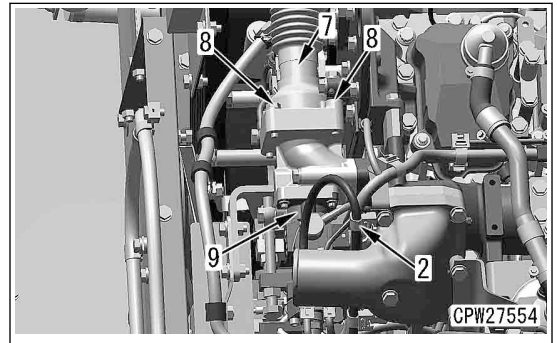
2. Remove KDPF and SCR assembly. For details, see "REMOVE AND INSTALL KDPF, SCR ASSEMBLY".

EGR valve assembly

3. Disconnect connectors SEGR (3) and EGR-SOL (4).
4. Remove tubes (5) and (6).
5. Remove clips (2) (2 pieces).



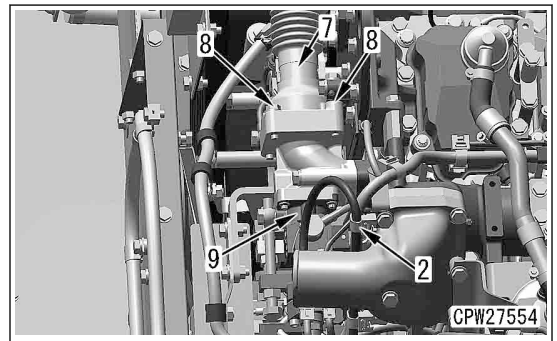
6. Remove mounting bolts (8) (4 pieces) of tube (7).
7. Remove mounting bolts (2 pieces), and remove EGR valve assembly (9).



METHOD FOR INSTALLING EGR VALVE ASSEMBLY

EGR valve assembly

1. Install EGR valve assembly (9) with mounting bolts (2 pieces).
2. Install mounting bolts (8) (4 pieces) of tube (7).
3. Install clips (14a) (2 places).



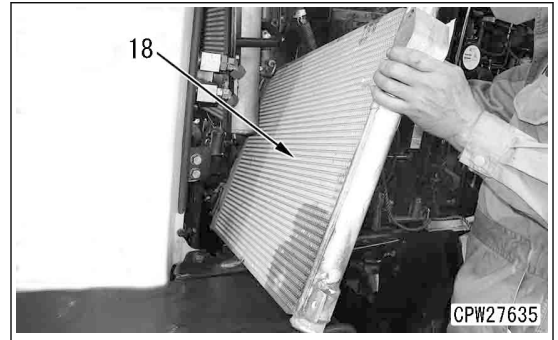
METHOD FOR INSTALLING HYDRAULIC OIL COOLER ASSEMBLY

Hydraulic oil cooler assembly

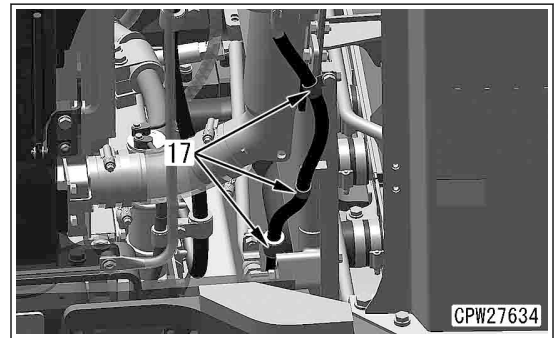
1. Install hydraulic oil cooler (18).

REMARK

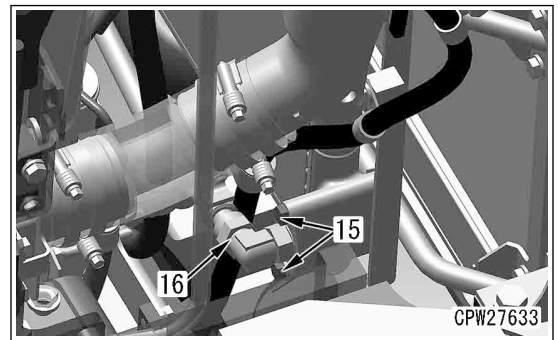
Install hydraulic oil cooler (18) so that it does not interfere with hose, etc.



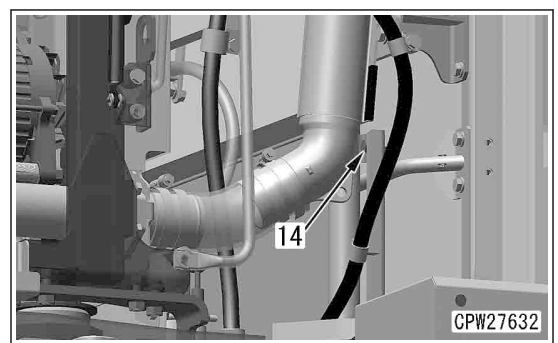
2. Install clamps (17) (3 places).



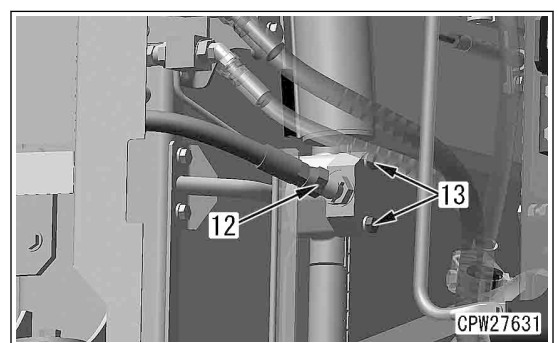
3. Install tube (16) with mounting bolt (15).




4. Install mounting bolt (14).



5. Install hose (12) with mounting bolt (13).

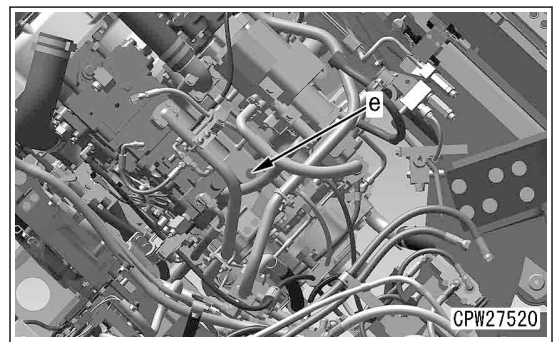
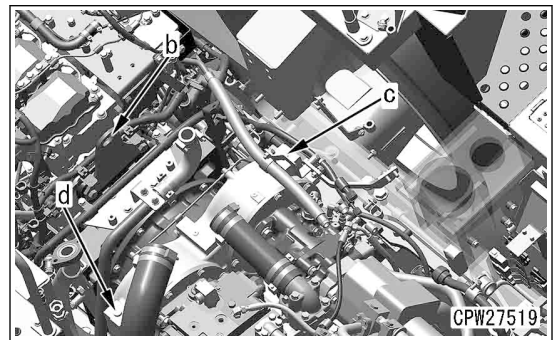
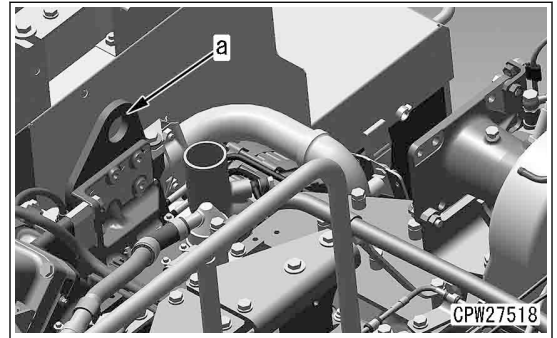
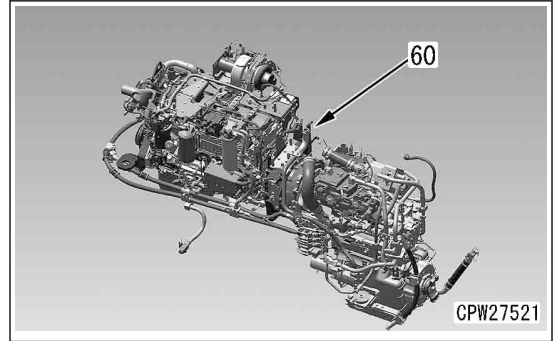


54. Install tool G to (a), (b), (c), (d) and (e) parts respectively, sling engine, torque converter, and transmission assembly (60), and remove the assembly.

 Engine, torque converter, and transmission assembly (60):
3000 kg

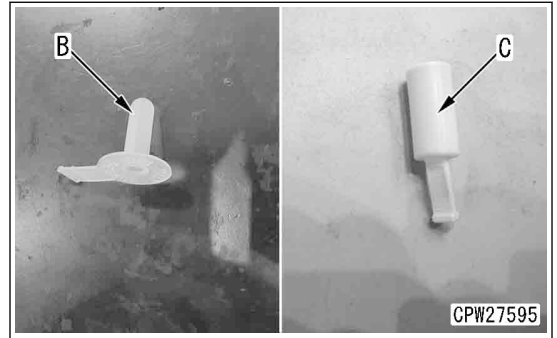
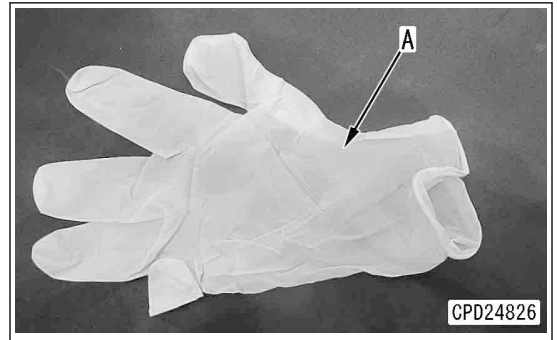
REMARK

Sling engine, torque converter, and transmission assembly (60) while checking that all wirings and pipings are disconnected, and then remove the assembly.

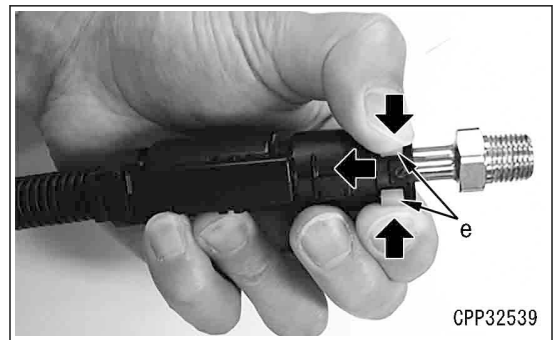


NOTICE

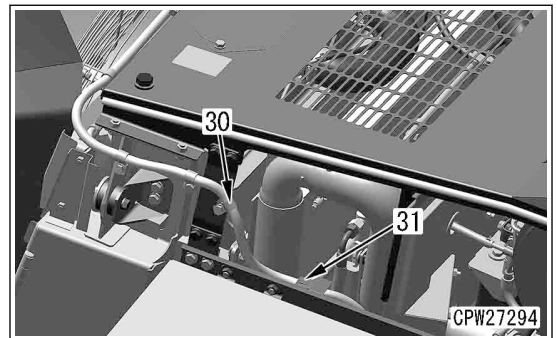
- When handling AdBlue/DEF, be sure to use tool A.
- Before disconnecting AdBlue/DEF hose (29f), wipe the connection of AdBlue/DEF hose with moist cloth, etc. to remove the sticking materials.
- After disconnecting the hose on AdBlue/DEF joint side, install tool B to the hose side, and tool C to AdBlue/DEF joint side to prevent leakage and entering of foreign materials.

**REMARK**

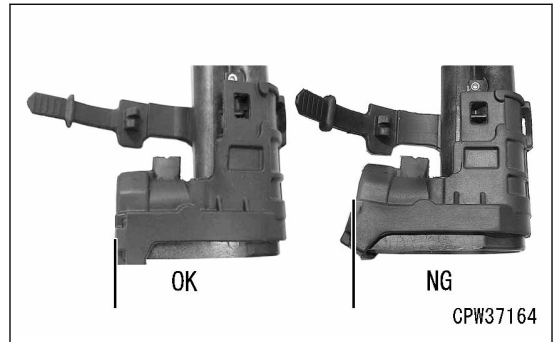
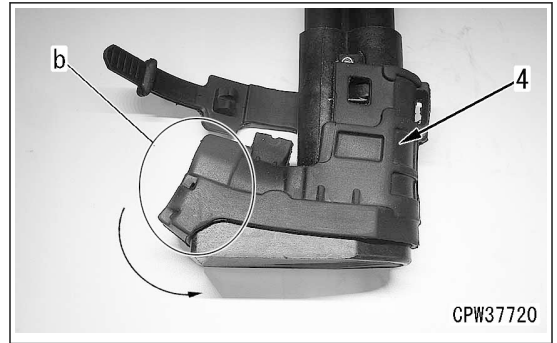
The lock of AdBlue/DEF hose (29f) is released by pinching the clip with your fingers while bringing protrusions (e) close to each other. Disconnect the hose while keeping this state.



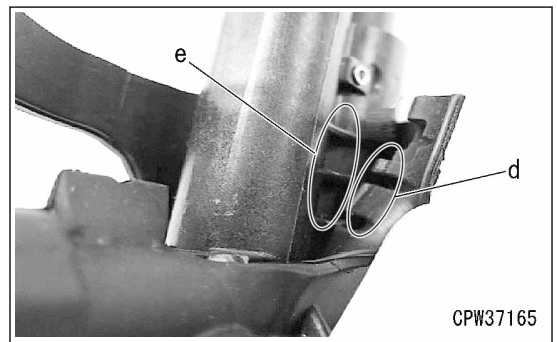
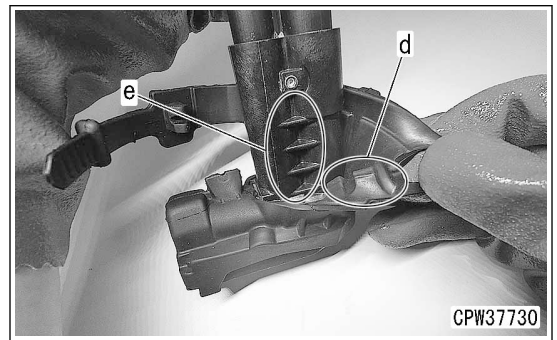
17. Remove clamp (30), and disconnect connector GR2 (31).



- 4) Set the boot (4) to the sensor top part (b) by moving it in the direction of the arrow.




- 5) Set the convex part (d) of the boot to the concave part (e) of the sensor body.




5. Install backup plates (34) and clamps (33).
6. Install mounting bolts (30) (12 pieces) of inlet (5) and KDOC (6), mounting bolts (31) (13 pieces) of KDOC (6) and KCSF (7), and mounting bolts (32) (12 pieces) of KCSF (7) and outlet (8).

NOTICE

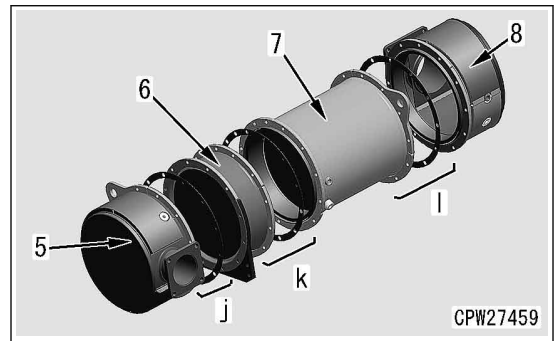
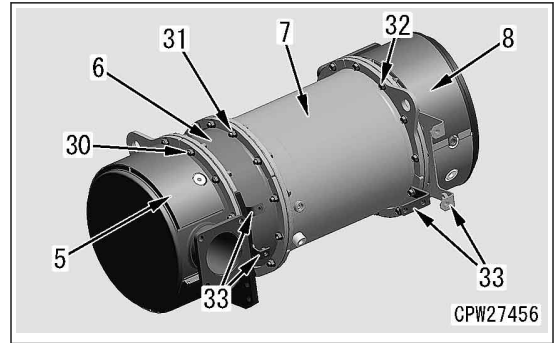
Install washer to bolts which length is 40 mm and 45 mm among mounting bolts (30) of inlet (5) and KDOC (6).

 Mounting bolt:
Seizure prevention compound(LC-G)





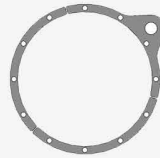
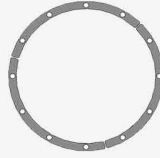
 Mounting bolt:
59 to 74 Nm {6.0 to 7.6 kgm}

REMARK

- j: Connection between inlet (5) and KDOC (6)
- k: Connection between KDOC (6) and KCSF (7)
- l: Connection between KCSF (7) and outlet (8)



- Installation position of backup plate

	Inlet side	Outlet side
j		
k		
l		

CPW27460

METHOD FOR INSTALLING KDPF, SCR ASSEMBLY

KDPF and SCR assembly

1. Install the tool F to the slinging positions (f) (4 places).
2. By using the tool F, sling the KDPF and SCR assembly (51), and set it to the installing position.

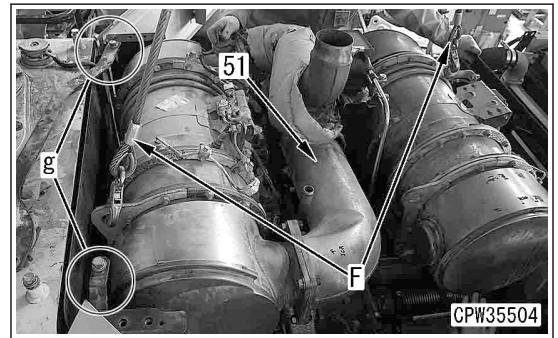
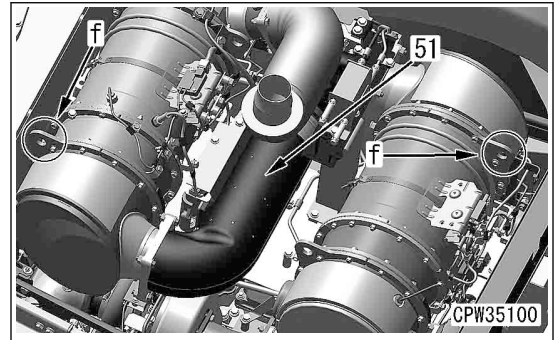


KDPF and SCR assembly (51):

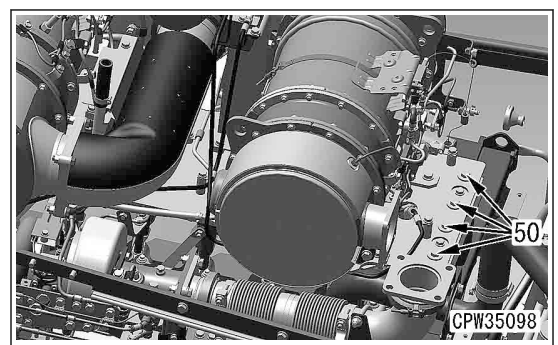
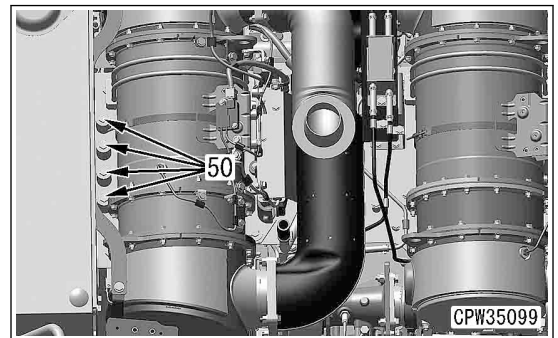
250 kg

NOTICE

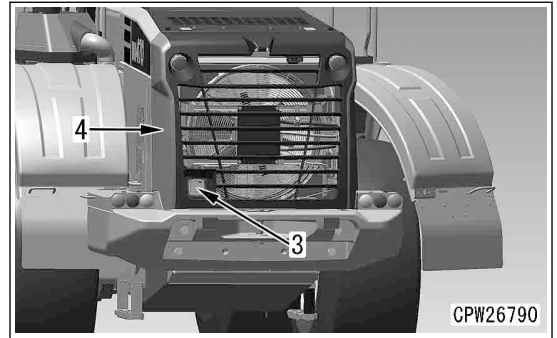
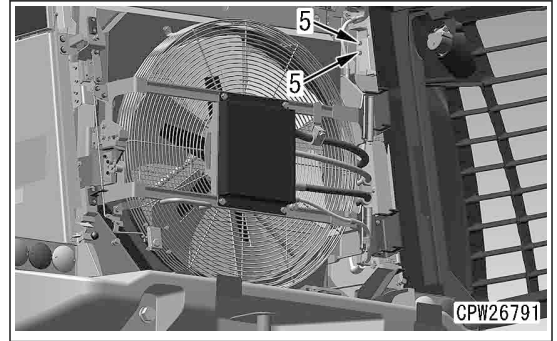
Be careful not to interfere with the (g) part.



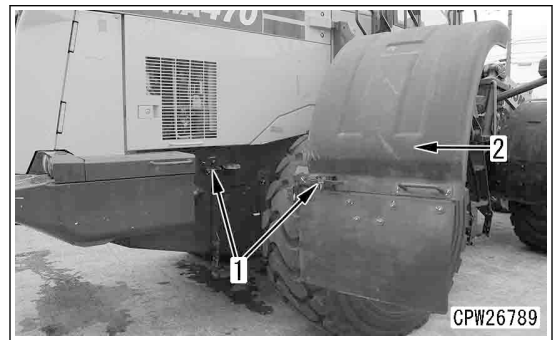
3. Install KDPF and SCR assembly (51) with the bolts (50) (8 pieces).



23. Install mounting bolts (5) (4 pieces each on the right and left), close grille cover (4), and fix grill lock (3).



24. Close rear fender (2), and fix it by using fender lock (1).



Refilling with coolant

25. Refill with coolant.

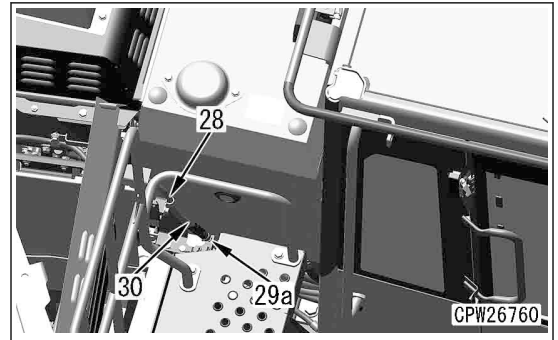


Radiator:

78 ℓ

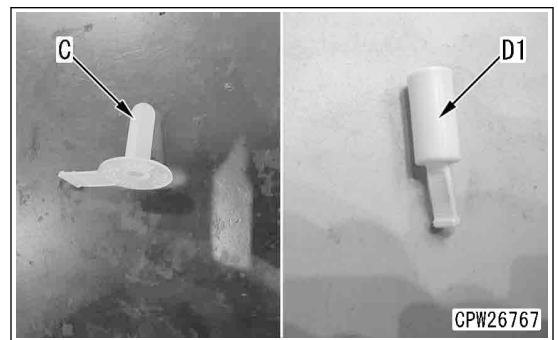
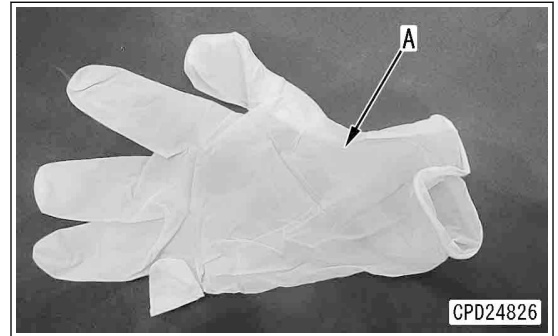
26. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant. Then check the coolant level again. (For details, see STRUCTURE AND FUNCTION, “TABLE OF FUEL, COOLANT, AND LUBRICANTS”.)

13. Remove clamp (28), and disconnect AdBlue/DEF hose (30) from joint (29a).



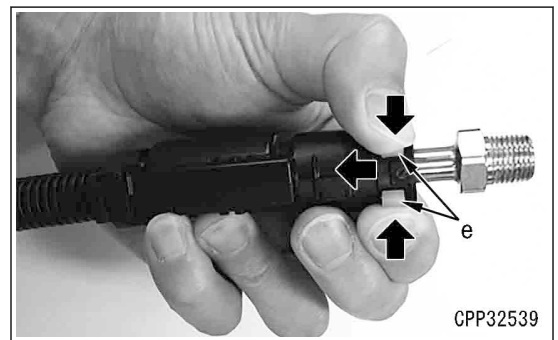
NOTICE

- When handling AdBlue/DEF, be sure to use tool A.
- Wash their connection of AdBlue/DEF hose (30) with distilled water to remove the sticking materials before disconnecting the hose.
- After disconnecting AdBlue/DEF hose (30), install tool C to the hose side, and tool D1 to the joint side to prevent leakage and entering of foreign materials.
- Cover the connecting portion with a clean plastic sheet, etc. to prevent entering of dust or sticking of AdBlue/DEF.

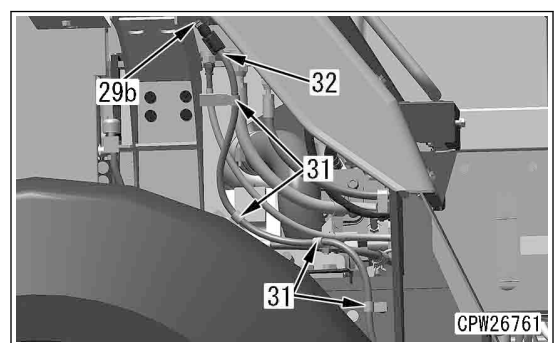


REMARK

The lock of AdBlue/DEF hose (30) is released by pinching the clip with your fingers while bringing protrusions (e) close to each other. Disconnect the hose while keeping this state.

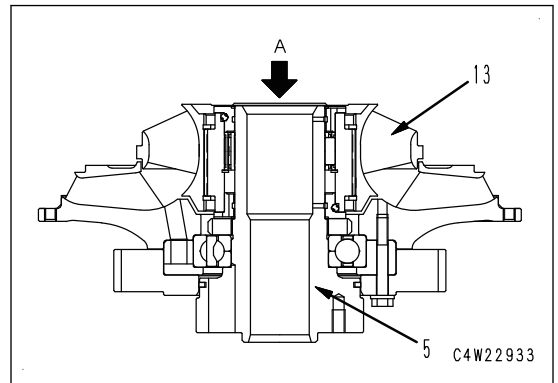


14. Remove clamps (31) (4 places), and disconnect AdBlue/DEF hose (32) from joint (29b).



Stator assembly and turbine and case assembly

- 22. Set stator assembly (13) to stator shaft (5).
- 23. Check that the stator rotates as follows when seen from the boss side (input side: view A).
 Clockwise: Turning with no load
 Counterclockwise: Locked



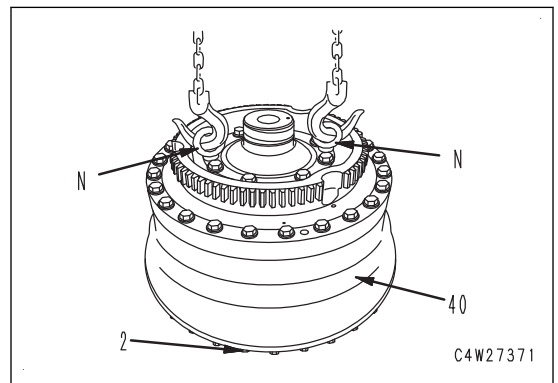
- 24. By using tool N (M12 x 1.75), sling turbine and case assembly (40), lower it, and tighten bolts (2) lightly.
- 25. Invert the torque converter assembly, and tighten bolts (2).



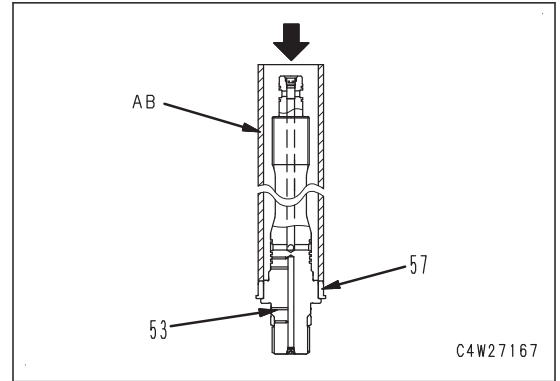
Bolt:
Adhesive (LT-2)



Bolt:
49.0 to 58.8 Nm {5.0 to 6.0 kgm}




61. Press fit inner race (57) to input shaft (53) by using tool AB.

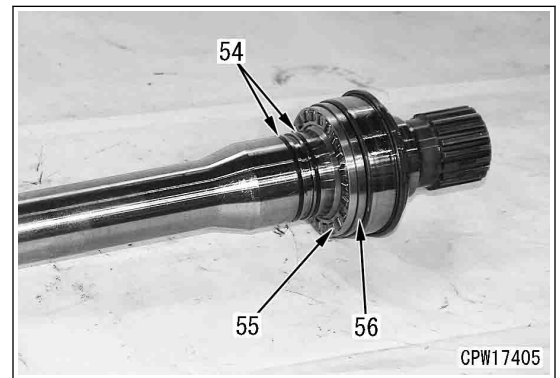


62. Install thrust plate (56), thrust bearing (55), and seal rings (54).

REMARK

When installing seal ring (54), check that there are oil grooves on its sides.

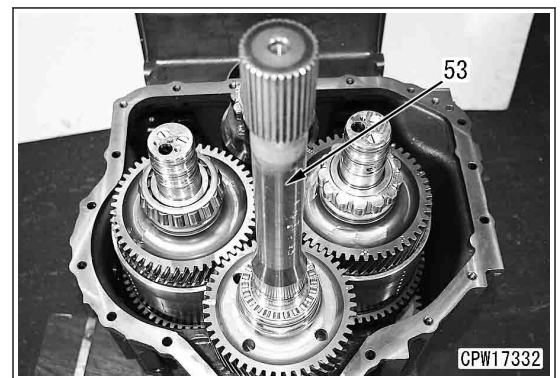
 Periphery of seal ring:
Grease (G0-LI or G2-LI)



63. Install input shaft (53).

REMARK

The shape of the input shaft shown in the figure is different from the real one.




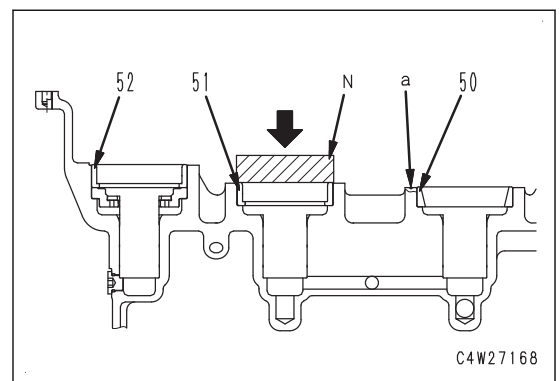
Rear case

64. Press fit outer race (50), (51), and (52) to the rear case by using tool N.

REMARK

Press fit outer race (50) for the taper roller bearing to the portion where there is identification hole (a).

 Inner periphery of outer race:
Power train oil (TO10)



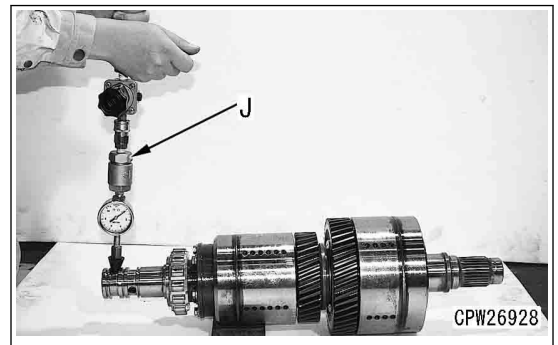
PTO assembly

[4th clutch] Clutch operation check

31. Supply air to the oil hole of the shaft by using tool J, and check that the 3rd and 4th clutches operate.

REMARK

If the gear on the air-blown side is fixed, the clutch is operating normally.



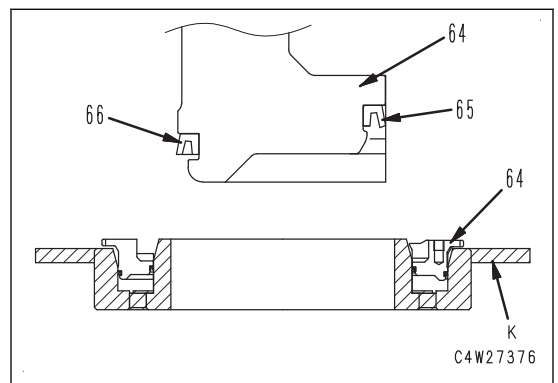
Assembly of R, 2nd clutch pack assembly

[2nd clutch] Piston


1. Install seal rings (65) and (66) to piston (64) in the direction shown in the figure.
2. Fit seal rings (65) and (66) to piston (64) by using tool K.

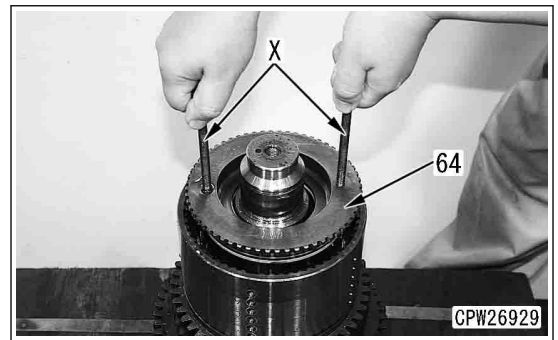
REMARK

Leave them for approximately 2 to 3 minutes as they are.



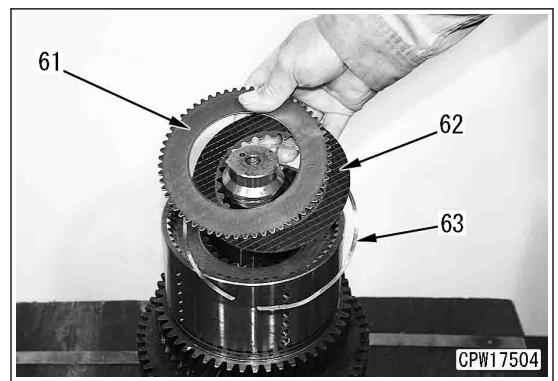
3. Install piston (64) by using tool X (M8 x 1.25).

 Seal ring contact surface:
Power train oil(TO10)

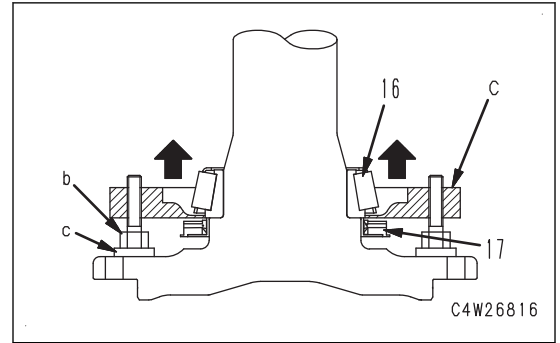


[2nd clutch] Plate, disc, spring

4. Install plate (61), disc (62), and spring (63) in this order.

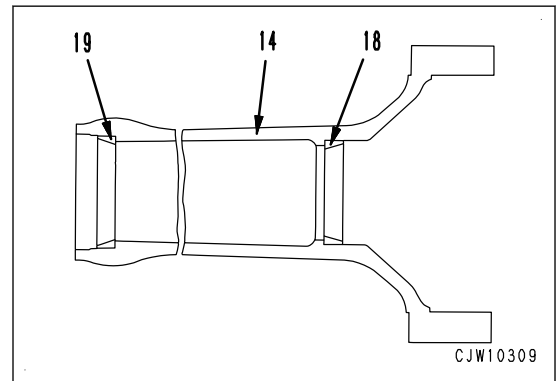


13. Install tool C to the bottom of bearing (16), and fix it securely.
14. Insert washers (c) between bolts (c) and flange face.
15. Rotate bolts (b) in the loosening direction, and remove bearing (16).
16. Remove oil seal (17).



Axle housing

17. Remove outer race (18) and (19) from axle housing (14).

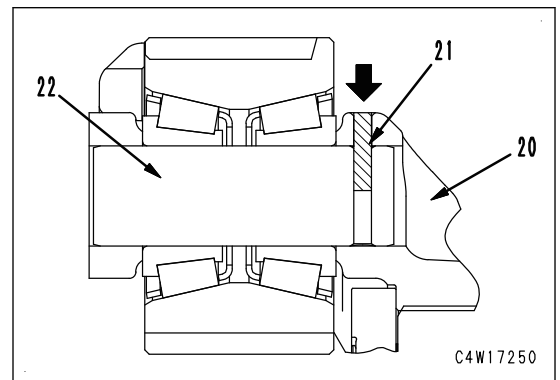


Planetary carrier

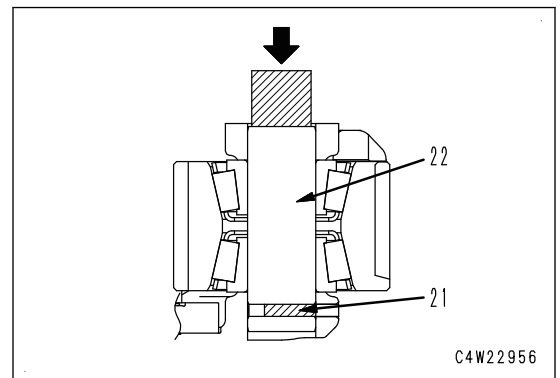
18. Drive in spring pin (21) of planetary carrier (20) to shaft (22) so that the pin does not protrude from the shaft.

REMARK


- Pay attention to drive in spring pin (21) sufficiently.
- After driving in, rotate the gear, and check that shaft (22) rotates.

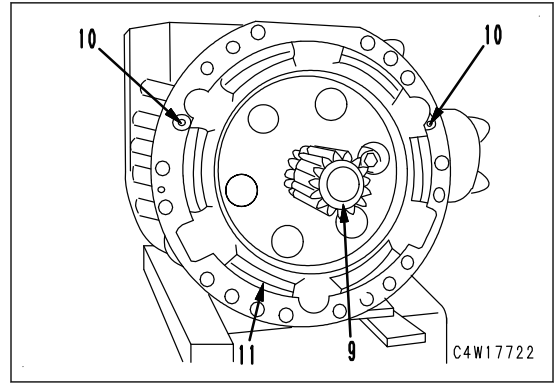


19. Pull out shaft (22) by using a press.
20. Pull out spring pin (21) from removed shaft (22).

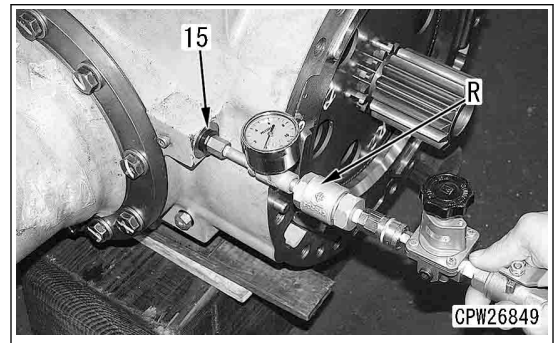


71. Install outer plate (11) and sun gear shaft (9), and tighten bolts (10).

 Bolt (10):
27 to 34 Nm {2.8 to 3.5 kgm}



72. By using tool R, supply air to brake oil port (15) to allow the piston to move smoothly.





Cover

73. Install cover (8) to differential case (7).

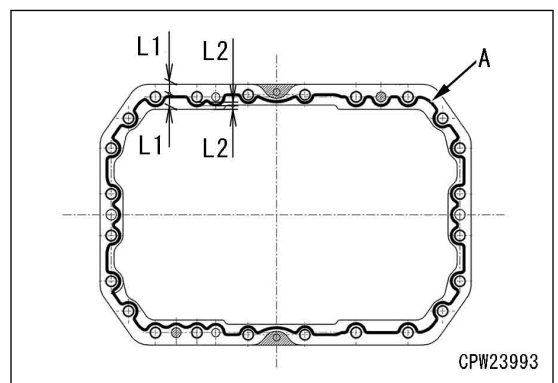
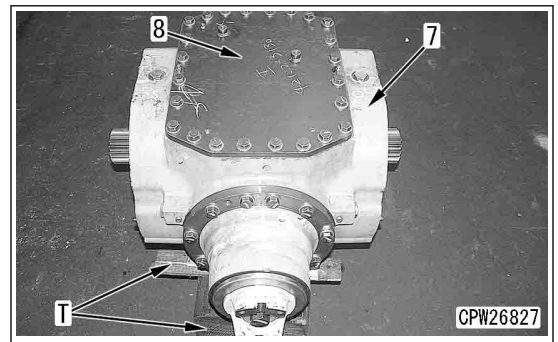
REMARK

- Apply liquid gasket (A) without a break.
- Apply liquid gasket (A) at the center of the mating face as shown in the figure.

 Cover mounting face:
Liquid gasket (LG-12)

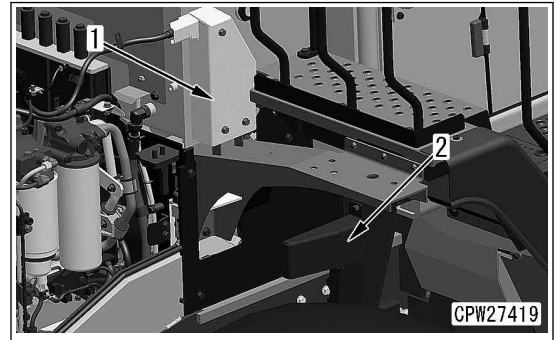
 Mounting bolt:
157 to 196 Nm {16 to 20 kgm}

- Front differential

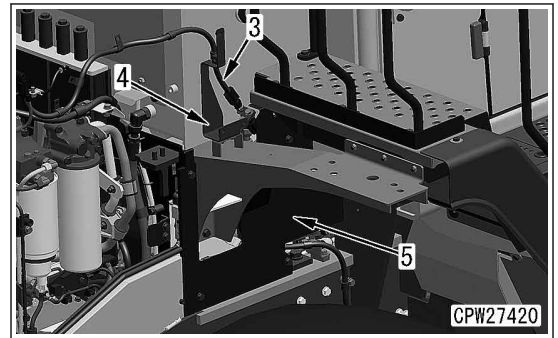


Cover

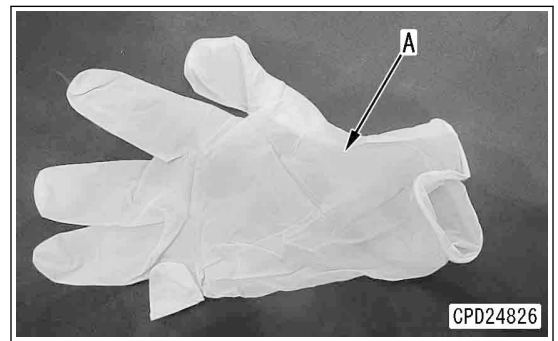
5. Remove mounting bolts (3 pieces), and remove cover (1).
6. Remove mounting bolts (3 pieces), and remove cover (2).



7. Remove AdBlue/DEF hose (3).

**NOTICE**

- When handling AdBlue/DEF, be sure to use tool A.
- Wash their connection of AdBlue/DEF hose (3) with distilled water to remove the sticking materials before disconnecting the hose.
- After disconnecting AdBlue/DEF hose (3), install tool C to the hose side, and tool D1 to AdBlue/DEF injector side to prevent leakage and entering of foreign materials.
- Cover the connecting portion with a clean plastic sheet, etc. to prevent entering of dust or sticking of AdBlue/DEF.



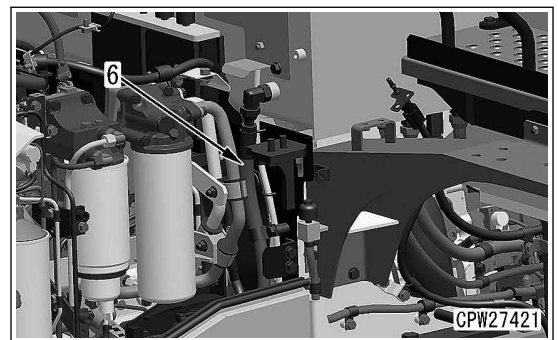
8. Remove mounting bolts (2 pieces), and remove bracket (4).
9. Remove mounting bolts (4 pieces), and remove cover (5).

REMARK

Remove them also on the opposite side.

Hose, tube

10. Disconnect hose (6) on the right side of the hydraulic tank.



Assembly of piston assembly

1. Expand piston ring (9) by using tool E-1.

REMARK

Expand the piston ring (9) by rotating the handle of tool E-1 8 to 10 turns.

2. Remove piston ring (9) from tool E-1 and install to the piston (6).
3. Set tool E, and compress piston ring (9).

REMARK

When using and assembling ring of tool E and clamp, see the following.

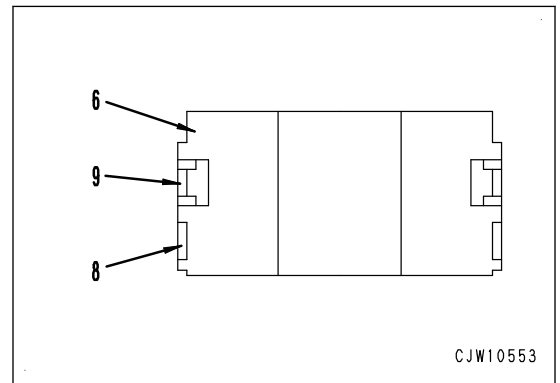
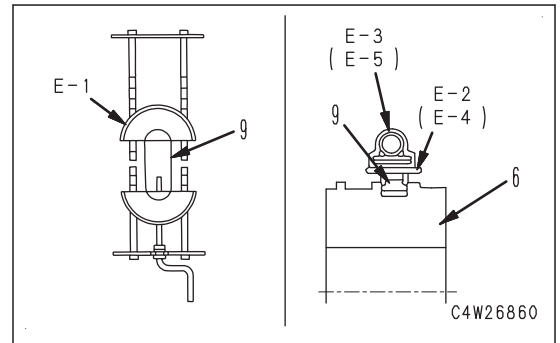
E-2, 3: Steering cylinder

E-4, 5: Bucket cylinder, lift cylinder

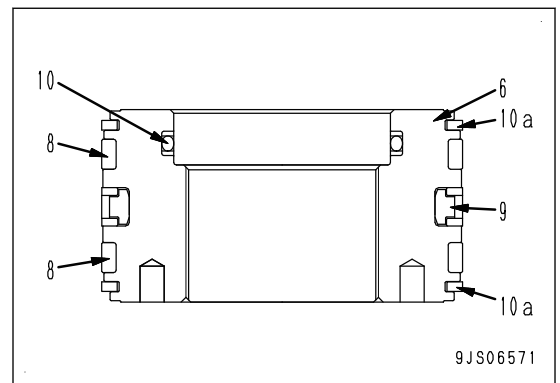
4. Install wear ring (8).
5. Install backup ring, O-ring (10), and ring (10a). (Lift cylinder and bucket cylinder)

REMARK

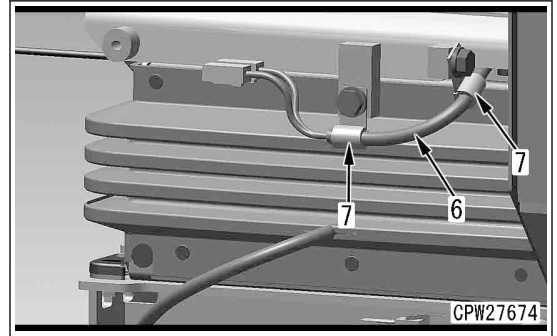
- When installing the backup ring, do not install it forcibly. Warm it in hot water at approximately 50 to 60 °C, and install it.
- The following shows steering cylinder.



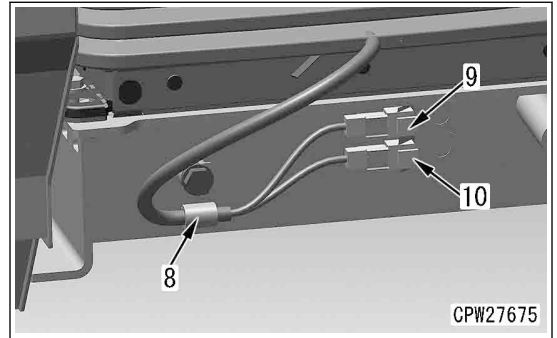
- The following shows lift cylinder and bucket cylinder.



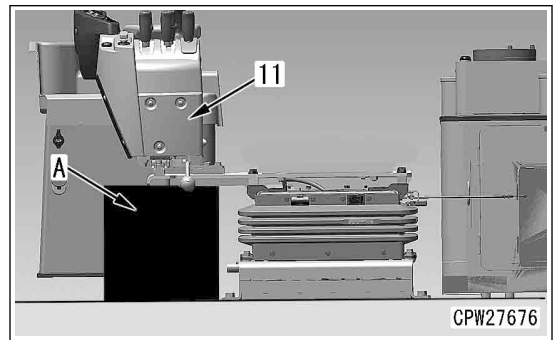
3. Disconnect clamps (7) of harness (6) (2 places).



4. Remove clamp (8), and disconnect connectors L11 (9) and SBS (10).



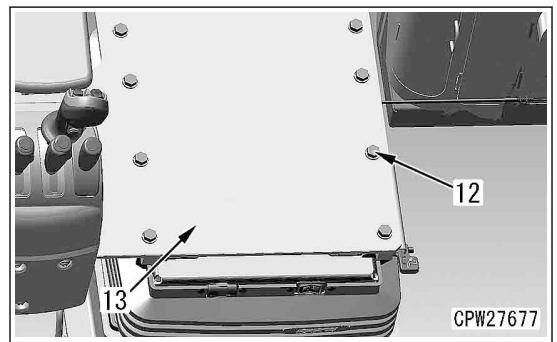
5. By using tool A, support R.H. console (11).



6. Remove mounting bolts (12) (8 pieces), and separate R.H. console (11) together with bracket (13) as a unit.

NOTICE

Since R.H. console (11) is leaned at angle without using tool A, be sure to use it.



Suspension

7. Remove mounting bolts (14) (4 pieces), and remove suspension (15).

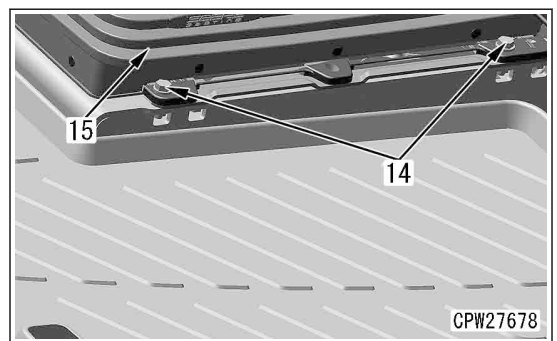
NOTICE

Since the crane cannot be used inside of the cab, remove it by 2 persons.



Suspension (15):

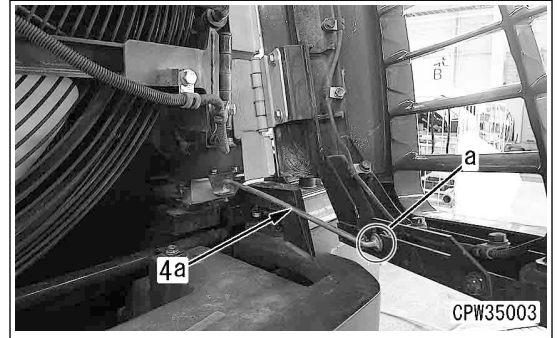
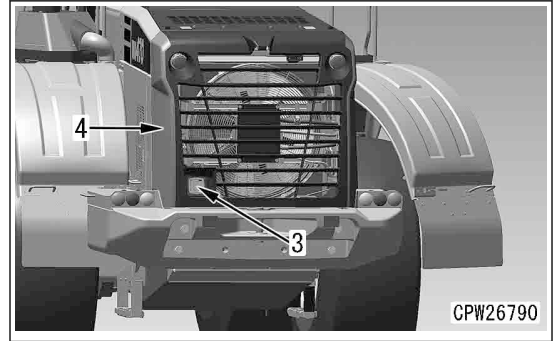
33 kg



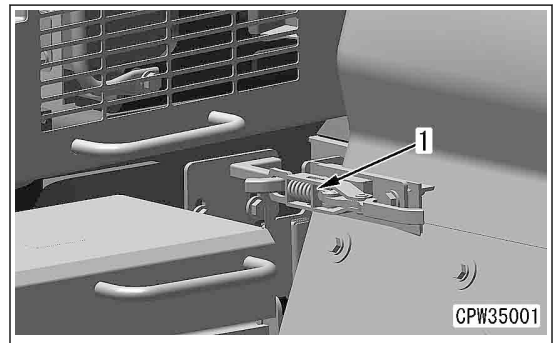
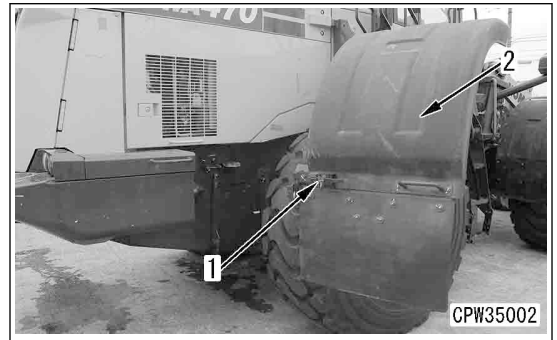
16. Remove the stopper (4a) from the lock position (a), and close the grille cover (4).

REMARK

Check that the grille lock (3) is securely engaged at the lock position.



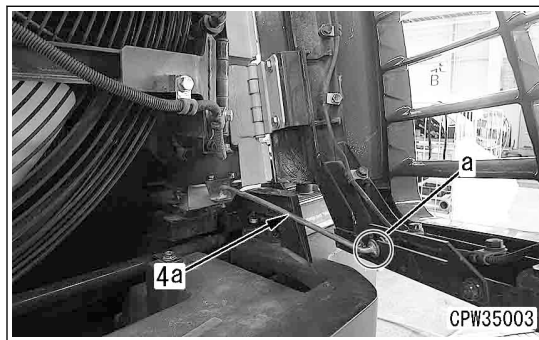
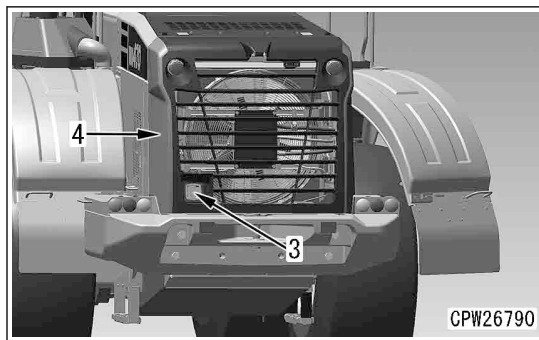
17. Close the rear fender (2), and engage the fender lock (1). (Right and left sides of the machine body)



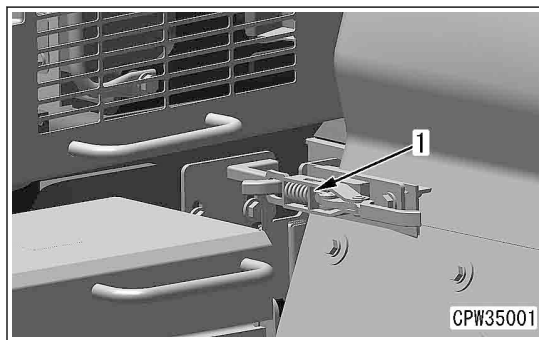
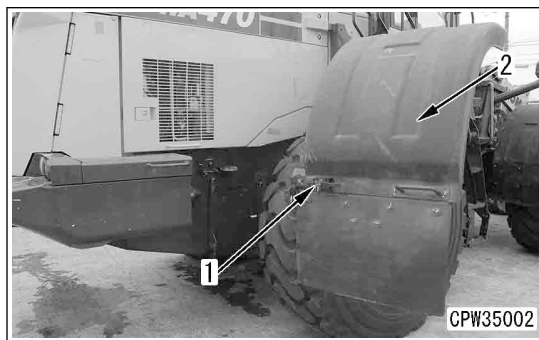
17. Remove the stopper (4a) from the lock position (a), and close the grille cover (4).

REMARK

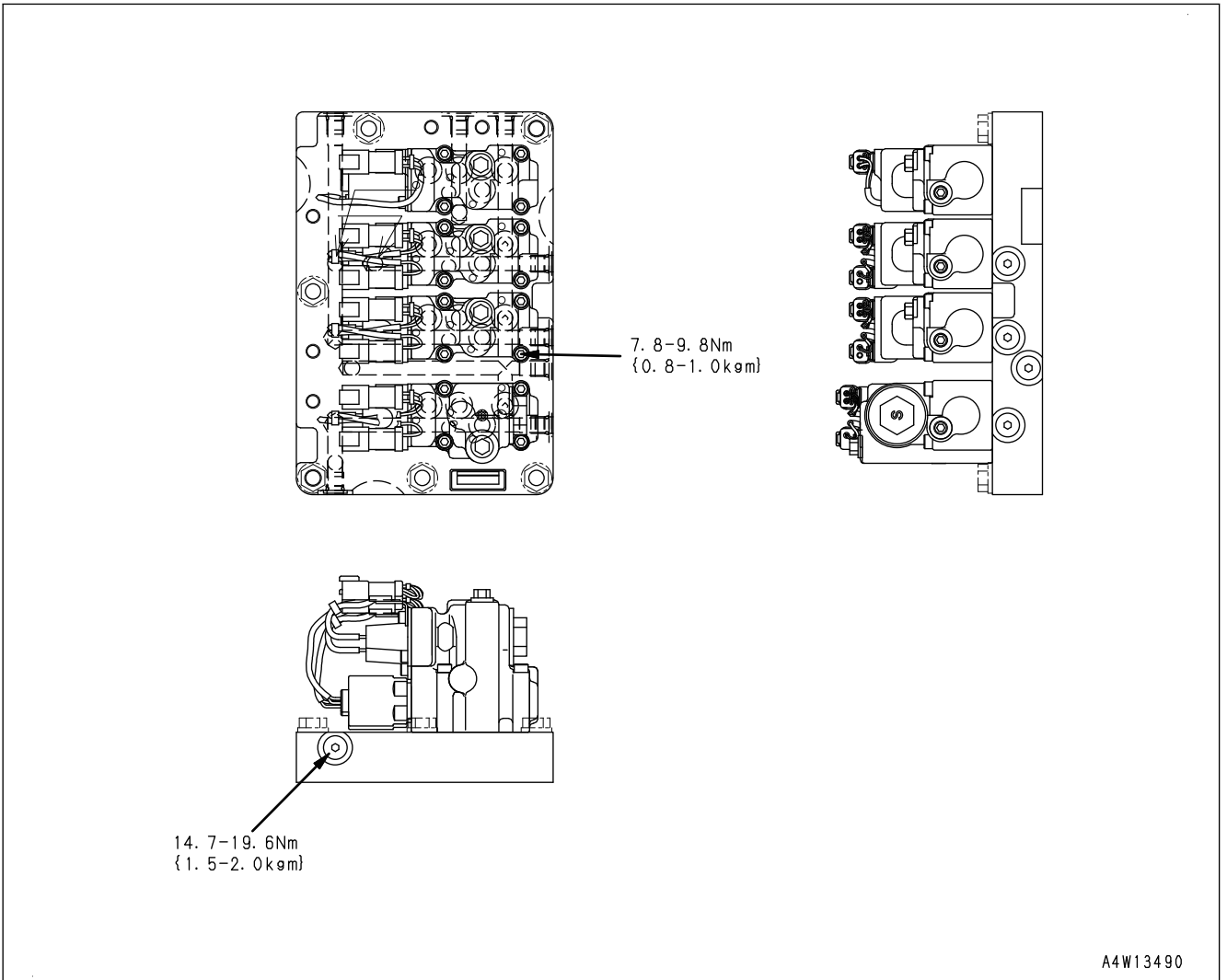
Check that the grille lock (3) is securely engaged at the lock position.



18. Close the rear fender (2), and engage the fender lock (1). (Right and left sides of the machine body)



R.H. valve assembly



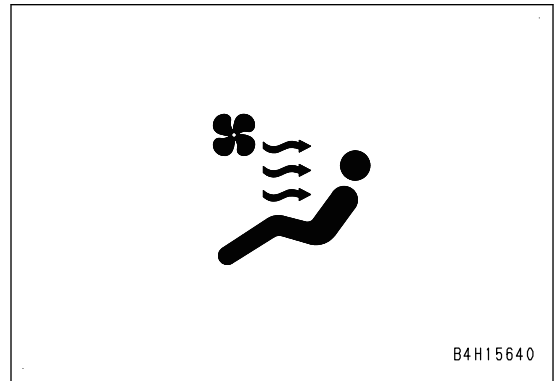
Unit: mm

No.	Item		Judgment criteria				Remedy	
1	Parking brake spring (outside)		Standard dimension			Repair limit		Replace
		Free height	Installed height	Load at installed height	Free height	Load at installed height		
		94	72.3	1284 N {131 kg}	91	1220 N {124 kg}		
2	Parking brake spring (inside)	94	72.3	672 N {69 kg}	91	638 N {66 kg}		
3	Plate	-	Standard dimension	Tolerance	Repair limit			
		Thick-ness	4.0	±0.05	3.9			
		Distortion	-	0.15	0.2			
4	Disc	Thick-ness	3.2	±0.10	2.75			
		Distortion	-	0.2	0.3			
5	Load of wave spring (test height: 3.2 mm)		735 N {75 kg}	±216 N {±22 kg}		519 N {53 kg}		

Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*1), or component/system)	Explanation
CRI	Common Rail Injection	Engine	This is a function that maintains optimum fuel injection amount and fuel injection timing. This is performed the engine controller which electronically controls supply pump, common rail, and injector.
ECM	Electronic Control Module	Electronic control system	This is an electronic control device that send the command to actuators using the signals from the sensors on the machine so that the optimum actuation is performed. (Same as ECU)
ECMV	Electronic Control Modulation Valve	Transmission (D, HD, WA, etc)	This is a proportional electromagnetic valve that decreases the transmission shock by gradually increasing oil pressure for engaging clutch.
ECSS	Electronically Controlled Suspension System	Travel (WA)	This is a device that ensures smooth high-speed travel by absorbing vibration of machine during travel with hydraulic spring effect of accumulator.
ECU	Electronic Control Unit	Electronic control system	This is an electronic control device that send the command to actuators using the signals from the sensors on the machine so that the optimum actuation is performed. (Same as ECM)
EGR	Exhaust Gas Recirculation	Engine	This is a function that recirculates a part of exhaust gas to combustion chamber, so that it reduces combustion temperature, and reduces emission of NOx.
EMMS	Equipment Management Monitoring System	Machine monitor	This is a function with which operator can check information from each sensor on the machine (filter, oil replacement interval, malfunctions on machine, failure code, and failure history).
EPC	Electromagnetic Proportional Control	Hydraulic system	Electromagnetic proportional control This is a mechanism with which actuators operate in proportion to the current.
FOPS	Falling Object Protective Structure	Cab and canopy	This structure protects the operator's head from falling objects. (Falling object protective structure) This performance is standardized as ISO 3449.
F-N-R	Forward-Neutral-Reverse	Operation	Forward - Neutral - Reverse
GPS	Global Positioning System	Communication (KOMTRAX, KOMTRAX Plus)	This system uses satellites to determine the current location on the earth.
GNSS	Global Navigation Satellite System	Communication (KOMTRAX, KOMTRAX Plus)	This is a general term for system uses satellites such as GPS, GALILEO, etc.
HSS	Hydrostatic Steering System	Steering (D Series)	This is a function that enables the machine to turn without steering clutch by controlling a difference in travel speed of right and left tracks with a combination of hydraulic motor and bevel shaft.
HST	Hydro Static Transmission	Transmission (D, WA)	Hydraulic transmission system that uses a combination of hydraulic pump and hydraulic motor without using gears for stepless gear shifting.

TESTING AIR CONDITIONER USING SELF-DIAGNOSIS FUNCTION

On the air conditioner operation screen of the machine monitor, the system performs various self-diagnosis such as the communication with the air conditioner controller, inside air temperature sensor, outside air temperature sensor, evaporator temperature sensor, sunlight sensor, temperature adjustment, and vent (mode) changeover. If any failure is detected, "Air conditioner system state monitor" is displayed on the screen.



REMARK

- Once a failure is detected in the self-diagnosis, the failure condition is not canceled even if the failed part returns to normal. The failure condition is canceled by turning the starting switch to OFF position.
- The system performs self-diagnosis of various sensors. If any failure is detected, a failure code is displayed on Electrical Sys Abnormality Record screen in the service mode of the machine monitor.
- FRESH/RECIRC air changeover servomotor has no self-diagnosis function.

Failure code list related to air conditioner

Failure code	Failure (Displayed on screen)	Remarks
879AKA	A/C Recirculation Air Temperature Sensor Open Circuit	While it is mounted on the machine, connector cannot be checked, so troubleshooting cannot be performed.
879AKB	A/C Recirculation Air Temperature Sensor Short Circuit	The air conditioner inside air sensor means the inside air temperature sensor.
879BKA	A/C Fresh Air Temperature Sensor Open Circuit	The air conditioner outside air sensor means the outside air temperature sensor.
879BKB	A/C Fresh Air Temperature Sensor Short Circuit	
879CKA	Ventilating Sensor Open Circuit	While it is mounted on the machine, connector cannot be checked, so troubleshooting cannot be performed.
879CKB	Ventilating Sensor Short Circuit	The vent sensor means the evaporator temperature sensor (frost sensor).
879DKZ	Sunlight Sensor Open Circuit or Short Circuit	
879EMC	Ventilation Damper Malfunction	While it is mounted on the machine, connector cannot be checked, so troubleshooting cannot be performed. The vent damper means the vent (mode) changeover damper (door).
879FMC	Air Mix Damper Malfunction	While it is mounted on the machine, connector cannot be checked, so troubleshooting cannot be performed. The A/M damper means the temperature control (air mix) damper (door).
DAZ9KQ	Model Selection Signal Mismatch (A/C)	Troubleshooting is not performed by the air conditioner unit but by the machine monitor.
DAZQKR	CAN 2 Defective Communication (A/C ECU)	See Chapter 40, "Troubleshooting by failure code".

No.	Cause	Procedure, measuring location, criteria and remarks	
3	Defective air mix actuator, defective air conditioner wiring harness, defective air conditioner controller	1. Turn the starting switch to OFF position. 2. Disconnect connectors [1] and [2], and insert T-adaptor into it. 3. Turn the starting switch to ON position.	
		Voltage	Between [2] (5) and [1] (29) 5 V
		1. Turn the starting switch to OFF position. 2. Disconnect connectors [1] and [2], and insert T-adaptor into it. 3. Turn the starting switch to ON position. 4. Be ready with COOL MAX by operating temperature adjustment switch on the air conditioner operation screen. 5. Operate temperature adjustment switch on the air conditioner operation screen, and turn it to HOT MAX. REMARK <ul style="list-style-type: none"> • The voltage is generated between connector [2] (20) and [2] (19) for approximately 3 seconds (only while door moves). • The voltage between connector [2] (16) and [1] (29) varies for approximately 3 seconds (only while door moves). (When door stops, the voltage is stabilized to fixed value.) 	
		Voltage	Between [2] (20) (+) and [2] (19) (-) REMARK When switch is turned from HOT MAX to COOL MAX, polarity is reversed.
4	Defective air conditioner wiring harness	Troubleshoot this when test result for cause 2 is normal and that for cause 3 is abnormal. Check by referring to circuit diagram.	
5	Defective air conditioner controller	When test result for cause 2 is normal and that for cause 3 is abnormal and that for cause 4 is normal, air conditioner controller is defective.	
6	Defective switch panel (defective switch)	1. Turn the starting switch to ON position. 2. Display the air conditioner operation screen on the machine monitor.	
		Press temperature adjustment switch	LCD display changes to 18 to 32 °C.

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