SEN06582-07

Shop Manual

BULLDOZER

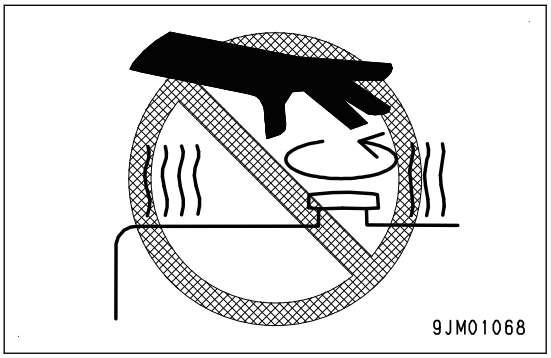
D155AXi-8

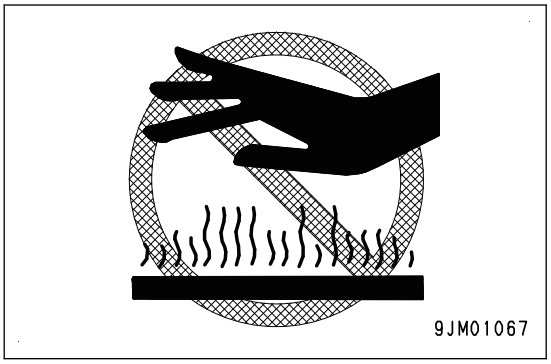
(Radio control specification)

SERIAL NUMBERS 100040 and up

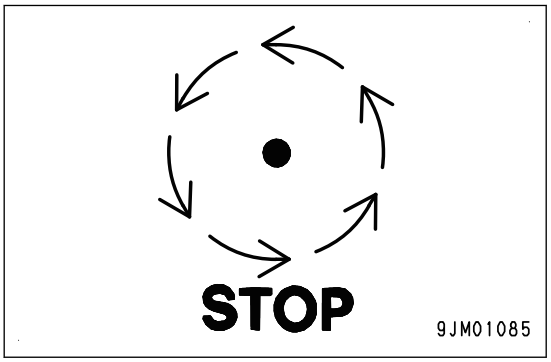
KOMATSU

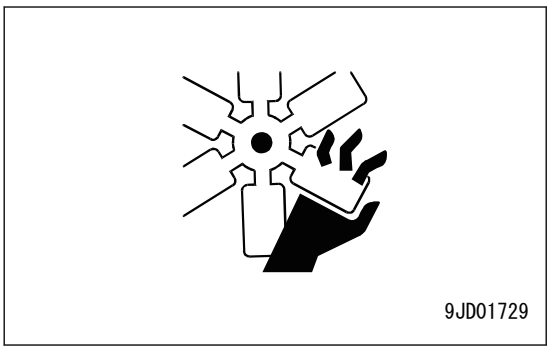
- Release the remaining pressure from the circuit before starting the work of disconnecting and removing of oil, fuel, water, or air from the circuit. When removing the cap of oil filter, drain plug, or oil pressure plug, it should be done slowly otherwise the oil spills.
- When removing or installing the checking plug or the piping in the fuel circuit, wait 30 seconds or longer after the engine is shut down and start the work after the remaining pressure is released from the fuel circuit.
- The coolant and oil in the circuits are hot when the engine is shut down. Be careful not to get scalded. Wait for the oil and coolant to cool before performing any work on the oil or coolant circuits.





- Before starting work, shut down the engine. When working on or around a rotating part, in particular, shut down the engine. When checking the machine without shutting down the engine (measuring oil pressure, revolving speed, temperature, etc.), take extreme care not to get caught in rotating parts or moving parts.
- When raising a heavy component (heavier than 25 kg), use a hoist or crane. Before starting work, check that the slings (wire ropes, webbing slings, chains, and hooks) are free from damage. Always use slings which have ample capacity and install them to proper places. Operate the hoist or crane slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
- When removing a part which is under internal pressure or under reaction force of a spring, always leave 2 bolts in diagonal positions. Loosen those 2 bolts gradually and alternately to release the pressure, and then remove the part.
- When removing components, do not break or damage the electrical wiring. Damaged wiring may cause a fire.
- When removing piping, do not spill the fuel or oil. If any fuel or oil drips onto the floor, wipe it off immediately. Fuel or oil on the floor can cause you to slip and can even cause fires.

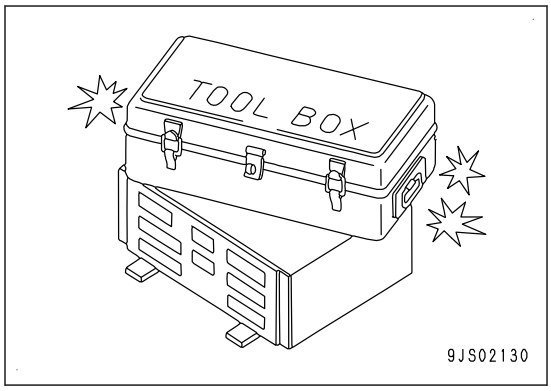


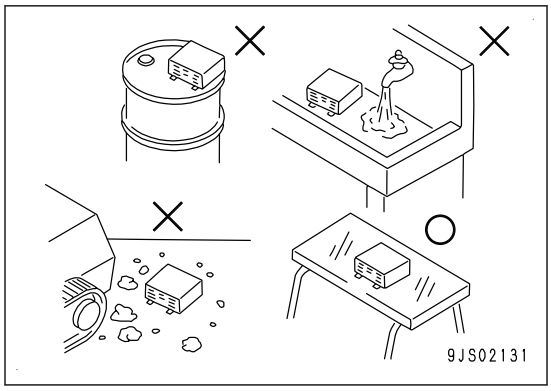


- Do not use gasoline to wash parts as a general rule. Do not use gasoline to clean electrical parts, in particular.

NOTICE

- **Controller has been assembled with electronic circuits for control including microcomputers. These electronic circuits inside of the controller must be handled with care since they control the machine.**
- **Do not leave things on the controller.**
- **Cover the connector portion of the controller with a tape and a plastic bag. Do not touch the connecting portion of connector.**
- **Do not leave the controller in a place where it is exposed to rain.**
- **Do not place the controller on oil, water, soil or any places where the temperature is likely to be high even for a short period of time (Place it on a suitable dry stand).**





Precautions for troubleshooting electrical circuits

- Be sure to turn the starting switch to OFF position before disconnecting or connecting the connectors.
- Before performing troubleshooting, check all the related connectors for loose connection.

  REMARK

  Check the related connectors for their performance by disconnecting and connecting them several times.
- Be sure to connect all the disconnected connectors before proceeding to the next step.

  NOTICE

  If the starting switch is turned to ON position while the connectors are disconnected, an unrelated failure beside the actual failed part may be displayed.
- When performing the troubleshooting for the circuit (measurement of voltage, resistance,continuity, current, etc.), shake the related wiring harnesses and connectors several times and check that the multimeter reading does not change.

  NOTICE

  If the value changes on the multimeter, there may be a defective contact in the circuit.

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

FUNCTION OF TEMPORARY RESTORATION FROM INDUCEMENT (FOR NORTH AMERICA)

- Temporary Restoration from Inducement is one of the Inducement strategies allowed to be included in Urea SCR systems. In case the Urea SCR system advances to “Severe Inducement”, engine power is derated heavily. This may cause difficulties of moving the machine to a safe place for adding AdBlue/DEF or troubleshooting and correcting abnormalities of the Urea SCR system. For temporary remedies from these difficulties the operator can restore engine power for a short time to the deration of “Mild Inducement” through the machine monitor. Note that “Temporary Restoration from Inducement” does not regain full engine power.
- “Temporary Restoration from Inducement” can be activated only when the Urea SCR system is in “Severe Inducement”. The maximum duration is limited to 30 minutes in each restoration operation, and 3 operations are allowed, but “Temporary Restoration from Inducement” is turned off whenever the system advances to “Final Inducement” even if either 30 minutes or 3 operations are not used up. All the abnormalities of the Urea SCR system need to be corrected to regain another restoration capability.
- If all the abnormalities of the Urea SCR system are not corrected when the system is in “Severe Inducement”, the system advances to “Final Inducement” in 1 hour after “Severe Inducement” started and engine speed will be fixed to low idle to disable practical machine operation.
- To activate Temporary Restoration, follow the procedures described below.

  REMARK

  For the operating procedure on this function, refer to “TEMPORARY RESTORATION FROM INDUCEMENT” on the OPERATION section in the Operation and Maintenance Manual.

INDUCEMENT STRATEGY FOR ABNORMALITY RECURRENCE WITHIN 40 HOURS (FOR NORTH AMERICA)

- The Urea SCR system continuously monitors its operation conditions and stores information on inappropriate operations including malfunctions.
- The stored information is utilized to monitor recurrences of abnormalities, “Abnormality Counter”. “Abnormality Counter” is required by the authorities. The abnormality counting spans 40 hours and it monitors the abnormalities that trigger Inducement other than the amount of AdBlue/DEF in the tank.
- If another abnormality/abnormalities is detected within 40 hours after the previous abnormalities were corrected, regardless of the level of the previous Inducement and whether the new abnormality/abnormalities is the same as the previous ones or not, it is judged as a recurrence.
- If a recurrence occurs, the Inducement strategy will be activated and starts from “Severe Inducement”.
- The duration of “Severe Inducement” in the recurrence is limited to 30 minutes. If the abnormalities are not corrected while Inducement is in “Severe Inducement (30 minutes)”, Inducement will advance to “Final Inducement” and engine speed will be fixed to low idle to disable practical machine operation.

INDUCEMENT STRATEGY WHEN THE AdBlue/DEF LEVEL IN THE TANK BECOMES LOW (FOR EUROPEAN UNION)

- When the AdBlue/DEF level in the tank becomes low, AdBlue/DEF level caution lamp on the machine monitor lights up, the Audible alert sounds, the action level is displayed and Inducement strategy including engine power deration is activated.
- The Inducement strategy progresses in 4 levels from Warning, Continuous Warning, Low-Level Inducement, and Severe Inducement.
- Up to the start of Severe Inducement the start of each warning step is triggered by the amount of AdBlue/DEF in the AdBlue/DEF tank.
- The Inducement strategy status can be checked on “SCR Information” screen of the user menu.
- The table shows warning indications and engine power derations by each Inducement strategy status.

EGR SYSTEM

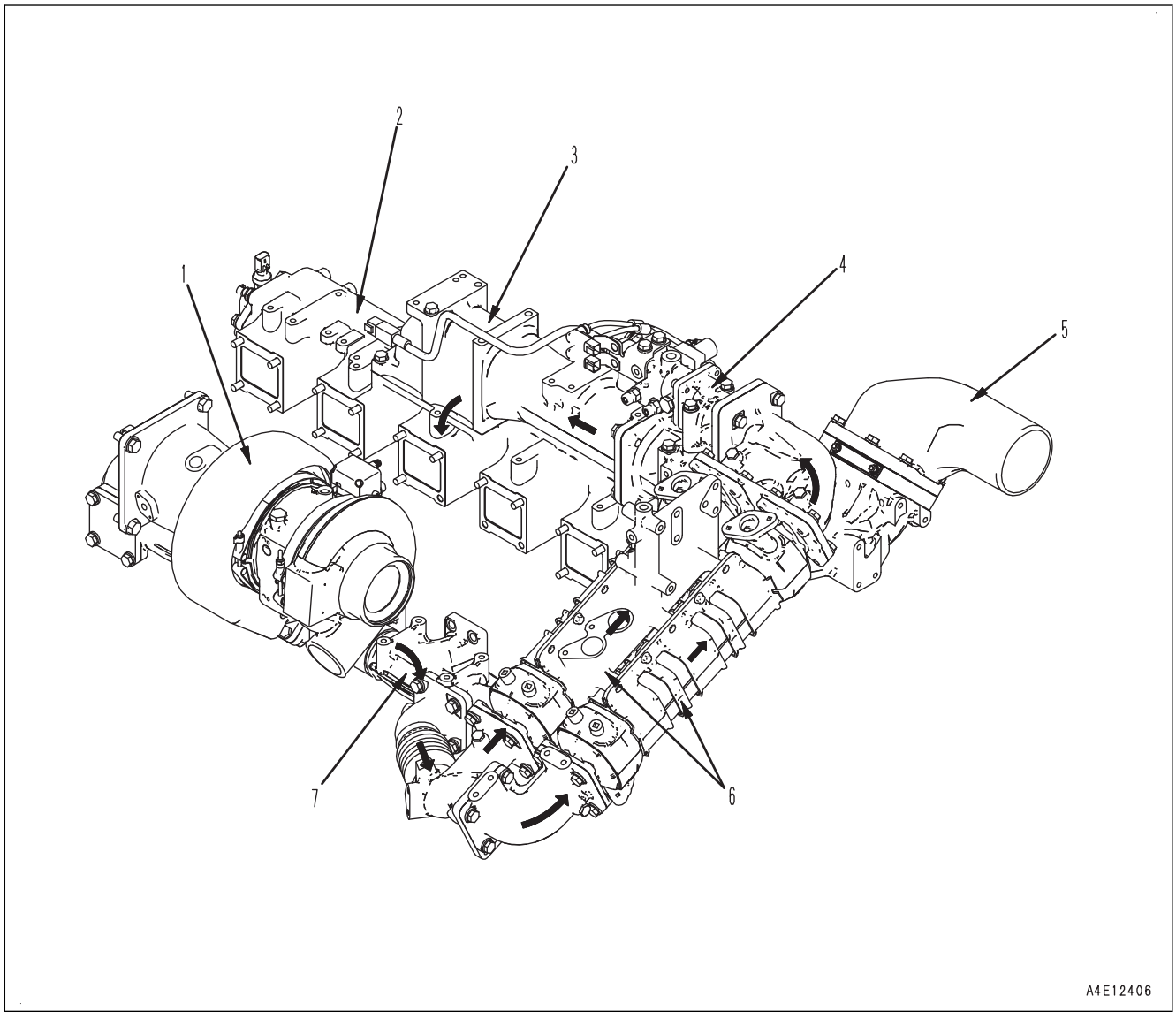
EGR

Abbreviation for Exhaust Gas Recirculation

LAYOUT DRAWING OF EGR SYSTEM

REMARK

The shape is subject to machine models.



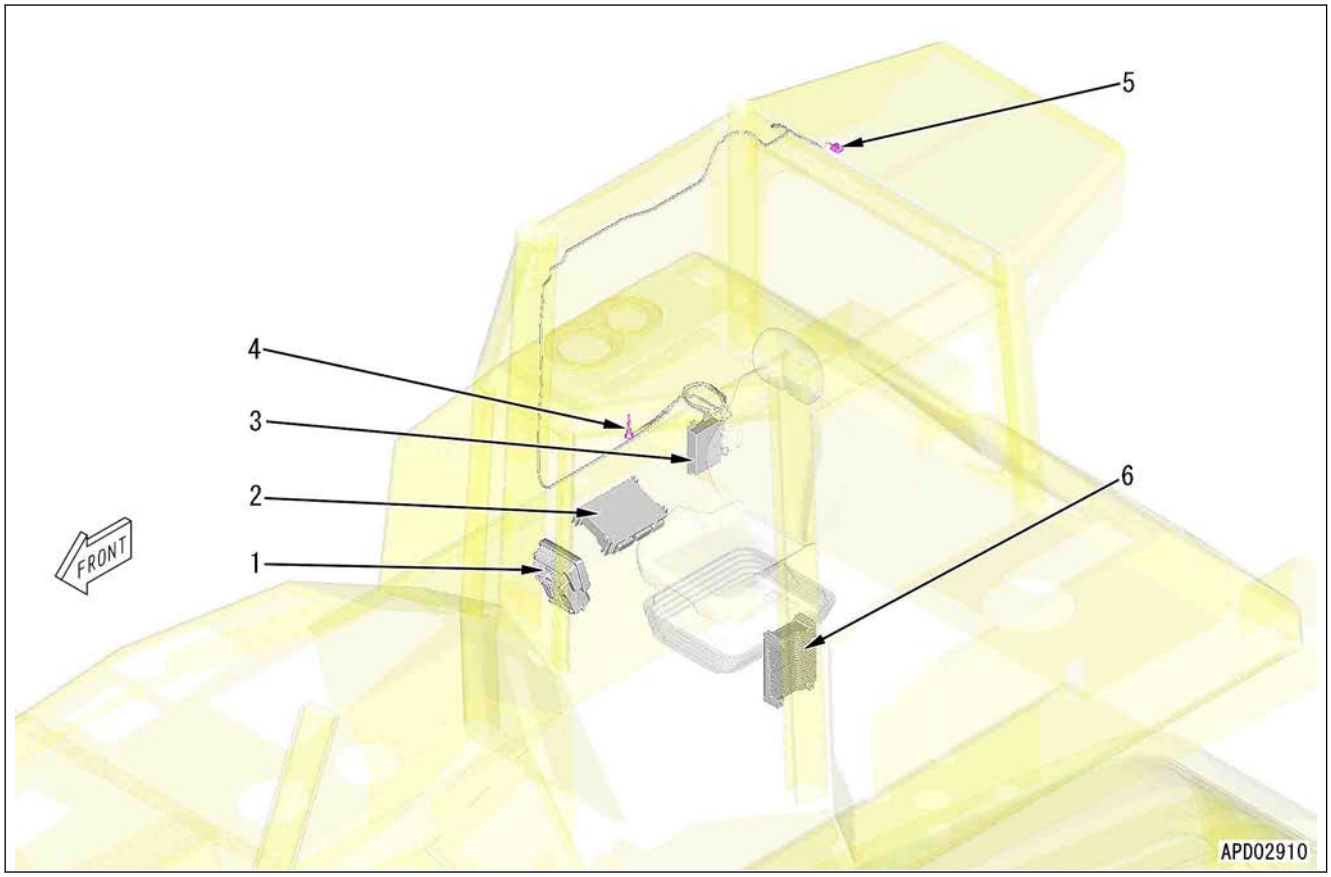
1: VGT
2: Intake manifold
3: Mixing connector
4: EGR valve
5: Intake connector
6: EGR cooler
7: Exhaust manifold

FUNCTION OF EGR SYSTEM

- EGR valve (hydraulically driven) (4) controls the gas flowing from the exhaust section to the intake section. Since the exhaust pressure is higher than the boost pressure, the exhaust gas flows to the intake section.
- EGR cooler (6) cools the exhaust gas.
  Engine coolant is used to cool the exhaust gas.

CONTROL SYSTEM

LAYOUT DRAWING OF CONTROL SYSTEM



1: Machine monitor
2: Work equipment controller
3: KOMTRAX terminal
4: Communication antenna
5: GPS antenna
6: Power train controller

Pin No.	Signal name	Input/Output
18	(*1)	-
19	(*1)	-
20	(*1)	-
21	Datalink4 (+) (Sensor controller)	Communication
22	Datalink4 (+) (KOMNET/c)	Communication
23	(*1)	-
24	(*1)	-
25	Power supply (+24 V, continuous)	Power supply
26	Power supply (+24 V, continuous)	Power supply
27	Power supply (+24 V, continuous)	Power supply
28	Power supply (+24 V, continuous)	Power supply
29	(*1)	-
30	(*1)	-
31	(*1)	-
32	GND	Ground/Shield/ Return
33	GND	Ground/Shield/ Return
34	(*1)	-
35	(*1)	-
36	(*1)	-
37	(*1)	-
38	AdBlue/DEF line heater 2	Input
39	AdBlue/DEF line heater 1	Input
40	(*1)	-
41	KDPF differential pressure sensor	Input
42	KDPF outlet pressure sensor	Input
43	(*1)	-
44	(*1)	-
45	Datalink4 (-) (Sensor controller)	Communication
46	Datalink4 (-) (KOMNET/c)	Communication
47	(*1)	-
48	System operating lamp	Output
49	Power GND	Ground/Shield/ Return
50	Power GND	Ground/Shield/ Return
51	Power GND	Ground/Shield/ Return
52	Power GND	Ground/Shield/ Return

B3: To blade lift cylinder bottom
B4: To blade tilt cylinder bottom
B5: To ripper lift cylinder bottom
B6: To ripper tilt cylinder head
IA1: Connector (from controller)
IA2: Connector (from controller)
IA3: Connector (from controller)
IA4: Connector (from controller)
IA5: Connector (from controller)
IA6: Connector (from controller)
IB1: Connector (from controller)
IB2: Connector (from controller)
IB3: Connector (from controller)
IB4: Connector (from controller)
1: EPC valve
IB5: Connector (from controller)
IB6: Connector (from controller)
LS: To pump LS valve
P: Pump port
PC: Pump pressure pickup port plug
PLSC: LS pressure pickup port plug
PEPC1: EPC valve source pressure input port (from self-pressure reducing valve)
PEPC2: EPC valve source pressure input port (from self-pressure reducing valve)
T: Drain port
T: Drain port
T: Drain port
TS: To tank

It consists of a parallel circuit, so when combined operations are carried out, the oil flow is divided corresponding to the opening area of each spool.

1. When blade tilt spool (1) and blade lift spool (2) are at the “HOLD” position or are at “OPERATE”, steering priority valve (3) is pressed to the right, and the area of the opening to the downstream section is at its maximum.
2. Blade tilt spool (1) and blade lift spool (2) are actuated by EPC valve output pressures (PA2) and (PB3), and each of them is balanced at a position that matches its own EPC valve output pressure.

When pressure (P2) ≦pressure (P3)

Blade lift valve load pressure (P3) is transmitted to the pump LS valve through LS circuit (O).

When pump swash plate does not reach maximum angle

- When the maximum flow of oil from the pump is greater than the sum of the oil flow demanded by the blade tilt valve and blade lift valve, an oil flow that matches the opening of the spool flows to both of the blade tilt valve and blade lift valve.

When pump swash plate is at maximum angle

- When the maximum flow of oil from the pump is smaller than the sum of the oil flow demanded by the blade tilt valve and blade lift valve, the flow of oil to the blade tilt valve and blade lift valve is divided corresponding to differential pressure (PO) - (P2) and differential pressure (PO) - (P3).
- In other words, more oil flows to (P2) where the load is small.

REMARK

When the blade is raised and the blade tilt valve and blade lift valve are moved to “RAISE” position at the same time, the blade tilt valve load pressure is smaller than the blade lift valve load pressure, so the flow of oil to the blade tilt valve is given priority. In addition, the oil flow demanded by the blade tilt valve is smaller, so the condition is just as if priority was given to the oil flow for the blade tilt valve.

When pressure (P2) = pressure (P3)

(P) - (P2) ≒ (P) - (P3), so an oil flow proportional to the size of the spool opening of each spool is distributed.

OPERATION OF UNLOAD VALVE PRESET SYSTEM

REMARK

The figure shows the condition with preset check valve (3) open immediately after blade lift valve is operated.

STATOR CLUTCH ECMV

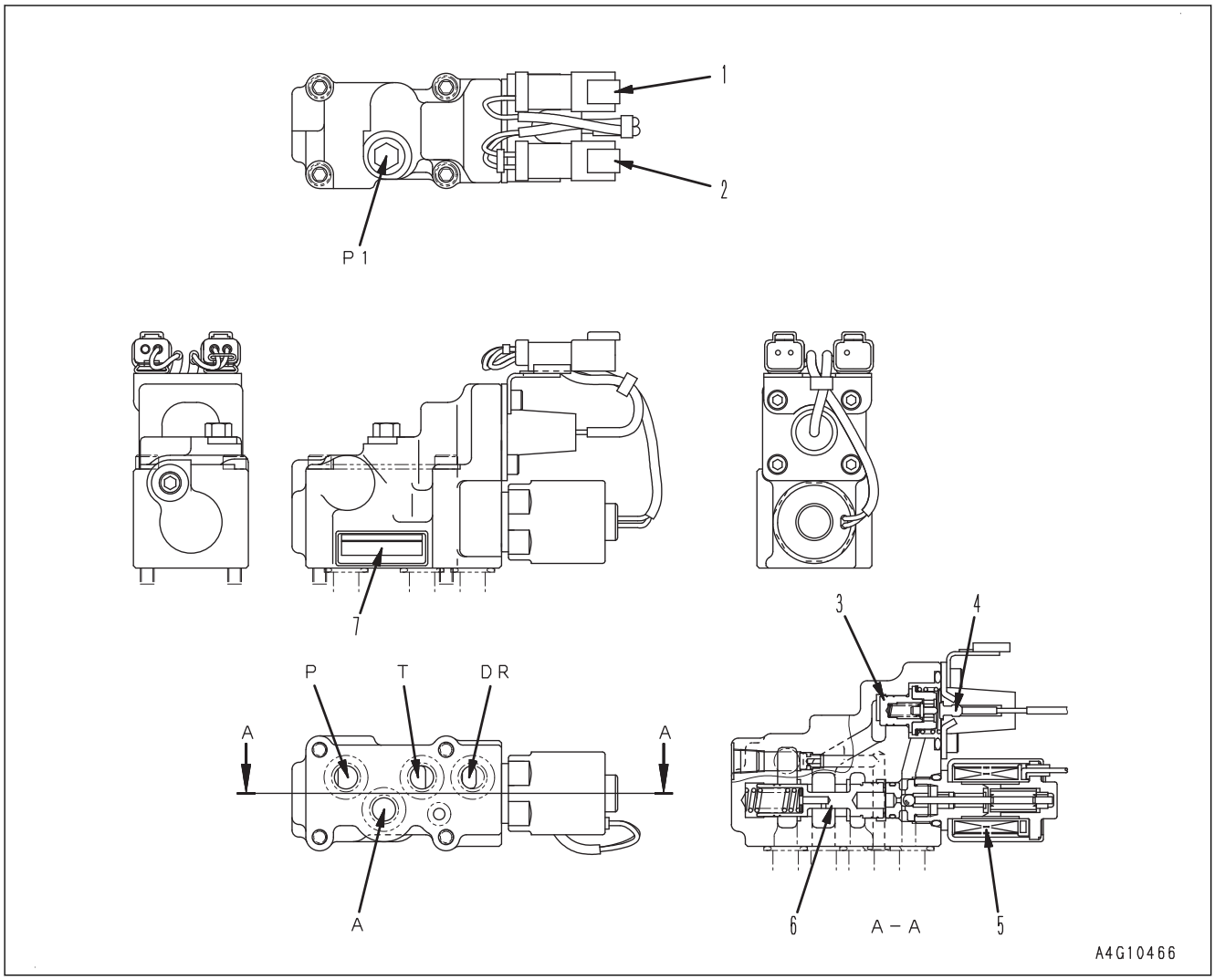
ECMV

Abbreviation for Electronic Control Modulation Valve

STRUCTURE OF STATOR CLUTCH ECMV

NOTICE

Do not disassemble this ECMV since it needs to be adjusted for maintaining the performance once assembled.



A: To clutch
P: From pump
T: Drain
1: Fill switch connector
2: Proportional solenoid connector
3: Oil pressure pickup valve
4: Fill switch
DR: Drain
P1: Clutch oil pressure pickup port
P2: Pilot oil pressure pickup port
5: Proportional solenoid
6: Pressure control valve
7: Nameplate (*1)

*1:

Clutches engaged	Stamp on name plate
Lockup	E*******

Power from transmission (reverse)
↓
Bevel pinion (1)
↓
Bevel gear (2)
↓
Bevel gear shaft (3)
↓
Hub (4)
↓
Ring gear (5)
↓
↓
↓
Planetary pinion (6)
↓
Carrier (15)
↓
Brake hub (16)
↓
Output shaft (17)

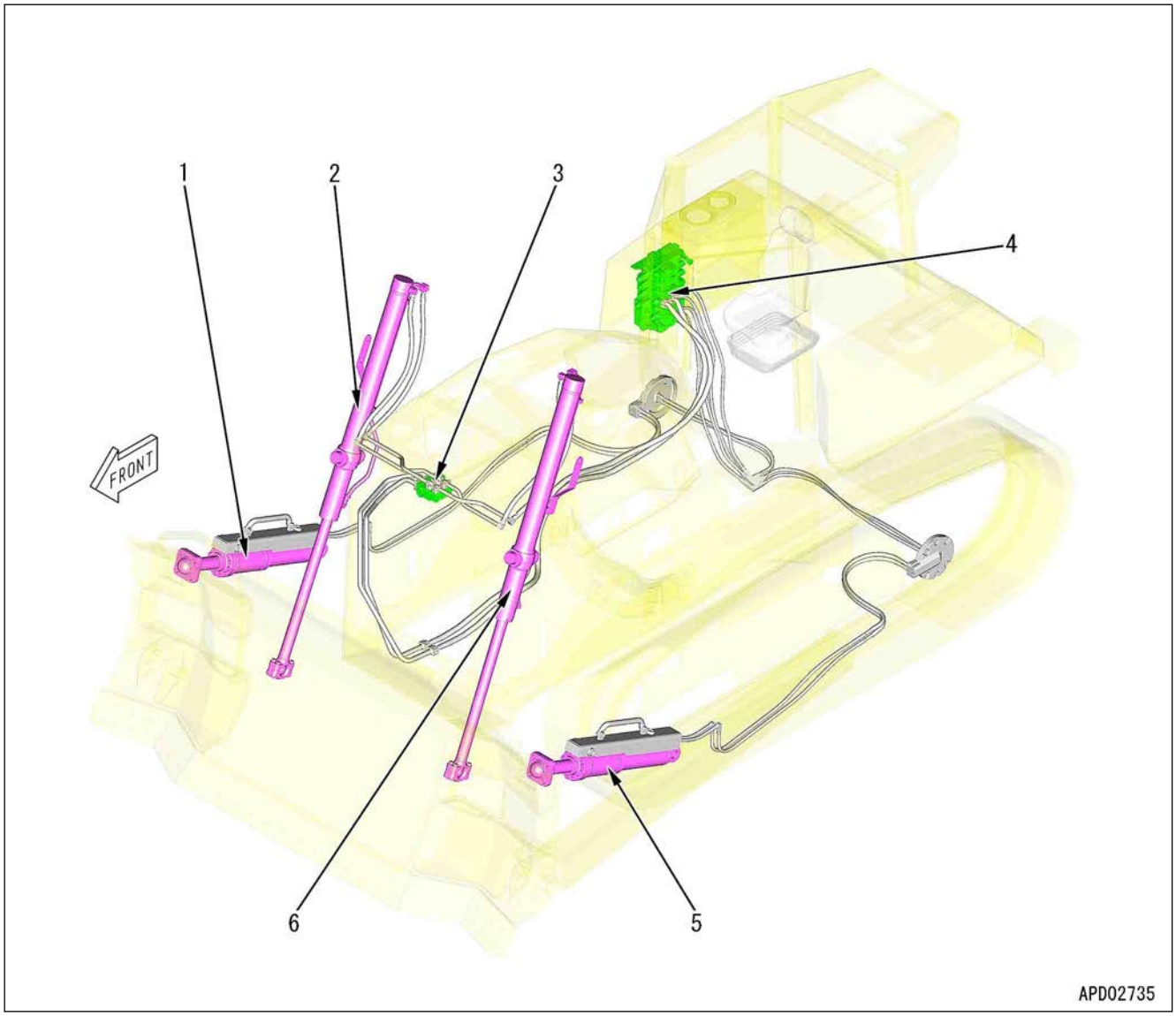
Power from HSS motor (7)
(Clockwise when viewed from left side of machine)
↓
Drive gear (8)
↓
Gear D (9)
↓
↓
↓
Left gear A (13)
(Clockwise when viewed from left side of machine)
↓
Left sun gear (14)
↓
←

→
Gear C (10)
↓
Shaft (11)
↓
Gear B (12)
↓
Right gear A (13)
(Counterclockwise when viewed from left side of machine)
↓
Right sun gear (14)
↓
←

LAYOUT DRAWING OF FRONT WORK EQUIPMENT

REMARK

The figure shows SIGMADOZER with dual tilt specification.



1: R.H. blade tilt cylinder (*1)
2: R.H. blade lift cylinder
3: Quick drop valve
4: Control valve
5: L.H. blade tilt cylinder
6: L.H. blade lift cylinder

*1: The single tilt specification uses the brace.

When back grade is disabled: The blade is raised to the certain height when the raising operation is performed with blade control lever.

OPERATION OF ASSIST CONTROL SYSTEM

1. Work equipment controller (1) calculates the current coordinates information (b) of blade edge from each cylinder length information (a).
2. Power train controller (4) detects the state information (c) of joystick (steering, directional and gear shift lever) and sends it to work equipment controller (1).
3. Work equipment controller (1) detects operation amount information (d) of blade control lever.
4. Work equipment controller (1) determines the activation of this function from the state information (c) of joystick (steering, directional and gear shift lever) and the operation amount information (d) of blade control lever.
5. Work equipment controller (1) calculates the deviation amount between the current coordinates information (b) of blade edge and its target coordinates by assistance.
6. Work equipment controller (1) calculates the cylinder EPC valve drive signal value corresponding to the deviation amount.
7. Work equipment controller (1) controls the blade by outputting the cylinder EPC valve drive signal (e) corresponding to the cylinder EPC valve drive signal value information.

CAB AND ITS ATTACHMENTS

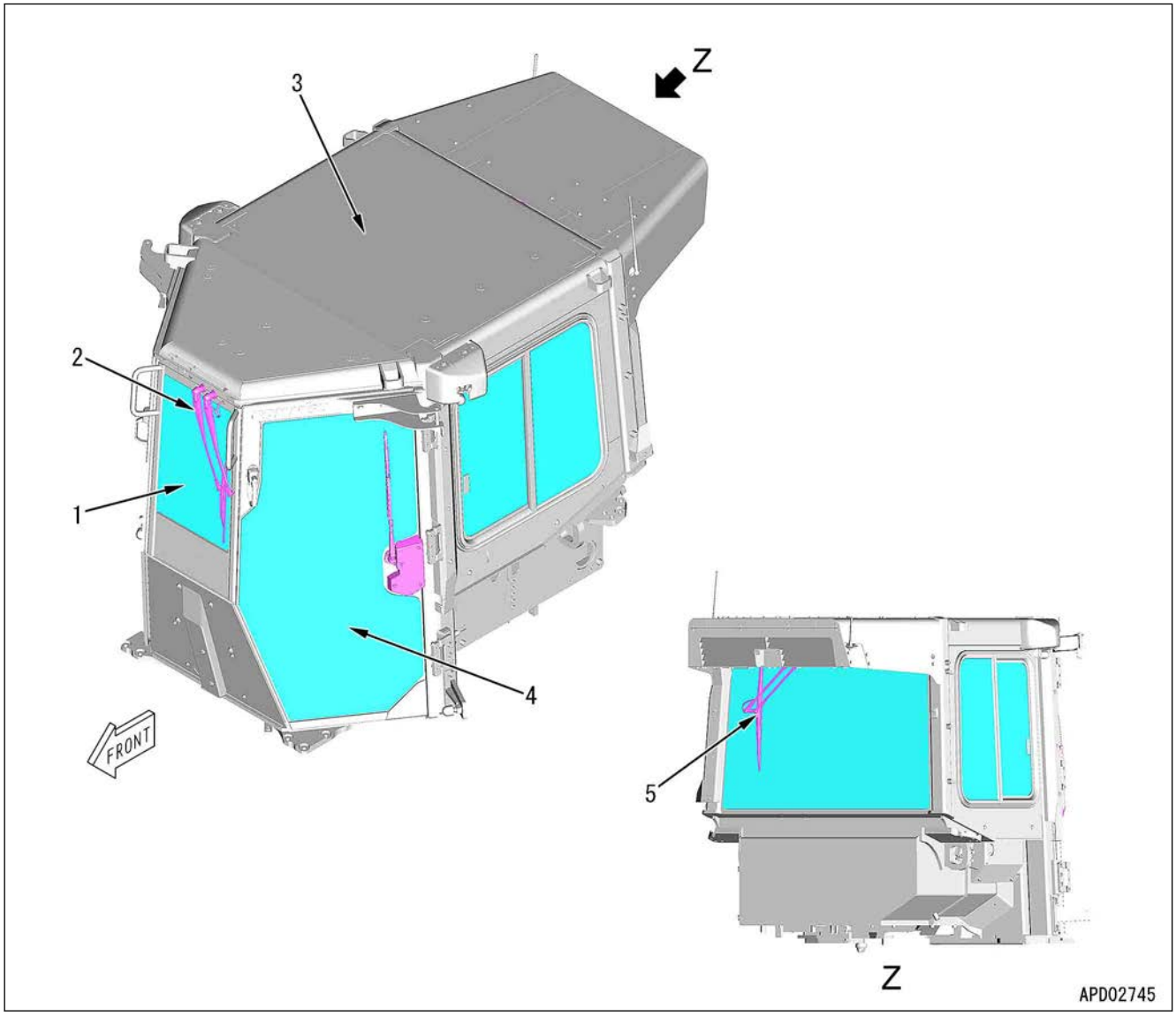
ROPS CAB

ROPS

Abbreviation for Roll-Over Protective Structure

STRUCTURE OF ROPS CAB

General view



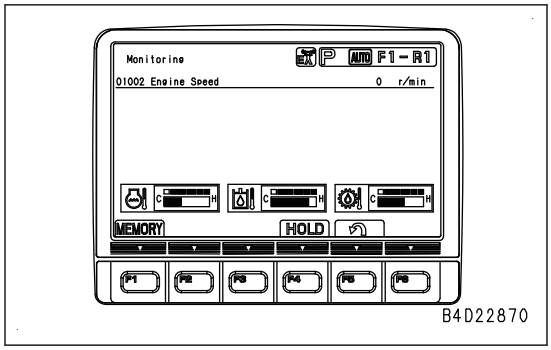
1: Front window
2: Front wiper
3: ROPS (with built-in cab)
4: Door
5: Rear wiper

FUNCTION OF ROPS CAB

ROPS cab is to protect the operator wearing seat belt from being crushed when the machine rolls over.

Machine model			D155AXI-8	
Engine			SAA6D140E-7	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Lift cylinder reset sensor (L.H.)	• Hydraulic oil temperature: 50 to 80 °C • Fuel control dial: MAX (High idle) • Control box power: ON • Lower the blade to the ground and repeat extending (ground) and retracting (lift RAISE) the cylinder just before its stroke end for 10 times • Work equipment: Right tilt operation (2.0 to 2.5 °) + holding blade raise stroke end operation for longer than 2 seconds	mm	0±7	0±7
Reset sensor for lift cylinder (R.H.)	• Hydraulic oil temperature: 50 to 80 °C • Fuel control dial: MAX (High idle) • Control box power: ON • Lower the blade to the ground and repeat extending (ground) and retracting (lift RAISE) the cylinder just before its stroke end for 10 times • Work equipment: Left tilt operation (2.0 to 2.5 °) + holding blade raise stroke end operation for longer than 2 seconds		0±7	0±7

The drawing is an example of a Monitoring code: 01002 “Engine Speed” screen displayed.



2. Shift the joystick (steering, directional and gearshift lever) (PCCS lever), blade control lever, and ripper control lever in their NEUTRAL position.
3. Start the engine with fuel control dial set in MIN (Low idle) position.

REMARK

The parking brake lever and work equipment lock lever can be tested in LOCK position.

4. Check that the fuel dial is set at MIN (Low idle) position, and measure the engine speed.

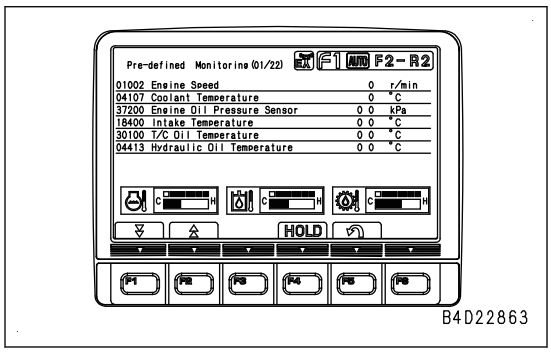
   For standard values, see Standard value table, “Standard value table for engine”.

Testing engine speed when decelerator pedal is depressed

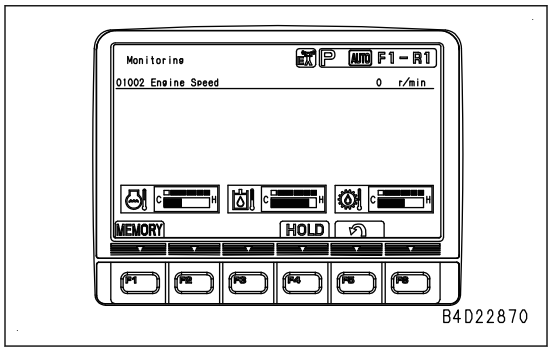
1. Select “Engine Speed” on “Pre-defined Monitoring”(01/22) or from Monitoring Selection Menu to display. For details, see “Setting and operating machine monitor”.

   Monitoring code: 01002 “Engine Speed”

   The drawing is an example of a “Pre-defined Monitoring” (01/22) screen displayed.



The drawing is an example of a Monitoring code: 01002 “Engine Speed” screen displayed.



2. Shift the joystick (steering, directional and gearshift lever) (PCCS lever), blade control lever, and ripper control lever in their NEUTRAL position.
3. Start the engine with fuel control dial set in MIN (Low idle) position.

REMARK

The parking brake lever and work equipment lock lever can be tested in LOCK position.

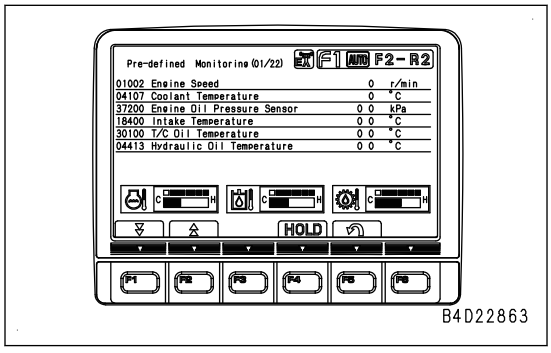
4. Set the fuel control dial to MAX (High idle) position.
5. Measure the engine speed with the decelerator pedal depressed to its stroke end.

   For standard values, see Standard value table, “Standard value table for engine”.

Testing engine high idle speed during neutral deceleration

1. Select “Engine Speed” on “Pre-defined Monitoring”(01/22) or from Monitoring Selection Menu to display. For details, see “Setting and operating machine monitor”.

   The drawing is an example of a “Pre-defined Monitoring” (01/22) screen displayed.



HANDLE NO-INJECTION CRANKING OPERATION

No-injection cranking operation means to crank the engine by using the starting motor while disabling injection in all cylinders electrically. The purpose and effect of this operation are as follows.

No-injection cranking is performed to lubricate the engine parts and to protect them from seizure. It is performed before the engine is started after the machine or engine has been stored for a long period.

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

REMARK

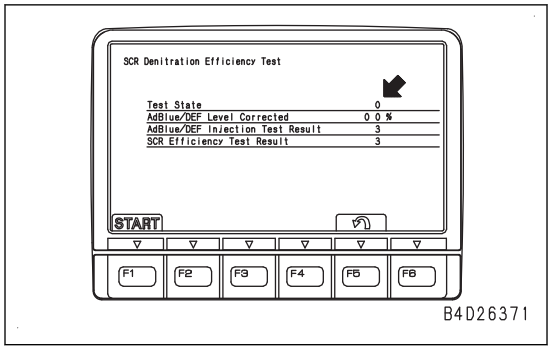
Flashing of “0” indicates “Waiting for the start (default)”, and test can be performed. Screen other than “0” is displayed, follow instructions according to “Parameter list of test state”.

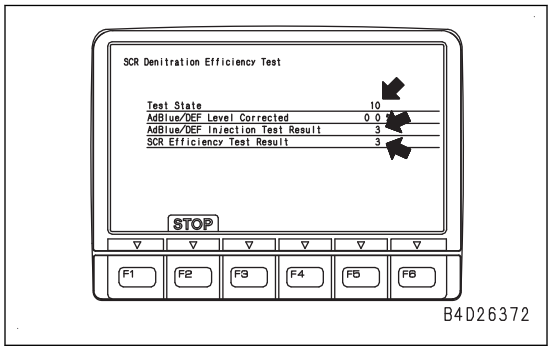
6. Press F1 to start “SCR Denitration Efficiency Test”.

F1: Starts “SCR Denitration Efficiency Test”.

F2: Stops “SCR Denitration Efficiency Test”. (When “STOP” is displayed)

F5: Returns the display to “SCR Service Test” screen





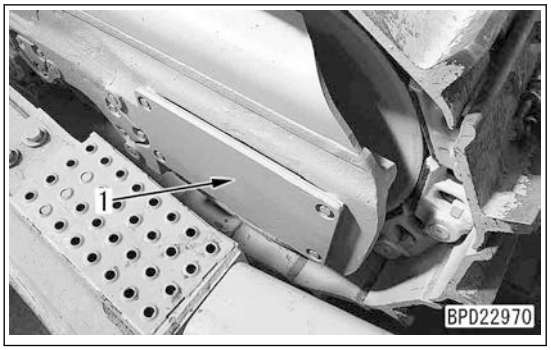
NOTICE

- **“Test State” does not change to “10” and test does not start even if F1 is pressed, turn starting switch to OFF position once, and repeat the procedure from step 1.**
- **When the test is stopped by pressing F2, “0” in “Test State” flashes. The test cannot be restarted by pressing F1. To restart the test, turn the starting switch to OFF position once. System operating lamp goes out, and engine controller shuts down.**
- **If the starting switch is mistakenly turned to OFF position during test, do not turn starting switch to ON position immediately. Check that system operating lamp is off, and turn starting switch to ON position again after engine controller shuts down.**
- **If KOMNET communication error remains less than 1 second, engine controller is unable to detect it. The test may be continued while the machine monitor does not continue the test (standard screen). In that case, once the starting switch is turned to OFF position, system operating lamp goes out, and the engine controller shuts down to reset the test.**

REMARK

- The display of “Test State” changes to the flashing of “10”, and “SCR Denitration Efficiency Test” starts.
- “SCR Denitration Efficiency Test” will be normally completed in approximately 30 minutes, however it may take approximately 90 minutes at maximum depending on the test state.
- When the display of “Test State” is “11” to “41” or “100”, follow “Parameter list of test state”.
- The test results of “AdBlue/DEF Injection Test Result” and “SCR Efficiency Test Result” are displayed as “3” during test.
- When the display of “Test State” changes from flashing of “10” to flashing of “20”, the test is completed.
- “Test State” becomes “14” temporarily at the half way of the test. This state means the temperature is in transition and is not abnormal. Resume the test. (The display changes to “10” in a few minutes.)
- If the test needs to be stopped at halfway, press F2 to return the screen to the standard screen.
- If F2 is pressed and the operation stops halfway through the test, “AdBlue/DEF Injection Test Result” and “SCR Efficiency Test Result” are displayed as “3”.
- The test results of “AdBlue/DEF Injection Test Result” and “SCR Efficiency Test Result” are displayed as “0”, “1” or “4” after the test.

2. Remove covers (1) (2 pieces).



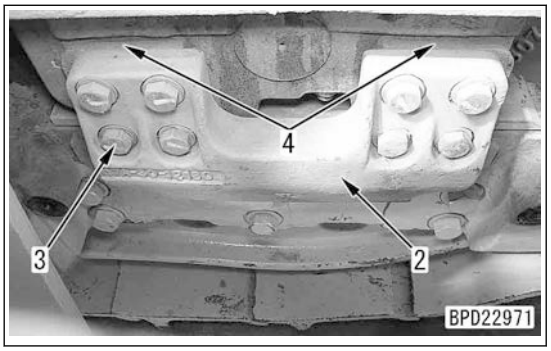
3. Measure clearance (a) at 2 places between the track frame and guide plate (2).

   If clearance (a) is 4 mm or more, adjust it by loosening bolts (3) and reducing shims (4).

   ⚠ **Do not loosen bolts (3) more than 3 turns. If you ignore this, guide plate (2) falls.**

   REMARK

   - Standard clearance (a) on each side0.5 to 1.0 mm
   - The adjustable limit of the clearance is 6 mm on each side.



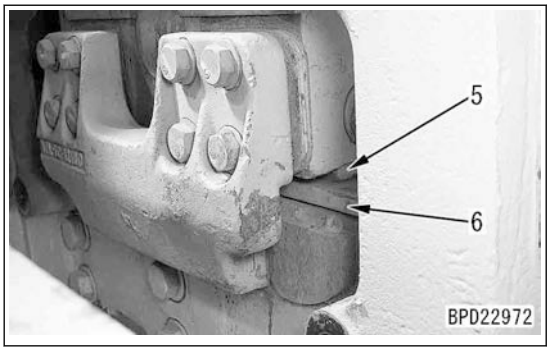
After finishing the adjustment, restore the machine.

Adjustment in vertical direction

Measure clearance (b) at 2 places between the guide plates (5) and (6).
The clearance in the vertical direction cannot be adjusted with shims. If clearance (b) is 8 mm or more, replace upper and lower guide plates (5), (6), (7), and (8) with new ones.

REMARK

Guide plates (5), (7), and (8) are welded.



After finishing the adjustment, restore the machine.

Operator mode
Display of warning after “Check before starting”
Display of maintenance due time over
Display of check of preset
Display of standard screen
Display of AdBlue/DEF gauge low level warning
Display of end screen
Display of engine shutdown secondary switch operation
Selection of Operating mode
Selection of gear shift mode
Selection of reverse slow mode
Operation of customizing
Selection of customize memory
Operation to cancel alarm buzzer
Operation of air conditioner
Selection of dual tilt (dual tilt specification)
Operation to display camera mode
Operation to display clock and service meter
Check of maintenance information
Setting and display of user mode (including KOMTRAX messages for users)
Display of ECO guidance
Operation of machine setting (fan reverse mode)
Display of alarm monitor
Display of aftertreatment devices regeneration
Display of SCR information
Display function of action level and failure code

Following functions become operational by performing special operations.

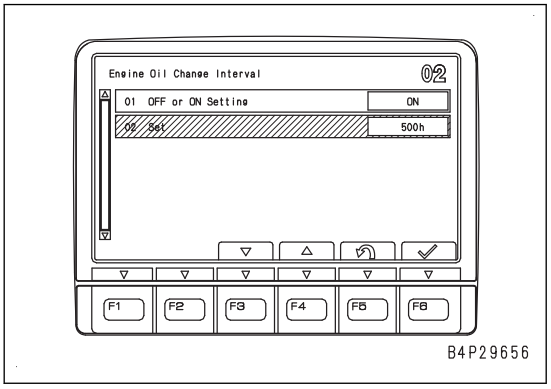
DISPLAY FUNCTION OF TECHNICIAN IDENTIFICATION STATUS SCREEN
DISPLAY FUNCTION OF OPERATOR IDENTIFICATION INPUT SCREEN
CHECKING FUNCTION BY LCD (LIQUID CRYSTAL DISPLAY)
CHECKING FUNCTION OF SERVICE METER
METHOD FOR SETTING USAGE LIMITATION AND CHANGING MAINTENANCE PASSWORD

- Service mode
  The information items in this mode are not ordinarily displayed. Technicians can change display and settings by operating the switches specially. This mode is used for testing, adjusting, or troubleshooting.

Service mode
METHOD FOR CHECKING PRE-DEFINED MONITORING INFORMATION
METHOD FOR CHECKING SELF-DEFINE MONITORING INFORMATION
METHOD FOR CONFIRMING ABNORMALITY RECORD (MECHANICAL SYSTEMS)

F6: Enters the selection and returns the screen to “Maintenance Mode Change” screen.

6. The screen is shifted by selecting “set value” of each maintenance item, perform the setting with the function switches.



“Default”: Maintenance set time set on the machine monitor (Recommended by the manufacturer and not changeable).

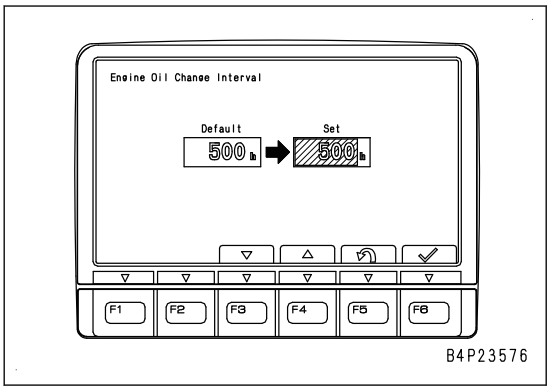
“Set”: Maintenance notice time that can be freely set. Maintenance reminder function works according to this set time in operator mode (the time can be increased or decreased in multiples of 25 hours).

F3: Decreases the set value

F4: Increases the set value

F5: Cancels contents of setting before entry and returns the screen to “Maintenance Mode Change” screen.

F6: Enters the setting and returns to each maintenance item screen.



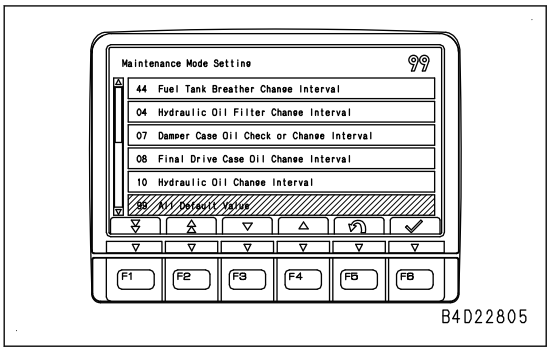
REMARK

- The setting becomes effective after you enter it with F6 and return the screen to “Maintenance Mode Setting” screen with F5.
- If the value of an item which is set to “ON” is changed after one operating hour or more from the setup, the change is recognized as a reset operation.

NOTICE

Maintenance notice time can be set at “Set” in “Air Cleaner Cleaning Interval or Change Interval”. However, perform the cleaning or replacement of the air cleaner element when air cleaner clogging “Air cleaner clogging monitor” lights up.

7. The screen is shifted by selecting “All Default Value”, perform the setting with the function switches.



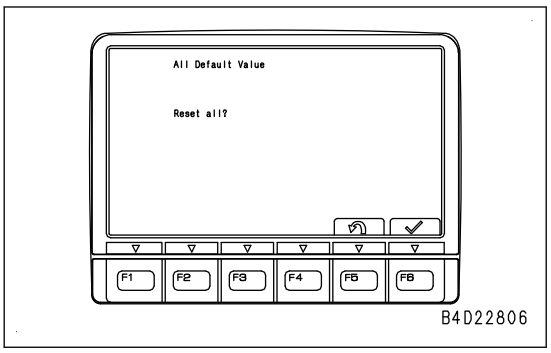
If this item is executed, the set values of all the maintenance items return to the default values.

F5: Returns the screen to “Maintenance Mode Setting” screen.

F6: Executes initialization.

REMARK

Press F6, and the initialization completion screen is displayed after a short while. “Maintenance Mode Setting” screen is displayed after that, and initialization is completed.



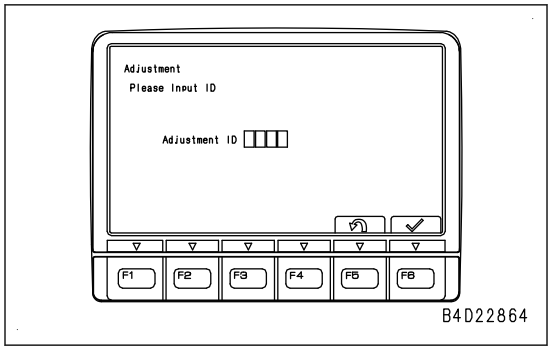
3. On “Input ID” screen, directly input Adjustment ID “0002” with the numeral input switches.

   F5: Returns the screen to “Adjustment” screen.

   F6: Enters input Adjustment ID.

   REMARK

   - For details of Adjustment ID and adjustment items, see “ADJUSTMENT ITEMS TABLE”.
   - When the input Adjustment ID is incorrect, “Incorrect ID” appears, and the screen next to “Input ID” does not appear (you can input Adjustment ID again when this screen is displayed).



4. On “Adjustment” screen, perform adjustment of “Power Train Controller Initialization” with function switches.

   F3: Not used.

   F4: Not used.

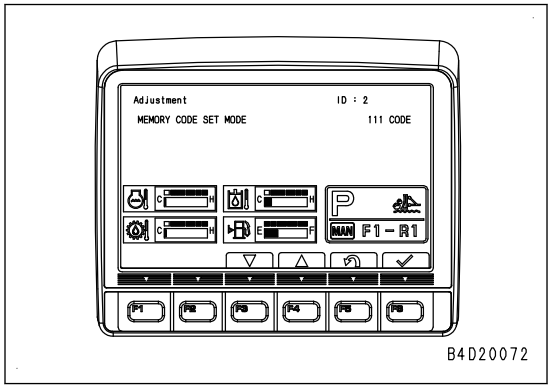
   F5: Returns the screen to “Input ID” screen.

   F6: Saves the setting.

   1) Press F6, and check that alarm buzzer sounds.
   2) Check that the specification code of “MEMORY CODE SET MODE” has changed from “1×1” to “111”.

   REMARK

   - If the specification code “111” of “MEMORY CODE SET MODE”does not appear, the wiring harness of the work equipment controller or the work equipment controller main unit may be defective.
   - In this adjustment, the memorized setting values are effective even when the starting switch is turned to OFF position after the adjustment is completed.

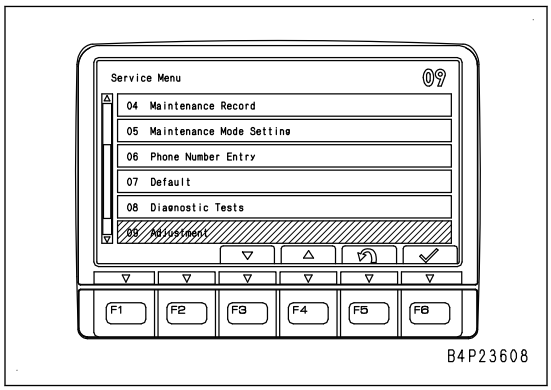


METHOD FOR PERFORMING WITH ADJUSTMENT ID: 0005 (BRAKE PEDAL POTENTIO INITIAL SET)

By “Brake Pedal Potentio Initial Set”, the power train controller recognizes the zero point of the brake pedal potentiometer.

When the power train controller or brake pedal potentiometer has been replaced, or when brake pedal linkage has been disconnected or connected, be sure to perform this adjustment.

1. Select “Adjustment” on “Service Menu” screen.



4. On “Adjustment” screen, perform adjustment of “Ripper Lift Lever Neutral Position Adjustment” with function switches.

   F3: Not used.

   F4: Not used.

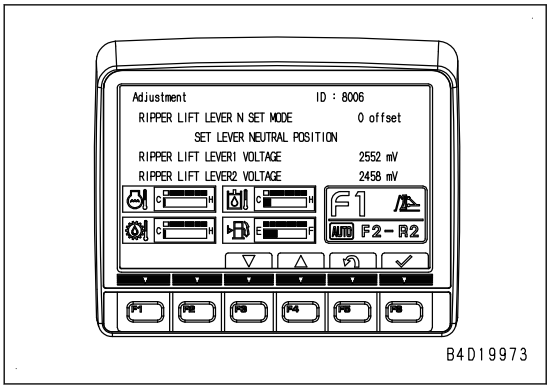
   F5: Returns the screen to “Input ID” screen.

   F6: Saves the adjustment value.

   1) Hold the ripper control lever at the neutral position.
   2) Press F6, and check that warning buzzer sounds.

   REMARK

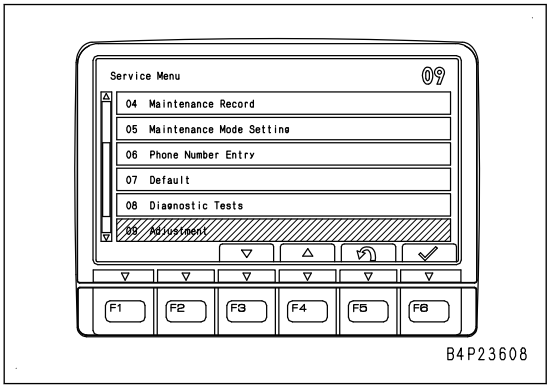
   - By this adjustment, the displayed values other than the adjustment value do not change.
   - By performing this adjustment, the saved compensation values are effective even while the starting switch is turned to OFF position.
   - By “Ripper Lift Lever Neutral Position Adjustment”, the sensitivity of the ripper control lever is not adjusted.
   - When performing the adjustment with the Adjustment menu (Ripper Lift Lever Neutral Position Adjustment), see “METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (RIPPER LIFT LEVER NEUTRAL POSITION ADJUSTMENT)”.



METHOD FOR PERFORMING WITH ADJUSTMENT ID: 8007 (RIPPER LIFT LEVER RAISE STROKE END ADJUSTMENT)

By “Ripper Lift Lever RAISE Stroke End Adjustment”, the work equipment controller recognizes the maximum RAISE position of the lift potentiometer of the ripper control lever.

1. Select “Adjustment” on “Service Menu” screen.



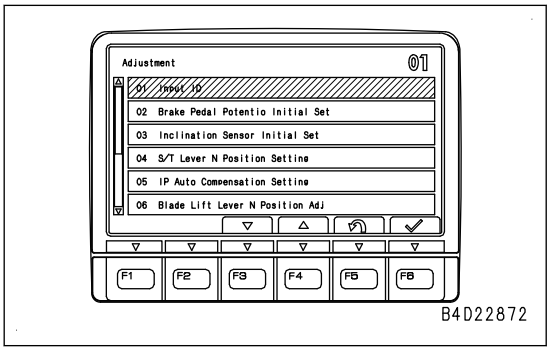
2. On “Adjustment” menu, select “Input ID” to be set.

   F3: Moves the selection downward.

   F4: Moves the selection upward.

   F5: Cancels the adjustment and returns the screen to “Service Menu” screen.

   F6: Enters the selection and moves the screen to the next “Adjustment” screen.



KOMTRAX SETTINGS MENU

METHOD FOR CONFIRMING KOMTRAX SETTINGS (TERMINAL STATUS)

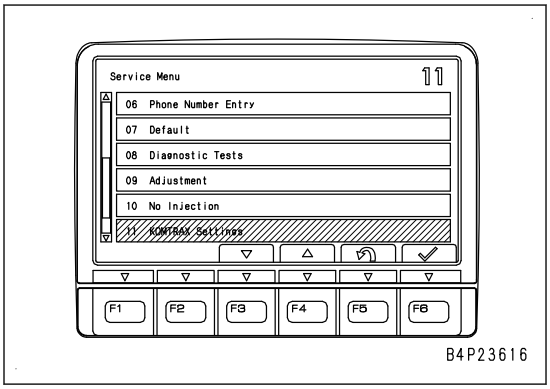
On “KOMTRAX setting display” screen, select “Terminal Status” with the function switches or numeral input switches.

"“Terminal Status”" is used to check the setting condition of the KOMTRAX terminal.

1. Select “KOMTRAX Settings” on “Service Menu” screen.

   REMARK

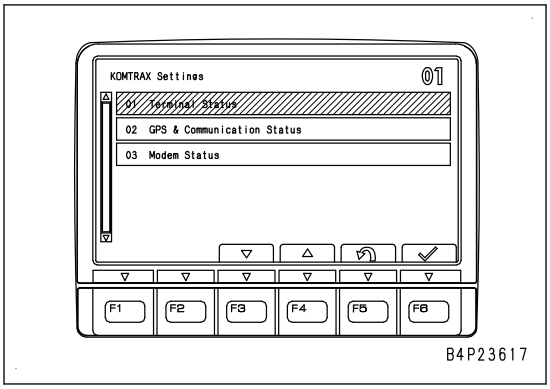
   For selecting method, see “Operating method of service mode” in “SERVICE MODE”.



2. On “KOMTRAX Settings”screen, select “Terminal Status” with the function switches or numeral input switches.

   REMARK

   For selecting method, see “Operating method of service mode” in “SERVICE MODE”.



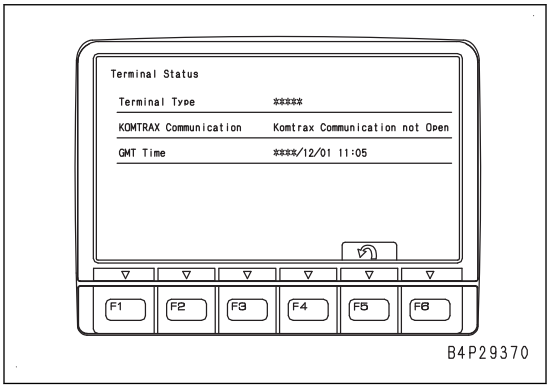
3. On “Terminal Status” screen, the following items are displayed.

   Terminal Type: Model name of the KOMTRAX communication modem

   KOMTRAX Communication Inspection: State of radio station establishment

   GMT time: Greenwich Mean Time (add 9 hours to it for Japan time)

   F5: Returns the screen to “KOMTRAX Settings” screen

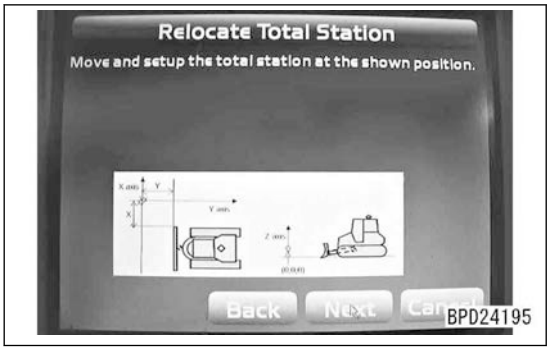


METHOD FOR CONFIRMING KOMTRAX SETTINGS (GPS AND COMMUNICATION STATUS)

The setting and operating state of KOMTRAX can be checked by using “KOMTRAX Settings” screen.

“GPS & Communication State” is used to check the positioning and communication state of the KOMTRAX system.

28. Move the total station A from left side to right side according to the following procedure after “Relocate Total Station” screen is displayed.



1) Place the total station A at the following distance from the right end of the blade.

   Location of total station A

   Lateral direction (X): 8 m

   Longitudinal direction (Y): 3 m

   REMARK

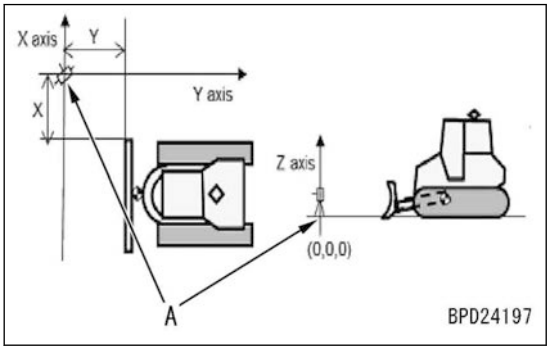
   The relationship between the lateral or longitudinal direction of the machine and the X or Y axis of total station A needs not be always perpendicular, it can be at an angle.

2) Set the position to which the total station A is installed (machine position) to total station A.

   Coordinates of position to which total station A is set (machine position): (0, 0, 0)

   REMARK

   For details of the method for setting the station, see the Operation and Maintenance Manual for total station A.



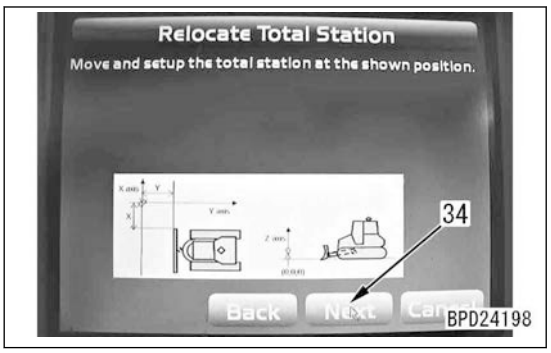
29. Press “Next” (34) after installing the total station A.

    “Back”: The screen returns to the previous screen.

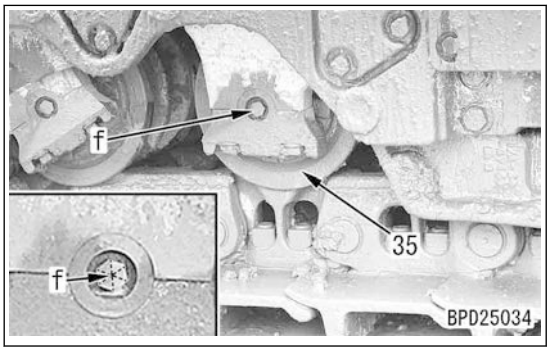
    “Next” (34): Proceeds the screen to the next screen.

    “Cancel”: Cancels “Machine Cal Step B”. The screen returns to the main screen.

    “Right Track Frame Position” screen is displayed by pressing “Next” (34).



30. Measure the coordinates of the center position (f) of the 1st track roller (35) according to the following procedure.



1) Put a mark on the center position (f) of the 1st track roller (35) for easier collimation.

2) Set the total station A to the non-prism mode.

   REMARK

   For the method of setting the non-prism mode, see the Operation and Maintenance Manual for total station A.

3) Input the height of the prism to the total station A as it is 0.

RADIO CONTROL

ID SETUP

⚠ Place the machine on a level ground, lower the work equipment completely to the ground in a stable posture. Set the lock lever to LOCK position, and then stop the engine.

ID module has its unique number.

REMARK

- When the switch of the radio control transmitter is turned on, the radio control automatically finds an available frequency to use. The frequency adjustment work is unnecessary.
- If an ID number of the radio control transmitter or the radio control receiver is wrong, the radio control controller cannot be used.
- Factory default ID is on the label of the radio control transmitter and the radio control receiver.

When the radio control transmitter or the radio control receiver is replaced, set up the ID according to the following procedure.

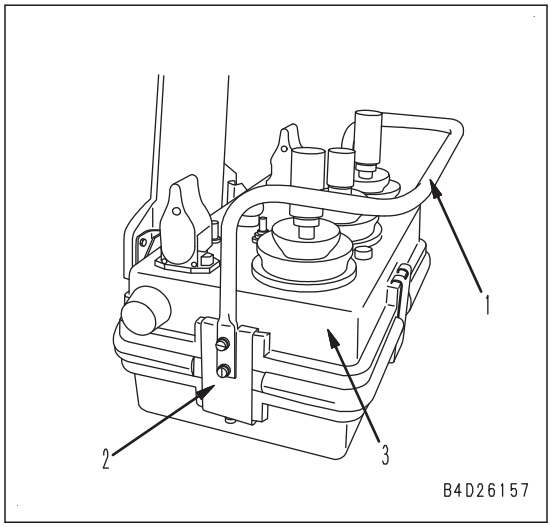
METHOD FOR SETTING RADIO CONTROL TRANSMITTER ID

Both radio control transmitter and receiver share the same module ID number.

1. Turn off the switch of the radio control transmitter and take out the battery.
2. Remove the protect bar (1), and the bracket (2) for the radio control transmitter, and then open the cover (3).

   NOTICE

   - **Do not wide open the cover (3) because the harness is attached to the cover (3).**
   - **The electronic equipment circuit in the receiver is precise. Keep water and dust out of the device.**



MAIN FILTER - CHECK

⚠ Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.

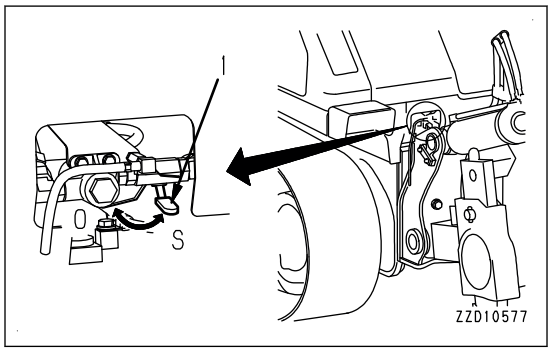
⚠ High pressure is generated inside the engine fuel piping system when the engine is running. Stop the engine and wait at least 30 seconds until the inner pressure is released and then replace the filter.

⚠ Keep fire away.

NOTICE

- **Komatsu genuine fuel filter cartridges adopt a special filter with high-efficiency filtering properties. Komatsu recommends Komatsu genuine parts when replacing.**
- **The common rail fuel injection system used on this machine consists of more precise parts than those in the conventional injection pump and nozzles. If any cartridge other than a Komatsu genuine fuel filter cartridge is used, foreign materials may enter and problem may occur in the injection system. Do no use substitute parts.**
- **During testing or maintenance of the fuel system, be sure that any foreign material does not enter the fuel system. If any dust or other material sticks to any part, wash the part thoroughly with clean fuel.**
- Prepare a container to receive oil.
- Prepare a filter wrench.

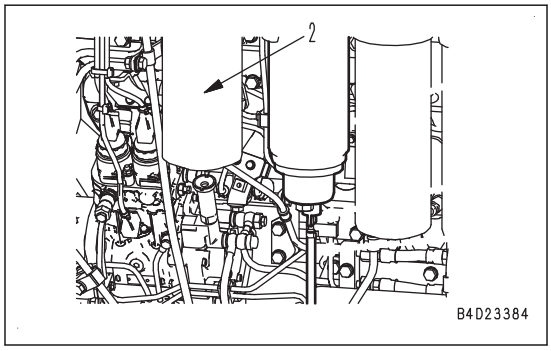
1. Set supply valve (1) of the fuel tank to CLOSE (S) position.



2. Open the side cover, and remove the mudguard cover.
3. Turn filter cartridge (2) counterclockwise by using the filter wrench, and remove it.
4. Clean the filter bracket and thinly apply oil to the packing surface of filter cartridge.

   REMARK

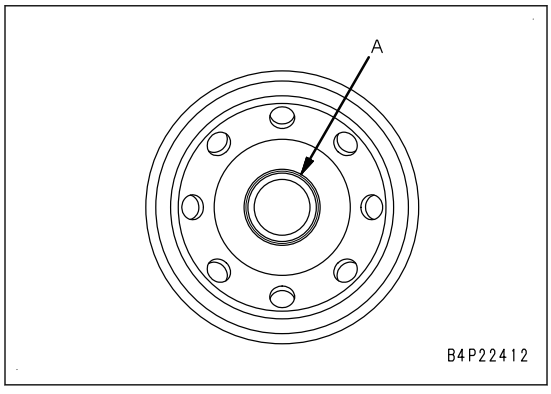
   Do not fill the new filter cartridge with fuel.



5. Remove cap A in the center, and then install it to the filter bracket
6. Install filter cartridge.

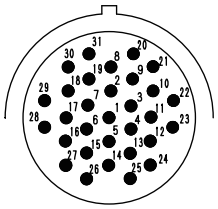
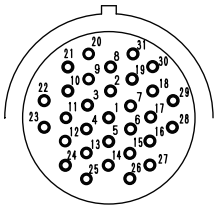
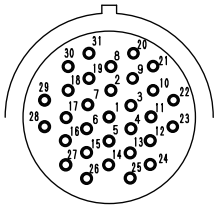
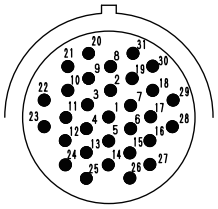
   REMARK

   - When installing it, tighten it by 3/4 turns after the O-ring came in touch with the sealing surface of filter bracket.
   - If the filter cartridge is fastened too much, the O-ring will be damaged and this leads to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from gaps of the packing. Therefore, be sure to observe the fastening angle.



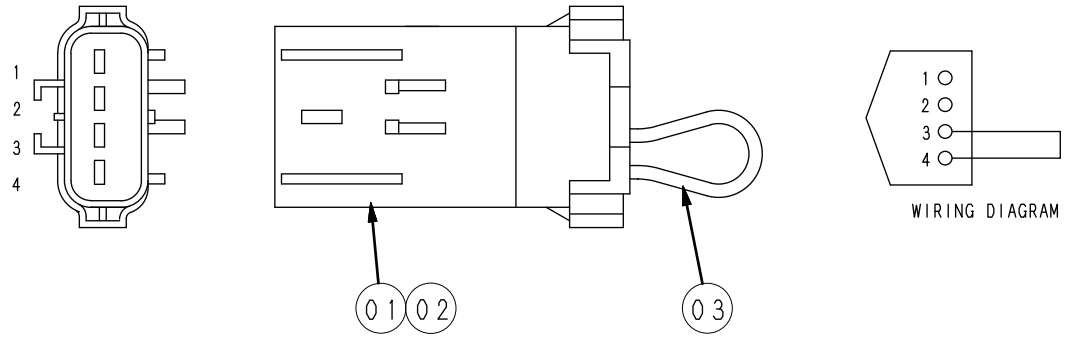
Connector No.	Connector type	Number of pins	Location	Address
DSOV1	DT	2	Shut off valve solenoid #1	AN-9
DSOV2	DT	2	Shut off valve solenoid #2	AM-9
EFP	DT	2	Electric fuel feed pump	E-1
EG1	DT	12	Intermediate connector	E-8
EG2	DT	12	Intermediate connector	F-1
EG3	DT	12	Intermediate connector	E-1
EG4	DT	12	Intermediate connector	F-1
EG5	DT	12	Intermediate connector	F-1
EG6	DT	12	Intermediate connector	D-8
EGPW	DTP	2	Intermediate connector	X-4
EGR-SOL	DT	2	EGR valve solenoid	AK-9
EHL	FURUKAWA	5	Engine hold relay	V-6
EPP	DT	12	Fuel feed and dozing pump timer	A-5
ESD	DT	3	Engine local option	X-6
F105	DTHD	1	Intermediate connector	X-3
F1T	DT	2	1st clutch ECMV fill switch	AF-9
F2T	DT	2	2nd clutch ECMV fill switch	AE-7
F3T	DT	2	3rd clutch ECMV fill switch	AE-8
F60	DTHD	1	Intermediate connector	X-3
FAC	DT	2	Fan pump control valve	AF-5
FAR1	DT	2	Fan reverse solenoid	A-1
FAR2	DT	2	Fan reverse rotation sensor	A-1
FBRL	DT	2	LH-side brake ECMV fill switch	AJ-9
FBRR	DT	2	RH-side brake ECMV fill switch	AJ-9
FDK/FD1	DRC-70B/A	70	Intermediate connector	W-9
FFT	DT	2	F clutch ECMV fill switch	AG-9
FLSW	SWP	6	Headlamp switch	P-1
FLUC	DT	2	Torque converter lockup clutch ECMV fill switch	AE-1
FLV	DT	2	Fuel level sensor	K-1
FRT	DT	2	Reverse clutch ECMV fill switch	AG-9
FSTC	DT	2	Torque converter stator clutch ECMV fill switch	AF-1
FTK	DT	6	Intermediate connector	J-7
G	SUMITOMO	3	G sensor	AM-5
G-RES	DT	2	Fuel supply pump pull-up resistor	AO-9
GND	Terminal	1	Ground (fender)	J-1
GND03	Terminal	1	Ground (ROPS)	L-8
GND06	Terminal	1	Ground (fender)	H-1
GND07	Terminal	1	Ground (Bulkhead)	F-9

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

<table>
<tr><td rowspan="2">Type (shell size code)</td><td colspan="2">HD30 Series connector</td><td rowspan="2">Testing connection use special tool Part No.</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td></tr>
<tr><td rowspan="3">24-31 (9)</td><td>Pin (male terminal)</td><td>Socket (female terminal)</td><td rowspan="3">799-601-9290 (T-adapter)</td></tr>
<tr><td> 
BWP05033</td><td> 
BWP05034</td></tr>
<tr><td>Part No. :08191-91203, 08191-91204,
08191-91205, 08191-91206</td><td>Part No. :08191-94103, 08191-94104,
08191-94105, 08191-94106</td></tr>
<tr><td></td><td>Socket (female terminal)</td><td>Pin (male termial)</td><td rowspan="3">799-601-9290 (T-adapter)</td></tr>
<tr><td></td><td> 
BWP05035</td><td> 
BWP05036</td></tr>
<tr><td></td><td>Part No. :08191-92203, 08191-92204,
08191-92205, 08191-92206</td><td>Part No. :08191-93103, 08191-93104,
08191-93105, 08191-93106</td></tr>
</table>

B4D18409

Short socket adapter for KDPF outlet pressure used in failure code [CA3135]



導通検査などには必ず専用アダプタ（ピンのみ挿入した相手側コネクタ）を使用し
コネクタピンに直接テスタ棒を当てないこと。

USE ADAPTER (MATING CONNECTOR WITH PIN INSERTED)
WHEN PERFORMING CIRCUIT TEST. NEVER PUT TESTER
STICK ON CONNECTOR PIN DIRECTLY.

B4H15690

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
03	WIRE	PURCH	1		AVS0.5 G
02	TERMINAL	PURCH	1		FRAMATOME 54001819
01	BODY	PURCH	1		FRAMATOME 54200413

HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	Q'TY
CONNECTOR	----
799T-601-4670 △	

FAILURE CODE [15SBLH]

Action level	Failure code	Failure	ECMV Engage Trouble (Reverse) (Power train controller system)
L03	15SBLH		
Details of failure	• Fill switch signal is OFF even when outputting to solenoid circuit of transmission R clutch ECMV.		
Action of controller	• Set to N (NEUTRAL) during R (REVERSE) operation (defective engagement prevention). • Controls operations of engine and transmission.		
Phenomenon on machine	• Once machine stops, engine speed is restricted to medium speed (half). • Once machine stops, travel is restricted to F1. • Automatic transmission function does not work.		
Related information	• Fill switch signal status (ON/OFF) of R clutch ECMV can be checked by monitoring function. (Code: 40906 Transmission fill switch input 1) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine and perform travel R (REVERSE). • Seat (Approx. 50 kg), remove cover under seat. • First, check for any failure such s clogged power train oil filter. • Next, check that clutch pressure is normal. For details, see Testing and adjusting “Testing power train oil pressure”.		

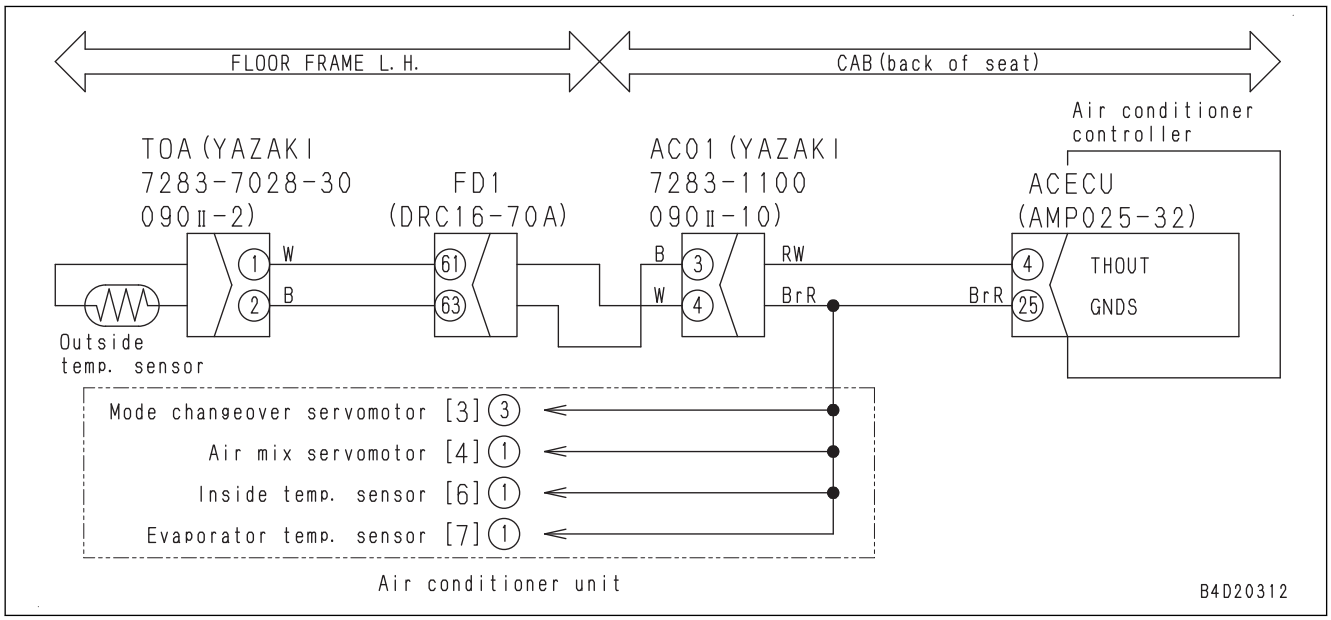
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective R clutch ECMV fill switch (cannot turn ON)	1. Turn starting switch to OFF position. 2. Disconnect connector FRT, and connect T-adapter to male side. 3. Start the engine. **REMARK** Hold the joystick (steering, directional and gear shift lever) at N.			
		Resistance	Between FRT (male) (1) and ground		Min. 1 MΩ
		1. Turn starting switch to OFF position. 2. Disconnect connector FRT, and connect T-adapter to male side. 3. Start the engine. 4. With the brake depressed, manipulate the joystick (steering, directional and gear shift lever) for check.			
		Resistance	Between FRT (male) (1) and ground	F1/F2/F3	Max. 1 Ω
2	Open circuit in wiring harness (wire breakage or defective contact)	1. Turn starting switch to OFF position. 2. Disconnect connectors PTCN2 and FRT, and connect T-adapters to each female side.			
		Resistance	Between PTCN2 (female) (36) and FRT (female) (1)		Max. 1 Ω

FAILURE CODE [8513KX]

Action level	Failure code	Failure	Radio Control Steering Lever Back Signal Error (Radio control controller system)
L03	8513KX		
Detail of failure	Steering lever back input signal of radio control transmitter exceeds specified range.		
Action of controller	Handles as if the lever is in neutral (ignore the input signal).		
Phenomenon on machine	Machine does not act according to radio control operation.		
Related information	• Front and back signal input of radio control steering lever can be checked with monitoring function. (Code: 71200) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine in radio control mode, turn the key switch of radio control transmitter to 2nd stage, and tilt backward the steering lever of radio control transmitter.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective radio control transmitter	Radio control transmitter is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to air conditioner fresh air temperature sensor



FAILURE CODE [B@BAZG]

Action level	Failure code	Failure	Engine Oil Pressure Low (Engine controller system)
L03	B@BAZG		
Detail of failure	Signal voltage from engine oil pressure switch becomes GND while engine is running, and engine controller detects engine oil pressure abnormality.		
Action of controller	• Lights up engine oil pressure monitor in red on machine monitor. • Engine power deration.		
Phenomenon on machine	• Engine power deration. • If machine is used as it is, engine may be seized.		
Related information	• Signal voltage of engine oil pressure switch is input to engine controller that transmits the information to machine monitor through CAN communication system. • See failure code [CA435] for troubleshooting of engine oil pressure switch while engine is stopped. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Low engine oil pressure (when system works properly)	1. Since engine oil pressure drop is sensed, check engine oil pressure. 2. Perform troubleshooting “Oil pressure drops”. 3. In the case of excessive consumption of engine oil, perform troubleshooting “Engine oil consumption is excessive”.
2	Defective engine oil pressure sensor system	If failure code is still displayed after above checks on cause 1, engine oil pressure sensor system may be defective. Perform troubleshooting for failure codes [CA135] and [CA141].
		If failure code is still displayed after above checks on cause 1, engine oil pressure switch system may be defective. Perform troubleshooting for failure code [CA435].

FAILURE CODE [CA227]

Action level	Failure code	Failure	Sensor 2 Supply Voltage High Error (Engine controller system)
L03	CA227		
Details of failure	High voltage occurs in sensor 2 supply (5 V) circuit.		
Action of controller	• Ignores signals from EGR valve lift sensor and VGT position sensor, and fixes values before detecting error for operation. • Ignores signal from doser fuel pressure sensor, and fixes values before detecting error for operation. • Engine power deration.		
Phenomenon on machine	Engine power deration.		
Related information	• After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note that the control is not released right after the failure code is cleared).		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective sensor 2 supply system	Perform troubleshooting for failure code [CA187].

FAILURE CODE [CA357]

Action level	Failure code	Failure	Mass Air Flow Sensor Low Error (Engine controller system)
L03	CA357		
Details of failure	Low frequency input error is detected in signal circuit of mass air flow sensor.		
Action of controller	• Sets mass air flow sensor to fixed value (10 kg/min) for operation. • EGR valve closed. • Engine power deration • Regeneration control stops.		
Phenomenon on machine	Engine power deration		
Related information	• Because sensor output is approximately. 5 V of pulse waveform, it is not measured by using multimeter. • Mass air flow sensor and intake air temperature sensor are provided as a unit. • This failure code and failure code [CA691] are displayed simultaneously if sensor connector is removed. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note the engine power deration is not canceled right after the failure code is cleared).		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	1. Perform checkup referring to descriptions of wiring harness and connectors in “c Electric equipment ”of “CHECKS BEFORE TROUBLESHOOTING” in “RELATED INFORMATION ON TROUBLESHOOTING”. 2. Turn starting switch to ON position.			
		If this failure code is cleared, wiring harness connector is defective.			
2	Defective sensor power supply system	If failure code [CA3419] or [CA3421] are displayed at the same time, perform troubleshooting these first.			
3	Defective mass air flow sensor (internal defect)	1. Turn starting switch to OFF position. 2. Replace mass air flow sensor. 3. Turn starting switch to ON position.			
		If this failure code is cleared, originally-provided mass air flow sensor is defective.			
4	Defective sensor power supply system	1. Perform preparation when starting switch is in OFF position. 2. Disconnect connector MAF and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between MAF (female) (2) and (3)	Power supply	Approx. 12 V

FAILURE CODE [CA698]

Action level	Failure code	Failure	Engine Controller Internal Temperature Sensor Low Error (Engine controller system)
L01	CA698		
Details of failure	Low voltage error occurs in signal circuit of engine controller internal temperature sensor.		
Action of controller	None in particular		
Phenomenon on machine	None in particular		
Related information	• Temperature detected by engine controller internal temperature sensor can be checked with monitoring function. (Code: 18900 (°C)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Improper use of controller	Check that controller is not used in low temperature environment.
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.)

FAILURE CODE [CA1776]

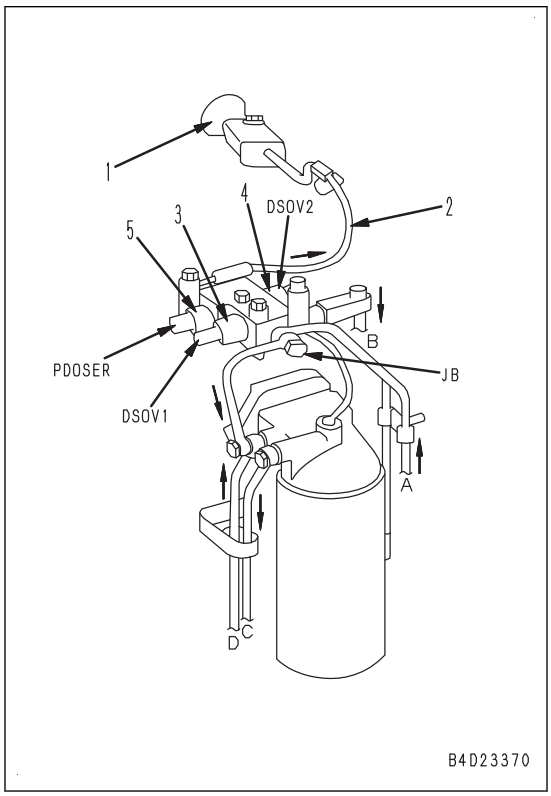
Action level	Failure code	Failure	Sensor Supply Relay Voltage High Error
L01	CA1776		(Engine controller system)
Detail of failure	A high voltage error occurs in sensor power supply relay circuit.		
Action of controller	None in particular		
Phenomenon on machine	• Inoperative KDPF temperature sensor, turbocharger outlet NOx sensor, SCR outlet NOx sensor, ammonia sensor, SCR temperature sensor and AdBlue/DEF tank sensor. • NOx emission increases because AdBlue/DEF injection is disabled.		
Related information	• This failure code is displayed if the connector is removed when the sensor power supply relay is turned OFF. • Note that sensor power supply relay connector is energized even if starting switch is turned to OFF position. • This failure code is detected until the sensor power supply relay is turned OFF, during which the engine controller shuts down since starting switch is turned to OFF position. • This failure code is not detected when starting switch is at ON position and not displayed on the monitor standard screen. Check the detection on “Abnormality Record” screen. • Troubleshooting of this failure code covers circuits from engine controller through sensor power supply relay to ground. **NOTICE** • **If the failure code is displayed, perform investigation of the cause, perform repair, clear “Electrical Sys Abnormality Record”, turn starting switch off, and shut down the engine controller. (See “PROCEDURE FOR TROUBLESHOOTING” in this chapter.) Turn starting switch to ON position again and check “Abnormality Record” screen. If this failure code is not logged, the repair is completed.**		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position. 3. Perform deletion of “Electrical Sys Abnormality Record” in “SERVICE MODE” of machine monitor. 4. Turn the starting switch to OFF position, and shut down the engine controller. 5. Turn starting switch to ON position.
		If this failure code is not logged on Abnormality Record screen, wiring harness connector is defective.

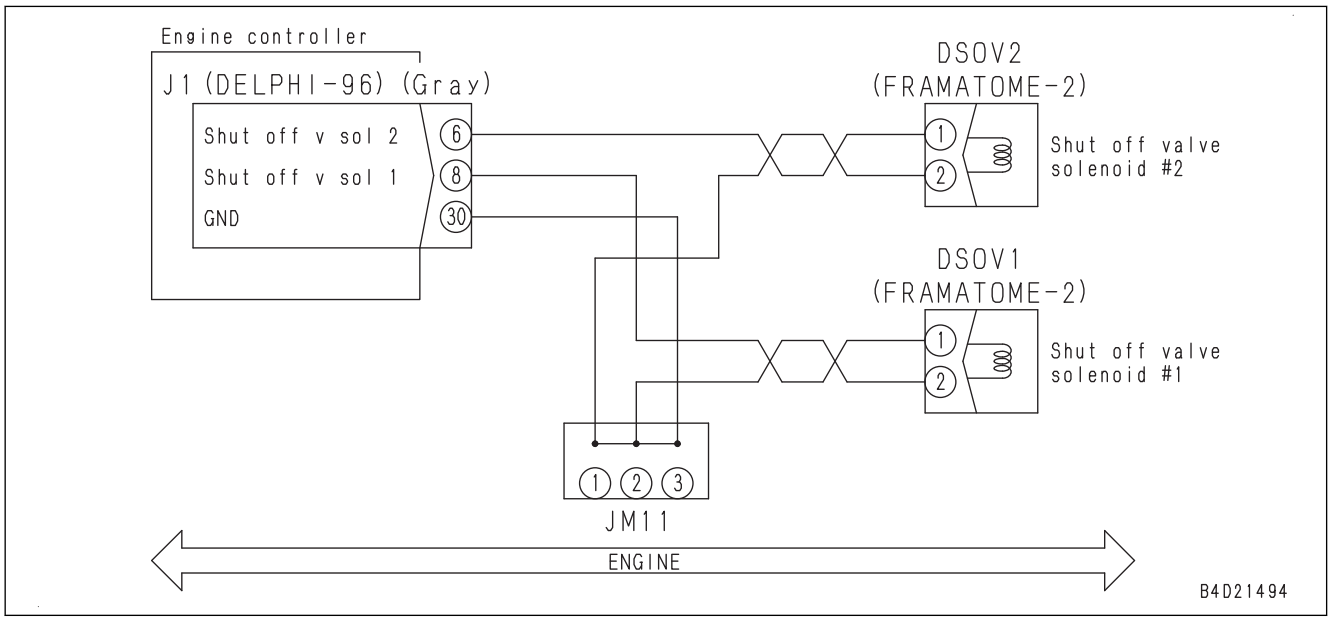
No.	Cause	Procedure, measuring location, criteria and remarks
7	Defective engine controller	1. Start the engine, and run it at low idle, and leave it for approximately 1 minute. 2. If other failure codes are displayed, perform troubleshooting for them.
		If this failure code is still displayed and no failure is found by preceding checks, engine controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)

Diagram related to fuel doser

A: From refueling pump
B: Fuel return
C: To fuel supply pump
D: From cooling plate of the engine controller
JB: Fuel tube joint bolt
PDOSER: Dosing fuel pressure sensor connector
DSOV1: Dosing fuel solenoid valve 1 (shut-off valve) connector
DSOV2: Dosing fuel solenoid valve 2 (drain valve) connector
1. Fuel doser
2. Fuel supply line
3. Dosing fuel solenoid valve 1 (shut-off valve)
4. Dosing fuel solenoid valve 2 (drain valve)
5. Dosing fuel pressure sensor



Circuit diagram related to dosing fuel solenoid valve



FAILURE CODE [CA2357]

Action level	Failure code	Failure	EGR Valve Servo Error (Engine controller system)
L03	CA2357		
Details of failure	EGR valve malfunctions. (Responsing value from EGR position sensor is different from the value of EGR valve opening command.)		
Action of controller	• Engine power deration. • EGR valve closed. • Advances to Inducement strategy. (EU Specification) • Regeneration control stops.		
Phenomenon on machine	• Engine output is reduced based on inducement strategy (EU Specification). • Engine power deration		
Related information	• Position of EGR valve can be checked with monitoring function. (Code: 18100 EGR Valve Position (mm)) • Engine power deration is canceled when the failure code is cleared and the starting switch is turned OFF (not canceled only by deactivation of the failure code). • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective relevant system	If other failure codes are also displayed, perform troubleshooting for them.
2	Defective EGR valve driving oil pressure	For testing of EGR valve drive pressure, see “TESTING AND ADJUSTING”, “TEST EGR VALVE AND VGT DRIVING OIL PRESSURE”.
		If EGR valve drive pressure is abnormal, perform checks on causes 3 and 4.
3	Defective engine oil pressure system (main circuit)	• For check of engine oil pressure, see “TESTING AND ADJUSTING”, “TEST ENGINE OIL PRESSURE”. • If engine oil pressure is not normal, perform troubleshooting (S mode). (Engine oil pressure drops)
4	Defective EGR valve oil pump	Oil pump and relief valve for EGR valve circuit may be defective. Check them.
5	Defective hydraulic piping for EGR valve	Hydraulic piping for EGR valve circuit may be defective. Check it.
6	Defective hydraulic return piping for EGR valve	Hydraulic return piping for EGR valve circuit may be defective. Check it.
7	Defective EGR valve	• EGR valve may have mechanical trouble. Check it. • Check especially that there is no foreign material in oil inlet and outlet of EGR valve.
8	Defective EGR valve lift sensor	Perform troubleshooting for failure codes [CA2271] and [CA2272].
9	Defective engine controller	If failure code is still displayed after above checks on causes 1 to 8, engine controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)

FAILURE CODE [CA2878]

Action level	Failure code	Failure	Fuel Doser Solenoid 2 Servo Error (Engine controller system)
L03	CA2878		
Detail of failure	At the pressure test immediately after engine start, fuel doser solenoid valve2 (DSOV2, drain valve) ON/OFF command does not match with the estimated fuel pressure detected by the dosing fuel pressure sensor. 1. When Open DSOV1 Valve and Close DSOV2 Valve commands are given, the dosing fuel pressure detected by dosing fuel pressure sensor does not increase sufficiently. 2. When Close DSOV1 Valve and Open DSOV2 Valve commands are given, the dosing fuel pressure detected by dosing fuel pressure sensor does not decrease sufficiently.		
Action of controller	Regeneration control stops.		
Phenomenon on machine	• Automatic regeneration is disabled. • Manual stationary regeneration is disabled.		
Related information	⚠ **Since exhaust connector and KDPF are heated to 500 °C or above, be careful not to get burn injury.** • Signal voltage from dosing fuel pressure sensor can be checked with monitoring function. (Code: 47601 (V)) • Pressure detected by dosing fuel pressure sensor can be checked with monitoring function. (Code: 47600 (kPa)) • Ambient pressure detected by ambient pressure sensor can be checked with monitoring function. (Code: 37400 (kPa)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine. (Observe for 3 minutes.) [Method of clearing failure codes] Turn the starting switch from OFF to ON and start the engine. When this failure code is cleared after running the engine at low idle speed for approximately 3 minutes, the repair is completed.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “c: Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Start engine.
		If this failure code is cleared, wiring harness connector is defective.
2	Defective fuel system	Perform “TESTING AND ADJUSTING”, “TEST ENGINE OIL PRESSURE”.
3	Defective dosing fuel solenoid valve 1 (shut-off valve)	If failure code [CA1923], [CA1924], or [CA1925] is displayed, perform troubleshooting for [CA1923], [CA1924], or [CA1925] first.
4	Defective dosing fuel solenoid valve 2 (drain valve) system	If failure code [CA2732] or [CA2733] is displayed, perform troubleshooting for [CA2732] or [CA2733] first.
5	Defective doser fuel pressure sensor system	If failure code [CA1927] or [CA1928] is displayed, perform troubleshooting for [CA1927] or [CA1928] first.

FAILURE CODE [CA3229]

<table>
<tr><td>Action level</td><td>Failure code</td><td rowspan="2">Failure</td><td rowspan="2">SCR Temperature High Error
(Engine controller system)</td></tr>
<tr><td>L03</td><td>CA3229</td></tr>
<tr><td>Detail of failure</td><td colspan="3">The SCR temperature is been high (800 °C or more).</td></tr>
<tr><td>Action of controller</td><td colspan="3">• Advances to Inducement strategy.
• AdBlue/DEF injection stops.</td></tr>
<tr><td>Phenomenon on machine</td><td colspan="3">• NOx emission increases because AdBlue/DEF injection is disabled.
• Engine power deration according to inducement strategy.</td></tr>
<tr><td>Related information</td><td colspan="3">⚠ Since KDPF, KDOC, and SCR are heated to 500 °C or above, 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”, “Removal and installation of SCR temperature sensor”.
• After turning starting switch to OFF position, engine controller performs AdBlue/DEF purging (for Max. 6 minutes) and then stops. To restart engine, wait until system operating lamp goes off after turning starting switch to OFF position, and then turn starting switch to ON position.
• If regeneration is not implemented, the failure code [CA3231] may be displayed.
• The temperature detected by the SCR temperature sensor can be confirmed from the Predefined Monitoring screen.
• Use engine operation state diagnosis, AdBlue/DEF level, or AdBlue/DEF quality sensor diagnosis on the Pre-defined Monitoring screen. (The following numbers are the monitoring codes)
• Engine operation state diagnosis
01002 Engine speed
19200 Exhaust gas flow rate
47300 KDOC Inlet Temperature
19300 SCR Temperature
19302 SCR Outlet Temperature
• AdBlue/DEF level, AdBlue/DEF quantity sensor diagnosis
19100 AdBlue/DEF Concentration
19110 AdBlue/DEF Level
19111 AdBlue/DEF Level Corrected
19115 AdBlue/DEF Temperature in Tank
19400 Ambient Temperature
19305 AdBlue/DEF Tank Heating State
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)</td></tr>
</table>

FAILURE CODE [CA3311]

<table>
<tr><td>Action level</td><td>Failure code</td><td rowspan="2">Failure</td><td rowspan="2">KDOC Outlet Temperature High Error 2
(Engine controller system)</td></tr>
<tr><td>L03</td><td>CA3311</td></tr>
<tr><td>Details of failure</td><td colspan="3">KDOC outlet temperature remains at very high level.</td></tr>
<tr><td>Action of controller</td><td colspan="3">• EGR valve closed.
• Engine power deration
• Regeneration control stops.
• Fuel dosing stops.</td></tr>
<tr><td>Phenomenon on machine</td><td colspan="3">Engine power deration</td></tr>
<tr><td>Related information</td><td colspan="3">⚠ The temperature of KDPF and KDOC becomes hot (Min. 500 °C). Be careful not to get burned.
• Temperature in KDOC inlet temperature sensor can be checked by monitoring function. (Code: 47300 (°C))
• Temperature in KDOC outlet temperature sensor can be checked by monitoring function. (Code: 47400 (°C))
• Temperature in KDPF outlet temperature sensor can be checked by monitoring function. (Code: 47200 (°C))
• As to procedure for accessing KDPF temperature sensor, see “50 DISASSEMBLY AND ASSEMBLY”, “REMOVE AND INSTALL KDPF ASSEMBLY” and “DISASSEMBLE AND ASSEMBLE KDPF ASSEMBLY”.
• Engine controller does not shut itself down immediately after turning the starting switch to the OFF position. The AdBlue/DEF purging starts after the starting switch is turned to the OFF position and Engine controller keeps working until the purging is completed. The purging lasts for maximun 6 minutes. Do not re-start the engine until the system operating lamp in the battery box goes out even if quick restart becomes necessary.
• Engine power deration is canceled when the failure code is cleared and the starting switch is turned OFF (not canceled only by deactivation of the failure code).
NOTICE
If this failure code is displayed, it indicates that KCSF may be damaged. After completing the repair of the problem, check the following. Replace the KCSF if the black smoke comes out of the exhaust pipe outlet.
• Start the engine, perform the quick acceleration from low idle to high idle two times, and then keep the engine running at high idle for 5 seconds.
• Check that the black smoke does not come out of the exhaust pipe outlet during this quick acceleration and high idling.
NOTICE
• This failure code requires “Loaded Diagnostics Operation To Confirm Failure Correction”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure the failure code is cleared.
• This failure code is cleared by performing operations indicated in “TESTING AND ADJUSTING”, “SETTING AND OPERATION OF MACHINE MONITOR”, “SERVICE MODE”, “METHOD FOR SETTING WITH TESTING MENU (ENGINE CONTROLLER ACTIVE FAULT CLEAR)”.</td></tr>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks
2	SCR outlet NOx sensor installation error	Check if the SCR outlet NOx sensor probe is installed securely.
3	Defective SCR outlet NOx sensor	If no failure is found by preceding checks, the SCR outlet NOx sensor is defective. 1. Turn starting switch to OFF position. 2. Replace the SCR outlet NOx sensor. 3. Turn starting switch to ON position. 4. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
		If this failure code is cleared, the original sensor is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)
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.)

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 safely to raise the exhaust gas temperature and SCR catalyst temperature. (Keep the engine speed so that monitoring code 19302 “SCR Outlet Temperature” becomes 150 °C or higher. Check that monitoring code 19210 “SCR Outlet NOx Sensor State” changes from 0 to 1.)
4. Repair is completed if failure code is not displayed after 3 minutes has passed.

REMARK

If the SCR outlet NOx sensor does not activate (that is, 19210 “SCR Outlet NOx Sensor State” remains as 0), return to troubleshooting.

Loaded Diagnostics Operation to Clear Failure Code

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

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

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position.
3. Run the engine at low idle speed for approximately 1 minute.
4. Stall torque converter continuously as described below with fuel control dial at MAX position for approximately 20 seconds.
   1) Use a manual gear shift mode in P mode.
   2) On the “Service Menu” screen of the machine monitor, select “Adjustment”.
   3) Enter 0530 “Stall mode” as an ID on the “Adjustment” screen.
   4) Use a shift up (UP) switch on the PCCS lever to set preset mode display to [F3-R3].

      REMARK

      The preset mode display (on the lower right of the screen) can be set to [F3-R3] only when the stall mode is selected in the “Adjustment” screen.
   5) With the brake pedal depressed securely and the parking brake lever in FREE position, set the direction of the PCCS lever to FORWARD position.

      NOTICE

      - **Make sure [F3] is displayed in a gear range display (on the lower right of the screen) before proceeding to the next step.**
      - **Hold the steering at NEUTRAL position.**
   6) Depress the decelerator pedal and set the fuel control dial at MAX position to run the engine at high idle speed.
   7) Return the decelerator pedal slowly to stall the torque converter with the fuel control dial at MAX position.

      ⚠ Depressing the brake pedal securely, and place your right foot on the decelerator pedal during stalling torque converter process for safety reason.
   8) As soon as power train oil temperature indicates 118 °C, reset the PCCS lever to NEUTRAL position.

      REMARK

      - Pay attention not to get overheating of power train oil.
      - Temperature indicated at the top of the green range on the power train oil temperature is approximately 118 to 120 °C.
      - Torque converter oil temperature is same as power train oil temperature.
5. Run the engine at high idle speed for approximately 20 seconds.
6. Repeat steps 4 and 5 for a several times, so that SCR temperature becomes 250 °C or above.
7. Run the engine at high idle speed and blade raise relief until the failure code is cleared (Max. 10 minutes).

   REMARK

   Pay attention not to get overheating of power train and hydraulic oil.
8. Make sure that SCR Temperature is 250 °C or above and Turbo Outlet NOx is 120 ppm or more on “Predefined Monitoring” screen.

   REMARK

   If the failure is cleared, the repair is completed.
9. Operate the following, if the temperature, turbocharger outlet, and NOx condition is not met, or if this failure is not cleared.
10. Stall torque converter continuously with fuel control dial at MAX position for approximately 20 seconds.

Related information	• If SCR efficiency is degraded due to lowered AdBlue/DEF concentration, failure code [CA3582] SCR Catalyst Efficiency Low Error 1 may be displayed. • A surface in AdBlue/DEF fluctuates more in work on slopes or travel on uneven ground, possibly disabling to detect the correct level or concentration. • If AdBlue/DEF level monitor lights up in red or warning for concentration is displayed when machine is operated on slopes or travels on rough ground, immediately move the machine to level ground, clear the failure code related to concentration according to step 3 “Contaminated AdBlue/DEF” and subsequent procedures, and add AdBlue/DEF. If these phenomena occur repeatedly, increase the AdBlue/DEF in AdBlue/DEF tank. • If AdBlue/DEF tank temperature is 0 °C or below, the engine controller does not troubleshoot this failure code (“Loaded Diagnostics Operation To Clear Failure Code” does not clear this failure code). • Make sure that AdBlue/DEF tank temperature is 0 °C or above on the Pre-defined Monitoring screen before troubleshooting this failure code. • When AdBlue/DEF tank level is 0 %, the engine controller does not troubleshoot this failure code (“Loaded Diagnostics Operation To Clear Failure Code” does not clear this failure code). • Make sure that AdBlue/DEF tank temperature is 20 % or above on the Pre-defined Monitoring screen before troubleshooting this failure code. • For draining and cleaning procedures of AdBlue/DEF tank, see Testing and adjusting, “AdBlue/DEF Tank Washing”. • For the replacement procedure of AdBlue/DEF level sensor, see Disassembly and assembly, “Disassembly and assembly of AdBlue/DEF level sensor”. • On the Pre-defined Monitoring screen troubleshooting for AdBlue/DEF level and AdBlue/DEF quality sensors are used (the figures below denote monitoring codes). • Troubleshooting for AdBlue/DEF level and AdBlue/DEF quality sensors 19100 AdBlue/DEF Concentration 19110 AdBlue/DEF Level 19111 AdBlue/DEF Level Corrected 19115 AdBlue/DEF Temperature in Tank 19400 Ambient Temperature 19305 AdBlue/DEF Tank Heating State **NOTICE** **This failure code requires “Loaded Diagnostics Operation To Clear Failure Code”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Clear Failure Code” to make sure that the failure code is cleared.**

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective AdBlue/DEF tank sensor system	1. If failure code [CA1669] or [CA1677] or [CA1678] or [CA1686] or [CA1714] or [CA1715] or [CA3868] or [CA4277] or [CA4731] or [CA4732] or [CA4739] or [CA4768] or [CA4769] is displayed, perform troubleshooting these first. 2. If troubleshooting has been performed, carry out “Loaded Diagnostics Operation To Clear Failure Code” topics.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Hot short circuit in wiring harness</td><td colspan="3">If failure code (no open circuit) is still displayed after above checks in cause 2, measure resistance at any one place in Hi line and Lo line.
1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn battery disconnect switch to OFF position.
3. Insert T-adapter into one of the related connectors.
4. Set battery disconnect switch to ON position.
5. Turn starting switch to ON position.</td></tr>
<tr><td rowspan="2">Voltage</td><td>Between ground and any of J2 (21), CTN2 (A), CTN (A), NOX1 (3), NH3 (2), DPFJ (3), SCRJ (3), NOX2 (3), and UREA (2).</td><td>1 to 4 V</td></tr>
<tr><td>Between ground and any of J2 (45), CTN2 (B), CTN (B), NOX1 (2), NH3 (3), DPFJ (2), SCRJ (2), NOX2 (2), and UREA (1).</td><td>1 to 4 V</td></tr>
<tr><td>7</td><td>Defective engine controller</td><td colspan="3">If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Defective SCR temperature sensor</td><td colspan="3">1. Turn starting switch to OFF position.
2. Replace SCR temperature sensor (SCRJ).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is cleared, the original sensor is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)</td></tr>
</table>

FAILURE CODE [CA4251]

Action level	Failure code	Failure	AdBlue/DEF Pump Temperature Sensor 2 In Range Error (Engine controller system)
L01	CA4251		
Detail of failure	AdBlue/DEF pump temperature sensor 2 response is poor.		
Action of controller	None in particular		
Phenomenon on machine	• AdBlue/DEF pump is not thawed • NOx emission increases because AdBlue/DEF injection is disabled at low temperature.		
Related information	• 19309 “AdBlue/DEF Pump Heater State”, 1: Thawing 2: Heating 3 or 0: OFF (the figures below denote monitoring codes). Troubleshooting for AdBlue/DEF pump thawing control 19107 AdBlue/DEF Pump Heater Control Command 19309 AdBlue/DEF Pump Heater State 19136 AdBlue/DEF Pump Temperature 19304 AdBlue/DEF Pump State 19400 Ambient Temperature 03203 Battery Power Supply **NOTICE** **After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Confirm Failure Correction” to check if the repair is completed. (Clearing the failure code does not determine the completion of repair.)** **(This failure code is not cleared by starting switch at ON position or “AdBlue/DEF pump heater relay drive test” only.)** • **If “AdBlue/DEF pump temperature” is 45 °C or higher when starting switch is turned to ON position, “Loaded Diagnostics Operation To Confirm Failure Correction” cannot determine if the repair is completed successfully, therefore, wait until “AdBlue/DEF pump temperature” becomes 45 °C or lower.** • **In addition, if “AdBlue/DEF pump temperature” is 55 °C or higher, “AdBlue/DEF pump heater relay drive test” in “Loaded Diagnostics Operation To Confirm Failure Correction” is disabled.**		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective AdBlue/DEF pump system	Perform troubleshooting for failure code [CA3558] or [CA3559] or [CA2976].
2	Defective AdBlue/DEF pump heater relay system	Perform troubleshooting for failure codes [CA4155] and [CA4156].
3	Defective AdBlue/DEF pump temperature sensor	1. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”. 2. If the AdBlue/DEF pump temperature does not rise by at least 5 °C during the test, replace the AdBlue/DEF pump. 3. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
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.)

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.)

Related information	AdBlue/DEF level changes with machine operation on the slop or travel on even ground, possibly disabling to detect the correct level or concentration. If AdBlue/DEF level monitor lights up in red or warning for concentration is displayed when machine is operated on slopes or travels on rough ground, immediately move the machine to level ground, clear the failure code related to concentration according to step 3 “Contaminated AdBlue/DEF” and subsequent procedures, and add AdBlue/DEF. If these phenomena occur repeatedly, increase the AdBlue/DEF in AdBlue/DEF tank. • If AdBlue/DEF tank temperature is 0 °C or below, the engine controller does not troubleshoot this failure code (“Loaded Diagnostics Operation To Clear Failure Code” does not clear this failure code). • Make sure that AdBlue/DEF tank temperature is 0 °C or above on the Pre-defined Monitoring screen before troubleshooting this failure code. • When AdBlue/DEF tank level is 0 %, the engine controller does not troubleshoot this failure code (“Loaded Diagnostics Operation To Clear Failure Code” does not clear this failure code). • Make sure that AdBlue/DEF tank temperature is 20 % or above on the Pre-defined Monitoring screen before troubleshooting this failure code. • For draining and cleaning procedures of AdBlue/DEF tank, see Testing and adjusting, “AdBlue/DEF Tank Washing”. • For the replacement procedure of AdBlue/DEF level sensor, see Disassembly and assembly, “Disassembly and assembly of AdBlue/DEF level sensor”. • On the “Pre-defined Monitoring” screen troubleshooting for AdBlue/DEF level and AdBlue/DEF quality sensors are used (the figures below denote monitoring codes). • Troubleshooting for AdBlue/DEF level and AdBlue/DEF quality sensors 19100 AdBlue/DEF Concentration 19110 AdBlue/DEF Level 19111 AdBlue/DEF Level Corrected 19115 AdBlue/DEF Temperature in Tank 19400 Ambient Temperature 19305 AdBlue/DEF Tank Heating State **NOTICE** **This failure code denotes requires “Loaded Diagnostics Operation To Clear Failure Code”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Clear Failure Code” to make sure that the failure code is cleared.**

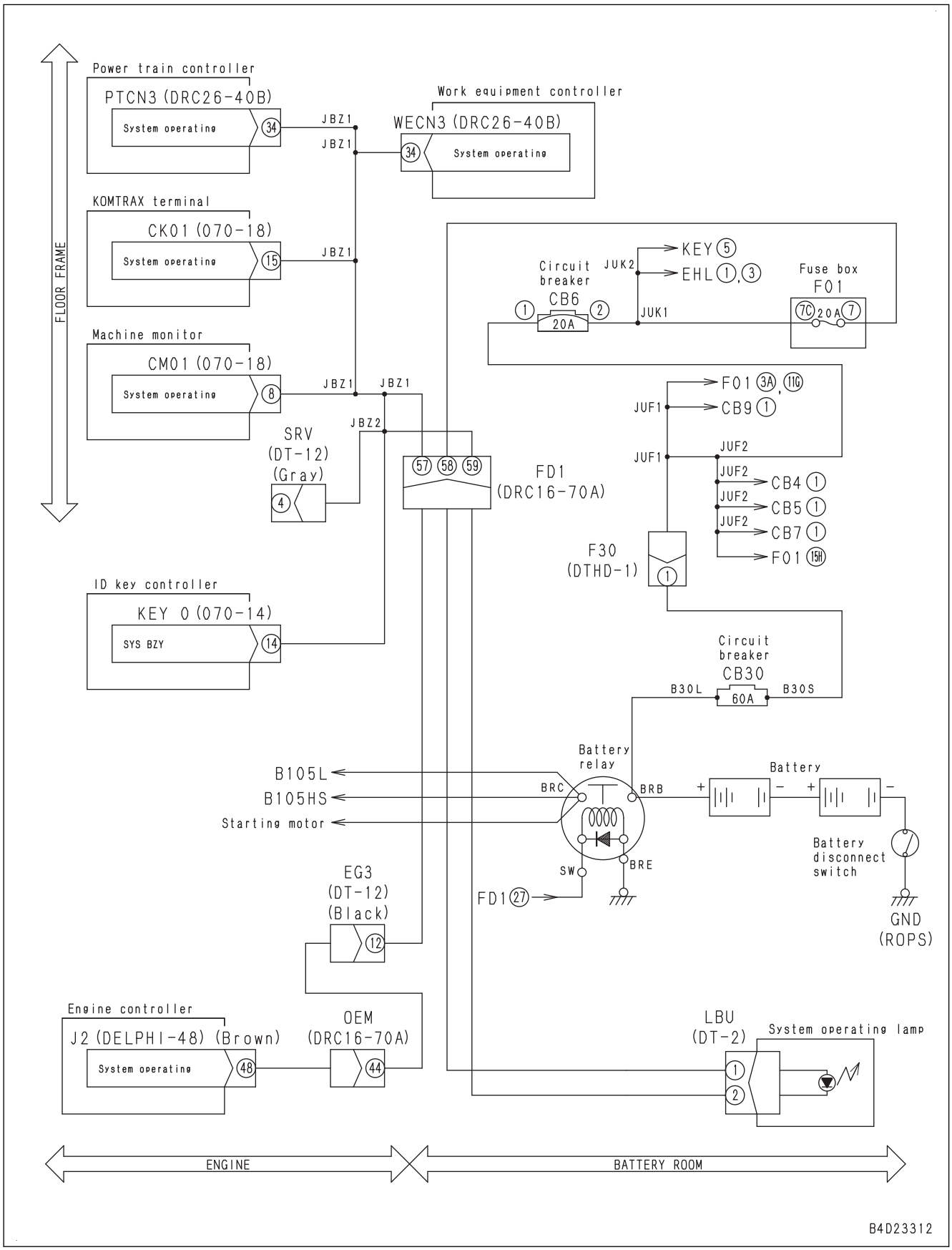
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective AdBlue/DEF tank sensor system	1. If failure code [CA1669] or [CA1677] or [CA1678] or [CA1686] or [CA1714] or [CA1715] or [CA3868] or [CA4277] or [CA4731] or [CA4732] or [CA4739] or [CA4768] or [CA4769] is displayed, perform troubleshooting these first. 2. If troubleshooting has been performed, carry out “Loaded Diagnostics Operation To Clear Failure Code” topics.

FAILURE CODE [D19CKY]

Action level	Failure code	Failure	Red Revolving Light Relay Hot Short Circuit (Radio control controller system)
L03	D19CKY		
Detail of failure	Current always flows through primary circuit (coil side) of red revolving lamp relay.		
Action of controller	Stops driving primary circuit (coil side) of red revolving lamp relay.		
Phenomenon on machine	If the starting switch is turned to ON position, red revolving lamp lights up and stays lit.		
Related information	• Output to primary circuit (coil side) of red revolving lamp relay can be checked with monitoring function. (Code: 03726) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the radio control/on-board selector switch to “Radio control side”, and turn the starting switch to ON position. • This failure code detects failure in primary circuit (coil side) of red revolving lamp relay, but does not detects failure in secondary circuit (contact side).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Internal defect of relay (internal short circuit)	1. Turn the starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Replace relay RDR with the relay for another radio control. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position. **REMARK** Same relays are connected to radio control relay (connectors ACT, RHR, ESR, RLR, RDR, YLR, BLR, and GLR).		
		If this failure code is cleared, original red revolving lamp relay RDR is defective.		
2	Hot short circuit in wiring harness (contact with 24 V circuit)	1. Turn the starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Disconnect connector RDR, and connect T-adapter to female side. 4. Turn the battery disconnect switch to ON position. 5. Turn the starting switch to ON position.		
		Voltage	Between RDR (female) (1) and (2)	Max. 4.5 V
3	Defective controller of radio control	If no failure is found by above checks, radio control controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to system operating lamp



FAILURE CODE [DB95KK]

Action level	Failure code	Failure	Work Equipment Controller 5V Sensor 0 Power Voltage Out of Range (Work equipment controller system)
L03	DB95KK		
Details of failure	• Voltage of 5 V power supply circuit for work equipment controller sensor is below 4.5 V or above 5.5 V. • Unusual current flows in 5 V power supply circuit for work equipment controller sensor.		
Action of controller	• Stops outputting of 5 V power supply circuit for work equipment controller sensor. • Restricts operation of engine and transmission.		
Phenomenon on machine	• System may not operate normally. • Automatic gear shift system does not work. • Once machine stops, engine speed is restricted to medium (half) speed. • Once machine stops, gear speed is restricted to F1 and R2.		
Related information	• After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective blade control lever (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connectors of the following levers, and turn starting switch to ON position. **REMARK** Because defective connectors are disconnected from disconnected lever when this failure code is cleared, other failure code is displayed. **REMARK** However, ignore failure codes other than this failure code.			
		Connector	WLV1	Blade control lever	DB95KK does not disappear.
2	Defective ripper control lever (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connectors of the following levers, and turn starting switch to ON position. **REMARK** Because defective connectors are disconnected from disconnected lever when this failure code is cleared, other failure code is displayed. **REMARK** However, ignore failure codes other than this failure code.			
		Connector	WLV2	Ripper control lever	DB95KK does not disappear.
3	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors WECN1, WLV1, and WLV2, and connect T-adapter to either female side.			
		Resistance	Between ground and WECN1 (22), WLV1 (4), WLV1 (8), or WLV2 (4)		Min. 1 MΩ

<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">Short circuit in wiring harness</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Turn off the power supply of the control box.
3. Turn the battery disconnect switch to OFF position.
4. Disconnect connectors MONI and GPSB1, and connect T-adapter to female side of GPSB1.</td></tr>
<tr><td rowspan="4">Continuity</td><td>Between GPSB1 (female) (3) and each pin other than pin (3)</td><td>No continuity
(No sound is heard.)</td></tr>
<tr><td>Between GPSB1 (female) (13) and each pin other than pin (13)</td><td>No continuity
(No sound is heard.)</td></tr>
<tr><td>Between GPSB1 (female) (23) and each pin other than pin (23)</td><td>No continuity
(No sound is heard.)</td></tr>
<tr><td>Between GPSB1 (female) (33) and each pin other than pin (33)</td><td>No continuity
(No sound is heard.)</td></tr>
<tr><td rowspan="5">4</td><td rowspan="5">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Turn off the power supply of the control box.
3. Turn the battery disconnect switch to OFF position.
4. Disconnect connectors MONI and GPSB1, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="4">Resistance</td><td>Between ground and MONI (male) (J) or GPSB1 (female) (23)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and MONI (male) (K) or GPSB1 (female) (33)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and MONI (male) (L) or GPSB1 (female) (3)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and MONI (male) (M) or GPSB1 (female) (13)</td><td>Min. 1 MΩ</td></tr>
<tr><td>5</td><td>Defective control box</td><td colspan="3">If no failure is found by above checks, control box is defective. (Since this is an internal defect, troubleshooting cannot be performed).</td></tr>
<tr><td>6</td><td>Defective GNSS receiver</td><td colspan="3">If no failure is found by preceding checks, GNSS receiver is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect connector WECN3 and connect T-adapter to female side.</td></tr>
<tr><td rowspan="2">Resistance</td><td colspan="2">Between WECN3 (female) (29) and ground</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between WECN3 (female) (39) and ground</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Short circuit in wiring harness</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect connectors WECN3 and RNSW, and connect T-adapter to female side of WECN3.
REMARK
Investigate it by continuity mode of tester.</td></tr>
<tr><td rowspan="2">Continuity</td><td colspan="2">Between WECN3 (female) (29) and each pin other than WECN3 (29).</td><td>No continuity (no sound)</td></tr>
<tr><td colspan="2">Between WECN3 (female) (39) and each pin other than WECN3 (39).</td><td>No continuity (no sound)</td></tr>
<tr><td rowspan="5">6</td><td rowspan="5">Defective work equipment controller</td><td colspan="4">If no failure is found by above checks, work equipment controller is defective.
• Reference
1. Turn the starting switch to OFF position
2. Insert T-adapters into connectors WECN1 and WECN3.
3. Turn the starting switch to ON position.
4. Operate ripper tilt lever (in tilt-back direction) to perform troubleshooting.
REMARK
Voltage of approximately 9 V is applied to WECN3 pin (29) and pin (4) through resistor in work equipment controller.</td></tr>
<tr><td rowspan="4">Voltage</td><td rowspan="2">Between WECN3 (29) and WECN1 (4)</td><td>Free</td><td>7 to 11 V</td></tr>
<tr><td>Tilt IN</td><td>Max. 1 V</td></tr>
<tr><td rowspan="2">Between WECN3 (39) and WECN1 (4)</td><td>Free</td><td>7 to 11 V</td></tr>
<tr><td>Tilt IN</td><td>Max. 1 V</td></tr>
</table>

FAILURE CODE [DFA5KY]

Action level	Failure code	Failure	Blade Lift Lever1 Potentiometer 1 Hot Short Circuit (Work equipment controller system)
L01	DFA5KY		
Detail of failure	• Signal voltage of blade lift lever potentiometer system 1 is 4.5 V or higher.		
Action of controller	• Continues control with signal from blade lift lever potentiometer system 2.		
Phenomenon on machine	• None		
Related information	• Signal voltage of blade lift lever potentiometer 1 can be checked with monitoring function. (Code: 73400 Blade Lift Lever 1 Potentio Volt) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

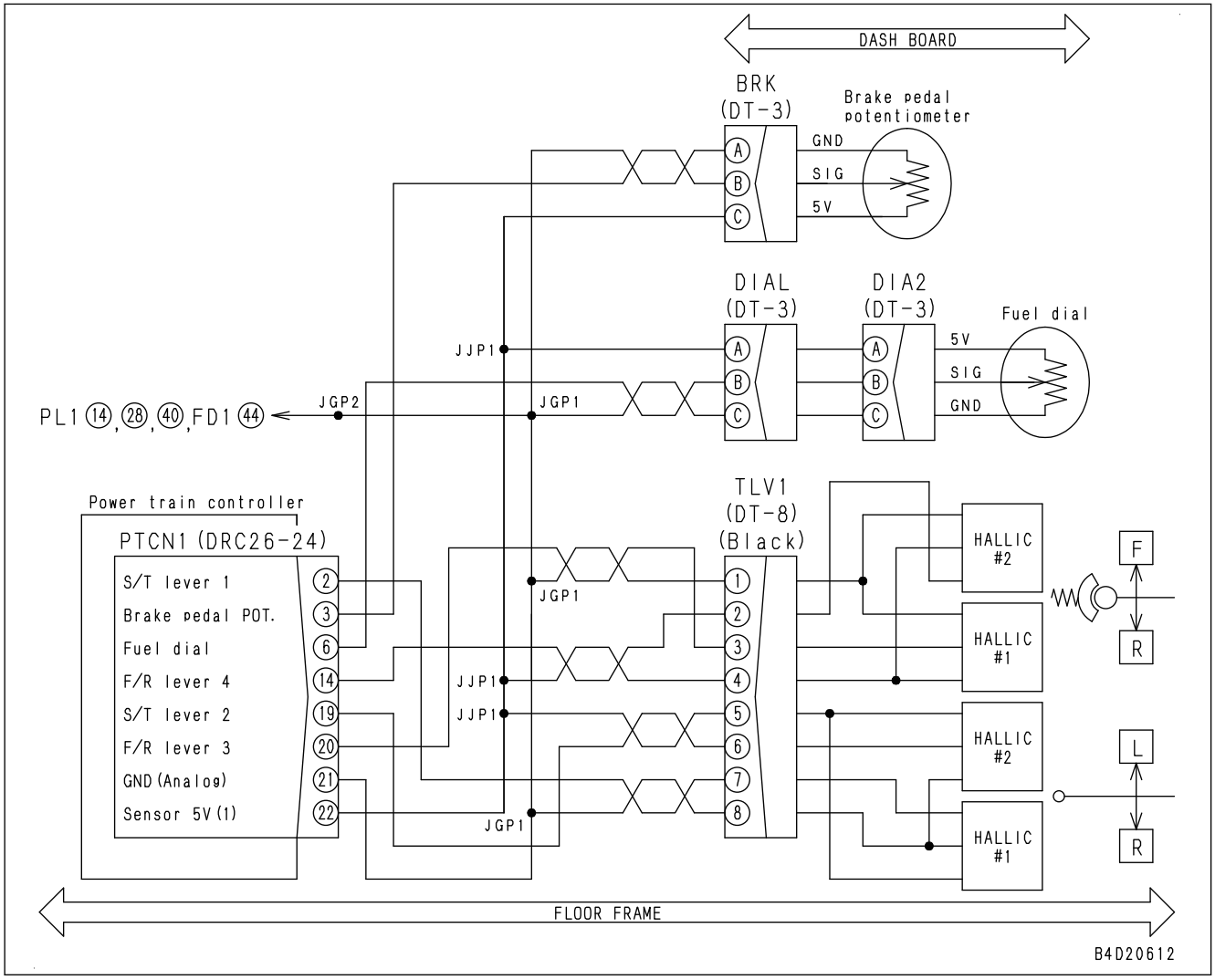
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 5 V sensor power supply system	If failure code [DB95KK] is also displayed, perform troubleshooting these first.		
2	Defective blade lift lever potentiometer 1 (internal short circuit) or ground fault	1. Turn starting switch to OFF position. 2. Disconnect connector WLV1. 3. Turn starting switch to ON position.		
		If failure code [DFA5KY] goes out, blade lift lever potentiometer is defective. (If this failure code is still displayed, wiring harness or work equipment controller is defective.) **REMARK** Since connector WLV1 is disconnected, many other failure codes appear. Ignore all of them other than [DFA5KY].		
3	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector WLV1 and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between WLV1 (female) (3) and (4) or ground	Max. 1 V
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors WECN1 and WLV1, and connect T-adapter to female side of WECN1. **REMARK** Check with multimeter in continuity mode.		
		Continuity	Between WECN1 (female) (8) and each pin other than (8)	No continuity (No sound)

FAILURE CODE [DGS1KX]

Action level	Failure code	Failure	Hydraulic Oil Temperature Sensor Input Signal Out of Range (Work equipment controller system)
L01	DGS1KX		
Detail of failure	Hydraulic oil temperature sensor signal is out of normal range.		
Action of controller	None in particular		
Phenomenon on machine	• Fan speed is restricted to half speed. • Hydraulic oil temperature is not displayed correctly on monitor panel.		
Related information	• Hydraulic oil temperature can be checked with monitoring function. (Code: 04401 Hydraulic Oil Temperature) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position or start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective hydraulic oil temperature sensor (internal open circuit or short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector HDT. 3. Turn starting switch to ON position.		
		If failure code [DGS1KX] disappears and [DGS1KA] for open circuit appears, hydraulic oil temperature sensor is defective. (If failure code [DGS1KX] is still displayed, wiring harness or work equipment controller is defective.)		
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors WECN1 and HDT, and connect T-adapter to either female side.		
		Resistance	Between ground and WECN1 (female) (14) or HDT (female) (1)	Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors WECN1 and HDT, and connect T-adapter to female side of WECN1. **REMARK** Check it by using multimeter in continuity mode.		
		Continuity	Between WECN1 (female) (14) and each pin other than (14)	No continuity (no sound is heard)
4	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective.		

Circuit diagram related to steering potentiometer

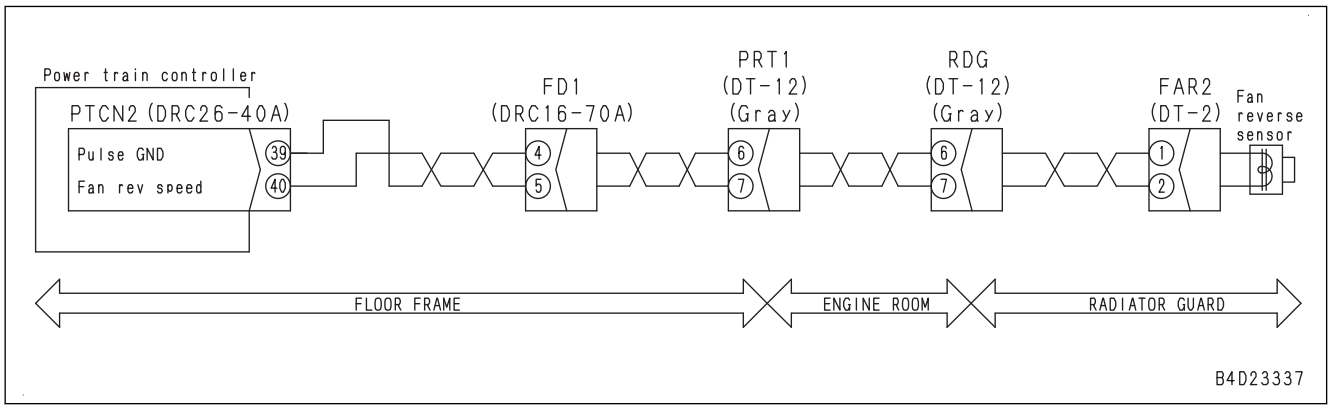


FAILURE CODE [DKH1KY]

Action level	Failure code	Failure	Inclination Angle Sensor Hot Short Circuit (power train controller system)
L03	DKH1KY		
Detail of failure	Signal voltage of pitch angle sensor is 4.85 V or above.		
Action of controller	• Cannot sense pitch angle of machine. • Restricts operation of engine and transmission.		
Phenomenon on machine	• Shifting shocks occur when traveling on slopes. • Automatic gear shift function does not work. • Once machine stops, engine speed is restricted to medium (half) speed. • Once machine is stopped, selectable gear speeds are restricted to F1 and R1.		
Related information	• Signal from pitch angle sensor signal can be checked with monitoring function. (Code: 60100 Machine Pitch Angle Sensor Volt) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Even when system works properly, failure code [DKH1KA] is displayed if pitch angle sensor connector is disconnected and starting switch is turned to ON position.		

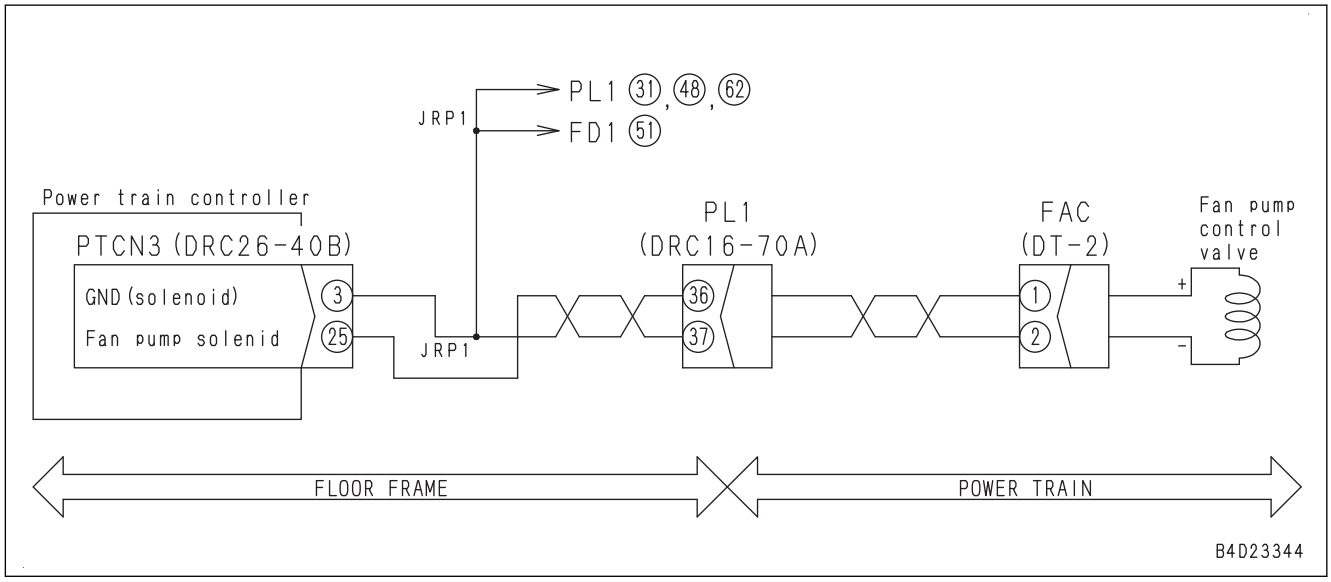
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective sensor 24 V power supply system	If failure code [DBE6KK] is also displayed, perform troubleshooting these first.		
		1. Turn starting switch to OFF position. 2. Disconnect connector PT1 and connect T-adapter to female side. 3. Turn starting switch to ON position. If power supply voltage is abnormal, go to Cause 3.		
		Voltage	Between PT1 (female) (C) and (A)	20 to 30 V
2	Defective pitch angle sensor (Internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector PT1. 3. Turn starting switch to ON position.		
		If failure code [DKH1KY] is cleared and failure code for wire breakage [DKH1KA] is displayed, pitch angle sensor is defective. (If failure code [DKH1KY] is displayed again, wiring harness or power train controller is defective.)		
3	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector PT1 and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between PT1 (female) (B) and (A) or ground	Max. 1 V
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors PTCN1 and PT1, and connect T-adapters to female side of connector PTCN1. **REMARK** Check by using multimeter in continuity mode of tester.		
		Continuity	Between PTCN1 (female) (8) and each pin other than (8)	No continuity (no sound)

Circuit diagram related to fan speed sensor



No.	Cause	Procedure, measuring location, criteria and remarks
4	Defective power train controller	If failure code is still displayed after above checks, power train controller may be defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)

Circuit diagram related to fan control solenoid 1

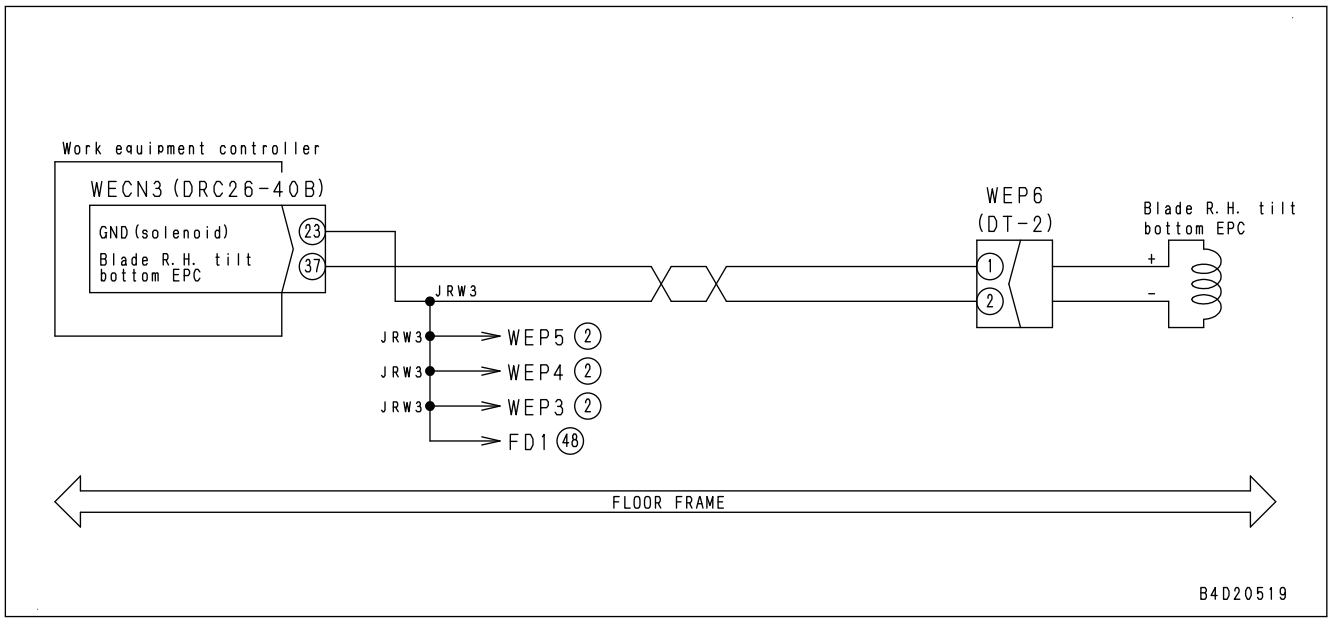


FAILURE CODE [DXH8KB]

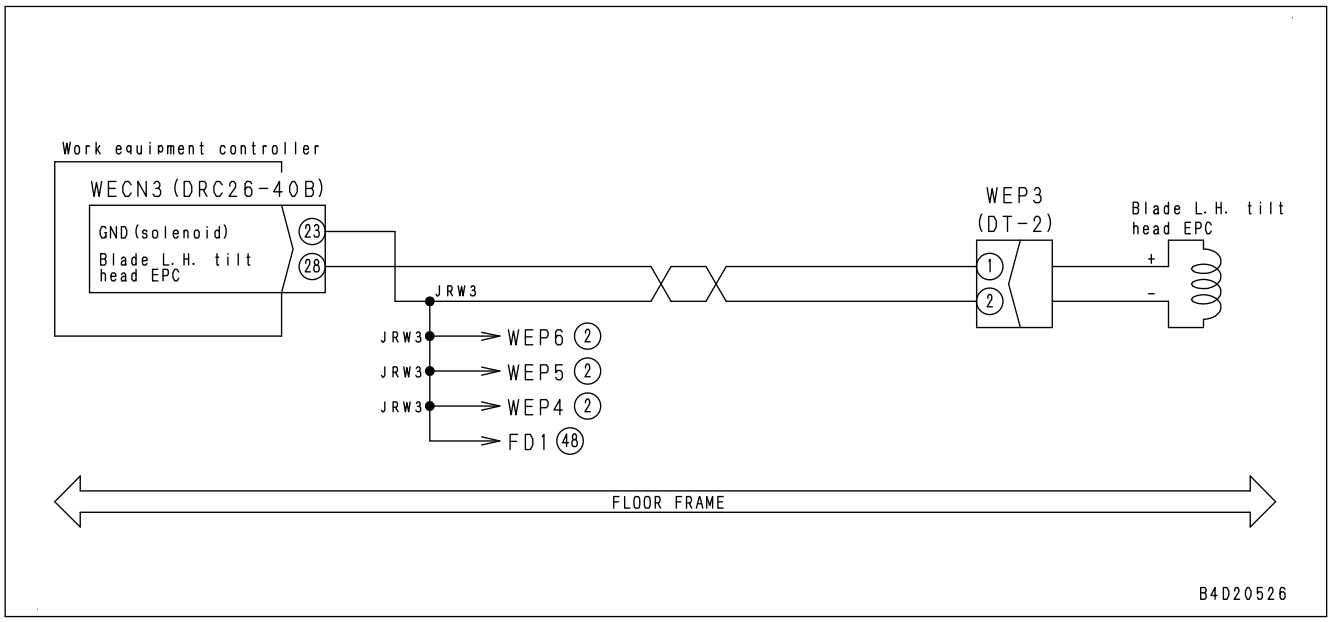
Action level	Failure code	Failure	Transmission Forward Clutch ECMV Solenoid Short Circuit (power train controller system)
L03	DXH8KB		
Detail of failure	• When controller drives transmission F clutch ECMV solenoid, unusual current flows through circuit.		
Action of controller	• Stops driving transmission F clutch ECMV solenoid. Restricts operation of engine and transmission.		
Phenomenon on machine	• Automatic gear shift function does not work. • Once machine stops, engine speed is restricted to medium (half) speed. • Once machine stops, selectable gear speed is restricted to R1.		
Related information	• Output condition to F clutch ECMV solenoid can be checked with monitoring function. (Code: 31622 T/M Forward Clutch ECMV Current (F/B)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Start engine and travel forward.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective solenoid of F clutch ECMV (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector SFT, and connect T-adapter to male side.		
		Resistance	Between SFT (male) (1) and (2)	3 to 13 Ω
			Between SFT (male) (1) and ground	Min. 1 MΩ
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors PTCN3 and SFT, and connect T-adapter to either female side.		
		Resistance	Between ground and PTCN3 (female) (18) or SFT (female) (1)	Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors PTCN3 and SFT, and connect T-adapter to either female side.		
		Resistance	Between PTCN3 (female) (13) and (18) or SFT (female) (1) and (2)	Min. 1 MΩ
4	Defective power train controller	If failure code is still displayed after above checks, power train controller may be defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)		

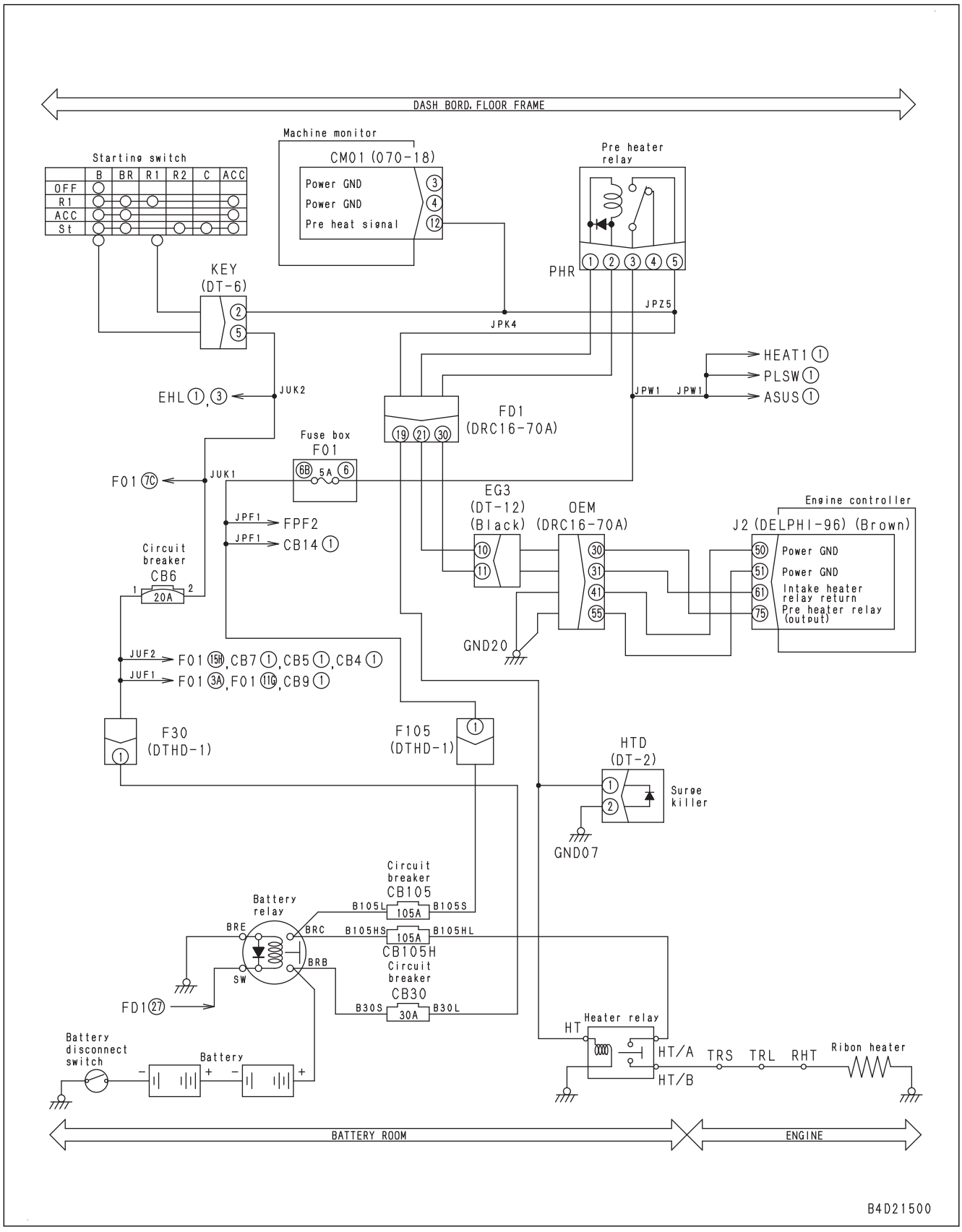
CIRCUIT DIAGRAM (BLADE TILT RI)GHT BOTTOM EPC SOLENOID



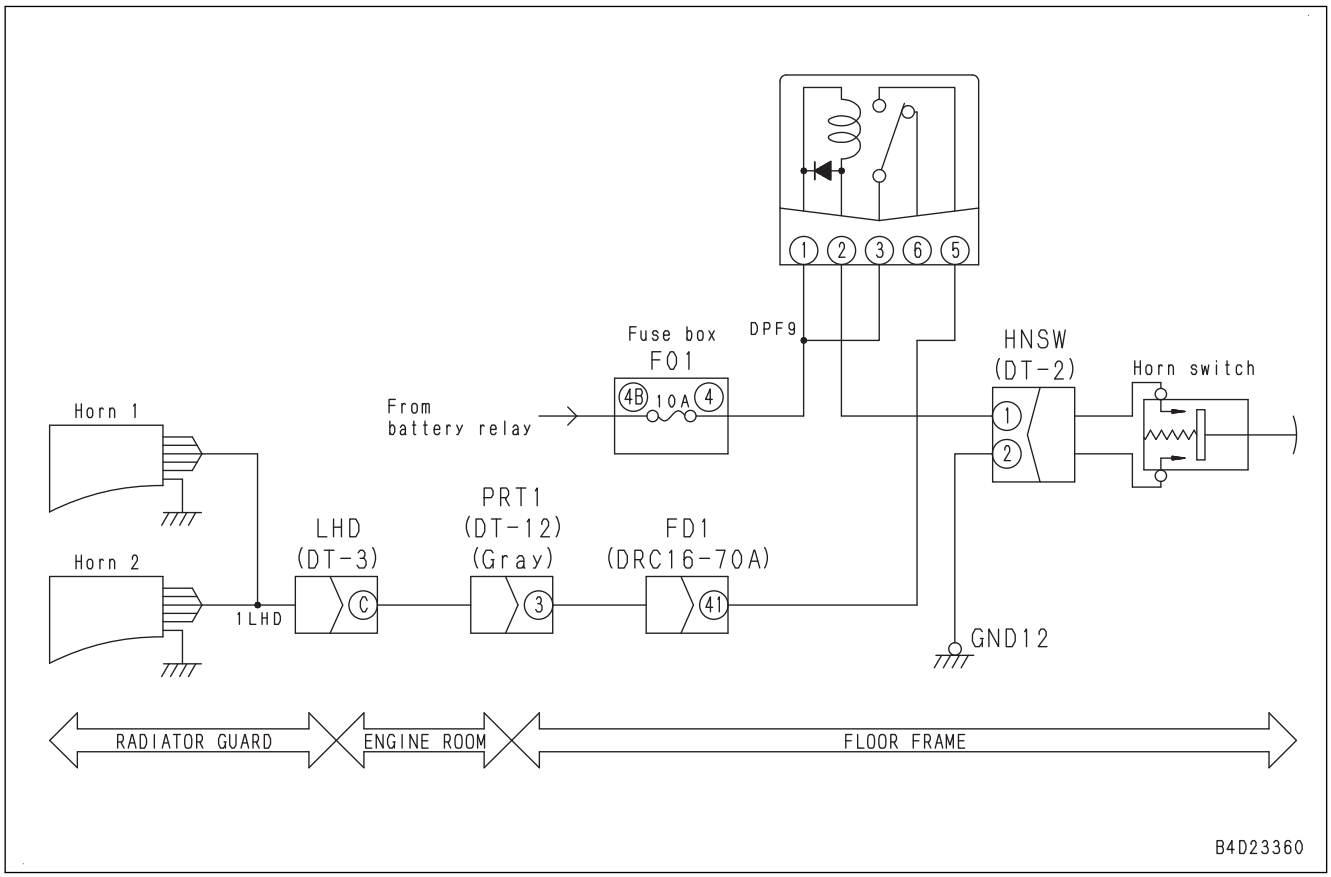
Circuit diagram related to blade tilt left head EPC solenoid



CIRCUIT DIAGRAM (ENGINE PREHEATING SYSTEM)



Circuit diagram related to horn



E-43 FRONT WIPER DOES NOT OPERATE

Failure	Front wiper does not operate (failed in both continuous and intermittent operations).
Related information	• See E-mode in “NO WIPER OPERATES CONTINUOUSLY OR INTERMITTENTLY“ if a rear windshield wiper does not work either. • The wiper motor is driven by the power supplied from front and rear wiper intermittent unit CB26 even during continuous operation. • The wiper motor detects a stop position and pulses 24 V voltage from the fuse. • The wiper motor is driven by 24 V voltage pulse interchanged with front and rear wiper intermittent unit CB26 during intermittent operation. • Pins which are associated with this failure in wiper intermittent unit CB 26 are as follows. 1. (1):GND1 2. (2):Relay output 1 (power supply 1 to wiper motor) 3. (3):Continuous (24 V) input 4. (4):Intermittent (24 V) input 5. (6):24 V common input 6. (8):24 V pulse input 1 from wiper motor • Check an open circuit in wiring harness in pins 2 and 8 of wiper intermittent unit CB26 in this troubleshooting. See E-mode in “NO WIPER OPERATES CONTINUOUSLY OR INTERMITTENTLY“ for an open circuit in other pins.

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective front wiper motor (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector CB23, and connect T-adapter to male side.			
		Continuity	Between CB23 (6) and (1)		Continuity
2	Defective front and rear (F, R) wiper intermittent unit (internal open circuit)	**REMARK** Check that right and left door wipers operate. 1. Turn starting switch to OFF position. 2. Disconnect connectors CB26 and 27, and switch wiper intermittent units. 3. Turn starting switch to ON position. 4. Turn front wiper switch to ON position.			
		If front wiper is normal, originally provided front and rear wiper intermittent unit is defective.			
		Resistance	Reference: Between CB26 (male) (2) and (8)		Max. 1 Ω
			Reference: Between CB26 (male) (2) and (6)		Min. 1 MΩ
3	Defective front wiper switch	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch to OFF position. 3. Disconnect connector CB14, and connect T-adapter to male side. 4. Turn switch to ON and OFF positions, and perform troubleshooting.			
		Resistance	Between CB14 (male) (2) and (3)	OFF	Min. 1 MΩ
			Between CB14 (male) (2) and (3)	ON	Max. 1 Ω

No.	Cause	Procedure, measuring location, criteria and remarks		
4	Defective GNSS receiver	If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Turn off the power supply of the control box. 3. Turn the battery disconnect switch to OFF position. 4. Insert T-adapter into connector GPSB1. 5. Turn the battery disconnect switch to ON position.		
		Voltage	Between GPSB1 (15) and (16)	20 to 30 V
5	Open or short circuit in control box wiring harness (wire breakage or defective contact)	If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Turn off the power supply of the control box. 3. Turn the battery disconnect switch to OFF position. 4. Disconnect connectors MONI and GPSB1. 5. Connect T-adapter to male side of MONI and female side of GPSB1.		
		Resistance	Between MONI (male) (C) and GPSB1 (female) (15)	Max. 1 Ω
			Between MONI (male) (D) and GPSB1 (female) (16)	Max. 1 Ω
6	Ground fault in control box wiring harness (contact with ground circuit)	If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Turn off the power supply of the control box. 3. Turn the battery disconnect switch to OFF position. 4. Disconnect connectors MONI and GPSB1, and connect T-adapter to female side of MONI.		
		Resistance	Between MONI (male) (C) and (D)	Min. 1 MΩ
7	Defective control box	If no failure is found by above checks, control box is defective. (Since this is an internal defect, troubleshooting cannot be performed).		

E-86 FINISHED SURFACE IS INACCURATE (THE FINISHED SURFACE IS NOT SMOOTH)

Failure	Finished surface is inaccurate. (The finished surface is not smooth.)
Related information	• Perform troubleshooting outdoors or at a place open to the sky to acquire a sufficient number of satellites. • Before performing troubleshooting, check that “PROJECT FILE” is set correctly as specified in the “Project File Setting” section of the Operation and Maintenance Manual. • Before performing troubleshooting, check that “Elevation Control Key” and “Slope Control Key” are green on the control box screen.

No.	Cause	Procedure, measuring location, criteria and remarks
1	Low hydraulic oil temperature	Response of blade automatic control is degraded due to low hydraulic oil temperature. Raise hydraulic oil temperature to the operating range.
2	Blade automatic control not suitable for operation	Blade automatic control is not suitable for performing the following operations and may cause degrade in blade response. • Digging and ditching of hard or frozen ground
3	Incorrect setting of dozing mode	When a long distance digging operation is performed in other mode than “Cutting & Carry”, ground surface after digging may not be smooth due to the change in load. In that case, travel in reverse and restart.
4	Sharp turning on slope	After machine is turned sharp on slope or its direction is changed by stumbling over rocks, etc., the accuracy may become worse.
5	Set travel speed too fast	• According to type of soil (especially on sand ground) , if machine travels too fast, the finished surface may undulate. In this case, downshift the speed range. • If the ground has various type of soil, the surface may undulate at where the hardness of the ground varies.
6	Incorrect setting of gain adjustment for blade automatic control	When the setting of gain adjustment for blade automatic control does not suit to the soil for finishing, the surface may undulate. Check the setting of gain adjustment. for details, see “BLADE AUTO CONTROL GAIN ADJUSTMENT” in the Operation and Maintenance Manual. Perform readjustment if needed.
7	Incorrect automatic adjustment of control valve	Automatic adjustment of control valve may be defective. Adjust it again. (Adjustment ID: 8042)
8	GNSS receiver is not receiving signals from a sufficient number of effective satellites	1. Check if visibility in the sky above GNSS antenna is sufficient. 2. Make sure there are no trees, buildings, vehicles, cliffs, or other obstacles that may block or reflect satellite signals.
9	Volume of dosing is excessive.	When finishing operation is performed, see Operation and Maintenance Manual, “RECOMMENDED APPLICATIONS AND MODES”, LEVELING WORK, and check the gear speed and volume of dosing recommended every operation.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="6">6</td><td rowspan="6">Defective transmission clutch valve (ECMV)</td><td colspan="4">Be ready with engine stopped, then perform troubleshooting with engine at low idle.
REMARK
Gear speed clutch is operated by combined 2 clutches. Check combination with Table 1.</td></tr>
<tr><td>F clutch ECMV output pressure</td><td>PCCS lever</td><td>F3 stalled</td><td>Min. 2.25 MPa {23.0 kgf/cm^2}</td></tr>
<tr><td>R clutch ECMV output pressure</td><td>PCCS lever</td><td>R3 stalled</td><td>Min. 2.45 MPa {25.0 kgf/cm^2}</td></tr>
<tr><td>1st clutch ECMV output pressure</td><td>PCCS lever</td><td>F1 stalled</td><td>Min. 2.62 MPa {26.7 kgf/cm^2}</td></tr>
<tr><td>2nd clutch ECMV output pressure</td><td>PCCS lever</td><td>F2 stalled</td><td>Min. 2.40 MPa {24.5 kgf/cm^2}</td></tr>
<tr><td>3rd clutch ECMV output pressure</td><td>PCCS lever</td><td>F3 stalled</td><td>Min. 2.62 MPa {26.7 kgf/cm^2}</td></tr>
<tr><td>7</td><td>Clogged last chance filter</td><td colspan="4">If failure code is still displayed after above checks on cause 3 and clutch oil pressure is low or “0”, check last chance filter for clogging.</td></tr>
<tr><td>8</td><td>Defective transmission clutch</td><td colspan="4">• If oil pressure is found low by check on cause 7, oil may be leaking through seal ring of clutch.
• If oil pressure is found normal by check on cause 7, clutch may be slipping.</td></tr>
<tr><td>9</td><td>Defective power train pump</td><td colspan="4">• When oil pressure during check on cause 3 is abnormal but main relief valve is normal, disconnect power train pump outlet hose, crank engine, and see if oil flows out.
• Check line filter for sticking foreign material such as metal chips.</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Defective brake valve</td><td colspan="4">REMARK
Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Brake pressure</td><td>Parking brake lever in FREE</td><td>S/T brake pedal OFF</td><td>2.16 MPa {22.0 kgf/cm^2}</td></tr>
<tr><td colspan="4">If brake pressure is abnormal, perform troubleshooting for “H-8 Brake does not operate”.</td></tr>
</table>

S-1 ENGINE DOES NOT CRANK WHEN STARTING SWITCH IS TURNED TO START POSITION

Failure	Engine does not crank when starting switch is turned to “START” position
Related information	• See E-mode in “ENGINE DOES NOT START (ENGINE DOES NOT CRANK)” for electrical system troubleshooting • If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Defective starting circuit wiring system	When starting switch is turned to START, starting motor pinion does not pop out.	Perform troubleshooting of “ENGINE DOES NOT START (ENGINE DOES NOT CRANK)” in E mode, and take corrective action.
2	Defective starting motor (safety relay portion)	• Starting motor pinion makes grating noise (When starting switch is turned to START position, starting motor pinion pops out). • Starting motor pinion comes off halfway (When starting switch is turned to START position, starting motor pinion pops out). • Starting motor makes flapping sound and does not turn (When starting switch is turned to START position, starting motor pinion protrudes) (Reference: “Flapping sound” means sound made when starting motor pinion pops in and out)	Perform troubleshooting of “ENGINE DOES NOT START (ENGINE DOES NOT CRANK)” in E mode, and take corrective action.
3	Breakage of flywheel ring gear	If starting motor pinion makes grating noise and the starting motor does not turn, visually check the flywheel ring gear.	Replace if the item is broken
4	A crack on the EGR cooler (Reference: coolant contained in exhaust)	Disconnect the inlet and outlet gas piping of EGR cooler to check if water containing coolant is draining. **REMARK** Moisture in exhaust gas may be condensed, but this is not a failure. Check if it is coolant or not.	After EGR cooler replacement, drain the water in the engine cylinder.

50 DISASSEMBLY AND ASSEMBLY

Tools to be used when removing and installing the carrier roller assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	-	Hydraulic jack	■	2			Supporting the track shoe
B	-	Rope	■	1			Removing and installing the carrier roller assembly

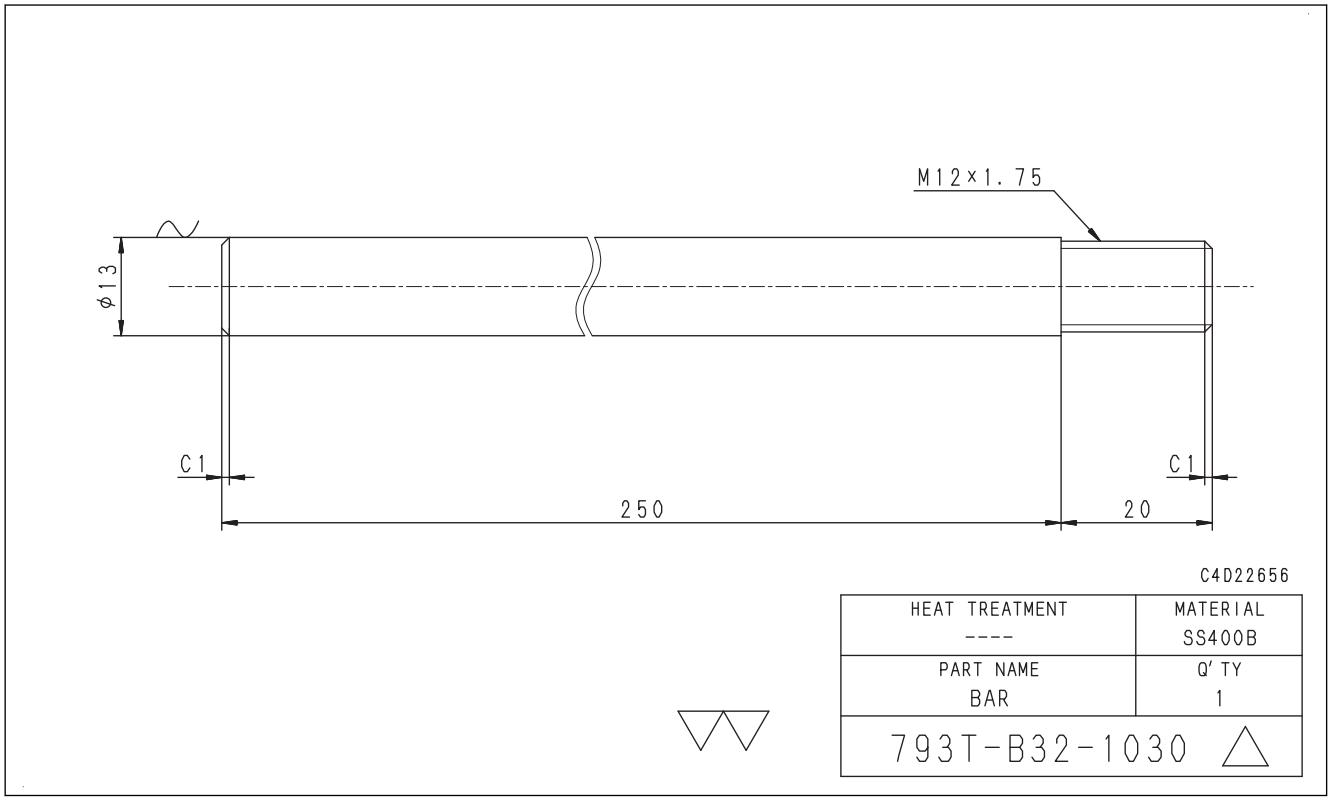
Tools to be used when disassembling and assembling the carrier roller assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	-	Block	■	1			Fixing the carrier roller assembly
B	790-102-1891	Nut wrench	■	1			Removing and installing the nut
C	790-101-2501	Push puller	■	1			Pulling out the bearing and roller
	790-101-2510	• Block		1			
	790-101-2520	• Screw		1			
	791-112-1180	• Nut		1			
	790-101-2540	• Washer		1			
	790-101-2620	• Leg		2			
	790-101-2570	• Plate		4			
	790-101-2560	• Nut		2			
	790-101-2710	• Adapter		2			
	790-201-1410	Plate	■	1			
D	790-101-3000	Push puller	■	1			Pulling out the bearing and ring
E	793T-417-1130	Push tool	■	1		○	Pulling out the ring
F	793T-417-1210	Push tool	■	1		○	Press fitting the bearing
G	793T-623-1170	Push tool	■	1		○	
H	791-651-1510	Installer	■	1			Installing the floating seal
J	791-601-1000	Oil pump	■	1			Refilling with oil
K	791T-630-1350	Spacer	■	1		○	Press fitting the ring

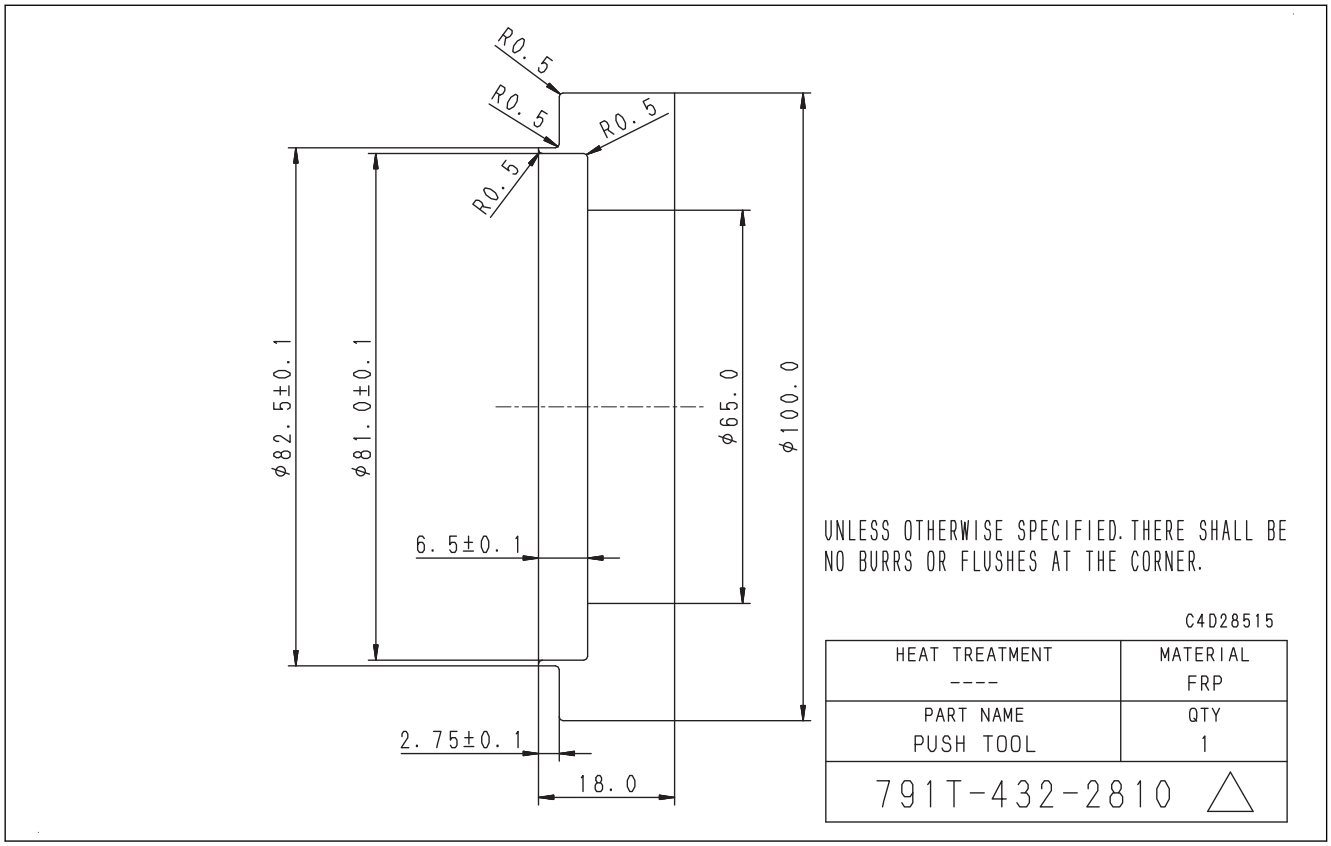
Tools to be used when removing and installing the pivot shaft assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	-	Forcing screw	■	2			Removing the pivot shaft assembly

793T-B32-1030: Bar

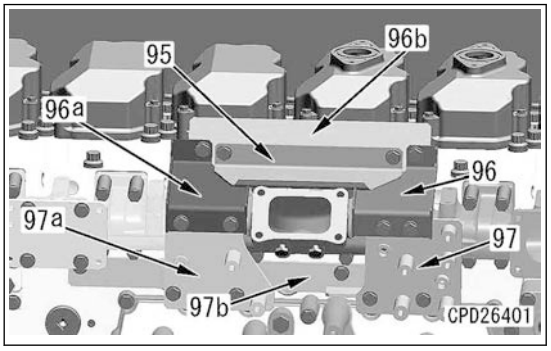


791T-432-2810: Push tool

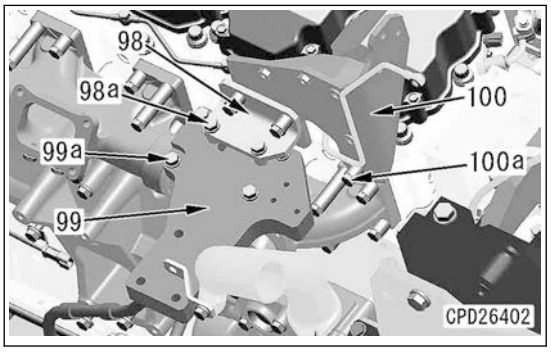


Exhaust manifold

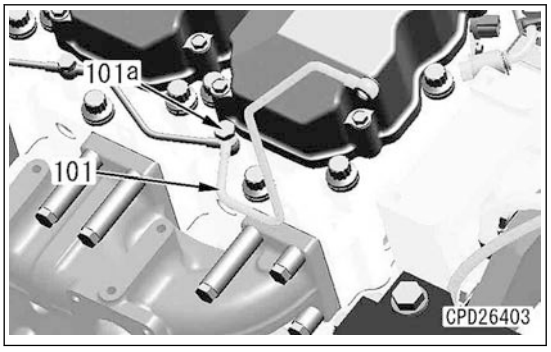
88. Remove mounting bolts (2 pieces), and remove bracket (95).
89. Remove mounting bolts (3 pieces), and remove bracket (96).
90. Remove 2 mounting bolts to remove bracket (96a).
91. Remove mounting bolts (2 pieces), and remove bracket (96b).
92. Remove mounting bolts (3 pieces), and remove bracket (97).
93. Remove 2 mounting bolts to remove bracket (97a).



94. Remove mounting bolts (3 pieces), and remove bracket (97b).
95. Remove mounting bolts (98a) (4 pieces), and remove bracket (98).
96. Remove mounting bolts (99a) (4 pieces), and remove bracket (99).
97. Remove mounting bolts (100a) (4 pieces), and remove bracket (100).

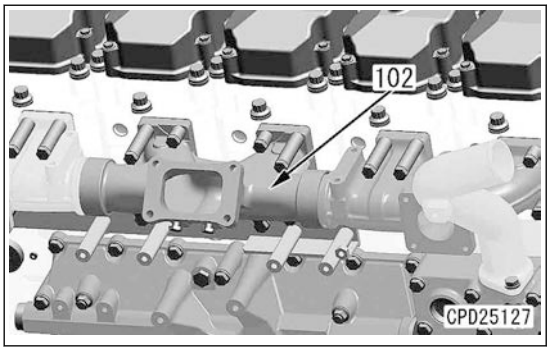


98. Remove joint bolt (101a), and remove tube (101).



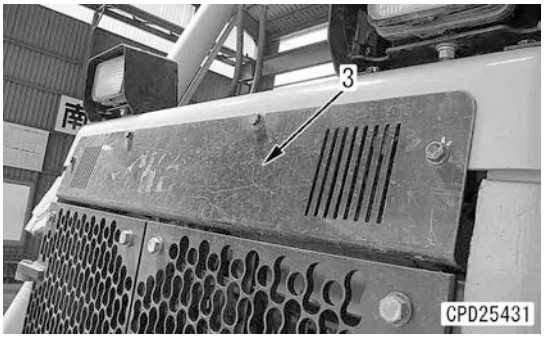
99. Remove mounting bolts (24 pieces), sling exhaust manifold (102) and remove it.

Exhaust manifold (102):
25 kg



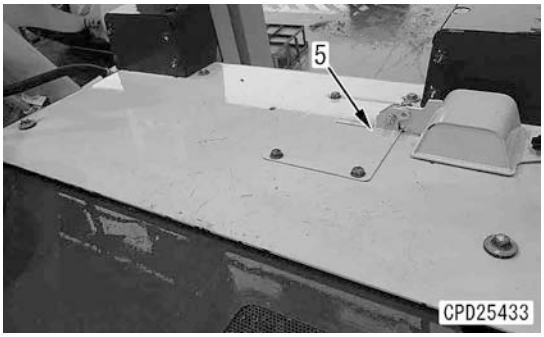
Smaller hood

4. Remove cover (3).

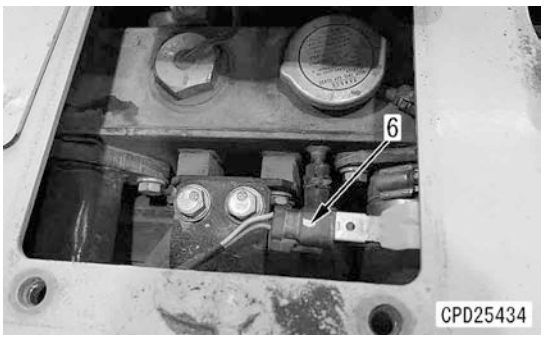


5. Remove wiring harness (4) on the back side of cover (3).

6. Remove coolant filler port cover (5).



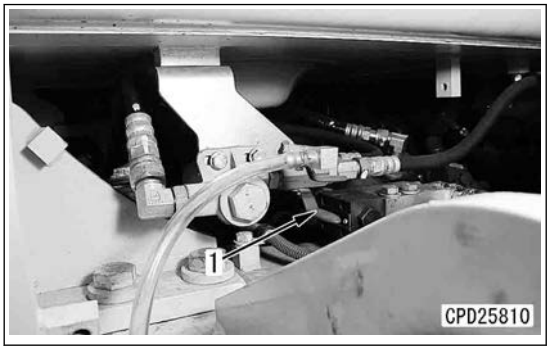
7. Disconnect connector LHDL (6).



8. Sling smaller hood (7), and remove it.

Smaller hood:
25 kg

Oil and coolant



49. Open fuel valve lever (1).
50. 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. (For details, see STRUCTURE AND FUNCTION, “TABLE OF FUEL, COOLANT, AND LUBRICANTS”.)

    Hydraulic tank:

    95 ℓ
51. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant. Then check the coolant level again. (For details, see Structure and function, “TABLE OF FUEL, COOLANT, AND LUBRICANTS”.)

    Radiator:

    103.5 ℓ

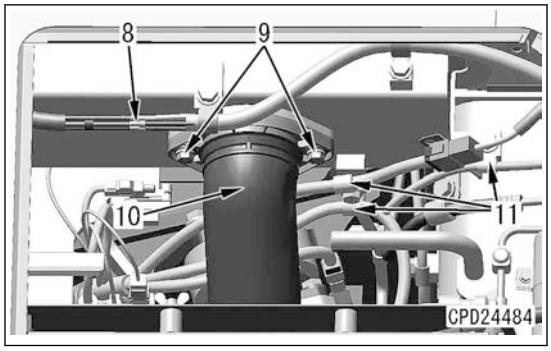
Air conditioner gas

52. Refill the refrigerant (air conditioner gas: R134a) from the air conditioner circuit.

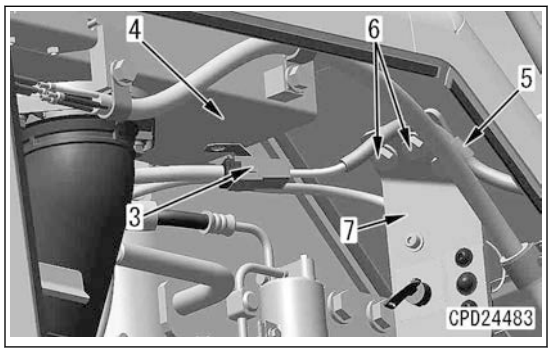
    REMARK

    Refrigerant to be collected: 900±50 g

20. Install clamp (11).
21. Install tube (10) with bolts (9) (2 pieces).
22. Connect washer hose (8).

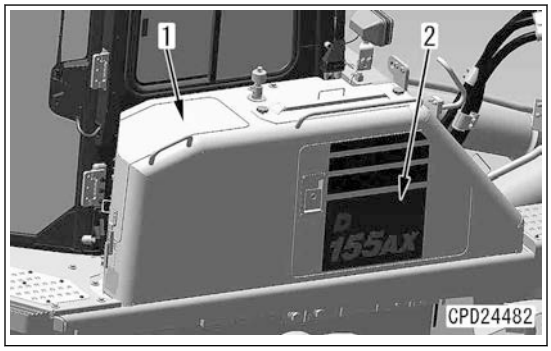


23. Install bracket (7) with bolts (6) (2 pieces).
24. Install connector (3) to battery cover (4).
25. Install clamp (5).



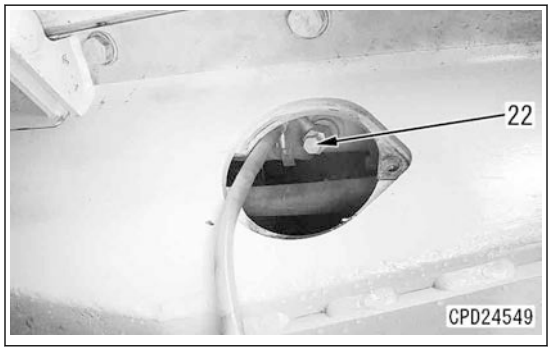
Refilling with AdBlue/DEF

26. Refill with AdBlue/DEF to the specified level through the filler port of the AdBlue/DEF tank.
27. Close covers (1) and (2).



Refilling with coolant

28. Tighten drain plug (22).



Marking

6. Mark at 3 points (e), (f), and (g) of each body connection in the circumferential direction.

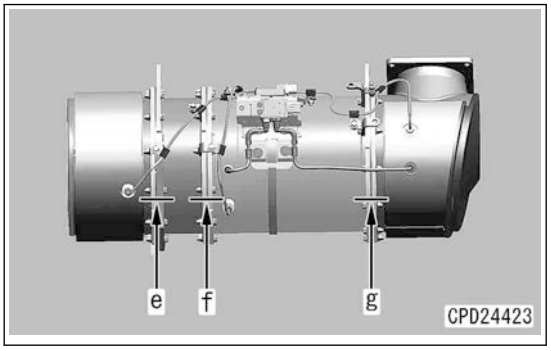
   NOTICE

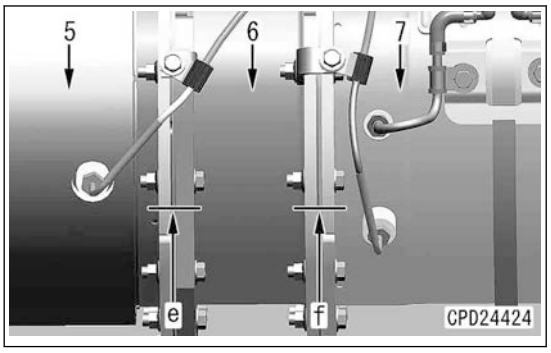
   These marks are required to facilitate the angle adjustment of KDPF inlet and outlet flanges securely in assembly work.

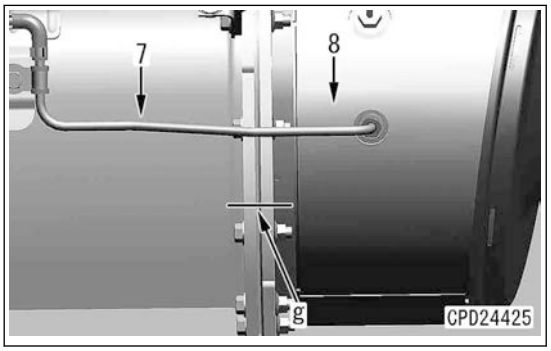
   (a): Connection of inlet (5) and KDOC (6) (3 points in the circumferential direction)

   (b): Connection of KDOC (6) and KCSF (7) (3 points in the circumferential direction)

   (b): Connection of KDOC (7) and outlet (8) (3 points in the circumferential direction)





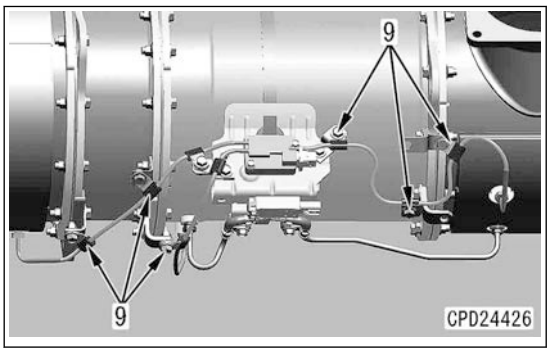


Temperature sensor

7. Remove clamps (9) (7 places).

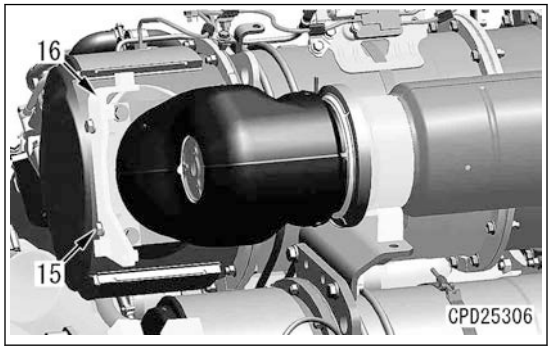
   NOTICE

   Put the marks to clamp installation positions.



AdBlue/DEF mixing tube

7. Remove mounting bolts (15) (2 pieces), and remove bracket (16).



8. Use a lifting tool and sling AdBlue/DEF mixing tube (17) together with connector and tube and keep holding it.

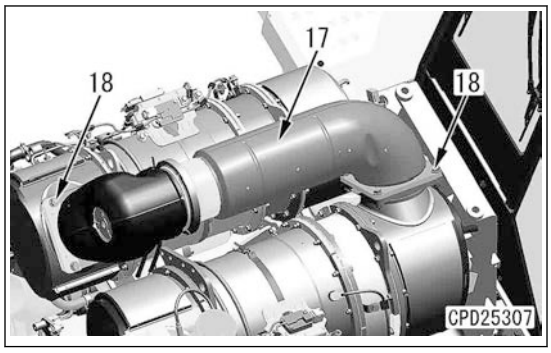
   AdBlue/DEF mixing tube:

   30 kg

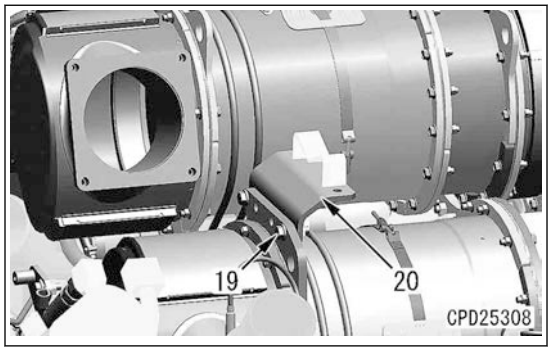
9. Remove mounting bolts (18) (4 pieces each at front and rear).
10. Sling AdBlue/DEF mixing tube (17) by using a lifting tool, and remove it.

    AdBlue/DEF mixing tube:

    30 kg



11. Remove mounting bolts (19) (2 pieces), and remove bracket (20).



REMOVE AND INSTALL AIR CONDITIONER COMPRESSOR ASSEMBLY

⚠ **Park the machine on a level ground, and set parking brake lever to the LOCK position.**

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

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

⚠ **Turn the battery disconnect switch to OFF position, and remove the key.**

⚠ **If you drain the radiator coolant when it is still hot, you may be scalded. Wait until the coolant temperature drops before draining.**

⚠ **Collect the air conditioner refrigerant (R134a) from the air conditioner circuit before disconnecting the air conditioner hose.**

⚠ **Ask a qualified person for collecting, adding and filling operations of the refrigerant (R134a).**

⚠ **Never release the refrigerant (R134a) to the atmosphere.**

⚠ **If refrigerant gas (air conditioner gas: R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Put on protective eyeglasses, gloves and working clothes with long sleeves while collecting the refrigerant or filling the air conditioner circuit with the refrigerant.**

⚠ **Check the connector numbers and installed positions before disconnecting wiring and hoses, and record them.**

⚠ **When disconnecting the wiring and hoses, take extreme care not to damage or deform the wiring and hoses by the clips and clamps. If the wiring and hoses may be damaged or deformed, remove the clips and clamps before disconnecting them.**

METHOD FOR REMOVING AIR CONDITIONER COMPRESSOR ASSEMBLY

Collecting refrigerant

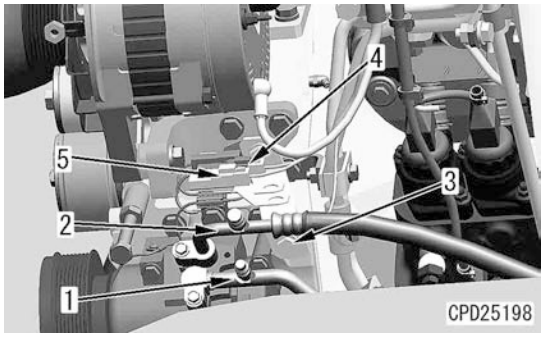
1. Collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit.
   Quantity of refrigerant to be collected: : 900±50 g g

Alternator belt

2. Remove the alternator belt. For details, see “REMOVE AND INSTALL ALTERNATOR BELT”.

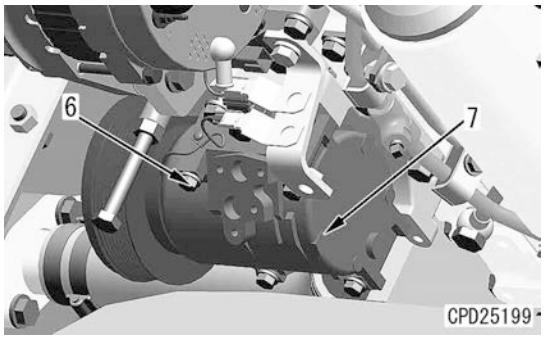
Hose, connector

3. Disconnect air conditioner hoses (1) and (2).
4. Disconnect ground cable (3), and disconnect connectors A/C (4) and (5).

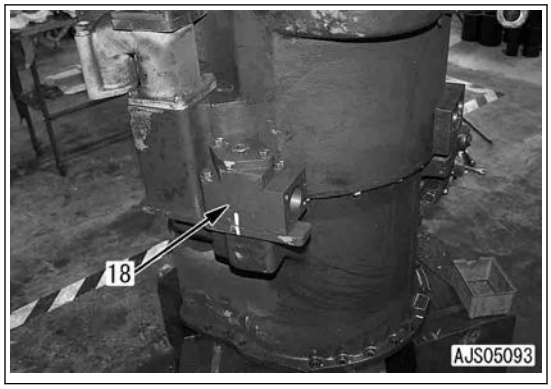


Air conditioner compressor

5. Remove mounting bolts (6) (8 pieces), and remove air conditioner compressor assembly (7).



10. Install block (18) together with the internal strainer.

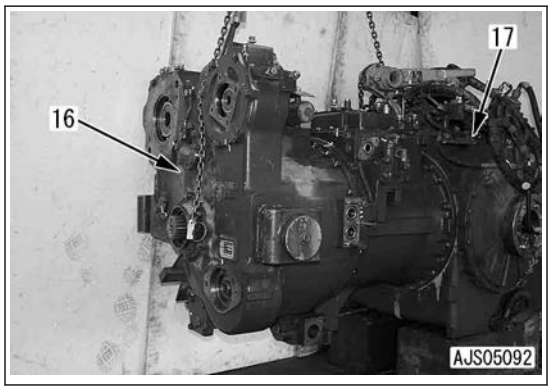


PTO, torque converter, and transmission assembly

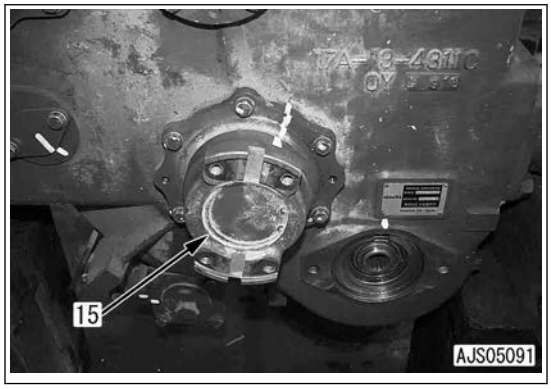
11. Sling PTO, torque converter, and transmission assembly (16), hold it, and connect it to HSS unit assembly (17) with the mounting bolts (18 pieces).

    PTO, torque converter, and transmission assembly (16):
    1500 kg

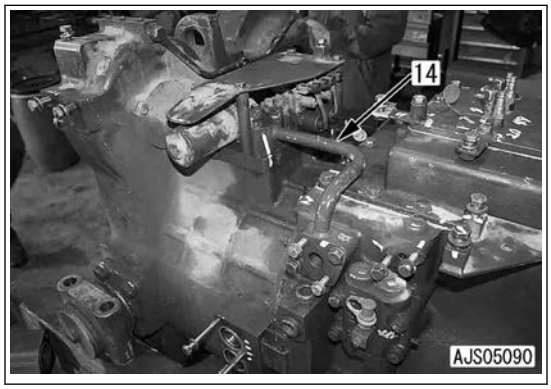
    Transmission case mounting bolt:
    98 to 123 Nm {10.0 to 12.5 kgfm}



12. Install coupling (15).

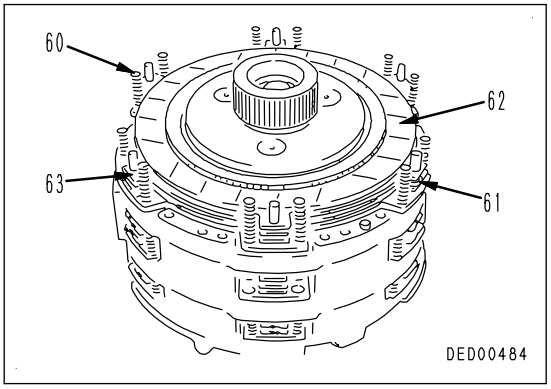


13. Install tube (14).



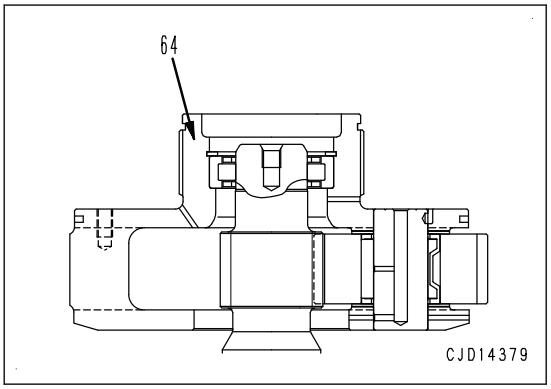
No.3 disc, plate, spring

37. Remove spring (60).
38. Remove spring (61), disc (62), and plate (63).



No.3 carrier assembly

39. Remove No.3 carrier assembly (64).

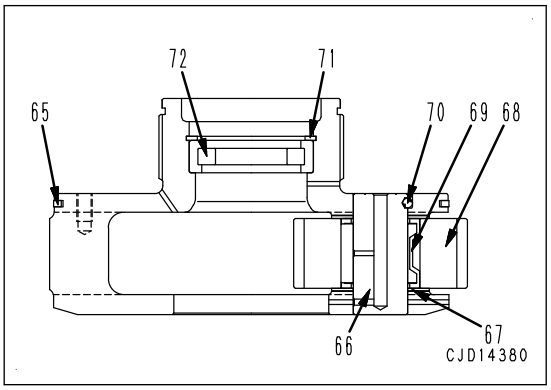


Disassembly of No.3 carrier assembly

40. Remove seal ring (65).
41. Pull out shaft (66).
42. Remove thrust washers (67), planetary gear (68), bearing (69) and ball (70).

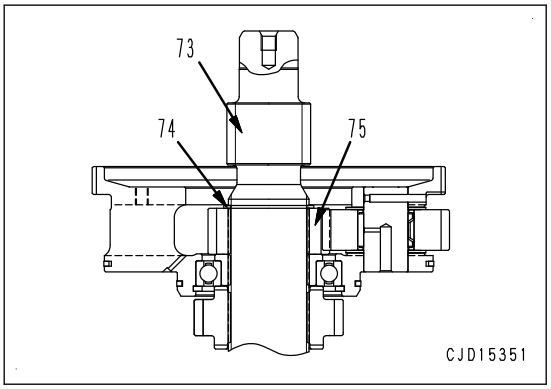
    REMARK

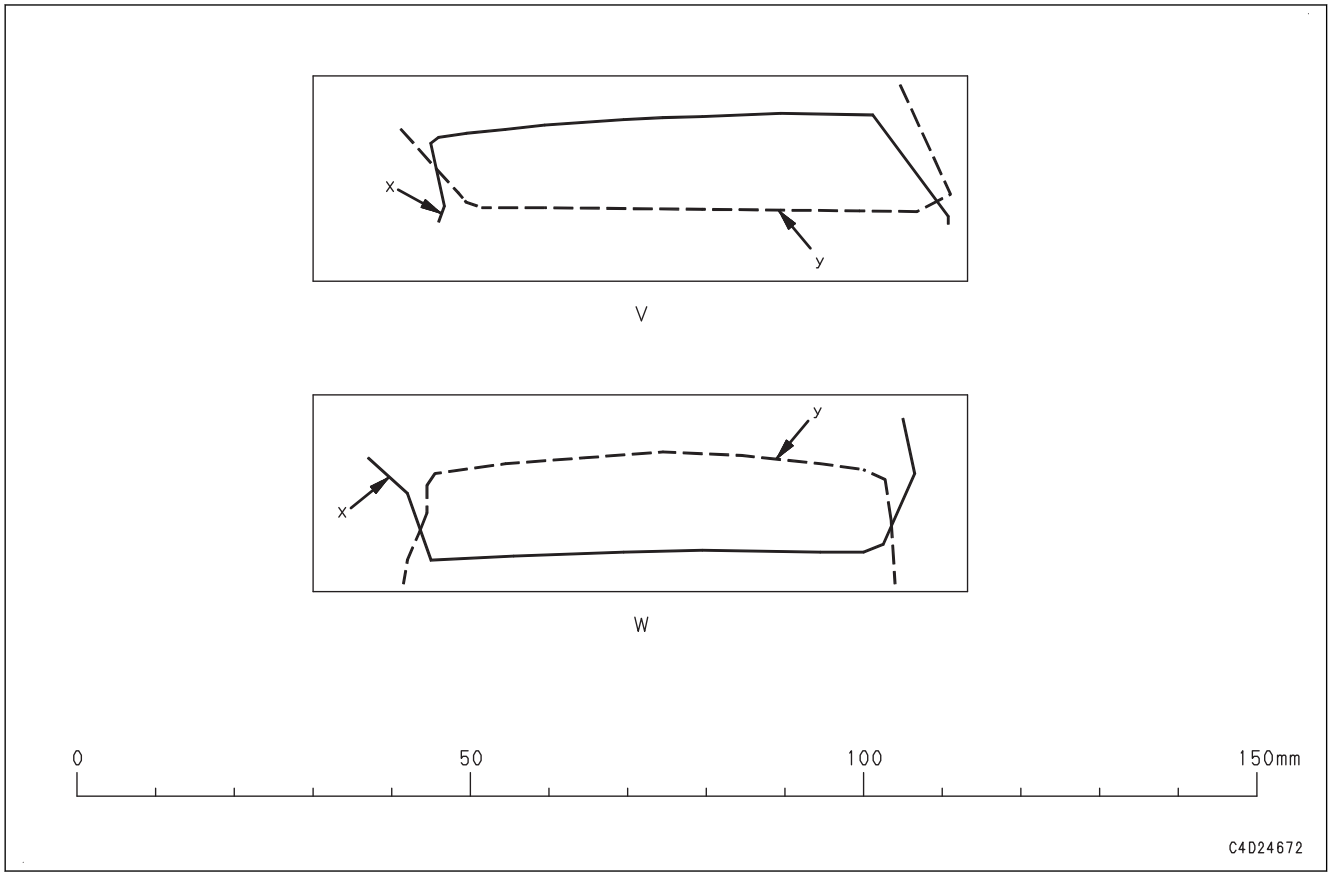
    Be careful not to lose the ball.
43. Remove snap ring (71), and remove bearing (72).



Output shaft, No.4 sun gear

44. Remove output shaft (73).
45. Remove snap ring (74) from the output shaft.
46. Remove No.4 sun gear (75).





(v): Concave surface

(w): Convex surface

(x): External form of gear

(y): External form of pinion

REMARK

- The tooth contact is as shown below.

  (j): 16 to 28 mm

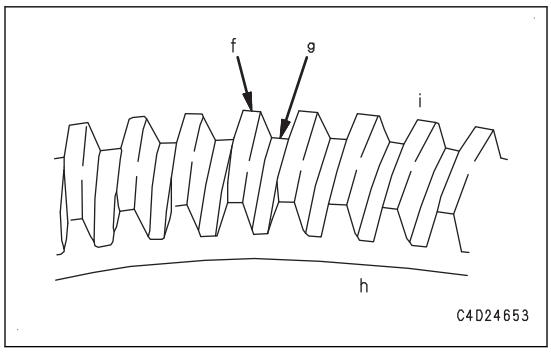
  (k): 22 to 34 mm

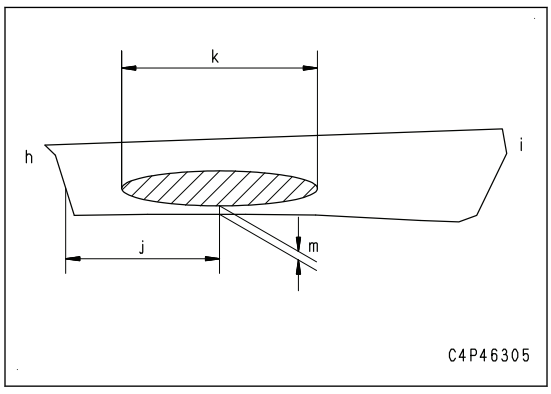
  (m): 1 to 3 mm

  Check that there are no marks of strong contact at tooth tip (f), dedendum (g), small end (h) and large end (i).

  REMARK

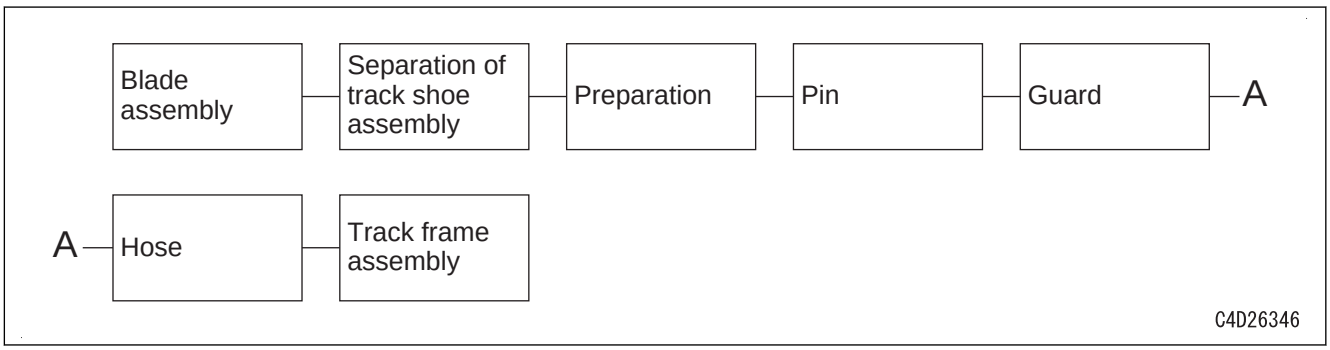
  If the adjustment is done in this way, correct tooth contact is obtained when the load is applied.





UNDERCARRIAGE AND FRAME

REMOVE AND INSTALL TRACK FRAME ASSEMBLY



Tools for removal and installation of track frame assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	791T-130-1010	Bracket	■	6		○	Fixing bogie assembly
	01010-63060	Bolt	■	12			
	01643-33080	Washer	■	12			
B	-	Blocking tool	■	2			Support of machine
C	-	Hydraulic jack	■	1			
D	-	Blocking tool	■	2			
E	-	Eyebolt	■	1			Removal and installation of track frame assembly
F	791T-685-1410	Lifting tool	●	1		○	
G	-	Container	■	1			Receiving of oil

⚠ Park the machine on a level ground, and set parking brake lever to the LOCK position.

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

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

METHOD FOR REMOVING TRACK FRAME ASSEMBLY

Blade assembly

1. Remove the blade assembly. For details, see “REMOVE AND INSTALL BLADE ASSEMBLY”.

Separation of track shoe assembly

2. Separate the track shoe assembly. For details, see “SEPARATION AND CONNECTION OF TRACK ASSEMBLY”.

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
J	790-101-2310	Block	■	1			Press fit of cartridge pin assembly
	790-445-4130	Screw	■	2			
	796T-470-1130	Plate	■	1		○	
	790-101-2360	Plate	■	2			
	791-112-1180	Nut	■	2			
	790-101-4000	Puller (490 kN {50 t})	■	1			
	790-101-1102	Hydraulic pump	■	1			
K	791T-630-1390	Guide	■	1		○	Pin hole alignment of track frame and bogie

⚠ Park the machine on a level ground, and set parking brake lever to the LOCK position.

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

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

METHOD FOR REMOVING NO. 1 BOGIE ASSEMBLY

Undercover

1. Remove undercover.

   REMARK

   When removing the bogie assembly, remove the undercover in the way of works.

   Engine undercover:

   220 kg

   Power train undercover:

   270 kg

Separation of track shoe assembly

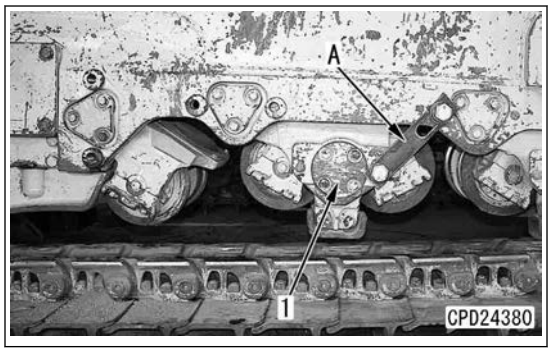
2. Separate the track shoe assembly. For details, see “SEPARATION AND CONNECTION OF TRACK ASSEMBLY”.

Preparation

3. Fix 2nd bogie assembly by using tool A, and operate the blade and ripper to lift the machine up to the position where the track roller of 2nd bogie assembly (2) is lifted from the track link.

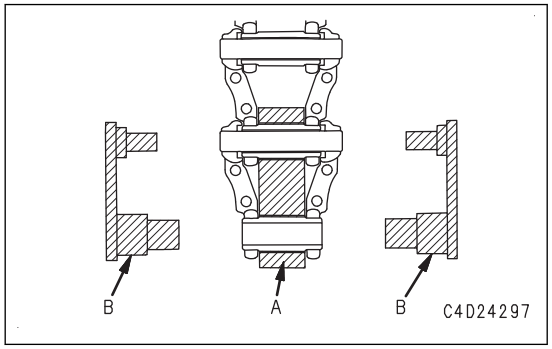
   NOTICE

   Set the blocking tools and blocks under the front and rear frames to prevent the machine from lowering.



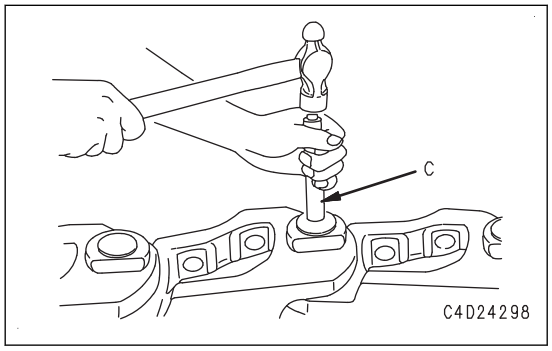
Link

2. Set the link assembly on the link press. Tap it by using a hammer to make the bushing contact with tool A.



REMARK

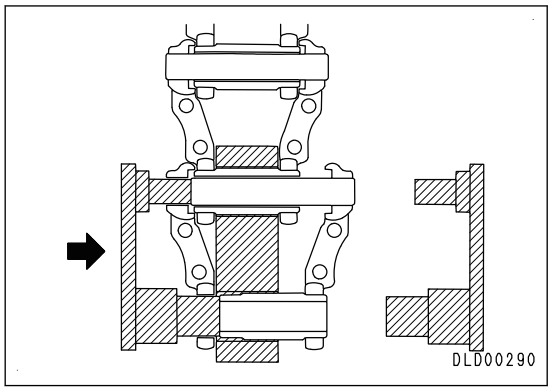
- If the link tread and bushing outside diameter are worn, adjust the height of tool H or guide plate to perform centering of tool B on the bushing center. Be careful not to damage the link hole when disassembling.
- If centering is not sufficient, the link hole may be damaged, pin may be broken, or bushing may be cracked when disassembling.
- Drive in the small plug of the pin towards the inside after disassembly by using tool C to keep the workplace clean.



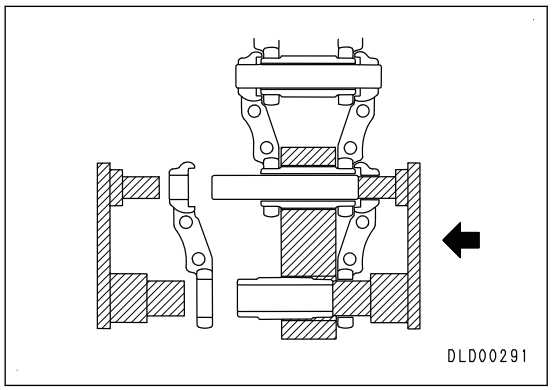
3. Operate the left side cylinder to pull out the left side link and press-fitting portions of the pin and bushing simultaneously.

REMARK

Check the pulling-out force of the pin and bushing to see if the press-fitting force of them is obtained, that is required when they are reversed and reassembled.

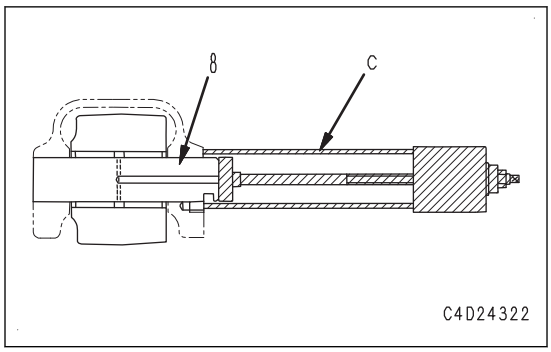


4. Return the left side cylinder, and operate the right side cylinder to pull out the right side link and press-fitting portions of the pin and bushing simultaneously.



10. Pull out center pin (8) by using tool C.

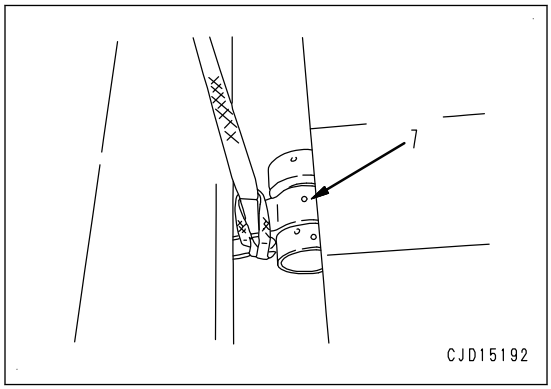
⚠ Operate the hydraulic parts remotely. Do not operate them on the front and bottom side of the puller.



11. Operate the chain block and crane to remove equalizer bar assembly (7).

Equalizer bar assembly:
240 kg

⚠ After removing the equalizer bar assembly, do not lower the machine.



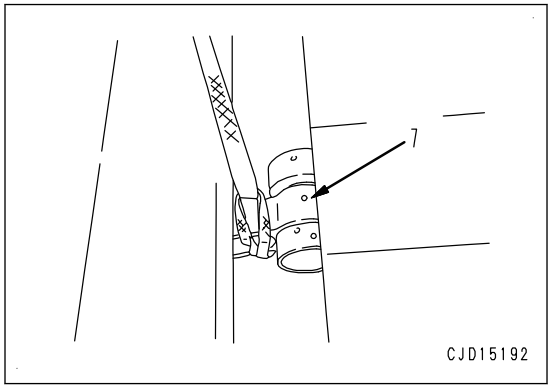
METHOD FOR INSTALLING EQUALIZER BAR ASSEMBLY

Equalizer bar assembly

1. Operate the chain block and crane to install equalizer bar assembly (7).

REMARK

Install the equalizer bar with the greasing nipple side facing forward.

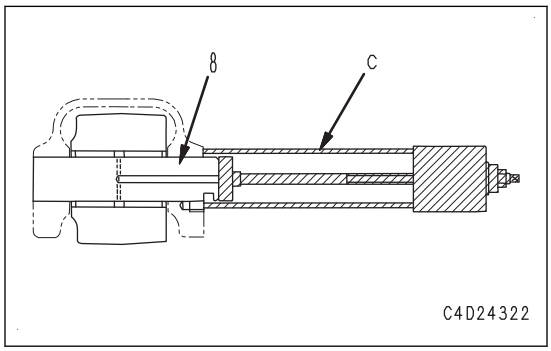


2. Install center pin (8) by using tool C.

⚠ When aligning pin holes, never insert your finger into the holes.

⚠ Operate the hydraulic parts remotely. Do not operate them on the front and bottom sides of the puller.

Equalizer bar center bushing:
Grease (G2-LI)



REMOVE AND INSTALL SCAVENGING PUMP ASSEMBLY

⚠ **Park the machine on a level ground, and set parking brake lever to the LOCK position.**

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

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

⚠ **Turn the battery disconnect switch to OFF position, and remove the key.**

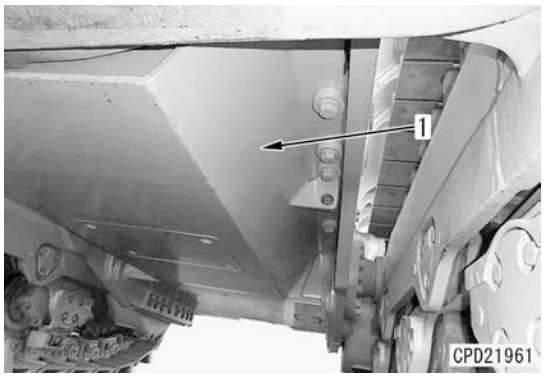
⚠ **If you drain the radiator coolant when it is still hot, you may be scalded. Wait until the coolant temperature drops before draining.**

METHOD FOR REMOVING SCAVENGING PUMP ASSEMBLY

Underguard

1. Remove underguard (1) under the power train.

   Underguard:
   300 kg



Draining

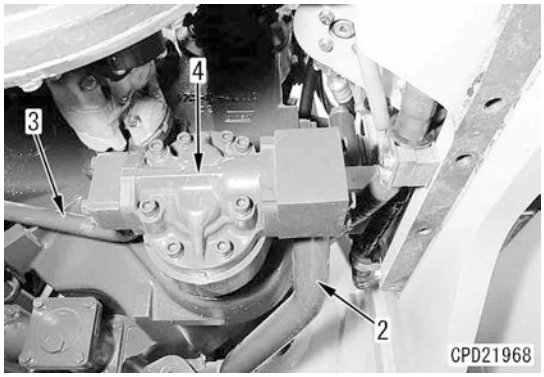
2. Drain oil from the power train case.

   Power train case:
   90 ℓ

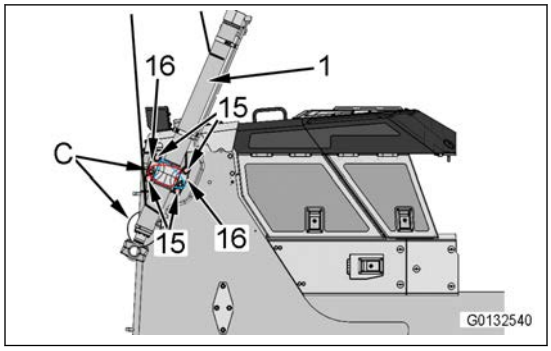
Scavenging pump assembly

3. Remove suction tube (2).
4. Disconnect outlet tube (3).
5. Remove the mounting bolts (2 pieces), and remove scavenging pump assembly (4).

   Scavenging pump assembly (4):
   20 kg

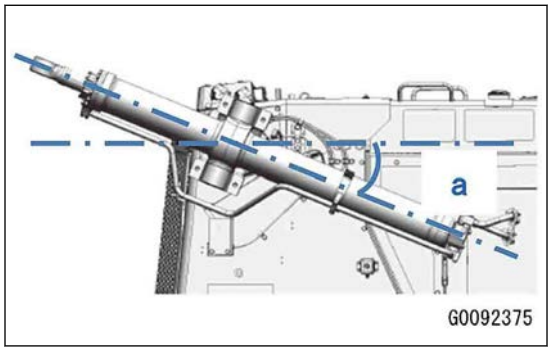


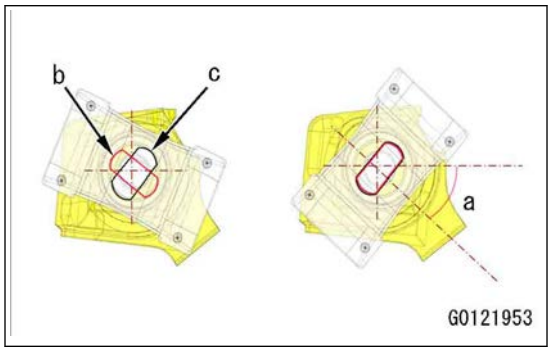
7. Install the stroke and reset sensing blade lift cylinder assembly (1) with the 4 bolts (15).



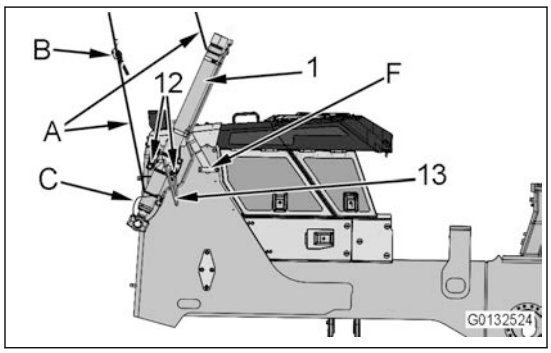
NOTICE

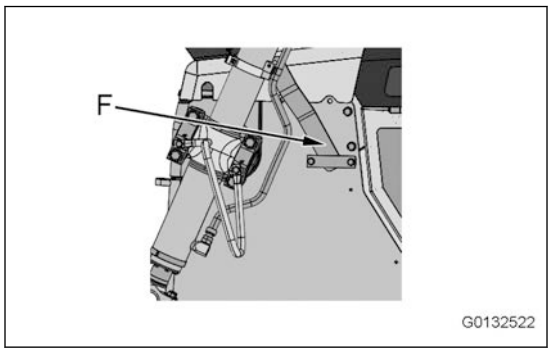
- **Do not rotate the stroke and reset sensing blade lift cylinder assembly (1) to the angle above the horizontal. If the angle becomes (a) shown in the figure, there is a danger that the yoke is removed from the radiator guard.**
- **Angle (a): 28±5°**
- **(b) and (c) in the figure show the parts with the key structure.**
- **(b): Line of yoke**
- **(c): Line of radiator guard**



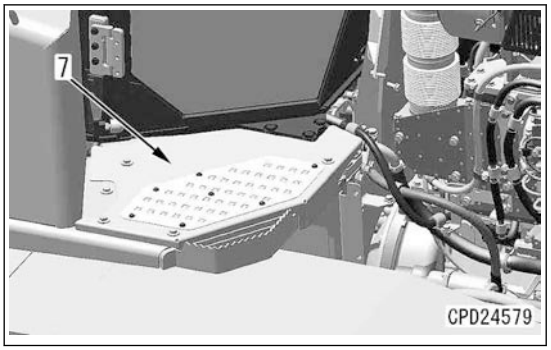


8. Set the stroke and reset sensing blade lift cylinder assembly (1) as shown in the figure, and install the fixing tool (F).
9. Install the grip (13) with the 2 bolts (12).

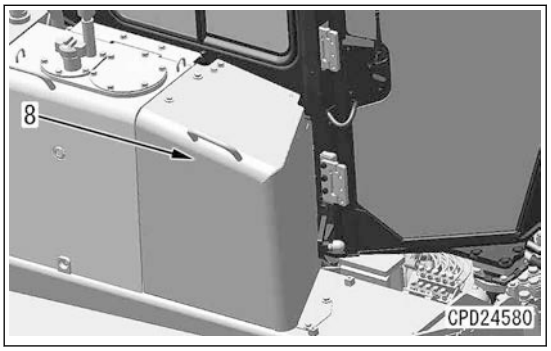




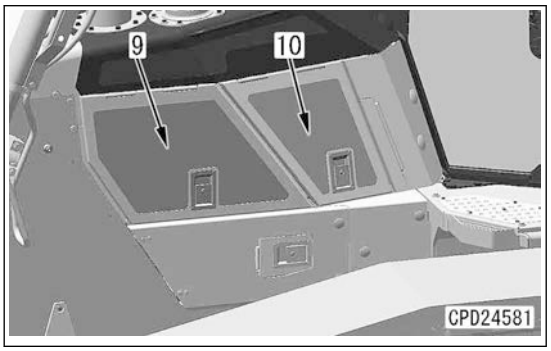
7. Remove cover (7).



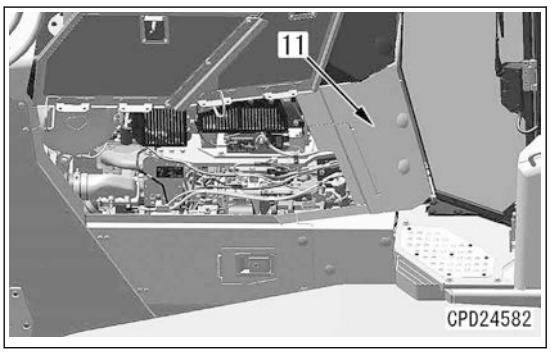
8. Remove control valve cover (8).



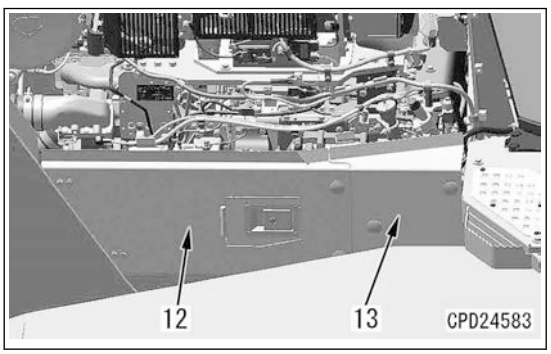
9. Open side covers (9) and (10) on the left of engine.



10. Remove cover (11).

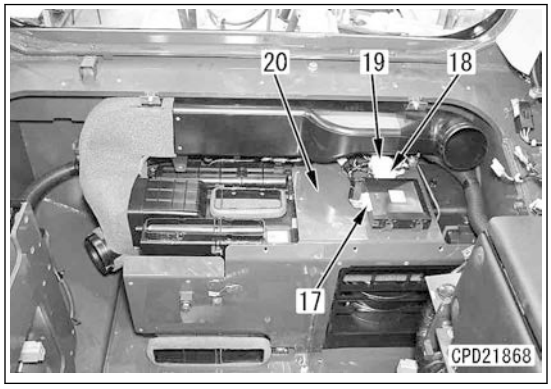


11. Remove mudguard covers (12) and (13).

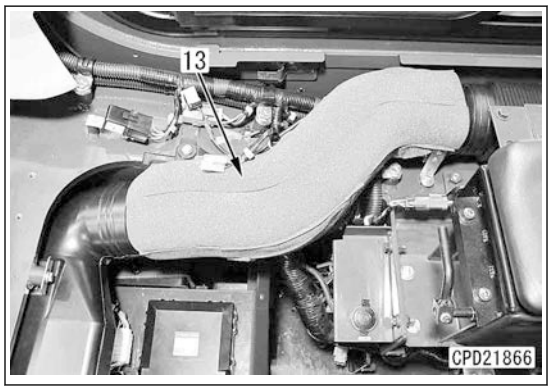


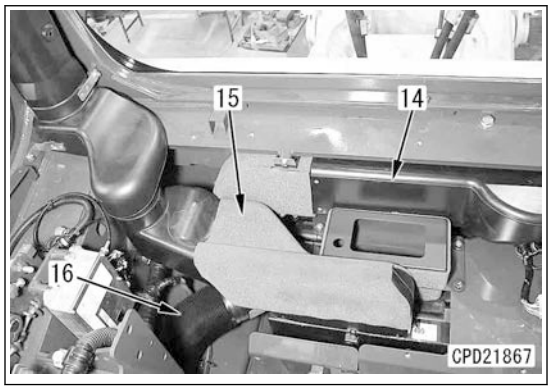
Duct

22. Install cover (20).
23. Connect wiring connectors ACECU (17), AC01 (18), and AC02 (19), and install the wiring clamp and band.
24. Install ducts (16), (15), (14), and (13) in this order.
25. Install the mounting clips (2 pieces) of ducts (14) and (15).



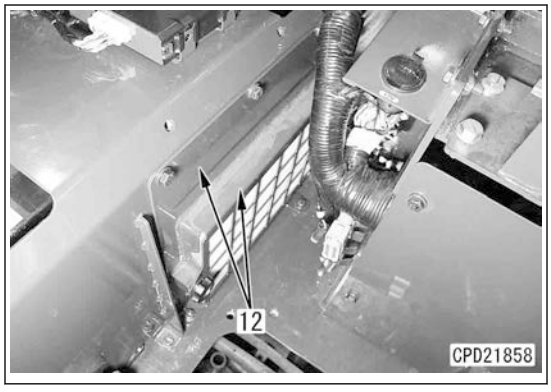
26. Install the mounting bolts of ducts (13) and (15).





Cover

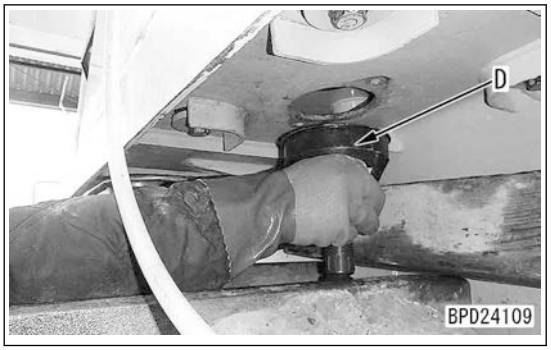
27. Install filter bracket (12) with the mounting bolts.

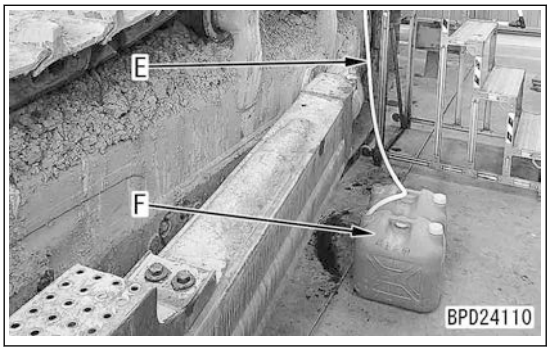


20. After removing drain plug (20), draining amount increases or decreases in approximately 10 seconds. Change tool A to tool D at the timing of decreasing.

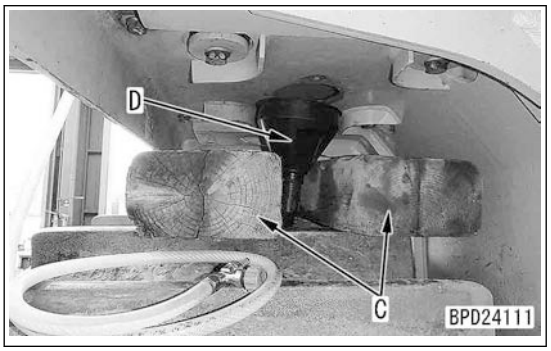
    REMARK

    Insert tip of tool D into tool E placed on the ground.





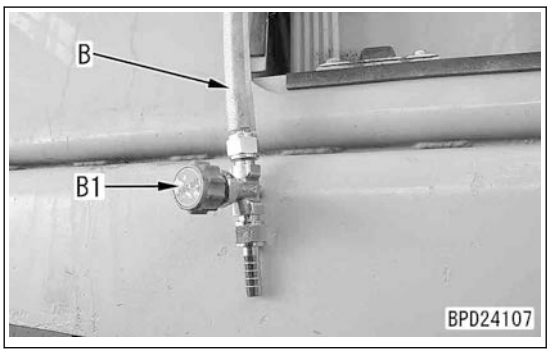
21. Pinch tool D by using tool C to fix it.



22. Fully open valve B1 of tool B.
23. When tool E is nearly fully filled, securely close valve B1 of tool B.
24. After closing valve B1, draining amount increases or decreases in approximately 10 seconds. Change tool E to tool D at the timing of decreasing.

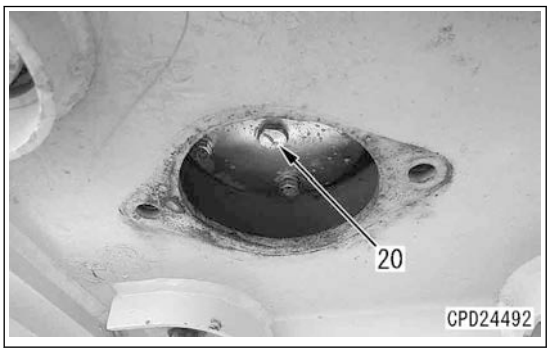
    REMARK

    The guide until draining is weakened is approximately 0.9 ℓ.



25. When the AdBlue/DEF tank becomes empty, install drain plug (20) securely.

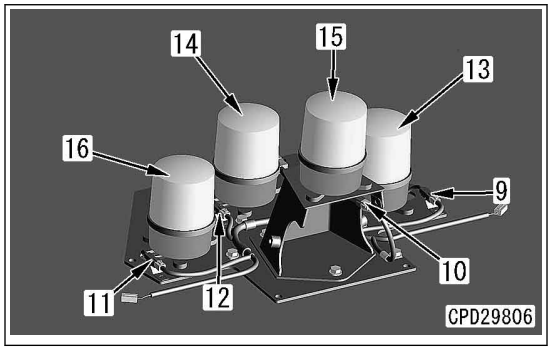
    Drain plug (20):
    9.8 to 12.7 Nm {1.0 to 1.3 kgfm}



METHOD FOR INSTALLING REVOLVING LAMP

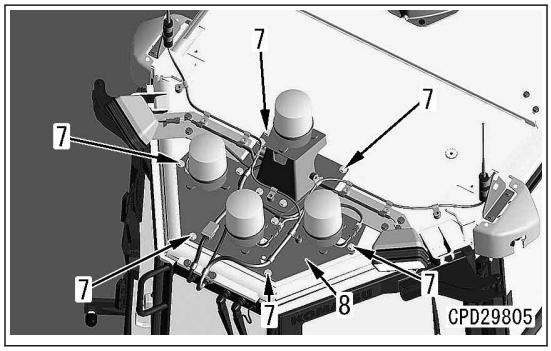
Revolving lamp

1. Install revolving lamps (red) (13), (green) (14), (yellow) (15), and (blue) (16).
2. Connect connectors P2 (9), P3 (10), P4 (11), and P5 (12).

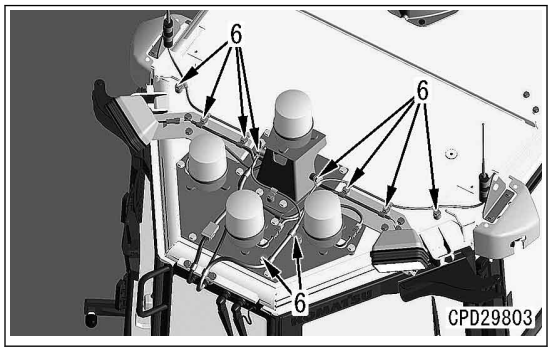


3. Sling bracket (8), and install it with bolts (7) (6 pieces).

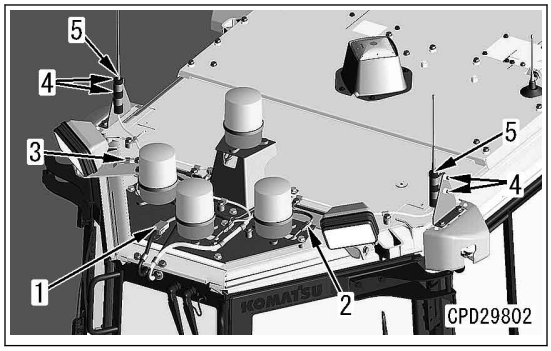
   Bracket (8):
   25 kg

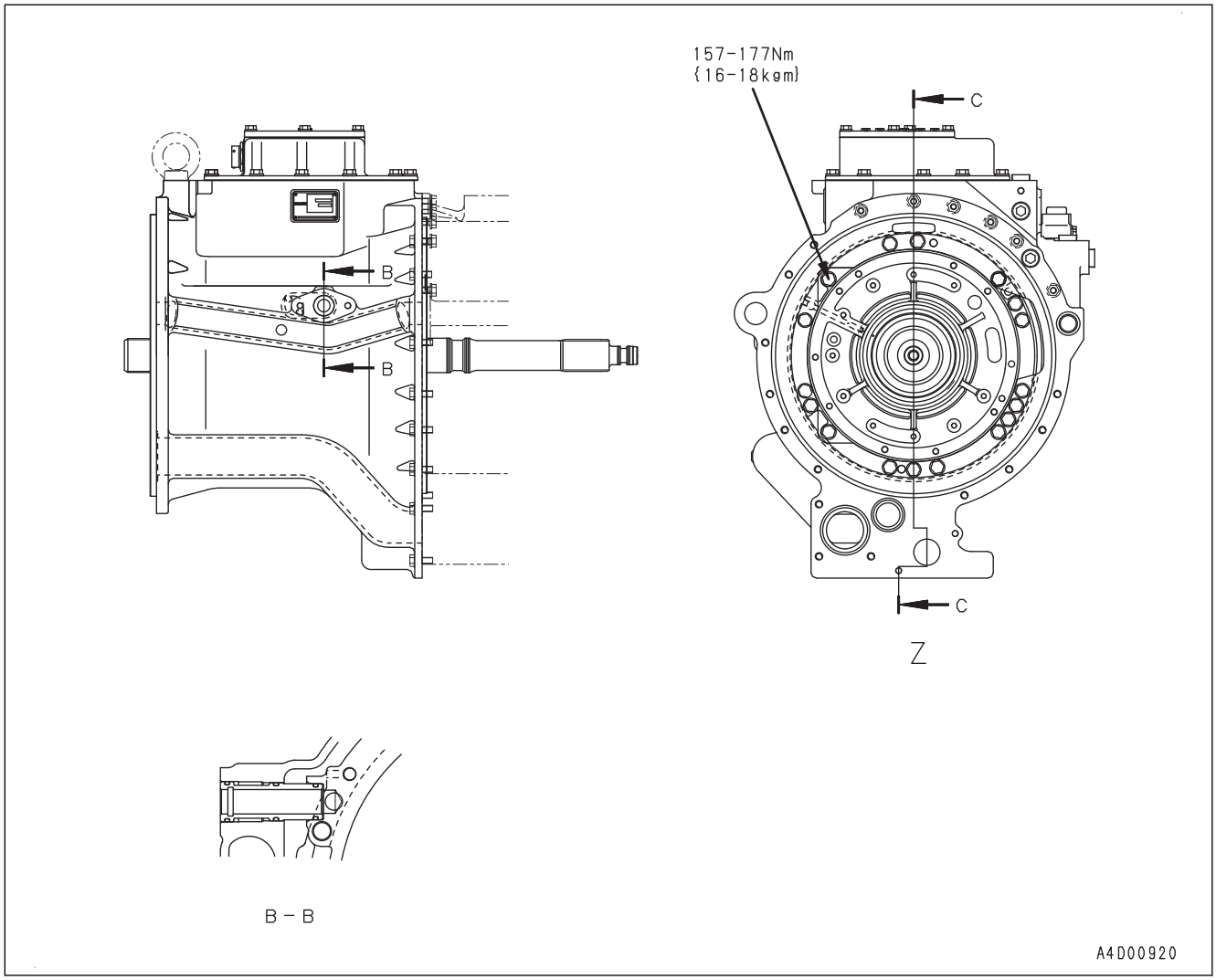


4. Install bolts (6) (11 pieces).

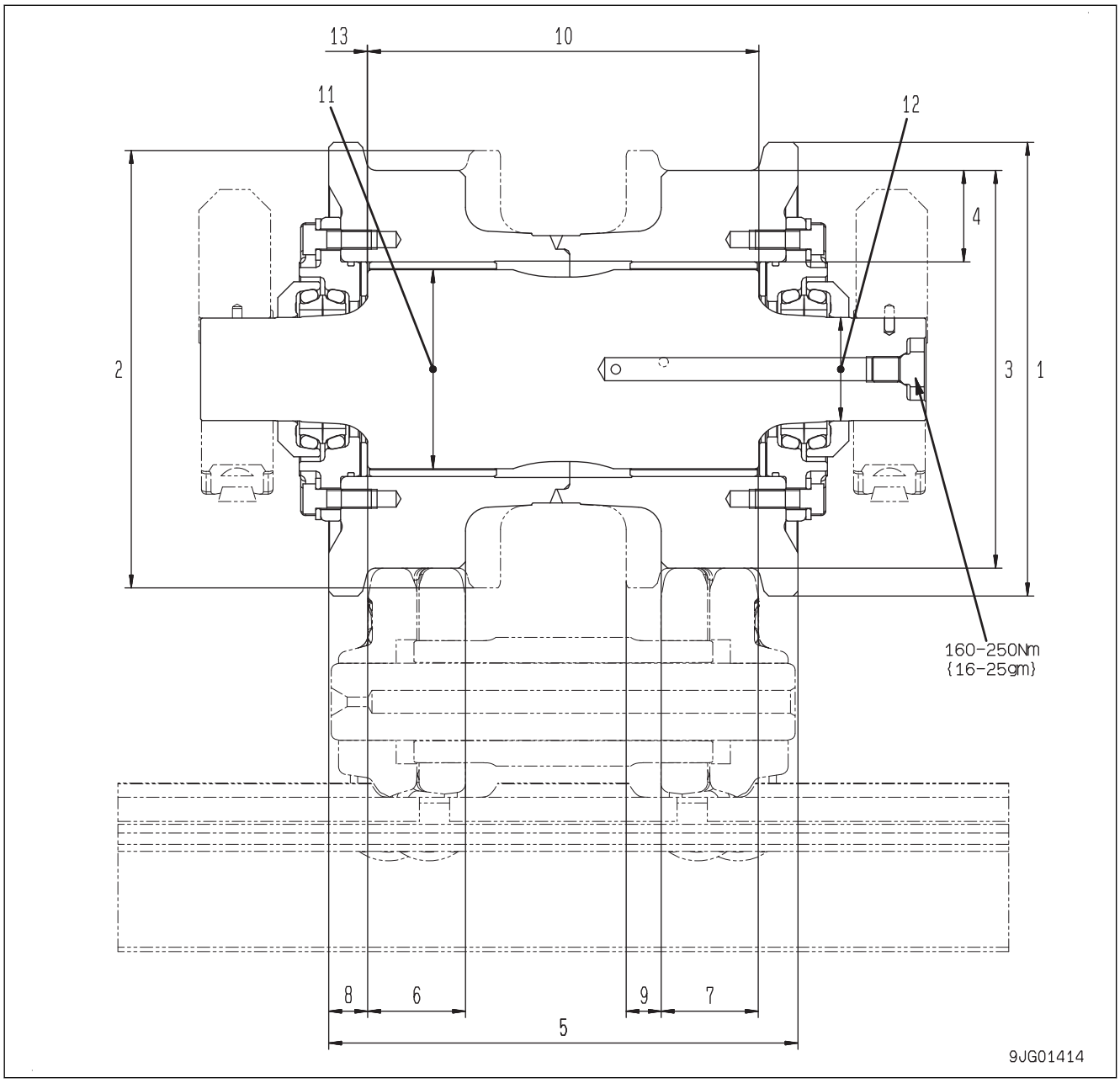


5. Install radio control antennas (5) (2 pieces) with bolts (4) (4 pieces).
6. Connect connectors P1 (1), CBFL (2), and CBFR (3).

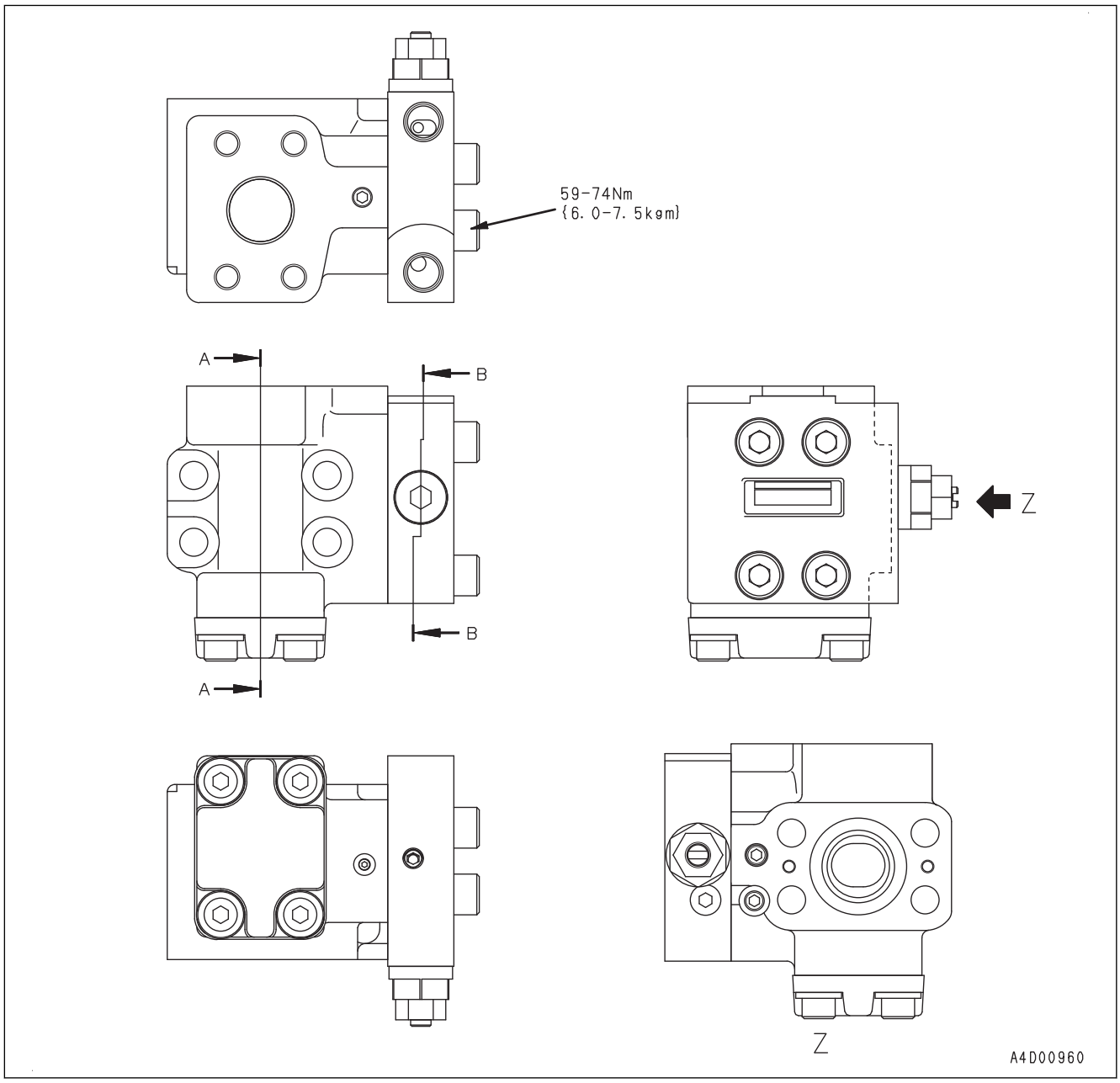



157-177Nm
{16-18kgm}
B
B
C
C
Z
B - B
A4D00920

MAINTENANCE STANDARD OF TRACK ROLLER FOR CONVENTIONAL TYPE TRACK SHOES



MAINTENANCE STANDARD OF SELF-PRESSURE REDUCING VALVE



OUTLINE OF REFRIGERATION CYCLE

Regeneration cycles are composed of the following 4 processes. Refrigerant circulates around the system repeatedly changing its phase from liquid → gas → liquid.

Compression (Compressor)

- The compressor sucks in the refrigerant which is evaporated in the evaporator and compresses the refrigerant until it can be easily liquefied at the ambient temperature.
- The gas refrigerant sucked in the compressor cylinder is compressed to make the pressure higher. When the refrigerant is cooled at the ambient temperature, it can be easily liquefied.

Condensation (Condenser)

- The condenser cools and liquefies the high-temperature and high-pressure gas refrigerant sent from the compressor at the ambient temperature.
- The heat radiation from the condenser to the atmosphere is called the condensation heat.
- The amount of condensation heat is the sum total of the heat absorbed by the evaporator from the air in the cab and the quantity of the work applied (the value converted into a heat quantity) by compression of the compressor.
- The refrigerant liquefied in the condenser is sent to the receiver and dewatered.
- In the condensation process, gas refrigerant and liquid refrigerant are mixed.
- The temperature (condensation temperature) and the pressure (condensation pressure) at which the gaseous refrigerant is liquefied are proportional to each other.
  Reference: The pressure varies depending on the condensation temperature of the refrigerant.

Expansion (Expansion valve)

- The expansion valve reduces the liquid refrigerant pressure to a level where liquid refrigerant can be easily evaporated by the throttle action (*1).
- The action of reducing the pressure of the liquid refrigerant to a state where it easily evaporates before sending it to the evaporator is called expansion.
- The expansion valve used for expansion reduces the refrigerant pressure and controls the refrigerant flow simultaneously.
- The quantity of the liquid refrigerant that can be evaporated in the evaporator depends on the amount of heat (refrigeration load) to be removed under the specific evaporation temperature (evaporation pressure).
- The expansion valve controls the refrigerant supply rate to prevent too much or too little supply of the liquid refrigerant.

(*1) Throttle action

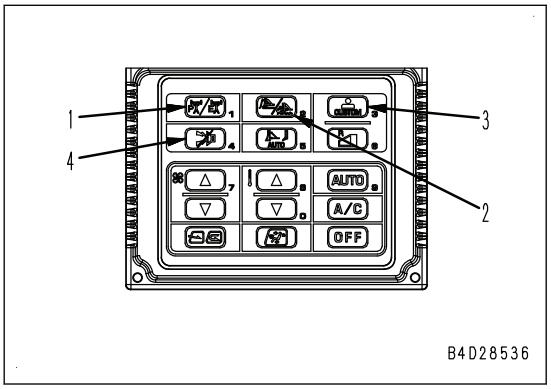
- If there is a narrow section in the passage through which liquid is flowing at a constant rate, a resistance to the flow is generated.
  When the liquid passes through a narrow section, cross-sectional area suddenly increases. The liquid expansion causes pressure and temperature to decrease.
- No heat is transferred between inside and outside by the throttle action.

Evaporation (Evaporator)

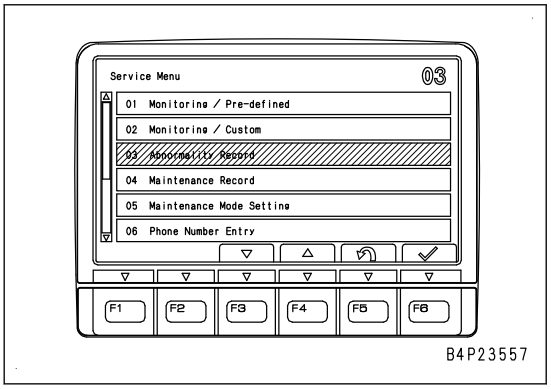
- The evaporator evaporates the liquid refrigerant (superheated vapor).
- The refrigerant evaporates, while absorbing an amount of heat necessary for evaporation (evaporation heat) from the air around the cooling fins (air in the cab).
- The cooled air is sent into the cab by the blower fan, and it decreases the temperature in the cab.
- In the evaporator, the misty refrigerant sent from the expansion valve and the evaporated gas refrigerant are mixed together.
- The temperature (evaporation temperature) and the pressure (evaporation pressure) at which the liquid refrigerant is evaporated are proportional to each other.

HOW TO OPEN THE ELECTRICAL SYSTEM ABNORMALITY RECORD SCREEN IN SERVICE MODE OF THE MACHINE MONITOR

1. Press“1”, “2”, and “3” in this order on the standard screen while pressing numeric key “4”.



2. Press F3 twice on the Service Menu screen, and select “03 Abnormality Record”.
3. Press F6 to enter the selection.



4. Press F3 once on the Abnormality Record screen, and select “02 Electrical Systems”.
5. Press F6 to enter the selection.