SEN06755-03

Shop Manual

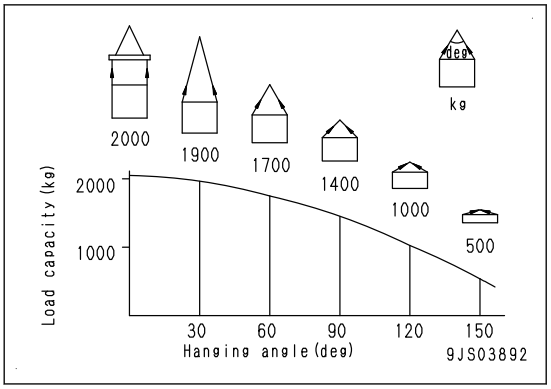
WHEEL LOADER **WA500-8E0**

SERIAL NUMBERS 90278 and up

KOMATSU

REMARK

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



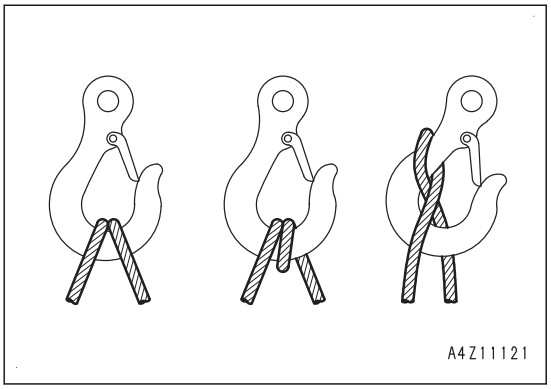
- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle part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

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

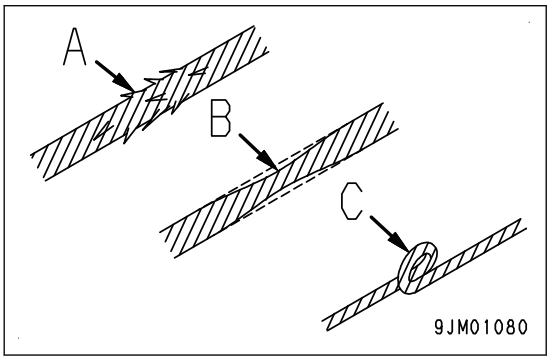
  ⚠ **Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting.**

  REMARK

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



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



Precautions for slinging up

- Wind in the crane slowly until wire ropes are stretched. When settling the wire ropes with the hand, do not grasp them but press them from above. If you grasp them, your fingers may be caught.
- After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
- If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
- Do not lift up the load at an angle.

Precautions for slinging down

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

Precautions for using mobile crane

REMARK

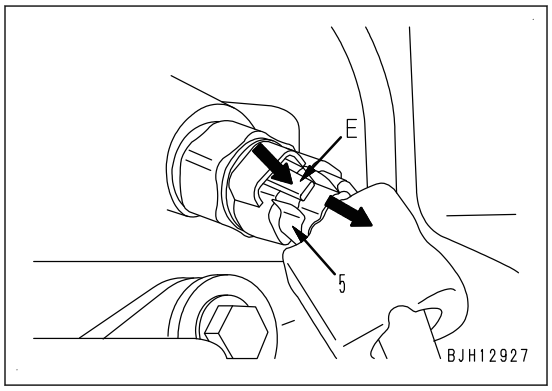
Read Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

Precautions for using overhead traveling crane

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

Method for disconnecting connector with lock to push (AMP-3)

While pressing lock (E), pull out connector (5) in the direction of the arrow.



Method for connecting connector with lock to push (AMP-3)

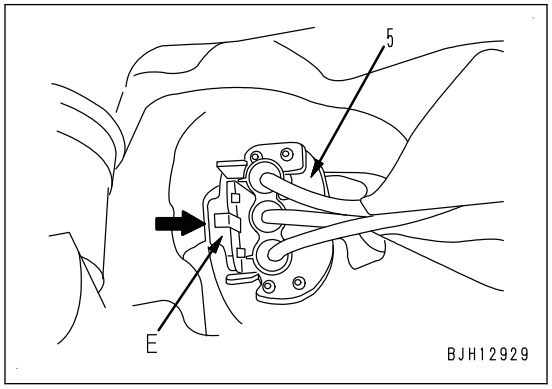
Insert it straight until it clicks.

Method for disconnecting connector with lock to push (SUMITOMO-3)

While pressing lock (E), pull out connector (5) in the direction of the arrow.

REMARK

Pull up the connector straight.

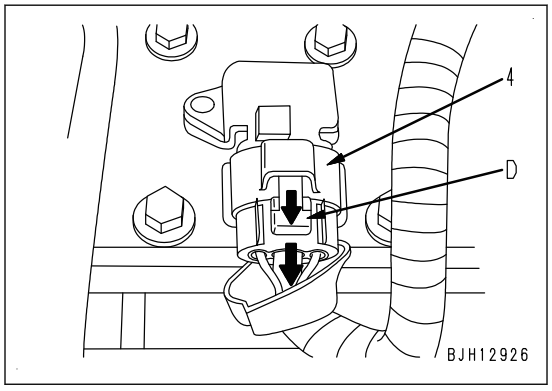


Method for connecting connector with lock to push (SUMITOMO-3)

Insert it straight until it clicks.

Method for disconnecting connector with lock to push (SUMITOMO-4)

While pressing lock (D), pull out connector (4) in the direction of the arrow.



Method for connecting connector with lock to push (SUMITOMO-4)

Insert it straight until it clicks.

TABLE OF FUEL, COOLANT, AND LUBRICANTS

For details of notes (Note 1, Note 2...) in the table, see “Operation and Maintenance Manual”.

Reservoir	Fluid Type	Ambient Temperature, degrees Celsius -22 -4 14 32 50 68 86 104 122 °F -30 -20 -10 0 10 20 30 40 50 °C	Recommended Komatsu Fluids
Engine oil pan	Engine oil for KDPF used in cold terrain (Oil Change interval 250 hours)	(Note.1)	EOS5W30-LA (KES Diesel Engine Oil)
		(Note.1)	EOS5W40-LA (KES Diesel Engine Oil)
	Engine oil for KDPF (Oil Change interval 500 hours)		EO10W30-LA (KES Diesel Engine Oil)
			EO15W40-LA (KES Diesel Engine Oil)
Transmission case	Power train oil (Note.2)		TO30 (KES)
			TO10 (KES)
Hydraulic system	Power train oil		TO10 (KES)
	Hydraulic oil		HO46-HM (KES)
			HO-MVK (KES)
	Engine oil		EO10W30-DH (KES)
			EO15W40-DH (KES)
Axle	Axle oil (Note.3)		AXO80 (KES)
	Power train oil (Note.4)		TO50 (KES)
Pin/Bushing Grease fitting	Hyper grease (Note.5)		G2-TE (KES)
	Lithium EP grease		G2-LI (KES)
Cooling system	Non-Amine Engine Coolant (AF-NAC) (Note.6)		AF-NAC (KES)
Fuel tank	Diesel fuel		ASTM D975 No.1-D S15
			ASTM D975 No.2-D S15
DEF tank	DEF	(Note.7)	DEF

AJD02892

Unit: ℓ

Places to supply oil, coolant, etc.	Specified capacity	Refill capacity
Engine oil pan	45	37
Transmission case	90	71
Hydraulic oil system	460	337
Axle (front wheel)	95	95

3: AdBlue/DEF tank sensor
4: AdBlue/DEF tank
5: Center flange assembly
6: AdBlue/DEF tank filter
7: Drain plug

AdBlue/DEF TANK SENSOR

STRUCTURE OF AdBlue/DEF TANK SENSOR

REMARK

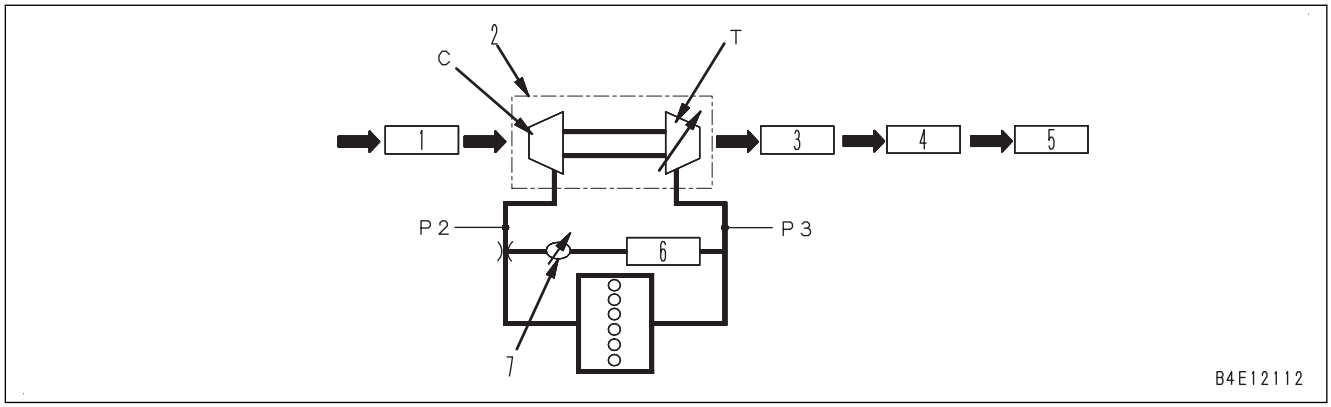
The shape is subject to machine models.

1: Connector
2: Concentration Sensing part
3: Temperature sensing part
4: Level sensing part

FUNCTION OF AdBlue/DEF TANK SENSOR

- This sensor is installed to AdBlue/DEF tank and outputs AdBlue/DEF level, AdBlue/DEF concentration, and AdBlue/DEF temperature through CAN communication.
- AdBlue/DEF level and AdBlue/DEF concentration are measured by using ultrasonic wave.
- When the tank is frozen or empty, AdBlue/DEF level and AdBlue/DEF concentration are not measured.

FUNCTION OF VGT



C: Blower impeller
T: Turbine impeller
1: Air cleaner
5: SCR assembly(*1)
2: VGT
6: EGR cooler
3: KDPF
7: EGR valve
4: AdBlue/DEF mixing tube(*1)

*1: This may not be installed on some machine models and specifications.

- The exhaust gas regulations are applied to the exhaust gas from the engine running at low speed, as well as at high speed. To meet this, the EGR ratio is improved. (EGR ratio = Ratio of amount of EGR to amount of fresh suction air)
- To attain high EGR ratio, turbine inlet pressure (P3) must be set higher than boost pressure (P2) (P3 > P2). For this reason, the variable turbocharger (VGT) is employed, in which the exhaust gas pressure acting on turbine impeller (T) is adjustable.
  Also, since the boost pressure increases more quickly, generation of particulate caused by lack of oxygen during low-speed operation (rotation) is reduced.
- The shaft joined to turbine impeller (T) drives blower impeller (C) and sends much air to the cylinder for combustion.
  If VGT (2) sends more air, the fuel injection rate can be increased, thus the engine output is increased.
  In addition, the air cooled by aftercooler becomes dense, that is, more oxygen is supplied, thus the fuel injection rate can be increased and the engine output is increased.

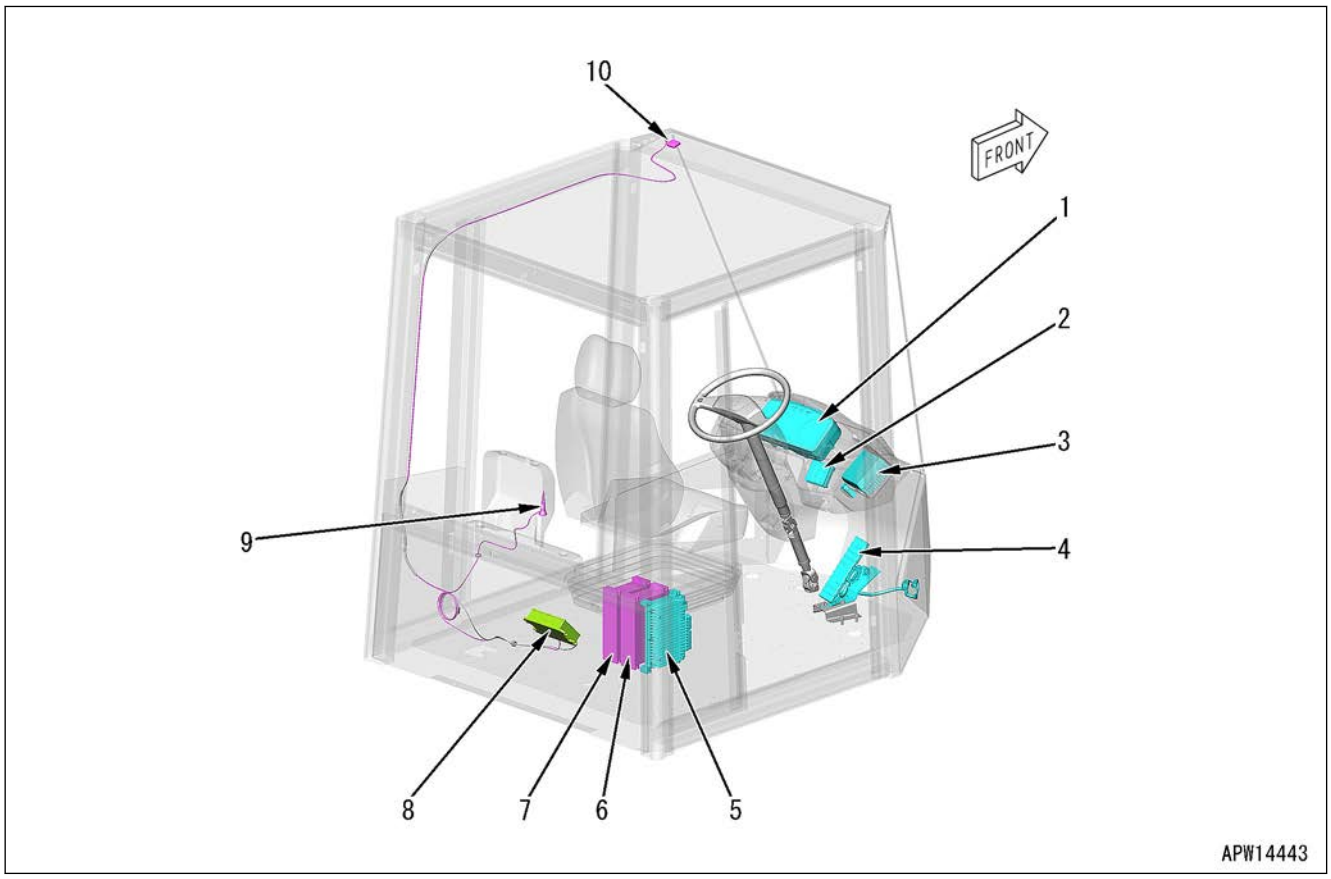
NOTICE

Adequate amount of clean high quality oil is required to maintain VGT performance. Be sure to use Komatsu genuine high quality oil. Follow the procedures in the Operation and Maintenance Manual when replacing oil or oil filter.

REMARK

It sounds like air is leaking from VGT or a boost pipe, but it is not abnormal.

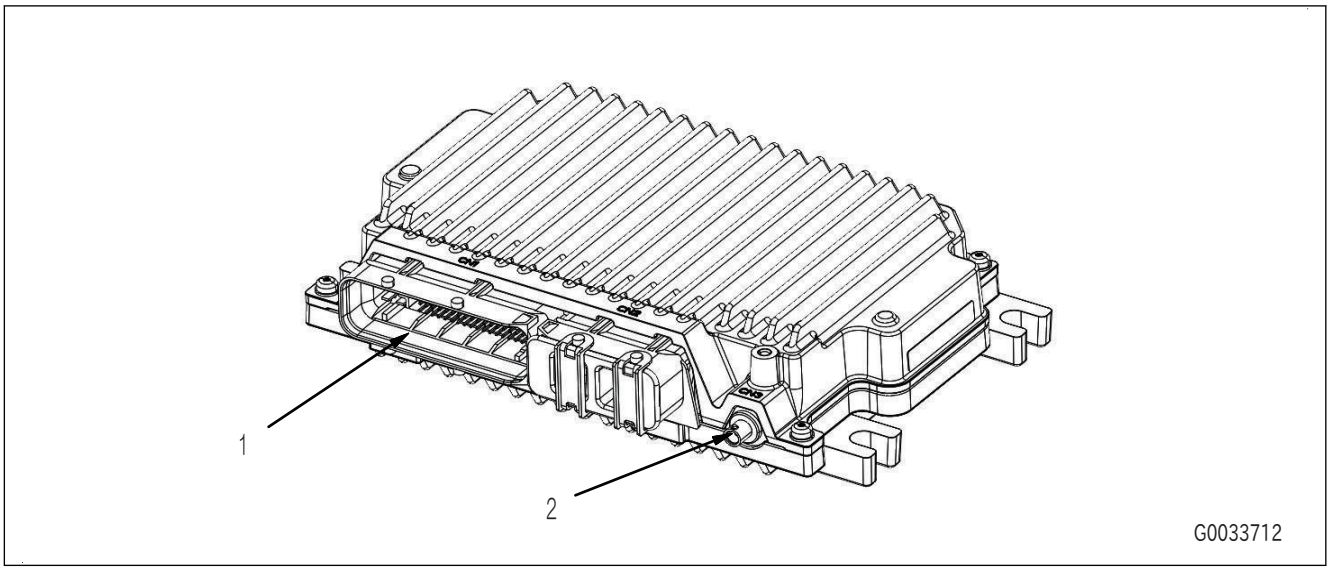
Around the cab and floor



1: Machine monitor
2: Switch panel
3: Rearview monitor
4: Accelerator pedal
5: Monitor controller
6: Transmission controller
7: Work equipment controller
8: KOMTRAX terminal
9: KOMTRAX communication antenna
10: KOMTRAX GPS antenna

GATEWAY FUNCTION CONTROLLER

FUNCTION OF GATEWAY FUNCTION CONTROLLER



1: Machine wiring harness connection port (AMP-81P) 2: GNSS antenna connection port

The Gateway Function Controller is used to transmit various information about machines obtained from network signals and input signals, and GPS location information via wireless communication. It sends the information through the communication terminal.

You can check the condition of this controller on the KOMTRAX Setting screen in the service mode of the machine monitor.

NOTICE

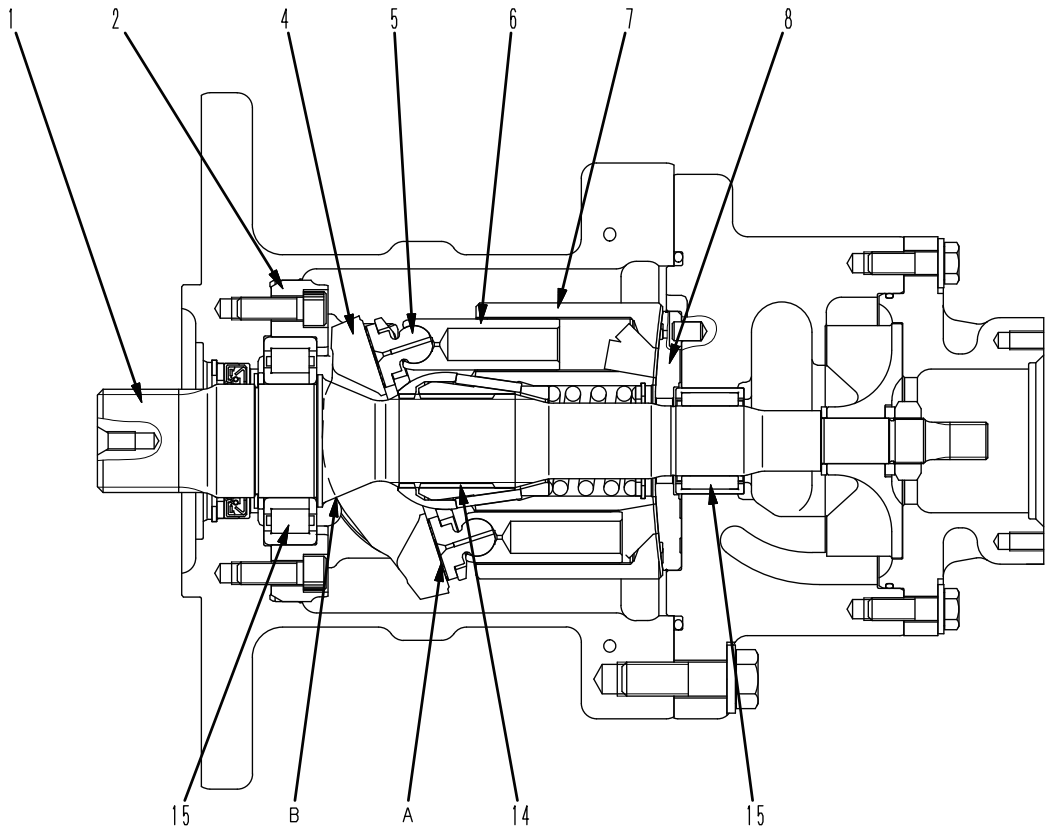
The Gateway Function Controller cannot be used in countries or regions without legal permission.

INPUT AND OUTPUT SIGNALS OF GATEWAY FUNCTION CONTROLLER

AMP-81P “L80”

Pin No.	Signal name	Input/output signal
1	Turn on the power supply.	Input
2	Power supply GND	Input
3	Turn on the power supply.	Input
4	Power supply GND	Input
5	Frame ground	Input
6	(*1)	-
7	CAN_H (Komnet/r)	Input/output
8	CAN_H (sensor 2)	Input/output
9	(*1)	-
10	(*1)	-
11	(*1)	-
12	(*1)	-
13	(*1)	-
14	Ethernet_RX- (service tool)	Input

Structure



- Cylinder block (7) is supported to shaft (1) by spline (14).
- Shaft (1) is supported by each bearing (15) at the front and rear.
- The tip of piston (6) is shaped as a concave sphere and is crimped together with shoe (5).
- Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has flat surface (A), and shoe (5) is always pressed against this surface while sliding in a circular pattern.
- Rocker cam (4) rocks on cylindrical surface (B) of cradle (2) fixed to the case. High-pressure oil is supplied between them to form a static pressure bearing.
- Piston (6) moves relatively in the axial directions inside each cylinder chamber of cylinder block (7).
- Cylinder block (7) rotates relatively to valve plate (8) while sealing the pressurized oil.
- The oil pressure is balanced properly on the sealing surface of cylinder block (7) and valve plate (8).
- The pressurized oil is sucked in and discharged from each cylinder chamber in cylinder block (7) through valve plate (8).

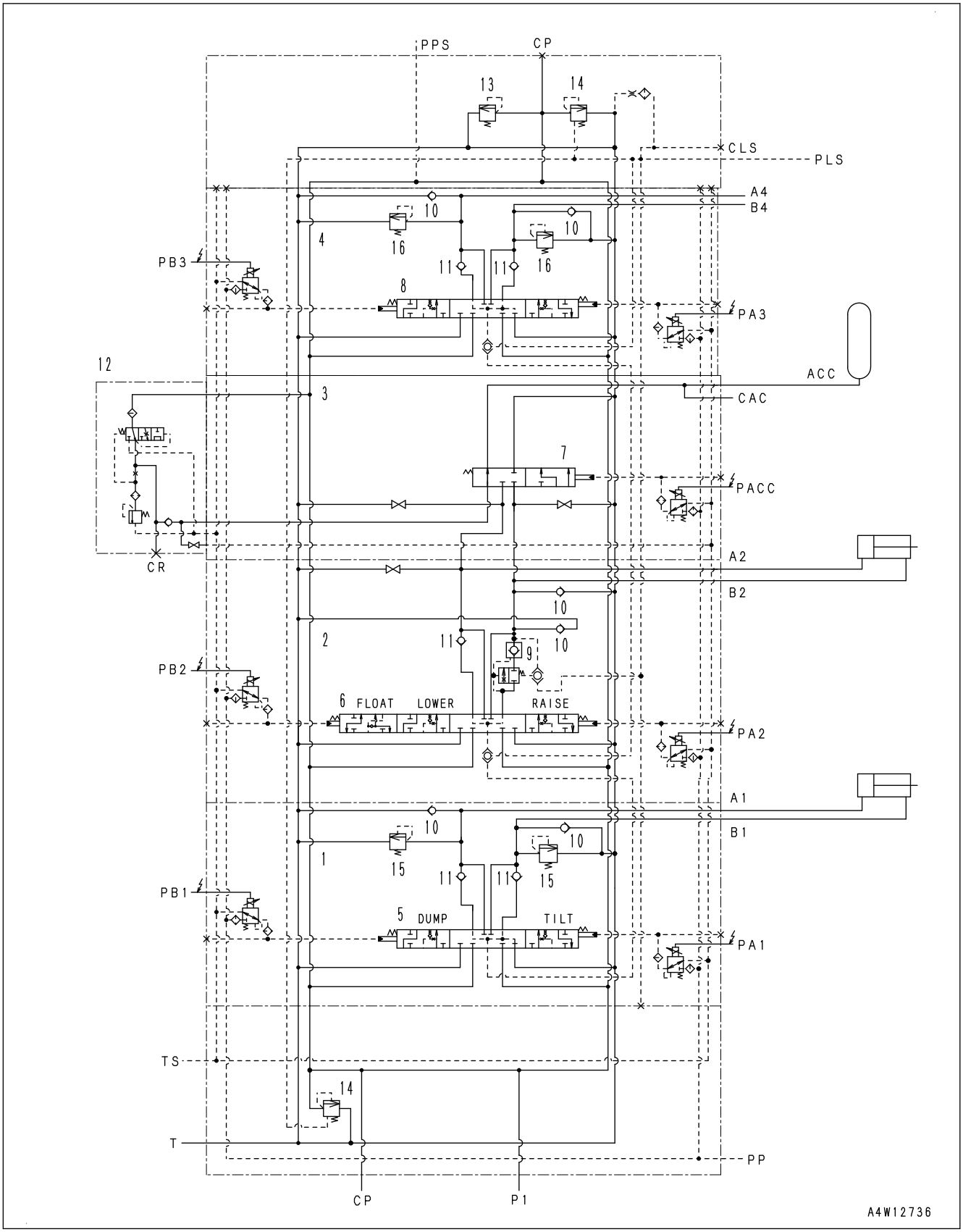
SPECIFICATIONS OF WORK EQUIPMENT PUMP

Model: HPV190

Type: Variable displacement swash plate type piston pump

Theoretical discharged volume: 170 ± 1 cm^3/rev

HYDRAULIC CIRCUIT DIAGRAMS OF CONTROL VALVE AND NAMES OF VALVES



1: Bucket valve
2: Boom valve
3: ECSS valve
4: Attachment valve

- The downshift protection is effective even in the kickdown operation. If the kickdown switch is pressed when the travel speed is higher than the protection condition, it is not accepted but the alarm buzzer sounds for 3 seconds.
- The downshift protection is effective even when the auto kickdown is applied, but the alarm buzzer does not sound in this case.
- Alarm buzzer sounds if directional lever is shifted to N position when running the engine at high speed (25 km/h or higher) in order to prevent the damage to the transmission.
- The downshift protection operates under the following condition.

Downshift target gear speed	Transmission output shaft speed (rpm) {Reference: Actual travel speed (km/h)}	
	Protection condition	Protection cancellation condition
To 3rd	Min. 1721 (26.1)	Below 1549 (23.5)
To 2nd	Min. 1102 (16.7)	Below 964 (14.6)
To 1st	Min. 895 (15.6)	Below 861 (13.1)

ENGINE OVERRUN PREVENTION FUNCTION

- If the engine speed rises above 2425 rpm, the alarm buzzer sounds for notice of operation of engine overrun prevention function. The alarm buzzer stops when the engine speed lowers below 2325 rpm.
- If the engine speed rises above 2525 rpm, the lockup is canceled automatically to prevent overrun of the engine.
- The alarm buzzer sounds while the engine overrun prevention function is in operation.
- Once the lockup is canceled, the lockup condition is maintained for 5 seconds. When the transmission output shaft speed becomes a level corresponding to the engine speed 2375 rpm or less after 5 or more seconds, the lockup is applied again.
- This function upshifts the gear when the engine speed exceeds 2525 rpm during traveling with torque converter, and sounds the alarm. This function does not downshift for three seconds after the upshifting.
- This function stops sounding the alarm when the engine speed drops below 2375 rpm after a lapse of three seconds, and controls the gear shift with a normal control.
- This function does not upshift during traveling with 4th speed, but operates the alarm.

MAXIMUM SPEED LIMITATION FUNCTION

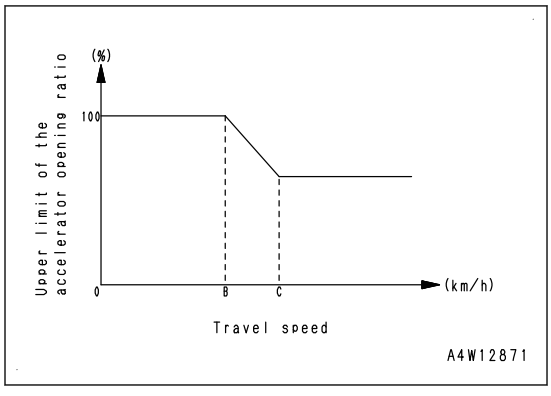
- If travel speed exceeds the specified maximum travel speed, alarm buzzer sounds.

  Alarm activation specified value (actual travel speed): 40.0 km/h

  Alarm cancellation specified value (actual travel speed): 39.5 km/h
- If the travel speed exceeds the specified value in 4th lockup mode, the upper limit of the accelerator pedal position is restricted to limit the maximum travel speed.
  This function works only when shift range is F4 or R4.

  Actual travel speed (B): 36.8 km/h

  Actual travel speed (C): 37.8 km/h



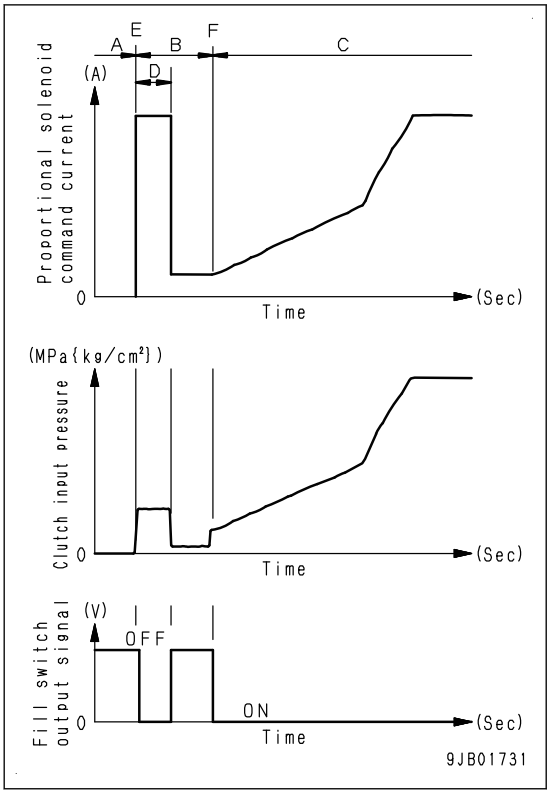
ECMV and fill switch

For each ECMV, 1 fill switch is installed.

When the clutch is filled with oil, the fill switch is turned “ON” by the pressure on the clutch. This signal allows the oil pressure to build up.

OPERATION OF FORWARD AND REVERSE CLUTCH ECMV AND GEAR SPEED CLUTCH ECMV

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



Range A: Before shifting gear (when oil is drained)

Range B: Being filled

Range C: Pressure is being adjusted

Range D: Being filled (being triggered)

Point E: Filling is started

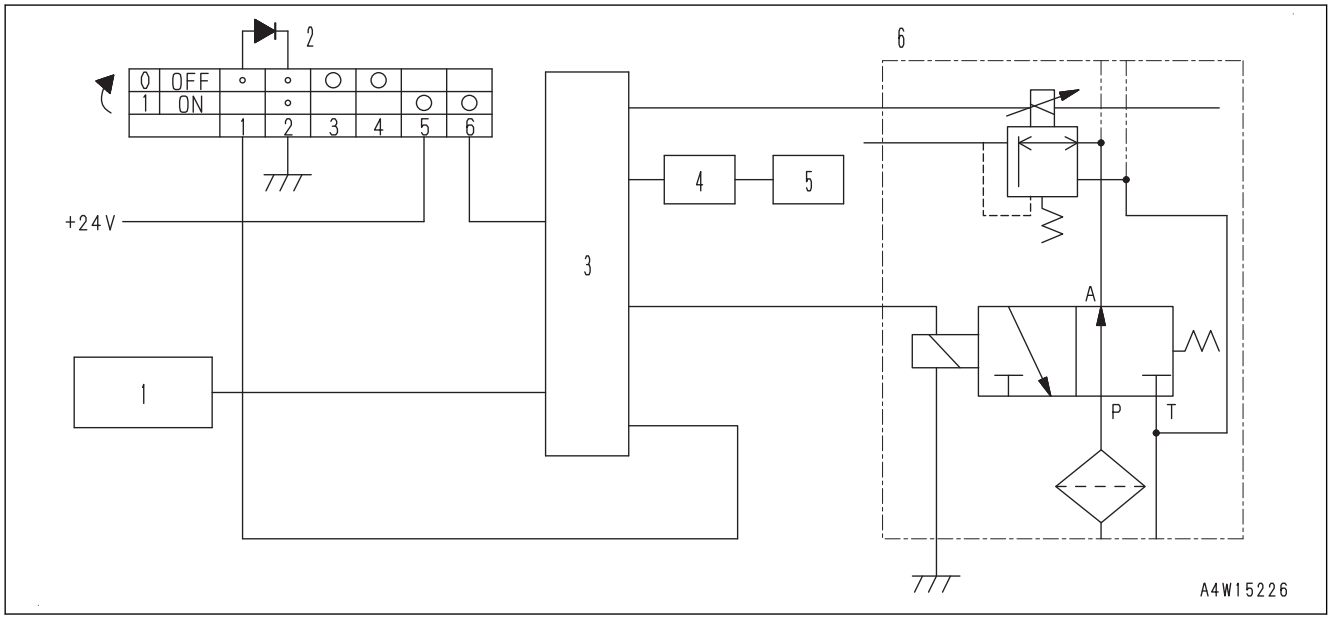
Point F: Filling is finished

REMARK

This is a logic that the controller does not recognize completion of filling even if the fill switch is turned “ON” during the triggering period (range D).

WORK EQUIPMENT NEUTRAL LOCK SYSTEM

WORK EQUIPMENT NEUTRAL LOCK SYSTEM DIAGRAM



1: Transmission controller
2: Work equipment lock switch
3: Work equipment controller
4: Monitor controller
5: Machine monitor
6: Work equipment neutral lock valve

FUNCTION OF WORK EQUIPMENT NEUTRAL LOCK SYSTEM

- When the work equipment lock switch is operated, the controller turns the output to the work equipment EPC off to stop the operation of the work equipment.
- If ECSS switch is turned OFF, the work equipment neutral lock valve is turned ON to cut the EPC pilot source pressure to stop the operation of the work equipment.
- Work equipment is not unlocked and kept locked for safety even if an operator tries to unlock the work equipment while the lever is being operated and the work equipment is locked.

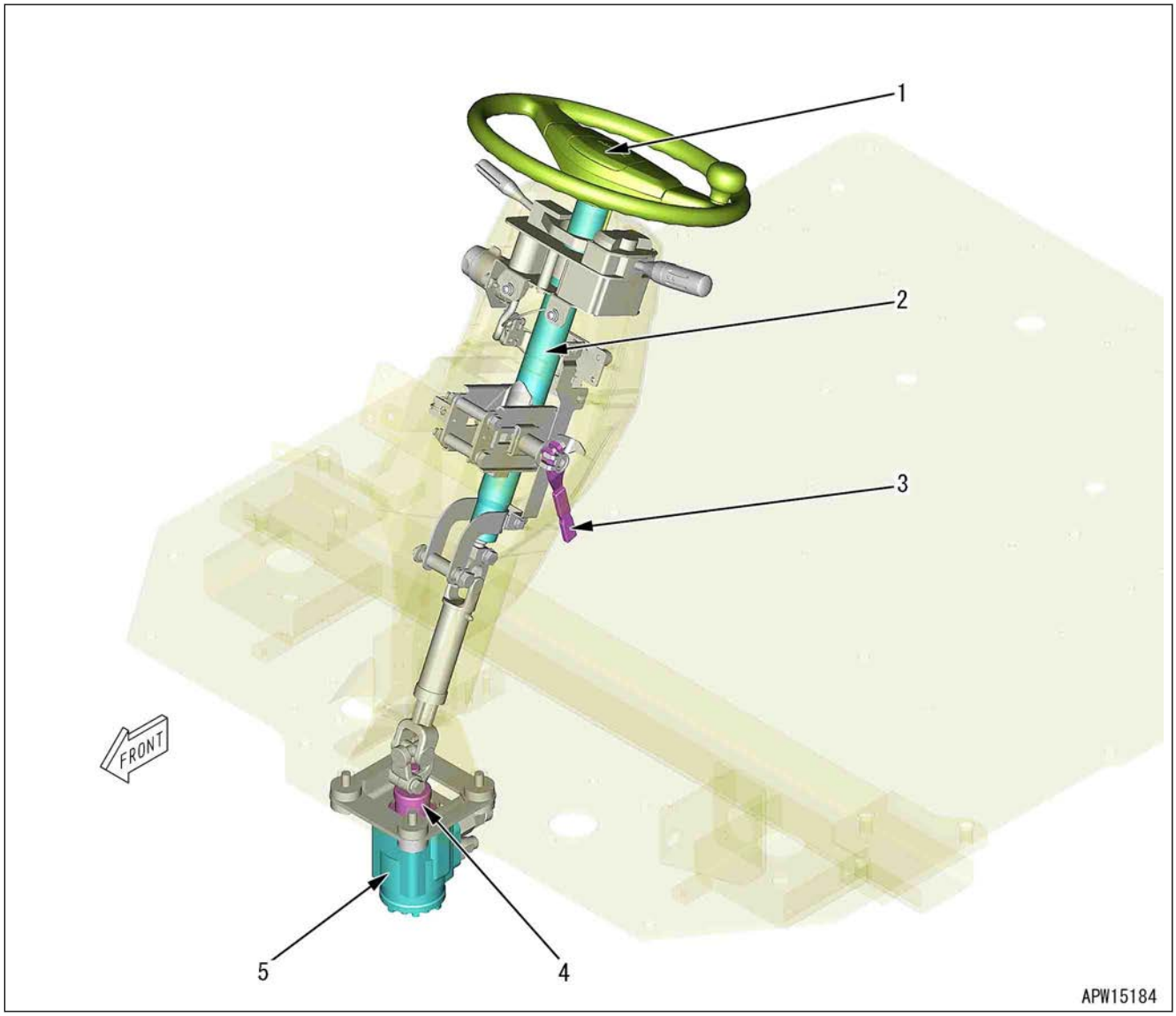
Operator's intention in operation of work equipment lock switch	Work equipment control lever state when work equipment lock switch is operated	Controller	Operation of ECSS	Controller Output				Movement of machine
					Work equipment lock indicator		Work equipment detent of work equipment EPC	
		Recognizes	ECSS SW signal (Transmission controller input)	Work equipment lock solenoid valve	Switch	Monitor		Hydraulic pressure
Being locked (no switch operation)	-	Being locked	ECSS SW = OFF	ON (24 V)	ON (lights up)	ON (lights up)	OFF (no output)	Cut (work equipment and ECSS stop)
			ECSS SW = ON	OFF (OPEN)				Only ECSS operates

STEERING COLUMN

STRUCTURE OF STEERING COLUMN

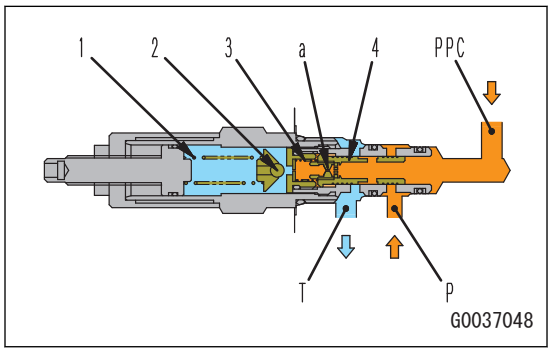
General view

(Steering wheel specification)



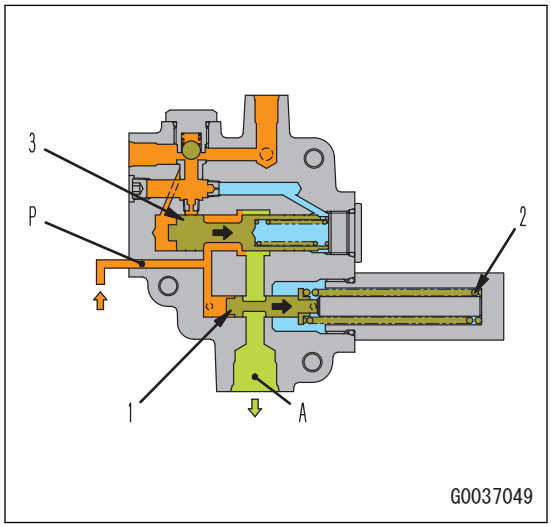
1: Steering wheel
2: Steering column
3: Steering tilt lock lever
4: Short column
5: Orbitrol valve

PPC relief valve (R3)



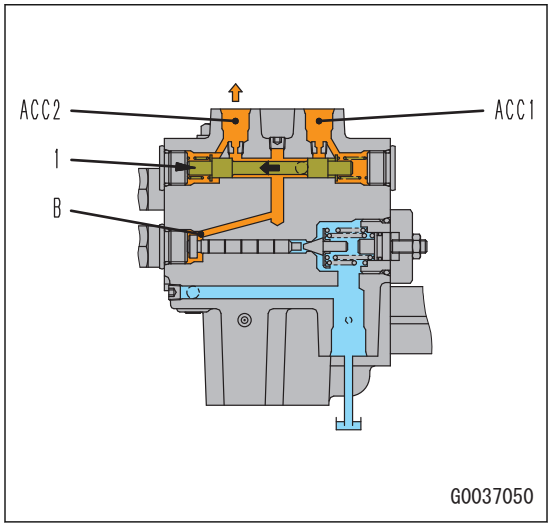
1. When the pressure in port (PPC) (pilot pressure) exceeds the set pressure, the pressurized oil from the pump compresses spring (1) and moves ball (2) to the left.
2. The pressurized oil from the pump reduces in pressure when it passes through orifice (a). As a result, the pressure difference over the orifice compresses spring (3) and moves valve (4) to the left.
3. The open area between ports (PPC) and (P) decreases and causes pressure drop. As a result, the pressure in port (P) does not decrease to the set pressure of the PPC relief valve but is maintained.
4. The pressure in port (PPC) is maintained constant and supplied as the source pressure of the pilot pressure by adjusting the open area between ports (PPC) and (P).
5. When the pressure in port (PPC) becomes abnormal, port (PPC) is connected to port (T) to release the abnormal pressure and protect the pilot circuit.

Sequence valve (H1)



1. The pressure of port (P) (pump pressure) is applied to the left end of sequence valve (1) and the drain pressure is applied to the right end.
2. When the pump pressure exceeds the set pressure of spring (2), sequence valve (1) moves to the right and connects ports (P) and (A).
3. The pressurized oil from the pump flows through priority valve (3) to port (A) and to the cooling fan motor to become motor drive pressure.
4. Even when the driving pressure of the cooling fan motor is low, the sequence valve maintains the pump pressure above the set pressure of spring (2) and prevents the accumulator charge pressure and the source pressure of the pilot circuit from decreasing.

Shuttle valve (S1)



1. When the pressure in port (ACC1) is higher than the pressure in port (ACC2), shuttle valve (1) moves to the left to disconnect port (ACC1) and oil passage (B).
2. The open area between port (ACC2) and oil passage (B) increases and the oil is supplied to the accumulator on the port (ACC2) side.
3. When the pressure in port (ACC2) is higher than port (ACC1), the oil is supplied to the accumulator on the port (ACC1) side.
4. The pressurized oil from the pump is preferentially supplied to the lower pressure circuit of the 2 systems.

Abbreviation	Actual word spelled out
S/T	Steering
STRG	
SIG	Signal
SOL	Solenoid
STD	Standard
OPT	Option
OP	
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

Abbreviation	Actual word spelled out
S/T	Steering
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OPT	Option
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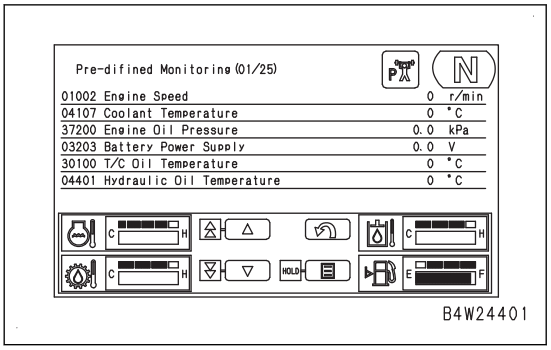
PRESS	Pressure
SPEC	Specification
SW	Switch
TEMP	Temperature
T/C	Torque Converter
T/M	Transmission

5. Select “Pre-defined Monitoring” (01/25) or the following monitoring items, and display it by referring to “SET AND OPERATE MACHINE MONITOR”.

   Monitoring code: 04107 “Coolant Temperature”

6. Set the coolant temperature to the specified range.
7. Measure the oil pressure when the accelerator pedal is depressed to the full stroke (at high idle) and when the accelerator pedal is not depressed (at low idle).

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



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

Measurement plug (1):
3.9 to 6.9 Nm {0.4 to 0.7 kgfm}

TEST AdBlue/DEF LINE HEATER RELAY 1

Tools to be used when testing AdBlue/DEF line heater relay 1

Symbol	Part No.	Part name	Q'ty	Remarks
A	799-601-9020	T-adapter	1	
B	799-601-2600	T-box	1	
C	Commercially available	Multimeter	1	

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

⚠ **Chock the tires to prevent the machine from moving.**

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.

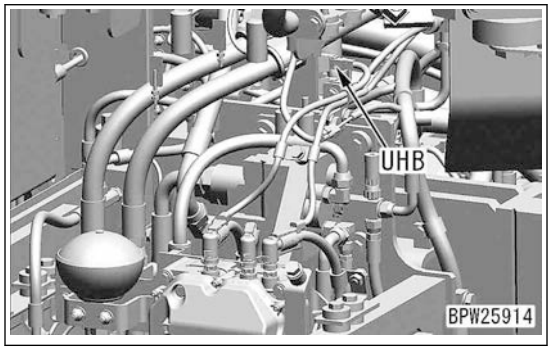
"AdBlue/DEF Line Heater Relay 1 Test" function can actuate AdBlue/DEF line heater relay 1 at any timing, and can check electrical action.

For testing of AdBlue/DEF suction/return circuit heater relay to perform troubleshooting or others, refer to this section.

METHOD FOR TESTING AdBlue/DEF LINE HEATER RELAY 1

1. Check that the system operating lamp is off, turn the battery disconnect switch to OFF position, and remove the key.
2. Remove cover (1) on the right side of the machine.

3. Disconnect the connector (UHB) of the relay circuit to be tested.

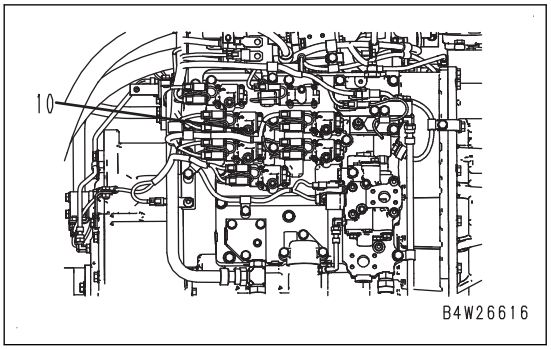


2. Remove oil pressure pickup plug (10), and connect nipple D and gauge A1 in hydraulic tester A.

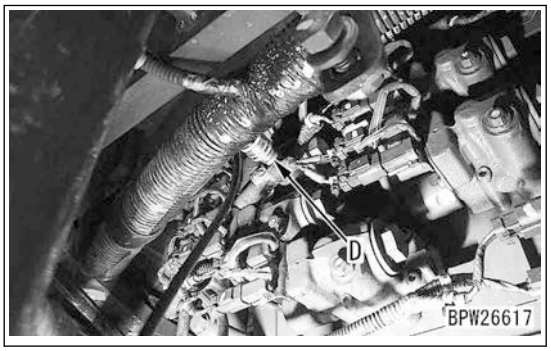
   Nipple D:
   9.8 to 12.7 Nm {1.0 to 1.3 kgfm}

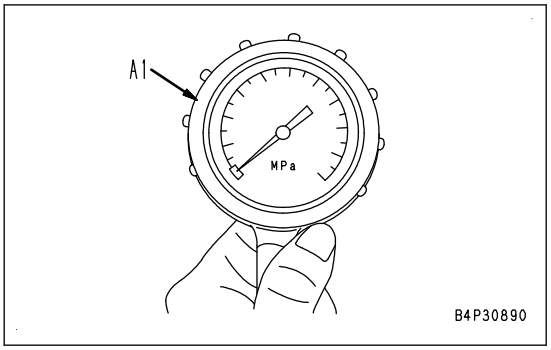
   REMARK

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

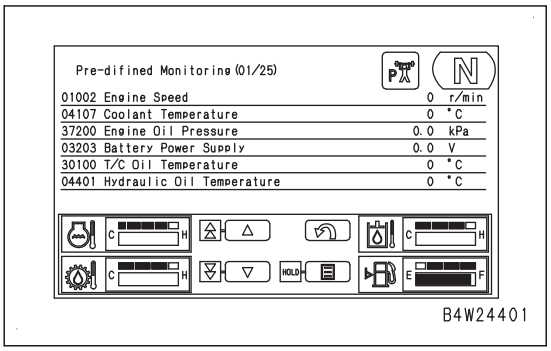


3. Set the transmission shift mode selector switch to MANUAL position.
4. Depress the L.H. brake pedal.
5. Start the engine.





6. Display “Pre-defined Monitoring” (01/25) by referring to “SET AND OPERATE MACHINE MONITOR”.
7. Keep the torque converter oil temperature within the range of testing condition.
8. Check the directional lever or directional selector switch is at NEUTRAL (N) position.
9. Set the parking brake switch to OFF (RELEASE) position.
10. Set the gear speed switch to the 4th position.
11. Set the directional lever or directional selector switch in FORWARD (F) while depressing the L.H. brake pedal and not depressing the accelerator pedal (at low idle).



   ⚠ Hold the L.H. brake pedal depressed fully.

   ⚠ Ensure the safety of the surrounding area since the machine may move.

   REMARK

   When the directional lever or directional selector switch is in N (NEUTRAL) position, the gear speed is not changed even if the gear speed switch is moved. To avoid this, perform the above operation.

12. Measure the oil pressure when the engine speed is set to 1900 rpm (target value).

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

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

REMARK

- Tighten the bleeder screw (5), and then slowly return the brake pedal.
- Perform the work with 2 workers. One worker depresses the brake pedal and the other bleeds air from bleeder screw (5).
- Do not bleed air while bleeder screw (5) is opened.
- If the pressure accumulated in the accumulator is lowered, start the engine, accumulate the pressure in the accumulator, stop the engine, and then bleed air according to the same procedure.

6. Repeat steps 3 and 4 four times or more. When there are no bubbles in the oil flowing through hose A, depress the brake pedal to the full stroke, and tighten the bleeder screw (5).

REMARK

Tighten the bleeder screw (5), and then slowly return the brake pedal.

Bleeder screw (5):
7.8 to 11.8 Nm {0.8 to 1.2 kgfm}

7. Bleed air from each brake cylinder in the same manner.

REMARK

Bleed air from each brake cylinder in the following order: R.H. rear brake cylinder (farthest from the brake valve), L.H. rear brake cylinder, R.H. front brake cylinder, and L.H. front brake cylinder.

8. After completion of bleeding air from brake cylinders, test the braking performance by referring to “TEST BRAKING PERFORMANCE”.
9. Drain oil from each bleeder screw, and check that there is no bubbles.

After bleeding air, check the hydraulic oil level while the accelerator pedal is not depressed (at low idle). If not sufficient, add the oil to the specified level.

⚠ Put on protection safety equipment, goggles, leather gloves and clothing to prevent nitrogen gas leak from your skin. Do this work on the up wind side as much as possible.

⚠ When you use the nitrogen gas indoors or in an ill-ventilated location, make sure that the location has good airflow, etc. and obey the Industrial Safety and Health Law, Ordinance on Prevention of Anoxia, etc.

⚠ The accumulator is charged with high-pressure nitrogen gas, and incorrect operation may cause an explosion which will lead to serious injury or death. When handling, always observe the following.

- **Do not bring open flame near or put it in fire.**
- **Do not do drilling, welding, or flame-cutting.**
- **Do not hit, drop, or apply it to the external force.**
- **Release the gas before you discard.**
- **Before you remove and take the assembly apart, be sure to lower the gas pressure to the level of ambient pressure.**
- **Be sure to use the nitrogen gas for charging.**
- **Do not charge explosive gas such as oxygen.**
- **Follow this procedure always when handling accumulator.**

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

⚠ While the starting switch is turned to the ON position, set the work equipment lock switch to the release position and operate the work equipment control lever 2 to 3 times to release the pressure in the PPC accumulator circuit.

⚠ Stop the machine on a level ground. Lower the work equipment to the ground. Set the parking brake switch to the PARK (P) position. Set the work equipment lock switch to the lock state. Stop the engine.

⚠ Chock the tires to prevent machine movement.

REMARK

The tools to check and charge the HYDAC accumulator gas pressure are commercially available. Consult your HYDAC distributor.

If you need to check and charge the ECSS accumulator nitrogen gas pressure with the troubleshooting, Pm Clinic, or periodic maintenance, see this section.

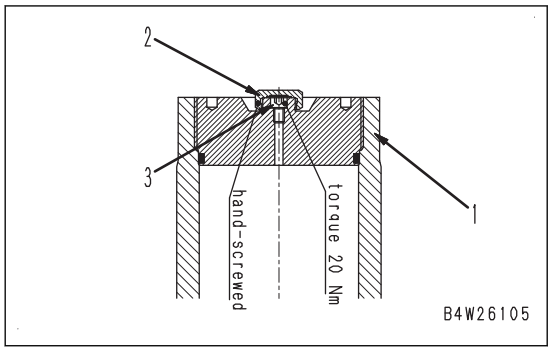
TEST ECSS ACCUMULATOR NITROGEN GAS PRESSURE

REMARK

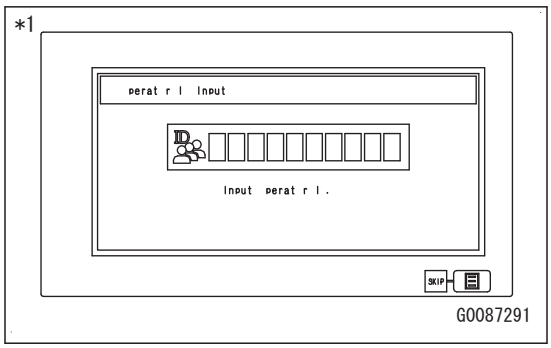
You can check a single accumulator.

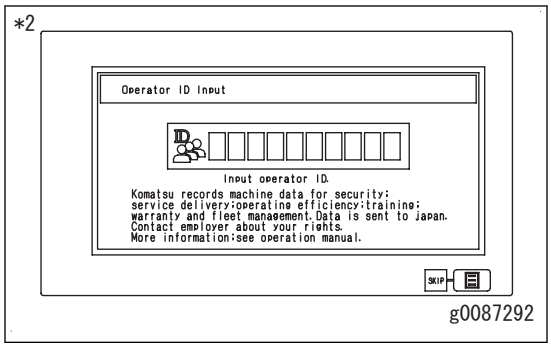
Applicable machine: 90001 to 90302

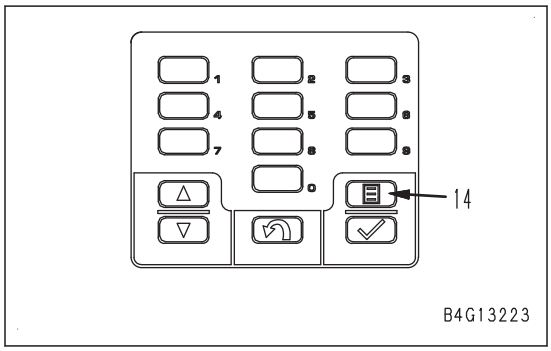
1. Remove the cap (2) from the charge port of the accumulator (1).
2. Loosen the hexagonal socket head bolt (3) with the hexagonal wrench (6mm) counterclockwise slightly (approximately 1/2 turn).



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





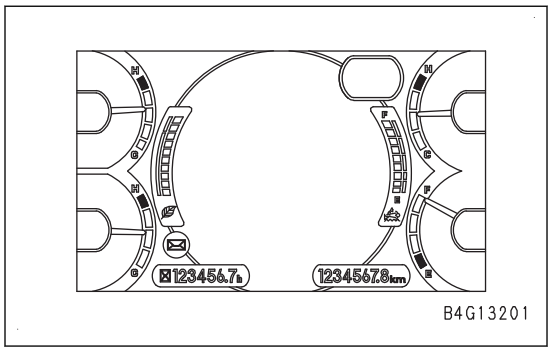


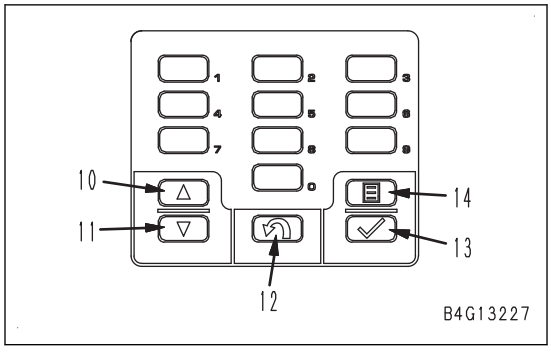
CHECKING FUNCTION BY LCD (LIQUID CRYSTAL DISPLAY)

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

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

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



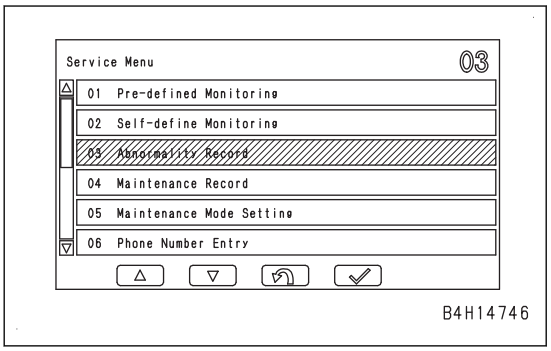


METHOD FOR CONFIRMING ABNORMALITY RECORD

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

   REMARK

   For selecting method, see “METHOD FOR OPERATING SERVISE MODE” in “SERVICE MODE”.



2. After the “Abnormality Record” screen is displayed, use a switch on the switch panel to select “Electrical Sys Abnormality Record”.

   UP switch (10): Moves the selection up by one item

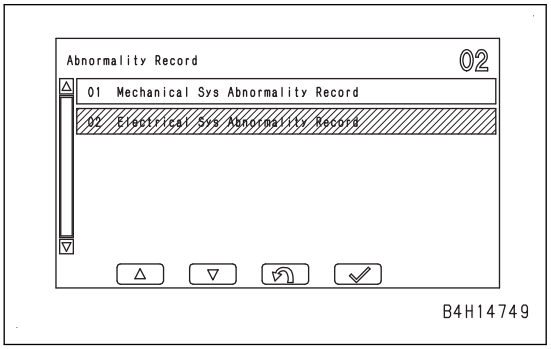
   DOWN switch (11): Moves the selection down by one item

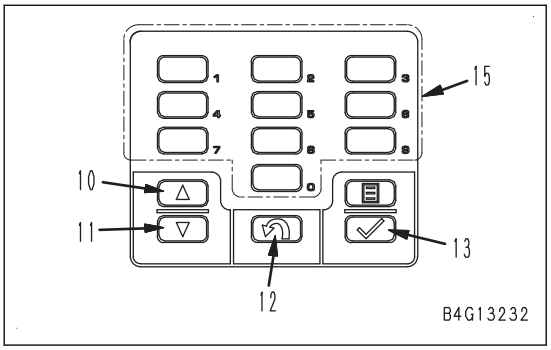
   RETURN switch (12): Returns the screen to “Service Menu” screen

   ENTER switch (13): Validates the selection

   REMARK

   Input a code (2-digit) by using the numeral (15) input switch to directly select the item, and then press ENTER switch (13) to enter the selection.





3. After the “Electrical Sys Abnormality Record” screen is displayed, the following information is displayed.

   a: Occurrence order of abnormalities from latest one/ Total number of records

   b: Failure code

   c: Detail of failure

   d: Number of occurrences (displayable range: 0 to 65535 times)

   e: Service meter reading at the first occurrence

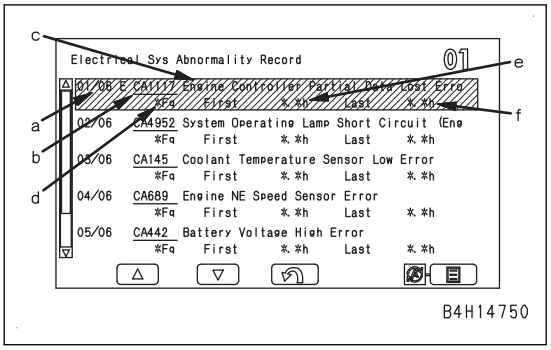
   f: Service meter reading at the last occurrence

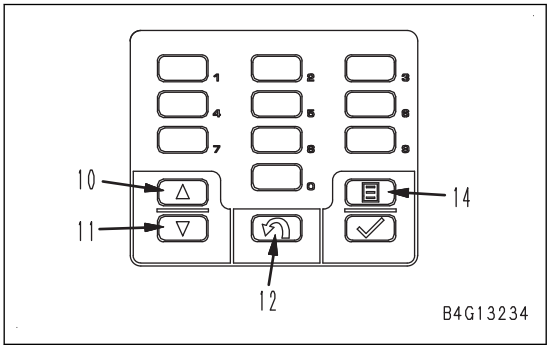
   UP switch (10): Moves the selection up by one item

   DOWN switch (11): Moves the selection down by one item

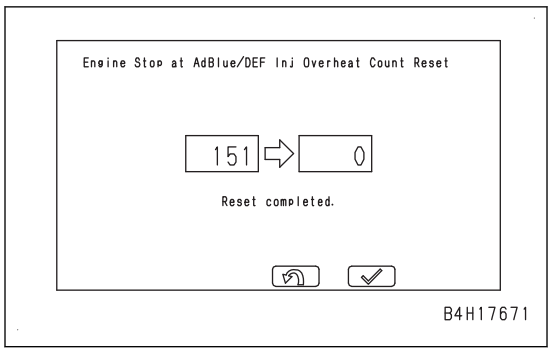
   RETURN switch (12): Returns the screen to the Abnormality Record screen

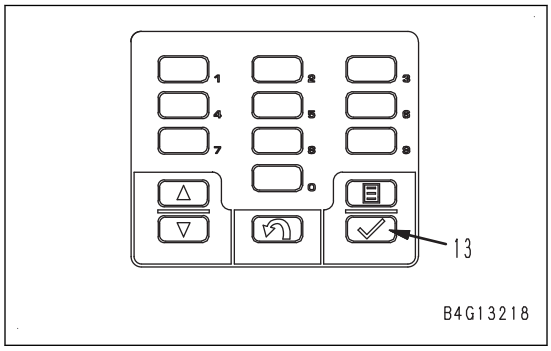
   Menu switch (14): Scrolls the displayed failure to the left again.



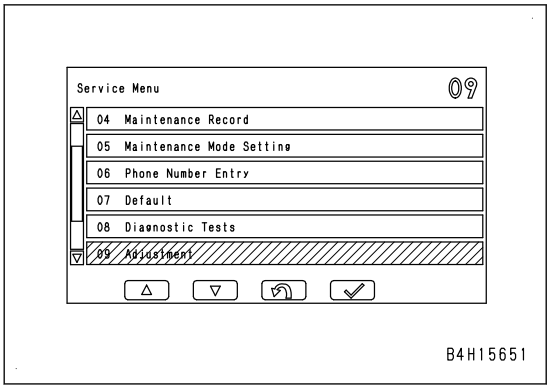


4. After executing resetting, press ENTER switch (13) to return the display to “Diagnostic Tests” screen.





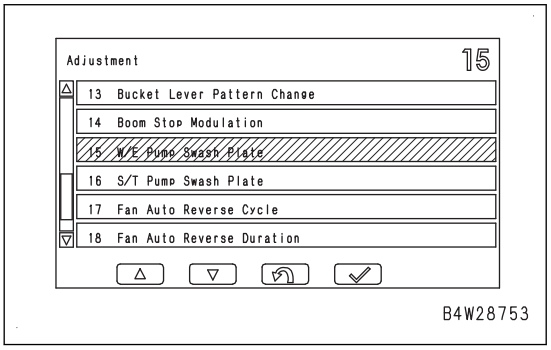
1. From “Service Menu” screen, select “Adjustment”.



2. When “Adjustment” screen is displayed, use a switch on the switch panel to select “W/E Pump Swash Plate”.

   REMARK

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



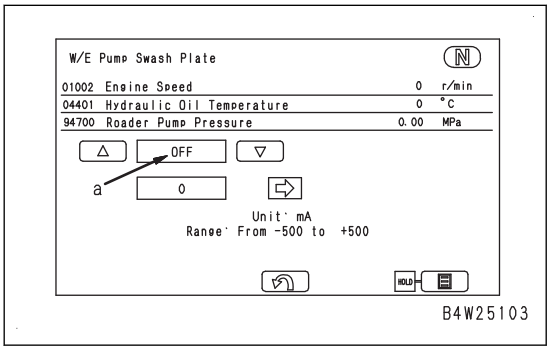
3. When “W/E Pump Swash Plate” screen is displayed, set the adjustment point displayed in (a) to “C” with the switches on the switch panel.

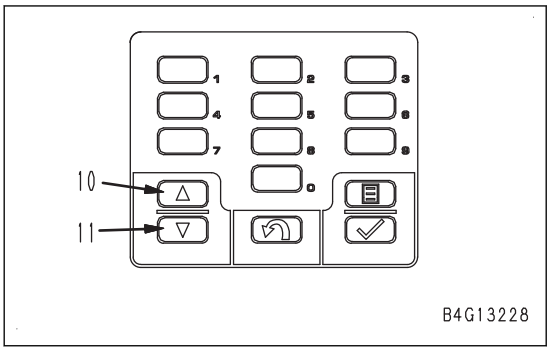
   UP switch (10): Changes the adjustment point

   DOWN switch (11): Changes the adjustment point

   NOTICE

   Do not select the adjustment points other than “C”.

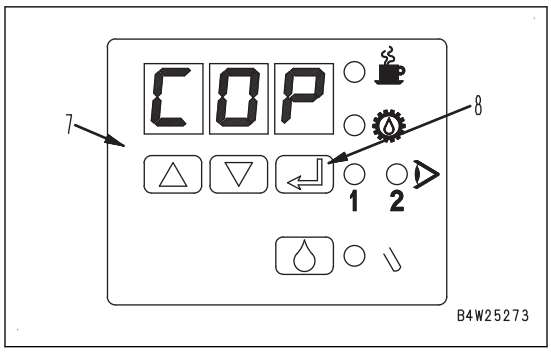




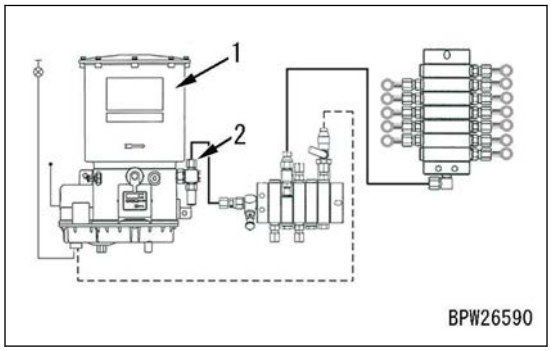
2. Operate the pump by holding the push-button switch (8) of control unit (7).

   Grease pours through the pump.

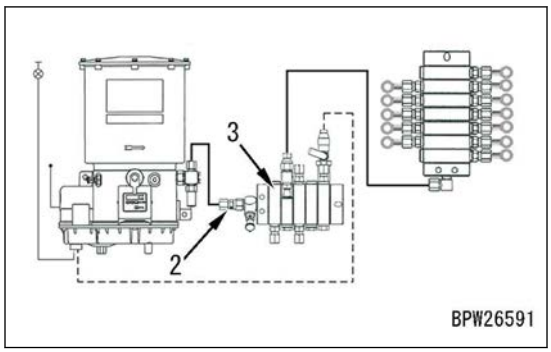
3. If the grease without containing air bubbles pours through pump unit (1), release the pushing-button switch (8) to stop pump operation.



4. Connect hose (2) to pump unit (1).



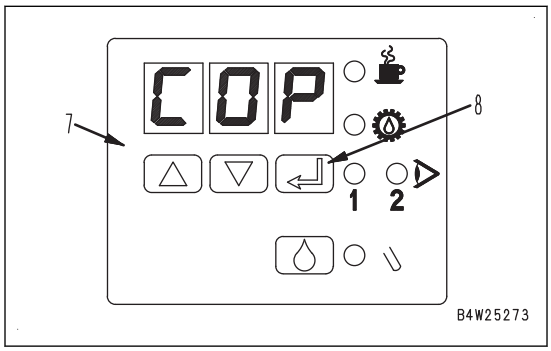
5. Disconnect hose (2) from parent greasing distributor (3).



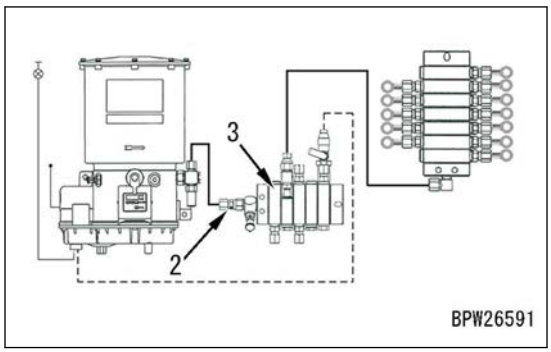
6. Operate the pump by holding the push-button switch (8) of control unit (7).

   Grease pours through the pump.

7. If the grease without containing air bubbles pours through parent greasing distributor (3), release the pushing-button switch (8) to stop pump operation.



8. Connect hose (2) to parent greasing distributor (3).



RELATED INFORMATION ON TROUBLESHOOTING

GENERAL TROUBLESHOOTING POINTS

⚠ If you remove the radiator cap while the engine is still hot, hot coolant may spout out and can scald you. Wait until the engine cools down.

⚠ Take extreme care not to touch a hot portion or not to be wound in a turning portion.

⚠ Before removing a plug or a cap of a portion where oil pressure, hydraulic pressure, or air pressure is applied, release the internal pressure first, then connect the measuring tool securely.

⚠ When disconnecting wiring, remove the key and turn the battery disconnect switch to OFF position.

⚠ Park the machine on a level place and check the frame lock bar, chocks, parking brake, etc.

⚠ When working in a group, make signs and allow only the persons concerned to approach the machine.

- Troubleshooting means to investigate the root cause of a failure, repair immediately, and prevent recurrence of the failure.
- One important thing when you perform troubleshooting is to understand the structure and operation.
- It is important to have an interview with the operator and set up an aim of failure cause for performing a troubleshooting effectively.
- If you disassembly the machine hastily when it has a failure, you may disassemble unrelated portions and may not be able to find the cause. As a result, the costs of the man-hours, parts, oil, or grease may increase, and you may lose the confidence of the users and operators. Accordingly, sufficient advance check and proper procedure are necessary for troubleshooting.

1. Ask users or operators the following questions.
   1) Have any other problems occurred apart from the problem that has been reported?
   2) Is there anything strange about the machine before the failure occurred?
   3) Did the failure occur suddenly, or were there problems with the machine condition before this?
   4) Under what conditions did the failure occur?
   5) Had any repairs been performed before the failure? When were these repairs performed?
   6) Has the same kind of failure occurred before?
2. Perform the following checks before troubleshooting.
   1) Check the machine for a symptom of abnormality.
   2) Perform the Check before starting items.
   3) Check the other check items.
   4) Check other maintenance matters which can be checked externally and are considered to be necessary.
3. Check the degree of the trouble by yourself and judge if it is a real failure or it is a problem of handling or operation.

   When reproducing the trouble phenomenon by operating the machine, do not perform check or measurement that can increase the failure.
4. Use the results of the investigation and inspection to narrow down the probable causes of the failure, then use the troubleshooting flow chart (matrix) to locate the failure exactly.

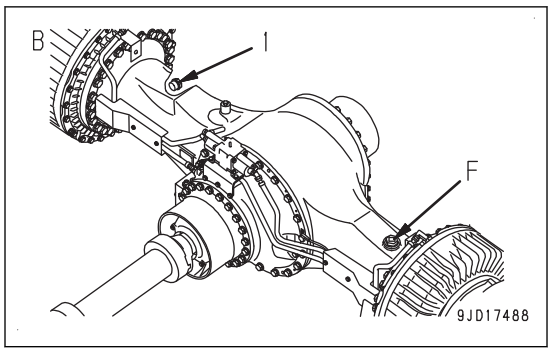
   The basic troubleshooting procedure is as follows.
   - Start from the simple points.
   - Start from the most likely points.
   - Investigate other related parts or information.
5. If the root cause is not corrected, a similar failure may occur again even if the apparent failure has been repaired. Always find out the cause of a failure first and remove the root cause of each failure.

3. Remove the plug (1).
4. Check the oil level.

   If the oil is close to the lower edge of the hole of the plug, the oil level is correct.

   If the oil is not close to the lower edge of the hole of the plug, add oil through oil filler port (F).
5. When oil level is appropriate, Install plug (1).

   Tightening torque:
   152 ± 24 Nm {15.5 ± 2.5 kgfm}



BLEED AIR FROM FUEL SYSTEM

For the bleeding air from the fuel system, see “TESTING AND ADJUSTING”, “BLEED AIR FROM FUEL SYSTEM”.

BLEED AIR FROM HYDRAULIC SYSTEM

For bleeding air from the hydraulic system, see TESTING AND ADJUSTING, “BLEED AIR FROM STEERING CYLINDER CIRCUIT”, “BLEED AIR FROM BRAKE CIRCUIT”, “BLEED AIR FROM WORK EQUIPMENT CIRCUIT”, “BLEED AIR FROM COOLING FAN CIRCUIT”.

METHOD FOR CHECKING ELECTRIC EQUIPMENTmethod

Check of battery terminal for looseness and corrosion

1. Check the battery cable terminals for looseness and corrosion.
2. Check for any accumulated dirt and combustibles (dead leaves, twigs, etc.) around the batteries. If any, remove them.

Check of alternator terminal for looseness and corrosion

3. Check terminal B (E03), terminal R (E04) and terminal E (E02) of alternator for open circuit, looseness and corrosion.

Check of starting motor terminal for looseness and corrosion

4. Check terminal B of starting motor for open circuit, looseness and corrosion.

Check of battery voltage (with engine stopped)

5. Check the battery voltage by using the battery tester while the engine is stopped.

Check of battery electrolyte level

6. Check the battery electrolyte level according to the following procedure.

   ⚠ Battery electrolyte level must be checked before operating the machine.

   ⚠ Do not use the battery if the battery electrolyte level is below LOWER LEVEL line. If you do so, it will reduce the service life of the battery. In addition, it may cause an explosion.

   ⚠ Since the battery produces combustible gas that can explode, do not bring any open flame near it.

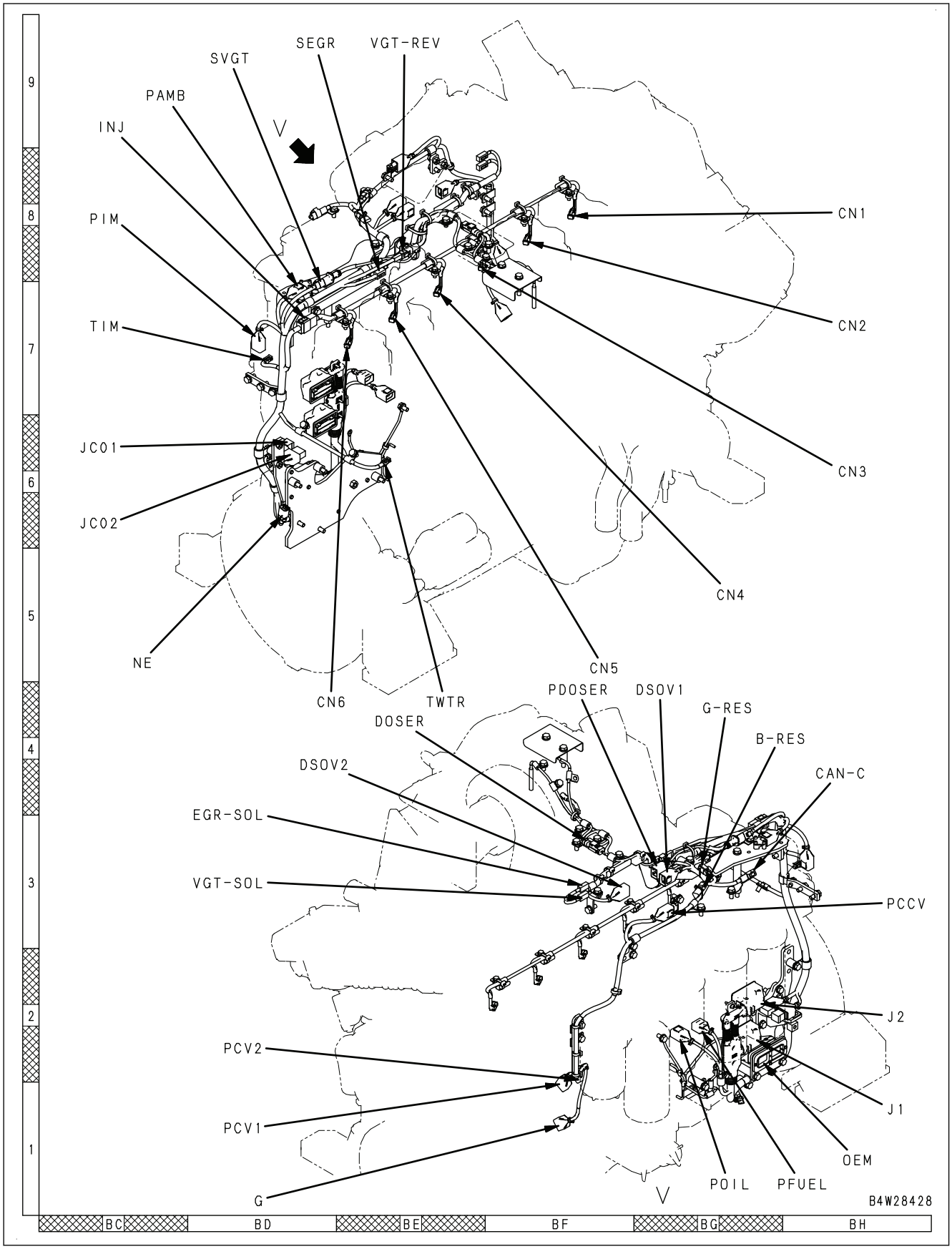
   ⚠ Battery electrolyte is dangerous. Take care that it does not come in contact with your eyes or skin. If it does, wash it away with water and contact your doctor.

   NOTICE

   - **Do not add the electrolyte to the battery exceeding UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.**
   - **To avoid freezing, add the purified water (such as a commercial battery fluid) before starting the work in the next day.**
   - When checking the electrolyte level through the side face of the battery

Connector No.	Connector type	Number of pins	Installation position	Address
S_F4	SWP	6	ECSS ON/OFF switch	M-6, AK-6
S_F6	SWP	6	Auto greasing switch	N-6, AL-6
S_F7	SWP	6	Daylight switch	N-6, AL-6
S_FA	SWP	6	Parking brake switch	O-9, AM-9
S_FB	SWP	6	Hazard switch	M-9, AK-9
S_FS	SWP	6	Engine shutdown secondary switch	M-8, AK-8
S_OH1	SWP	6	Service connector	AA-9, AY-9
S_OH2	S	3	Quick coupler switch (option)	-
S_OH2A	DT	3	Intermediate connector	AA-9, AY-9
S_OHA	SWP	6	Rear glass heater switch	Z-9, AX-9
S_RH1	SWP	6	Transmission cut-off/set switch	P-7, AN-7
S_RH1_OP	SWP	6	Transmission cut-off/set switch (option)	-
S_RH2	SWP	6	Power mode switch	P-7, AN-7
S_RH2_OP	SWP	6	Power mode switch (option)	-
S_RH3	SWP	6	Shift mode switch	P-7, AN-7
S_RH3_OP	SWP	6	Shift mode switch (option)	-
S_RH4	SWP	6	Lockup switch	P-8, AN-8
S_RH4_OP	SWP	6	Lockup switch (option)	-
S_RH5	SWP	6	FNR selector switch	P-8, AN-8
S_RH5	SWP	6	ECSS ON/OFF switch (machine with emergency engine stop switch)	BX-9
S_RH5_OP	SWP	6	FNR selector switch (option)	-
S_RH6	SWP	6	Positioner switch	P-8, AN-8
S_RH6_OP	SWP	6	Positioner switch (option)	-
S_RH7	SWP	6	RPM set ACC/DEC switch	P-8, AN-8
S_RH7_OP	SWP	6	RPM set ACC/DEC switch (option)	-
S_RH8	SWP	6	Turn signal switch	AN-7, BY-9
S_RHA	DT	2	Horn switch	N-4, AL-4
S_RHA_OP	DT	2	Horn switch (option)	AR-1
S_RHB	DT	4	R.H. FNR switch (option)	N-6, AL-6
S_RHC	SWP	6	Boom lock switch	O-6, AM-6
S_RHC_OP	SWP	6	Boom lock switch (option)	-
S_RV	SWP	6	Camera brightness adjustment switch	N-4, AL-4
S04	DT	4	Intermediate connector	AL-6, BX-8
S30	DT	3	AJSS lever	AR-9, CD-2
S31	DTM	12	AJSS lever	AR-1, CC-1
S40	DT	6	Starting switch	O-9, AM-9 BW-9

10/15


SEGR
VGT-REV
SVGT
PAMB
INJ
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TIM
JC01
JC02
NE
CN6
TWTR
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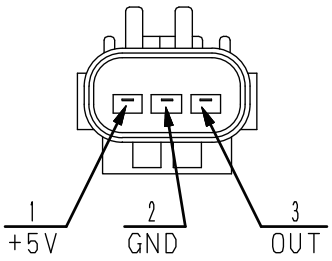
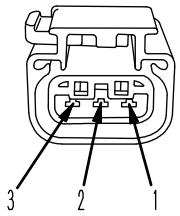
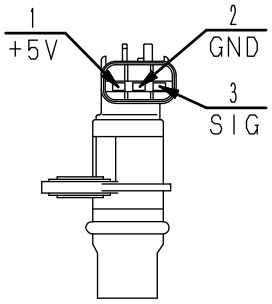
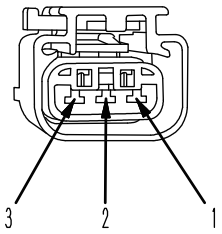
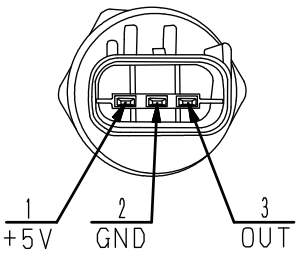
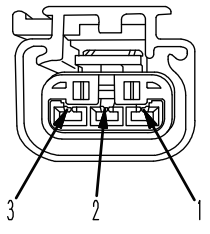
CN2
CN3
CN4
PDOSER
DSOV1
G-RES
B-RES
CAN-C
DOSER
DSOV2
EGR-SOL
VGT-SOL
PCCV
J2
J1
OEM
PFUEL
POIL
PCV2
PCV1
G
B4W28428
9
8
7
6
5
4
3
2
1
BC
BD
BE
BF
BG
BH

FRAMATOME connector for engine

No. of pins	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
3	Crankcase pressure sensor, ambient pressure sensor (95, 107, 114, 125, 140 engine) Dosing fuel pressure sensor (125, 140 engine) 		799-601-4140 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
	—	—	
3	NE speed sensor (95, 107, 114, 125, 140 engine) and CAM sensor (95, 107, 114 engine) 		799-601-4130 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
	—	—	
3	Boost (air intake) pressure sensor (125, 140 engine) Exhaust manifold pressure sensor (107, 114 engine) 		799-601-4180 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
	—	—	

B4W21627

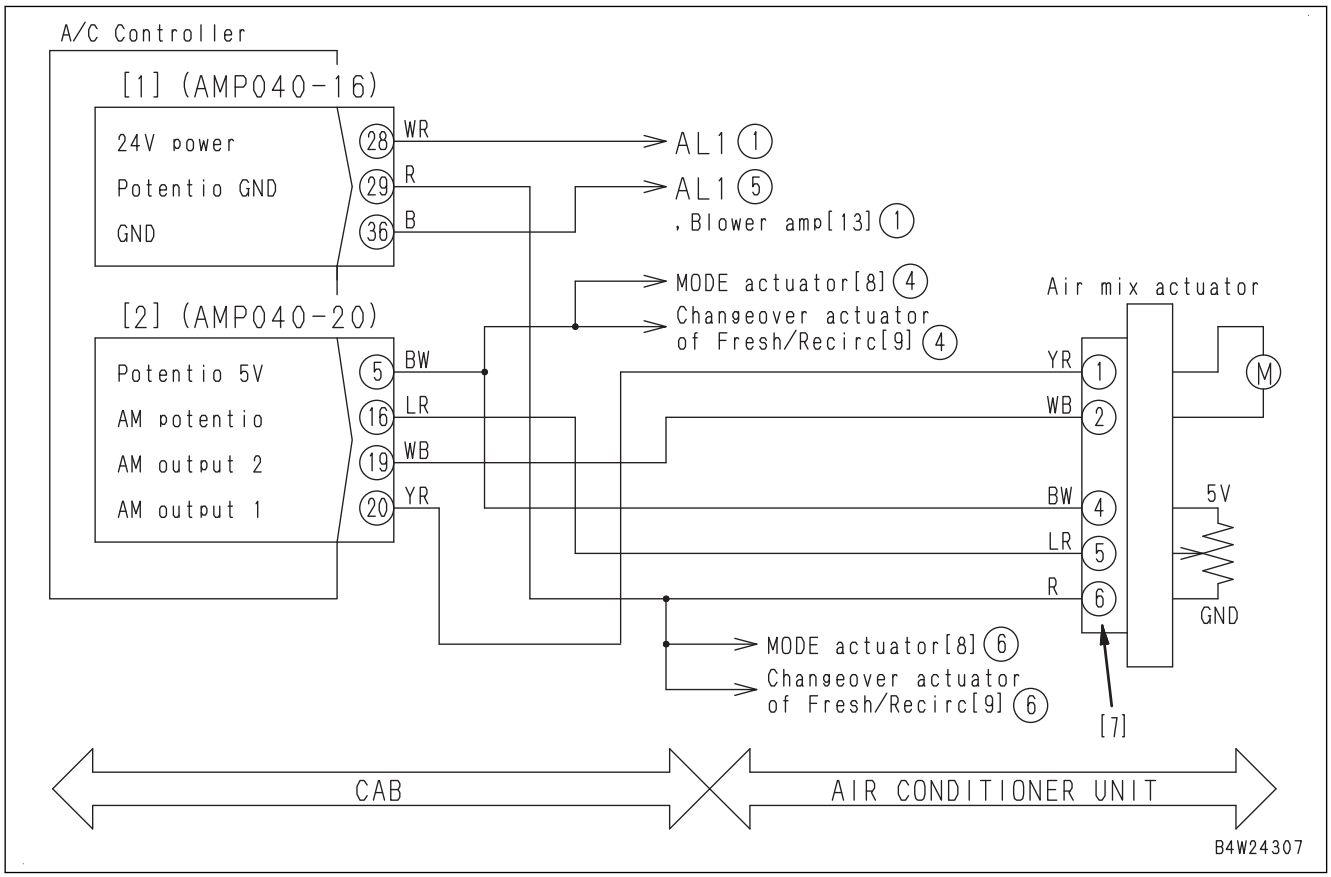
Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
CA441	Power Voltage Low Error	ENG	L04	Electrical system	
CA442	Power Voltage High Error	ENG	L04	Electrical system	
CA449	Common Rail Pressure High Error 2	ENG	L03	Electrical system	
CA451	Common Rail Pressure Sensor High Error	ENG	L03	Electrical system	
CA452	Common Rail Pressure Sensor Low Error	ENG	L03	Electrical system	
CA515	Common Rail Pressure Sensor Supply Voltage High Error	ENG	L03	Electrical system	
CA516	Common Rail Pressure Sensor Supply Voltage Low Error	ENG	L03	Electrical system	
CA553	Common Rail Pressure High Error 1	ENG	L01	Electrical system	
CA555	Crankcase Pressure High Error 1	ENG	L01	Electrical system	
CA556	Crankcase Pressure High Error 2	ENG	L03	Electrical system	
CA559	Common Rail Pressure Low Error 1	ENG	L01	Electrical system	
CA595	Turbocharger Speed High Error 2	ENG	L01	Electrical system	
CA687	Turbocharger Speed Low Error	ENG	L01	Electrical system	
CA689	Engine NE Speed Sensor Error	ENG	L01	Electrical system	
CA691	Intake Air Temperature Sensor High Error	ENG	L01	Electrical system	
CA692	Intake Air Temperature Sensor Low Error	ENG	L01	Electrical system	
CA697	Engine Controller Internal Temperature Sensor High Error	ENG	L01	Electrical system	
CA698	Engine Controller Internal Temperature Sensor Low Error	ENG	L01	Electrical system	
CA731	Engine Backup Speed Sensor Phase Error	ENG	L01	Electrical system	
CA778	Engine Backup Speed Sensor Error	ENG	L01	Electrical system	
CA1117	Engine Controller Partial Data Lost Error	ENG	L04	Electrical system	
CA1664	KDOC Abnormality	ENG	L03	Electrical system	
CA1669	AdBlue/DEF Level Sensor Voltage High Error	ENG	L01	Electrical system	

FAILURE CODE [15SGL1]

Action level	Failure code	Failure	ECMV Release Trouble (3rd clutch) (Transmission controller system)
L03	15SGL1		
Detail of failure	When controller does not drive 3rd ECMV solenoid, ON signal is input from 3rd ECMV fill switch. Accordingly, clutch is not disengaged.		
Action of controller	• Judges that 3rd ECMV fill switch signal is ON. • Continues to stop driving 1st, 2nd and 4th clutch proportional solenoids • Makes centralized warning lamp light up and alarm buzzer sound. • Even if cause of failure disappears, machine does not become normal until directional (FNR) lever or R.H. directional selector (FNR) switch is set to N (neutral) position.		
Phenomenon on machine	Machine may be able to travel in 3rd gear speed but cannot travel in 1st, 2nd, nor 4th gear speed.		
Related information	• 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. • Method of reproducing failure code: Start the engine. • When remaining pressure exists in 3rd clutch oil pressure line only, and no remaining pressure exists in other clutch than 3rd, 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	1. Turn the starting switch to OFF position. 2. Disconnect connector 3.SW. 3. Turn the starting switch to ON position.		
		• If failure code [15SGL1] is cleared, 3rd clutch fill switch is defective • If failure code [15SGL1] is not cleared, wiring harness has ground fault or transmission controller is defective.		
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connector 3.SW. 3. Disconnect connectors 3.SW and L62, and connect T-adapter to either female side.		
		Resistance	Between ground and connector L62 (female) (13) or 3.SW (female) (1)	Min. 1 MΩ
3	Defective transmission controller	If no failure is found by preceding checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to temperature control (A/M)



No.	Cause	Procedure, measuring location, criteria and remarks		
5	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector NE, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between NE (female) (3) and ground	Max. 1 V
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and NE, and connect T-adapter to either female side.		
		Resistance	Between J1 (female) (79) and (31), or between NE (female) (1) and (3)	Min. 1 MΩ
			Between J1 (female) (55) and (31), or between NE (female) (2) and (3)	Min. 1 MΩ
7	Defective engine NE speed sensor	If no failure is found by above checks, the engine NE speed sensor may be defective. (Since this is an internal defect, troubleshooting cannot be performed.) **REMARK** • Since speed sensor output is 5 V of pulse voltage, it cannot be measured by using multimeter. • Because internal speed sensor consists of electronic circuit instead of coil, whether speed sensor is normal or not cannot be determined even if resistance of speed sensor is measured by using multimeter.		
8	Damaged engine Bkup speed sensor or defective installation (looseness)	Perform checks since the engine Bkup speed sensor installation (looseness) may be defective.		
9	Insufficient resistance	1. Turn starting switch to OFF position. 2. Disconnect connector G-RES and connect T-adapters to male side.		
		Resistance	Between G-RES (male) (1) and (2)	620 Ω
10	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors J1, G, and G_RES, and connect T-adapter to each female side.		
		Resistance	Between J1 (female) (78) and G (female) (1)	Max. 1 Ω
			Between J1 (female) (54) and G (female) (2)	Max. 1 Ω
			Between J1 (female) (18) and G (female) (3)	Max. 1 Ω
11	Ground fault in wiring harness	1. Turn starting switch to OFF position to perform troubleshooting. 2. Disconnect connectors J1 and G, and connect T-adapters to either female side.		
		Resistance	Between ground and J1 (female) (18) or G (female) (3)	Min.1 MΩ
12	Hot short circuit in wiring harness	1. Turn starting switch to OFF position to perform troubleshooting. 2. Disconnect connectors G and G-RES, and connect T-adapters to female side of G. 3. Turn starting switch to ON position (with connector PIM disconnected).		
		Voltage	Between G (female) (3) and ground	Max.1 V

FAILURE CODE [CA271]

Action level	Failure code	Failure	IMV or PCV 1 Short Circuit Error (Engine controller system)
L03	CA271		
Detail of failure	Short circuit is detected in supply pump PCV1 circuit.		
Action of controller	Stops driving PCV1.		
Phenomenon on machine	• The engine power deration. • Engine startability is poor.		
Related information	• 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 PCV1(1). Because it is pulse voltage, it cannot be measured by using multimeter. • If ground fault or hot short circuit is detected in line on minus side when starting switch is in ON position. Failure codes [CA271] and [CA273] appear simultaneously. • 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 PCV1 (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector PCV1, and connect socket to male side.		
		Resistance	Between PCV1 (male) (1) and (2)	2.3 to 5.3 Ω
		Resistance	Between PCV1 (male) (1) and ground	Min. 1 MΩ
2	Ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and PCV1, and connect T-adapter to female side of J1.		
		Resistance	Between J1 (female) (23) and ground	Min. 1 MΩ
			Between J1 (female) (24) and ground	Min. 1 MΩ
3	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector J1. 3. Turn starting switch to ON position.		
		Voltage	Between J1 (24) and ground	Max. 1 V
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector J1, and connect T-adapter to female side.		
		Resistance	Between J1 (female) (23) and (24) (PCV1 resistance)	2.3 to 5.3 Ω
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.)		

FAILURE CODE [CA442]

Action level	Failure code	Failure	Power Voltage High Error (Engine controller system)
L04	CA442		
Detail of failure	High voltage (36 V and above) is generated in power supply circuit of controller.		
Action of controller	Operates the engine with power supply voltage at fixed value approximately 36 V.		
Phenomenon on machine	Engine continues operation normally, however, engine may stop while running or not able to start while it is stopped.		
Related information	• 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. • Power supply voltage of engine controller can be checked with monitoring. (Code: 03203) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

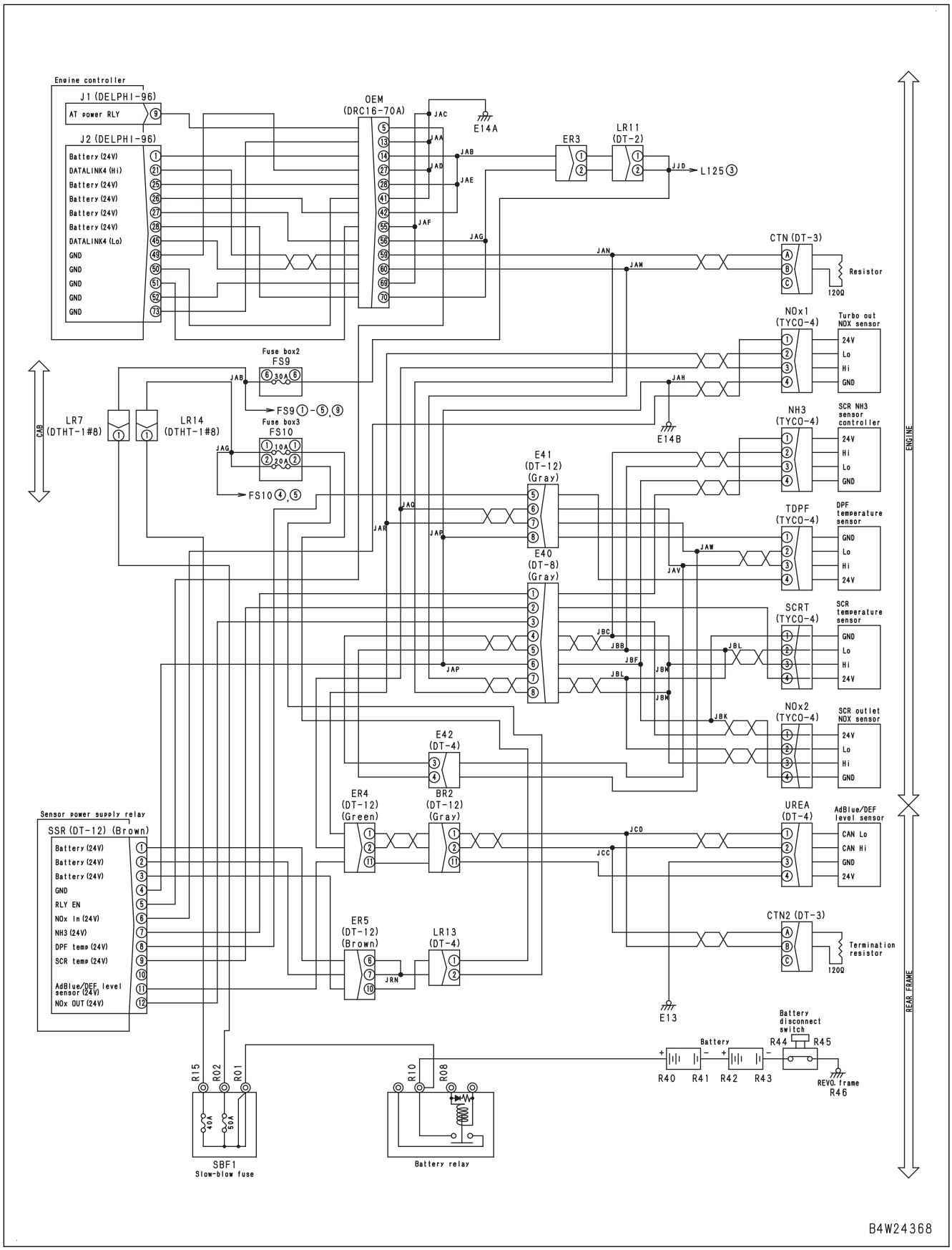
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective battery	Check battery voltage and specific gravity of battery electrolyte.			
		Battery Voltage (1 battery)		Min. 12 V	
		Battery Voltage (2 batteries in series)		Min. 24 V	
		Specific gravity of battery electrolyte		Min. 1.26	
2	Defective alternator	1. Turn the starting switch to OFF position. 2. Start the engine.			
		Voltage	Between E04 terminal and ground	Engine speed in medium or above	26 to 30.5 V
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.)			

FAILURE CODE [CA1117]

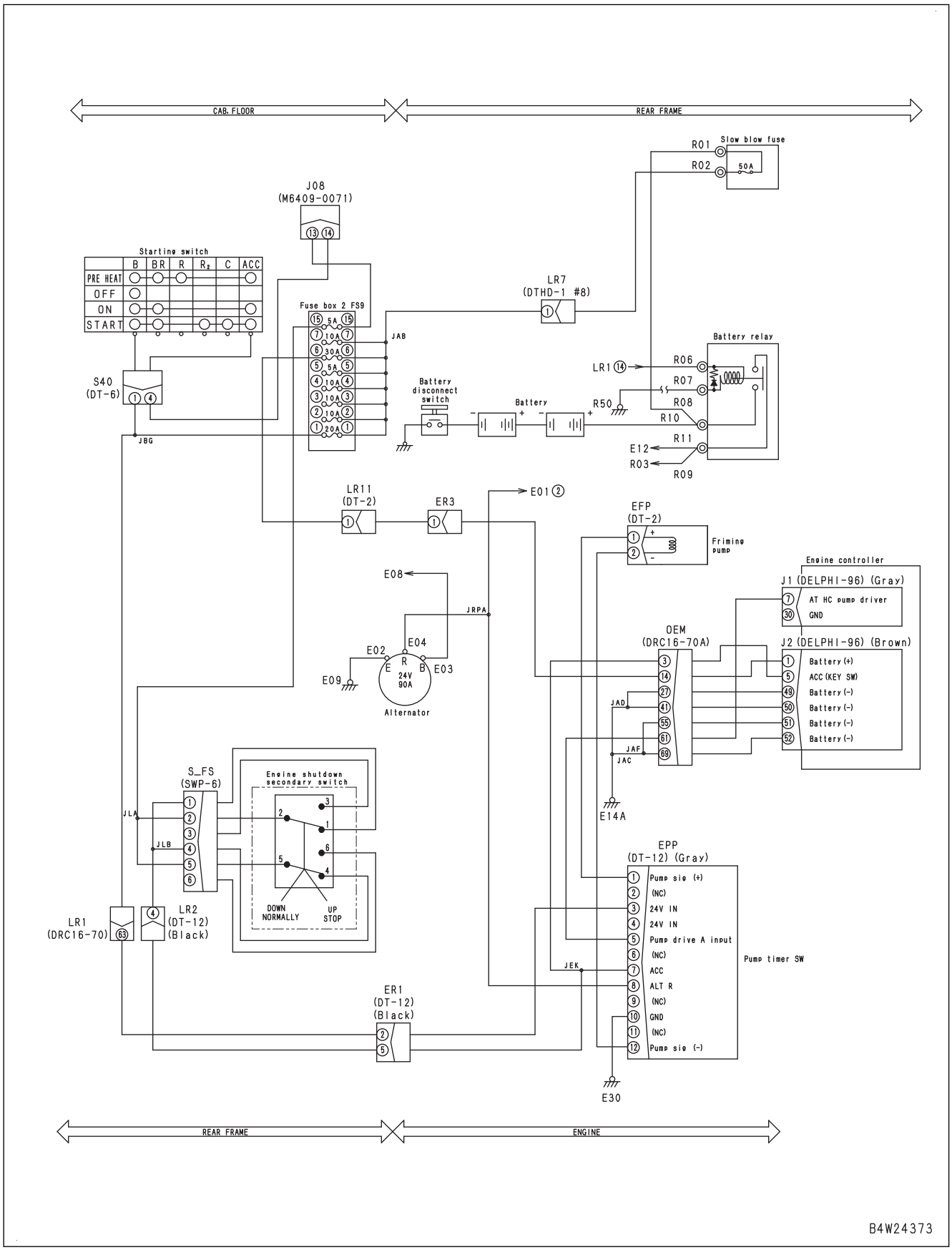
Action level	Failure code	Failure	Engine Controller Partial Data Lost Error (Engine controller system)
L04	CA1117		
Detail of failure	Internal defect is detected in engine controller.		
Action of controller	None in particular		
Phenomenon on machine	• Engine continues operation normally, however, engine may stop while running or not able to start while it is stopped. • Engine controller cannot save internal data correctly.		
Related information	• 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. • Power supply voltage of engine controller can be checked with monitoring. (Code: 03203) • Engine controller internal data (related to KDPF, AdBlue/DEF level, etc.) may be lost. Appropriate remedy must be performed after resetting error. • This failure code is displayed when power supply is disconnected by battery disconnect switch, etc. before engine controller is normally exited. **NOTICE** **Remedy after resetting error** • **Perform “Active Regeneration for Service”. for details, see TESTING AND ADJUSTING, “SERVICE MODE” and “METHOD FOR SETTING WITH TESTING MENU (ACTIVE REGENERATION FOR SERVICE)” of “SETTING AND OPERATION OF MACHINE MONITOR”.** • **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 battery	Check battery voltage and specific gravity of battery electrolyte.			
		Battery Voltage (1 battery)		Min. 12 V	
		Battery Voltage (2 batteries in series)		Min. 24 V	
		Specific gravity of battery electrolyte		Min. 1.26	
2	Defective alternator	1. Turn the starting switch to OFF position. 2. Start the engine.			
		Voltage	Between E04 terminal and ground	Engine speed in medium or above	26 to 30.5 V
3	Incorrect operation of battery disconnect switch	Incorrect operation of battery disconnect switch may be suspected. **REMARK** This failure code is displayed when power supply is disconnected by battery disconnect switch, etc. before engine controller is normally exited.			
4	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 sensor power supply relay circuit



CIRCUIT DIAGRAM (ELECTRIC FUEL FEED PUMP SWITCH)



FAILURE CODE [CA2555]

Action level	Failure code	Failure	Intake Air Heater Relay Open Circuit Error (Engine controller system)
L01	CA2555		
Detail of failure	Short circuit is detected in preheating relay drive circuit (primary side).		
Action of controller	None in particular		
Phenomenon on machine	Intake air heater does not work in auto preheating mode (resulting in degraded startability and emission of white smoke at low temperature).		
Related information	• 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. • Troubleshooting of this failure code covers circuits from engine controller to primary (coil) side of preheating relay. • This failure code is detected only when the relay is OFF. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position (engine coolant temperature: -4 °C and above).		

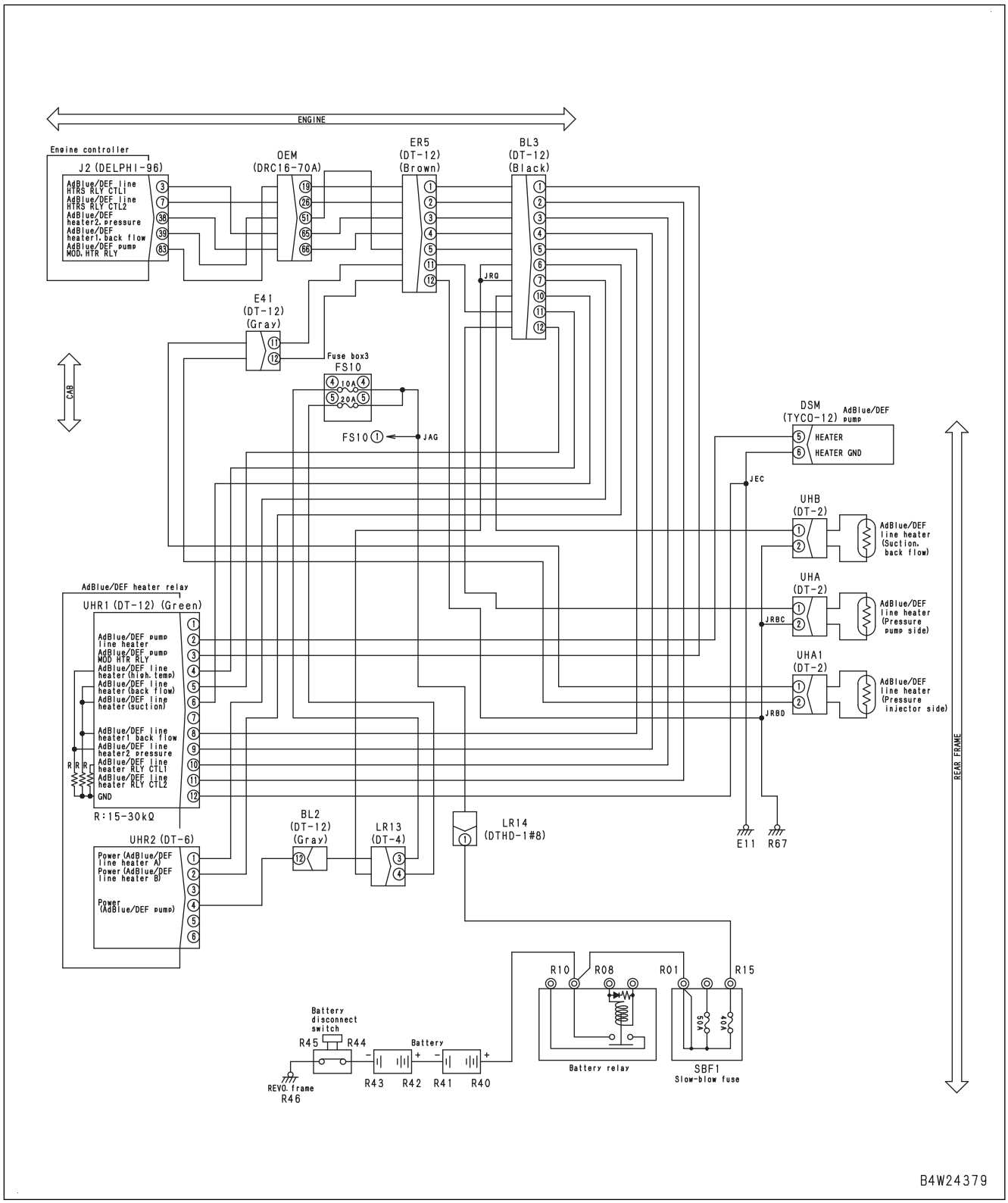
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective preheating relay	1. Turn the starting switch to OFF position. 2. Disconnect relay L125, and connect T-adapter to male side.		
		Resistance	Between L125 (male) (1) and (2)	200 to 400 Ω
2	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors J2 and L125, and connect T-adapter to each female side.		
		Resistance	Between J2 (female) (75) and L125 (female) (1)	Max. 1 Ω
			Between J2 (female) (61) and L125 (female) (2)	Max. 1 Ω
3	Hot short circuit in wiring harness	Perform it under condition where preheat does not operate (Engine coolant temperature: -4 °C or higher). 1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector J2. 3. Turn the starting switch to ON position.		
		Voltage	Between J2 (75) and (61)	Max. 1 V
4	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.)		

FAILURE CODE [CA3143]

Action level	Failure code	Failure	SCR Temperature Sensor Low Error (Engine controller system)
L03	CA3143		
Detail of failure	Ground fault or sensor circuit error in SCR temperature sensor measuring section or probe (+)		
Action of controller	• As SCR temperature cannot be detected, substitutes SCR outlet temperature for SCR temperature and run the engine (if SCR outlet temperature sensor also has an error, use the last normal value). • Derates engine power for operation. • Stops AdBlue/DEF injection. • Closes EGR valve. • Stops regeneration control. • Stops fuel dosing. • Activates Inducement strategy.		
Phenomenon on machine	• NOx emission increases because AdBlue/DEF injection is disabled. • Engine output is reduced based on Inducement strategy.		
Related information	⚠ **SCR assembly, sensor installation piping, and sensor probe are heated to 400 °C and above. Be careful not to get burn injury.** • 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. • For SCR temperature sensor replacement, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL SCR TEMPERATURE SENSOR”. • If ground fault or sensor circuit error in the SCR temperature sensor measuring section or probe (+) occurs, the information is sent to the engine controller through CAN communication, and 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 SCR temperature sensor	1. Turn the starting switch to OFF position. 2. Replace SCR temperature sensor. 3. Turn the starting switch to ON position.
		If this failure code is cleared, the original SCR temperature 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.)

Circuit diagram related to AdBlue/DEF line heater



⚠ Keep the brake pedal firmly depressed.

7) While depressing the brake pedal, depress the accelerator pedal gradually to stall the torque converter.

NOTICE

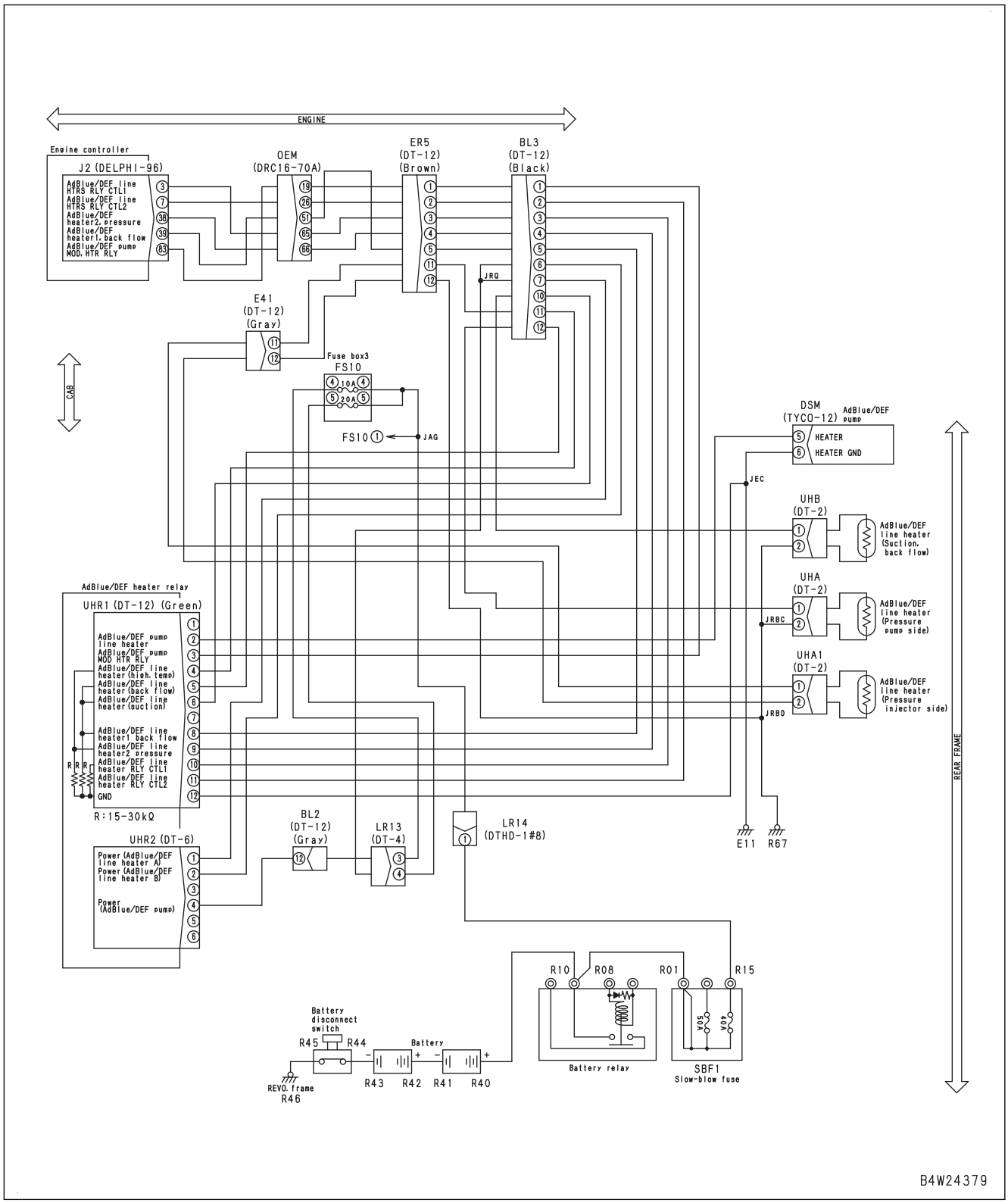
Be careful that torque converter oil does not overheat.

7. When oil temperature rises, change the operation to low idle or high idle to lower the oil temperature.
8. Continuously repeat steps 6 and 7 for up to 50 minutes while being careful that torque converter oil does not overheat.
9. Make sure that this failure code is cleared.

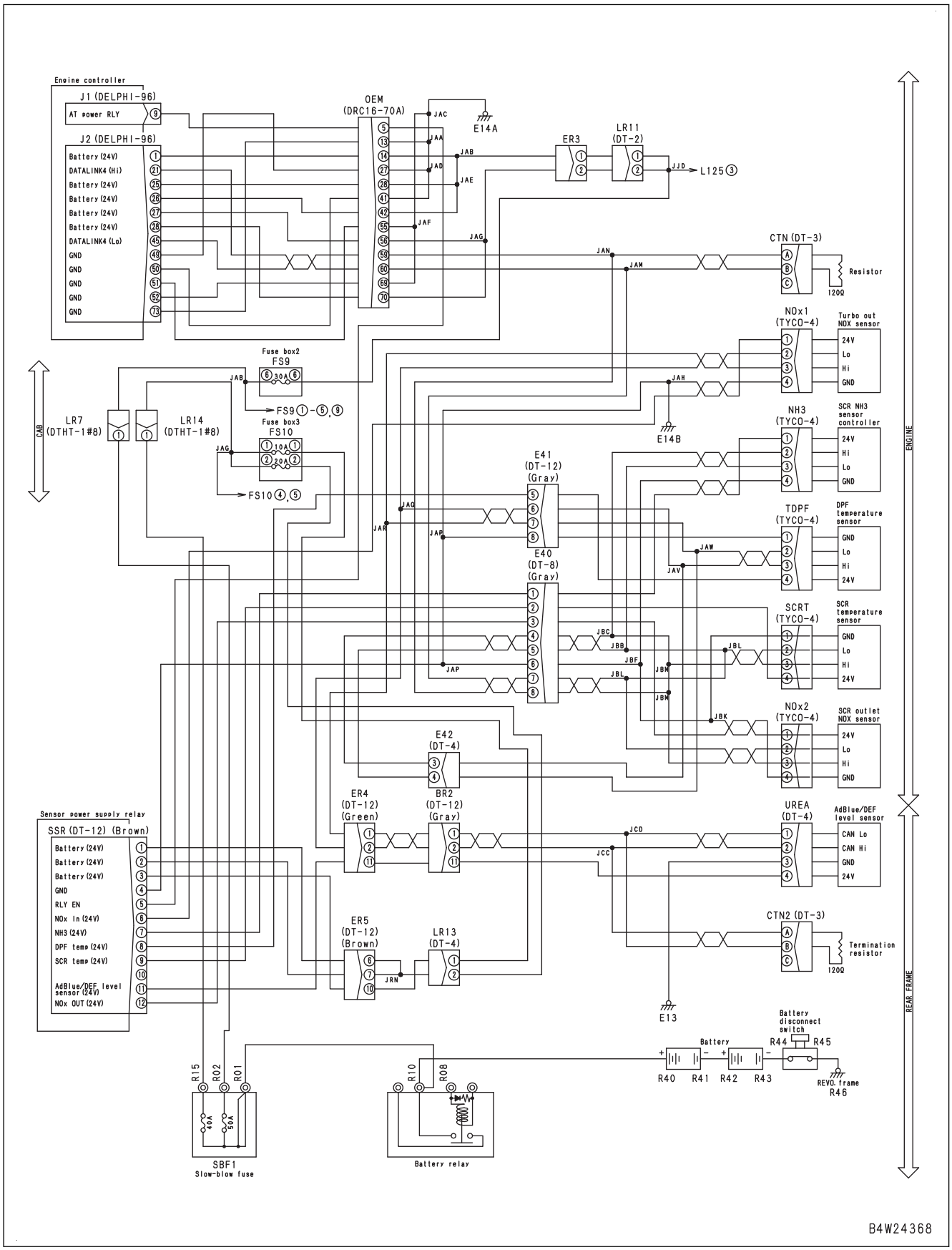
REMARK

- If this failure code is cleared, repair is completed.
- If this failure code is displayed, return to troubleshooting.

Circuit diagram related to AdBlue/DEF line heater



Circuit diagram related to SCR system CAN communication



No.	Cause	Procedure, measuring location, criteria and remarks
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.)

Loaded Diagnostics Operation to Confirm Failure Correction

Check if the repair has been completed with the following procedure:

(Make sure this failure code is not displayed after this procedure.)

Clear this failure code by “Engine Controller Inducement Fault Clear” before step 1. (EU Specification)

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position, and start the engine.
3. Run the engine at high idle speed to raise the exhaust temperature. (Keep the engine speed so that monitoring code 19300 “SCR temperature” is 150 °C or higher.)
4. Check if this failure code is not displayed after 1 minute.

REMARK

- If this failure code is not displayed, repair is completed.
- In case it is displayed, return to troubleshooting.

FAILURE CODE [CA4166]

Action level	Failure code	Failure	SCR Temperature Sensor ECU High Temperature Error (Engine controller system)
L01	CA4166		
Detail of failure	High temperature error is detected in SCR temperature sensor controller. (Min. 150 °C)		
Action of controller	None in particular		
Phenomenon on machine	• Defective detection of SCR temperature and SCR outlet temperature		
Related information	⚠ **The SCR assembly, sensor fitting piping, and sensor probe become hot (Min. 400 °C). Be careful not to get burned.** • The SCR temperature sensor and SCR outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • For the replacement procedure of the SCR temperature sensor, see “DISASSEMBLY AND ASSEMBLY”, “REMOVE AND INSTALL SCR TEMPERATURE SENSOR”. **NOTICE** **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 that the failure code is cleared. (Repair completion cannot be judged without raising the exhaust temperature even if this failure code is cleared by turning ON the starting switch)**		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Leakage of exhaust gas	Check the periphery of the temperature sensor controller for excessively high temperature (150 °Cor higher).
2	Defective SCR temperature sensor	1. Turn the starting switch to OFF position. 2. Replace SCR temperature sensor. 3. Turn the starting switch to ON position.
		If this failure code is cleared, the original SCR temperature sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
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.)

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.)

REMARK

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

Check if the repair has been completed with the following procedure:

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to the ON position, and check the failure code is cleared. If this failure code is displayed, return to troubleshooting.
3. Start the engine.
4. Run the engine at low idle speed for 10 minutes.
5. Run the engine at high idle speed for 10 minutes.

No.	Cause	Procedure, measuring location, criteria and remarks
6	Defective turbocharger outlet NOx sensor	1. Turn the starting switch to OFF position. 2. Replace turbocharger outlet NOx sensor since NOx sensor is irreparable. 3. Turn the starting switch to ON position. 4. Implement operation for “Loaded Diagnostics Operation To Clear Failure Code”. **REMARK** Offset/drift may occur due to sulfur-poisoned turbocharger outlet NOx sensor.
		If this failure code is cleared, the original turbocharger outlet NOx sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
7	Abnormal intake system	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. **REMARK** Offset/drift due to the deteriorated and aged MAF sensor, distorted intake system, damaged rectifier
8	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.)

Loaded Diagnostics Operation To Clear Failure Code

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

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

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

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

   NOTICE

   - **Check that monitoring code: 19300 “SCR Temperature” is Min. 290 °C and monitoring code: 19202 “Turbo Outlet NOx Corrected” is Min. 120 ppm on “Pre-defined Monitoring” screen.**
   - **Be careful that torque converter oil does not overheat.**
7. Run the engine at high idle speed for 5 minutes.
8. Check that monitoring code 19300 “SCR Temperature” is approximately 250 °C on “Pre-defined Monitoring” screen.
9. Repeat high idle speed run under no load for 5 minutes and dump body LOWER relief for 3 minutes for 5 times.

   NOTICE

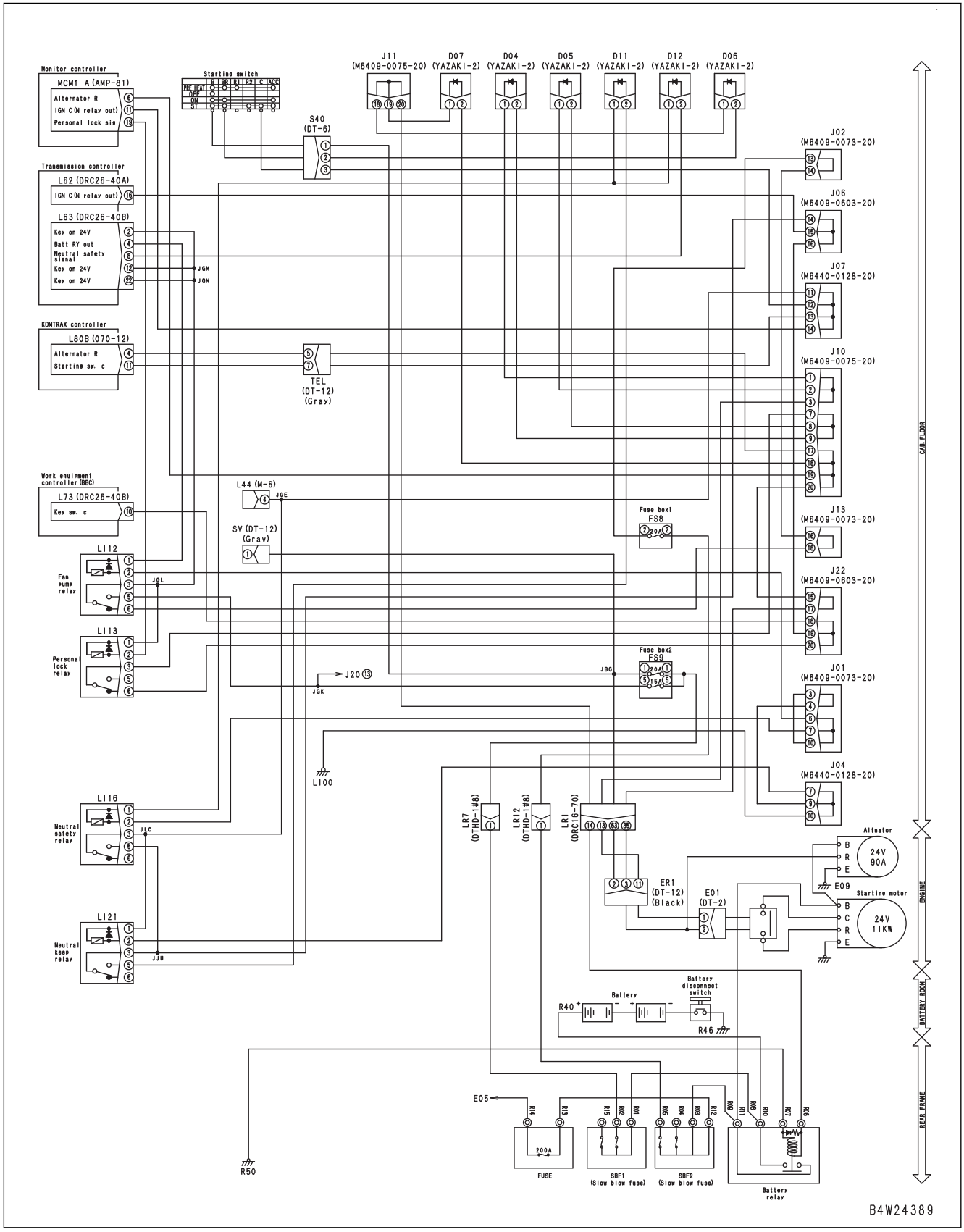
   Be careful that torque converter oil does not overheat.
10. Check that this failure code is cleared.

FAILURE CODE [D160KY]

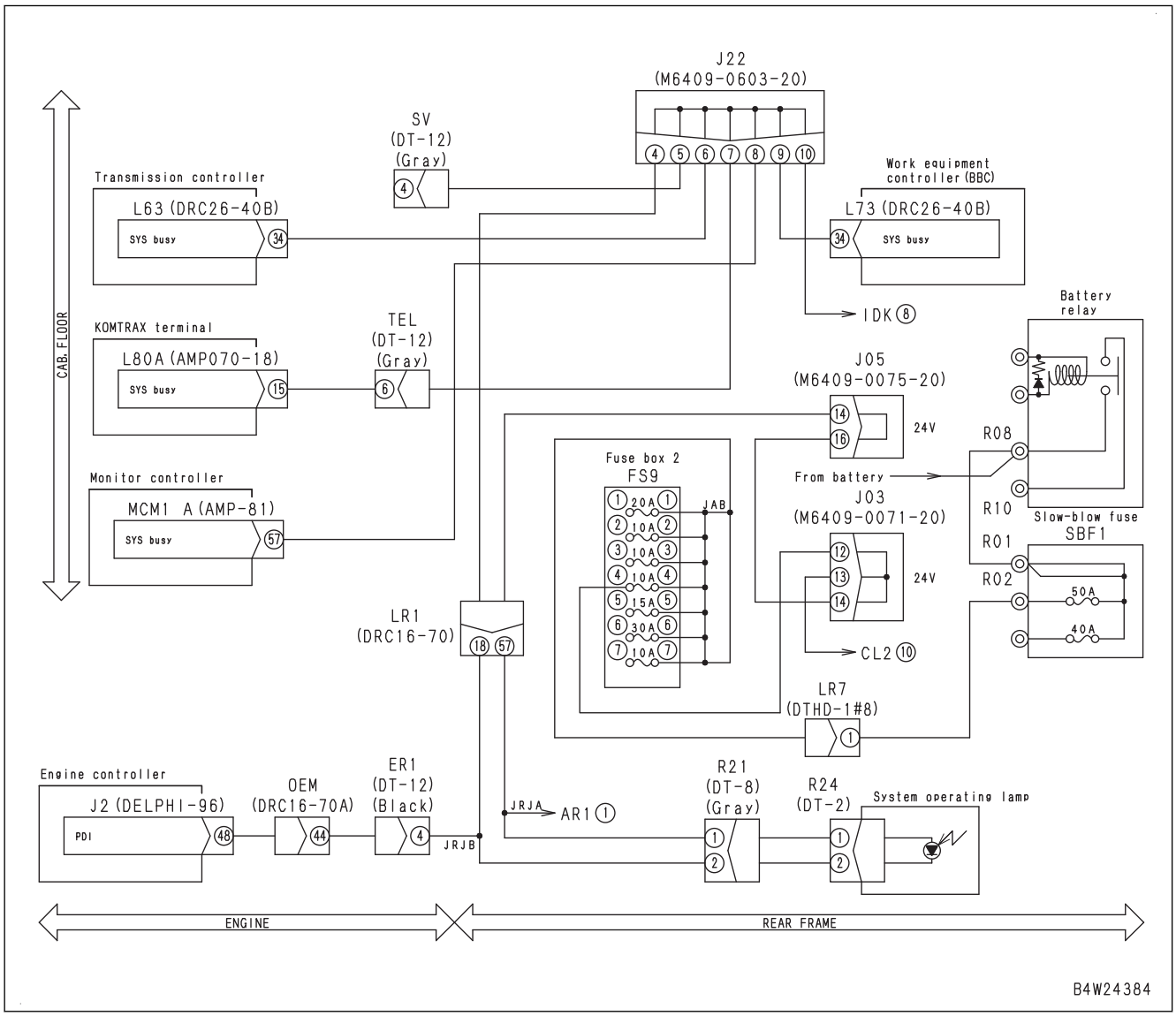
Action level	Failure code	Failure	Backup Lamp Relay Output Hot Short Circuit (Transmission controller system)
L01	D160KY		
Detail of failure	Even when controller does not drive primary circuit (coil) of backup lamp relay, current flows due to hot short of backup lamp relay output system.		
Action of controller	• Stops driving primary circuit (coil) of backup lamp relay. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• Backup lamp stays lit. • Backup buzzer keeps sounding.		
Related information	• Output state (ON/OFF) to backup lamp relay can be checked with monitoring function. (Code: 03705) • This failure code detects failure in primary (coil side) circuit of backup lamp relay, but does not detects failure in secondary (contact side) circuit. • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective backup lamp relay (internal short circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connector L117, and connect T-adapter to male side.			
		Resistance	Between L117 (male) (1) and (3)		Min.1 MΩ
2	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector L117, and connect T-adapter to female side. 3. Turn the starting switch to ON position.			
		Voltage	Between L117 (female) (1) and ground		Max. 4.5 V
3	Defective transmission controller	1. Turn the starting switch to OFF position. 2. Insert T-adapter into the connector L62. 3. Turn the starting switch to ON position.			
		Voltage	Between L62 (19) and ground	Directional (FNR) lever: R (reverse)	20 to 30 V
				Directional (FNR) lever: Other than R	Max. 4.5 V

Circuit diagram related to key switch C terminal signal



Circuit diagram related to system operating lamp



No.	Cause	Procedure, measuring location, criteria and remarks		
6	Open circuit in wiring harness (wire breakage or defective contact of connector)	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 J2 (5) and (49)	20 to 30 V
			Between MCM1 A (24) and (2)	20 to 30 V
			Between (21) and each of L73 (14) and (24)	20 to 30 V
			Between (21) and each of L63 (14) and (24)	20 to 30 V
			Between AL1 (1) and (5)	20 to 30 V
			Between L80 (24) and (2)	20 to 30 V
		If no failure is found by check on cause 5, this check is not required. 1. Turn the starting switch to OFF position, and turn the battery disconnect switch to OFF position. 2. Disconnect related connectors, and connect T-adapters to each female side connector to be measured.		
		Resistance	Between MDM3 (female) (3) and MCM1 B (female) (97)	Max. 1 Ω
			Between MDM3 (female) (8) and MCM1 B (female) (89)	Max. 1 Ω
			Between MCM1 B (female) (97) and L62 (female) (32)	Max. 1 Ω
			Between MCM1 B (female) (89) and L62 (female) (22)	Max. 1 Ω
			Between MCM1 B (female) (97) and J2 (female) (22)	Max. 1 Ω
			Between MCM1 B (female) (89) and J2 (female) (46)	Max. 1 Ω
			Between MCM1 B (female) (97) and L72 (female) (32)	Max. 1 Ω
			Between MCM1 B (female) (89) and L72 (female) (22)	Max. 1 Ω
			Between MCM1 B (female) (97) and AL1 (female) (4)	Max. 1 Ω
			Between MCM1 B (female) (89) and AL1 (female) (6)	Max. 1 Ω
			Between MCM1 B (female) (97) and L80 (female) (45)	Max. 1 Ω
			Between MCM1 B (female) (89) and L80 (female) (64)	Max. 1 Ω
			Between J2 (female) (22) and CAN1 (female) (A)	Max. 1 Ω
			Between J2 (female) (46) and CAN1 (female) (B)	Max. 1 Ω

FAILURE CODE [DBE6KX]

Action level	Failure code	Failure	24 V Sensor Power Supply Ground Fault (Transmission controller) (Transmission controller system)
L01	DBE6KX		
Detail of failure	24 V sensor power supply system is shorted to ground.		
Action of controller	Cannot normally detect input signals of sensors that uses this power supply since sensor signal is abnormal.		
Phenomenon on machine	Sensor failure codes [DHT1KX], [DHT5KX], and [DHT7KX] are displayed.		
Related information	• After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. • Voltage value of each sensor is indicated as 0 V. (Codes: 41202 , 32602 , 32604)		

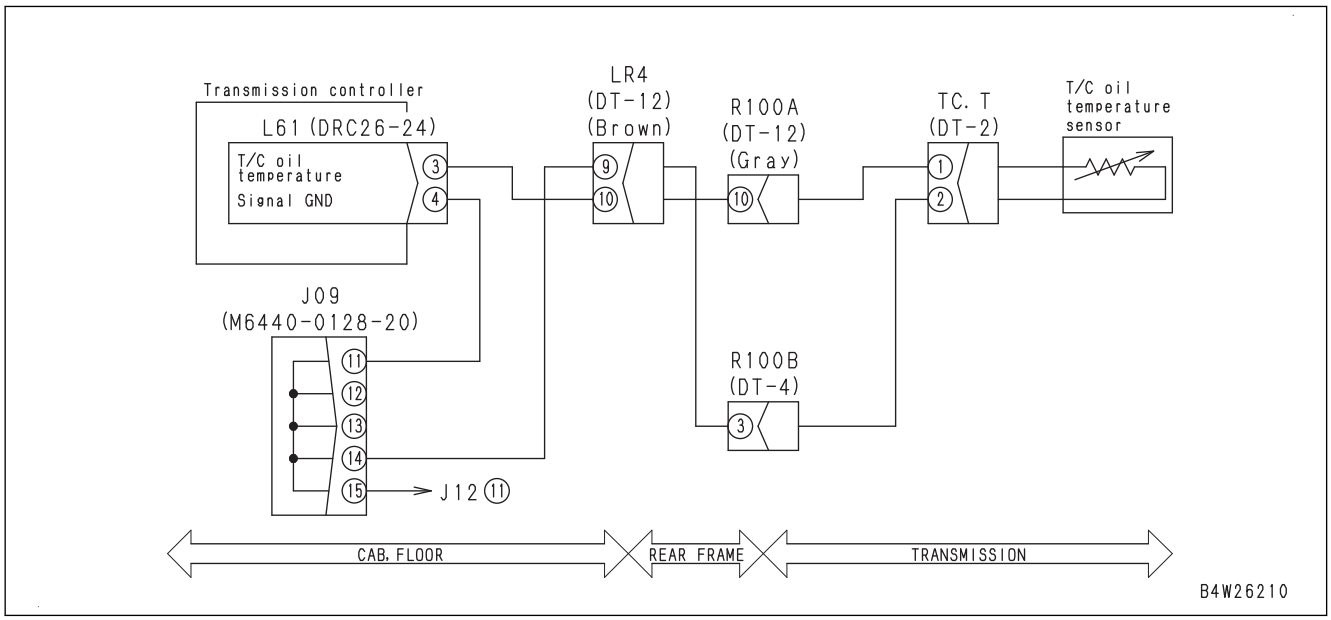
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Cause of defective pressure sensor	1. Turn the starting switch to OFF position. 2. Disconnect connectors of the following sensors one by one, and turn starting switch to ON position each time. **REMARK** • If this failure code goes out, disconnected sensor is defective. • Since connector is disconnected, other failure codes are displayed. Ignore all failure codes other than this one. 3. Each time troubleshooting is finished, return to step 1.		
		Connector	Left brake pressure sensor	B01
			Torque converter input oil pressure sensor	TCIN.P
			Torque converter outlet oil pressure sensor	R91
2	Cause of failure in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors R73, R91, TCIN.P, and L61. 3. Connect T-adapter to female side of connector L61.		
		Resistance	Between L61 (female) (16) and ground	Min. 1 MΩ
3	Defective transmission controller	1. Turn the starting switch to OFF position. 2. Disconnect the connector L61, and connect T-adapter to male side. 3. Turn the starting switch to ON position (with connector disconnected).		
		Voltage	Between L61 (male) (16) and (4)	20 to 30 V

FAILURE CODE [DDKLKA]

Action level	Failure code	Failure	Joystick Effective Switch Open Circuit Or Hot Short Circuit (Transmission controller system)
L01	DDKLKA		
Detail of failure	Combination of following 2 switch inputs is incorrect with joystick steering enabled. • Input from joystick ON/OFF switch: No.39 pin of L63 and No.27 pin of L62 are open.		
Action of controller	Controls with control signal before detecting abnormality.		
Phenomenon on machine	Steering wheel operation or joystick steering operation can be continued as before detecting abnormality.		
Related information	• Input state (ON/OFF) from joystick ON/OFF switch can be checked with monitoring function. (Code: 02230) • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and enable joystick steering.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective joystick ON/OFF switch	1. Turn the starting switch to OFF position. 2. Disconnect connector JS1, and connect T-adapter to male side.			
		Resistance	Between JS1 (male) (5) and (6)	Switch: OFF	Min. 1 MΩ
				Switch: ON	Max. 1 Ω
			Between JS1 (male) (3) and (4)	Switch: OFF	Max. 1 Ω
				Switch: ON	Min. 1 MΩ
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn the starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Disconnect connectors L62, L63, and JS1, and connect T-adapters to each female side.			
		Resistance	Between L62 (female) (27) and JS1 (female) (6)		Max. 1 Ω
			Between L63 (female) (39) and JS1 (female) (4)		Max. 1 Ω
			Between JS1 (female) (3) and ground		Max. 1 Ω
			Between JS1 (female) (5) and ground		Max. 1 Ω
3	Defective transmission controller	Joystick ON/OFF switch system 1. Turn the starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Insert T-adapter into the connector L63. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. 6. Operate joystick ON/OFF switch to perform troubleshooting.			
		Voltage	Between L63 (39) and ground	Switch: OFF	Max. 1 V
				Switch: ON	7 to 9 V

Circuit diagram related to torque converter oil temperature sensor



FAILURE CODE [DK30KA]

Action level	Failure code	Failure	AJSS Lever Potentio Sensor Signal Open Circuit or Ground Fault (Work equipment controller)
L03	DK30KA		
Detail of failure	Due to open circuit or ground fault in AJSS lever angle sensor, AJSS lever angle signal voltage is lower than normal range. (AJSS angle sensor signal voltage: Max. 0.3 V)		
Action of controller	• Makes centralized warning lamp light up and alarm buzzer sound. • Stops steering neutral safety function. • Sets AJSS EPC output to 1.47 MPa {15 kgf/cm^2} or equivalent. • If cause of failure is eliminated, machine becomes normal by itself.		
Phenomenon on machine	• Steering fine control is not enabled (steering rattles). • Swing at full speed is not enabled.		
Related information	• Input state from AJSS lever potentiometer sensor can be checked with monitoring function. (Code: 94300, 94301) • This failure code is displayed only when AJSS specifications is set. • After completion of repair, check that the failure code is cleared by the following procedure. Method: Turn the starting switch to ON position and operate AJSS.		

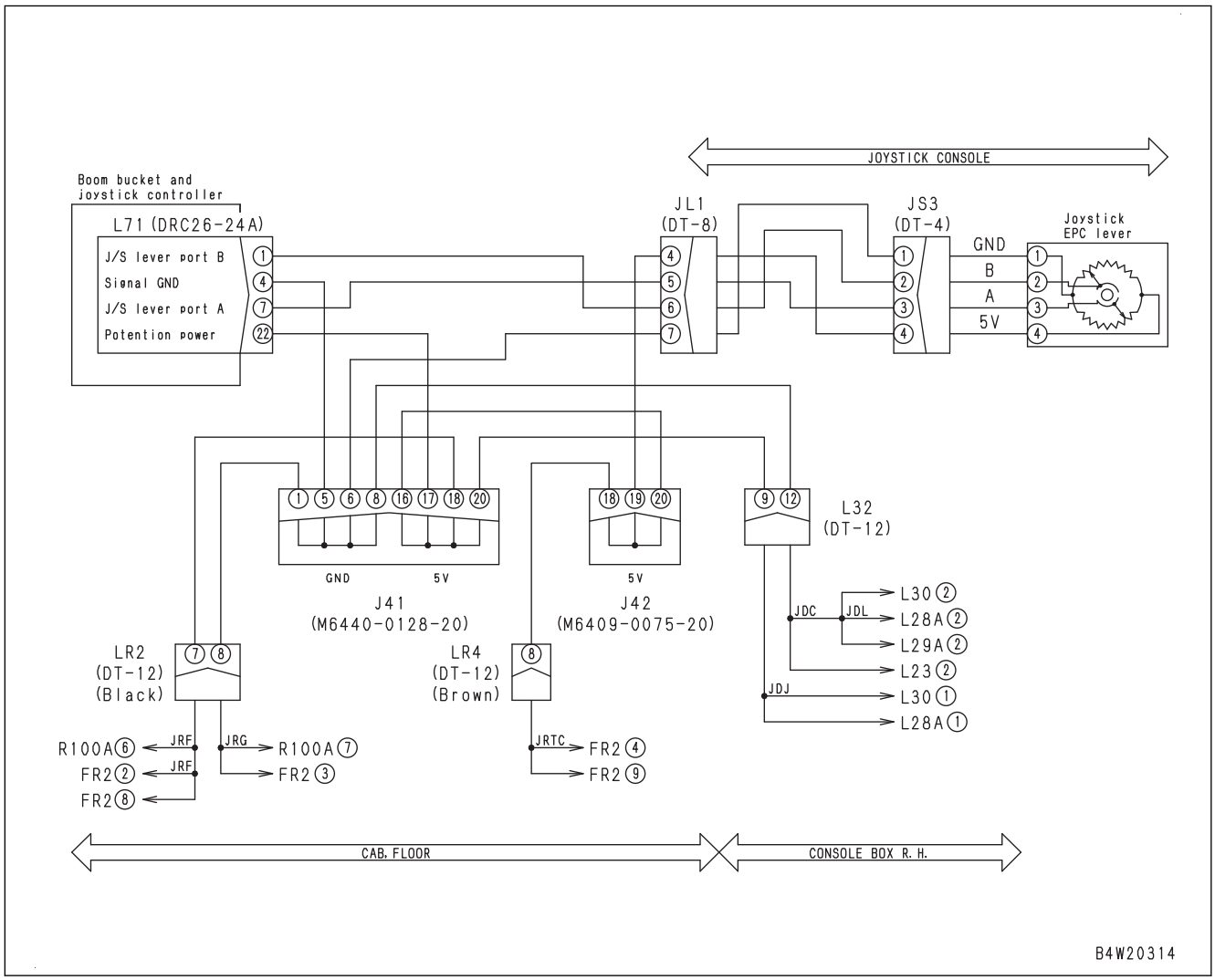
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective AJSS angle sensor	1. Starting switch: OFF 2. Disconnect connector S30, and connect T-adapter to male side			
		Resistan	Between S30 (B) and (C)		5 kΩ±20 %
			Between ground and each of S30 (A), (B), and,(C)		Min. 1 MΩ
		1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector S30. 3. Turn the starting switch to ON position.			
		Voltage	Between S30 (A) and (B)	Always	4.85 to 5.15 V
			Between S30 (A) and (C)	Always	0.30 to 4.70 V
				Lever in NEUTRAL	2.20 to 2.80 V
				When steering lever is at right full operate swing	2.83 to 3.83 V
				When steering lever is at left full operate swing	1.17 to 2.17 V
2	Open circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors S30, L71 and connect T-adapter to each female side.			
		Resistance	Between S30 (female) (A) and L71 (female) (13)		Max. 1 Ω
			Between S30 (female) (B) and BBC2 (female) (22)		Max. 1 Ω
			Between S30 (female) (C) and L71 (female) (4)		Max. 1 Ω

FAILURE CODE [DK5BL8]

Action level	Failure code	Failure	Bucket Lever Potentiometer Main Or Sub Signal Abnormality (Work equipment controller system)
L03	DK5BL8		
Detail of failure	Total of signal voltage of bucket lever potentiometer signals (main: A line and sub: B line) is out of specified range. (Total is Max. 4.65 V or Min. 5.35 V.)		
Action of controller	• Makes work equipment system caution lamp light up in red, centralized warning lamp light up, and alarm buzzer sound intermittently at the same time. • If the position of bucket control lever is recognized, controller lowers the speed of bucket to 30 % and continues bucket operation. • If the position of bucket control lever is not recognized, controller stops bucket operation. • Stops driving detent solenoid.		
Phenomenon on machine	• Bucket speed lowers to approximately 30 %, or bucket does not move. • If remote bucket positioner is used, bucket control lever cannot be held at TILT position.		
Related information	• Input voltage from bucket lever potentiometer (main: A line) can be checked with monitoring function. (Code: 42002) • Input voltage from bucket lever potentiometer (sub: B line) can be checked with monitoring function. (Code: 42003) • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and set the work equipment lock switch to UNLOCK position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 5 V sensor power supply system	If failure code [DB96KX] is also displayed, perform troubleshooting for failure code [DB96KX] first. If failure code [DB96KX] is not displayed, perform followings.		
		1. Turn the starting switch to OFF position. 2. Disconnect connector L29A, and connect T-adapter to female side. 3. Turn the starting switch to ON position. **REMARK** If power supply voltage is abnormal, proceed to check on cause 3 (to locate the wiring harness open circuit).		
		Voltage	Between L29A (female) (1) and (2)	4.8 to 5.2 V

Circuit diagram related to joystick lever potentiometer



FAILURE CODE [DPQ1KR]

Action level	Failure code	Failure	LIN Defective Communication (Switch panel) (Machine monitor system)
L01	DPQ1KR		
Detail of failure	Updating of data received from switch panel (control switch on machine monitor) via LIN communication is interrupted.		
Action of controller	None in particular		
Phenomenon on machine	• You can neither enter user menu and service menu screens, nor settings by using these menus. • Air conditioner cannot be controlled. • SMR cannot be displayed on screen while starting switch is in OFF position. • If engine start lock is enabled, you cannot start engine since you cannot enter password.		
Related information	• Since signal of active LIN communication line is pulse voltage, it cannot be measured by using multimeter. • When failure code [DPQ2KR] or [DPQ3KR] is displayed simultaneously on screen, ground fault or hot short circuit may occur in LIN communication line. • After completion of repair, check if the failure code is cleared by the following procedure. Method: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Ground fault or hot short circuit in 12 V power supply line of switch panel	If failure code [DAFDKB] is displayed, perform troubleshooting for [DAFDKB] first.		
2	Open circuit in 12 V power supply line of switch panel	1. Turn the starting switch to OFF position. 2. Disconnect connector MOM1, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between MOM1 (female) (1) and (2)	9 to 14 V
3	Defective 5 V power supply line of switch panel	1. Turn the starting switch to OFF position. 2. Disconnect connector MOM1, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between MOM1 (female) (4) and (2)	4 to 6 V
4	Hot short circuit in wiring harness (LIN communication line) (contact with 24 V circuit)	When failure code [DPQ2KR] and [DPQ3KR] are displayed at the same time, perform following check. 1. Turn the starting switch to OFF position. 2. Disconnect connector MOM1, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between MOM1 (female) (3) and (2)	Approx. 9 V
5	Ground fault in wiring harness (contact with ground circuit)	• When failure code [DPQ2KR] 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. 1. Turn the starting switch to OFF position. 2. Disconnect connectors MCM1 B, MDM2, MOM1, and RVM1, and connect T-adapter to any female side.		
		Resistance	Between ground and each of MCM1 B (female) (108), MDM2 (female) (3), MOM1 (female) (3), and RVM1 (female) (9)	Min. 1 MΩ

FAILURE CODE [DW4QKY]

Action level	Failure code	Failure	Boom LOWER EPC Solenoid Hot Short Circuit (Work equipment controller system)
L03	DW4QKY		
Detail of failure	Due to hot short circuit in output signal circuit to boom LOWER EPC solenoid, abnormal voltage is generated when controller stops driving boom LOWER EPC solenoid.		
Action of controller	• Drives work equipment neutral lock solenoid. • Stops driving boom RAISE and LOWER, bucket TILT and DUMP, and 3rd spool (for attachment) EXTEND and RETRACT. • Stops driving every work equipment detent. • 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	• All work equipment do not move because controller drives work equipment neutral lock solenoid. • Boom LOWER EPC solenoid may be burnt out.		
Related information	• Output current value to boom RAISE EPC solenoid can be checked with monitoring function. (Code: 41900) • Output current value to boom LOWER EPC solenoid can be checked with monitoring function. (Code: 41901) • Output current value to bucket TILT EPC solenoid can be checked with monitoring function. (Code: 41902) • Output current value to bucket DUMP EPC solenoid can be checked with monitoring function. (Code: 41903) • Output current value to 3rd spool (for attachment) EXTEND EPC solenoid can be checked with monitoring function. (Code: 41906) • Output current value to 3rd spool (for attachment) RETRACT EPC solenoid can be checked with monitoring function. (Code: 41907) • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Start the engine.		

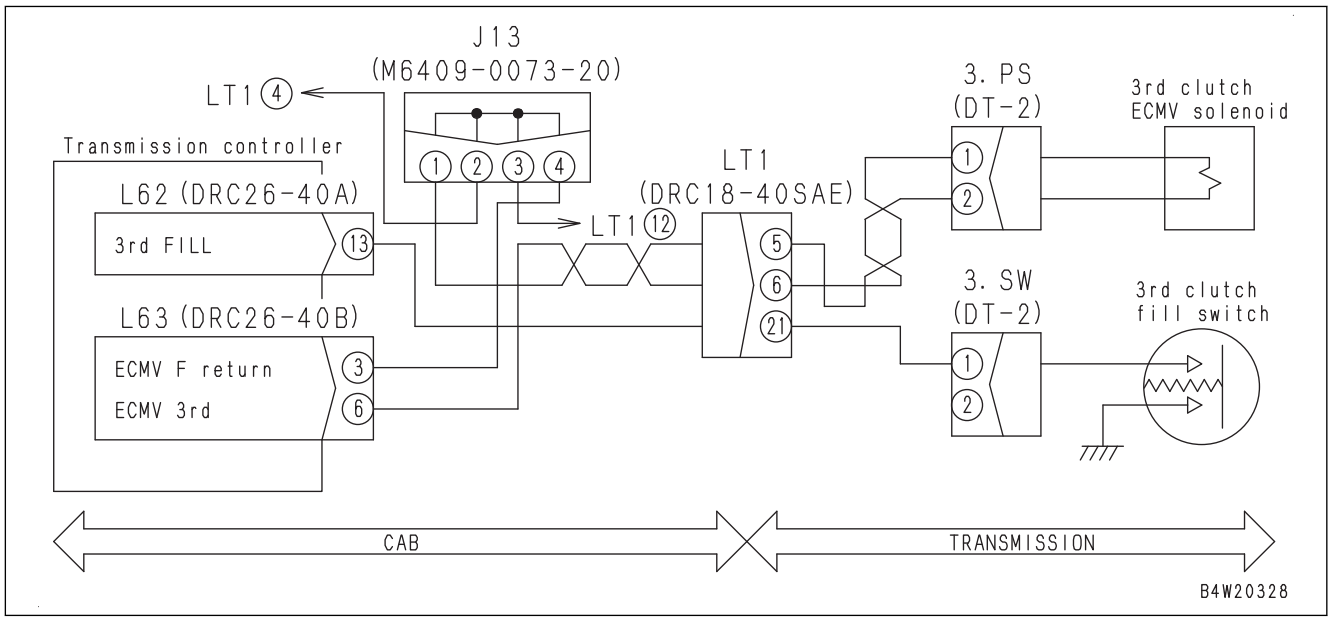
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector F24, and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between F24 (female) (1) and (2)	Max. 4.5 V
2	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connectors L73 and F24, and connect T-adapters to female side of L73. **REMARK** Check it by using multimeter in continuity mode.		
		Continuity	Between L73 (female) (16) and each pin other than (16)	No continuity
3	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.)		

FAILURE CODE [DX16KB]

Action level	Failure code	Failure	Radiator Fan Pump EPC Solenoid Ground Fault (Transmission controller system)
L03	DX16KB		
Detail of failure	Due to ground fault in fan pump EPC solenoid system, abnormal current flows through circuit when controller drives fan pump EPC solenoid.		
Action of controller	• Disables fan to rotate in reverse direction. • Stops driving fan pump EPC solenoid. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• Fan speed becomes maximum. • Fan cannot rotate in reverse direction. • When this failure occurs with fan rotating in reverse direction, fan rotation direction switches to normal direction.		
Related information	• Output current value to fan pump EPC solenoid can be checked with monitoring function. (Code: 41400) • After completion of repair, check if the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective radiator fan pump EPC solenoid	1. Turn the starting switch to OFF position. 2. Disconnect connector R29, and connect T-adapter to male side.		
		Resistance	Between R29 (male) (1) and (2)	5 to 10 Ω
			Between ground and each of R29 (male) (1) and (2)	Min. 1 MΩ
2	Open or short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector L63, and connect T-adapter to female side. **REMARK** If it is Min. 1 MΩ, wiring harness has open circuit. If it is Max. 1 Ω, wiring harness has short circuit.		
		Resistance	Between L63 (female) (25) and (23)	5 to 10 Ω
3	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors L63 and R29, and connect T-adapter to either female side.		
		Resistance	Between ground and L63 (female) (25) or R29 (female) (1)	Min. 1 MΩ
4	Short circuit in wiring harness	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 L63 and R29, and connect T-adapter to either female side.		
		Resistance	Between L63 (female) (25) and (23), or between R29 (female) (1) and (2)	Min. 1 MΩ
5	Defective transmission controller	If no failure is found by preceding checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to 3rd clutch

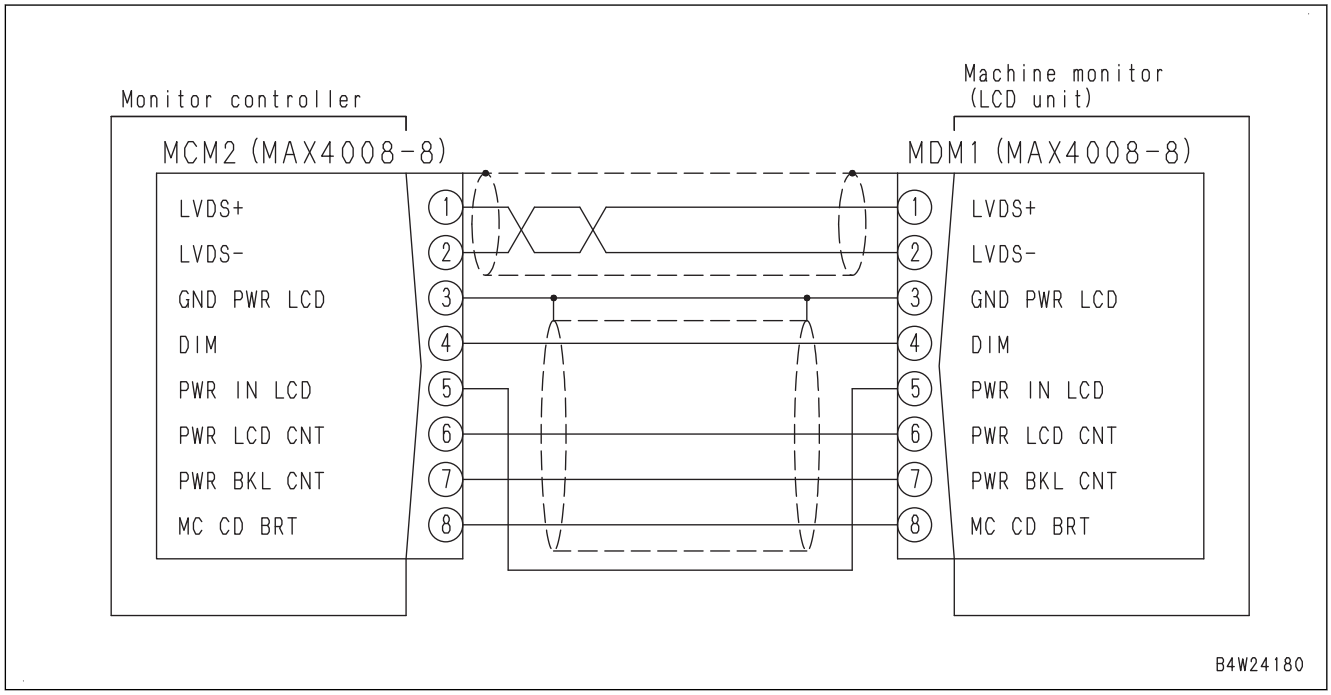


FAILURE CODE [DXHMKB]

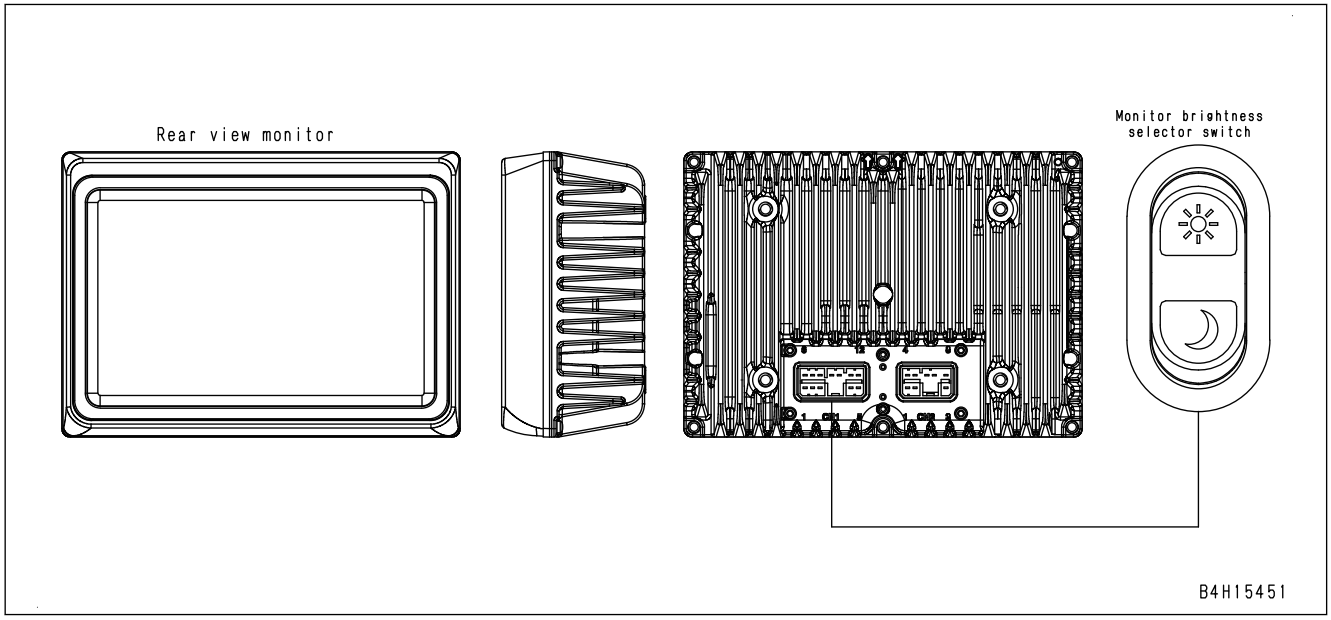
Action level	Failure code	Failure	J/S LH EPC Solenoid Ground Fault (Work equipment controller system)
L03	DXHMKB		
Detail of failure	• A ground fault occurs in the output system of the joystick steering solenoid cut-off relay. Thus, the joystick steering solenoid cut-off relay does not operate correctly.		
Action of controller	• Stops the output of the right EPC solenoid of the joystick and the left EPC solenoid of the joystick. • Stops the output of the joystick steering solenoid cut-off relay. • Makes centralized warning lamp light up and alarm buzzer sound. • Even if the cause of the failure no longer exists, the machine does not become normal until the starting switch is turned to the OFF position one time.		
Phenomenon on machine	You cannot use the joystick steering to operate the steering. (you can use the steering wheel to operate the steering.)		
Related information	• Output condition (current value) to the left EPC solenoid of the joystick steering can be checked with monitoring function. (Code: 41905) • Output condition (ON/OFF) to the joystick steering solenoid cut-off relay can be checked with monitoring function. (Code: 03708) • If failure codes for the system of the joystick steering solenoid cut-off relay are shown, do the troubleshooting for failure codes [D193KA], [D193KB], [D193KY], and [D193MC] first. • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Turn the starting switch to the ON position, and operate the joystick steering to the left.		

No.	Cause	Procedure, measurement location, criteria and remarks		
1	Defective joystick steering solenoid cut-off relay	1. Starting switch: OFF 2. Replace joystick steering solenoid cut-off relay JL3 with winker hazard lamp relay L122. 3. Start the engine, and operate the joystick steering to the left.		
		If this failure code is not shown in this check, joystick steering solenoid cut-off relay JL3 is defective.		
2	Defective left EPC solenoid of the joystick steering	1. Starting switch: OFF 2. Disconnect the connector L36L. Connect a T-adapter to the male side.		
		Resistance	Between L36L (male) (1) and (2)	5 to 15 Ω
			Between L36L (male) (1) and ground	Min. 1 MΩ
3	Ground fault in wiring harness	1. Starting switch: OFF 2. Disconnect the connectors L73 and L36L. Connect a T-adapter to one of them on the female side.		
		Resistance	Between ground and L73 (female) (7) or L36L (female) (1)	Min. 1 MΩ

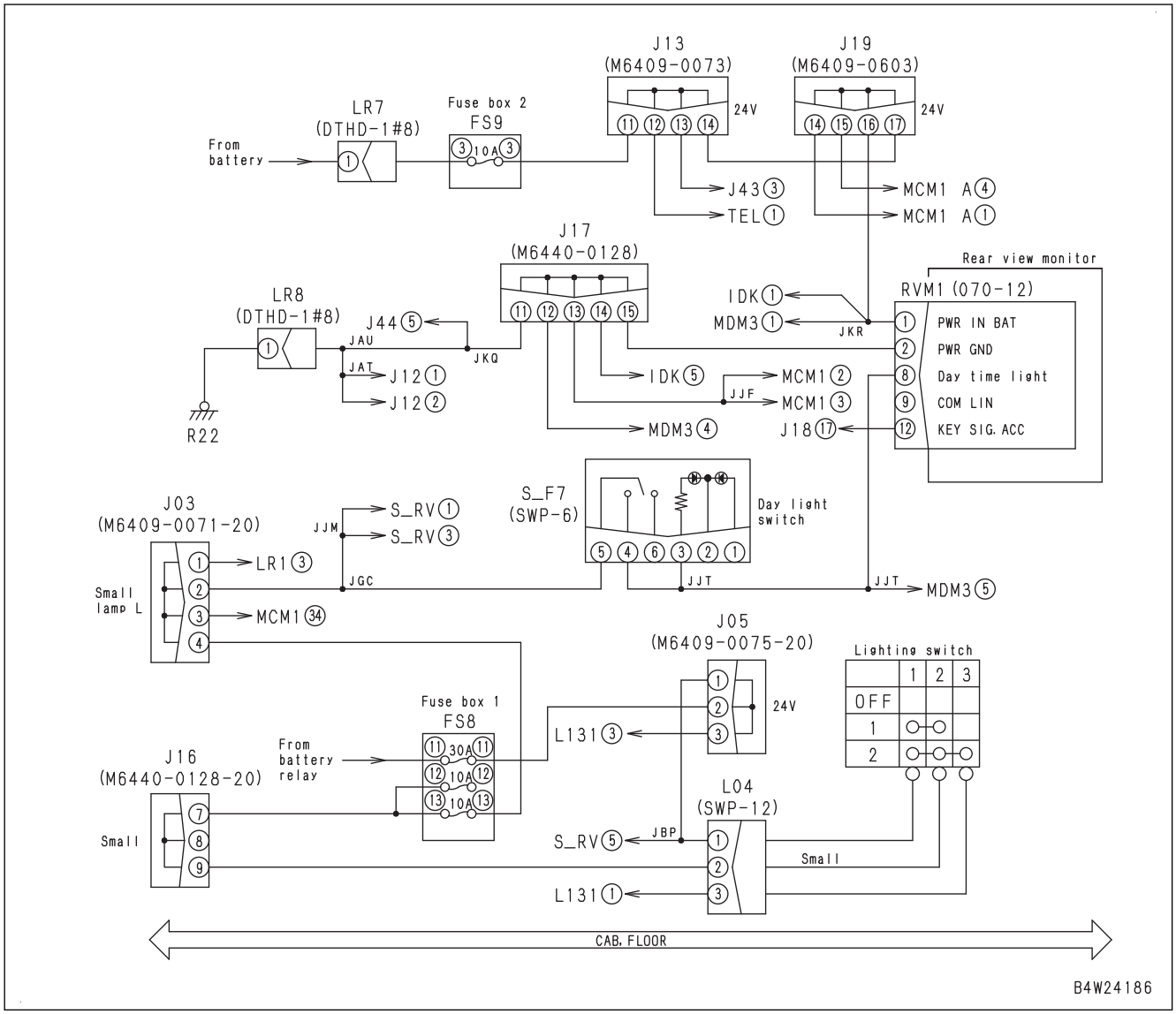
Circuit diagram between monitor controller and liquid crystal unit of machine monitor



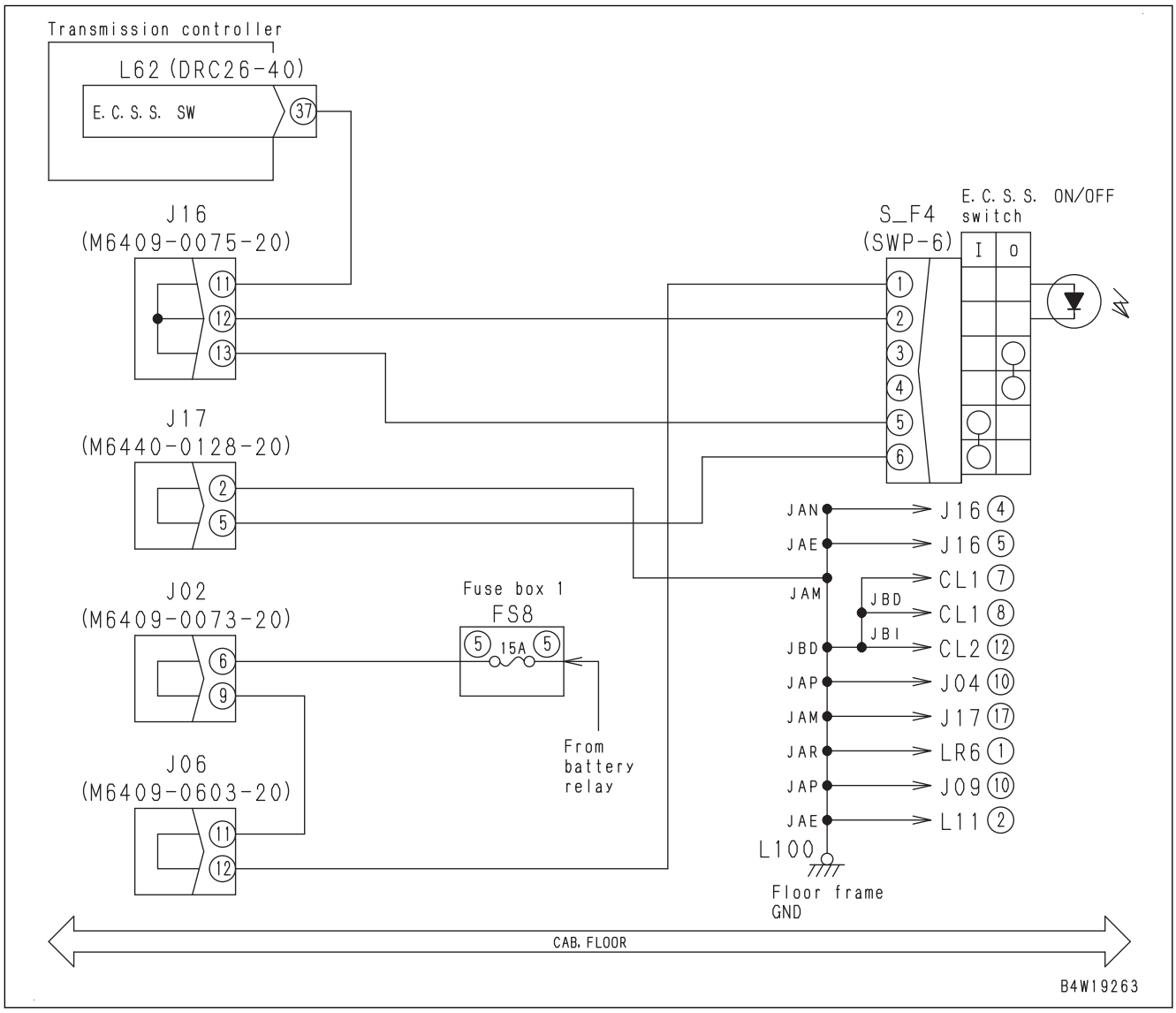
Wiring harness of rearview monitor



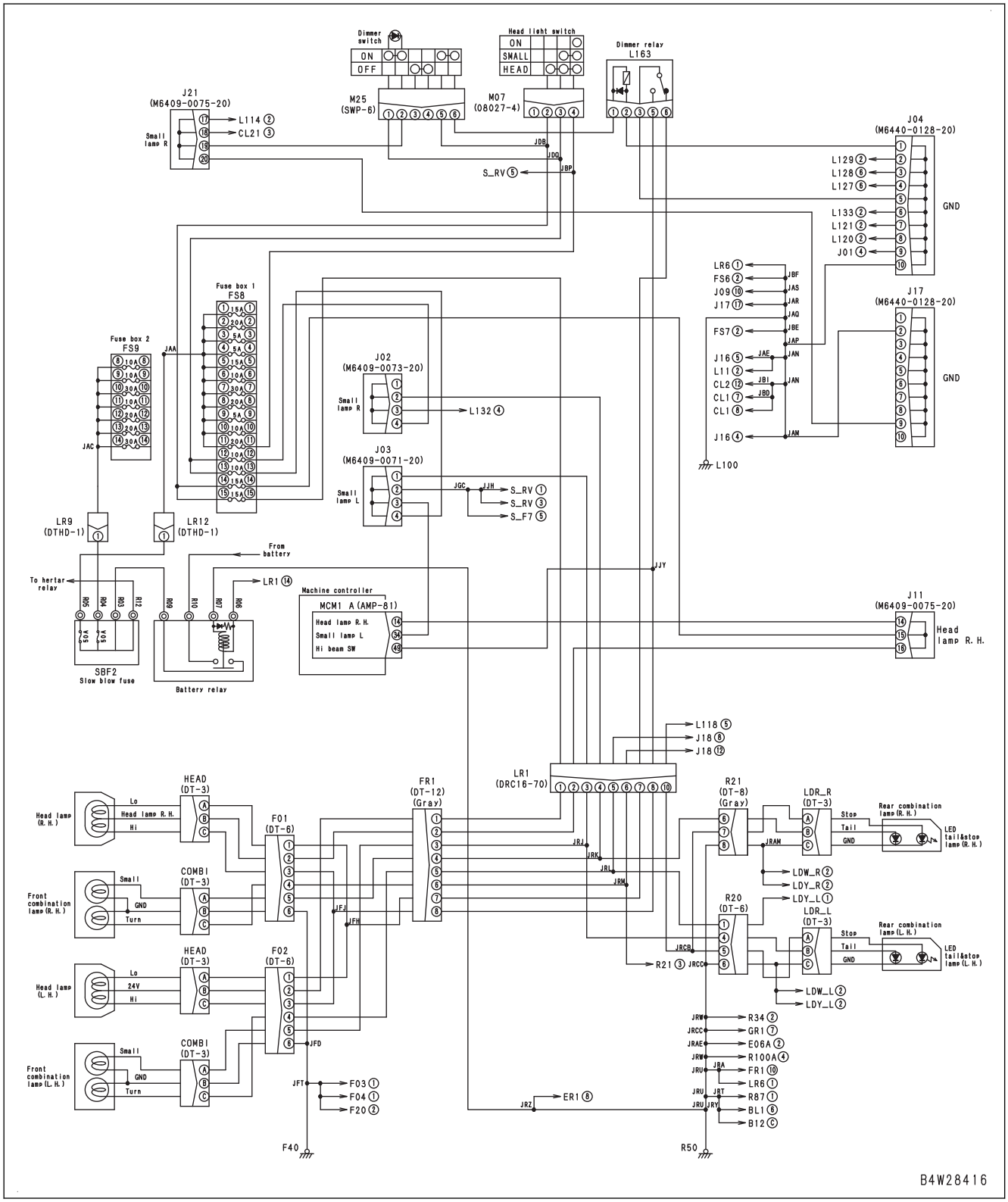
Circuit diagram related to night lighting switch of rearview monitor



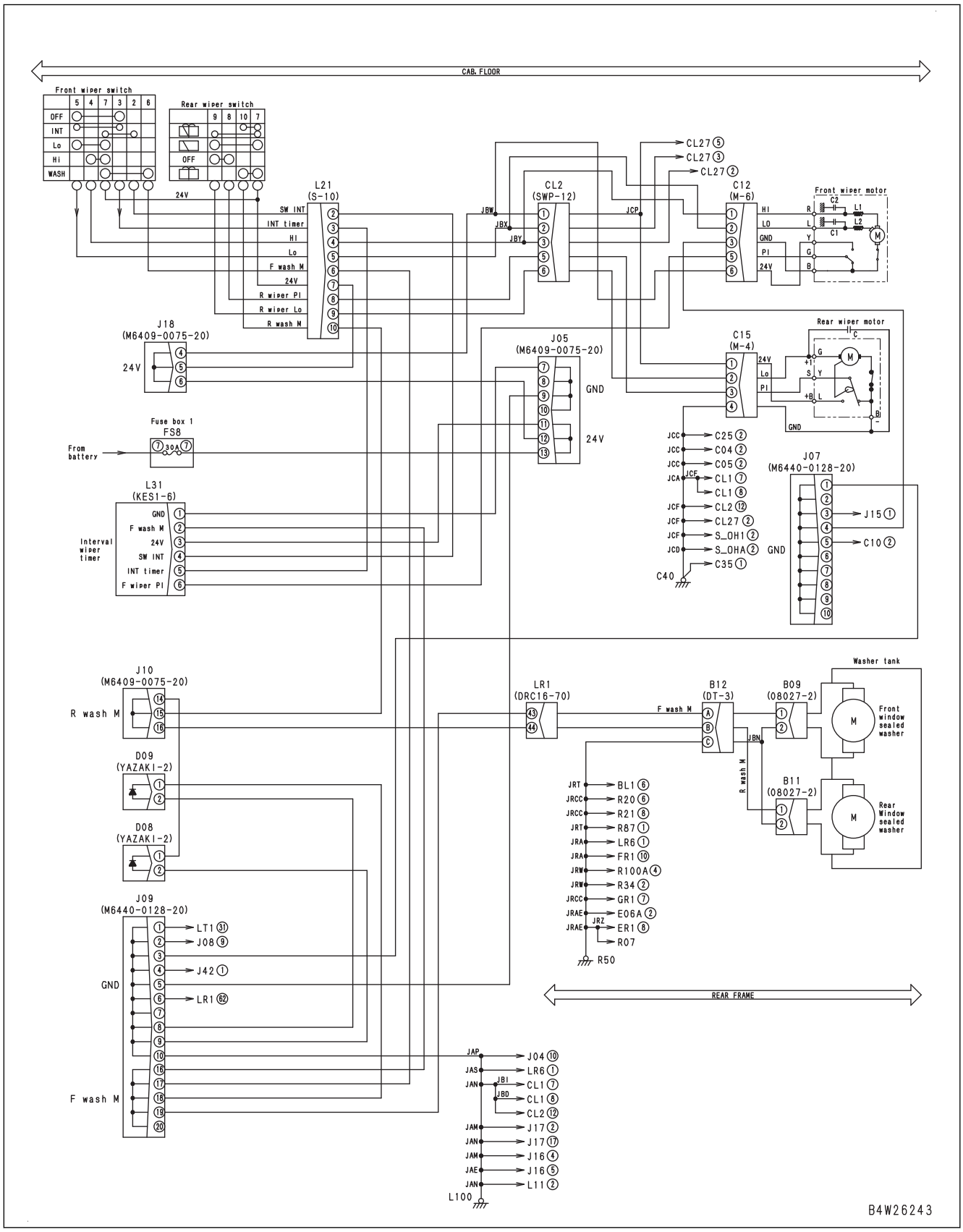
Circuit diagram related to ECSS operating switch



Circuit diagram related to headlamp, clearance lamp, and tail lamp (for AJSS spec)



Circuit diagram related to wiper



Failure		Component causing failure: Steering component: Steering valve (main relief valve)	Steering component: Steering valve (overload relief valve)	Steering component: Steering valve (unload valve)	Steering component: Joystick steering solenoid valve	Steering component: Joystick steering solenoid valve (line filter)	Steering component: Steering wheel priority valve	Steering component: Return filter	Steering component: Suction strainer	Steering component: Steering cylinder	Hydraulic tank strainer	Transmission controller	Transmission oil temperature sensor	Transmission output shaft speed sensor	Work equipment and hydraulic component: Work equipment pump	Work equipment and hydraulic component: PC valve	Work equipment and hydraulic component: LS valve	Work equipment and hydraulic component: Work equipment pump (suction piping)
Power train system	Machine does not move off.																	
	Lockup is not released.																	
	Torque converter lockup clutch does not engage.																	
	Travel speed is slow, bucket thrust force is weak, gradeability is low, or gear speed does not shift.																	
	Large shock is made when machine moves off or gear is shifted.																	
	Long time lag is made when machine moves off or gear is shifted.																	
	Torque converter oil temperature is high.														○			

H-14 STEERING WHEEL IS HEAVY TO OPERATE

Failure	Steering wheel is heavy to operate.
Related information	• Check that oil level in hydraulic tank is normal. • Check that steering shaft is not damaged. • Check that steering stop valve is properly adjusted. • Check that tire inflation pressures are normal. • If machine does not turn smoothly, perform troubleshooting for “MACHINE DOES NOT TURN” and “TURNING RESPONSE IS POOR”. • Steering pump pressure can be checked with monitoring. (Code: 95302)

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective pressure reducing valve of accumulator charge valve	Measure it referring to TESTING AND ADJUSTING.	
		Control circuit pressure of work equipment EPC (EPC source pressure)	3.72 ± 0.2 MPa {38 ± 2.0 kgf/cm^2}
		Control circuit pressure of work equipment EPC (EPC source pressure) is source pressure of Orbitrol.	
2	Defective Orbitrol	Measure it referring to TESTING AND ADJUSTING.	
		Orbitrol outlet pressure	Pressure is applied during operation.
3	Defective steering main relief valve	Perform measurement by referring to TESTING AND ADJUSTING.	
		Steering main relief pressure	24.5±1.23 MPa {250±12.5 kgf/cm^2}
4	Defective stop valve	If no failure is found in check on defective steering main relief valve, and machine turns only one of either right and left direction, or machine does not turn either one of right and left direction due to heavy operating effort of steering wheel, stop valve may be defective. Check the stop valve.	
5	Defective steering spool	• If the measured oil pressure in check on defective steering main relief valve is normal, and oil pressure is not applied to the steering cylinder during steering operation, malfunction of steering spool is suspected. • Check that the spool is not stuck.	
6	Malfunction of steering wheel or steering shaft	Check them after disconnecting steering shaft from Orbitrol.	
7	Defective cooling fan pump	Perform measurement by referring to TESTING AND ADJUSTING. • If the fan speed is below the standard value, perform troubleshooting for “FAN SPEED IS ABNORMAL (TOO HIGH OR LOW, OR STATIONARY)” in H mode.	
		Maximum fan speed	1055±50 rpm

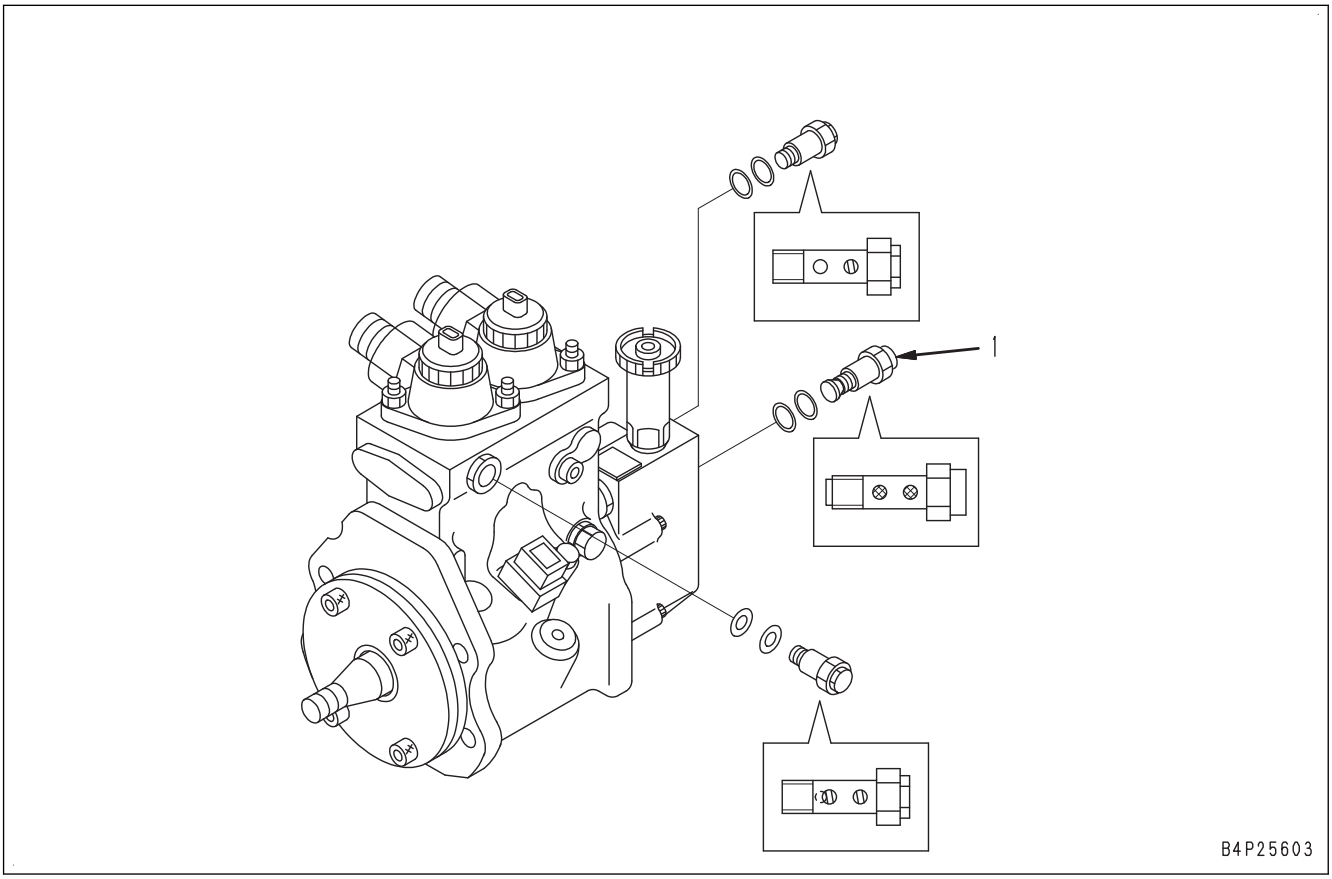
TROUBLESHOOTING OF ENGINE (S-MODE)

INFORMATION MENTIONED IN TROUBLESHOOTING TABLE (S MODE)

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

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

Cause		Point to check, remarks	Remedy
1 2 3 4 5	**Probable cause of failure (Each number is serial number, not priority sequence.)**	**<Contents of description>** • **Contents of check to determine probable causes** • **Remarks for determination of probable cause**	• Actions to eliminate probable cause of failure



1.Gauze filter for feed pump

This figure shows the location of gauze filter (1) for the feed pump explained in this manual.

Fault	Cause	Remedy
Pump		
Stirring arm in the grease container does not rotate during the activated pump operation period	Mechanical damage, e.g., motor defective.	Exchange auto-greasing pump unit • Disconnect main grease line at outlet of pressurization safety valve • Disconnect electrical connection • Unscrew three fastening screws • Dismount defective pump • Install new pump, and connect grease line as well as electrical cable Put pump into operation and carry out functional test! Make sure that pause and contact time values are correct!
	Electrical connection interrupted	• Check fuse, and replace it, if necessary • Check electrical connections Check cable set for damage!
Pump no function		
When pressing the  key, although all electrical connections are in order. Pump is not delivering lubricant, although the stirring arm is rotating.	Electrical control has failed Pump drive/motor defective	Exchange auto-greasing pump unit
	Grease level in reservoir below minimum	Top up lubricant reservoir up to “max”
	Check valve in pump element does not close. (Can be seen from the fact that the outlet can be kept closed with the finger when the main line is dismounted.)	Exchange pump element ⚠ **Pay attention to: Metering mark with grooves**
	Suction problems due to air inclusions in grease	Dismount pump element, and operate pump via key  until grease emerges at housing outlet
	Pump element does not build up pressure, pump element is worn. (Can be seen from the fact that the outlet can be kept closed with the finger when the main line is dismounted.)	Exchange pump element ⚠ **Pay attention to: Metering mark with grooves**
Pressure relief valve (1) on pump opens, and grease emerges	System pressure exceeds 300 bars, e.g., due to clogging of feeder or clogged grease point	Check system, and carry out repair or modification of system so that the system pressure at 20 °C will not exceed 200 bars as a maximum
	Valve damaged or soiled so that it does not close properly	Exchange pressurization safety valve

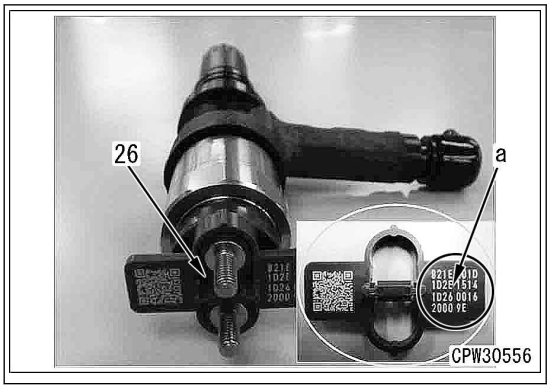
Tools to be used when disassembling and assembling the transmission assembly

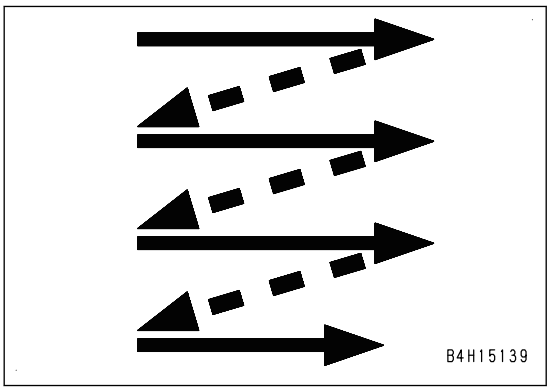
Symbol		Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A		799-301-1500	Oil leak tester	■	1			Operation check of the clutch piston
B	1	796-514-2000	Remover	■	1			Pulling out of No.3 planetary gear shaft
	2	796-515-2140	Adapter	■	1			
C		790-201-1702	Push tool kit	■	1			Pressure of No.3, No.4 carrier push
		790-201-1741	Push tool	■	1			
		790-101-5021	Grip	■	1			
		01010-50816	Bolt	■	1			
D		Commercially available	Forcing screw (M16 x 2)	●	1			Transmission assembly
E		Commercially available	Block	●	2			
F		Commercially available	Eyebolt (M12 x 1.75)	●	2			
G		Commercially available	Push tool (outside diameter 40 mm)	●	1			No.1 carrier housing assembly
H		Commercially available	Push tool (outside diameter 109 mm)	●	1			
J		Commercially available	Push tool (outside diameter 64 mm)	●	1			Disassembling of No.1 carrier assembly
K		Commercially available	Push tool (outside diameter 167 mm)	●	1			Disassembling of No.2 housing assembly
L		Commercially available	Push tool (outside diameter 139 mm)	●	1			Cage assembly
M		Commercially available	Push tool (outside diameter 189 mm)	●	1			No.6 housing assembly
N		Commercially available	Push tool (outside diameter 199 mm)	●	1			
P		Commercially available	Push tool (outside diameter 141 mm)	●	1			No. 6 cage assembly
S		Commercially available	Push tool (inside diameter 91 mm) (outside diameter 109 mm)	●	1			Output shaft
R		Commercially available	Tool	●	1			
T		Commercially available	Eyebolt (M18 x 2.5)	●	2			Transmission assembly
U		Commercially available	Push tool (inside diameter 66 mm)	●	1			Bearing, spacer
V		Commercially available	Push tool (outside diameter 149 mm)	●	1			No.1 spring

24. Before removing the injector assembly, record the cylinder number to which the injector is installed and the character string (a) listed on QR code tab (75) as a set.

REMARK

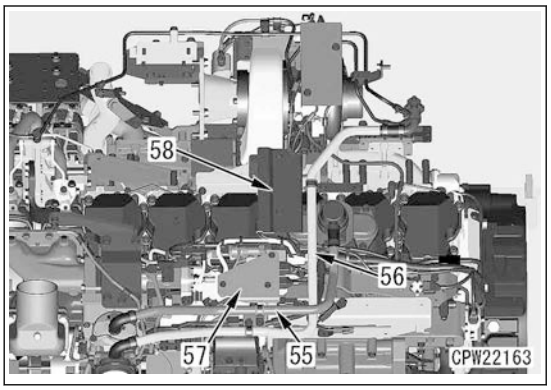
- Check that the character string (a) is correctly recorded.
- Do not remove QR code tab (26) attached to the head of the injector assembly.
- Be careful not to damage QR code tab (26) attached to the head of the injector assembly. (Reference: QR code and character string indicate the compensation value for fuel injection of the injector, which is specific to each fuel injector.)
- For the order of reading the character string (a), see the following figure.





Removing No.4, 5, 6 injector assembly

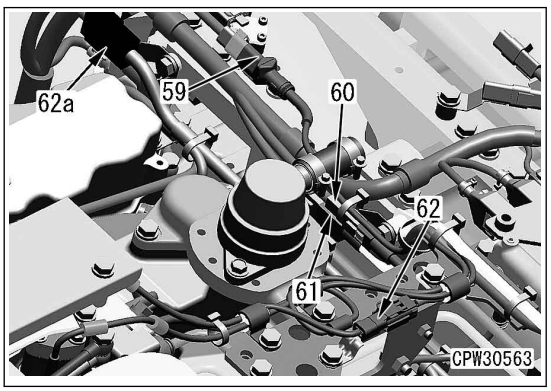
25. Remove the tubes (55) and (56).
26. Remove the covers (57) and (58).



27. Disconnect the connectors SVGT (59), VGT-REV (60), SEGR (61), DOSER (62), and INJ (62a).

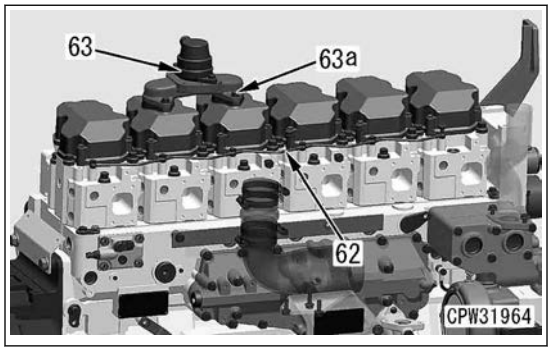
REMARK

- Disconnect the connector INJ (62a) when No.6 injector is removed.
- Disconnect the wiring clamp and fixing band, and move them aside so that they do not hinder the work.



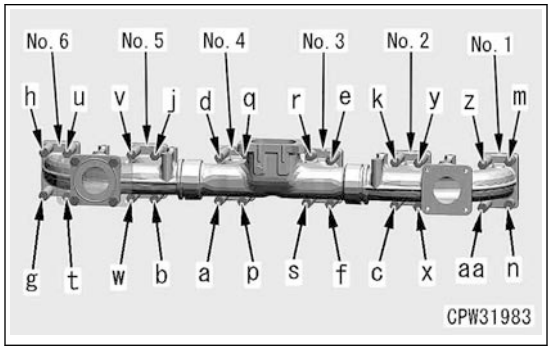
21. Tighten the gate type frame (39) to the specified torque.
22. Fasten the stays of the fuel high-pressure pipe clamps (m), (n), (o), (p), (q), (r), (s), (t), and (u) to the specified torque.
23. Install the breather and breather connector assembly (63) with the bolts (4 pieces).
24. Install the cooling return tube (62).

    Joint of cooling return tube (62):
    9.8 to 12.7 Nm {1.0 to 1.3 kgfm}



25. Replace the gasket on the flange of the exhaust manifold (61) with a new one, sling the exhaust manifold (61), and install it.

    Exhaust manifold (61):
    25 kg

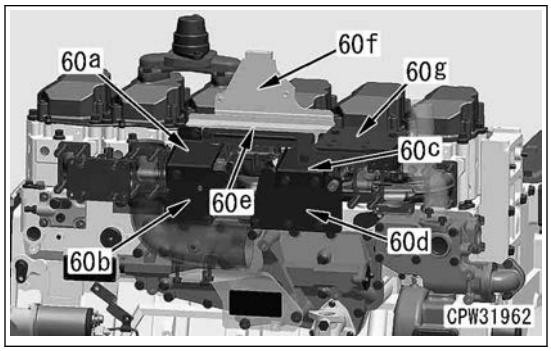


26. Tighten the bolts (a) to (z) according to the following procedure.
    1) Lightly tighten the bolts (3 pieces) in the order of (a) to (z).
    2) Lightly tighten the remaining bolts (21 pieces) in the order of (d) to (z).
    3) Tighten all the bolts to the specified torque in the order of (a) to (z) again.

       Bolts (a) to (z):
       Seizure prevention compound (LC-G)

       Bolts (a) to (z):
       58.8 to 73.5 Nm {6 to 7.5 kgfm}

27. Install the exhaust manifold according to the following procedure.
    1) Install the brackets (60f) and (60g).
    2) Install the brackets (60a), (60b), (60c), (60d), and (60e).



METHOD FOR INSTALLING COOLING FAN AND COOLING FAN MOTOR ASSEMBLY

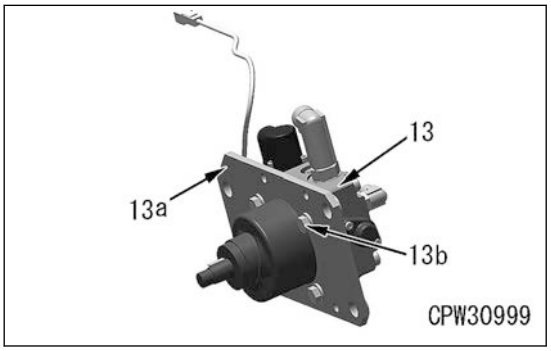
Fan motor assembly

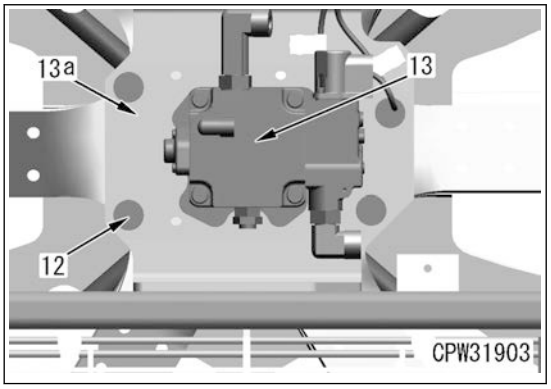
1. Install the fan motor assembly (13) to the bracket (13a) with the bolts (13b) (4 pieces).

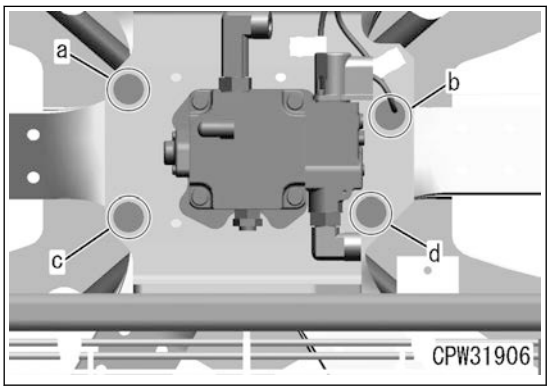
   Bolt (13b):
   98 to 123 Nm {10 to 12.5 kgfm}

2. Install the fan motor assembly (13) together with the bracket (13a) with the bolts (12) (4 pieces) in the order of (a) to (d).

   Bolt (12):
   235 to 285 Nm {23.5 to 29.5 kgfm}







Cooling fan

3. Sling the cooling fan (11), and install the cooling fan (11) to the motor.

   Cooling fan (11):
   40 kg

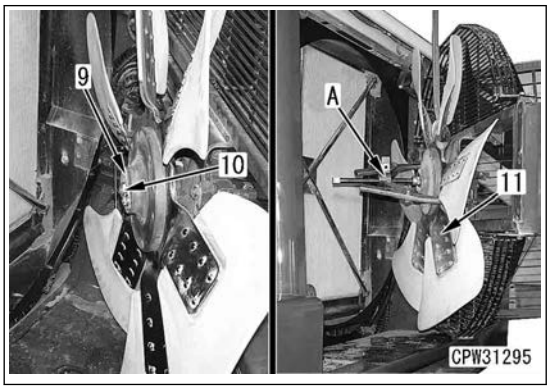
4. Tighten the nut (10), and install the lock plate (9).

   Nut (10):
   Liquid adhesive (LT-2)

   Nut (10):
   132.3 to 156.8 Nm {13.5 to 16 kgfm}

   REMARK

   Do not turn the nut toward the loosening side for hole alignment of the nut and the lock plate. Install it so that the nut comes to the tightening side.



Operator's cab assembly

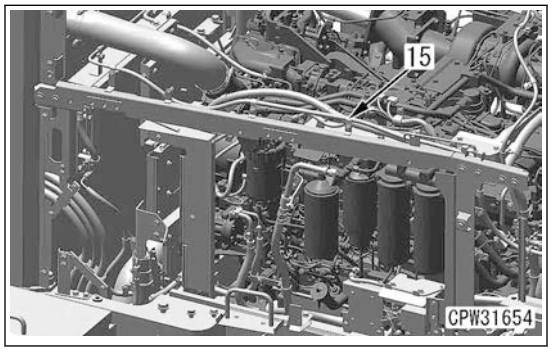
22. Remove the operator's cab assembly. For details, see “REMOVE AND INSTALL OPERATOR'S CAB ASSEMBLY”.

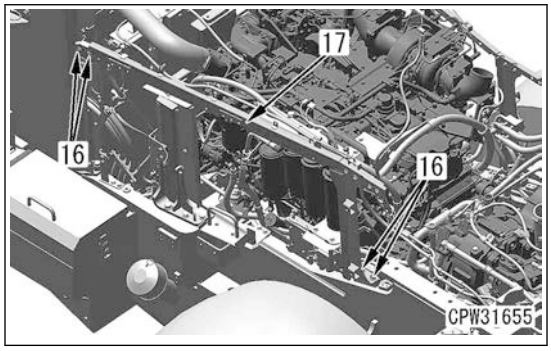
Hydraulic tank assembly

23. Remove the hydraulic tank assembly. For details, see “REMOVE AND INSTALL HYDRAULIC TANK ASSEMBLY”.

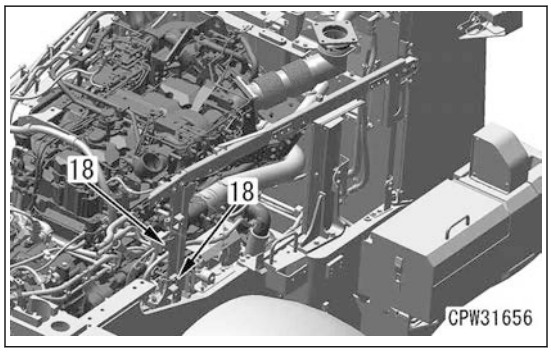
Side cover frame

24. Remove the clamps (15) (8 places).
25. Remove the bolts (16) (4 pieces), and remove the R.H. side cover frame (17).

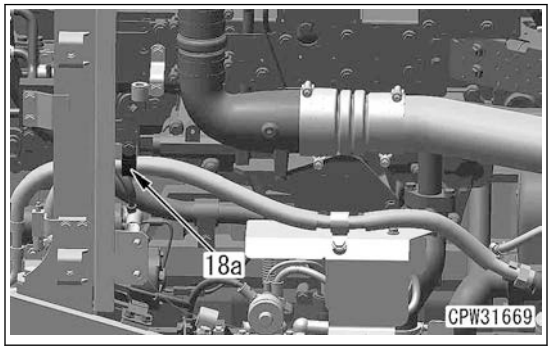




26. Remove the bolts (18) (4 pieces).



27. Remove the clamp (18a).

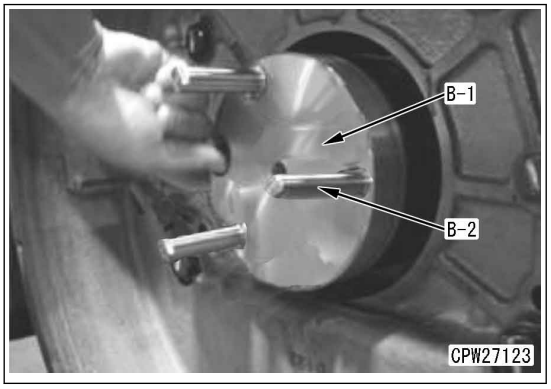


Installing the sleeved oil seal

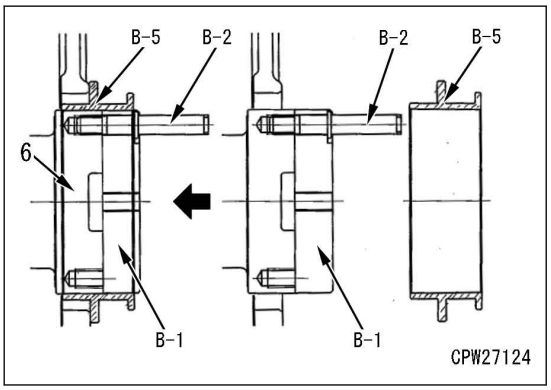
16. Install the push tool (B-1) to the rear end of the crankshaft, and screw in the guide bolts (B-2) (3 pieces) lightly.

    REMARK

    At this stage, the guide bolts (B-2) must have a little play.



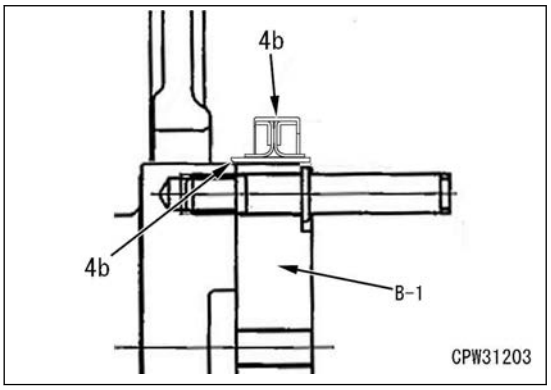
17. Insert the guide (B-5) into the push tool (B-1), adjust the position of the push tool (B-1) so that the centers of the crankshaft (6) and push tool (B-1) are aligned, tighten the guide bolts (B-2), and fix them.



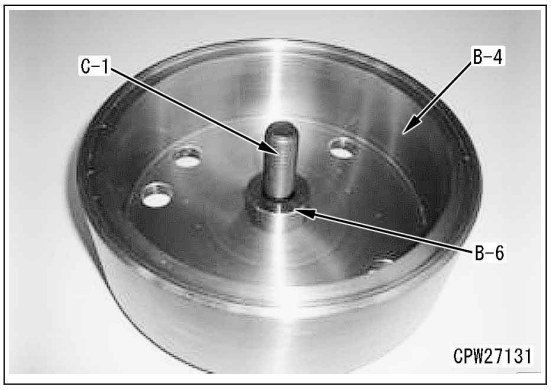
18. Remove the guide (B-5), and check that the centers of the crankshaft and push tool (B-1) are aligned.
19. Apply liquid gasket to inside of sleeve of sleeved seal, and insert the sleeved seal (4b) to the push tool (B-1).

    When inserting the seal, place chamfered side (4b) inside the sleeve to the end of the push tool (B-1).

    Inside surface of sleeve:
    Liquid gasket (LG-7)



20. Install the bolt (C-1) (stem length 60 mm) and washer (D) to the push tool (B-4), and insert the spacer (B-6) into the bolt (C-1) (stem length 60 mm).

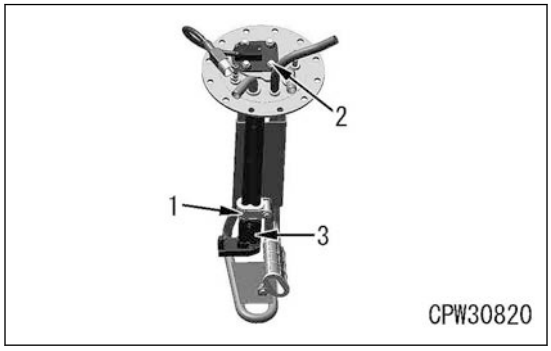


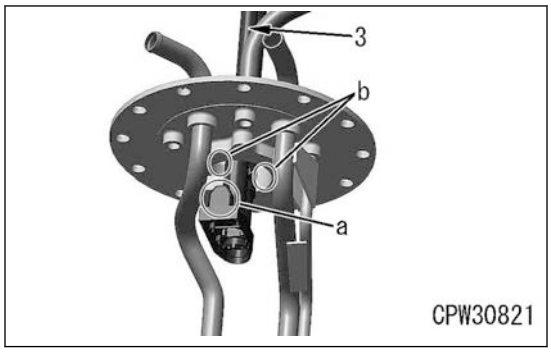
AdBlue/DEF tank sensor

3. Remove the clamp (1).
4. Remove the bolts (2) (4 pieces), and remove AdBlue/DEF tank sensor (3).

NOTICE

Pull out the tip end (a) of AdBlue/DEF tank sensor (3) carefully not to interfere with the edge (b) of AdBlue/DEF tank sensor flange assembly.

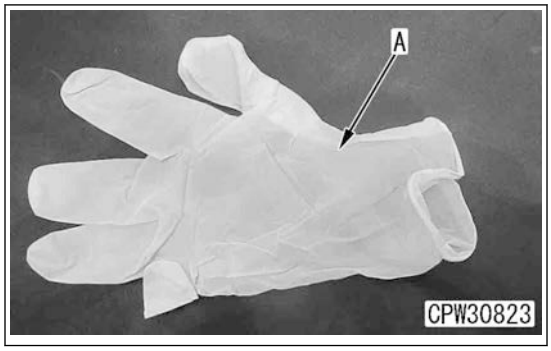




METHOD FOR INSTALLING AdBlue/DEF TANK SENSOR

NOTICE

When handling AdBlue/DEF, be sure to use the vinyl gloves (A).

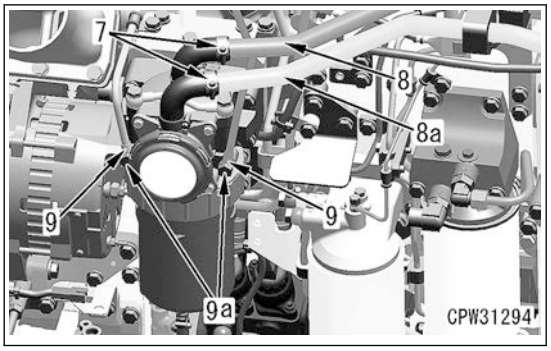


10. Remove the clamps (7) (2 places), and disconnect KCCV inlet tube (8) and KCCV outlet tube (8a).

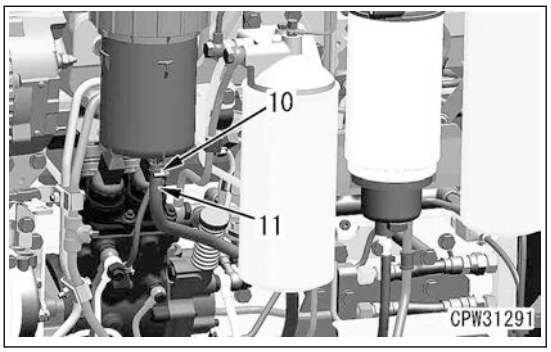
    REMARK

    Disconnect KCCV inlet tube (8) and KCCV outlet tube (8a) at the KCCV assembly side.

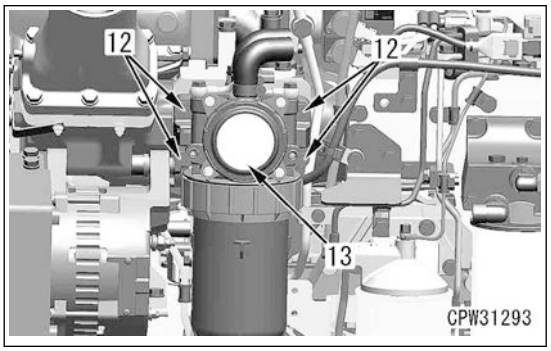
11. Remove the joint bolts (9a) (2 pieces), and disconnect the coolant tubes (9) (2 pieces).



12. Remove the clamp (10), and disconnect the drain hose (11).



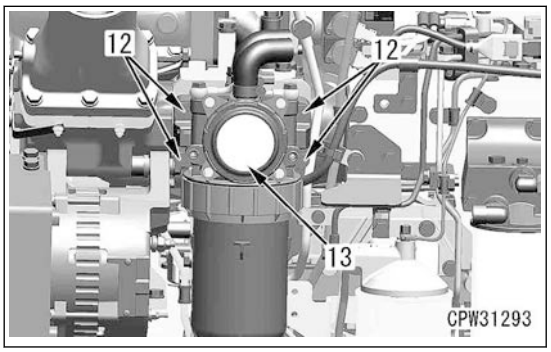
13. Remove the bolts (12) (4 pieces), and remove KCCV assembly (13).



METHOD FOR INSTALLING KCCV ASSEMBLY

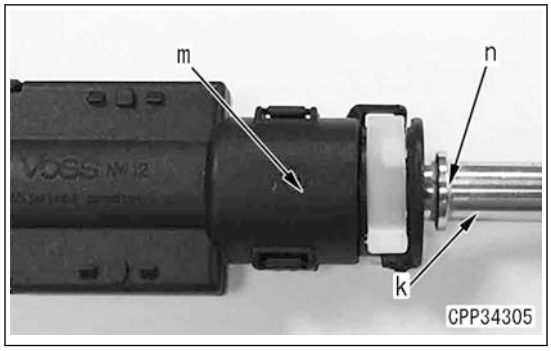
KCCV assembly

1. Install KCCV assembly (13) with the bolts (12) (4 pieces).

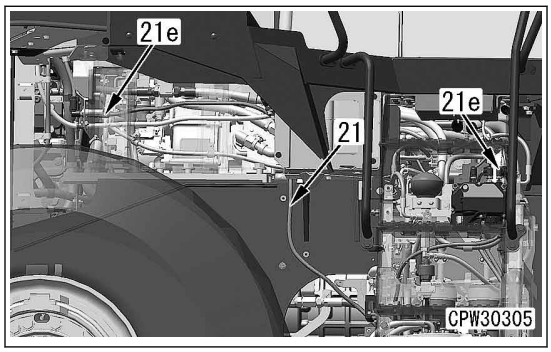


REMARK

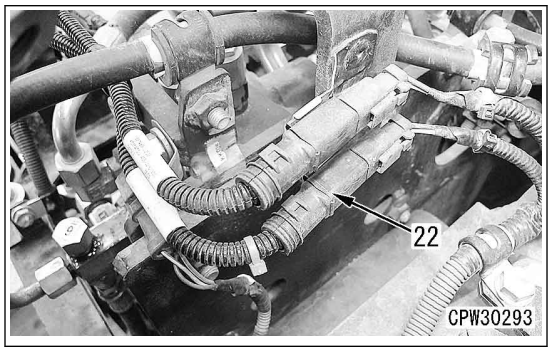
- Insert the connector (m) of AdBlue/DEF hose (21) into the pin (k) on the tank/pump side until click sound is heard to install it.
- When the convex part (n) of the pin (k) passes the convex part inside of the clip, lock it by using the clip.



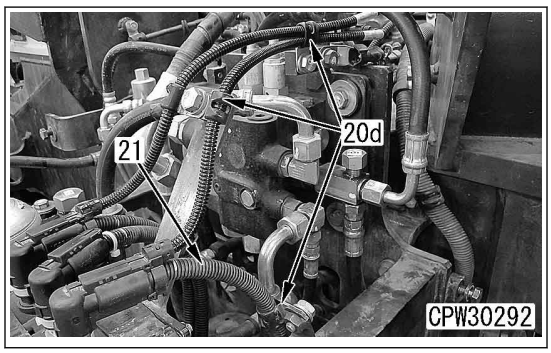
6. Connect the connectors (21e) on both sides of AdBlue/DEF hose (21) to AdBlue/DEF pump and the joint.



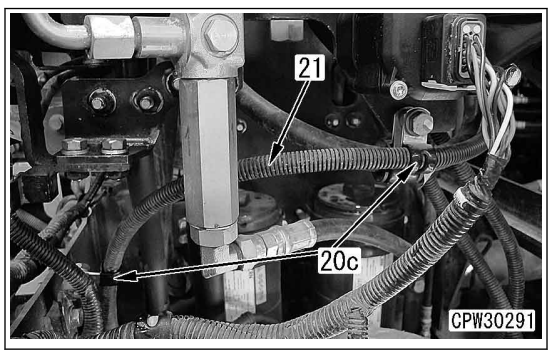
7. Connect the connector UHA (22).



8. Install the clamps (20d) (3 pieces) of AdBlue/DEF hose (21).

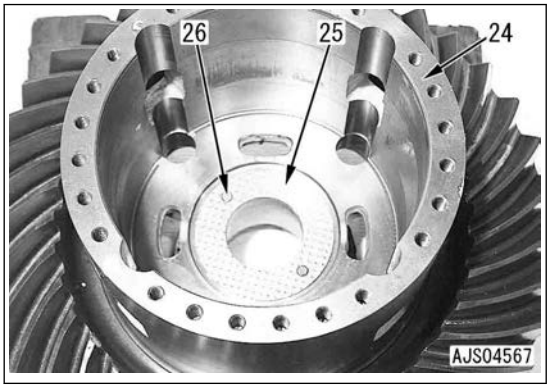


9. Install the clamps (20c) (2 pieces) of AdBlue/DEF hose (21).



Gear case cover B

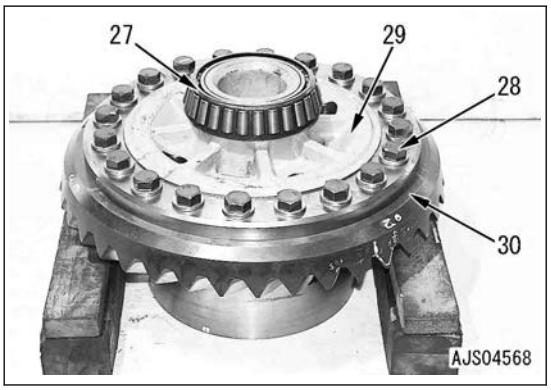
20. Remove the thrust plate (25) and dowel pin (26) from the gear case cover B (24).



21. Invert the gear case, and remove the bearing (27).
22. Remove the bolts (28) (20 pieces).
23. Remove the gear case cover B (29) from the bevel gear (30).

    REMARK

    Put the matchmarks on the bevel gear (30) and gear case cover B (29).

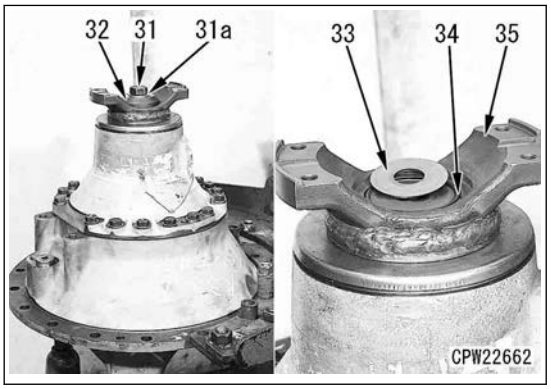


Coupling

24. Remove the bolt (31), washer (31a), and holder (32).
25. Remove the shims (33), O-ring (34), and coupling (35).

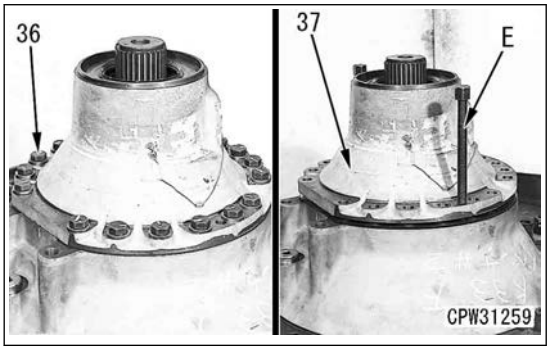
    REMARK

    Check the thickness and quantity of the shims, and write down them.



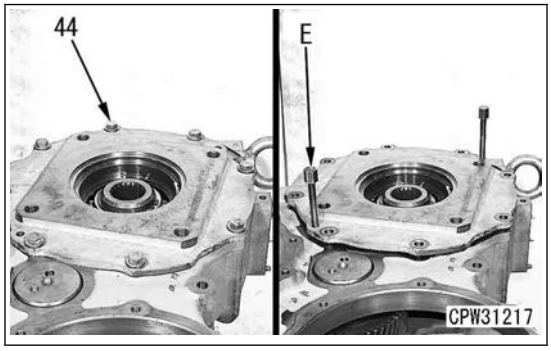
Pinion assembly

26. Remove the bolts (36) (18 pieces).
27. Disconnect the pinion assembly (37) by using the forcing screw (E).

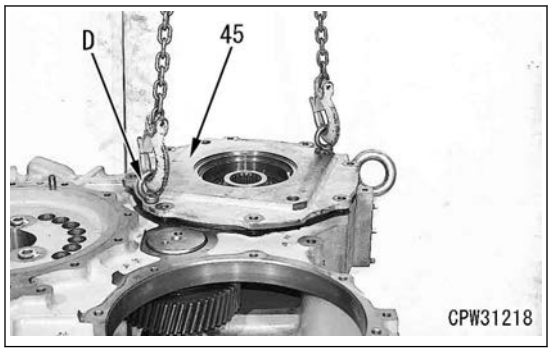


PTO gear B assembly

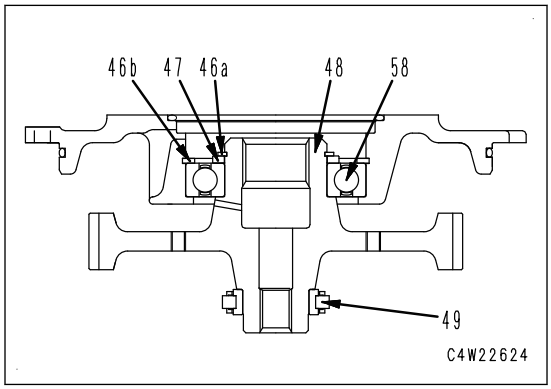
42. Remove the bolts (44) (8 pieces).
43. Disconnect PTO gear B assembly (45) by using the forcing screw (E).



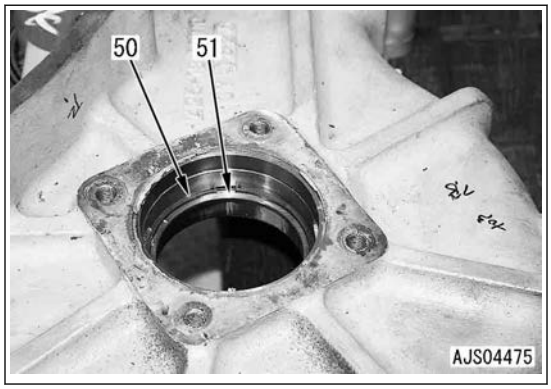
44. Remove PTO gear B assembly (45) by using the eyebolts (D).



45. Remove the snap ring (46a) and spacer (47).
46. Remove the gear (48) from the bearing (49).
47. Remove the snap ring (46b) and bearing (58).

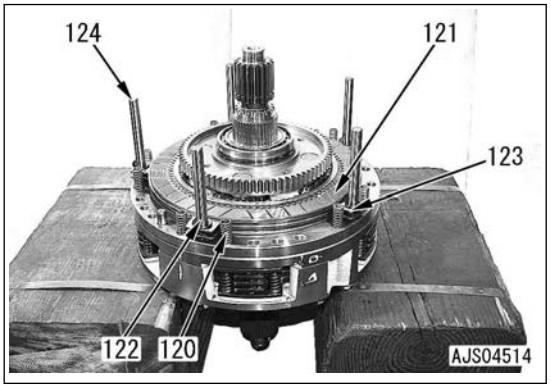


48. Remove the snap ring (50), and remove the outer race (51) on the case side.

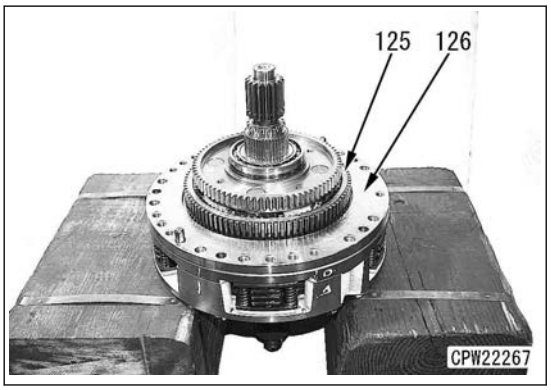


No.5 spring

88. Remove No.5 springs (120) (10 pieces).
89. Remove No.5 discs (121) (3 pieces), springs (122) (15 pieces), and No.5 plates (123) (2 pieces).
90. Remove the guide pins (124) (5 pieces).

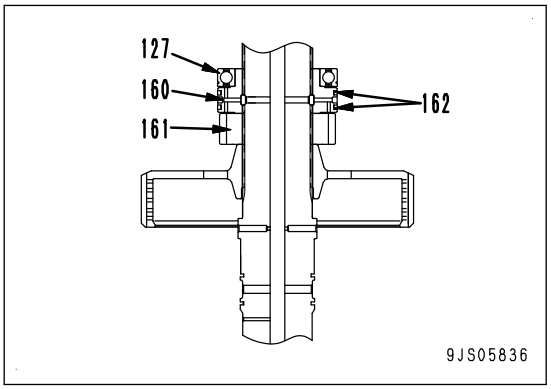


91. Remove No.5 ring gear (125).
92. Remove No.5 plate (126).



No.5 sun gear

93. Remove the spacer (160) and No.5 sun gear (161).
94. Remove the bearing (127) and seal rings (162) from the spacer (160).

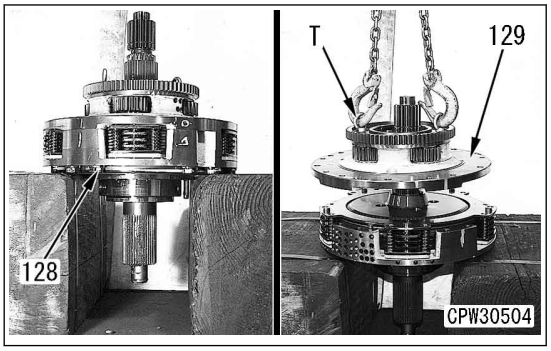


No.5 carrier assembly

95. Remove the bolts (128) (11 pieces).
96. Remove No.5 carrier assembly (129) by using the eyebolts (T).

    REMARK

    When disconnecting the dowel pin, tap the dowel pin and pull it out by using a copper hammer.



Piston

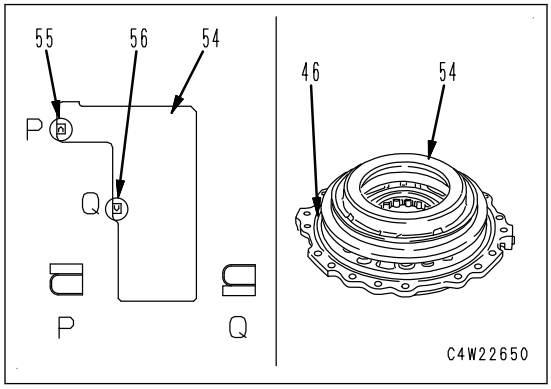
7. Install the seal (55) and backup ring (56) to the piston (54).

   REMARK

   Install the seal (55) and backup ring (56) at the position indicated in the figure.

   Outside perimeters of seal and backup ring: Grease (G2-LI)

8. Install the piston (54) to the cover assembly (46).

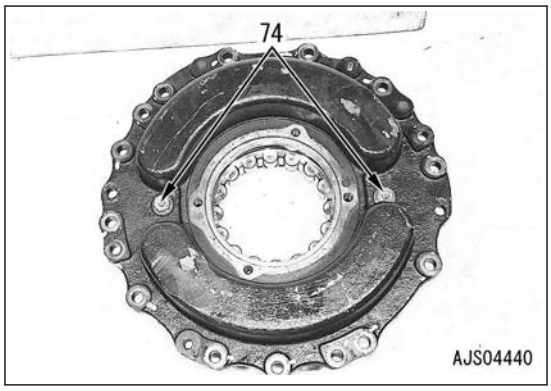


Plug

9. Remove the plugs (74) (2 pieces).
10. Install the washers to the bolts (2 pieces) of the parking brake assembly, install them to the plug holes, and then tighten them.

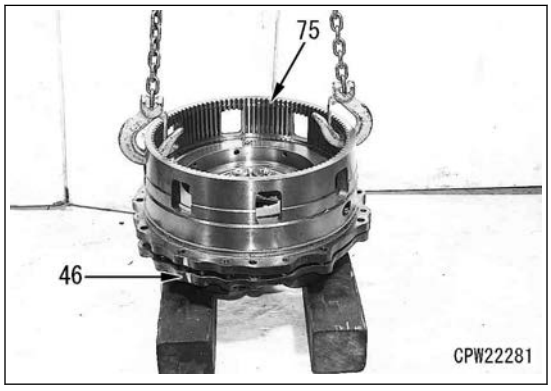
    REMARK

    - Tighten the bolts gradually and alternately.
    - Tightening the bolts pulls the piston.

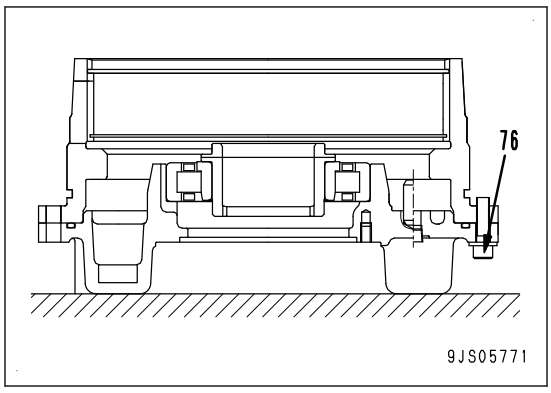


Housing

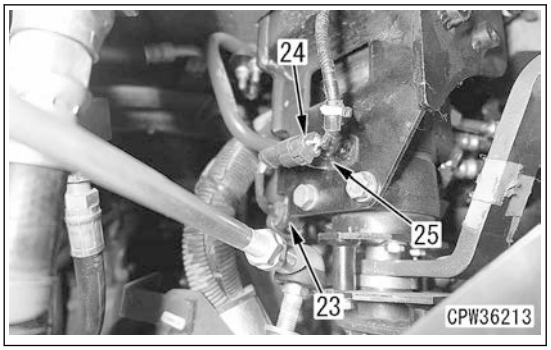
11. Install the housing (75) to the cover (46).



12. Install the hexagonal socket head bolts (76) (4 pieces).



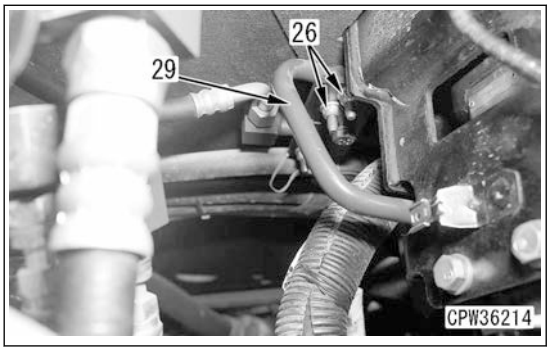
16. Remove the clamp (23).
17. Disconnect the connector AJ2 (24), and remove it from the clip (25).



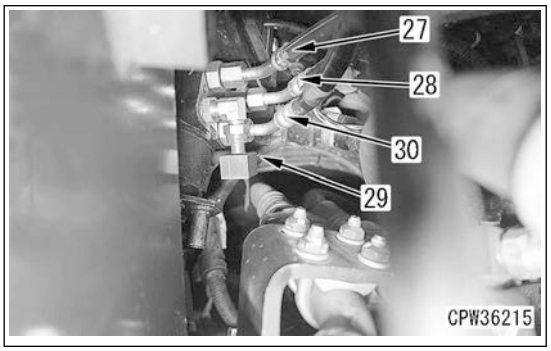
18. Loosen the nuts (26) (2 pieces).

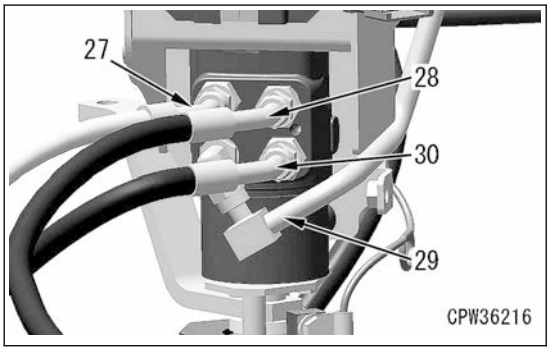
    REMARK

    Loosen the nuts (26) (2 pieces) so that the tube (29) is disconnected easily.

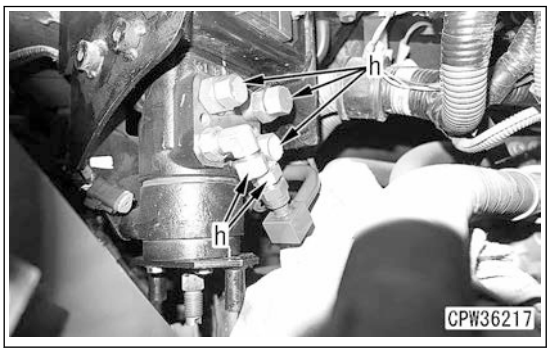


19. Disconnect hoses (27), (28), tube (29), and hose (30) in this order.



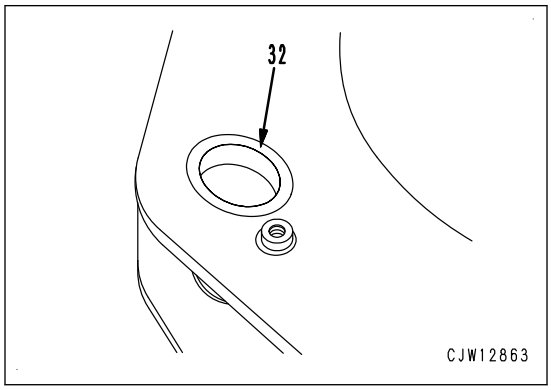


20. Put the plugs (h) to prevent oil leakage.



⚠ Always use a stick, etc, for hole alignment. Never insert your fingers.

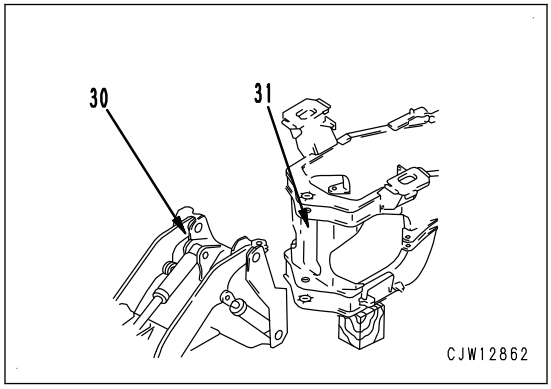
16. Install the bushing (32) and collar to the rear frame.



REMARK

- Install the bushing (32) so that the slit is located on the R.H. of the machine.
- Press fit the collar.

17. Slowly return the front frame (30), and install it to the rear frame (31).



REMARK

Perform the installation within approximately100 mm of the moving distance each time.

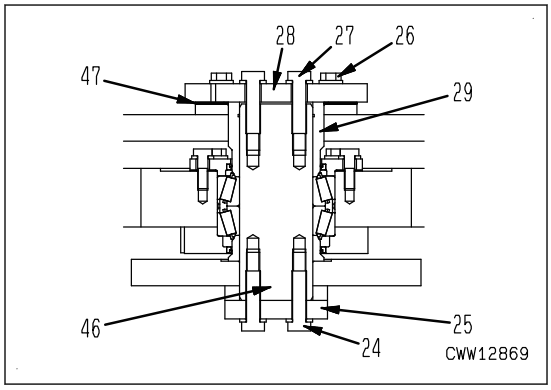
Procedure for installing upper hinge pin

18. Measure the thickness of the retainer (28) in advance.

    Measure the thickness at the retainer hole (φ6.5) (3 places).

19. Install the bushing (29) to the upper hinge.

20. Insert the retainer (28) into the pin hole of the hinge pin (46) while the bolt (27) is installed lightly.



REMARK

The clearance between the pin (46) and the retainer (28) is approximately 10 mm.

Outer periphery of hinge pin:
Grease (G2-LI)

21. Install the plate (25) with the bolt (24) from the bottom of the machine.

22. Tighten the bolts (27) to the specified torque.

REMARK

- At this time, paying attention to the behavior of each bolt during installation.
- Tighten them to the specified torque, and tighten them repeatedly until all the bolts are not moved.

Refilling with hydraulic oil

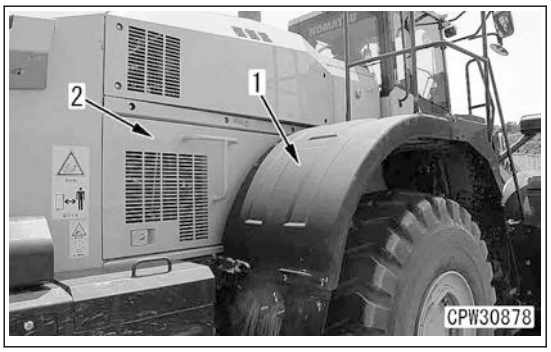
7. Refill the hydraulic tank with Komatsu genuine oil to the specified level through the oil filler port. Start the engine to circulate the oil through the piping, and check the oil level again.

   Hydraulic tank:

   337 ℓ

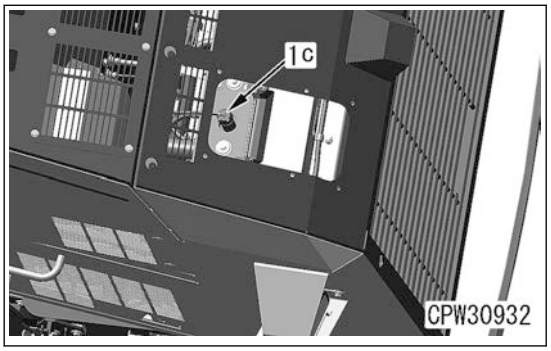
Full-length fender, cover

8. Close the cover (2) on the R.H. of the machine, and close the full-length fender (1).



Refilling with coolant

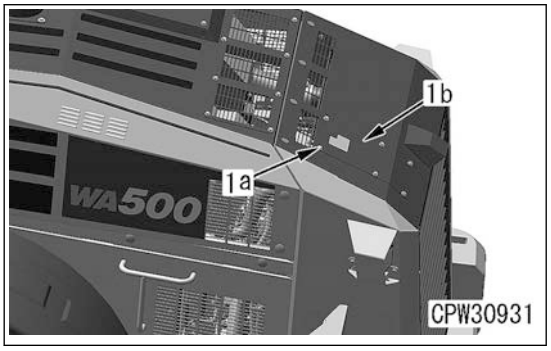
9. Tighten the radiator cap (1c).



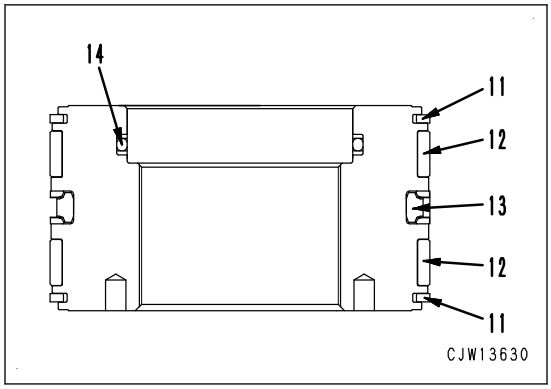
10. Install the cover (1b) with the bolts (1a) (4 pieces).
11. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant. Then check the coolant level again.

    Radiator:

    85 ℓ

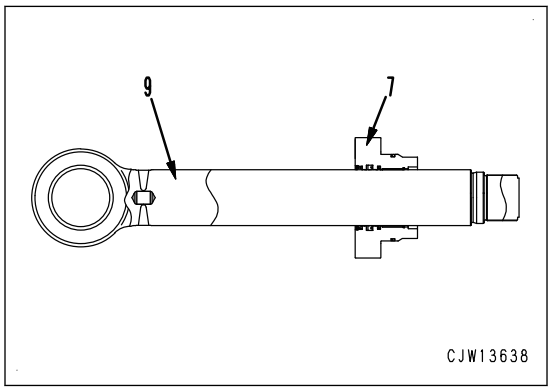


11. Install the wear ring (12) to the piston.
12. Install the guard ring (11) to the piston.
13. Install O-ring and backup ring (14) to the piston.



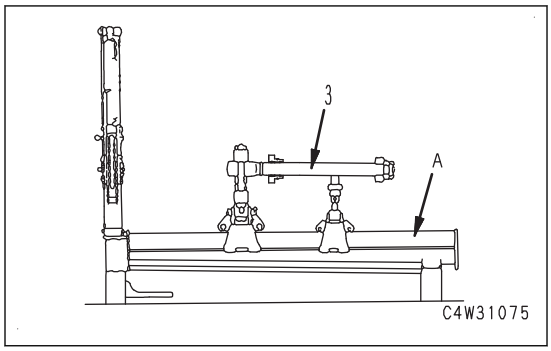
Assembling the cylinder head assembly

14. Install the cylinder head assembly (7) to the piston rod (9).



Piston rod assembly

15. Set the piston rod assembly (3) on the repair stand (A).

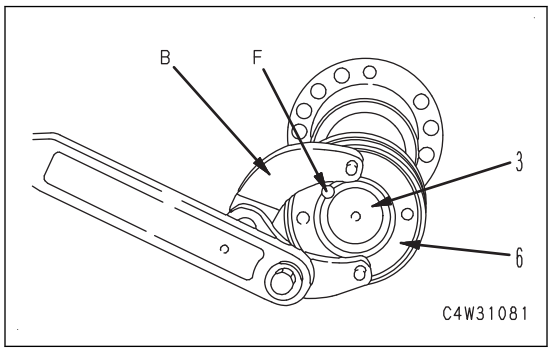


- When reusing the piston rod assembly (3) and piston assembly (6)

  REMARK

  Clean them thoroughly, and remove all chips and dusts.

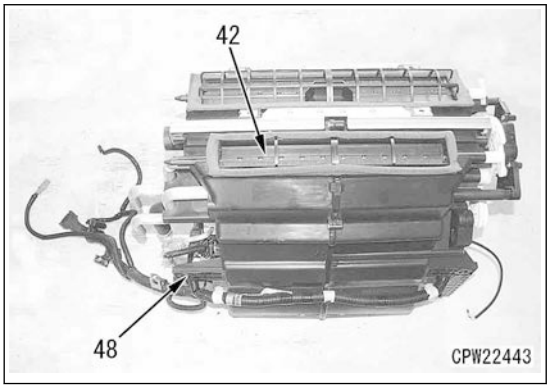
  1) Screw in the piston assembly (6), and tighten the piston assembly (6) by using the wrench (B) until the tap (F) is positioned.
  2) Remove burrs and sharp edges from threaded portion by using a file, etc.



METHOD FOR INSTALLING AIR CONDITIONER UNIT ASSEMBLY

Air conditioner unit

1. Install the unit (42), and install the bolts (48) (4 places) of the air conditioner unit.



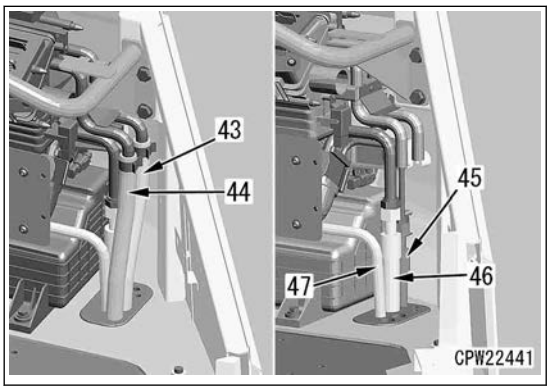
2. Install the heater hoses (43), (44), the air conditioner tubes (45), (46), and the drain hoses (47) (2 pieces) which are on the lower right of the air conditioner unit.

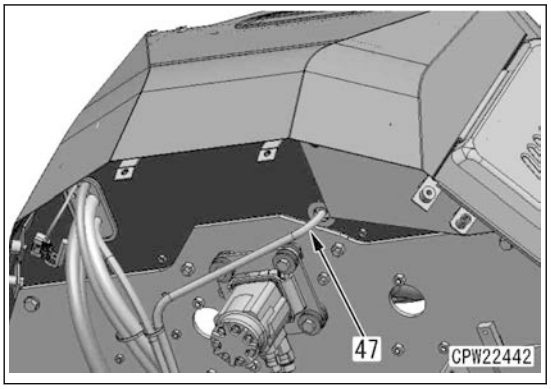
   REMARK

   When connecting the air conditioner circuit piping, be careful of the following points.

   - Do not remove the plugs used to plug the pipes until just before the pipes are installed.
   - Be careful that dirt, dust, water, etc. do not enter the air conditioner tube.
   - Check that O-ring is installed for the air conditioner hose connection before installation.
   - Check that O-ring is not damaged or deteriorated.
   - When connecting the refrigerant pipes, apply compressor oil for refrigerant (R134a) to O-ring.

   O-ring and threaded portion:
   Compressor oil for R134a (DENSO: ND-OIL8, VALEO THERMAL SYSTEMS: ZXL100PG (equivalent to PAG46), SANDEN: SP-10)

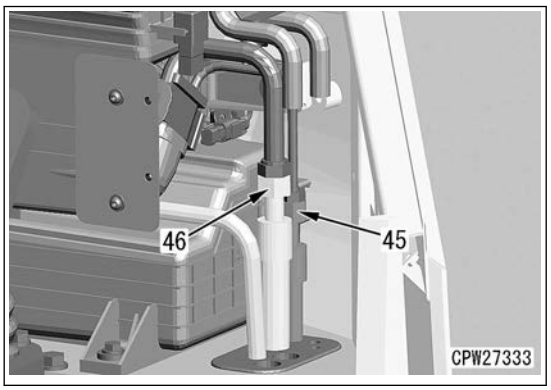




3. Fasten the air conditioner tubes (45) and (46) to the following torques.

   Air conditioner tube (45):
   12 to 15 Nm {1.2 to 1.5 kgfm}

   Air conditioner tube (46):
   30 to 35 Nm {3.1 to 3.6 kgfm}



REMOVE AND INSTALL KCCV CRANKCASE PRESSURE SENSOR

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

⚠ **Set the frame lock bar to LOCK position, and chock the tires.**

⚠ **Lower the work equipment to the ground, and set the work equipment lock switch to LOCK position.**

⚠ **Turn the starting switch to OFF position to stop the engine.**

⚠ **Turn the battery disconnect switch to OFF position. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)**

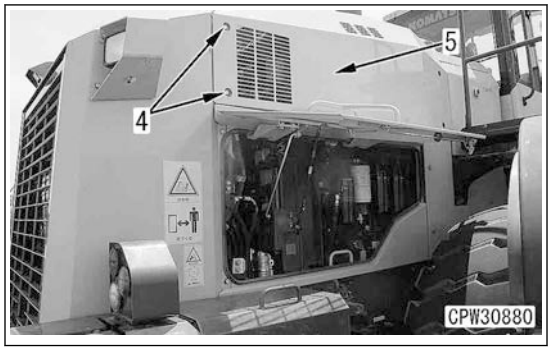
METHOD FOR REMOVING KCCV CRANKCASE PRESSURE SENSOR

Side cover

1. Open the full-length fender (1), and open the cover (2) on the R.H. of the machine.

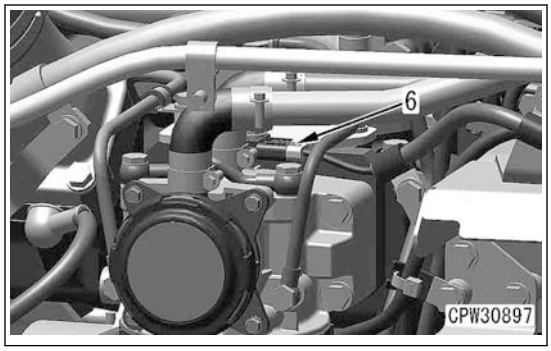
2. Remove the caps (3) (2 pieces).

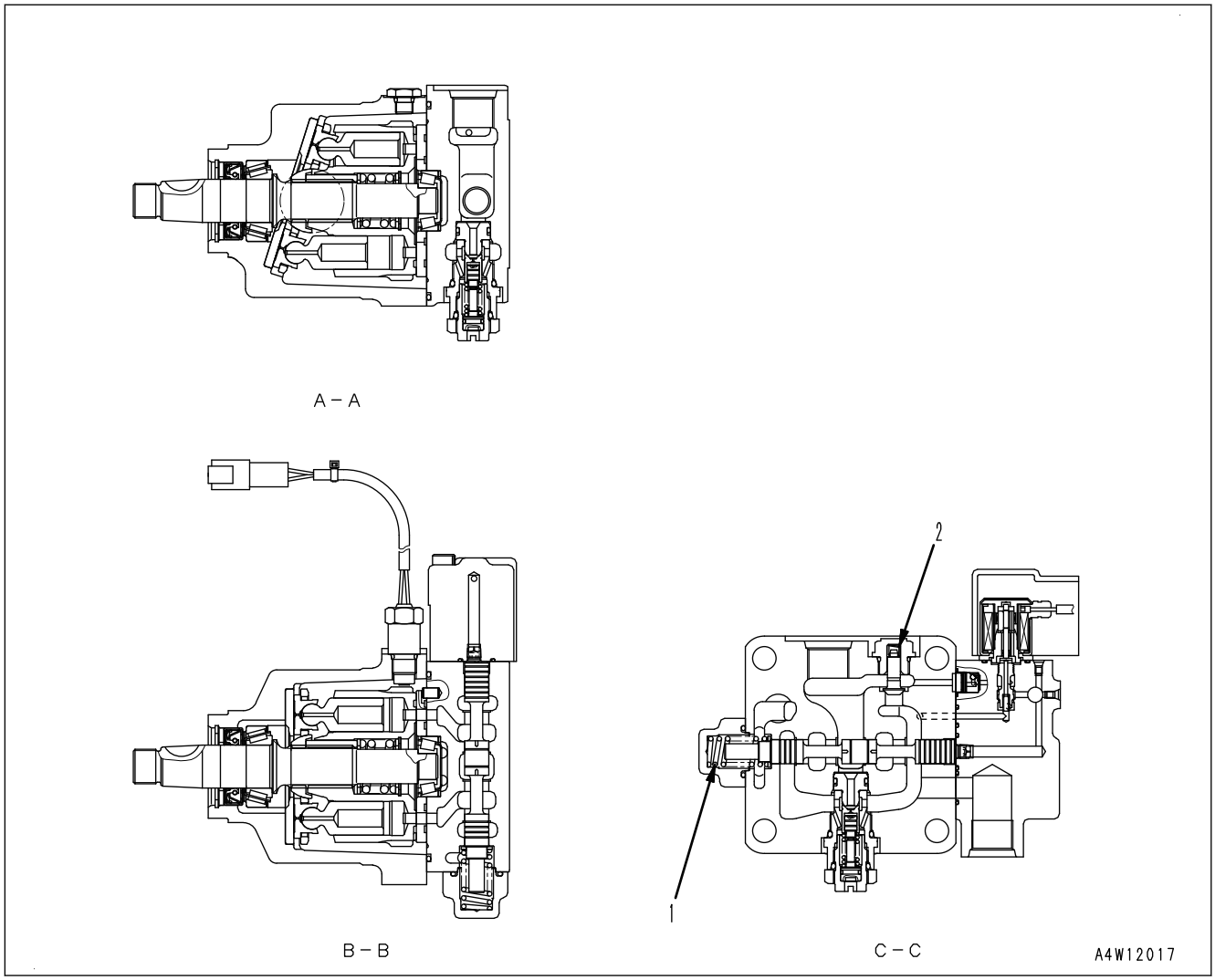
3. Remove the bolts (4) (2 pieces), and open the cover (5).



KCCV crankcase pressure sensor

4. Disconnect the connector PCCV (6).

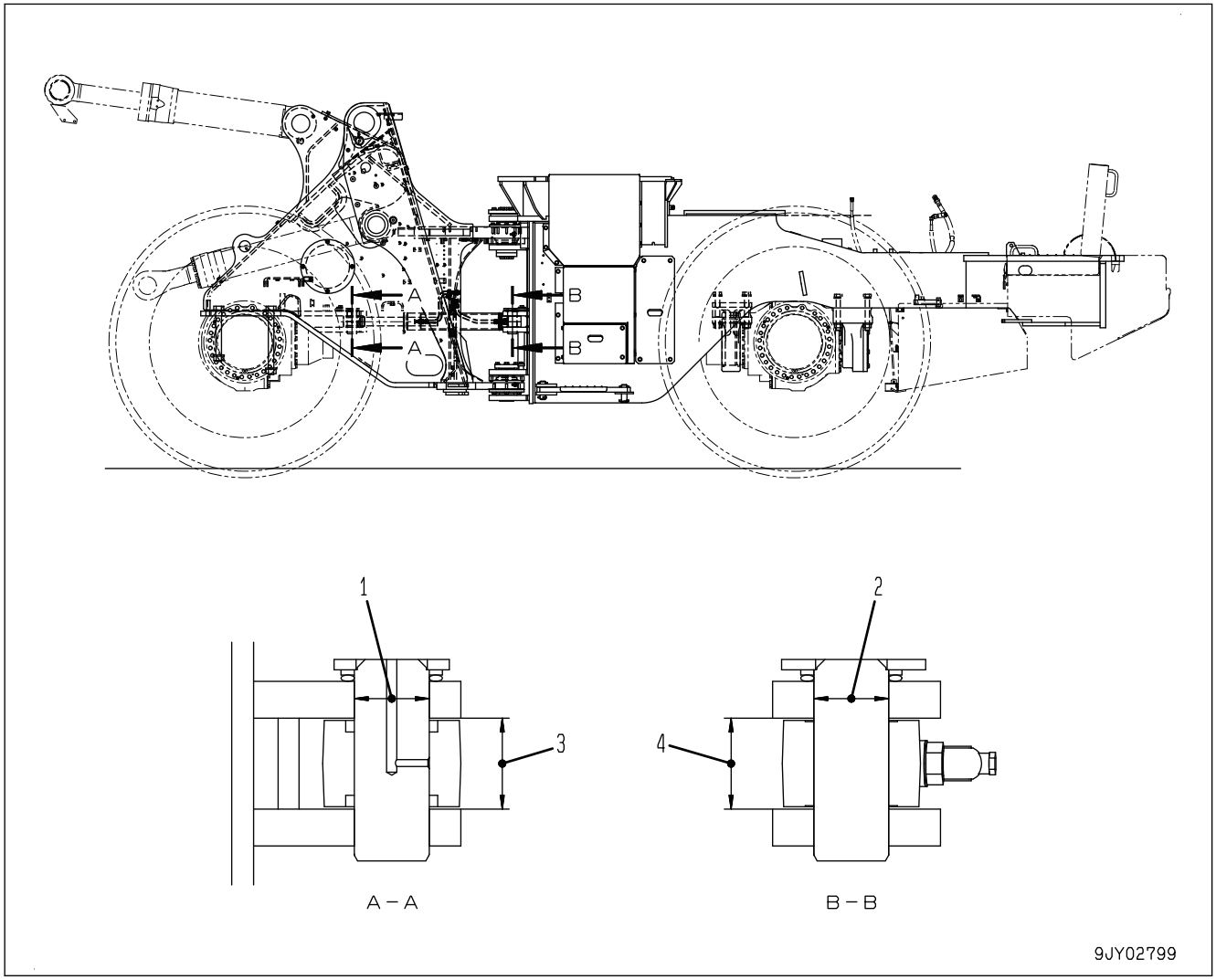




Unit: mm

No.	Item	Judgment criteria					Remedy
		Standard dimension			Repair limit		
1	Spool return spring	Free height x outside diameter	Installed height	Load at installed height	Free height	Load at installed height	Replace spring (replace spring if damaged or deformed as well)
		38.1 x 17.6	35	58.8 N {6 kg}	-	47.1 N {4.8 kg}	
2	Check valve spring	13.0 x 6.5	7	3.43 N {0.35 kg}	-	2.75 N {0.28 kg}	

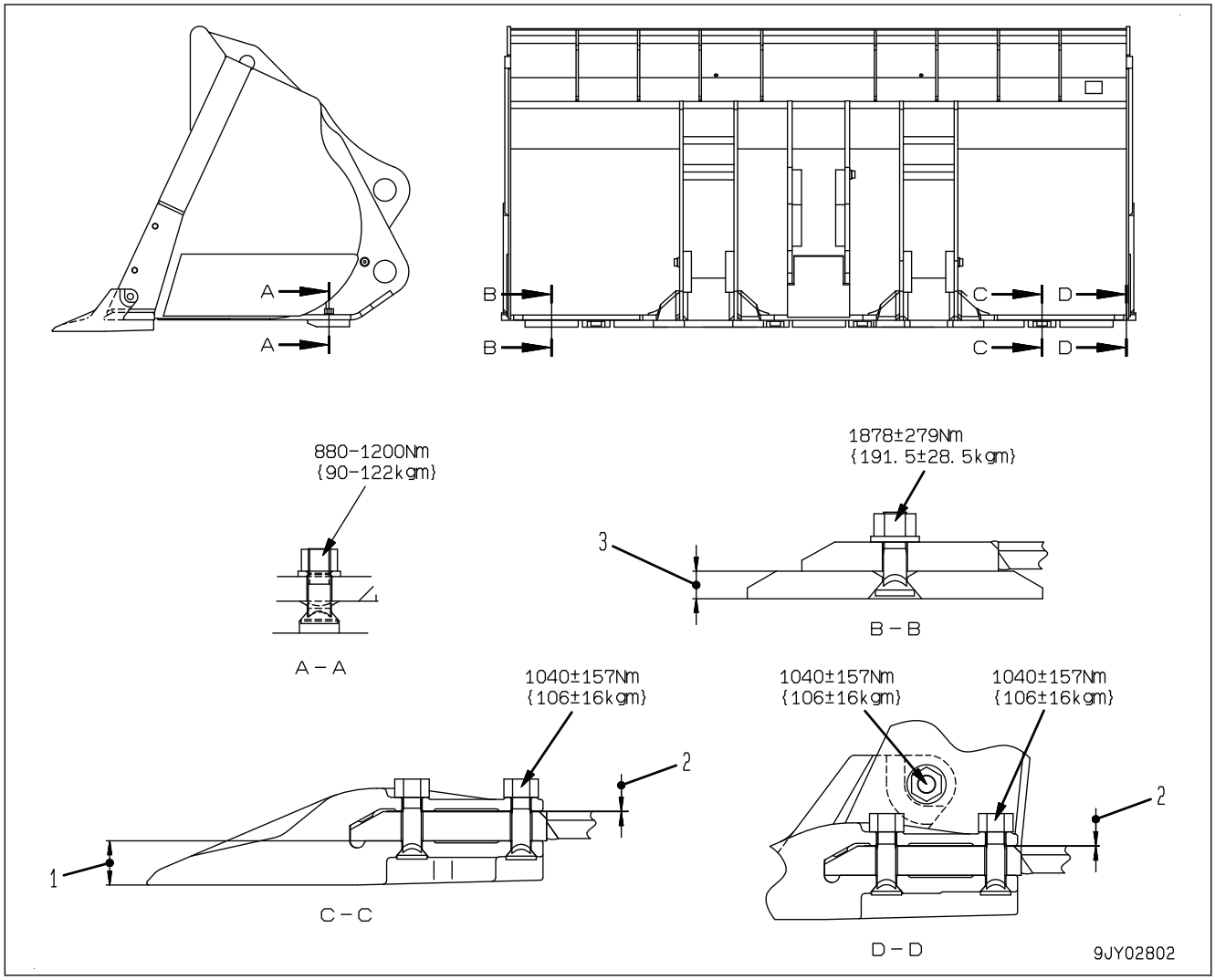
MAINTENANCE STANDARD OF STEERING CYLINDER



Unit: mm

No.	Item	Judgment criteria					Remedy
1	Clearance between bushing at front frame connect part and installation pin of steering cylinder	Standard dimensions	Tolerance		Standard clearance	Allowable clearance	Replace bushing and pin
			Shaft	Hole			
		65	0 -0.074	+0.174 +0.100	0.100 to 0.248	1.0	
2	Clearance between bushing at rear frame connect part and installation pin of steering cylinder	65	0 -0.074	+0.174 +0.100	0.100 to 0.248	1.0	
3	Connect part of steering cylinder and front frame	Width of boss		Width of hinge		Standard clearance	Adjust it so that it becomes Max. 0.5 mm and below after shim adjustment.
		75 ± 1.2		79 ± 1		1.8 to 6.2	
4	Connecting part of steering cylinder and rear frame	75 ± 1.2		79 ± 1		1.8 to 6.2	

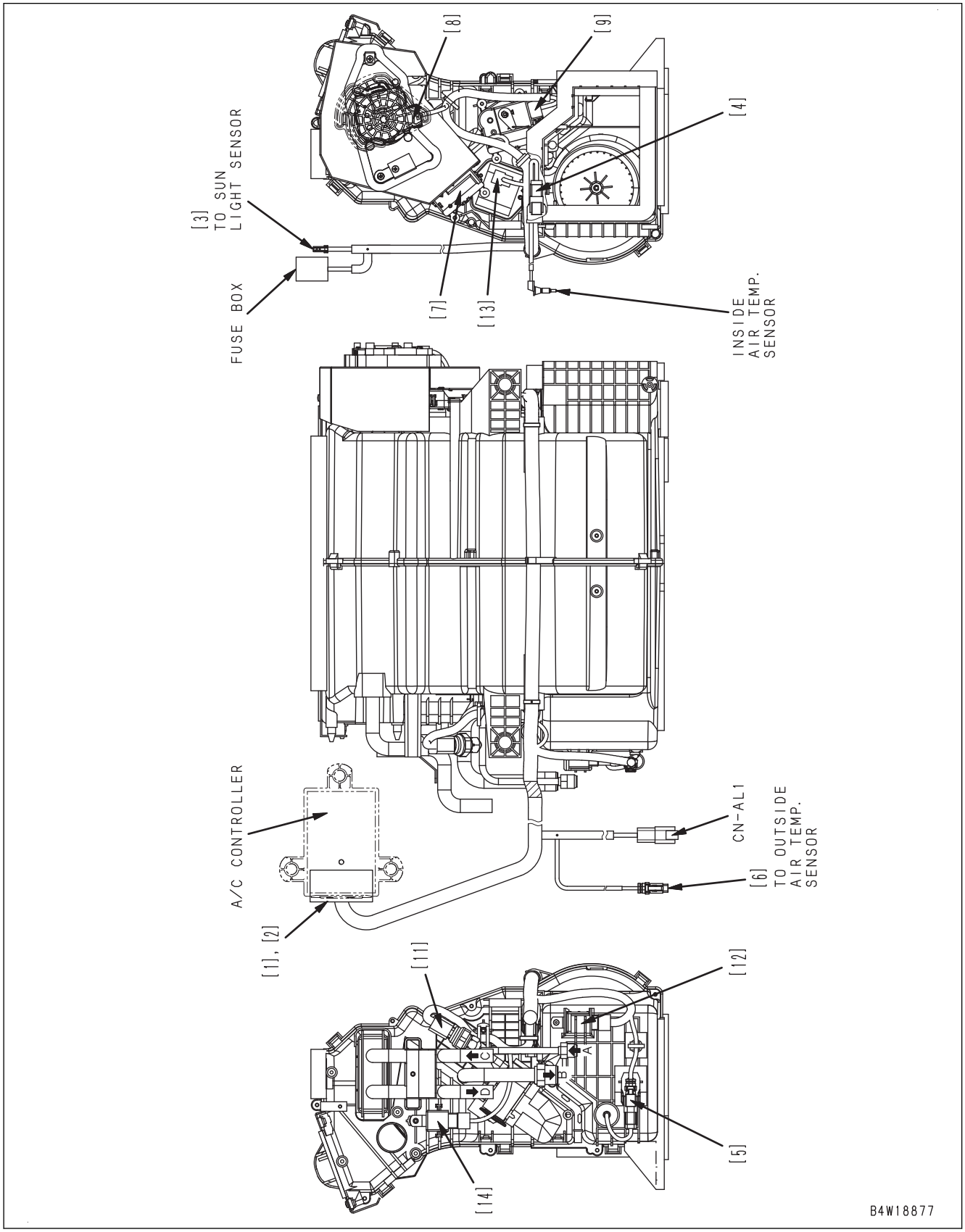
Bucket 5.2 m^3 (with teeth and segment edge)



Unit: mm

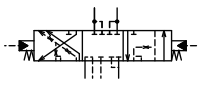
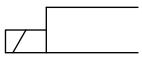
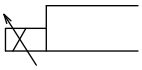
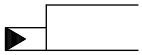
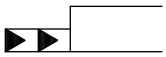
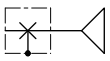
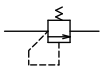
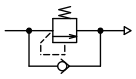
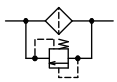
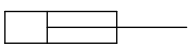
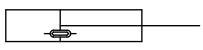
No.	Item	Judgment criteria		Remedy
1	Wear of bucket tooth	Standard dimensions	Repair limit	Replace
		38	23	
2	Clearance of bucket teeth installation part	0.5 or below	–	Adjust or replace
3	Wear of segment edge	38	15	Turn 180 deg. or replace

Connector of air conditioner unit



[1], [2] Air conditioner controller connectors
[3]: Sunlight sensor connector
[4]: Inside air temperature sensor connector
[5]: Evaporator temperature sensor connector
[6]: Outside air temperature sensor connector
[7]: Air mix actuator connector

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">3</td><td rowspan="5">Defective vent (mode) actuator, defective air conditioner wiring harness, defective air conditioner controller</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors [1] and [2], and insert T-adapter into it.
3. Turn the starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between [2] (5) and [1] (29)</td><td>5 V</td></tr>
<tr><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors [1] and [2], and insert T-adapter into it.
3. Turn the starting switch to ON position.
4. Be ready with FACE by operating vent switch on the air conditioner operation screen.
5. Change it to DEFROSTER by operating vent switch on the air conditioner operation screen.
REMARK
• The voltage is applied between connector [1] (22) and [1] (33) for only approximately 3 seconds (only while door is moving).
• The voltage between connector [2] (5) and [1] (36) varies for only approximately 3 seconds (only while door is moving). (When door stops, the voltage becomes constant.)</td></tr>
<tr><td rowspan="2">Voltage</td><td>Between [1] (22) (+) and [1] (23) (-)
REMARK
When vent is changed from DEFROSTER to FACE, the polarity of voltage becomes reverse.</td><td>Approx. 12 V</td></tr>
<tr><td>Between [2] (11) (+) and [1] (29) (-)</td><td>Varies within Max. 5 V.</td></tr>
<tr><td>4</td><td>Defective air conditioner wiring harness</td><td colspan="3">Perform when the result of check on cause 2 is normal and the result of check on cause 3 is abnormal.
Check by referring to circuit diagram.</td></tr>
<tr><td>5</td><td>Defective air conditioner controller</td><td colspan="3">When test result for cause 2 is normal and that for cause 3 is abnormal and that for cause 4 is normal, air conditioner controller is defective.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective switch panel (defective switch)</td><td colspan="3">1. Turn the starting switch to ON position.
2. Display the air conditioner operation screen on the machine monitor.</td></tr>
<tr><td colspan="2">Operate the vent switch to change LCD display to FACE, FACE and REAR, FOOT and FACE and REAR, FOOT, FOOT and DEFROSTER, DEFROSTER.</td><td>LCD display changes to each mode.</td></tr>
</table>

Symbol	Content
 9JC01498	Control valve
 9JC01499	Single acting solenoid valve
 9JC01500	Single acting proportional solenoid valve
 9JC01501	Hydraulic pilot valve
 9JC01502	Hydraulic 2-stage pilot valve
 9JC01503	Lock valve
 9JC01504	Drain valve
 9JC01505	Pressure regulating valve, safety valve, relief valve
 9JC01506	Pressure regulating valve, safety valve, relief valve (when the oil pressure is discharged to the low-pressure side)
 9JC01507	Bypass valve
 9JC01508	Accumulator
 9JC01509	Cylinder
 9JC01510	Cylinder with piston valve