

Shop Manual

WHEEL LOADER

WA600-8E0

SERIAL NUMBERS 85001 and up

KOMATSU

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Precautions for disconnecting air conditioner piping

NOTICE

When replacing the air conditioner unit, air conditioner compressor, condenser or receiver drier, etc., collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit before disconnecting the air conditioner hoses.

REMARK

- Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a).
- Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.

⚠ Put on the protective eyeglasses, gloves and working clothes with long sleeves while you are collecting or filling the refrigerant. Otherwise, when refrigerant gas (R134a) gets in your eyes, you may lose your sight, and when it touches your skin, you may suffer from frostbite.

- When loosening the nuts fixing air conditioner hoses and tubes, be sure to use 2 wrenches; use one wrench to fix and use the other one to loosen the nut.

Precautions for air conditioner piping

- When installing the air conditioner piping, be careful so that dirt, dusts and water do not enter the hose.
- Check that the O-rings are fitted to the joints when connecting the air conditioner piping.
- Do not reuse an O-ring because it is deformed and deteriorated if it is used once.
- When removing the O-rings, use a soft tool so that the piping is not damaged.
- Check that the O-ring is not damaged or deteriorated.
- Apply compressor oil for refrigerant (R134a) to O-ring.

REMARK

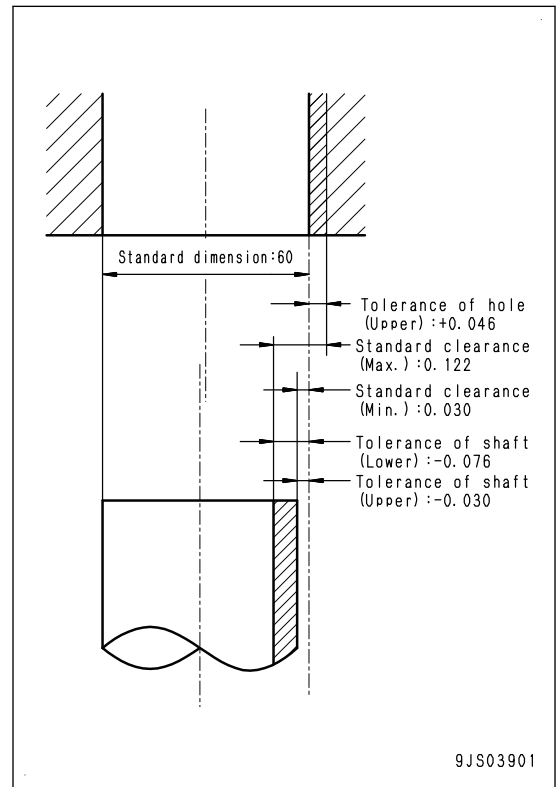
Do not apply oil to the threaded portion of a bolt, nut or union.

Manufacturer	Part name
DENSO	ND-OIL8
VALEO THERMAL SYSTEMS	ZXL100PG (PAG46 or equivalent)
SANDEN	SP-10

When tightening nuts of the air conditioner hoses and tubes, be sure to use 2 wrenches. Use one wrench to fix and tighten the nut with the other wrench to the specified torque (Use a torque wrench for tightening).

Standard clearance and standard value

- The clearance made when new parts are assembled is called the standard clearance, which is indicated by the range from the minimum clearance to the maximum clearance.
- When some parts are repaired, the clearance is generally adjusted to the standard clearance.
- The values indicating performance and function of new products or equivalent are called "standard value", which is indicated by a range or a target value.
- When some parts are repaired, the value of performance/function is set to the standard value.



Standard interference

- When the diameter of a hole of a part shown in the given standard dimension and tolerance table is smaller than that of the shaft to be inserted, the difference between those diameters is called "interference".
- Subtract the maximum dimension of the hole from the minimum dimension of the shaft and call it (A). Subtract the minimum dimension of the hole from the maximum dimension of the shaft and call it (B). The range between (A) and (B) is "standard interference".
- After repairing or replacing some parts, measure the dimension of their hole and shaft and check that the interference is in the standard range.

Repair limit and allowable value or allowable dimension

- The dimension of parts changes due to the wear or deformation while they are used. When the dimension changes exceeding certain value, parts cannot be used any longer. This value is called "repair limit".
- If a part is worn to the repair limit, it must be replaced or repaired.
- The performance and function of products lower while they are used. A value with which the product can be used without causing a problem is called "allowable value" or "allowable dimension".
- A product whose dimension is out of the allowable value, must be repaired. However, since the allowable values are generally estimated through various tests or experiences in most cases, the judgment must be made in consideration of the operating condition and customer's requirement.

Allowable clearance

- Parts can be used until the clearance between them is increased to a certain limit. The limit at which those parts cannot be used is called "allowable clearance".
- If the clearance between the parts exceeds the allowable clearance, they must be replaced or repaired.

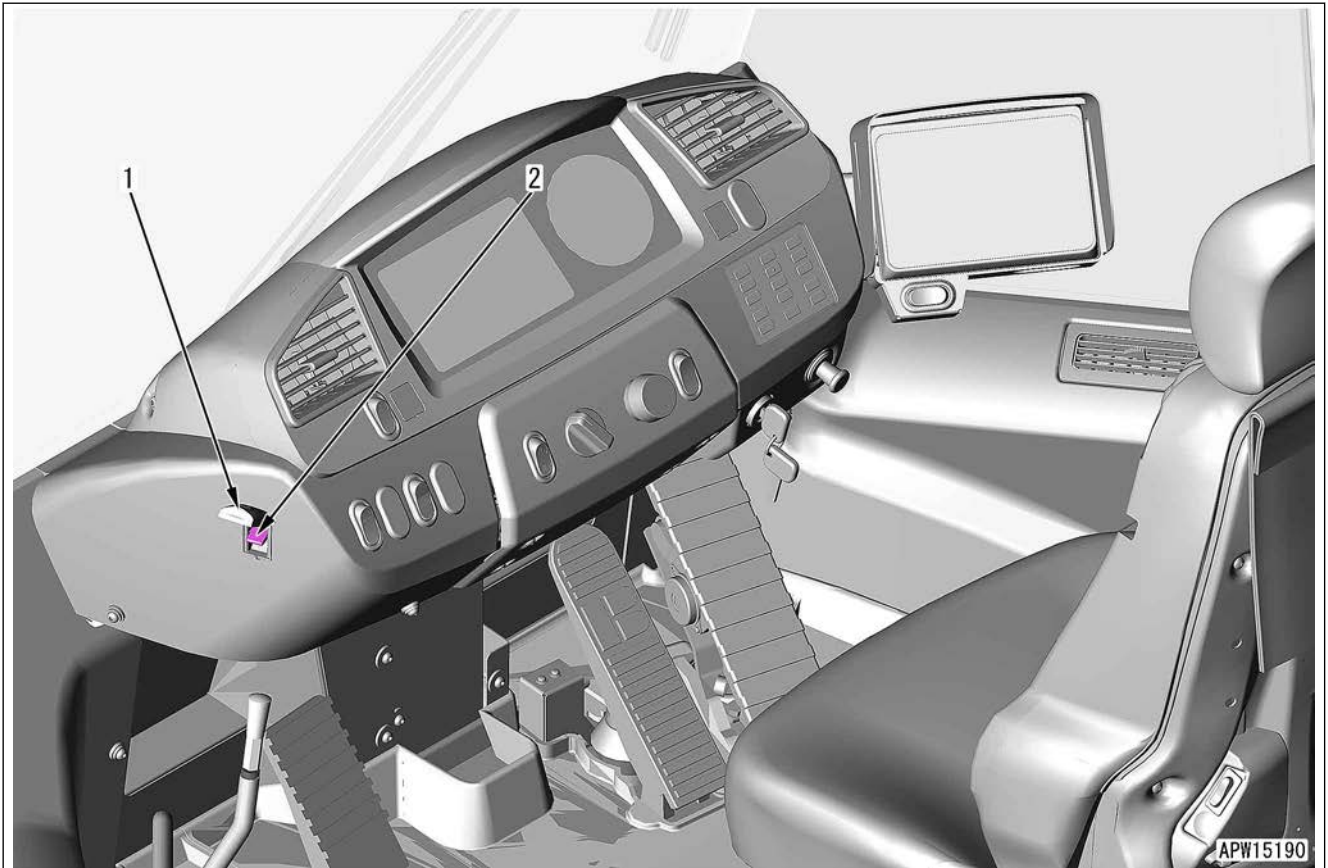
Allowable interference

- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called "allowable interference".
- The allowable interference shows the repair limit of the part of smaller tolerance.

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.

ENGINE SHUTDOWN SECONDARY SWITCH

LAYOUT DRAWING OF ENGINE SHUTDOWN SECONDARY SWITCH



1: Cover

2: Engine shutdown secondary switch

FUNCTION OF ENGINE SHUTDOWN SECONDARY SWITCH

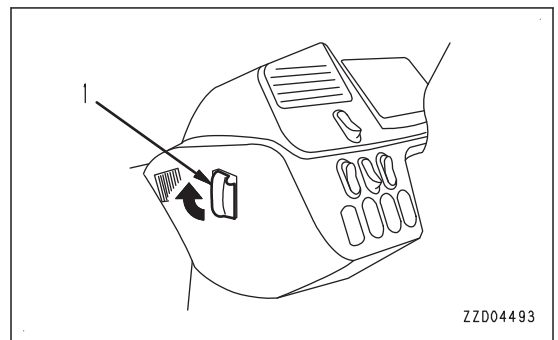
The engine shutdown secondary switch is used to stop the engine when the engine does not stop when the starting switch is turned to "OFF" position.

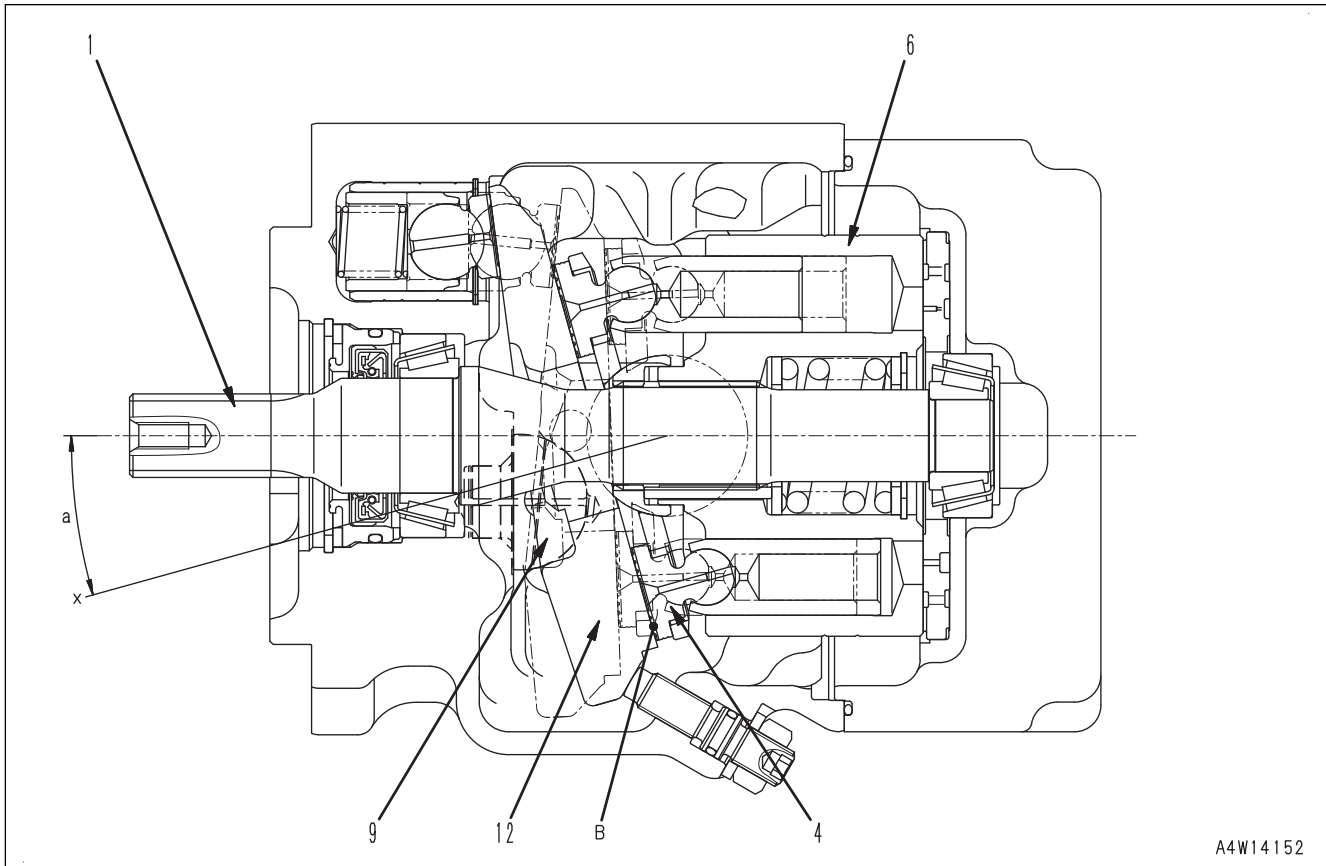
NOTICE

- Do not use this switch except when an abnormality has occurred.
If any abnormality is found, ask your KOMATSU distributor for repair immediately.
- If this switch is set to the position of stopping the engine while the machine is operating normally, "Engine Shutdown Secondary SW in Operation" is displayed on the machine monitor.
If "Engine Shutdown Secondary SW in Operation" is displayed on the machine monitor, check that the switch cover is closed and the switch is in "Normal" position.
If the switch is in "Abnormal" position, return it to "Normal" position.










OPERATION OF ENGINE SHUTDOWN SECONDARY SWITCH

1. Raise the cover (1).



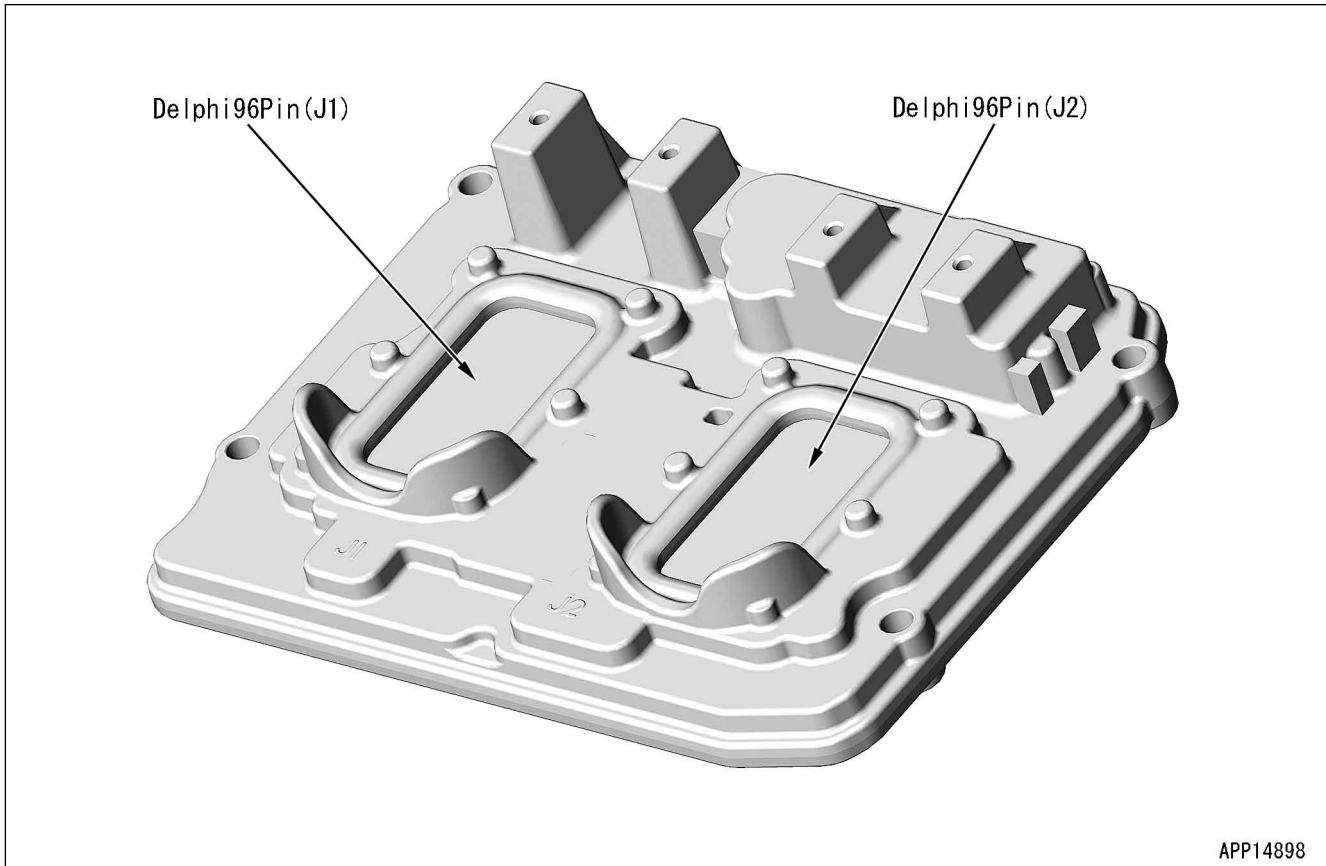
OPERATION OF BRAKE AND COOLING FAN PUMP**Selection of discharged volume (selection of swash plate angle)**

1. Cylinder block (6) rotates together with shaft (1), and shoe (4) slides on plane (B).
2. Rocker cam (12) pivots on ball retainer (9), and accordingly swash plate angle (a) between center line (X) of rocker cam (12) and the axial direction of cylinder block (6) changes.

Symbol	Item to be displayed	Range and method for display	Remarks
 A4W12240	Bucket positioner	Lights up: When the position is set with bucket positioner.	<ul style="list-style-type: none"> This pops up for only 3 seconds when the position is set with the bucket positioner. Displays set angle in range of ± 5 levels.
 9JC01183	Aftertreatment devices regeneration	<p>Lit: Aftertreatment devices regeneration in progress</p> <p>Not lit: Aftertreatment devices regeneration has been completed.</p>	Indicates the regeneration state of aftertreatment devices.
 9JC01184	Aftertreatment devices regeneration disable	<p>Lit: Aftertreatment devices regeneration is disabled</p> <p>Not lit: Aftertreatment devices regeneration disable is canceled</p>	<ul style="list-style-type: none"> Indicates the regeneration state of aftertreatment devices. When manual stationary regeneration is necessary, KDPF soot accumulation caution lamp lights up.
 9JC01439	P mode	Light is lit: When power mode is selected	
 A4H10450	E mode	Light is lit: When economy mode is selected	
 A4H10451	Shift hold	Lit: When shift hold switch is enabled	
 A4H10452	Lockup	Lit: When lockup is in operation	
 A4W12241	Fan rotating in reverse	<p>Lit: Fan is rotating in reverse</p> <p>Not lit: Fan is rotating forward</p>	Displays the operation state of fan.
 9JC01177	Preheating	Lit: Engine preheating is in operation by electrical intake air heater	

STRUCTURE OF ENGINE CONTROLLER -B

General view

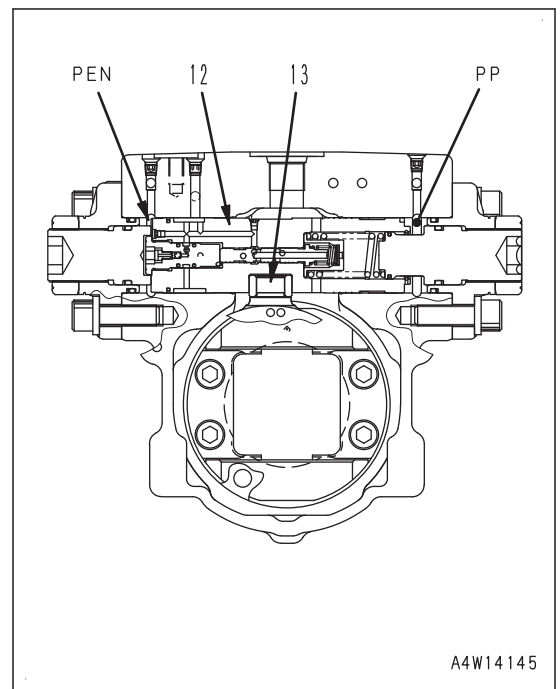
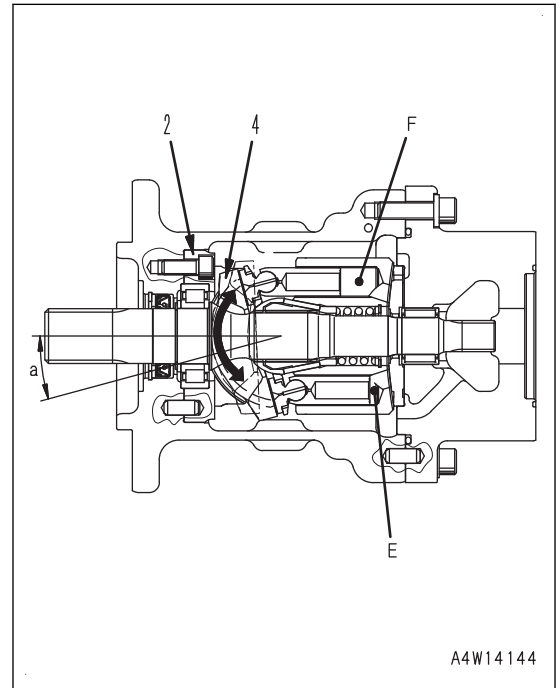


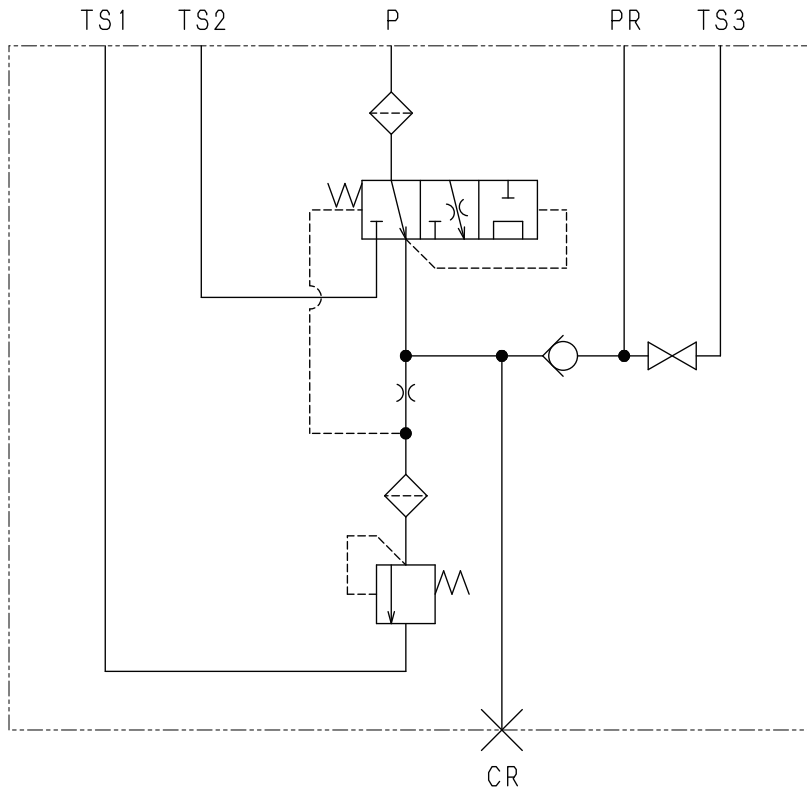
FUNCTION OF ENGINE CONTROLLER -B

- Engine controller (CM2250) is employed, which was developed in cooperation between Komatsu and Cummins.
- The engine controller calculates the input signals from sensors installed to various portions, and outputs them to control the engine properly.
- The engine controller commonly possesses the information of other controllers mounted on the machine through the network (CAN) and controls the engine and machine properly.
- Since the engine controller is mounted on the engine, its field serviceability is improved.
- It is mounted through rubber vibration isolators to reduce the vibration transmitted to it.

Control of the discharged volume

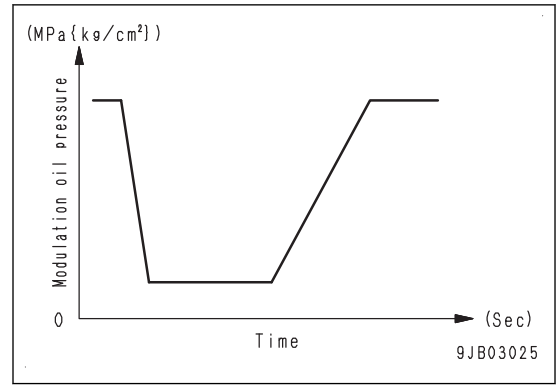
1. The swash plate angle (a) increases, the difference between volumes (E) and (F) increases, and also pump discharged volume (Q) increases.
2. Swash plate angle (a) is changed by servo piston (12).
3. Servo piston (12) moves in a direction of linear reciprocating motion corresponding to the signal pressure from the PC valve and LS valve.
4. Rocker cam (4) supported on the cylindrical surface of cradle (2) slides and pivots on that surface.
5. This linear movement is transmitted to rocker cam (4) through slider (13).
6. The area of servo piston (12) for receiving the pressure are not identical on the right side and left side. Main pump discharged pressure (self-pressure) (PP) is always transmitted to the pressure chamber of the small diameter piston side.
7. Pump pressure (PP) is supplied to port (J) on the small diameter side of the piston.
8. The movement of servo piston (12) is controlled by the relationship of pressure between small diameter piston side (PP) and large diameter side (PEN) and by the ratio of the area receiving the pressure between small diameter piston and large diameter piston.





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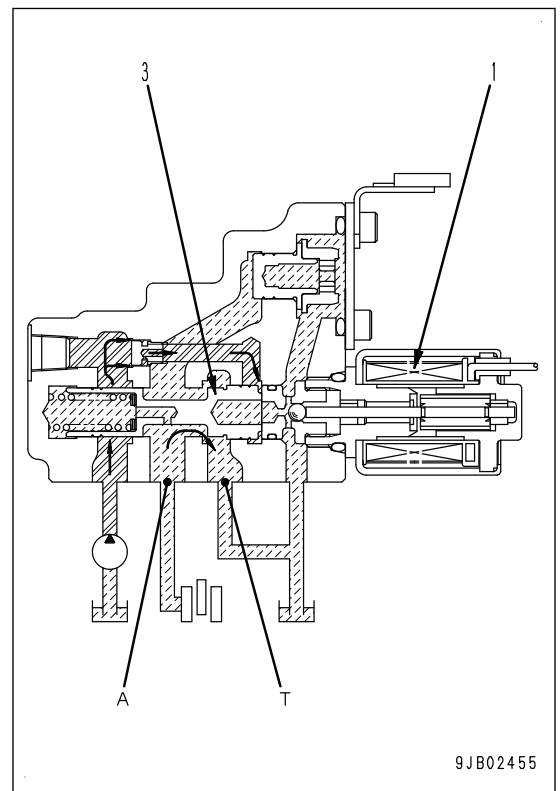
Control of modulation clutch oil pressure

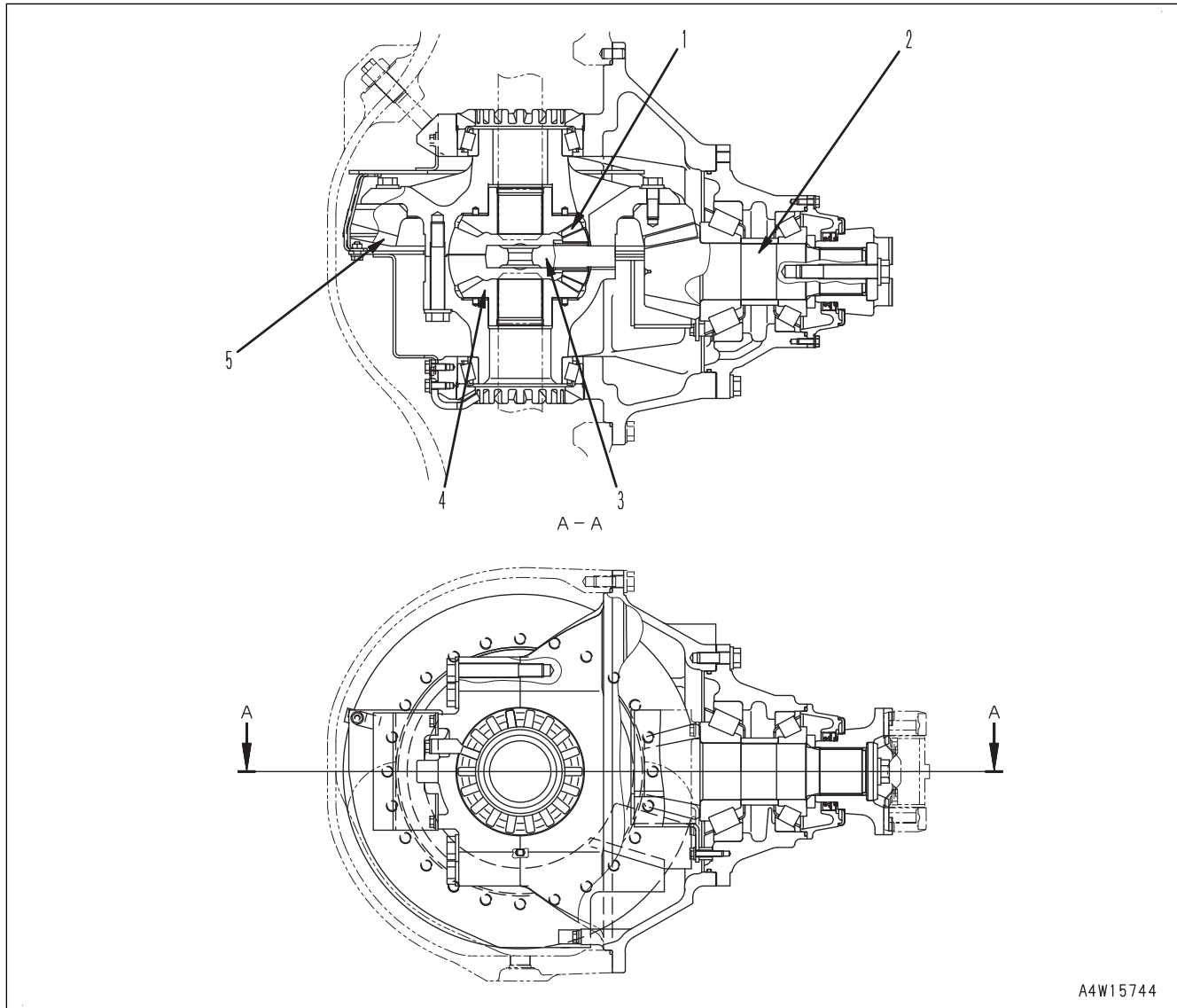


OPERATION OF MODULATION CLUTCH ECMV

Operation when clutch is “disengaged” (released)

While no current is flowing to the proportional solenoid (1), pressure control valve (3) drains the oil from clutch port (A) through drain port (T).



DIFFERENTIAL**STRUCTURE OF FRONT DIFFERENTIAL****General view and sectional view**

1: Pinion gear (number of teeth: 12)

2: Bevel pinion (number of teeth: 9)

3: Shaft

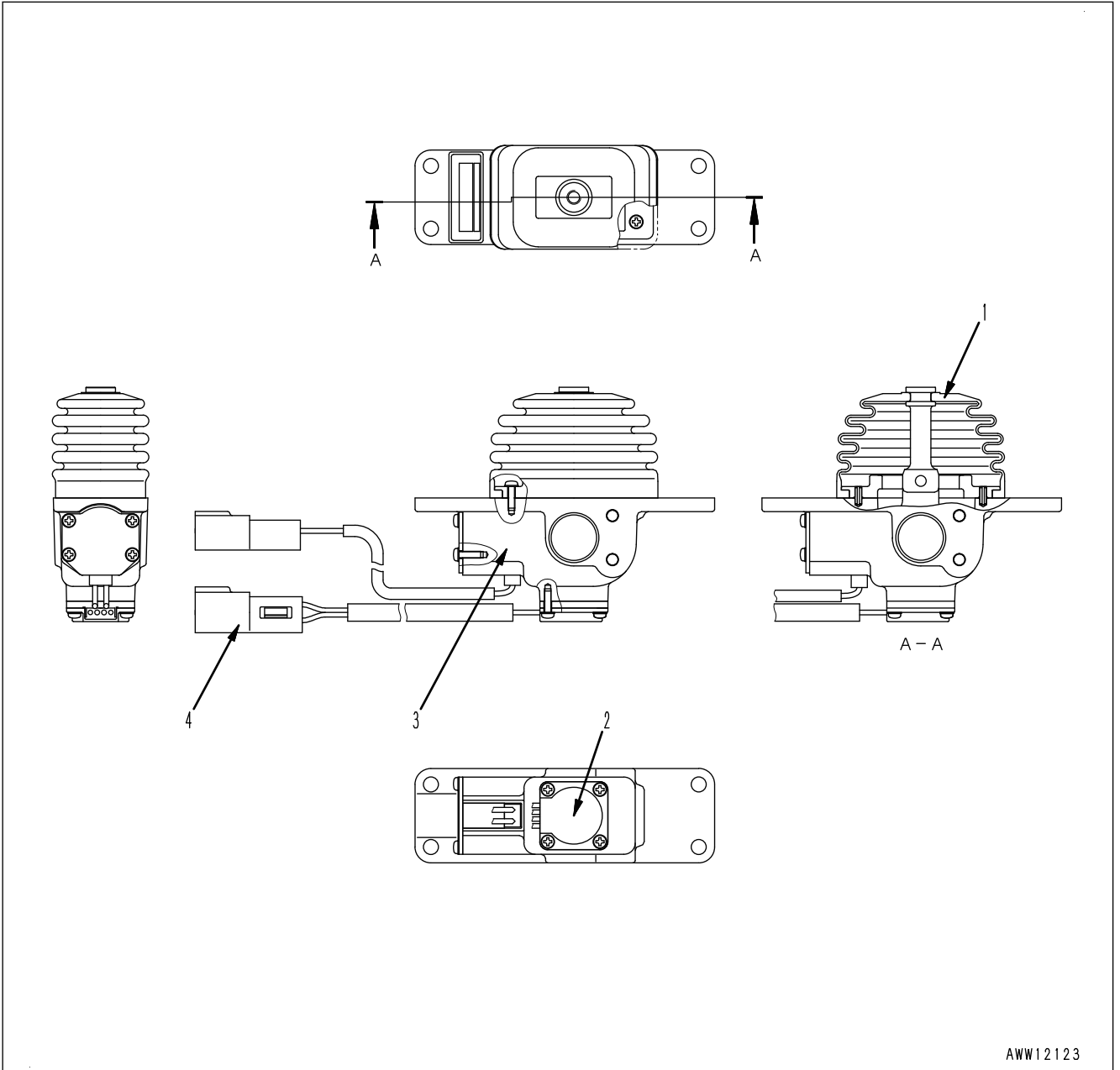
4: Side gear (number of teeth: 24)

5: Bevel gear (number of teeth: 42)

WORK EQUIPMENT ELECTRIC LEVER

STRUCTURE OF WORK EQUIPMENT ELECTRIC LEVER

General view



1: Boot

2: Sensor

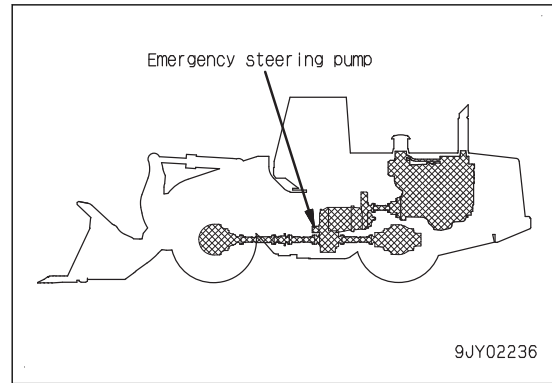
3: Detent solenoid

4: Connector

1. When the pump or engine has trouble while the machine is traveling, the rotation of the wheels drives the secondary steering pump through the transmission.
2. Since the steering pump is not rotating, no pressure of the oil is generated in port (D).
3. Accordingly, spool (3) is pushed to the right by spring (4).
4. The oil from the secondary steering pump flows through port (A) and port (B), and then flows to the rotary valve and the steering valve, which enables steering.

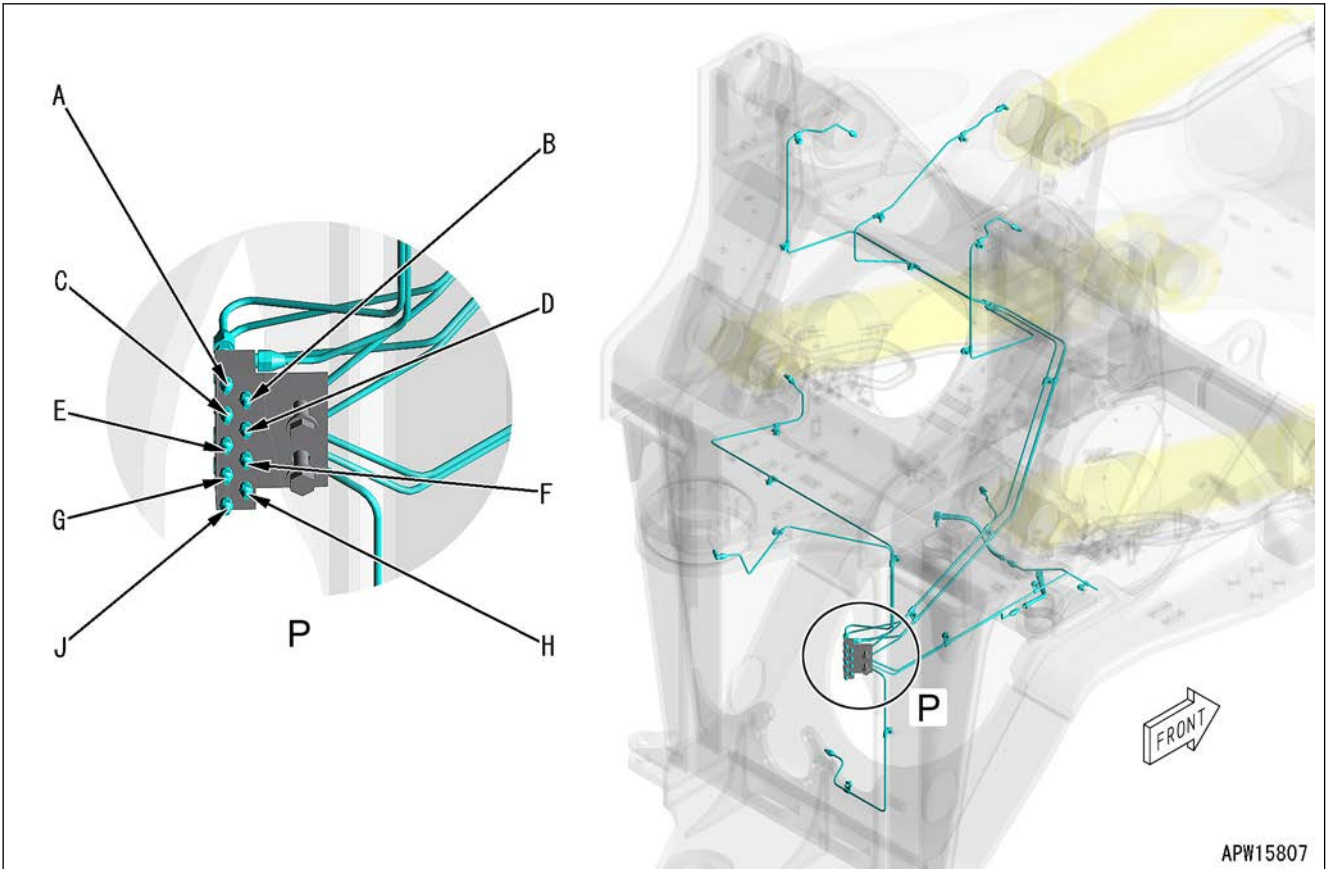
REMARK

The secondary steering pump can rotate in the normal and reverse directions.



STRUCTURE OF WORK EQUIPMENT LUBRICATION

Front side



APW15807

- A: Upper hinge pin
- B: Lift cylinder (L.H.)
- C: Lift cylinder (R.H.)
- D: Boom pin (R.H.)
- E: Bucket cylinder

- F: Boom pin (L.H.)
- G: Steering cylinder (L.H.)
- J: Center support
- H: Steering cylinder (R.H.)

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TEST BLOWBY PRESSURE

Tools for testing blowby pressure

Symbol	Part No.	Part name	Q'ty	Remarks	
A	-	799-201-1506	Blowby checker	1	
	1	799-201-1591	Gauge	1	Pressure range: 0 to 10 kPa
	2	799-201-1511	Tool	1	
	3	799-201-1450	Adapter	1	
	4	07281-00289	Clamp	2	
B	Commercially available	Plug	2	Hose inside diameter: 23 mm	
C	Commercially available	Cap	1	Tube outside diameter: 28.1 mm	

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

⚠ Chock the tires to prevent the machine from moving.

⚠ Immediately after the engine is stopped, its parts and oil are still very hot and may cause burn injury. Wait for the temperature to go down, and then start the work.

Check this item under the following conditions.

- Engine coolant temperature: 60 to 100 °C
- Torque converter oil temperature: 60 to 80 °C
- Aftertreatment devices regeneration is disabled

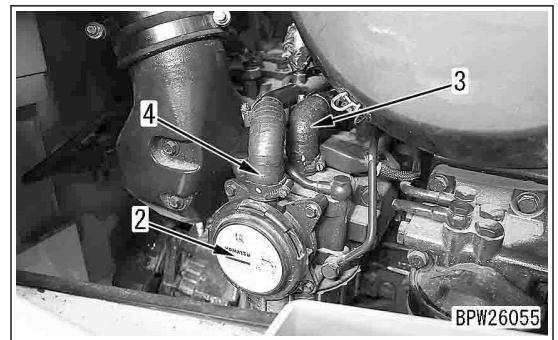
For testing of blowby pressure to perform troubleshooting, Pm Clinic, or periodic maintenance, refer to this section.

METHOD FOR TESTING BLOWBY PRESSURE

1. Open cover (1).



2. Remove the clamps and disconnect KCCV (2) blowby gas inlet side hoses (3) and outlet side hose (4).



- 2) Check the monitoring information of (a) to (d) on "Monitoring" screen.

Details of monitoring information are as follows.

- 1: Being thawed
- 2: Being kept warm
- 3: OFF

- When the status of the monitoring information (a) to (d) is "1" AdBlue/DEF is being thawed because it is still frozen. Keep the engine speed at low idle and wait until the status of the monitoring information becomes "2" or "3", and then proceed to step 3.
- The status of the monitoring information (a) to (b) is "2" or "3": AdBlue/DEF is not frozen. Proceed to step 3.

3. Stop the engine.
4. Turn the starting switch to ON position.

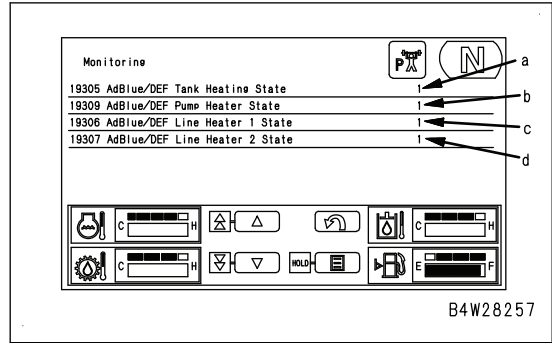
⚠ For the safety reasons, this test cannot be performed while engine is running.

5. Check that AdBlue/DEF level is higher than level (a) of the sight gauge of AdBlue/DEF tank.

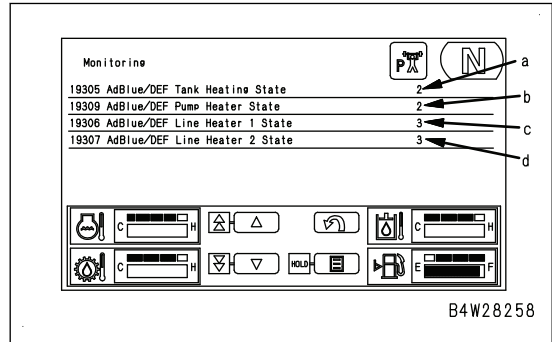
REMARK

When AdBlue/DEF level is below level (a), the AdBlue/DEF level is low. Add AdBlue/DEF.

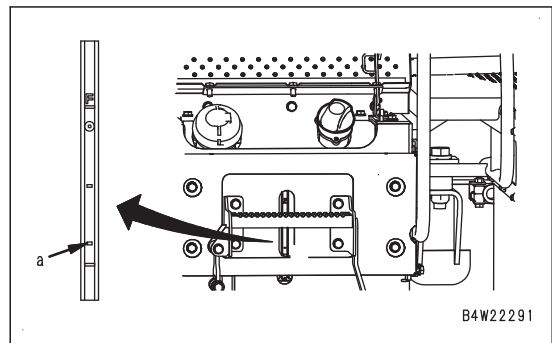
6. See "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)" of "SETTING AND OPERATION OF MACHINE MONITOR", and select "AdBlue/DEF Pump Pressure Up Test".



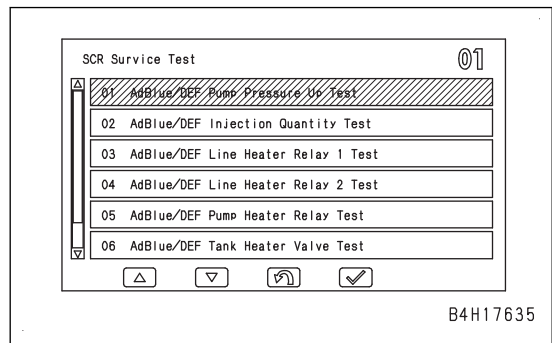
B4W28257



B4W28258



B4W22291



B4H17635

TEST SCR NO_x REMOVAL EFFICIENCY

- ⚠ 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.
- ⚠ Ensure there are no people or combustible materials near the machine (particularly in the direction of the exhaust gas flow).

NOTICE

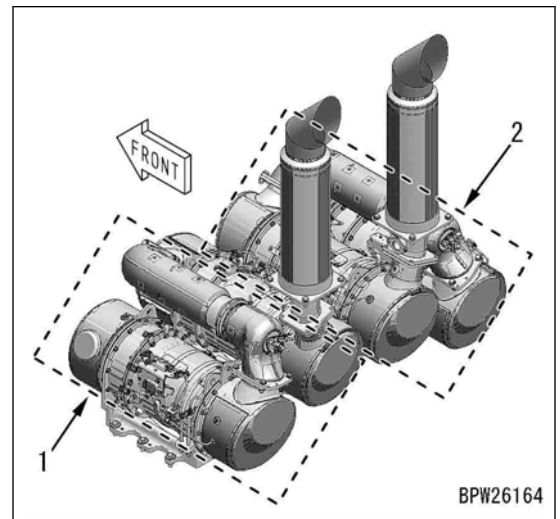
The engine controller cannot detect a KOMNET communication error which does not remain for one second, and the test may continue even when the machine monitor does not continue the test (standard screen). In such a case, turn the starting switch to OFF position to shut down the engine controller, and the system operating lamp goes out, and then the test is reset.

For testing of AdBlue/DEF injection performance and catalyst efficiency to perform troubleshooting or others, refer to this section.

METHOD FOR TESTING DENITRATION EFFICIENCY OF SCR

NOTICE

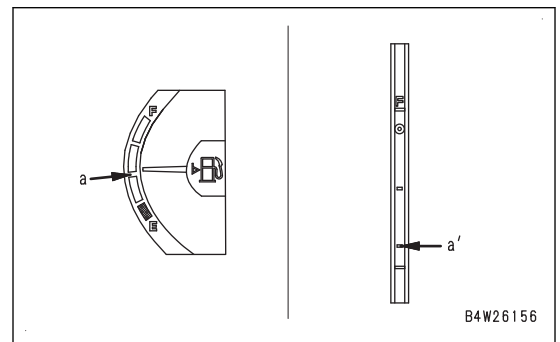
- This machine is equipped with 2 SCR systems. Check the test result of each system by changing the machine monitor screen.
- Check the test result of SCR system-A (1) mounted on the left side of the machine by displaying “SCR Denitration Efficiency Test” screen.
- Check the test result of SCR system-B (2) mounted on the right side of the machine by displaying “SCR Denitration Efficiency Test_2” screen.



1. Check that AdBlue/DEF level is higher than level (a') of the sight gauge of AdBlue/DEF tank.
2. Check that the system operating lamp is not lit, turn the starting switch to ON position, and check fuel gauge for the remaining fuel.

REMARK

- “SCR Denitration Efficiency Test” uses fuel and AdBlue/DEF, and it takes approximately 90 minutes at maximum. Make sure that the remaining amount of these are at least the minimum amount to perform the testing.
- If the fuel and AdBlue/DEF are less than minimum amount shown below, be sure to refill with them.



Gauge	Minimum amount (gauge position)
Fuel gauge	(a) position and above
Sight gauge of AdBlue/DEF tank	(a') position and above

3. Start the engine.

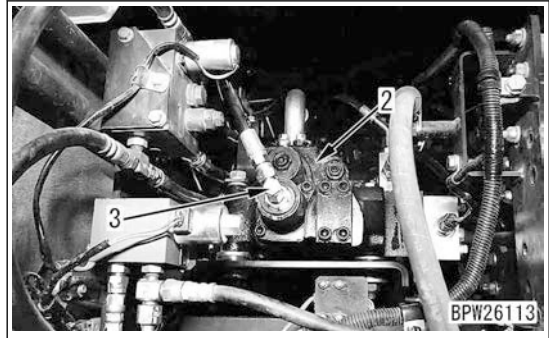
REMARK

Run the engine at low idle without depressing the accelerator pedal.

- Remove inspection plug (3) of steering valve (2).

REMARK

Use inspection plug (3) to test the pilot pressure when the machine is steered to the right. Remove the inspection plug on the opposite side to test the pilot pressure when the machine is steering to the left.

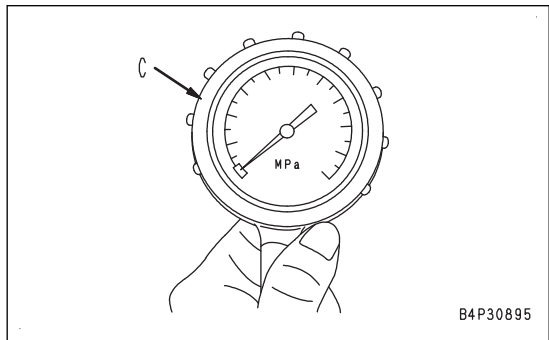
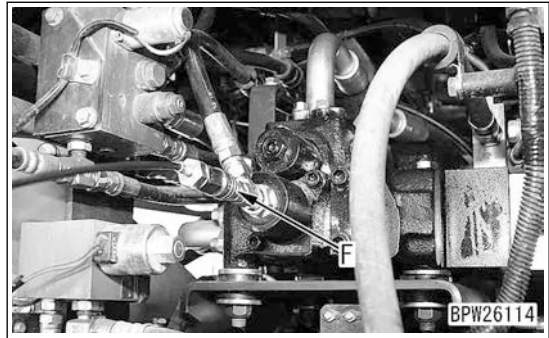


- Install nipple F, and connect gauge C.

REMARK

Gauge in digital hydraulic tester B can also be used in place of gauge C.

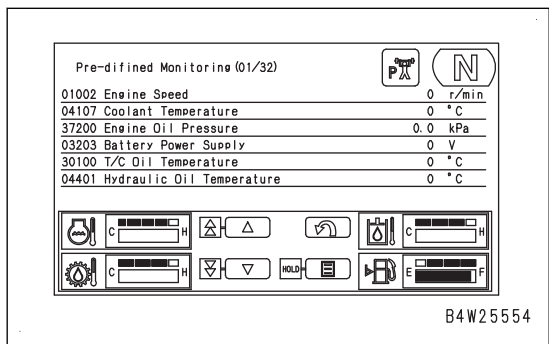
- Start the engine, and set the power mode to P mode.



- Select and display “Pre-defined Monitoring” (01/32). For details, see “SET AND OPERATE MACHINE MONITOR”.
- Keep the hydraulic oil temperature within the range of testing condition.
- Steer the machine to the left or right continuously while depressing the accelerator pedal to the full stroke (high idle) and measure the oil pressure.

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

- When testing at inspection plug (3): Steer the machine to the right continuously.
- When testing at inspection plug on the opposite side: Steer the machine to the left continuously.



After finishing the test, remove the testing tools and restore the machine.

Method for testing outlet pressure of AJSS EPC solenoid valve (AJSS specification)

- Set the frame lock bar to LOCK position.

5. Install nipple D, and connect gauge A1 of hydraulic tester A or differential pressure gauge C.
 - When using differential pressure gauge C, connect the pump discharged pressure (discharged pressure pick-up port (PFC)) to the high-pressure side (rear side), and LS pressure (LS pressure pickup port (PLSFC)) to the low-pressure side (lower side).

REMARK

Differential pressure gauge needs 12 V DC power, connect it to 1 battery.

- When using gauge A1, measure the pressure while replacing the same gauge since the differential pressure goes up to 2.0 MPa at maximum.

REMARK

The gauge in digital hydraulic tester B can also be used in place of gauge A1.

6. Start the engine, and set the power mode to P mode.

7. Select and display “Pre-defined Monitoring” (01/32). For details, see “SET AND OPERATE MACHINE MONITOR”.
8. Keep the hydraulic oil temperature within the range of testing condition.
9. Raise the boom approximately 400 mm.
10. Depress the accelerator pedal to the full stroke (High idle).
11. Measure the pump discharged pressure and LS pressure (actuator load pressure) simultaneously while raising the boom and holding the boom control lever at a half stroke position.

REMARK

Do not operate the lift cylinder to the full stroke.

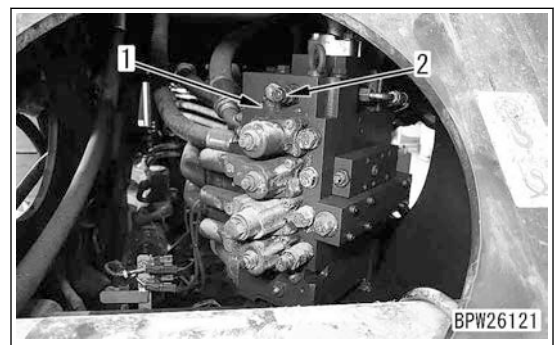
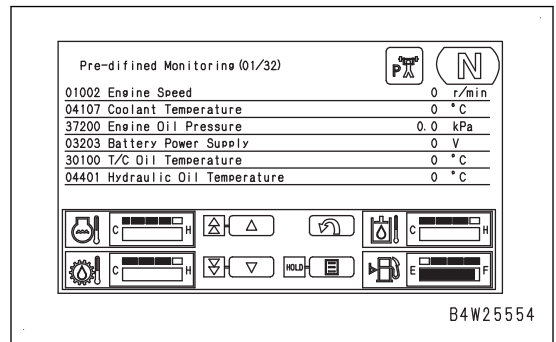
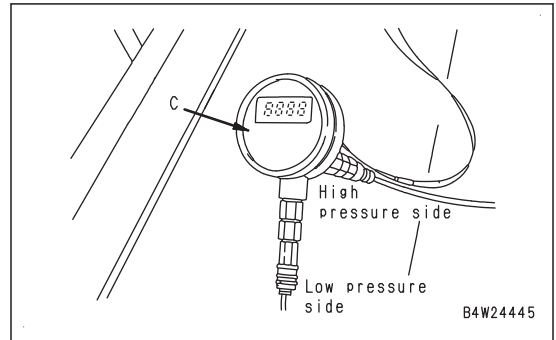
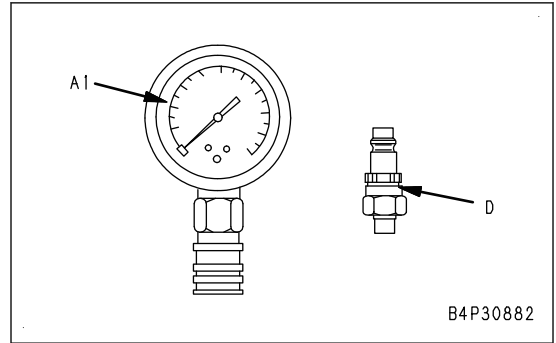
For standard values, see STANDARD VALUE TABLE, “STANDARD VALUE TABLE FOR MACHINE”.

After finishing the test, remove the testing tools and restore the machine.

METHOD FOR ADJUSTING WORK EQUIPMENT OIL PRESSURE

Method for adjusting work equipment relief pressure

1. Release the remaining pressure in the circuit. For details, see “RELEASE REMAINING PRESSURE FROM WORK EQUIPMENT CIRCUIT”.
2. Adjust main relief valve (2) of control valve (1).



User reviews	Setting/adjustment	Reference page
Fine control performance of the boom (RAISE/LOWER) is poor, weak controllability	Change in pattern of the boom lever	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (BOOM LEVER PATTERN CHANGE)
Fine control performance of the bucket (tilt/DUMP) is poor, dump shock is small	Change in pattern of the bucket lever	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (BUCKET LEVER PATTERN CHANGE)
Reaction of the boom (RAISE/LOWER) operation is large, hydraulic cylinder drifts too much	Change in modulation of the boom stop	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (BOOM STOP MODULATION)
Lever shock in switching the AJSS lever is large, follow-up performance of the lever is slow	Change in pattern of AJSS lever	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (CHANGE THE COMMAND TABLE PATTERN OF AJSS OIL PRESSURE)
Displayed travel speed is too high or too low	Tire size compensation	METHOD FOR SETTING WITH DEFAULT SETTING MENU (OPTION SELECTION)
Limit the maximum travel speed	Select the 4th gear prohibition mode	METHOD FOR SETTING WITH DEFAULT SETTING MENU (OPTION SELECTION)
Reduce the fuel consumption when the machine travels at high speed (in FORWARD 4th lockup).	Maximum speed limitation function during lockup	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (SPEED LIMIT)
Change ECSS operating speed	ECSS operating speed setting	METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (ECSS OPERATING SPEED SETTING)
Change the engine mode to power mode while the starting switch is in ON position	Change the priority of the power mode	METHOD FOR SETTING WITH DEFAULT SETTING MENU (OPTION SELECTION)

The unit of display can be either "SI" or "Non-SI". (The display unit can be changed on "Service Menu". Select "Unit Selection" of "Default".)

"mg/st" in the display unit is an abbreviation for milligram/stroke.

- Applicable component
 - ENG: The engine controller detects the monitoring information.
 - KDPF: The engine controller detects the monitoring information via KDPF.
 - SCR: The engine controller detects the monitoring information via SCR.
 - T/M: The transmission controller is in charge of detecting the monitoring information.
 - BBC: The work equipment controller detects monitoring information.
 - MON: The monitor controller detects the monitoring information.
 - KOM PLS: KOMTRAX Plus controller detects the monitoring information.

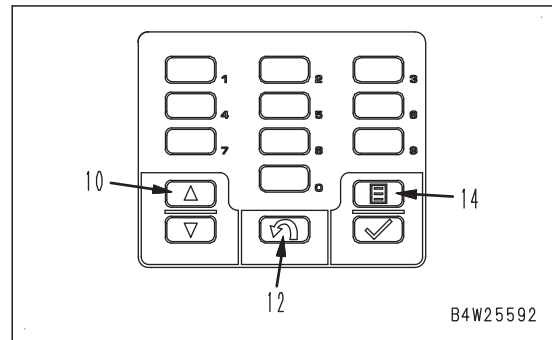
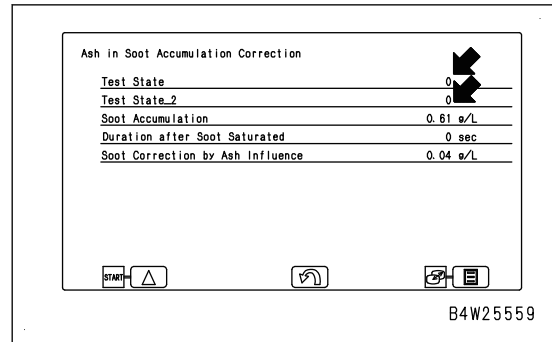
4. Check that the status value “0” of “Test State” and “Test State_2” is flashing.

UP switch (10): Starts correction

RETURN switch (12): Returns the display to “Diagnostic Tests” screen

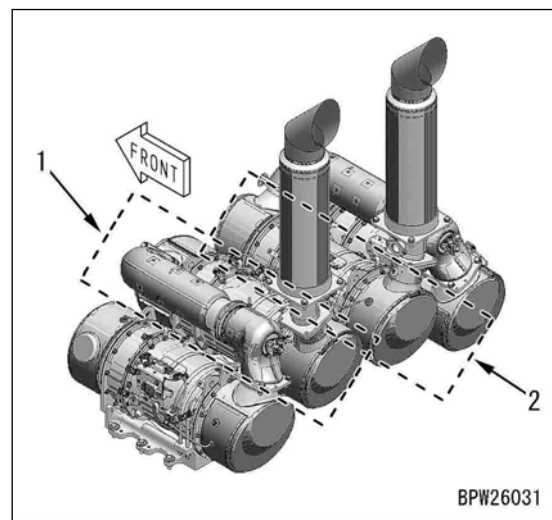
Menu switch (14): Switches to other screen

When “0” is flashing, you can perform the correction.

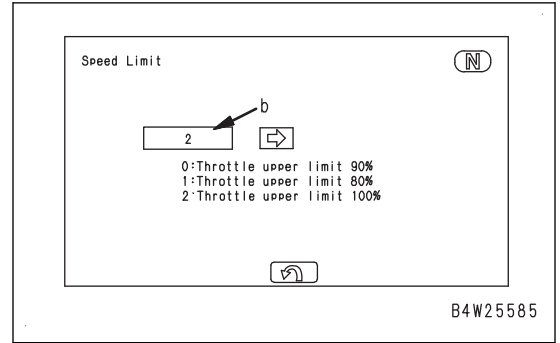


REMARK

- Previous screen shows the condition of the KDPF-A (1) on the left side of the machine.
- The current screen (“_2” is in the name of testing menu) shows the condition of the KDPF-B (2) on the right side of the machine.
- For the display of “Test State”, see the section “TEST SCR RELATED FUNCTIONS”.



If the input value is displayed in portion (b), setting is completed.



METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (ECSS OPERATING SPEED SETTING)

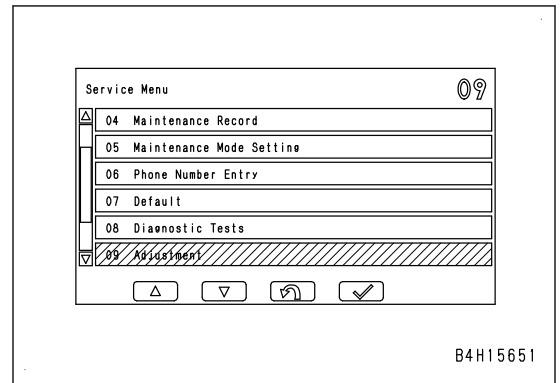
Adjustment menu is used to check the various settings of the machine or to adjust the value.

This function arbitrarily sets the travel speed when ECSS is operated.

REMARK

This item is displayed only when “ECSS” is set to “ADD” in “Option Selection”.

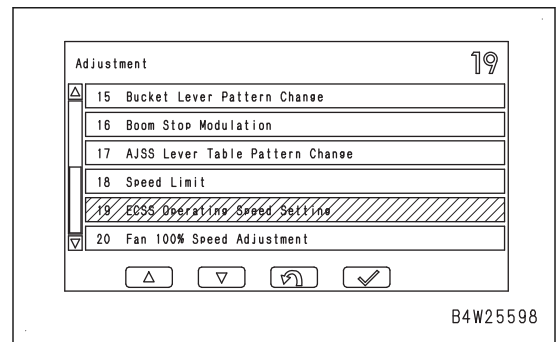
1. From the “Service Menu” screen, select “Adjustment”.



2. When “Adjustment” screen is displayed, use a switch on the switch panel to select “ECSS Operating Speed Setting”.

REMARK

Selecting method is the same as on “Service Menu” screen.

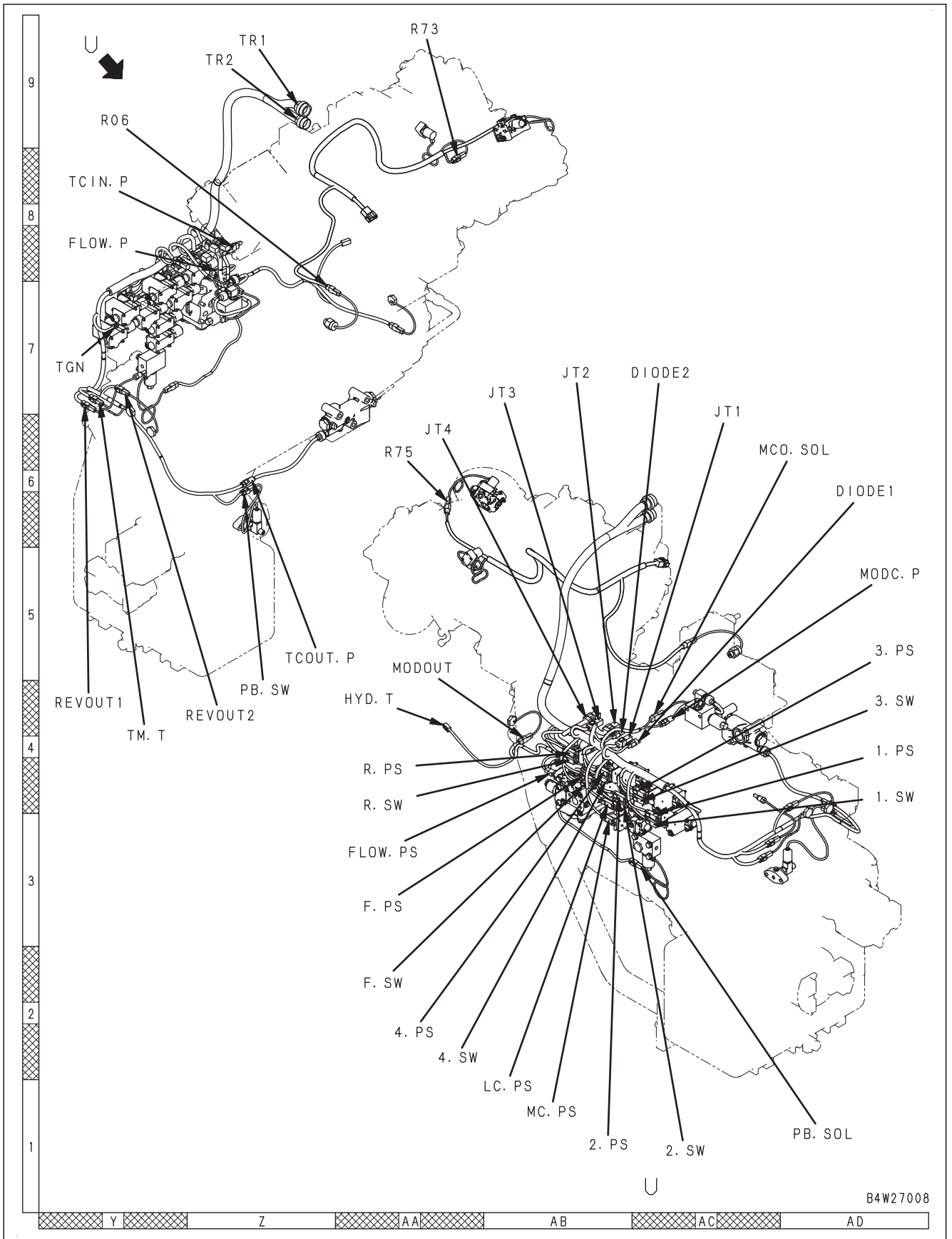


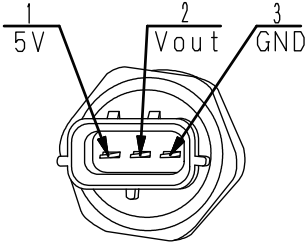
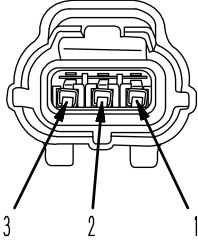
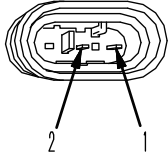
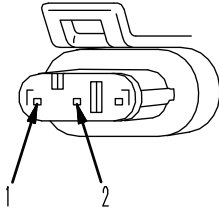
Machine model			WA600-8E0				
Engine			SAA6D170E-7				
Item	Testing conditions	Unit	Standard value for new machine	Repair limit	Measured value	Good	No good
Engine speed at hydraulic stall	<ul style="list-style-type: none"> Engine coolant temperature: 60 to 100 °C Hydraulic oil temperature: 45 to 55 °C Torque converter oil temperature: 60 to 80 °C Power mode: P mode Accelerator pedal: Depress to stroke end (High idle) Operation of work equipment: At bucket TILT relieved 	rpm	1840 to 2040	1740 to 2140			
Engine speed at full stall (torque converter stall+hydraulic stall)	<ul style="list-style-type: none"> Engine coolant temperature: 60 to 100 °C Hydraulic oil temperature: 45 to 55 °C Torque converter oil temperature: 60 to 80 °C Power mode: P mode Operation of work equipment: At bucket TILT relieved 	rpm	1630 to 1830	1430 to 2030			
Engine oil pressure	<ul style="list-style-type: none"> Engine coolant temperature: 60 °C and above Power mode: P mode 	Accelerator pedal: Depress to stroke end (High idle)	Min. 0.34 {Min. 3.47}	Min. 0.21 {Min. 2.14}			
	<ul style="list-style-type: none"> Each control lever: NEUTRAL (N) position Engine oil (*2) EO10W30-LA EO15W40-LA EOS5W30-LA EOS5W40-LA 	Accelerator pedal: Not depressed (Low idle)	MPa {kg/cm ² }	Min. 0.10 {Min. 1.02}	Min. 0.08 {Min. 0.82}		
Blowby pressure	<ul style="list-style-type: none"> Engine coolant temperature: 60 to 100 °C Torque converter oil temperature: 60 to 80 °C Power mode: P mode With torque converter stalled 	kPa {mmH ₂ O}	Max. 3.53 {Max. 360}	Max. 9.41 {Max. 960}			

Transition pattern	Occurrence of failure code (with or without "E")			Determination of the repair completion
	Before repair (under failure)	After repair	Remarks	
Failure A	"E"	No display	The "E" is not displayed after the repair is completed.	To determine if the repair is completed successfully enables to turn the starting switch to ON position.
Failure B	"E"	"E"	The "E" does not go out only by the repair is completed.	It is necessary to perform "Loaded Diagnostics Operation To Clear Failure Code" to determine if the repair is completed successfully.
Failure C	No display	No display	Once the engine controller shuts down, the "E" goes out even if the repair is not completed.	<ul style="list-style-type: none"> See the most recent SMR on Abnormality Record screen and determine if it is to be repaired because only the "E" cannot determine if the failure is cleared. It is necessary to perform "Loaded Diagnostics Operation To Confirm Failure Correction" to determine if the repair is completed successfully.

2. Unless clearing the "E" of failure code, a number of occurrences increase every time when turning the starting switch to ON position.

5/14



AMP connelcor for engine			
No. of pins	Common rail (fuel) pressure sensor (95, 125, 140 engine)		
	Sensor side (plue)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-9420 (T-adapter) (kit:799-601-4101) (kit:799-601-4201)
	—	—	
No. of pins	Turbocharger speed sensor (107, 114 engine)		
	Sensor side (plue)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-4660 (Socket) (kit:799-A65-4600)
	☆ Without pin (3)	☆ Without pin (3)	

B4W21625

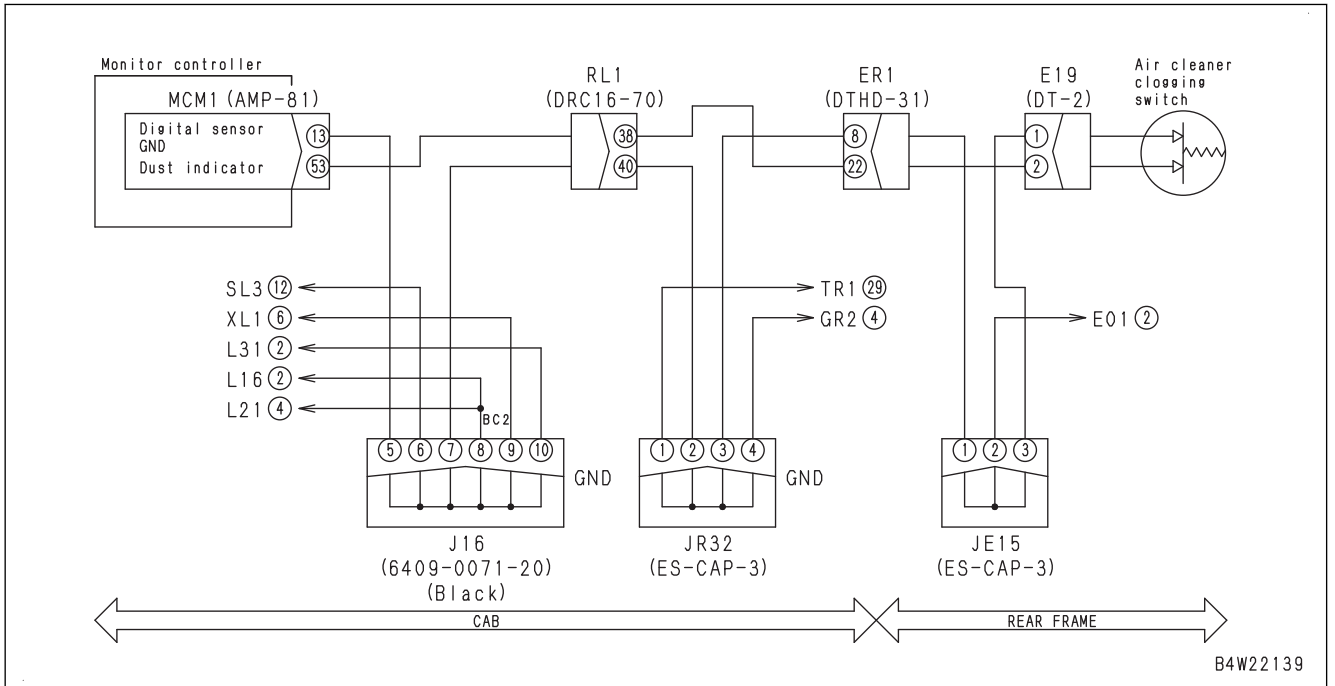
Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
CA3254	KDOC Outlet Temperature High Error 1	ENG	L01	Electrical system	
CA3255	KDPF Temperature Error - Non Regeneration	ENG	L03	Electrical system	
CA3256	KDPF Outlet Temperature High Error 1	ENG	L01	Electrical system	
CA3311	KDOC Outlet Temperature High Error 2	ENG	L03	Electrical system	
CA3312	KDPF Outlet Temperature High Error 2	ENG	L03	Electrical system	
CA3313	KDOC Inlet Temperature Sensor Low Error	ENG	L03	Electrical system	
CA3314	KDOC Inlet Temperature Sensor High Error	ENG	L03	Electrical system	
CA3315	KDOC Inlet Temperature Sensor In Range Error	ENG	L03	Electrical system	
CA3316	KDOC Outlet Temperature Sensor Low Error	ENG	L03	Electrical system	
CA3317	KDOC Outlet Temperature Sensor High Error	ENG	L03	Electrical system	
CA3318	KDOC Outlet Temperature Sensor In Range Error	ENG	L03	Electrical system	
CA3319	KDPF Outlet Temperature Sensor High Error	ENG	L03	Electrical system	
CA3321	KDPF Outlet Temperature Sensor Low Error	ENG	L03	Electrical system	
CA3322	KDPF Outlet Temperature Sensor In Range Error	ENG	L03	Electrical system	
CA3419	MAF Sensor Supply Voltage High Error	ENG	L03	Electrical system	
CA3421	MAF Sensor Supply Voltage Low Error	ENG	L03	Electrical system	
CA3497	AdBlue/DEF Level Low Error 1	ENG	-	Electrical system	
CA3498	AdBlue/DEF Level Low Error 2	ENG	-	Electrical system	
CA3543	AdBlue/DEF Quality Error (SCR Catalyst Efficiency Low)	ENG	L01	Electrical system	
CA3545	SCR Outlet NOx Sensor Unstable Error	ENG	L01	Electrical system	
CA3547	AdBlue/DEF Level Low Error 4	ENG	L04	Electrical system	
CA3558	AdBlue/DEF Pump Voltage High Error	ENG	L01	Electrical system	
CA3559	AdBlue/DEF Pump Voltage Low Error	ENG	L01	Electrical system	

FAILURE CODE [15SGLH]

Action level	Failure code	Failure	ECMV Engage Trouble (3rd clutch) (Transmission controller system)
L01	15SGLH		
Detail of failure	When controller drives 3rd ECMV solenoid, ON signal is not input from 3rd ECMV fill switch.		
Action of controller	<ul style="list-style-type: none"> Judges that 3rd ECMV fill switch signal is OFF. If cause of failure disappears, machine becomes normal by itself. 		
Phenomenon on machine	<ul style="list-style-type: none"> Machine may not travel in 3rd gear speed. Shifting to 3rd gear speed may cause gear shift shock or time lag. 		
Related information	<ul style="list-style-type: none"> This failure code may be displayed immediately after replacement of transmission oil. Output current value to 3rd clutch ECMV solenoid can be checked with monitoring function. (Code: 31604) Input state (ON/OFF) from 3rd fill switch can be checked with monitoring function. (0: OFF, 1: ON) (Code: 02216) First, check for mechanical failures such as problem in 3rd clutch or clogged oil filter of pressure control valve, etc. After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Start the engine, turn manual/auto shift selector switch to "MANUAL", set directional (FNR) lever or R.H. directional selector (FNR) switch to F (forward) or R (reverse) position, and set shift lever to 3rd speed. When controller drives 3rd ECMV solenoid, and if no pressure exists in 3rd clutch, failure code is displayed. (See troubleshooting (H mode) for hydraulic and mechanical system.) 		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective 3rd clutch fill switch (internal open circuit)	<ol style="list-style-type: none"> Start the engine. While depressing brake pedal, move gear shift lever to gear speed F2 (F: 2nd) and check that failure code [15SFLH] is not displayed. Turn the starting switch to OFF position. Replace connectors of 2nd clutch and 3rd clutch. <ul style="list-style-type: none"> 2.PS ↔ 3.PS 2.SW ↔ 3.SW Start the engine. While depressing brake pedal, set the AUTO/MANUAL shift mode selector switch to "MANUAL", and move the shift lever to gear speed F2 (F: 2nd). <ul style="list-style-type: none"> If failure code [15SFLH] is displayed, check clutch oil pressure. If oil pressure is normal, 3rd clutch fill switch is defective. If failure code [15SFLH] is not displayed, wiring harness has open circuit or transmission controller is defective. After finishing test, restore connector.

CIRCUIT DIAGRAM (AIR CLEANER CLOGGING SENSOR)



FAILURE CODE [CA132]

Action level	Failure code	Failure	Throttle Sensor Low Error (Engine controller system)
L03	CA132		
Detail of failure	A low voltage occurs in throttle sensor signal circuit.		
Action of controller	Set throttle position to 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	<p>If failure code [CA2186] is displayed, sensor power supply system may be defective. Perform troubleshooting for it first.</p> <ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. Input voltage from throttle sensor can be checked with monitoring. (Code: 03000) Accelerator pedal position detected by throttle sensor can be checked with monitoring. (Code: 31701) After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

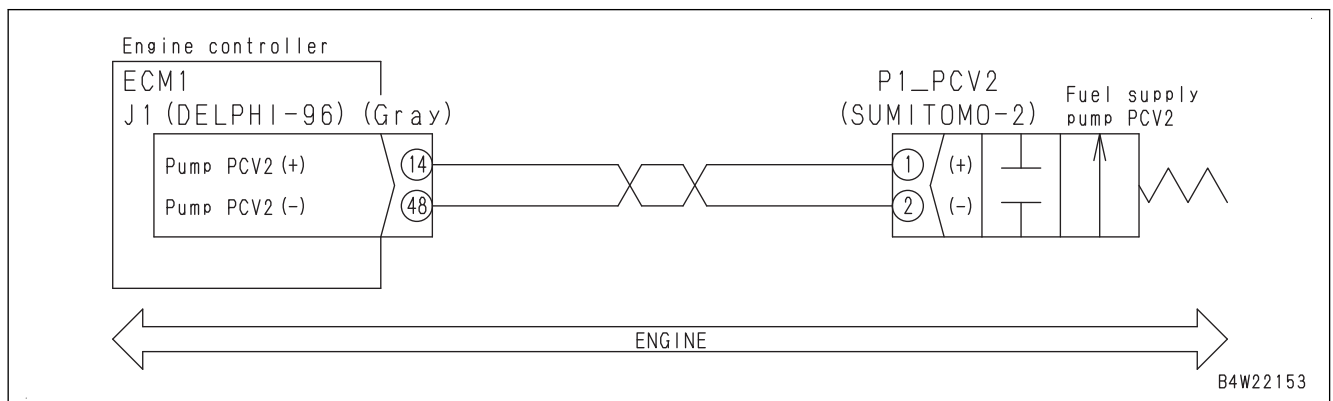
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Open circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. Disconnect the connectors ECM1 J2 and L01, and L02, and connect the T-adaptor to each female side. 		
		Resistance	Between ECM1 J2 (female) (9) and L01 (female) (1)	Max. 1 Ω
			Between ECM1 J2 (female) (33) and L01 (female) (3)	Max. 1 Ω
			Between ECM1 J2 (female) (10) and L01 (female) (2)	Max. 1 Ω
			Between ECM1 J2 (female) (62) and L02 (2)	Max. 1 Ω
Between ECM1 J2 (female) (8) and L02 (1)	Max. 1 Ω			
2	Ground fault in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors ECM1 J2 and L01, and connect the T-adaptor to either female side. 		
		Resistance	Between ground and ECM1 J2 (female) (10) or L01 (female) (2)	Min. 1 MΩ
3	Short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect the connectors ECM1 J2 and L01, and connect the T-adaptor to either female side. 		
		Resistance	Between ECM1 J2 (female) (10) and (33) or between L01 (female) (2) and (3)	Min. 1 MΩ

FAILURE CODE [CA274]

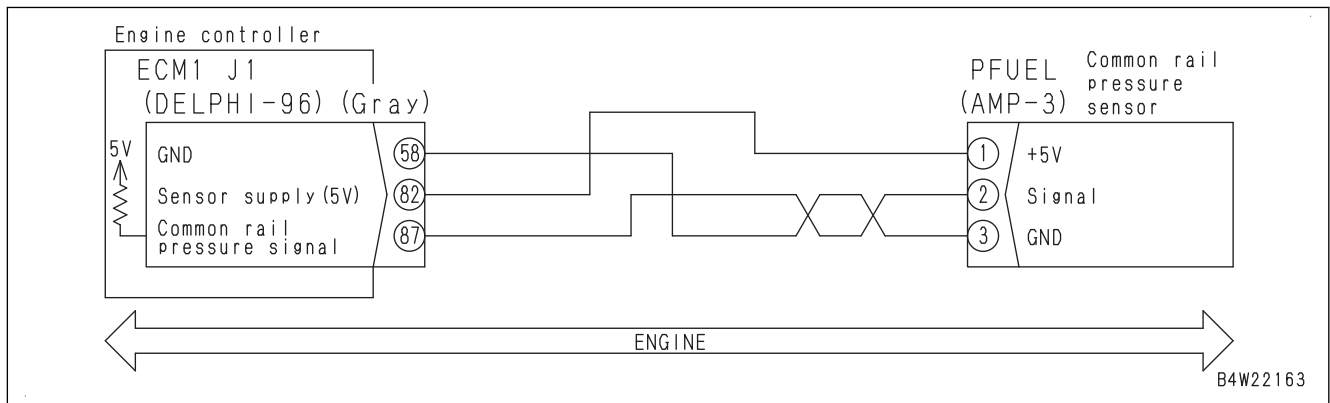
Action level	Failure code	Failure	PCV 2 Open Circuit Error (Engine controller system)
L03	CA274		
Detail of failure	Open circuit is detected in supply pump P1_PCV2 circuit.		
Action of controller	None in particular		
Phenomenon on machine	<ul style="list-style-type: none"> The engine power deration. Engine startability is poor. 		
Related information	<ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. While engine is running normally, approximately 24 V of pulse voltage is supplied to P1_PCV2(1). Because it is pulse voltage, it cannot be measured by using multimeter. Because female connector alone is provided in "Socket" for troubleshooting for this sensor, socket cannot be connected to female connector on wiring harness side of sensor, and check for wire breakage cannot be performed (T-adapter is not provided). After completion of repair, check that 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 supply pump P1_PCV2	1. Turn the starting switch to OFF position. 2. Disconnect connector P1_PCV2, and connect socket to male side.	
		Resistance	Between P1_PCV2 (male) (1) and (2) 2.3 to 5.3 Ω Between ground and P1_PCV2 (male) (1) Min. 1 MΩ
2	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector ECM1 J1, and connect T-adapter to female side.	
		Resistance	Between ECM1 J1 (female) (14) and (48) (P1_PCV2 resistance) 2.3 to 5.3 Ω
3	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.)	

CIRCUIT DIAGRAM (FUEL SUPPLY PUMP PCV2)



Circuit diagram related to common rail pressure sensor



FAILURE CODE [CA1669]

Action level	Failure code	Failure	AdBlue/DEF Level Sensor Voltage High Error (Engine controller system)
L01	CA1669		
Detail of failure	AdBlue/DEF Level Sensor is defective (open circuit of Piezo element for level measurement).		
Action of controller	Activates Inducement strategy (EU specification only).		
Phenomenon on machine	<ul style="list-style-type: none"> Failure to measure AdBlue/DEF level Engine output is reduced based on Inducement strategy (EU specification only). 		
Related information	<ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. AdBlue/DEF level sensor is one of AdBlue/DEF tank sensors which are integrated in one unit with AdBlue/DEF temperature sensor and AdBlue/DEF quality sensor. It communicates with engine controller through CAN communication. When engine controller receives open circuit information of Piezo element for level measurement, this failure code is displayed. After completion of repair, check that 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 AdBlue/DEF tank sensor	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Check the sensor connector for stain or damage. Replace AdBlue/DEF tank sensor. Turn the starting switch to ON position.
		If this failure code is cleared, the original AdBlue/DEF tank sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
2	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.)

Related information	<p>⚠ KDPF is heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> • If failure code [CA1695] or [CA1696] is also displayed, sensor power supply system may be defective. Perform troubleshooting for it first. • Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. • KDPF differential pressure sensor and KDPF outlet pressure sensor are provided as a unit. • Signal voltage from KDPF differential pressure sensor can be checked with monitoring. (Code: 47101) • Differential pressure detected by KDPF differential pressure sensor can be checked with monitoring. (Code: 47100) • Temperature detected by KDOC inlet temperature sensor can be checked with monitoring. (Code: 47300) • Temperature detected by KDOC outlet temperature sensor can be checked with monitoring. (Code: 47400) • Temperature detected by KDPF outlet temperature sensor can be checked with monitoring. (Code: 47200) • Temperature detected by torque converter oil temperature sensor can be checked with monitoring. (Code: 30100) • Use “short socket adapter: 799T-601-4611”. • For details of access to KDPF differential pressure sensor, wiring harness and tube, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL KDPF ASSEMBLY” and “DISASSEMBLE AND ASSEMBLE OF KDPF ASSEMBLY”. • After turning starting switch to OFF position, engine controller performs AdBlue/DEF purge (for Max. 6 minutes) and then stops engine. To restart engine, wait until system operating lamp goes out after turning starting switch to OFF position, and then turn the starting switch to ON position. <p>NOTICE</p> <ul style="list-style-type: none"> • This failure code requires machine operation for clearing the failure code. After investigating the cause of the problem and completing the repair, perform “operation for clearing the failure code” to make sure the failure code is cleared. (This failure code is not cleared by only turning the starting switch to ON position.) • Stage IV (until 2018) can clear this trouble code, see TESTING AND ADJUSTING, “SETTING AND OPERATION OF MACHINE MONITOR”, “SERVICE MODE”, “METHOD FOR OPERATING TESTING MENU (ENGINE CONTROLLER ACTIVE FAULT CLEAR)”. • Stage V (after 2019) can not clear failure codes by “Engine Controller Active Fault Clear”. to clear code of the occurred failure, see “TROUBLESHOOTING POINTS FOR UREA SCR SYSTEM”, “Clearing Failure Code”.
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No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDPF differential pressure sensor tube	<ol style="list-style-type: none"> 1. Remove KDPF differential pressure sensor tube. 2. Clean and unclog KDPF differential pressure sensor tube. 3. Check KDPF differential pressure sensor tube for cracks and damage. 4. Install KDPF differential pressure sensor tube with both tube ends connected securely. 5. Implement “Loaded diagnostics operation to confirm failure correction”.

No.	Cause	Procedure, measuring location, criteria and remarks			
8	Defective supply pump P1_PCV2	1. Turn the starting switch to OFF position. 2. Disconnect connector P1_PCV2, and connect socket to male side.			
		Resistance	Between P1_PCV2 (male) (1) and (2)	2.3 to 5.3 Ω	
			Between ground and P1_PCV2 (male) (1)	Min. 1 MΩ	
9	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM1 J1 and P1_PCV2, and connect T-adapter to each female side.			
		Resistance	Between ground and ECM1 J1 (female) (14)	Min. 1 MΩ	
			Between ground and ECM1 J1 (female) (48)	Min. 1 MΩ	
10	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector ECM1 J1. 3. Turn the starting switch to ON position.			
		Voltage	Between ground and ECM1 J1 (48)	Max. 1 V	
11	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector ECM1 J1, and connect T-adapter to female side.			
		Resistance	Between ECM1 J1 (female) (14) and (48) (P1_PCV2 resistance)	2.3 to 5.3 Ω	
12	Defective common rail pressure sensor	Check for a damage of the wiring harness since the common rail pressure sensor may be defective.			
13	Defective pressure limiter	For details of testing pressure limiter leakage amount, see TESTING AND ADJUSTING, "TEST FUEL RETURN RATE AND LEAKAGE".			
		Pressure limiter leakage amount (rated operation or equivalent (stall load))	Max. 10 cc/min		
14	Defective injector	For check of limit return rate (spill) from injector, see TESTING AND ADJUSTING, "TEST FUEL RETURN RATE AND LEAKAGE".			
		Limit return rate (spill) from injector	Speed at operation equivalent to rating (stall load)	1600 rpm	960 cc/min
				1700 rpm	1020 cc/min
				1800 rpm	1080 cc/min
				1900 rpm	1140 cc/min
				2000 rpm	1200 cc/min
15	Defective supply pump	For testing of either supply pump A or supply pump B is defective, see TESTING AND ADJUSTING, "TEST SUPPLY PUMP".			

Test method of low-pressure circuit devices

<Using method of check sheet>

Perform the above troubleshooting and record its details in the attached "Check sheet for low rail pressure error".

Note 1: Investigate low-pressure fuel circuit parts for following items.

- Remaining quantity of fuel
- Clogging of fuel tank breather
- Sticking, wear, or clogged filter of feed pump
- Leakage from or clogging of low-pressure fuel piping
- Malfunction of bypass valve, installation of wrong parts (See figure below)

FAILURE CODE [CA2733]

Action level	Failure code	Failure	Fuel Doser Solenoid 2 Low Error (Engine controller system)
L03	CA2733		
Detail of failure	Low voltage error is detected in circuit of fuel doser solenoid valve 2 (drain valve).		
Action of controller	Stops regeneration control.		
Phenomenon on machine	<ul style="list-style-type: none"> Automatic regeneration is not performed. Manual stationary regeneration is disabled. 		
Related information	<p>⚠ Exhaust connector and KDPF are heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. Failure code [CA2732] is displayed if the connector AFT1_SOV2 is disconnected. After repair the abnormality, turn the starting switch to OFF position and turn it to ON position, and drive fuel doser solenoid valve 2 again, and then this failure code is cleared. After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective dosing fuel solenoid valve 2	1. Turn the starting switch to OFF position. 2. Disconnect connector AFT1_SOV2, and connect T-adapter to male side. 3. Turn the starting switch to ON position.		
		Resistance	Between AFT1_SOV2 (male) (2) and (1)	4 to 6 Ω
			Between ground and AFT1_SOV2 (male) (1)	Min. 1 MΩ
2	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM1 J1 and AFT1_SOV2, and connect T-adapter to either female side.		
		Resistance	Between ground and ECM1 J1 (female) (6) or AFT1_SOV2 (female) (1)	Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM1 J1 and AFT1_SOV2, and connect T-adapter to female side of ECM1 J1.		
		Continuity	Between ECM1 J1 (female) (6) and each pin other than pin (6)	No continuity
4	Defective engine controller	1. Start the engine, and run it at low idle, and leave it for approximately 1 minute. 2. If other failure codes are displayed, perform troubleshooting for them.		
		If this failure code is still displayed and no failure is found by preceding checks, engine controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)		

No.	Cause	Procedure, measuring location, criteria and remarks
3	Damaged AdBlue/DEF hose, AdBlue/DEF leakage at connection	<p>If crystallized AdBlue/DEF is adhered to the surrounding of AdBlue/DEF hose (including AdBlue/DEF tank, AdBlue/DEF pump, or engine compartment), AdBlue/DEF may be leaking. Perform "AdBlue/DEF Pump Pressure Up Test" to identify the location from which AdBlue/DEF leaks. For details, see TESTING AND ADJUSTING, "SETTING AND OPERATION OF MACHINE MONITOR", "SERVICE MODE", "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)".</p> <p>Replace the parts related to the leakage locations as required.</p>
4	Incorrect AdBlue/DEF quality	<ol style="list-style-type: none"> 1. Check the mounting of the AdBlue/DEF quality sensor is secured and the wiring harness connections are not loosen. 2. Turn the starting switch to ON position. 3. Check if failure code [CA3866] or [CA3867] is displayed. 4. Read 19100 "AdBlue/DEF Concentration" on the display, and confirm that the concentration is appropriate (Normal value: 29 to 36 %). 5. If failure code [CA3866] or [CA3867] is displayed and 19100 "AdBlue/DEF Concentration" reading is inappropriate, drain the AdBlue /DEF tank, clean the tank, and refill with genuine AdBlue/DEF. 6. Perform "Operation for clearing the failure code" to check if this failure code is redisplayed. 7. If 19205 "SCR NH3 Concentration Corrected" shows an normal value (5 to 100 ppm) and the failure code is cleared, the repair is completed. 8. If the ammonia concentration indicates an abnormal value or this failure code is redisplayed, proceed to the next step.
5	Defective urea SCR system	<ol style="list-style-type: none"> 1. Perform "SCR Denitration Efficiency Test". For details, see TESTING AND ADJUSTING, "SETTING AND OPERATION OF MACHINE MONITOR", "SERVICE MODE", "METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)". 2. If "SCR Denitration Efficiency Test" does not exit correctly as a result of "SCR Denitration Efficiency Test", proceed to "Defective AdBlue/DEF injector". 3. If any failure code of [CA1694], [CA3751], and [CA3755] appears as a result of "SCR Denitration Efficiency Test", perform the troubleshooting for the related code at first. 4. After the failure code in the above step 3 is cleared, perform "Loaded Diagnostics Operation To Clear Failure Code" to check if this failure code is redisplayed. 5. If the 19205 "SCR NH3 Concentration Corrected" reading is normal (5 to 100 ppm) and the failure code does not recur, the repair is completed. 6. If the ammonia concentration indicates an abnormal value or this failure code is redisplayed, proceed to "Abnormal intake system". 7. Also if "SCR Denitration Efficiency Test" correctly exits and any failure code of [CA1694], [CA3751], and [CA3755] does not appear, proceed to "Abnormal intake system".

No.	Cause	Procedure, measuring location, criteria and remarks
2	Defective injector	As a result of the check in the cylinder cut-out mode, a cylinder running at the unchanged speed is found. (For details, see TESTING AND ADJUSTING, "HANDLE CYLINDER CUT-OUT MODE OPERATION".)
3	Oil leakage into turbo-charger exhaust connector	<ol style="list-style-type: none"> 1. Remove the turbocharger exhaust connector. 2. Check if oil or fuel is not attached to inside of the turbocharger exhaust connector. <p>NOTICE</p> <ul style="list-style-type: none"> • If it is attached, visually check the EGR valve and turbocharger for oil leakage. Repair them if an abnormality is found. • Remove oil or fuel from the piping thoroughly.
4	Oil leakage into exhaust connector or duct to KDPF	<p>Check the exhaust system between the turbocharger and KDPF for entry of oil or fuel.</p> <ul style="list-style-type: none"> • If oil or fuel is attached, remove it thoroughly. • If a mark of oil or fuel flowing into KDPF is found, check KDPF, and then clean or replace it if required.
5	Defective KDOC (stain, crack, damage)	<ol style="list-style-type: none"> 1. Remove KDPF. 2. Remove KDOC. 3. Blow air from KDOC outlet, and remove stains on ceramic surface inside KDOC. 4. Check if ceramic inside KDOC is cracked. 5. If KDOC is cracked, KDOC is defective (replace KDOC). 6. Perform KDPF Memory Reset after installation or replacement of KDOC and KDPF. For details, see TESTING AND ADJUSTING, "SET AND OPERATE MACHINE MONITOR", "SERVICE MODE", "METHOD FOR OPERATING TESTING MENU (KDPF MEMORY RESET)". <p>REMARK</p> <p>If KDPF Memory Reset is performed, failure codes [CA1691] and [CA2637] do not appear. At this point, a corrective action which is effective when the failure code is displayed and is taken for dosing fuel which is not injected is reset.</p>

No.	Cause	Procedure, measuring location, criteria and remarks
6	Defective AdBlue/DEF injector	<ol style="list-style-type: none"> 1. Perform "AdBlue/DEF Injection Quantity Test" to judge the injector. For details, see "TESTING AND ADJUSTING", "SET AND OPERATE MACHINE MONITOR", "SERVICE MODE, METHOD FOR OPERATING TESTING MENU (SCR SERVICE TEST)". 2. From the test results, confirm that AdBlue/DEF injection quantity is within the values specified in TESTING AND ADJUSTING. 3. If AdBlue/DEF injection quantity is out of the range specified in TESTING AND ADJUSTING, replace AdBlue/DEF injector. 4. If AdBlue/DEF injector has been replaced, perform AdBlue/DEF Injection Quantity Test again. After confirming that AdBlue/DEF injection amount is within the range specified in TESTING AND ADJUSTING, proceed to the next cause. (This is because the restoration may have been inhibited by urea deposits accumulated in AdBlue/DEF mixing tube if AdBlue/DEF injector was faulty.) 5. Proceed to the next troubleshooting, even if AdBlue/DEF injector injection amount test results were normal.
7	Irremovable amount of urea deposit accumulated due to thermal load in AdBlue/DEF mixing tube	<ol style="list-style-type: none"> 1. Check from AdBlue/DEF injector mounting part if urea deposits are accumulated in AdBlue/DEF mixing tube. 2. If deposits are accumulated, remove AdBlue/DEF mixing tube to remove deposits and clean the tube. 3. Check if urea deposits are accumulated in SCR inlet case. If the deposits are accumulated, perform the following checks.
8	Accumulated urea deposit in SCR assembly	<ol style="list-style-type: none"> 1. If urea deposit is accumulated inside the SCR inlet case, remove the urea deposit as much as possible. 2. Repair AdBlue/DEF mixing tube back to normal.
9	Abnormal intake system	<ol style="list-style-type: none"> 1. Check for a defective air intake pipe and repair or replace any damaged or defective rectifier, if any. 2. Replace mass air flow (MAF) sensor. 3. Perform "Operation for clearing the failure code" to check if this failure code is redisplayed. <p>REMARK Offset/drift due to the deteriorated and aged MAF sensor, distorted intake system, damaged rectifier</p>
10	Defective ammonia sensor	<p>If no failure is found by above checks, the ammonia sensor may be defective. (Offset/drift due to the deteriorated and aged ammonia sensor)</p> <ol style="list-style-type: none"> 1. Replace the ammonia sensor. 2. Perform "Loaded Diagnostics Operation To Clear Failure Code" to check if this failure code is displayed. 3. If the 19205 "SCR NH3 Concentration Corrected" reading is normal (5 to 100 ppm) and the failure code does not recur, the repair is completed. 4. If the ammonia concentration indicates an abnormal value or this failure code is redisplayed, proceed to the next step.
11	Defective engine controller	<p>If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</p>

Loaded Diagnostics Operation To Confirm Failure Correction

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

(Check that failure code [CA3582] or this failure code is cleared surely after this procedure.)

FAILURE CODE [CA3583]

Action level	Failure code	Failure	SCR Outlet NOx Sensor Heater Warming up Error (Engine controller system)
L01	CA3583		
Detail of failure	Heater part of SCR outlet NOx sensor is defective (not heated or cannot keep temperature).		
Action of controller	<ul style="list-style-type: none"> Operates the engine at default NOx value (0 ppm). Activates Inducement strategy (EU specification). 		
Phenomenon on machine	<ul style="list-style-type: none"> AdBlue/DEF injection becomes inappropriate and the NOx emission may increase, or ammonia may be discharged. Engine output is reduced based on Inducement strategy (EU specification). 		
Related information	<p>⚠ KDPF, sensor installation piping, and sensor probe are heated to 500 °C and above. Be careful not to get burn injury.</p> <p>⚠ SCR assembly, sensor installation piping, and sensor probe are heated to 400 °C and above. Be careful not to get burn injury.</p> <p>⚠ As for the sensor probe, be careful not to get burn injury even if the surroundings is not hot, because sensor itself is heated.</p> <ul style="list-style-type: none"> If failure code [CA2771] is displayed, CAN communication system may be defective. Perform troubleshooting for it first. If failure code [CA1776] or [CA1777] is displayed, sensor power supply system may be defective. Perform troubleshooting for these first. If failure code [CA1887] or [CA3681] or [CA3717] is displayed, SCR outlet NOx sensor system may be defective. Perform troubleshooting for these first. SCR outlet NOx sensor operates when 19302 "SCR Outlet Temperature" is 150 °C and above (19210 "SCR Outlet NOx Sensor State" is "1"). SCR outlet NOx sensor is smart sensor which communicates with engine controller with other sensors through CAN communication. SCR outlet NOx sensor does not operate when 19302 "SCR outlet temperature" is 150 °C and below, and correct value is not displayed (the sensor does not operate by simply turning the starting switch to ON position even when it is normal). On "Pre-defined Monitoring" screen, items "SCR catalyst related (1)" and "SCR sensor related (1)" are used. (The numbers below denote monitoring codes). SCR catalyst related (1) <ul style="list-style-type: none"> 01002 Engine Speed 18600 Inject Fueling Command 19200 Exhaust Gas Flow Rate 47300 KDOC 1 Inlet Temperature 19300 SCR Temperature 19302 SCR Outlet Temperature SCR sensor related (1) <ul style="list-style-type: none"> 19120 AdBlue/DEF Injection Quantity 19205 SCR NH3 Concentration Corrected 19202 Turbo Outlet NOx Sensor State Corrected 19209 SCR Outlet NOx Corrected 19203 Turbo Outlet NOx Sensor State 19210 SCR Outlet NOx Sensor State <p>NOTICE</p> <p>For this failure code, after investigating the cause of the problem and completing the repair, perform "Loaded Diagnostics Operation To Confirm Failure Correction" to make sure the failure code is cleared. (This failure code is not cleared by simply turning the starting switch to ON position.)</p>		

FAILURE CODE [CA3868]

Action level	Failure code	Failure	AdBlue/DEF Tank Sensor Datalink Timeout Error (Engine controller system)
L01	CA3868		
Detail of failure	The engine controller does not receive AdBlue/DEF tank sensor data due to a communication error with the AdBlue/DEF tank sensor.		
Action of controller	Activates Inducement strategy.		
Phenomenon on machine	<ul style="list-style-type: none"> • AdBlue/DEF level, quality, and temperature cannot be measured. • AdBlue/DEF injection becomes inappropriate and the NOx emission may increase, or ammonia may be discharged. • Engine output is reduced based on Inducement strategy. 		
Related information	<ul style="list-style-type: none"> • If failure code[CA1776] or [CA1777] is displayed, smart sensor power supply relay system is defective. Perform troubleshooting for it first. • Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. • AdBlue/DEF tank sensor is smart sensor which communicates with engine controller with other sensors through CAN communication. • This failure code is displayed if the sensor controller connector or a smart sensor (power supply) relay connector is disconnected. • Failure codes of CAN communication related to sensor of engine are [CA2771], [CA3232], [CA3868], [CA3911], [CA4151], and [CA4152]. When all of these failure codes are displayed, smart sensor power supply relay is defective or relay system is defective, or ground fault, short circuit or hot short circuit in wiring harness (CAN communication circuit) is suspected. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter. • AdBlue/DEF tank sensor consists of AdBlue/DEF level sensor, AdBlue/DEF temperature sensor, and AdBlue/DEF quality sensor. The controller of integrated sensor communicates with the engine controller through CAN communication. • After completion of repair, check that 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 smart sensor power supply relay system	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn battery disconnect switch to OFF position 3. Disconnect relay connector SSR, and connect T-adaptor to female side. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. 		
		Voltage	Between SSR (female) (5) and (4)	Min. 22 V

FAILURE CODE [CA4161]

Action level	Failure code	Failure	KDOC and KDPF Temperature Sensor ECU Voltage High Error (Engine controller system)
L03	CA4161		
Detail of failure	High voltage error is detected in power supply of KDPF temperature sensor controller.		
Action of controller	<ul style="list-style-type: none"> Operates the engine with KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature as a fixed value (250 °C). Derates engine power for operation. Stops AdBlue/DEF injection. Closes EGR valve. Stops regeneration control. Stops fuel dosing. Activates Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> NOx emission increases because AdBlue/DEF injection is disabled. Control of active regeneration is defective. Soot accumulation is high. All temperature of KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature cannot be detected. Engine output is reduced based on Inducement strategy. 		
Related information	<p>⚠ KDPF and KDOC are heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. The KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. For KDPF temperature sensor replacement, see DISASSEMBLY AND ASSEMBLY, “DISASSEMBLE AND ASSEMBLE OF KDPF ASSEMBLY” After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared. (This deration is not canceled by simply failure code being cleared.) 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Abnormal sensor relay input voltage	1. Turn the starting switch to OFF position.	
		2. Check that system operating lamp is not lit, and then turn battery disconnect switch to OFF position.	
		3. Disconnect relay connector SSR, and connect T-adaptor to female side.	
		4. Turn the battery disconnect switch to ON position.	
		5. Turn the starting switch to ON position.	
	Voltage	Between SSR (female) (1) and (4)	22 to 30 V
		Between SSR (female) (2) and (4)	22 to 30 V
		Between SSR (female) (3) and (4)	22 to 30 V

FAILURE CODE [CA4259]

Action level	Failure code	Failure	KDOC and KDPF Temperature Sensor Power Interrupt Error (Engine controller system)
L03	CA4259		
Detail of failure	KDPF temperature sensor interrupt power failure error (12 open circuits are detected in the power supply line in 60 seconds.)		
Action of controller	<p>Normal control</p> <ul style="list-style-type: none"> • Default value of the KDOC inlet temperature, KDOC outlet temperature, and the KDPF outlet temperature (250 °C). • Engine power deration • AdBlue/DEF injection stops • EGR valve closed. • Regeneration control stops. • Fuel dosing stops. • Advances to Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> • KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature detection error. • Defective regeneration control. • NOx emission increases because AdBlue/DEF injection is disabled. • KDPF accumulated soot level is high. • Engine output is reduced based on inducement strategy. 		
Related information	<ul style="list-style-type: none"> • Mostly, momentary power failure is caused by defective contact and visually check a torn harness coating and check for defective contact at the connector. • To detect an incomplete wire breakage, sway the wiring harness as much as possible at the resistance measurement to check if the resistance can change or not. • The KDPF temperature sensor consists of the KDOC inlet temperature sensor, the KDOC outlet temperature sensor, and the KDPF outlet temperature sensor and is integrated into one sensor controller which provides CAN communication with the engine controller. • Note that sensor power supply relay connector is energized even if starting switch is turned to OFF position. • For replacement of the KDPF temperature sensor, see Disassembly and assembly, "Disassembly and assembly of KDPF assembly". • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine and travel (vibrate the machine). • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note that the engine power deration is not canceled only by the failure code is cleared). 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Open circuit in wiring harness (sensor power supply relay system circuit)	1. Turn the starting switch to OFF position.	
		2. Check that system operating lamp is not lit, and then turn battery disconnect switch to OFF position.	
		3. Disconnect connectors ECM1 J1 and SSR, and connect T-adaptor to each female side.	
	Resistance	Between ECM1 J1 (female) (9) and SSR (female) (5)	Max. 1 Ω
		Between ground and SSR (female) (4)	Max. 1 Ω

FAILURE CODE [CA5181]

Action level	Failure code	Failure	Engine Room Temperature Sensor Low Error (Engine controller system)
L01	CA5181		
Detail of failure	Low voltage error occurs in signal circuit of engine room temperature sensor.		
Action of controller	Operates the engine with engine room temperature at default value (25 °C).		
Phenomenon on machine	<ul style="list-style-type: none"> AdBlue/DEF line stops thawing NOx emission may increase in low ambient temperature because AdBlue/DEF line thawing is disabled. 		
Related information	<ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in "Electrical equipment" in "CHECKS BEFORE TROUBLESHOOTING" of "RELATED INFORMATION ON TROUBLESHOOTING", and check it. After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. 		

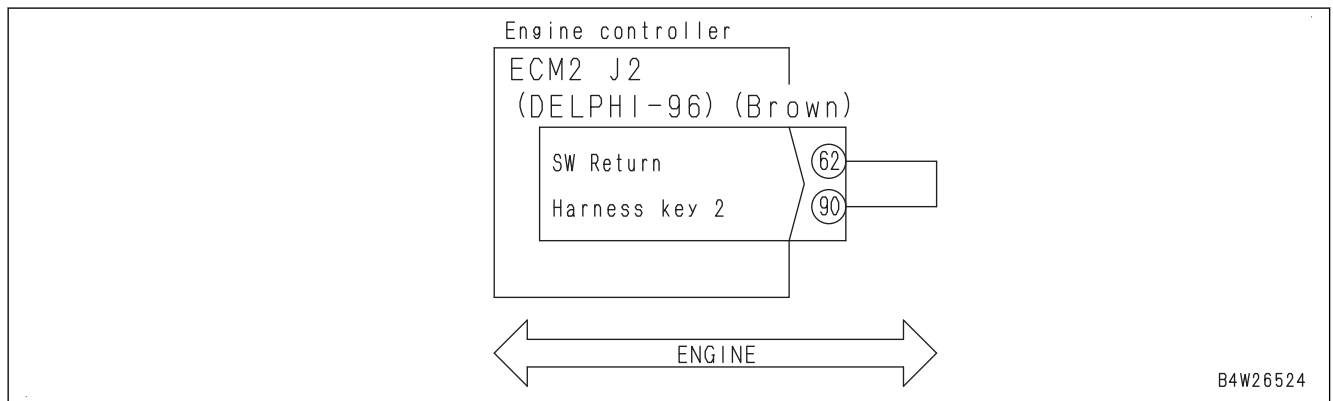
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective engine room temperature sensor	1. Turn the starting switch to OFF position. 2. Disconnect connector EGRJ, and connect socket to male side. REMARK Regard the engine room temperature sensor as normal if its resistance is 280 Ω to 382 kΩ.			
		Resistance	Between EGRJ (male) (A) and (B)	-40 °C	291 to 382 kΩ
				-20 °C	85 to 109 kΩ
				0 °C	29 to 36 kΩ
				30 °C	7.3 to 8.8 kΩ
				60 °C	2.3 to 2.7 kΩ
				90 °C	860 to 970 Ω
				130 °C	280 to 320 Ω
	Between ground and EGRJ (male) (B)	General	Min. 1 MΩ		
2	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM1 J2 and EGRJ, and connect T-adaptor to female side of ECM1 J2.			
		Resistance	Between ground and ECM1 J2 (female) (56)	Min. 1 MΩ	

FAILURE CODE [CB1257]

Action level	Failure code	Failure	Multi-controller ID Harness Key Error_2 (Engine controller system)
L03	CB1257		
Detail of failure	Inconsistency between controller and ID harness		
Action of controller	Stop the work.		
Phenomenon on machine	When key is in ON position: Engine cannot be started.		
Related information	<ul style="list-style-type: none"> After completion of repair, check that 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	Open circuit in wiring harness	1. Turn the starting switch to OFF position.		
		2. Disconnect connector ECM2 J2, and connect T-adapter to female side.		
		Resistance	Between ECM2 J2 (female) (62) and (90)	Max. 1 Ω
2	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.)		

CIRCUIT DIAGRAM RELATED TO ENGINE STARTING CIRCUIT



B4W26524

FAILURE CODE [CB1924]

Action level	Failure code	Failure	Fuel Doser Solenoid 1 Low Error_2 (Engine controller system)
L03	CB1924		
Detail of failure	Low voltage error is detected in circuit of fuel doser solenoid valve 1 (shut off valve).		
Action of controller	Stops regeneration control.		
Phenomenon on machine	<ul style="list-style-type: none"> Automatic regeneration is not performed. Manual stationary regeneration is disabled. 		
Related information	<p>⚠ Exhaust connector and KDPF are heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. If sensor connector AFT2_SOV1 is disconnected, failure code [CB1923] is displayed. After repair the abnormality, turn the starting switch to OFF position and turn it to ON position, and drive fuel doser solenoid valve 1 again, and then this failure code is cleared. After completion of repair, check that the failure code is cleared by the following procedure. <p>Procedure: Start the engine.</p>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective dosing fuel solenoid valve 1	1. Turn the starting switch to OFF position. 2. Disconnect connector AFT2_SOV1, and connect T-adaptor to male side.		
		Resistance	Between AFT2_SOV1 (male) (1) and (2)	4 to 6 Ω
			Between AFT2_SOV1 (1) and ground	Min. 1 MΩ
2	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J1 and AFT2_SOV1, and connect T-adaptor to each female side.		
		Resistance	Between ECM2 J1 (female) (8) and AFT2_SOV1 (female) (1)	Max. 1 Ω
			Between ECM2 J1 (female) (30) and AFT2_SOV1 (female) (2)	Max. 1 Ω
3	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J1 and AFT2_SOV1, and connect T-adaptor to either female side.		
		Resistance	Between ground and ECM2 J1 (female) (9) or AFT2_SOV1 (female) (1)	Min. 1 MΩ
4	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J1 and AFT2_SOV1, and connect T-adaptor to female side of ECM2 J1.		
		Continuity	Between ECM2 J1 (female) (8) and each pin other than pin (8)	No continuity
5	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.)		

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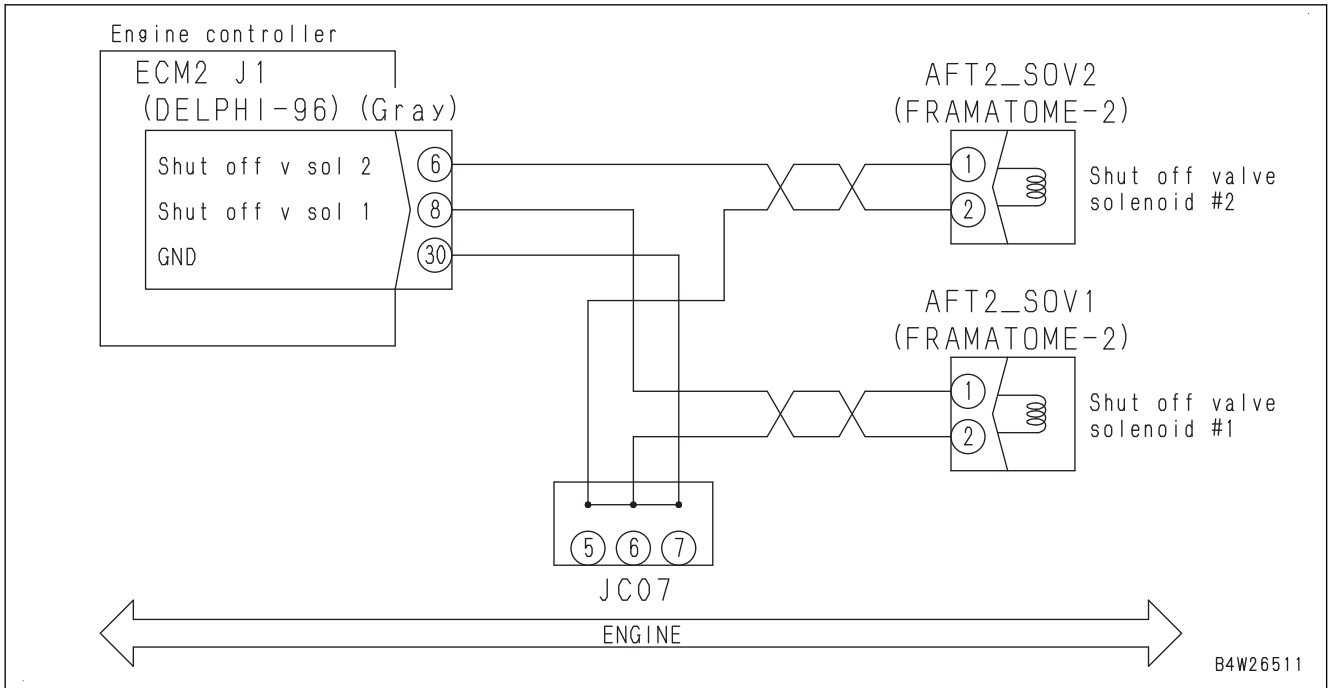
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AFT2_SOV1: Dosing fuel solenoid valve 1-B (shut-off valve) connector

AFT2_SOV2: Dosing fuel solenoid valve 2-B (drain valve) connector

Circuit diagram related to dosing fuel solenoid valve



FAILURE CODE [CB3235]

Action level	Failure code	Failure	SCR Outlet Temperature High Error - Non Regeneration_2 (Engine controller system)
L03	CB3235		
Detail of failure	SCR outlet temperature remains at high level when active regeneration is not performed.		
Action of controller	<ul style="list-style-type: none"> Stops AdBlue/DEF injection. Activates Inducement strategy. 		
Phenomenon on machine	<ul style="list-style-type: none"> AdBlue/DEF injection is stopped and NOx emission increases. Engine output is reduced based on Inducement strategy. 		
Related information	<p>⚠ KDPF, KDOC, and SCR are heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> If failure code [CB3142] or [CB3143] is displayed, SCR temperature sensor may be defective. Perform troubleshooting for [CB3142] or [CB3143] first. If failure code [CB3251] or [CB3253] or [CB3254] or [CB3311] or [CB3255] or [CB3256] or [CB3312] is displayed, KDPF system may be defective. Perform troubleshooting for [CB3251] or [CB3253] or [CB3254] or [CB3311] or [CB3255] or [CB3256] or [CB3312] first. If failure code [CA4277] is displayed or failure code [CA4277] is logged in the abnormality record, AdBlue/DEF quality sensor liquid distinction impossible error is suspected. Perform troubleshooting for it. SCR temperature sensor and SCR outlet temperature sensor are integrated into one sensor, and controller of integrated sensor communicates with the engine controller through CAN communication. After turning starting switch to OFF position, engine controller performs AdBlue/DEF purge (for 6 minutes in maximum) and then stops engine. To restart engine, wait until system operating lamp goes out after turning starting switch to OFF position, and then turn the starting switch to ON position. On “Pre-defined Monitoring” screen, items “SCR catalyst related (2)” and “AdBlue/DEF tank sensor related” are used. (The numbers below denote monitoring codes). SCR catalyst related (2) <ul style="list-style-type: none"> 01002 Engine Speed 18600 Inject Fueling Command 19218 Exhaust Gas Flow Rate_2 47302 KDOC 1 Inlet Temperature_2 19310 SCR Temperature_2 19312 SCR Outlet Temperature_2 AdBlue/DEF tank sensor related <ul style="list-style-type: none"> 19100 AdBlue/DEF Concentration 19110 AdBlue/DEF Level 19111 AdBlue/DEF Level Corrected 19115 AdBlue/DEF Temperature in Tank 19400 Ambient Temperature 19305 AdBlue/DEF Tank Heating State <p>NOTICE</p> <p>This failure code requires “Loaded Diagnostics Operation To Confirm Failure Correction”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure the failure code is cleared. (Even if this failure code is not displayed with starting switch in ON position, completion of repair cannot be determined unless exhaust temperature becomes high.)</p>		

Related information	<p>⚠ KDPF and KDOC are heated to 500 °C and above. Be careful not to get burn injury.</p> <ul style="list-style-type: none"> • If failure code [CB1925] or [CB1963] is displayed, fuel doser solenoid valve 1 may be defective. Perform troubleshooting for [CB1925] or [CB1963] first. • If failure code [CB3316] or [CB3317] is displayed, KDOC outlet temperature sensor may be defective. Perform troubleshooting for [CB3316] or [CB3317] first. • Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. • The KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor are integrated into one KDPF temperature sensor controller which provides CAN communication with the engine controller. • Temperature detected by KDOC inlet temperature sensor can be checked with monitoring. (Code: 47302) • Temperature detected by KDOC outlet temperature sensor can be checked with monitoring. (Code: 47402) • Temperature detected by KDPF outlet temperature sensor can be checked with monitoring. (Code: 47202) • As to procedure for accessing KDPF temperature sensor, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL KDPF ASSEMBLY” and “DISASSEMBLE AND ASSEMBLE OF KDPF ASSEMBLY”. • After turning starting switch to OFF position, engine controller performs AdBlue/DEF purge (for 6 minutes in maximum) and then stops engine. To restart engine, wait until system operating lamp goes out after turning starting switch to OFF position, and then turn the starting switch to ON position. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared. (This deration is not canceled by simply failure code being cleared.) <p>NOTICE</p> <ul style="list-style-type: none"> • This failure code requires “Loaded Diagnostics Operation To Confirm Failure Correction”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure the failure code is cleared. • This failure code can be cleared by performing operation procedure indicated in TESTING AND ADJUSTING, “SETTING AND OPERATION OF MACHINE MONITOR”, “SERVICE MODE” and “METHOD FOR OPERATING TESTING MENU (ENGINE CONTROLLER ACTIVE FAULT CLEAR)”.
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No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC outlet temperature sensor	<ol style="list-style-type: none"> 1. Check the sensor connector for stain or damage. 2. Turn the starting switch to OFF position. 3. Replace KDPF temperature sensor. 4. Turn the starting switch to ON position. <p>If this failure code is cleared, the original KDOC outlet temperature sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</p>
2	Defective intake system	Check air intake hoses, clamps, and tubes for damage and loosening. Repair as necessary.
3	Defective injector	As a result of the check in the cylinder cut-out mode, a cylinder running at the unchanged speed is found. (For details, see TESTING AND ADJUSTING, “HANDLE CYLINDER CUT-OUT MODE OPERATION”.)

FAILURE CODE [CB3582]

Action level	Failure code	Failure	SCR Catalyst Efficiency Low Error 1_2 (Engine controller system)
-	CB3582		
Detail of failure	The SCR catalyst efficiency remains low (70 % and below).		
Action of controller	The engine controller performs clearing active regeneration (approximately one hour) of urea deposit accumulation at failure judgment.		
Phenomenon on machine	The clearing active regeneration (approximately one hour) of urea deposit accumulation is performed automatically.		
Related information	<p>⚠ The turbocharger outlet, KDPF, sensor fitting piping, and sensor probe are heated to 500 °C and above. Be careful not to get burn injury.</p> <p>⚠ SCR assembly, sensor installation piping, and sensor probe are heated to 400 °C and above. Be careful not to get burn injury.</p> <p>⚠ As for the sensor probe, be careful not to get burn injury even if the surroundings is not hot, because sensor itself is heated.</p> <p>⚠ When removing AdBlue/DEF mixing piping or AdBlue/DEF injector, AdBlue/DEF may leak. Be careful about adherence of AdBlue/DEF</p> <ul style="list-style-type: none"> • If failure code [CA1885] or [CA3232] or [CA3649] or [CA3682] or [CA3718] or [CA3725] or [CA3748] is displayed, turbo outlet NOx sensor system may be defective. Perform troubleshooting for these first. • If failure code [CB1887] or [CB2771] or [CB3545] or [CB3583] or [CB3681] or [CB3717] is displayed, SCR outlet NOx sensor system may be defective. Perform troubleshooting for these first. • If failure code [CB3142], [CB3143], [CB3144], [CB3146], [CB3147], [CB3148], [CB3165], [CB3229], [CB3231], [CB3235], [CB4152], [CB4159], [CB4164], [CB4165], or [CB4166] is displayed, SCR temperature sensor system may be defective. Perform troubleshooting for these first. • If failure code [CB3899], [CB3911], [CB3912], [CB3932], [CB3933], [CB3934], [CB3935], [CB3936] or [CB4281] is displayed, ammonia sensor system is defective. Perform troubleshooting for these first. • When the failure state is not cleared after performing clearing active regeneration of urea deposit accumulation, and performing failure judgment again 20 or more minutes after, start clearing active regeneration of urea deposit accumulation again. • If any failures occur within 20 minutes after the previous active regeneration (clearing of soot, time management, cleaning of urea deposit accumulation), do not start active regeneration of urea deposit accumulation. • When the ambient pressure is 80 kPa and below and the ambient temperature is -7 °C and below, the engine controller does not troubleshoot this failure code. (Failure code is not cleared even after performing machine operation for clearing the failure code.) Confirm on “Pre-defined Monitoring” screen. • Under following condition, failure code is not cleared even after performing machine operation for clearing the failure code. <ol style="list-style-type: none"> 1. Active regeneration in progress 2. AdBlue/DEF injection being stopped by other failure code 		

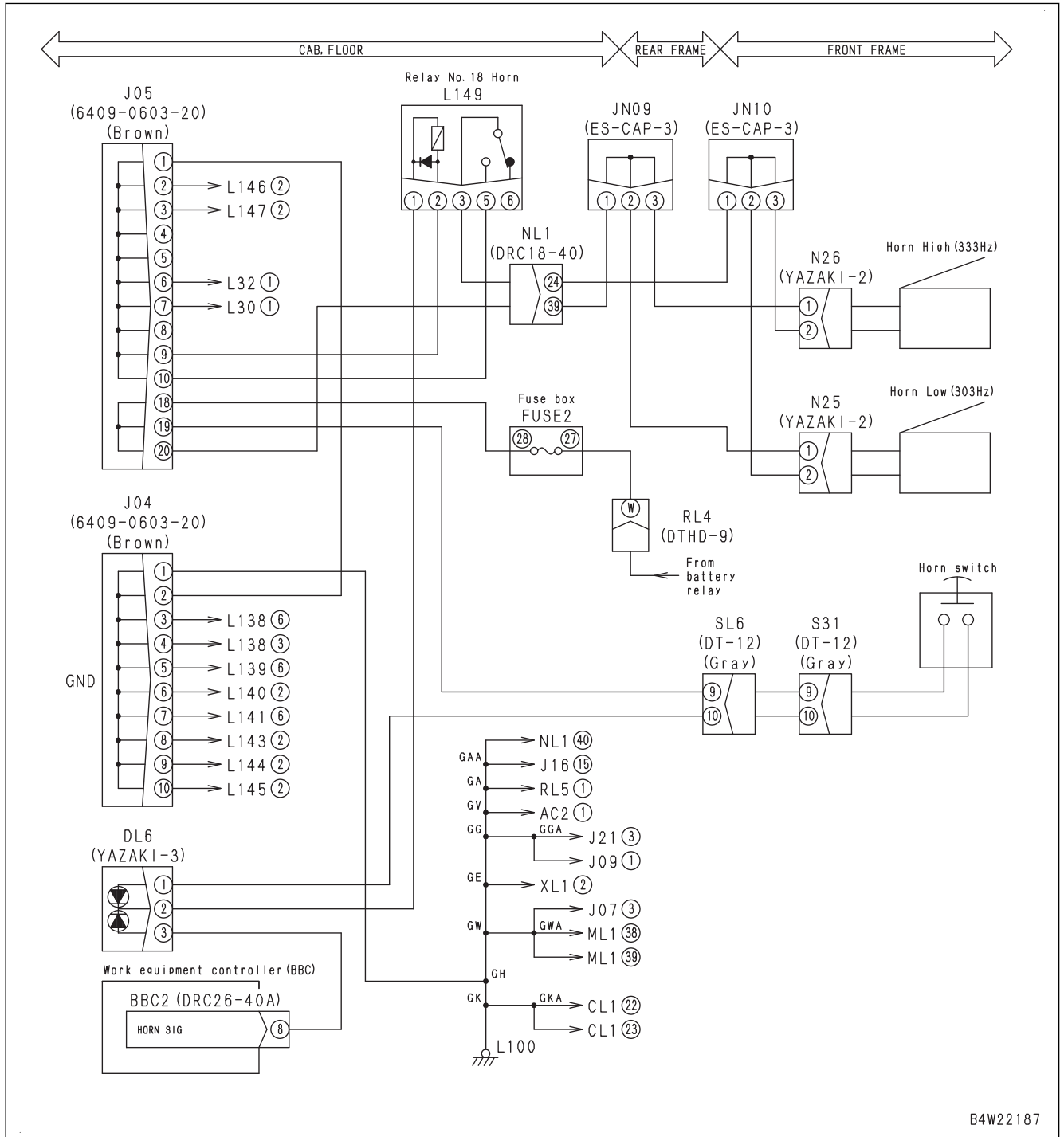
FAILURE CODE [CB3936]

Action level	Failure code	Failure	SCR NH3 Sensor Internal Circuit Error_2 (Engine controller system)
L01	CB3936		
Detail of failure	Ammonia sensor controller cannot recognize the value of trim resistance on the probe.		
Action of controller	<ul style="list-style-type: none"> Controls AdBlue/DEF injection without using ammonia sensor. Activates Inducement strategy (EU specification only). 		
Phenomenon on machine	<ul style="list-style-type: none"> AdBlue/DEF injection becomes inappropriate and the NOx emission may increase, or ammonia may be discharged. Engine output is reduced based on Inducement strategy (EU specification). 		
Related information	<p>⚠ SCR assembly, sensor fitting piping, and sensor probe are heated to 400 °C and above. Be careful not to get burn injury.</p> <p>⚠ As for the sensor probe, be careful not to get burn injury even if the surroundings is not hot, because sensor itself is heated.</p> <ul style="list-style-type: none"> Connectors of electrical parts around engine may be defective due to heat and vibration. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. Sensor controller itself has an internal defect. If ammonia sensor controller detects the circuit error of ammonia sensor, the information is sent to the engine controller through CAN communication, and this failure code is displayed. On “Pre-defined Monitoring” screen, items “SCR catalyst related (2)” are used. (The numbers below denote monitoring codes). SCR catalyst related (2) <ul style="list-style-type: none"> 01002 Engine Speed 18600 Inject Fueling Command 19218 Exhaust Gas Flow Rate 47302 KDOC 1 Inlet Temperature_2 19310 SCR Temperature_2 19312 SCR Outlet Temperature_2 <p>NOTICE</p> <p>This failure code requires “Loaded Diagnostics Operation To Confirm Failure Correction”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure the failure code is cleared.</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective ammonia sensor	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Replace the ammonia sensor. Implement operation for judging the repair result.
		If the failure code is no longer displayed, the original ammonia sensor may be defective.
2	Defective ammonia sensor controller	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Replace the ammonia sensor controller Implement operation for judging the repair result.
		If the failure code is no longer displayed, the original ammonia sensor controller may be defective.

No.	Cause	Procedure, measuring location, criteria and remarks		
2	Ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J2 and DSM_2, and connect T-adaptor to either female side.		
		Resistance	Between ground and either of ECM2 J2 (female) (6) or DSM_2 (female) (10)	Min. 1 MΩ
			Between ground and either of ECM2 J2 (female) (79) or DSM_2 (female) (9)	Min. 1 MΩ
3	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector DSM_2 and connect T-adaptor to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between DSM_2 (female) (10) and (8)	Max. 4.5 V
4	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J2 and DSM_2, and connect T-adaptor to either female side.		
		Resistance	Between ECM2 J2 (female) (6) and (54), or between DSM_2 (female) (10) and (8)	Min. 1 MΩ
			Between ECM2 J2 (female) (6) and (79), or between DSM_2 (female) (10) and (9)	Min. 1 MΩ
Between ECM2 J2 (female) (54) and (79), or between DSM_2 (female) (8) and (9)	Min. 1 MΩ			
5	Open circuit in wiring harness (AdBlue/DEF pump heater relay circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J2, UHR1_2, and DSM_2, and connect T-adaptor to each female side.		
		Resistance	Between UHR1_2 (female) (12) and ground	Max. 1 Ω
			Between ECM2 J2 (female) (83) and UHR1_2 (female) (3)	Max. 1 Ω
6	Ground fault in wiring harness (AdBlue/DEF pump heater relay circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors ECM2 J2 and UHR1_2 and connect T-adaptor to the female side. 3. Turn the starting switch to ON position.		
		Resistance	Between ground and ECM2 J2 (female) (83) or UHR1_2 (female) (3)	Min. 1 MΩ
7	Hot short circuit in wiring harness (AdBlue/DEF pump heater relay circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connector UHR1_2, and connect T-adaptor to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between UHR1_2 (female) (3) and (12)	Max. 4.5 V

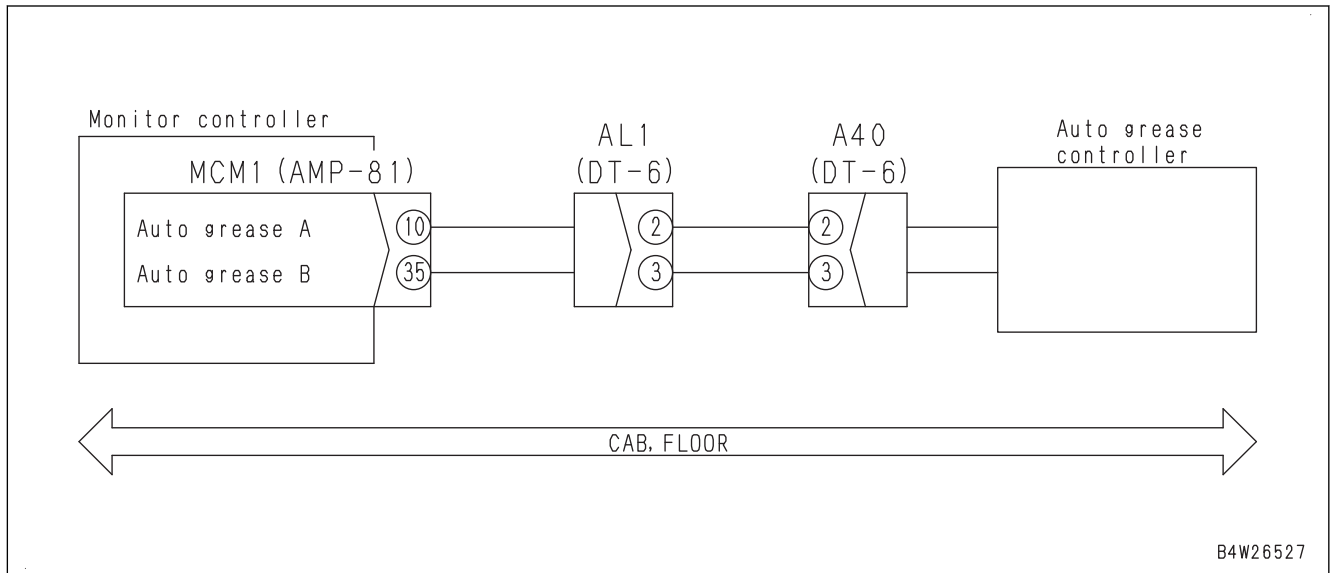
Circuit diagram related to horn



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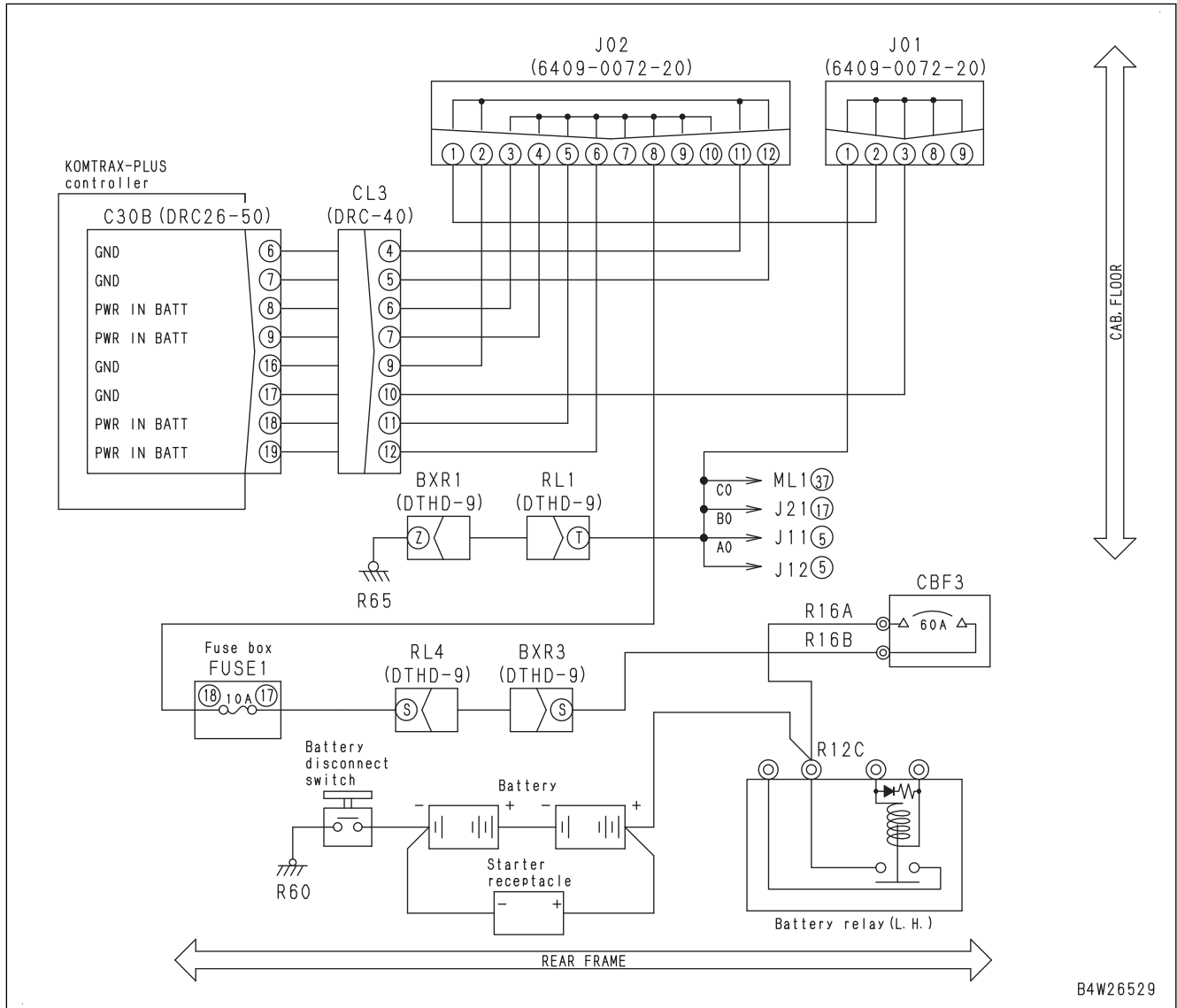
No.	Cause	Procedure, measuring location, criteria and remarks			
4	Defective auto-greasing controller	1. Turn the starting switch to OFF position. 2. Insert T-adaptor into connector A40. 3. Turn the starting switch to ON position. 4. Perform troubleshooting by turning auto-greasing start switch to ON and OFF positions.			
		Voltage	Between A40 (2) and ground	Auto-greasing: Operated	Max. 1 V
				Auto-greasing: Not operated	20 to 30 V
			Between A40 (3) and ground	Auto-greasing: Operated	20 to 30 V
Auto-greasing: Not operated	Max. 1 V				
5	Defective monitor controller	If no failure is found by preceding checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).			

Circuit diagram related to auto grease controller



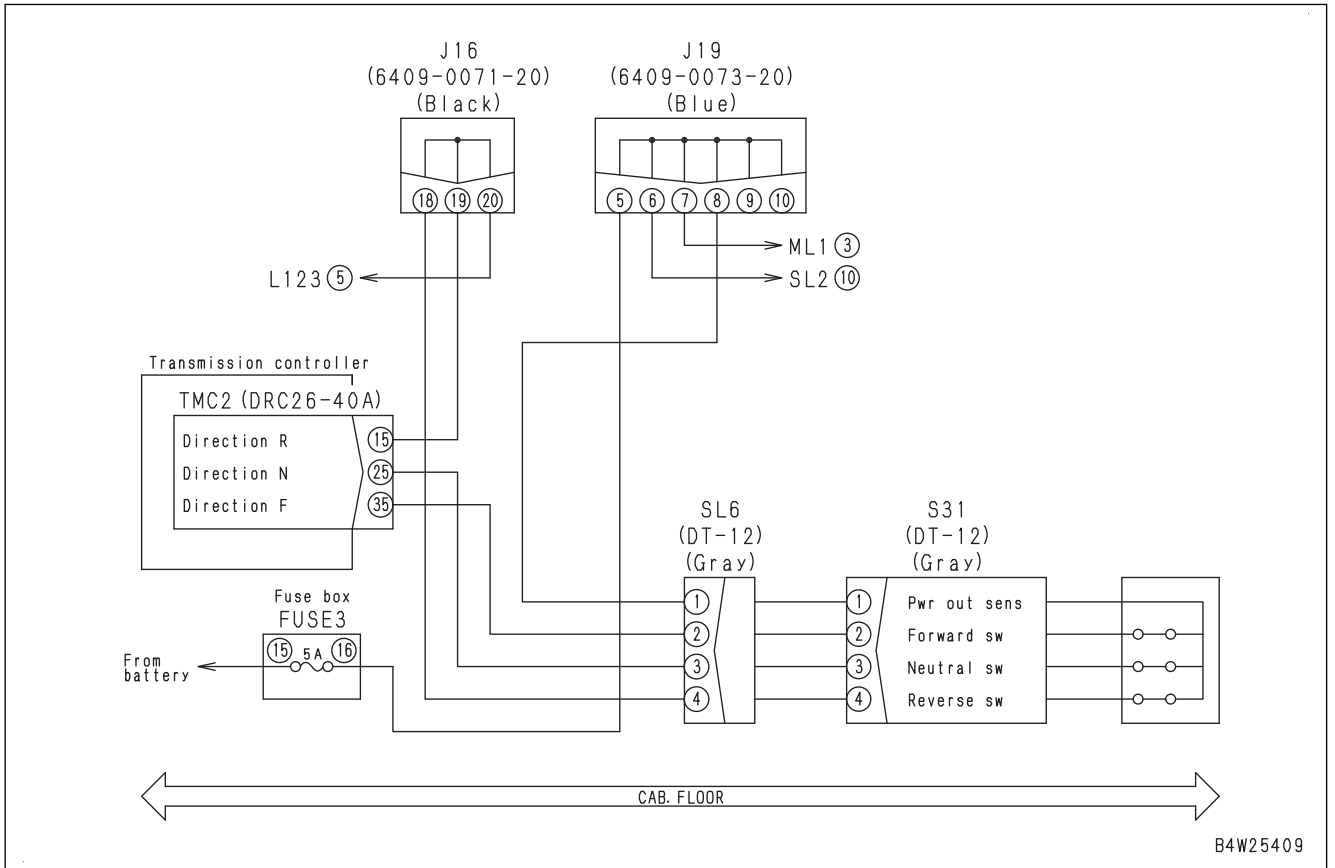
No.	Cause	Procedure, measuring location, criteria and remarks		
6	Open circuit in wiring harness (ACC signal line)	ACC signal of starting switch (start of CAN communication is not recognized) 1. Turn the starting switch to OFF position, and turn the battery disconnect switch to OFF position. 2. Disconnect connectors to be measured, and insert T-adapters. 3. Turn the battery disconnect switch to ON position, and turn the starting switch to ON position.		
		Voltage	Between ECM1 J2(5) and (49)	20 to 30 V
			Between ECM2 J2(5) and (49)	20 to 30 V
			Between (2) and each of MCM1 (24) and (43)	20 to 30 V
			Between (21) and each of BBC3 (14) and (24)	20 to 30 V
			Between (21) and each of TMC3 (14) and (24)	20 to 30 V
			Between AC1 (1) and (4)	20 to 30 V
			Between KOM (3) and (12)	20 to 30 V
			Between (6) and each of TMC3 (4) and (5)	20 to 30 V
			Between L80B (3) and (1)	20 to 30 V
Between IDK (2) and (7)	20 to 30 V			

Circuit diagram related to KOMTRAX Plus controller power supply



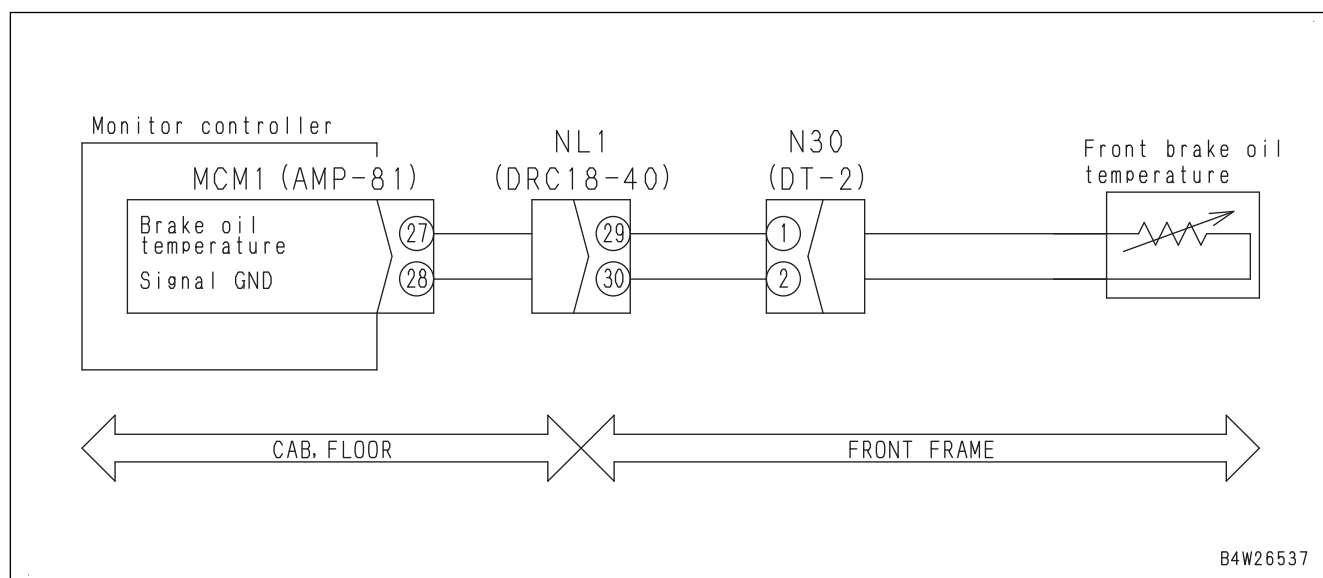
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Circuit diagram related to directional selector switch

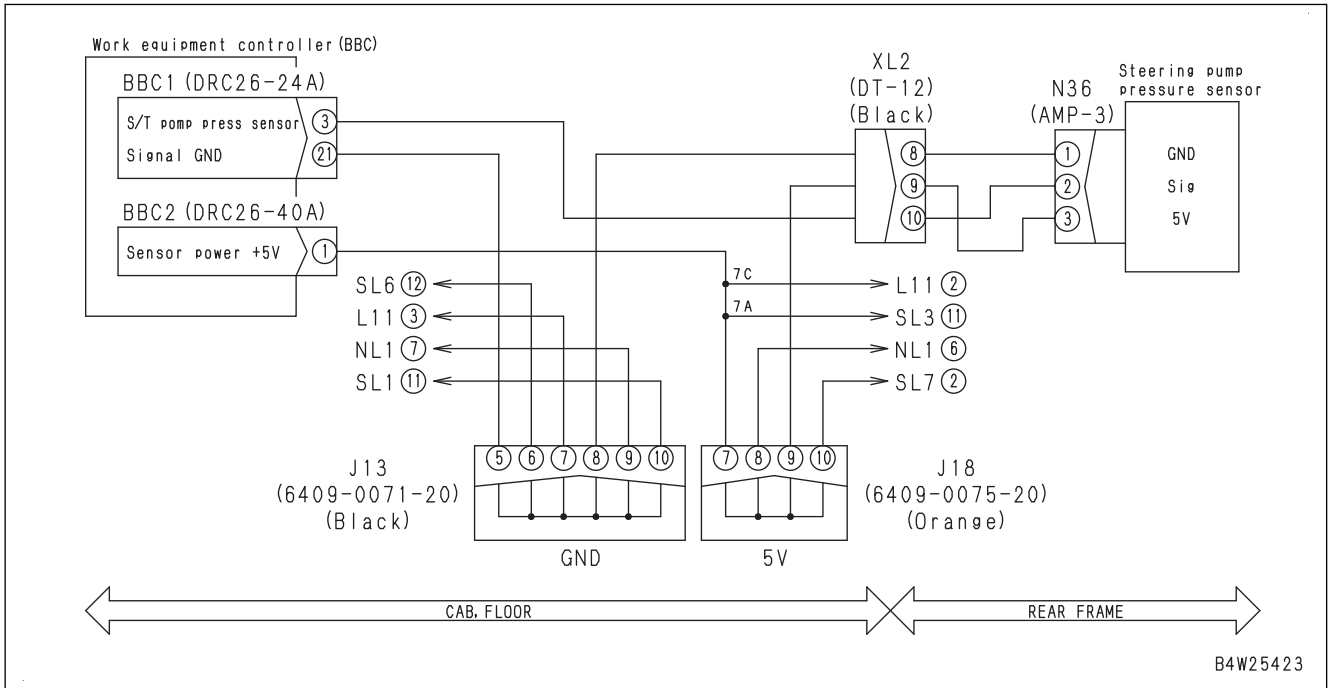


No.	Cause	Procedure, measuring location, criteria and remarks	
4	Hot short circuit in wiring harness	REMARK If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector MCM1 or N30. 3. Turn the starting switch to ON position.	
		Voltage	Between MCM1 (27) and (28), or between N30 (female) (1) and (2)
5	Defective monitor controller	If no failure is found by preceding checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).	

Electrical circuit diagram related to brake oil temperature sensor (front)



Circuit diagram related to steering pimp pressure sensor



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 BBC1 and S01, and connect T-adapter to each female side.			
		Resistance	Between BBC1 (female) (2) and ground, or between S01 (female) (4) and ground	Min. 1 MΩ	
5	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 connector BBC1. 3. Set work equipment lock switch to LOCK position. 4. Turn the starting switch to ON position. 5. Operate boom lever			
		Voltage	Between BBC1 (22) and (21)	Boom lever: Continuous	4.8 to 5.2 V
			Between BBC1 (2) and (21)	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	3.90 to 4.40 V				

No.	Cause	Procedure, measuring location, criteria and remarks		
2	Defective 3rd spool (for attachment) lever potentiometer (internal short circuit)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector S03, and connect T-adapter to male side. 		
		Resistance	Between S03 (male) (1) and ground	Min. 1 MΩ
			Between S03 (male) (2) and ground	Min. 1 MΩ
			Between S03 (male) (3) and ground	Min. 1 MΩ
			Between S03 (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 S03. Set work equipment lock switch to LOCK position. Turn the starting switch to ON position. Operate 3rd spool (for attachment) lever to perform troubleshooting. 		
Voltage	Between S03 (4) and (2)	3rd spool (for attachment) lever: NEUTRAL	2.38 to 2.62 V	
		3rd spool (for attachment) lever: EXTEND operation to stroke end	0.60 to 1.10 V	
		3rd spool (for attachment) lever: RETRACT operation to stroke end	3.90 to 4.40 V	
3	Hot short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector S03, and connect T-adapter to female side. Turn the starting switch to ON position. 		
		Voltage	Between S03 (female) (4) and ground	Max. 1 V
4	Short circuit in wiring harness	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connectors BBC2 and S03, and connect T-adapter to female side of BBC2. <p>REMARK Check it by using multimeter in continuity mode.</p>		
		Continuity	Between BBC2 (female) (25) and each pin other than BBC2 (female) (25)	No continuity

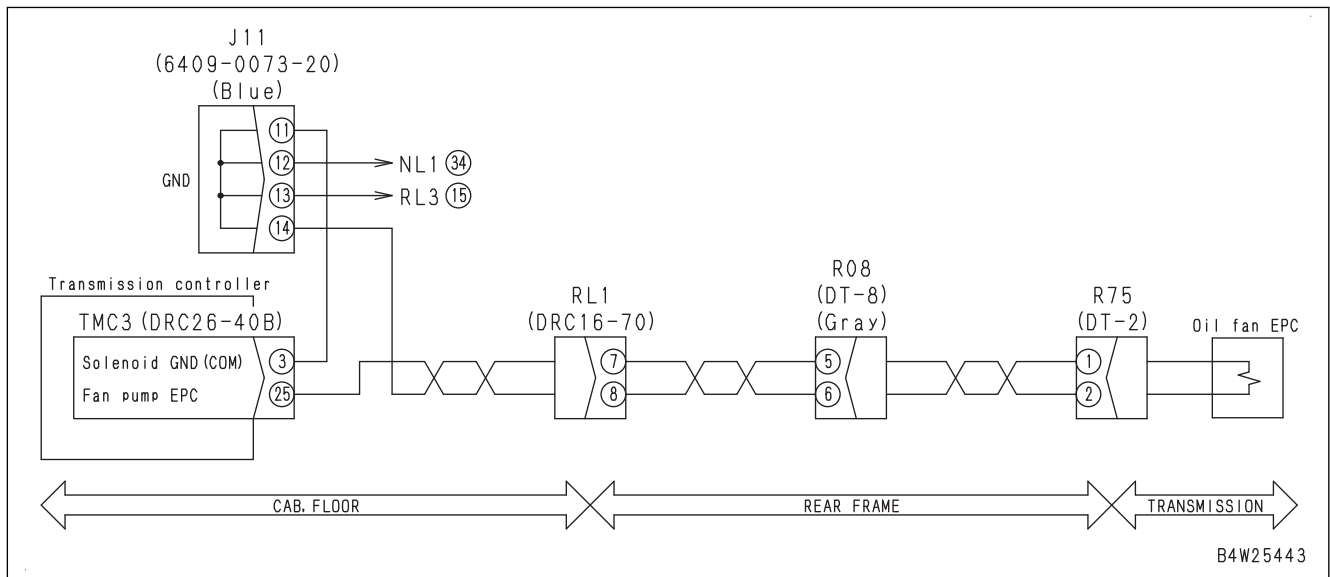
No.	Cause	Procedure, measuring location, criteria and remarks		
5	Ground fault in wiring harness (contact with ground circuit)	<ul style="list-style-type: none"> • When failure code [DPQ1KR] and [DPQ3KR] are displayed at the same time, perform following check. • If no failure is found by check on cause 4, this check is not required. <ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connectors MCM2, DPC2, OPM, and RMN1, and connect T-adapter to any female side. 		
		Resistance	Between ground and each of MCM2 (female) (108), DPC2 (female) (3), OPM (female) (3), and RMN1 (female) (9)	Min. 1 MΩ
6	Defective switch panel (operation switches of machine monitor)	<p>Perform the following troubleshooting when failure code [DPQ1KR] and [DPQ3KR] are displayed at the same time.</p> <ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connector OPM. 3. Turn the starting switch to ON position. <p>If failure codes [DPQ2KR] and [DPQ3KR] disappear, switch panel is defective.</p>		
7	Defective LED unit (display unit of machine monitor)	<p>Perform the following troubleshooting when failure code [DPQ1KR] and [DPQ3KR] are displayed at the same time.</p> <ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connector DPC2. 3. Turn the starting switch to ON position. <p>If failure code [DPQ1KR] and [DPQ3KR] are cleared, LED unit is defective.</p>		
8	Defective rearview monitor	<p>Perform the following troubleshooting when failure code [DPQ1KR] and [DPQ3KR] are displayed at the same time.</p> <ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connector RMN1. 3. Turn the starting switch to ON position. <p>If failure codes [DPQ1KR] and [DPQ2KR] disappear, rearview monitor is defective.</p>		
9	Defective monitor controller	If no failure is found by preceding checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).		

FAILURE CODE [DW4SKA]

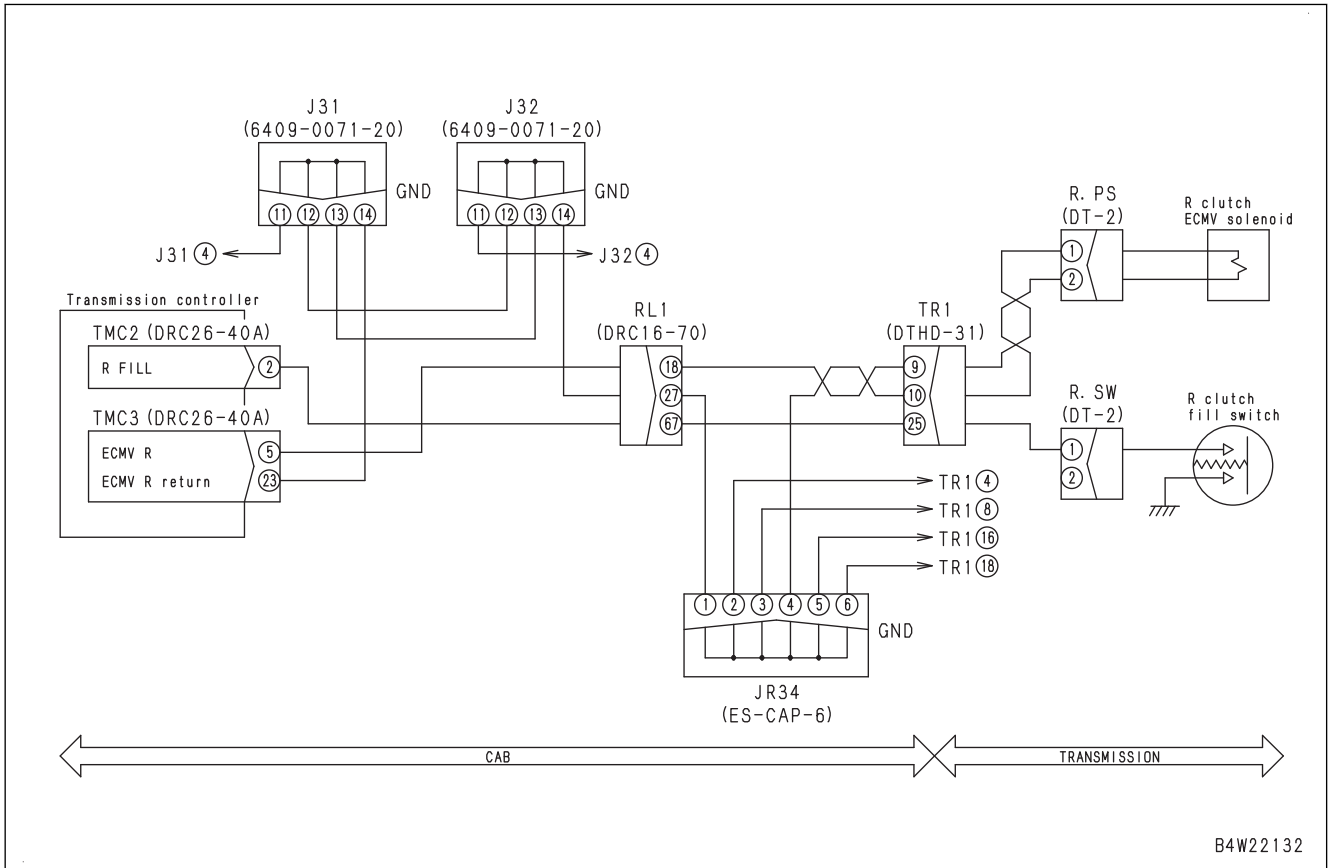
Action level	Failure code	Failure	Bucket DUMP EPC Solenoid Open Circuit (Work equipment controller system)
L03	DW4SKA		
Detail of failure	Due to open circuit in output signal circuit to bucket DUMP EPC solenoid, no current flows when controller drives bucket DUMP EPC solenoid.		
Action of controller	<ul style="list-style-type: none"> Disables bucket DUMP EPC command. 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	Bucket does not tilt down.		
Related information	<ul style="list-style-type: none"> Output current value to bucket DUMP EPC solenoid can be checked with monitoring function. (Code: 41903) After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Start the engine, and perform bucket DUMP operation. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective bucket DUMP EPC solenoid (inside)	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector N11, and connect T-adapter to male side. 		
		Resistance	Between N11 (male) (1) and (2)	5 to 15 Ω
2	Open circuit, short circuit, ground fault, hot short circuit in wiring harness, or defective transmission controller	<ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector N11, and connect T-adapter to female side. Turn the starting switch to ON position. <p>REMARK Shake wiring harness by hand while measuring the voltage. If the voltage becomes 0 V while shaking, wiring harness has open circuit at around this point.</p>		
		Voltage	Between N11 (female) (1) and (2)	1 to 4.5 V
3	Open or short circuit in wiring harness	<p>REMARK If no failure is found by check on cause 2, this check is not required.</p> <ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connector BBC3, and connect T-adapter to female side. <p>REMARK If resistance value is 1 MΩ and above, wiring harness has open circuit. If it is 1 Ω and below, wiring harness has short circuit.</p>		
		Resistance	Between BBC3 (female) (27) and (3)	5 to 15 Ω
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	<p>REMARK If no failure is found by check on cause 3, this check is not required.</p> <ol style="list-style-type: none"> Turn the starting switch to OFF position. Disconnect connectors BBC3 and N11 and connect T-adapters to each female side. 		
		Resistance	Between BBC3 (female) (3) and N11 (female) (2)	Max. 1 Ω
			Between BBC3 (female) (27) and N11 (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 radiator fan pump EPC solenoid



Circuit diagram related to R clutch

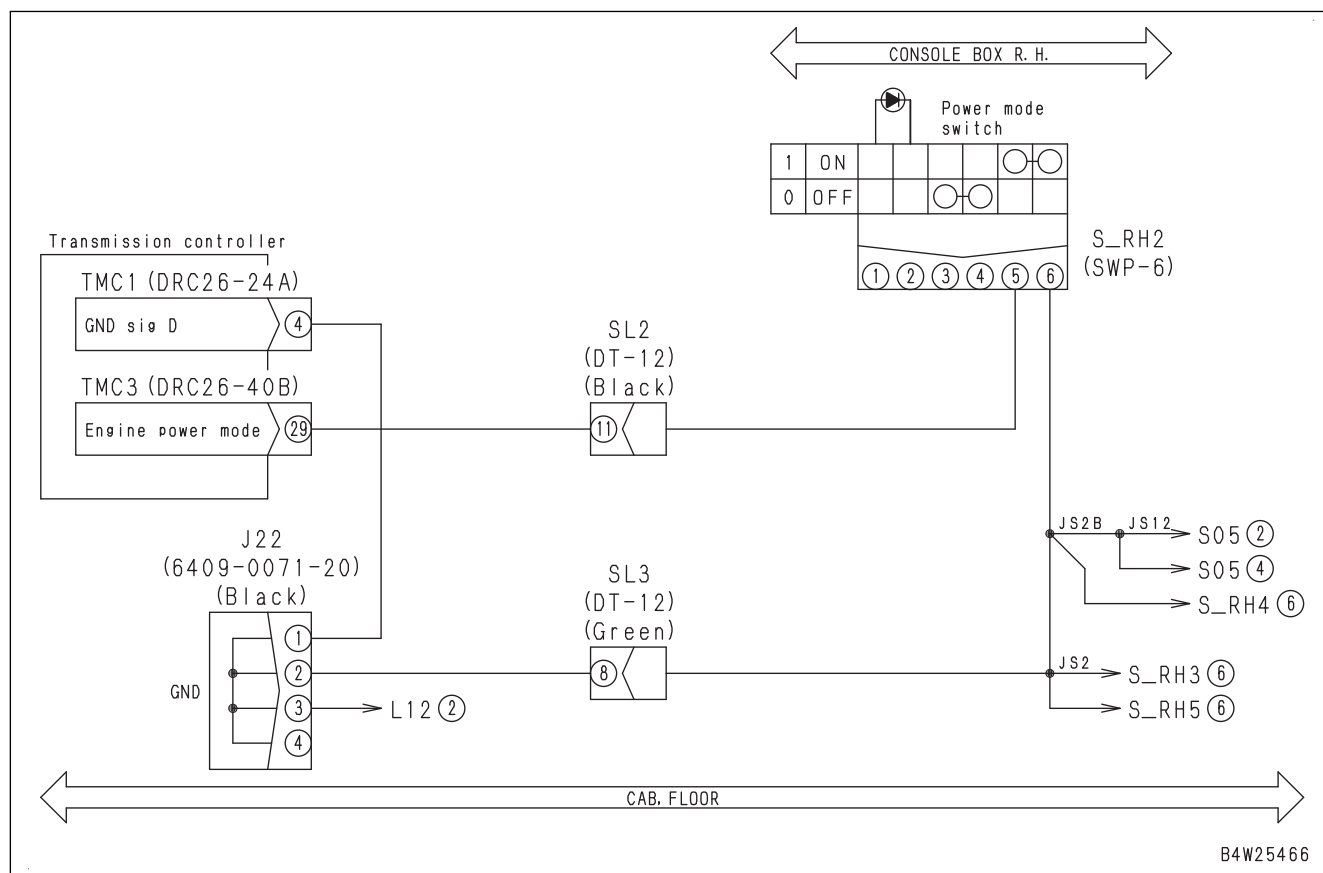


No.	Cause	Procedure, measuring location, criteria and remarks		
23	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector E10 and E11, and connect T-adapter to each female side. 3. Disconnect alternator terminal R. 4. Turn the starting switch to ON position. If a hot short circuit occurs, the charging lamp lights up when the starting switch is turned to ON position.		
		Voltage	Between E10 (female) (2) and ground	Max. 1 V
			Between E11 (female) (2) and ground	Max. 1 V

E-17 REARVIEW MONITOR DOES NOT LIGHT UP OR BACKLIGHT FLICKERS

Failure	Rearview monitor does not light up or backlight flickers.		
Related information			
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective fuse	If fuse is blown out, circuit probably has ground fault. (See check on cause of wiring harness ground fault.)	
2	Defective wiring harness connector	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Visually check connector (RMN1) connected to rearview monitor, and repeat connection and disconnection of connector. 4. Turn the battery disconnect switch to ON position 5. Turn the starting switch to ON position. 	
		If normal state is restored, cause of failure is defective contact of connector	
3	Open circuit in wiring harness (wire breakage or defective contact)	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn the battery disconnect switch to OFF position. 3. Visually check connector (RMN1) connected to rearview monitor, and repeat connection and disconnection of connector. 4. Turn the battery disconnect switch to ON position 5. Turn the starting switch to ON position. 	
		If normal state is restored, cause of failure is defective contact of connector	
		<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connectors G05 and RVM2, and connect T-adaptor to each female side. 3. Turn the starting switch to ON position. 	
		Resistance	Between G05 (female) (1) and RVM2 (female) (1)
	Between G05 (female) (2) and RVM2 (female) (2)	Max. 1 Ω	
	Between G05 (female) (4) and each of RVM2 (female) (5) and (8)	Max. 1 Ω	
4	Ground fault in wiring harness (contact with ground circuit)	<ol style="list-style-type: none"> 1. Turn the starting switch to OFF position. 2. Disconnect connector RMN1, and connect T-adaptor to female side. 3. Remove fuse-15(16) in fuse box FUSE1. 	
		Resistance	Between ground and RMN1 (female) (1) or FUSE1-15(16)
5	Defective rearview monitor	If no failure is found by preceding checks, rearview monitor is defective.	
6	Defective wiring harness	If you cannot perform the troubleshooting of wiring harness for open circuit, wiring harness may be defective.	

Circuit diagram related to engine power mode selector switch



No.	Cause	Procedure, measuring location, criteria and remarks		
6	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 L10, L123, L138, G30, and G30L, and connect T-adaptor to either female side. 4. Remove fuse14 in fuse box 2.		
		Resistance	Between ground and L10 (female) (1) or L138 (female) (2)	Min. 1 MΩ
			Between ground and L10 (female) (2) or L138 (female) (5)	Min. 1 MΩ
			Between ground and L138 (female) (1), G30 (female) (A) or G30L (female) (A)	Min. 1 MΩ
7	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors L10, L123, L138, G30, and G30L, and connect T-adaptor to either female side. 3. Remove fuse14 in fuse box 2. 4. Turn the starting switch to ON position.		
		Voltage	Between ground and L10 (female) (1) or L138 (female) (2)	Max. 1 V
			Between ground and L10 (female) (2) or L138 (female) (5)	Max. 1 V
			Between ground and L138 (female) (1), G30 (female) (A) or G30L (female) (A)	Max. 1 V

(*)

			Clutch to be engaged					
			F	R	1st	2nd	3rd	4th
Gear speed	N	When AUTO is selected				○		
		When MANUAL is selected			○	○	○	○
		F1	○		○			
		F2	○			○		
		F3	○				○	
		F4	○					○
		R1		○	○			
		R2		○		○		
		R3		○			○	
		R4		○				○

H-22 RISING BOOM SLOWS DOWN AT CERTAIN HEIGHT

Failure	Rising boom slows down at certain height.
Related information	Check booms and lift cylinders for visible deformation.

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective lift cylinder	Swelling of lift cylinder tube or damage of cylinder inside is suspected. Disassemble the lift cylinder and check it.
		<p>If the detent is held with the boom RAISE remote positioner operated and the boom is operated over the target stop angle, the boom RAISE is decelerated temporarily and then accelerated.</p> <p>REMARK</p> <p>For the other abnormal phenomena during boom RAISE operation, see "Boom moves slow or boom lacks lifting force" in H mode.</p>

S-15 FUEL MIXES INTO ENGINE OIL

Failure	Fuel mixes into engine oil.
Related information	<ul style="list-style-type: none"> If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	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 CUTOUT MODE OPERATION"). 	Replace injector.
2	Fuel leakage from injector or O-ring (spill circuit)	Check injector and O-ring.	Injector and O-ring replacement
3	Defective seal between injector and inspection pipe, or cracked injection pipe	Check of seal between injector and inspection pipe, check of injection pipe for cracking	Repair or replacement
4	Internal defect of supply pump	Replace supply pump, and check if mixing of fuel is prevented.	Supply pump replacement For testing of either supply pump A or supply pump B is defective, see TESTING AND ADJUSTING, "TEST SUPPLY PUMP".

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
T	792T-423-1130	Push tool	■	1		○	Assembling the drive gear
U	790-201-2220	Push tool	■	1			Assembling the PTO gear
V	790-201-2180	Push tool	■	1			Assembling the PTO gear
W	795-233-1420	Push tool	■	1			Assembling the PTO gear

Tools to be used when disassembling and assembling the transmission assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	04530-11628	Eyebolt	●	2			Removing and installing the transmission case
B	04530-11222	Eyebolt	●	2			
C	Commercially available	Guide bolt	●	2			
D	799-301-1500	Oil leak tester	●	1			Checking the operation state of piston
E	Commercially available	Eyebolt (M18 x 2.5 mm)	●	2			Removing and installing the carrier assembly, piston, housing, rotating clutch
F	Commercially available	Bar	●	1			Removing the carrier assembly, Removing the rotating clutch
G	790-201-2860	Push tool	■	1			Removing the carrier assembly
J	04530-11018	Eyebolt	●	2			Removing the ring gear, carrier assembly, piston from the housing
K	79G-17L-1000	Push tool	■	1			Driving-in the roll pin
L	792-104-1400	Push tool	■	1			Removing and installing the snap ring
M	790-101-2300	Puller	■	1			Removing the housing from the shaft
N	795-102-2640	Push tool	■	1			Removing the shaft from the carrier
P	790-201-2860	Push tool	■	1			Press-fit of the bearing into the shaft
Q	790-201-2870	Push tool	■	1			Press-fit of the bearing into the housing
R	791-830-1410	Push tool	■	1			
S	791-830-1480	Push tool	■	1			Press-fit of the bearing into the inner gear
T	792-104-2100	Push tool	■	1			Press-fit of the bearing into the sun gear
U	791-830-1410	Push tool	■	1			
V	790-201-2850	Push tool	■	1			Press-fit of the bearing into the shaft
W	790-201-2870	Push tool	■	1			Press-fit of the bearing into the housing
X	Commercially available	Block	■	1			Press-fit of the bearing into the inner gear

REMARK

This section explains only “Removing and installing the injector assembly”. If the injection pipe is also required to be replaced, see Engine Shop Manual, “170E SERIES ENGINE”.

When removing and installing the fuel piping, be careful that foreign materials do not enter the fuel piping. If any dust sticks to any part, clean that part completely with clean fuel.

METHOD FOR REMOVING INJECTOR ASSEMBLY**Coolant**

1. Drain the coolant.



Radiator:

150 ℓ

Engine hood assembly

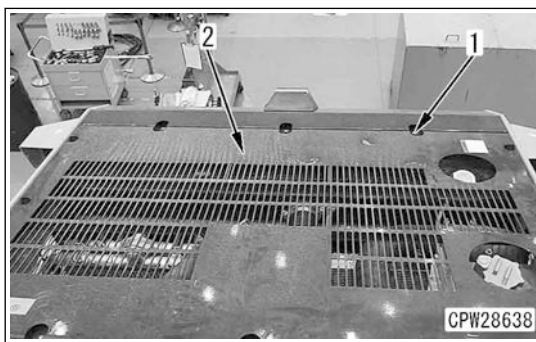
2. Remove the engine hood assembly. For details, see, “REMOVE AND INSTALL ENGINE HOOD ASSEMBLY”.

KDPF, SCR assembly

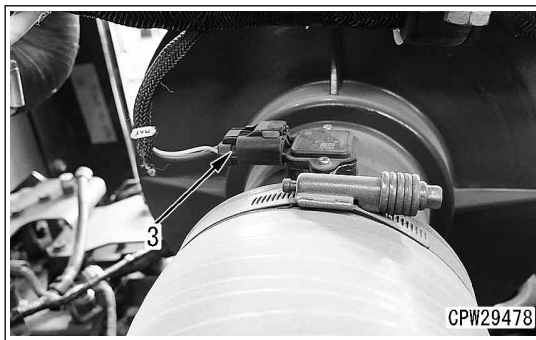
3. Remove KDPF and SCR assembly. For details, see “REMOVE AND INSTALL KDPF, SCR ASSEMBLY”.

Trench

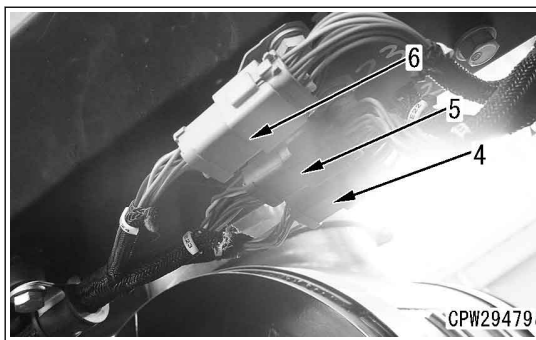
4. Remove the bolts (1) (12 pieces), and remove the guard (2).



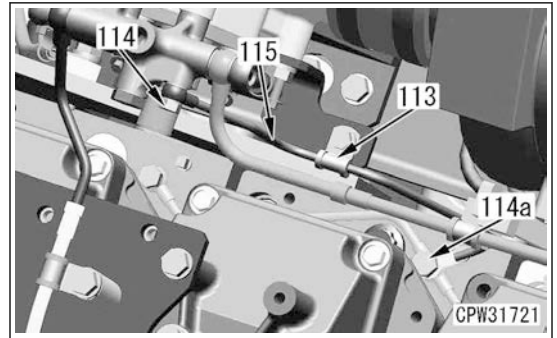
5. Disconnect the connector MAF (3).



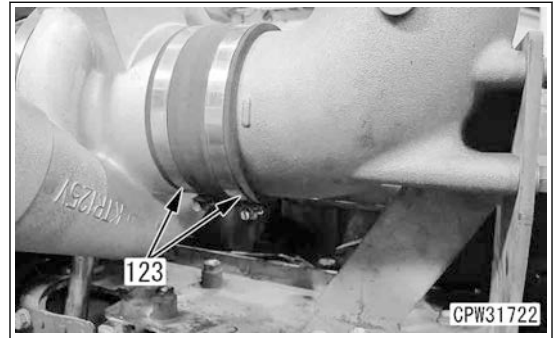
6. Disconnect the connectors EE22 (4), EE23 (5), and EE24 (6).



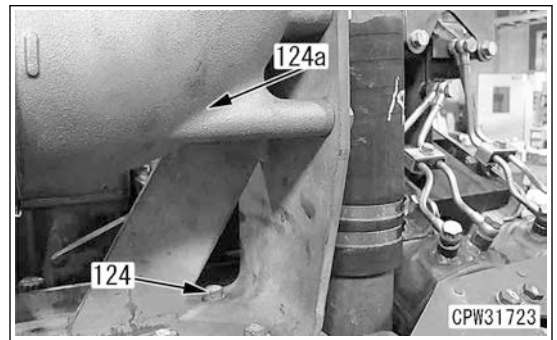
- 98. Remove the clamp (113).
- 99. Remove the joint bolts (114), (114a), and remove the tube (115).



- 100. Remove the clamps (123).

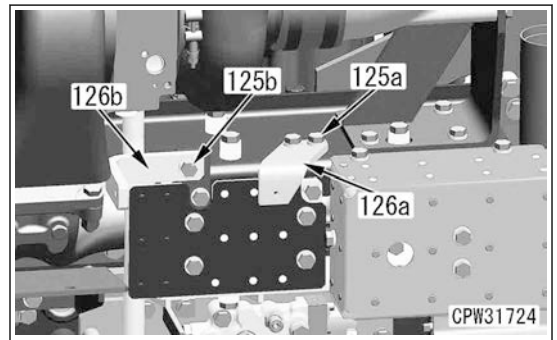


- 101. Remove the bolts (124) (4 pieces), and remove the connector (124a) together with the bracket as a unit.

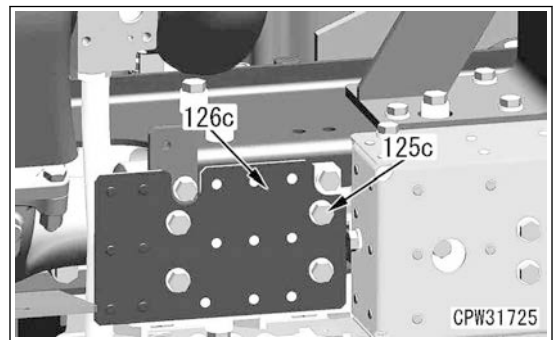


- 102. Remove the bolts (125a) (2 pieces), and remove the bracket (126a).

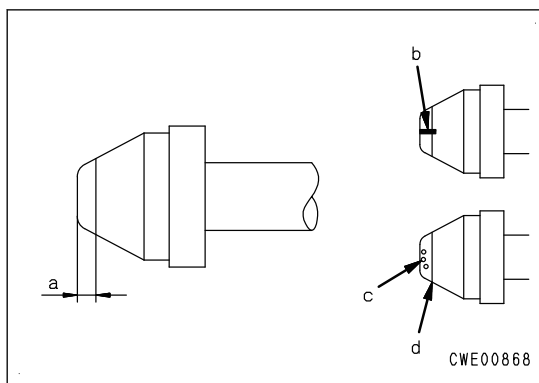
- 103. Remove the bolt (125b), and remove the bracket (126b).




- 104. Remove the bolts (125c) (4 pieces), and remove the heat insulation cover (126c).

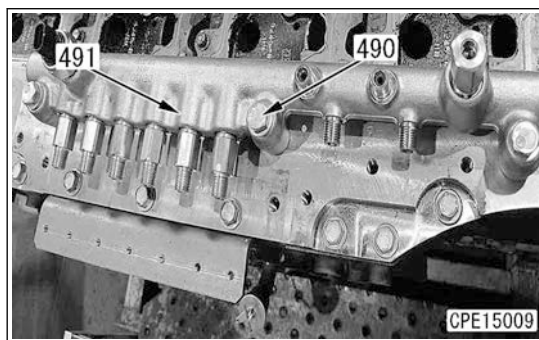


- ⚠ Check the high-pressure pipe for the following, and install it. If the high-pressure pipe has any defect, replace it with a new one since fuel may leak.
- ⚠ Visually check that the taper seal part (a) of the connecting part (2 mm area from the tip-end) is free from the longitudinal slits (b) or the spotty dents (c).
- ⚠ Make sure that the part (d) (the end of the taper seal: 2 mm from the tip-end) is free from steps you can feel by your fingernails (free from fatigue).

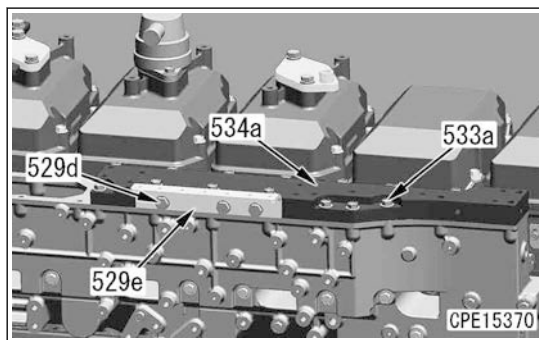


31. Install the common rail (491) with the bolts (490) (3 pieces).


 Bolt (490):
59.0 to 74.0 Nm {6.0 to 7.5 kgm}




32. Install the bracket (529e) with the bolts (529d) (3 pieces).




331. Install the bracket (89e) lightly with the bolts (88e) (2 pieces).

 Bolt (88e):
Seizure prevention compound (LC-G)

332. Install the bracket (89d) lightly with the bolts (88d) (2 pieces).


 Bolt (88d):
Seizure prevention compound (LC-G)

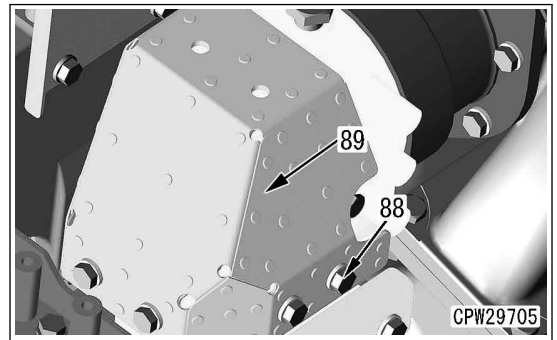
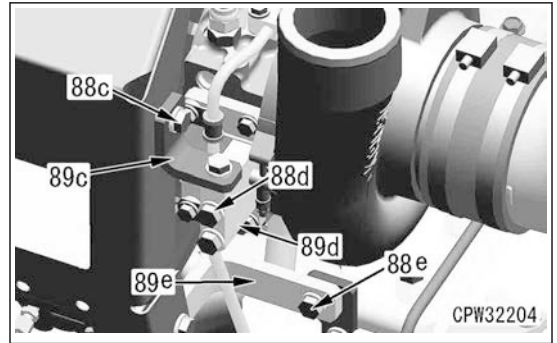
333. Install the bracket (89c) lightly with the bolts (88c) (2 pieces).

 Bolt (88c):
Seizure prevention compound (LC-G)


334. Tighten bolts (88c) to (88e) and (90a) to (90f) to the specified torque after the mounting position of each bracket is adjusted.

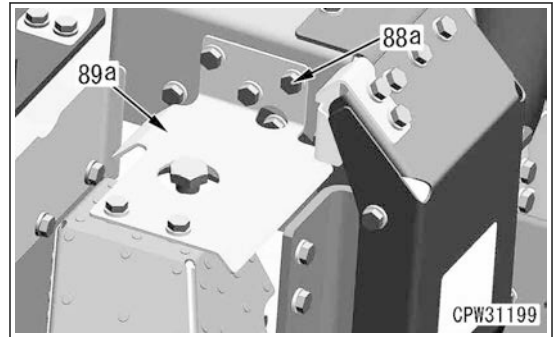
335. Install the heat insulation cover (89) with the bolts (88) (4 pieces).

 Bolt (88):
Seizure prevention compound (LC-G)





336. Install the heat insulation cover (89a) with the bolts (88a) (5 pieces).


 Bolt (88a):
Seizure prevention compound (LC-G)

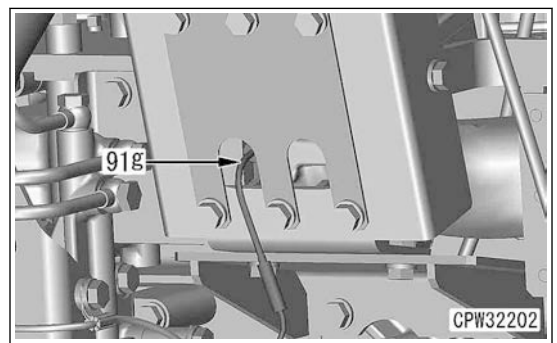


337. Install the exhaust gas temperature sensor (91g).

 Sleeve nut part of the exhaust gas temperature sensor (91g):
7.8 to 9.8 Nm {0.8 to 1.0 kgm}

 Fitting part of the exhaust gas temperature sensor (91g):
2.9 to 5.9 Nm {0.3 to 0.6 kgm}

 Exhaust gas temperature sensor (91g):
Seizure prevention compound (LC-G)



9. Close the grille guard (2), and install the bolts (1) (2 pieces).



Refilling with hydraulic oil

10. Refill with oil to the specified level through the oil filler port of the hydraulic tank. Run the engine to circulate the oil through the piping. Then check the oil level again. (For details, see STRUCTURE AND FUNCTION, "TABLE OF FUEL, COOLANT, AND LUBRICANTS".)



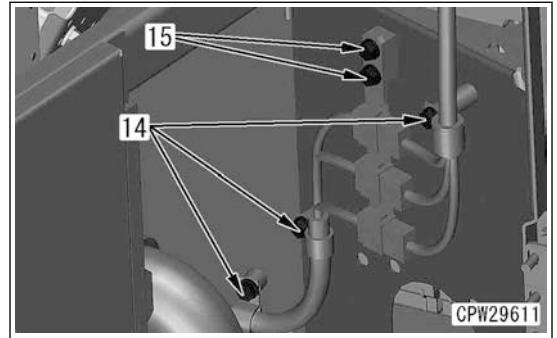
Hydraulic tank:

443 ℓ

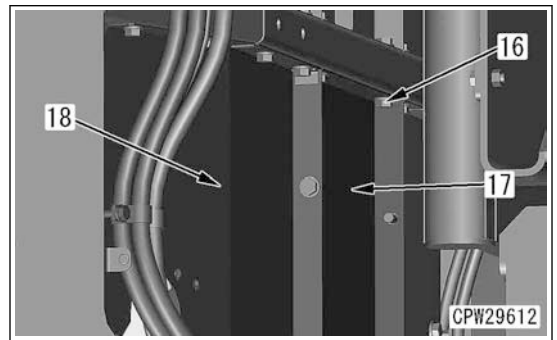
9. Open the cover (13).



10. Remove the clamps (14) (3 places).
 11. Remove the bolts (15) (2 pieces).




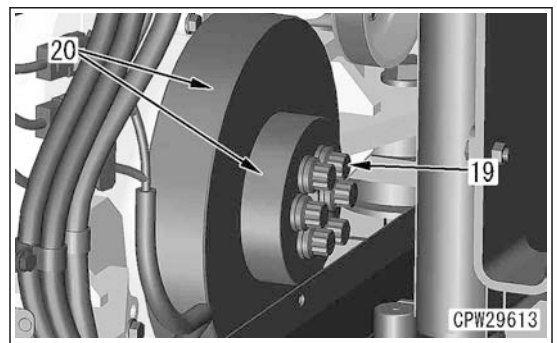
12. Remove the bolts (16) (12 pieces), and remove the covers (17) and (18).



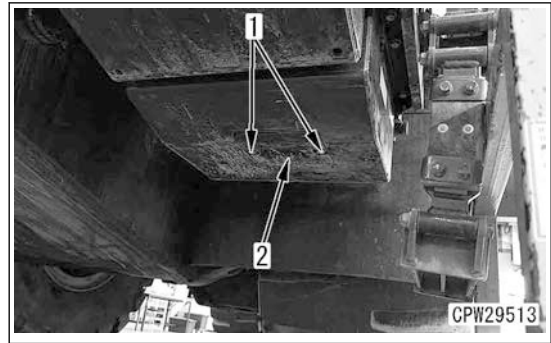
Pulley, damper assembly

13. Remove the bolts (19) (6 pieces), sling the pulley and damper assembly (20), and remove it.

 Pulley and damper assembly (20):
 50 kg



14. Install the cover (2) with the bolts (1) (2 pieces).



Refilling with coolant

15. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant. (For details, see STRUCTURE AND FUNCTION, "TABLE OF FUEL, COOLANT, AND LUBRICANTS".)



Radiator:

175 ℓ

Refilling with AdBlue/DEF

16. Refill AdBlue/DEF tank with AdBlue/DEF to the specified level through the filler port. (For details, see STRUCTURE AND FUNCTION, "TABLE OF FUEL, COOLANT, AND LUBRICANTS".)



AdBlue/DEF tank:

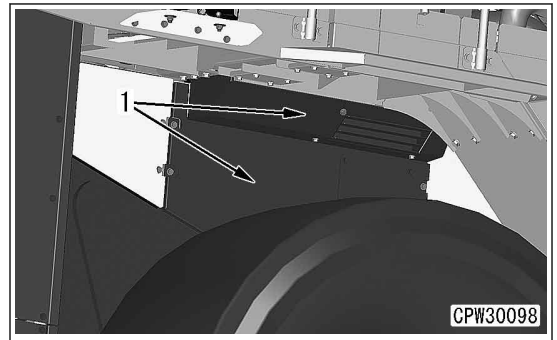
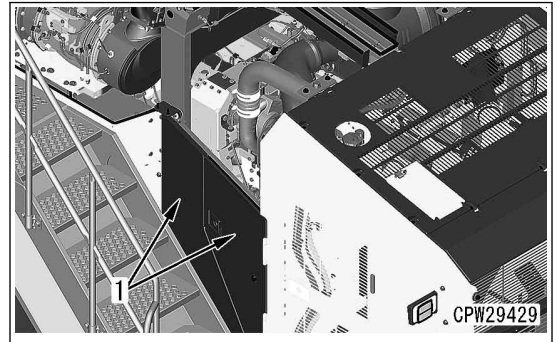
58 ℓ

Air bleeding

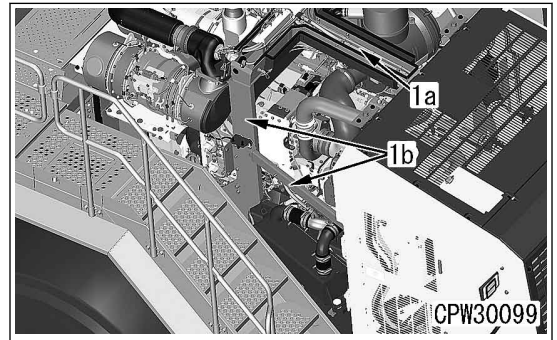
17. Bleed air from the coolant circuit. For details, see TESTING AND ADJUSTING, "BLEED AIR FROM COOLANT CIRCUIT OF AdBlue/DEF TANK".

Cover

- 3. Remove the side covers (1).

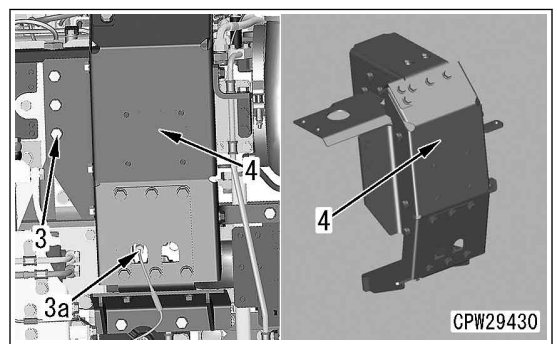


- 4. Sling the trench (1a), hold it, and remove the side supports (1b).

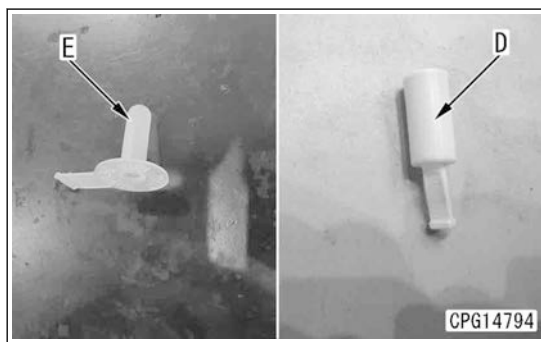
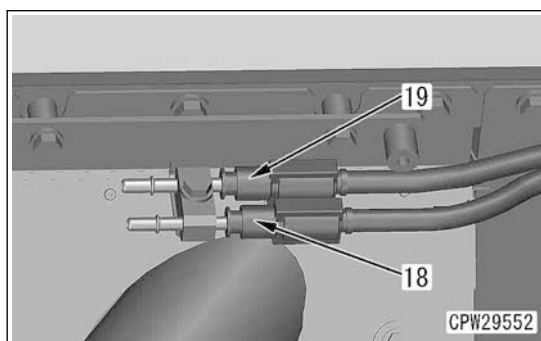
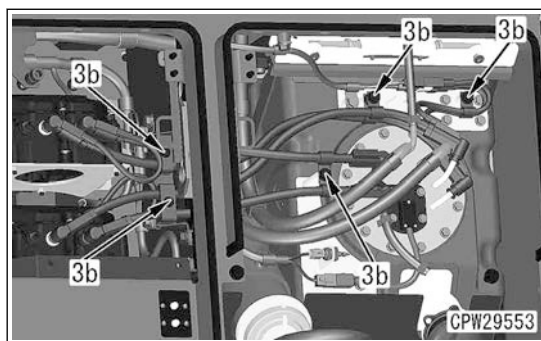
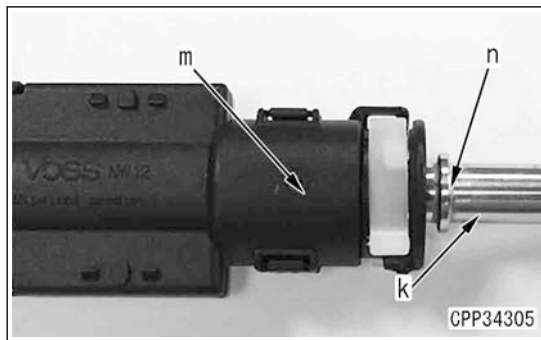


Heat shield

- 5. Remove the exhaust gas temperature sensor (3a).
- 6. Remove the bolts (3) (34 pieces), and remove the heat insulation covers (4) and the set of support bracket.

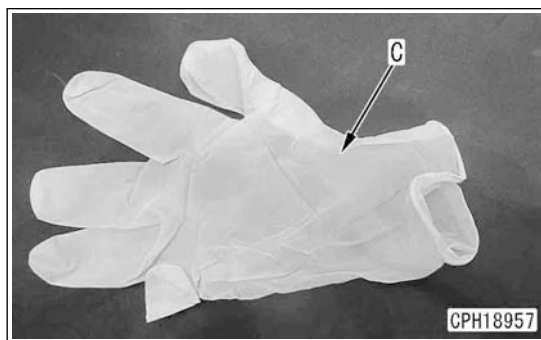


- Insert the connectors (m) of AdBlue/DEF hoses (22), (23), (24), and (25) into the pins (k) on the tank side until click sound is heard to connect them.
 - When they are inserted so that the convex portions (n) of the pins (k) pass the convex portions inside of the clips, they can be locked by the clips.
3. Connect the connectors UHBP (20) and UHB (21).
 4. Install the clamps (3b) (5 places) between AdBlue/DEF pump and AdBlue/DEF tank.
 5. Remove the caps (E) on the AdBlue/DEF hose side and the caps (D) on the nipple side, and connect AdBlue/DEF hoses (18) and (19).

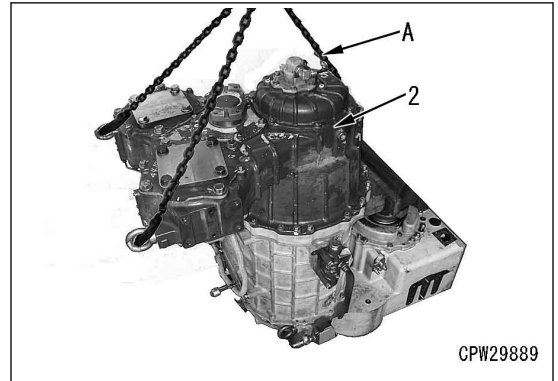


NOTICE

- When handling AdBlue/DEF, be sure to use the vinyl gloves (C).
- Clean the connecting portions of AdBlue/DEF hoses (18) and (19) and the pins of joints thoroughly, and check that there are no dust and damage on them. Check also that damage is not found.



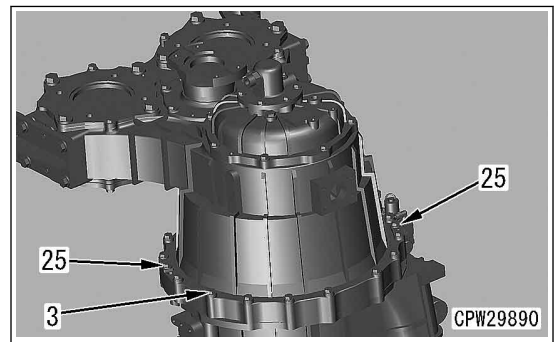
8. By using the lifting tool (A), sling the torque converter and PTO assembly (2), and hold them.




9. Remove the bolts (3) (16 pieces).

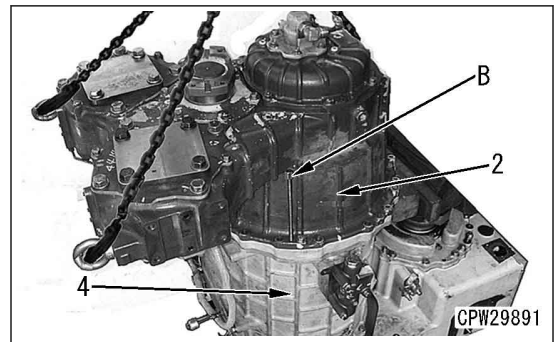
REMARK

Do not remove the sub assembly bolts (25) (2 pieces).



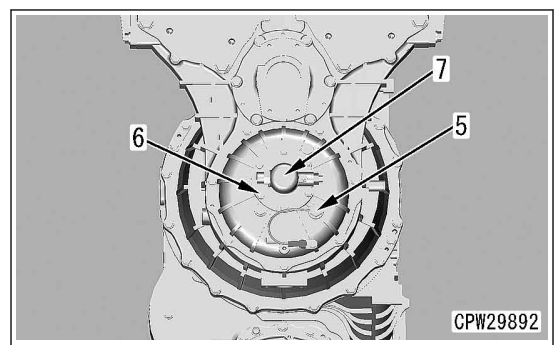
10. By using the guide bolts (B), remove the torque converter and PTO assembly (2) from the transmission assembly (4).

 Torque converter and PTO assembly (2):
490 kg

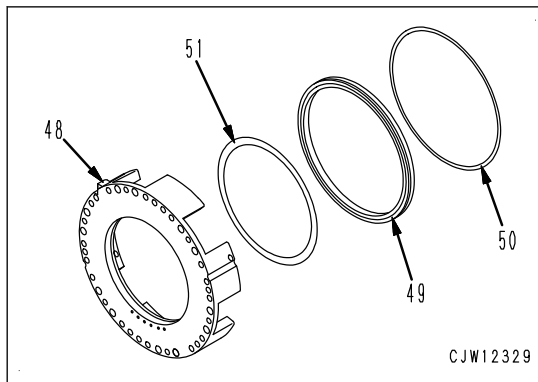


Seal cage

11. Remove the modulation clutch speed sensor (5).
12. Remove the bolt (6), and remove the seal cage (7).

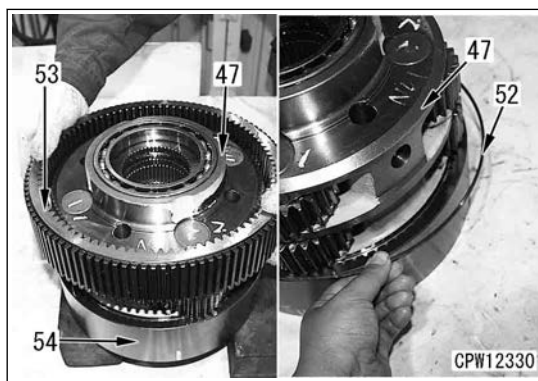


39. Remove the piston (49), the seal ring (50), and the seal ring (51) from the housing (48).

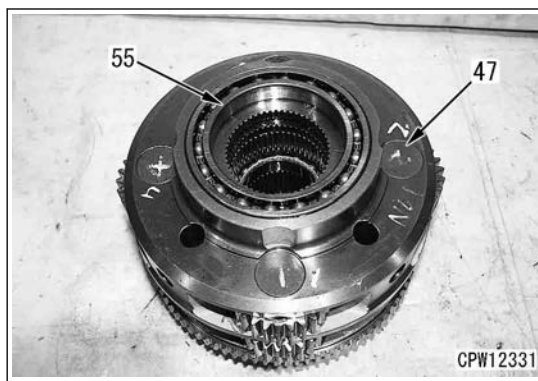


Disassembling the ring gear, carrier assembly

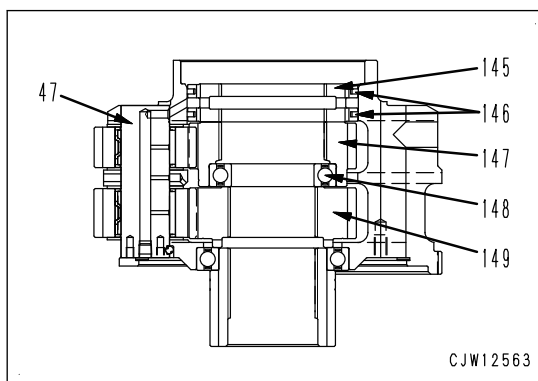
40. Invert the ring gear and carrier assembly. (47)
41. Remove the ring gear (53).
42. Remove the snap ring (52), and remove the ring gear (54).



43. Remove the bearing (55) from the carrier assembly (47).

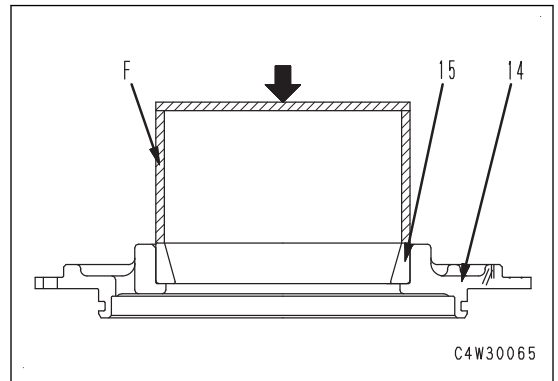


44. Remove the spacer (145) from the carrier assembly (47).
45. Remove the seal rings (146) (2 pieces) from the spacer (145).
46. Remove the sun gear (147).
47. Remove the bearing (148) from the sun gear (147).
48. Remove the sun gear (149).



Bearing cage assembly (input shaft gear side)

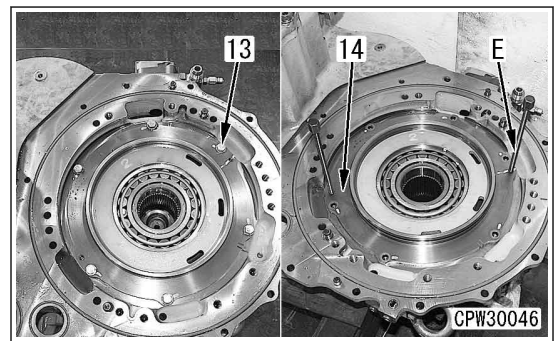
14. Press fit the outer race (15) into the bearing cage (14) by using the push tool (F).



15. Install the bearing cage assembly (14) by using the guide bolts (E).
 16. Install the bolts (13) (6 pieces).



Bolt (13):
 Liquid adhesive (LT-2)



17. Perform shim adjustment of the bearing cage (61).

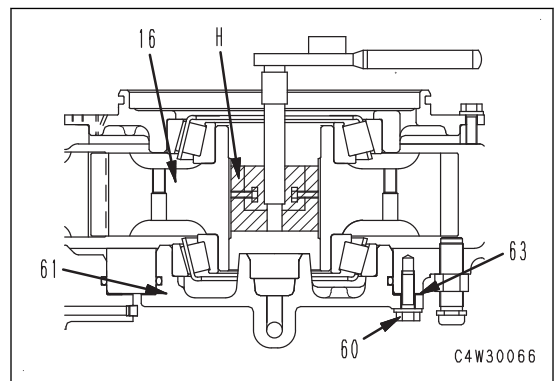
REMARK

Rotating torque becomes approximately double since preload adjustment of the input shaft bearing is performed with the idler shaft bearing installed.

- 1) Install the bearing cage (61) without the shim (63) with the bolt (60).



Bolt (60):
 4.9 Nm {0.5 kgm}



REMARK

Use the total number of the bolts.

- 2) After rotating the input shaft gear (16) by 20 turns, check that the tightening torque of the bolt (60) does not change.
 3) Repeat rotating the input shaft gear (16) by 20 turns and checking of the tightening torque of the bolt (60).
 4) Insert the shim (63) (standard thickness 1.1 mm), and tighten the bolt to the specified torque.
 5) By using the wrench assembly (H) and a torque wrench, measure the rotating torque of the idler shaft gear (16).

Rotating torque: 1.96 to 3.92 Nm {0.2 to 0.4 kgm}

Standard shim thickness: 1.1 mm

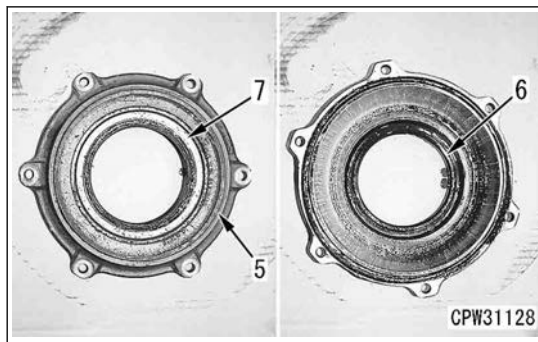
Standard clearance: 0.85 to 1.70 mm

REMARK

Check that there is no play on the gear.

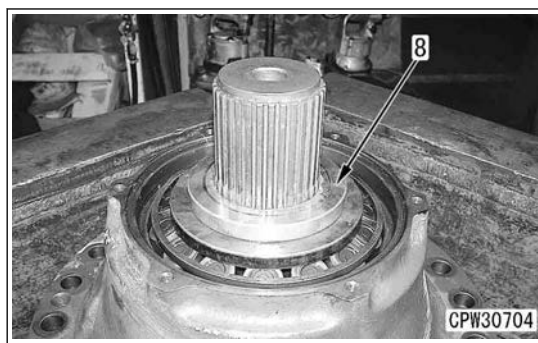
- 6) Adjust the shims so that the rotating torque is within the range shown above.
 7) After the adjustment, tighten the bolt to the specified torque.

- Remove the oil seal (6) and the dust seal (7) from the cage (5).



Support, bevel pinion assembly


- Remove the retainer (8).

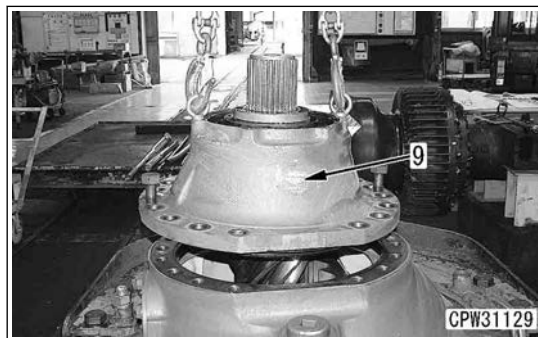


- Remove the bolts (20 pieces), sling the support and bevel pinion assembly (9), and remove them.

REMARK

Remove O-ring.

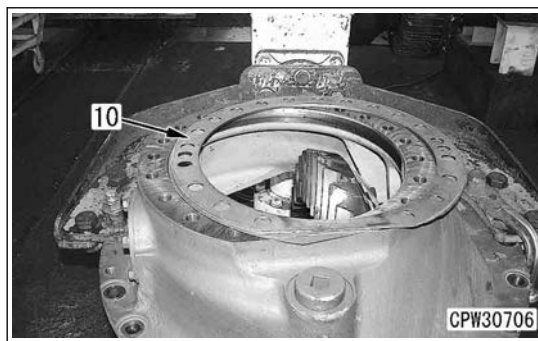
 Support and bevel pinion assembly (9):
100 kg



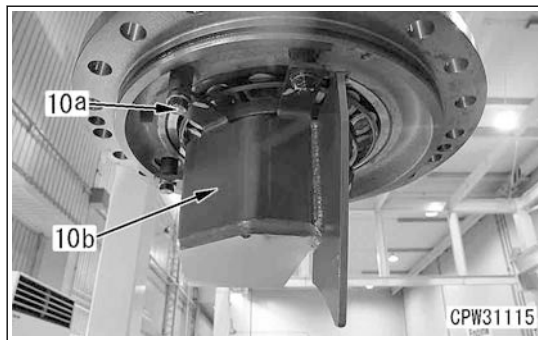
- Remove the shims (10).

REMARK

Check the quantity of the shims (10).



- Remove the bolts (10a) (3 pieces), and remove the pinion gear cover (10b).



BRAKE SYSTEM

DISASSEMBLE AND ASSEMBLE BRAKE ASSEMBLY

Tools to be used when disassembling and assembling the brake assembly

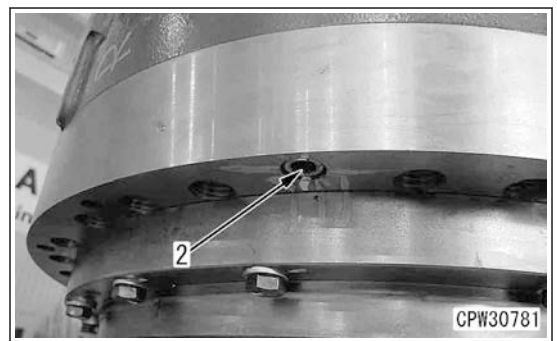
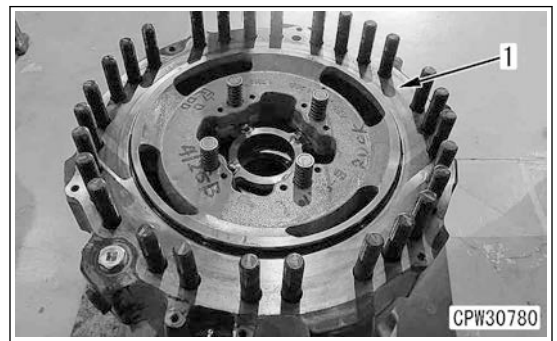
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Lifting tool	•	1			Removing and installing the brake assembly

⚠ Clean all parts, and check them for dust or damage, and apply Power line oil (TO30 or equivalent) before assembling.


METHOD FOR DISASSEMBLING BRAKE ASSEMBLY

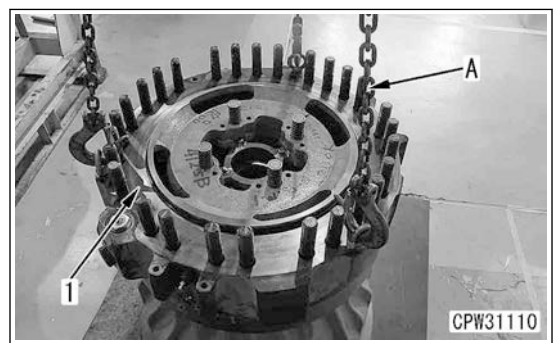
Brake assembly

1. Remove the hexagonal socket head bolts (2) (4 pieces) of the brake assembly (1).



2. By using the lifting tool (A), sling the brake assembly (1), and remove it.

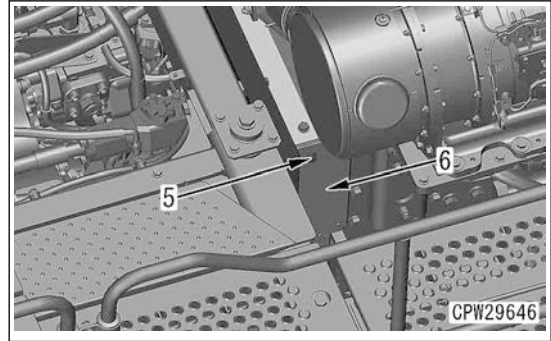
 Brake assembly (1):
200 kg



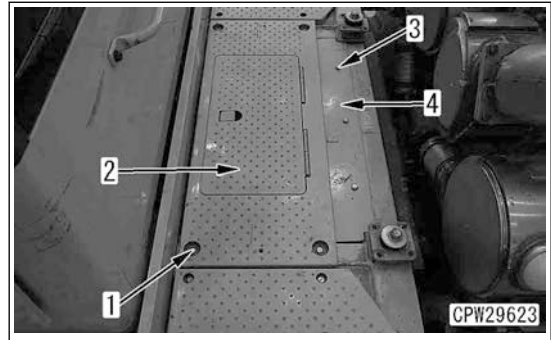
11. Install the cover (6) with the bolts (5) (3 pieces).

REMARK

Install the cover (6) on the opposite side according to the same procedure.



12. Install the cover (4) with the bolts (3) (3 pieces).
13. Install the cover (2) with the bolts (1) (4 pieces).



Engine hood assembly

14. Install the engine hood assembly. For details, see “REMOVE AND INSTALL ENGINE HOOD ASSEMBLY”.

Refilling with hydraulic oil

15. Refill with oil to the specified level through the oil filler port of the hydraulic tank. Run the engine to circulate the oil through the piping. Then check the oil level again. (For details, see STRUCTURE AND FUNCTION, “TABLE OF FUEL, COOLANT, AND LUBRICANTS”.)



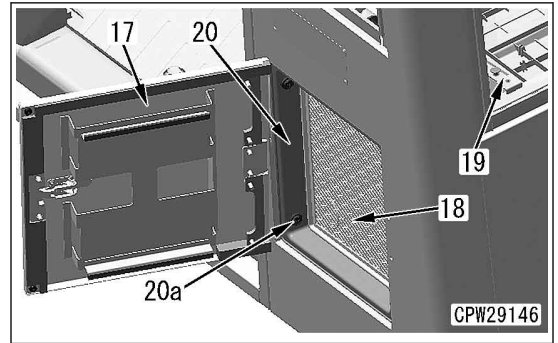
Hydraulic tank:

443 ℓ

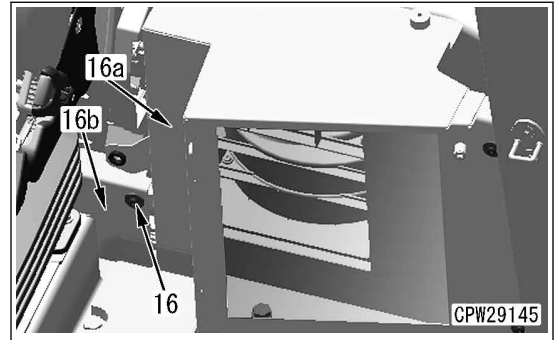
Air bleeding

16. Bleed air from the hydraulic circuit. For details, see TESTING AND ADJUSTING, “BLEED AIR FROM HYDRAULIC CIRCUIT”.

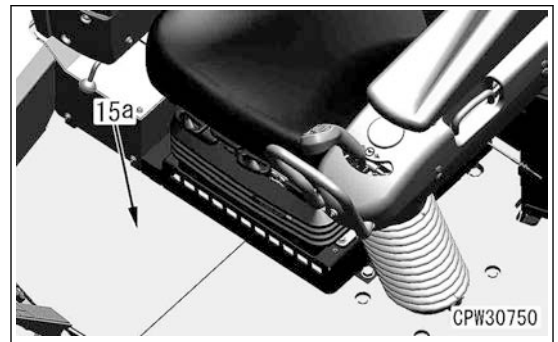
- 38. Install the fresh air filter duct (20) with the bolts (20a) (4 pieces) and the clip (19).
- 39. Install the fresh air filter (18).
- 40. Close the fresh air filter cover (20).



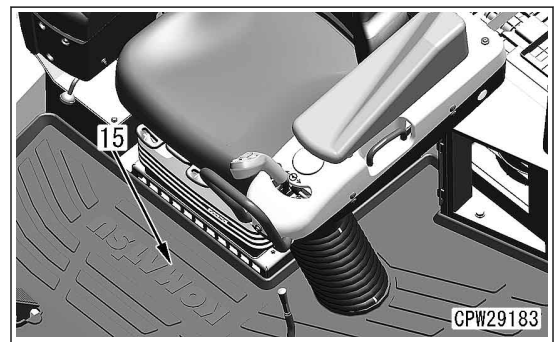
- 41. Install the covers (16a) and (16b) with the bolts (16) (7 pieces).



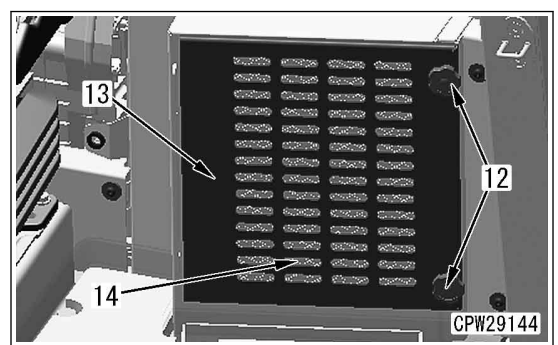
- 42. Install the sheet (15a).



- 43. Install the floor mat (15).



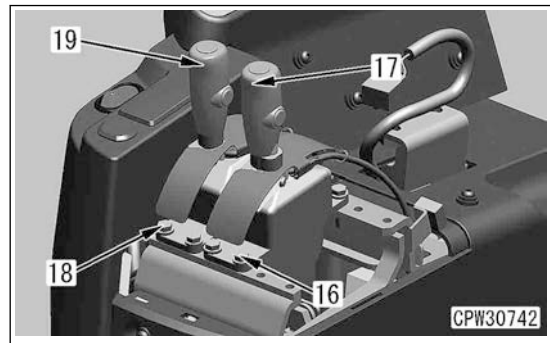
- 44. Install the recirculation air filter (14).
- 45. Install the recirculation air filter cover (13) with the bolts (12) (2 pieces).



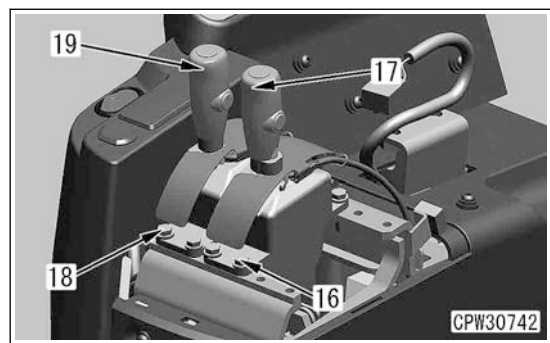
REMOVE AND INSTALL WORK EQUIPMENT CONTROL LEVER

Work equipment control lever

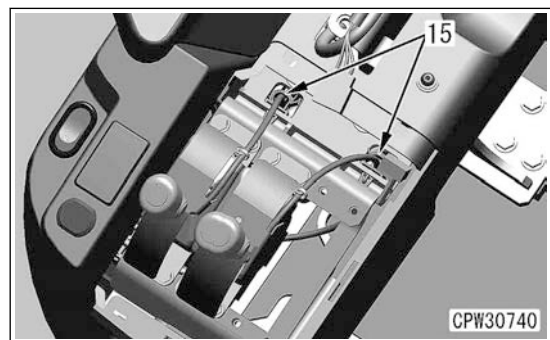
9. Remove the bolts (16) (4 pieces), and remove the bucket lever (17).
10. Remove the bolts (18) (4 pieces), and remove the boom lever (19).

**METHOD FOR INSTALLING WORK EQUIPMENT CONTROL LEVER****Work equipment control lever**

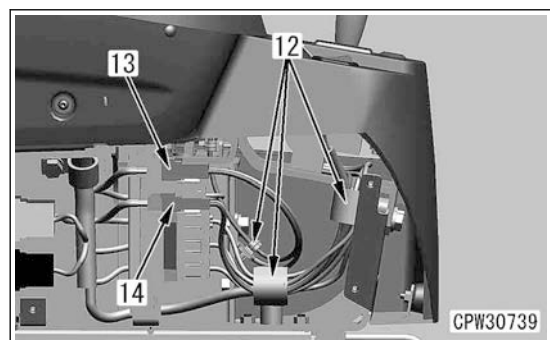
1. Install the boom lever (19) with the bolts (18) (4 pieces).
2. Install the bucket lever (17) with the bolts (16) (4 pieces).

**Clamp, connector**

3. Install the clamps (15) (2 places).

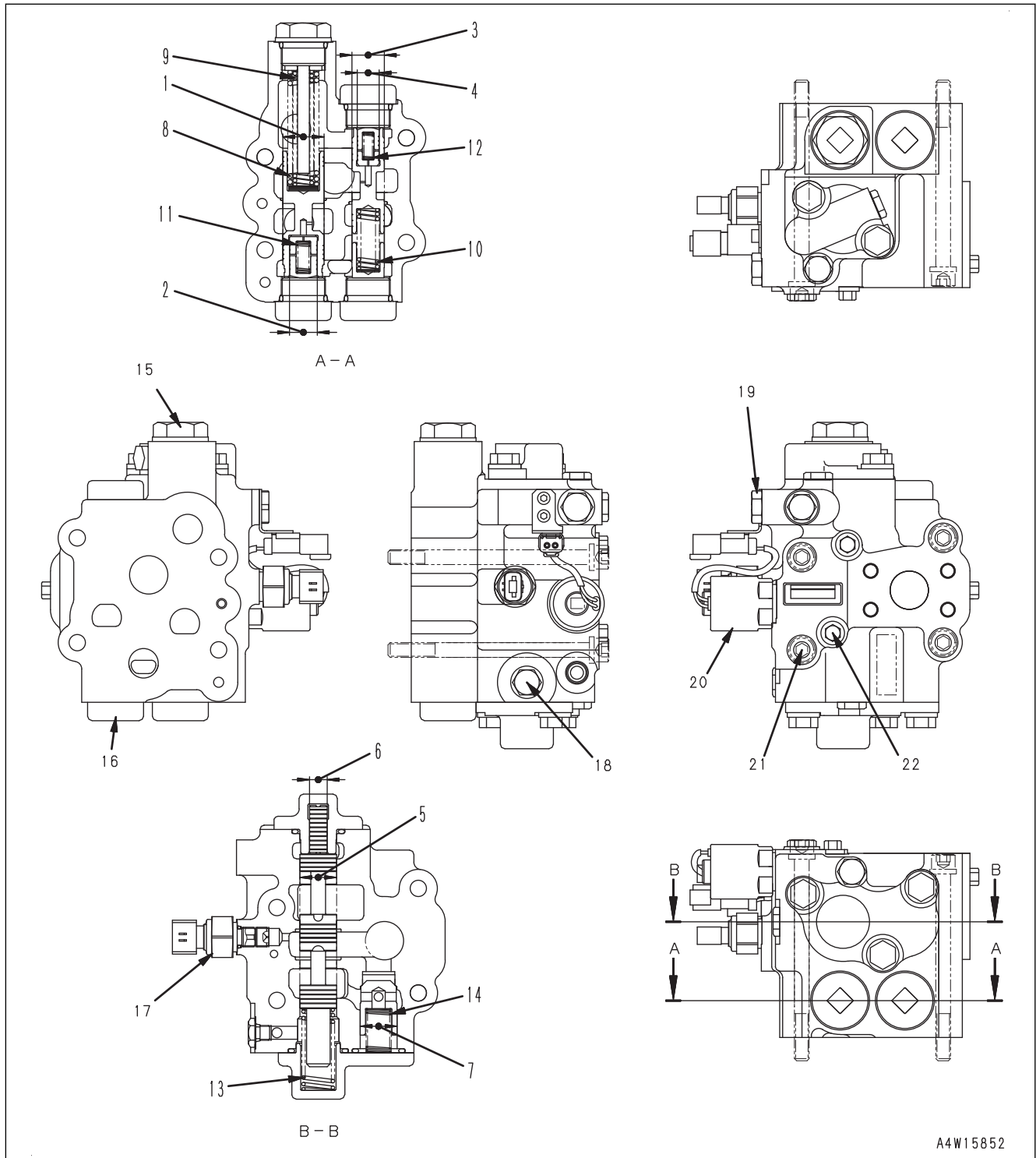


4. Connect the connectors S05 (red) (13) and S06 (14), and install the clamps (12) (3 places).



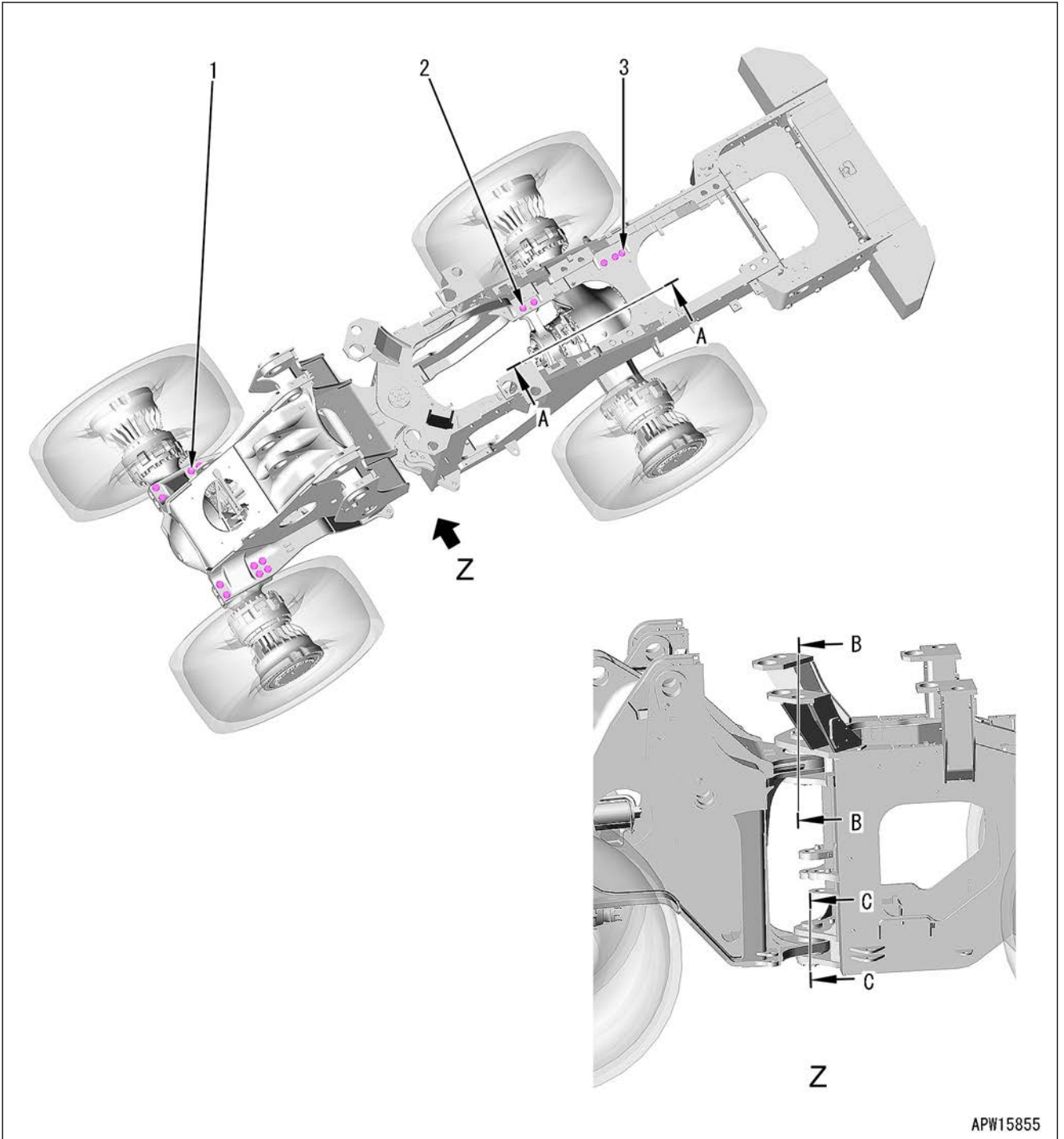
60 MAINTENANCE STANDARD

MAINTENANCE STANDARD OF MAIN RELIEF VALVE, TORQUE CON-
VERTER RELIEF VALVE, AND MAIN FLOW SELECTOR VALVE



UNDERCARRIAGE AND FRAME

MAINTENANCE STANDARD OF FRAME, AXLE MOUNT AND CENTER HINGE PIN



APW15855

No.	Item	Judgment criteria	Remedy
1	Tightening torque of nut	2890 to 3630 Nm {295 to 370 kgm}	Retighten
2	Tightening torque of nut	2450 to 3040 Nm {250 to 310 kgm}	
3	Tightening torque of nut	2450 to 3040 Nm {250 to 310 kgm}	

AIR CONDITIONER SYSTEM

PRECAUTIONS FOR REFRIGERANT

- ⚠ If refrigerant gas (air conditioner gas: R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Put on protective eyeglasses, gloves and working clothes with long sleeves while collecting the refrigerant or filling the air conditioner circuit with the refrigerant.
- ⚠ When replacing the air conditioner unit, air conditioner compressor or condenser, etc., collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit before disconnecting the air conditioner hoses.

NOTICE

- Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.
- Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a).

TEST (DUAL) PRESSURE SWITCH FOR REFRIGERANT

- ⚠ Place the machine on a level ground, set parking brake to “PARK” position, stop the engine, and chock the tires.
- ⚠ Turn the battery disconnect switch to OFF position.
- ⚠ Since refrigerant is potentially hazardous to health and environment, collect it before replacing the dual pressure switch.
See “PRECAUTIONS FOR REFRIGERANT” in chapter 80.

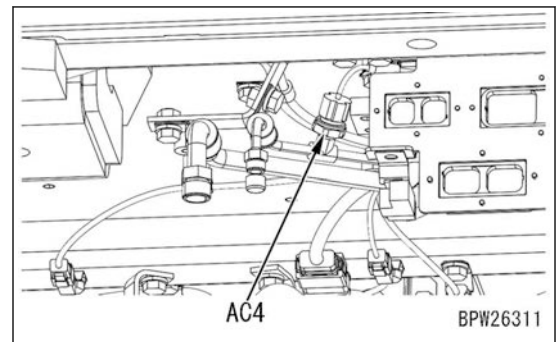
- Write down the connector numbers and installed positions before disconnecting wiring harnesses and hoses.
- If [879GKX] is displayed by the self-diagnosis (on "Air-conditioning System" screen of "Abnormality Record" in the machine monitor), test dual pressure switch connector AC4.
To reset the self-diagnosis system (detection of abnormality), turn the starting switch to OFF position.
- The dual pressure switch unit is ON when the refrigerant pressure is normal and OFF when the refrigerant pressure is abnormal.

REMARK

When the ambient temperature decreases below 0 °C, the refrigerant pressure decreases, thus the dual pressure switch may be turned OFF. In this case, the dual pressure switch is normal.

METHOD FOR TESTING (DUAL) PRESSURE SWITCH FOR REFRIGERANT

1. Remove the exterior cover at the rear side of the cab.
2. Disconnect the dual pressure switch connector AC4.



3. Check if the resistance between the switch-side terminals of connector AC4 is shorted (ON). (If it is not shorted, the dual pressure switch is OFF and detects abnormal refrigerant pressure.)

If the dual pressure switch is OFF, attach a pressure gauge to the high-pressure line of the air conditioner compressor and check the refrigerant pressure. If the refrigerant pressure is normal, the dual pressure switch is defective. See “Connection of service tool” and “Troubleshooting by gauge pressure”.

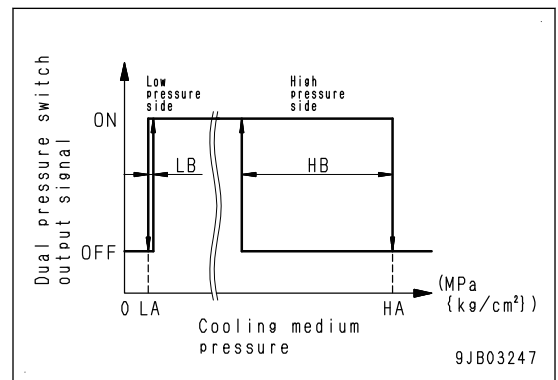
(Dual) Pressure switch

LA: 0.20 MPa {2 kg/cm²}

LB: 0.02 MPa {0.2 kg/cm²}

HA: 3.14 MPa {32 kg/cm²}

HB: 0.59 MPa {6 kg/cm²}



If resistance between the switch-side terminals from connector AC4 is shorted (ON), perform “Troubleshooting for compressor and refrigerant system”.

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