SEN06856-07

Shop Manual

BULLDOZER

D61EXi-24
D61EXi-24E0
D61PXi-24
D61PXi-24E0

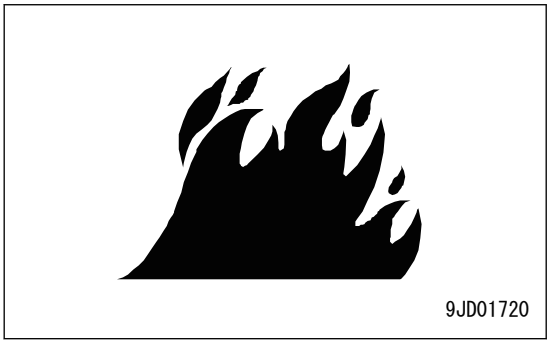
SERIAL NUMBERS D61EXi-45001 and up
D61PXi-45001

KOMATSU

Precautions to Prevent Fire

Fire Caused by Fuel, Oil, Coolant or Window Washer Fluid

Do not bring any open flame close to fuel, oil, coolant or window washer fluid. Always observe the following.


9JD01720


9JD01721

- Do not smoke or use any open flame near fuel or other flammable substances.
- Shut down the engine before adding fuel.
- Do not leave the machine when adding fuel or oil.
- Tighten all the fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the workplace.
- When washing parts with oil, use a non-flammable oil. Do not use diesel oil or gasoline.There is danger that they may catch fire.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.
- Determine well-ventilated areas for storing oil and fuel. Keep the oil and fuel in the specified place and do not allow unauthorized persons to enter.
- When performing grinding or welding work on the machine, move any flammable materials to a safe place before starting.

Fire Caused by Accumulated or Attached Flammable Objects

- Remove any dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated or attached to or around the engine exhaust manifold, muffler, or battery, or on the undercovers.
- To prevent fires from being caught, remove any flammable materials such as dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated around the cooling system (radiator, oil cooler) or on the undercover.

Fire Caused by Electrical System

Short circuits in the electrical system can cause fire. Always observe the following.

- Keep all the electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Reconnect any loose connectors or refasten wiring clamps. Repair or replace any damaged wiring.

Fire from Pipings

Check that all the clamps for the hoses and tubes, guards, and cushions are securely fixed in position.

If they are loose, they may vibrate during operation and rub against other parts.There is danger that this may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire and serious personal injury or death.

Fire Caused by High Temperature Exhaust Gas

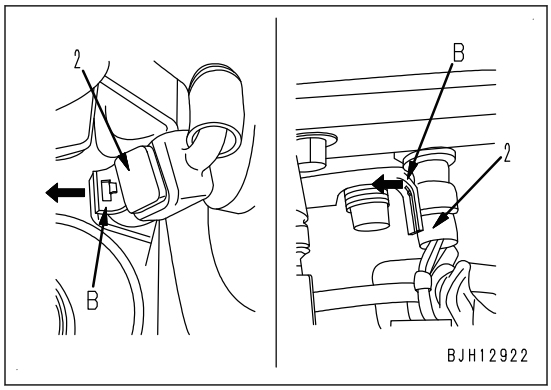
Some models and specifications may be equipped with KDPF (Komatsu Diesel Particulate Filter).

KDPF is a system for purifying exhaust gas by removing soot in exhaust gas. In the process of purification (regeneration), the temperature of discharged exhaust gas may be higher than that of conventional models. Do not bring any flammable materials close to exhaust pipe outlet.

How to Disconnect and Connect Connector with Lock to Pull

How to Disconnect Connector with Lock to Pull

Disconnect the connector (2) by pulling lock (B) (on the wiring harness side) of connector (2) outward.



How to Connect Connector with Lock to Pull

Insert the connector securely until it “clicks”.

REMARK

- The engine rated horsepower is indicated in the net value and gross value. Gross denotes the rated horsepower measured on the basic engine unit while net denotes the value measured of an engine under the condition nearly the same as that when it is installed on a machine.
  - The rated horsepower (net) at the maximum cooling fan speed is the following value.
    113 kW {152 HP} /2200 min^{-1} {2200 rpm}
  - The maximum engine gross horsepower is the following value.
    127 kW {170 HP} /2200 min^{-1} {2200 rpm}

Note 1: KDPF engine oil for cold district is deteriorated easily than that for normal area (replace every 500 hours), so replace oil and filter cartridge every 250 hours. For changing the maintenance time of machine monitor, ask your Komatsu distributor to perform the work.

Note 2: Hyper grease (G2-TE) has a high performance. When it is necessary to improve the lubricating ability of the grease in order to prevent squeaking of pins and bushings, the use of G2-TE is recommended.

Note 3: Non-Amine Engine Coolant (AF-NAC)

1. The coolant has the important function of preventing corrosion as well as preventing freezing.
   Even in the areas where freezing is not an issue, the use of coolant is essential.
   Komatsu recommends the use of Non-Amine Engine Coolant (AF-NAC). If you use another coolant, it may cause serious problems in the cooling system, including the engine.
   Komatsu machines are supplied with Non-Amine Engine Coolant (AF-NAC). Non-Amine Engine Coolant (AF-NAC) has excellent anti-corrosion, antifreeze and cooling properties and can be used continuously for every 3 years or every 6000 hours whichever occurs first in the below listed conditions (If other coolant than Komatsu approved non-Amine (AF-NAC) is used for refill or top off, the change interval is every 2 years or every 4000 hours whichever occurs first).
   Conditions to meet every 2 years or 4000 hours to extended coolant life:
   - Must pass coolant test/analysis at 4000 hours, the test interval is a precautionary procedure intended to prevent cooling and engine system damage
   - All maintenance top offs and refills were done with Komatsu approved non-Amine (AF-NAC) coolant

   For more information (e.g. test method) on the Coolant test/Analysis, consult an authorized Komatsu Distributor.
   Non-Amine Engine Coolant (AF-NAC) is strongly recommended wherever available.
2. For the density of Non-Amine Engine Coolant (AF-NAC), see “Coolant density table”.
   Non-Amine Engine Coolant (AF-NAC) is supplied already diluted. In this case, fill up the tank with pre-diluted fluid. (Never dilute the Non-Amine Engine Coolant with ordinary water.)

Coolant Density Table

Min. atmospheric temperature (℃)	-10 or more	-15	-20	-25	-30	-35	-40	-45	-50
Density(%)	30	36	41	46	50	54	58	61	64

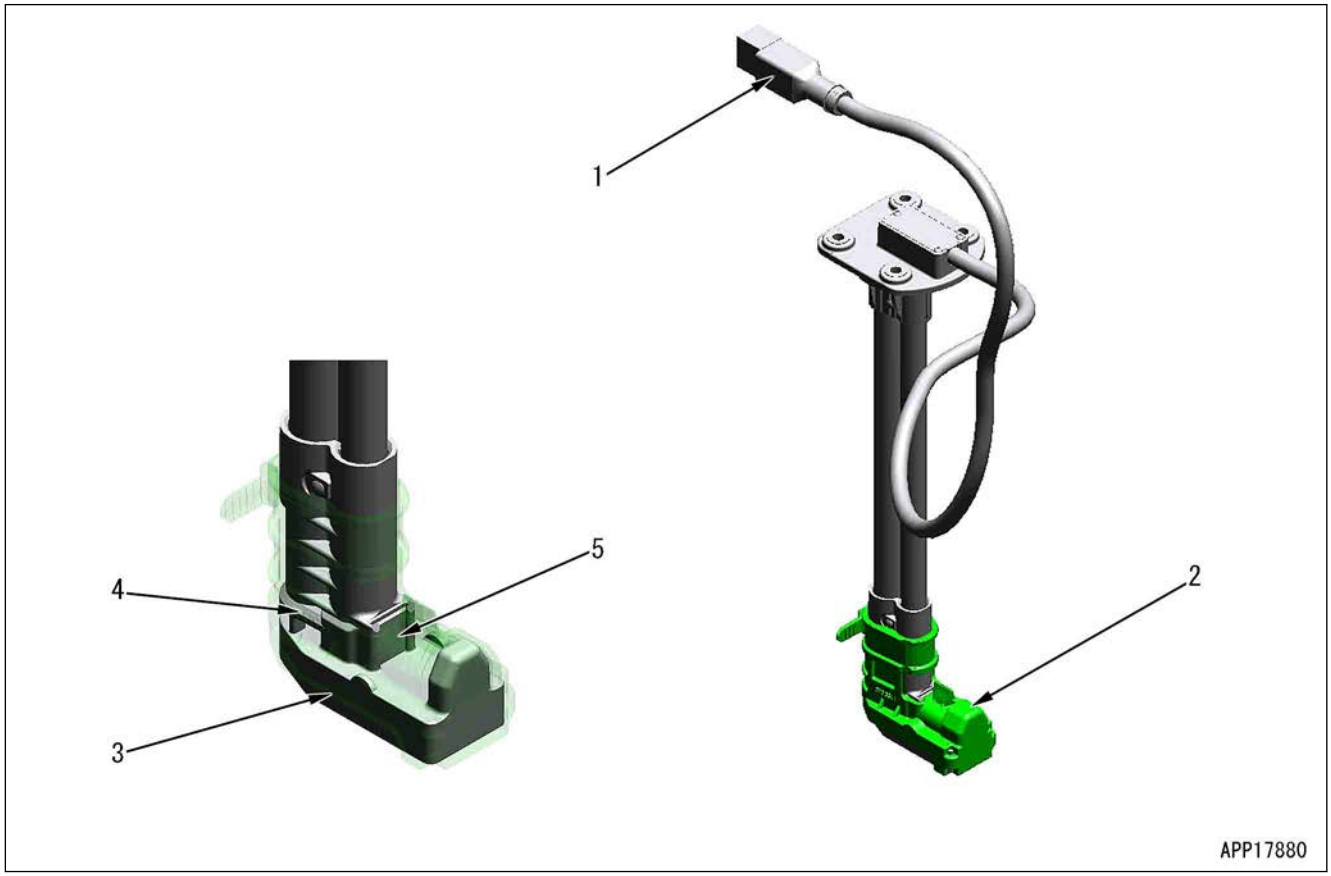
Note 4: The DEF freezes at -11℃. If thawing is necessary, the DEF system is automatically heated to thaw DEF after the engine is started.

DEF Tank Sensor

Structure of DEF Tank Sensor

REMARK

The shape is subject to machine models.



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

Function of DEF Tank Sensor

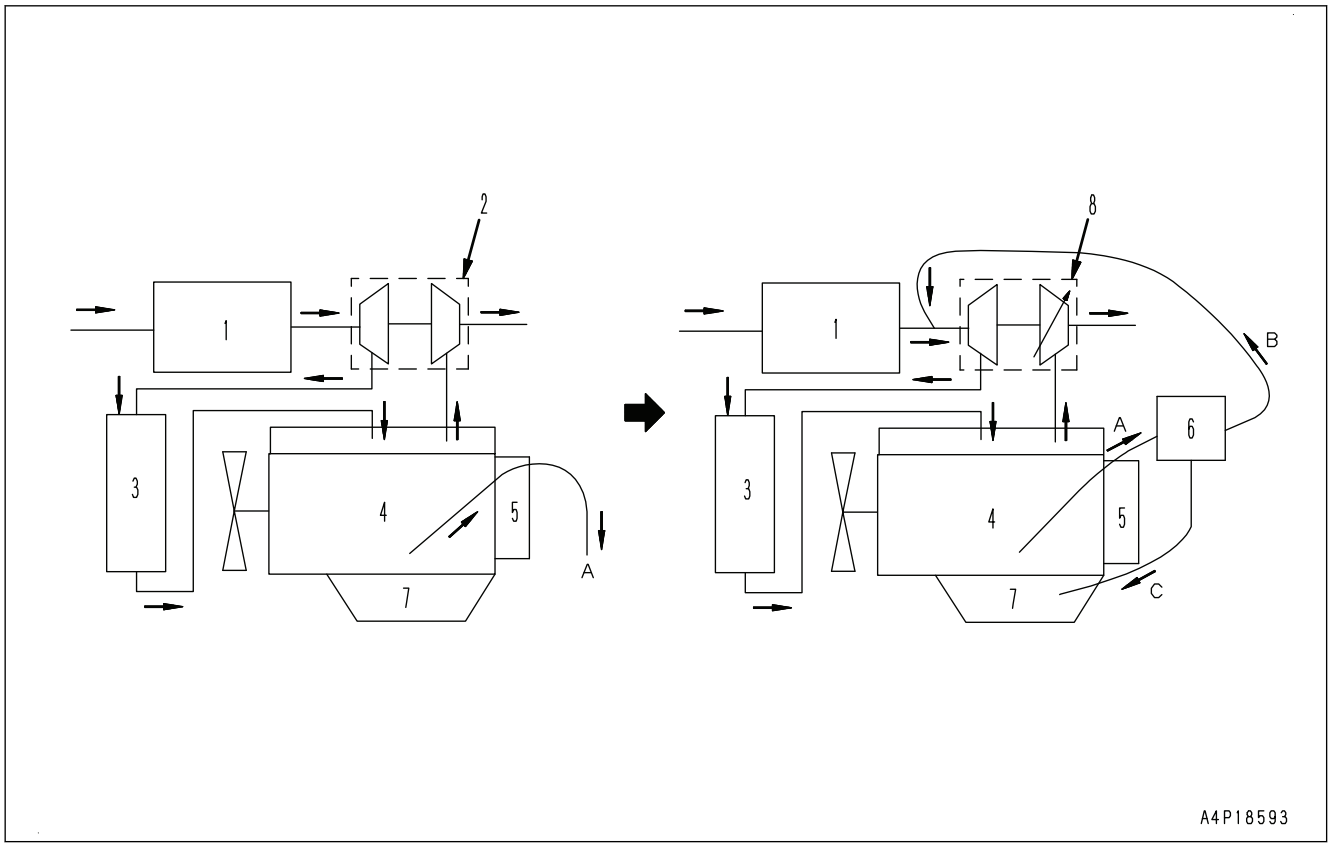
- This sensor is installed to DEF tank and outputs DEF level, DEF concentration, and DEF temperature through CAN communication.
- DEF level and DEF concentration are measured by using ultrasonic wave.
- When the tank is frozen or empty, DEF level and DEF concentration are not measured.

Function of KCCV System

- In the past, blowby gas (A) was allowed to be released into the atmosphere in the past, but now it is restricted by emission regulations.
- Blowby gas (A) contains ingredients of the engine oil. A filter is installed to KCCV ventilator (1) to remove the engine oil to prevent the following possible problems if it is recirculated to VGT (2) as it is.
  - Deterioration of turbocharger and aftercooler performance caused by sticking engine oil
  - Abnormal combustion in engine
  - Malfunction of each sensor caused by sticking engine oil

Operation of KCCV System

Drawing on the left shows the conventional flow of blowby gas. Drawing on the right shows the flow of blowby gas which is sucked in KCCV ventilator and recirculated.



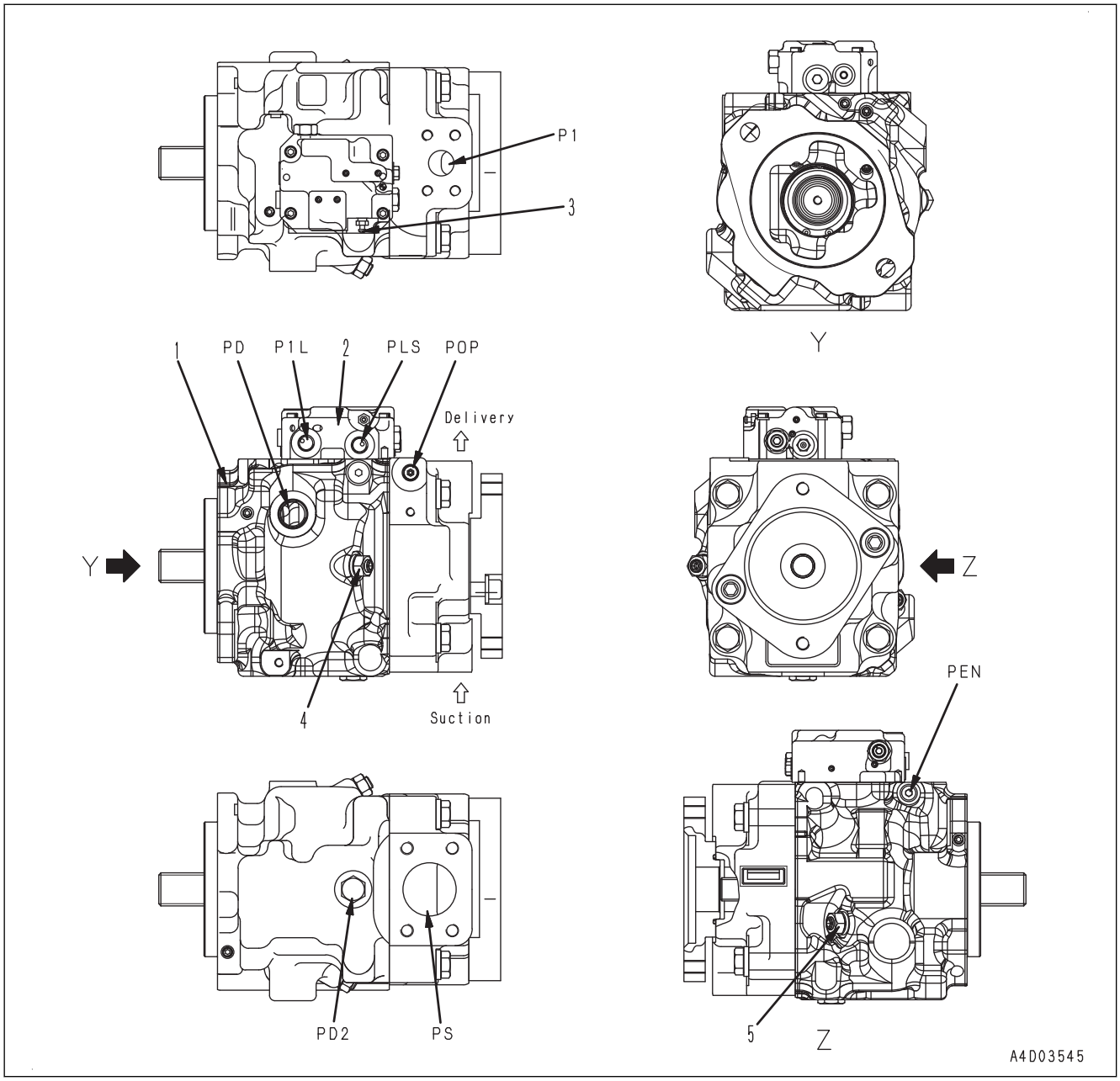
A: Blowby gas
B: Clean gas
C: Engine oil
1: Air cleaner
2: Turbocharger
3: Aftercooler
4: Cylinder block (crankcase)
5: Breather
6: KCCV ventilator
7: Engine oil pan
8: VGT

1. This system removes engine oil (C) from blowby gas (A) in cylinder block (4) by using the filter in KCCV ventilator (6), and recirculate clean gas (B) to the air intake side of VGT (8).
2. Separated engine oil (C) is drained to engine oil pan (7) through the check valve.

Symbol	Item to be displayed	Range and method for display			Remarks
		Range	Monitor display (background color)	Action level Caution lamp	
 9JC01170	State of engine system	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up when an abnormality is detected in engine system. • Alarm buzzer sounds when the background color is red.
		When action level L01 is detected	Lit (yellow)	L01 (*3)	
 9JC01171	State of hydraulic system	When action level L03 is detected	Lit (red)	L03	• Caution lamp lights up when abnormality is detected in hydraulic system. • Alarm buzzer sounds when the background color is red.
		When action level L01 is detected	Lit (yellow)	L01 (*3)	
 9JD00518	State of steering system	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up and alarm buzzer sounds when abnormality is detected in steering system.
 9JD00520	State of HST system	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up when abnormality is detected in HST system. • Alarm buzzer sounds when the background color is red.
		When action level L01 is detected	Lit (yellow)	L01 (*3)	
 9JD00519	State of brake system	When action level L03 is detected	Lit (red)	L03	• Caution lamp lights up and alarm buzzer sounds when abnormality is detected in brake system.
 G0173584	State of parking brake system (*4)	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up and alarm buzzer sounds when abnormality is detected in parking brake system.
 9JD00527	State of parking brake system (*4)	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up and alarm buzzer sounds when abnormality is detected in parking brake system.
 G0173585	State of fan control system (*4)	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up when an abnormality is detected in fan control system. • Alarm buzzer sounds when the background color is red.
		When action level L01 is detected	Lit (yellow)	L01 (*3)	
 9JD00528	State of fan control system (*4)	When action level L04 or L03 is detected	Lit (red)	L04 or L03	• Caution lamp lights up when an abnormality is detected in fan control system. • Alarm buzzer sounds when the background color is red.
		When action level L01 is detected	Lit (yellow)	L01 (*3)	

Work Equipment and Cooling Fan Pump

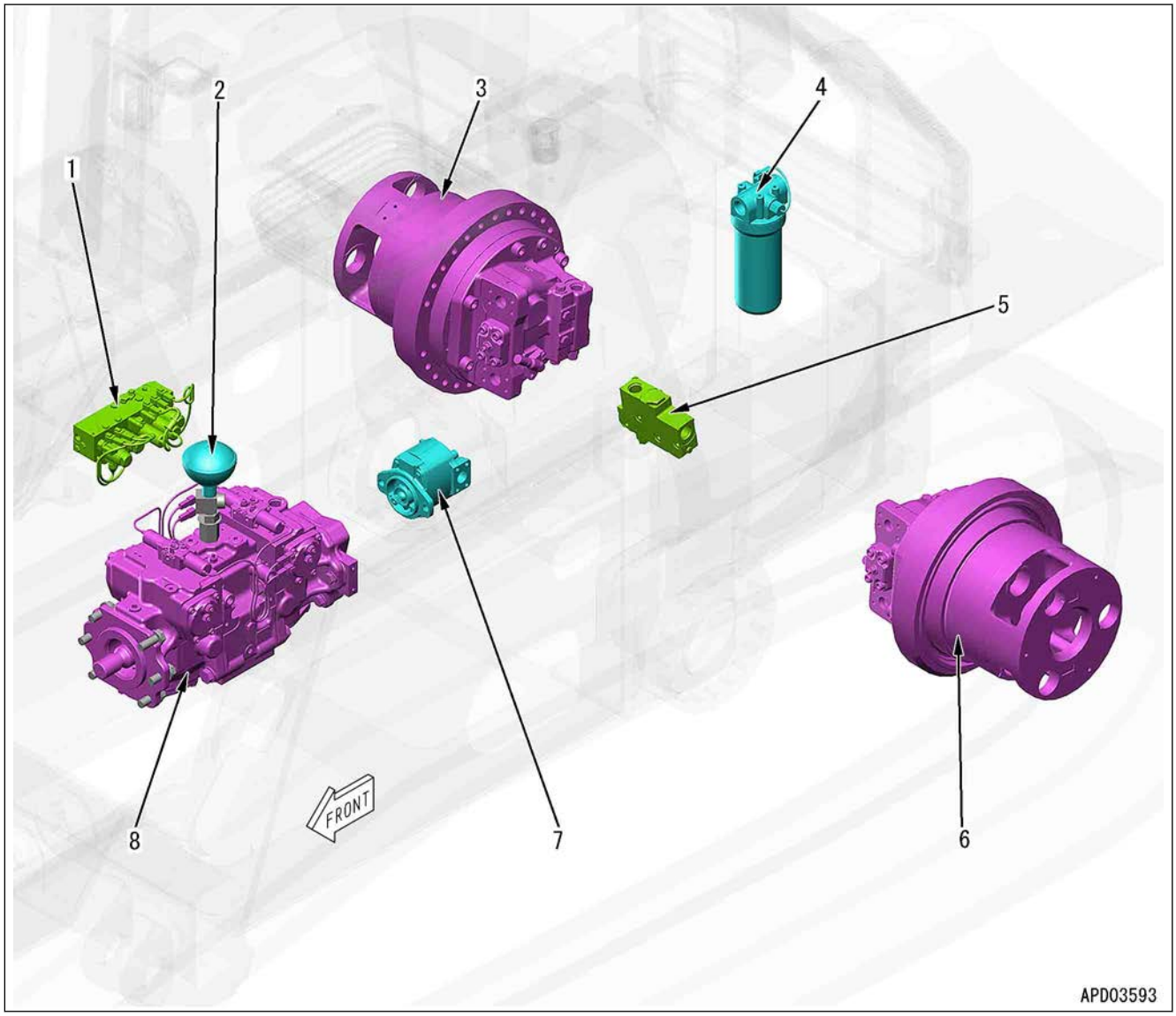
Structure of Work Equipment and Cooling Fan Pump
General View



P1: Pump discharge port
P1L: Pump pressure input port
PD: Drain port
PD2: Drain plug
1: Pump body
2: Servo valve
3: Bleeder
POP: Control source pressure input port
PEN: Control pressure pickup plug
PLS: Load pressure input port
PS: Pump suction port
4: Max. swash plate adjustment plug
5: Min. swash plate adjustment plug

Power Train System

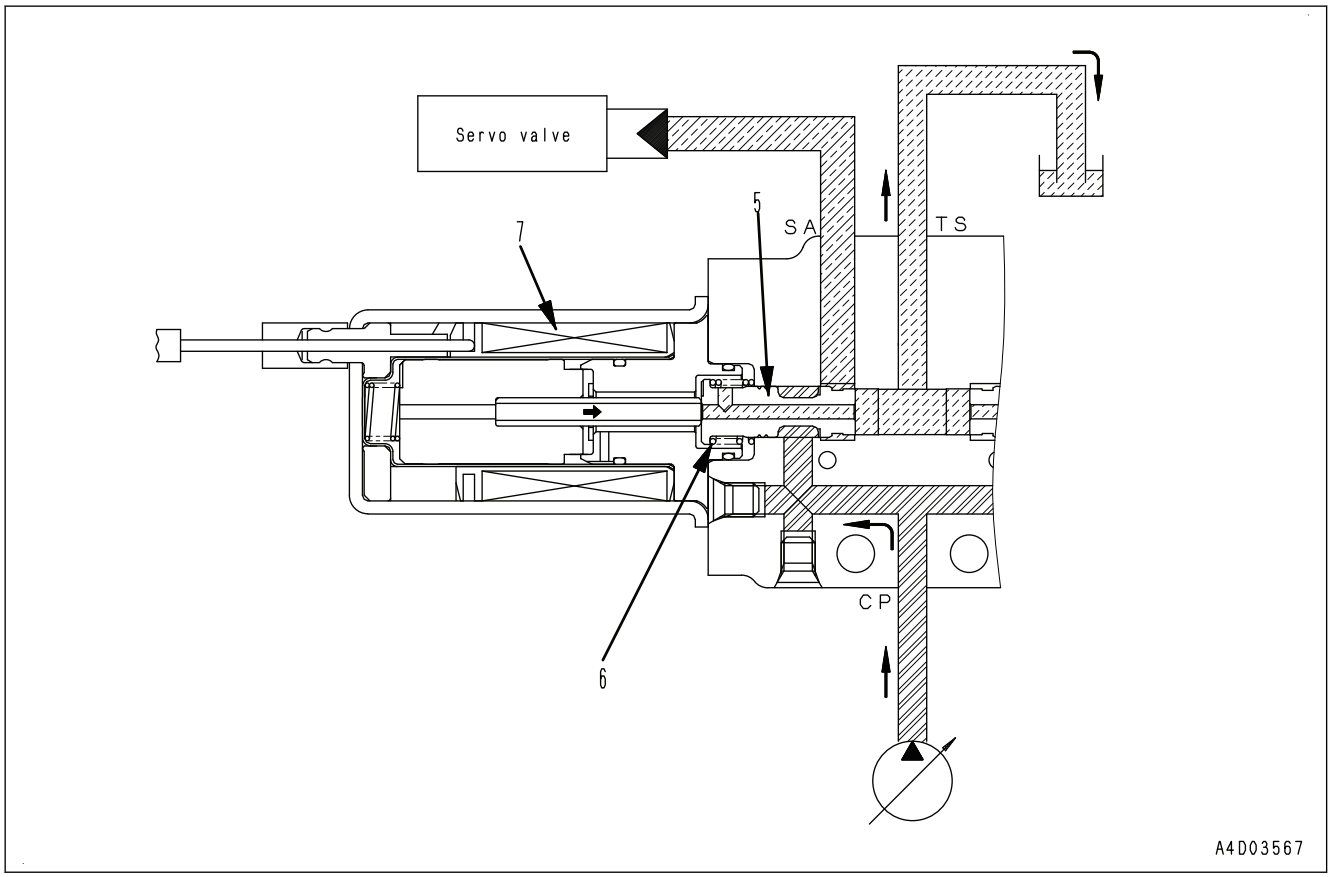
Layout Drawing of HST System



1: Solenoid valve
2: Accumulator
3: R.H. HST motor
4: Charge filter
5: Hydraulic oil cooler bypass and HST charge safety valve
6: L.H. HST motor
7: Charge pump
8: HST pump

4. The oil from servo valve is drained into the tank through port (SA) and port (TS).

When the Signal Current is Minute (Coil is Energized)



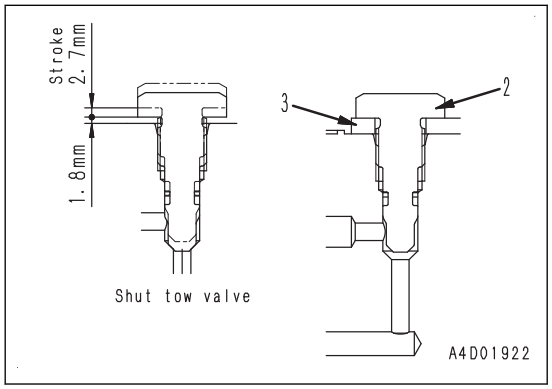
1. When the reaction force of spring (6) is higher than the signal current calculated by the controller, spool (5) is returned to the left. The circuit from port (CP) to port (SA) is throttled.
2. Spool (5) is further returned to the left, and the passage of port (CP) and port (SA) are blocked.
3. Spool (5) moves to a position where the thrust of plunger (8) becomes equal to the total of the pressure at port (SA) and the force of spring (6), and the oil pressure is adjusted.
4. The circuit pressure between HST pump and servo valve is controlled in proportion to the volume of the signal current.

10: Brake pressure sensor

Three solenoid valves (5), (8), and (9), two EPC valves (6) and (7), tow receiving valve (2), and brake pressure sensor (10) are installed in block (1).

Function of 5-Spool EPC and Solenoid Valve

- When parking brake solenoid valve (9) receives the parking brake actuation signal from HST controller, it drains the selector oil pressure and actuates the parking brake built in HST motor.
- The limit switch signals which operates when the brake pedal is fully depressed or operates together with the parking brake lever are not sent to slow brake solenoid valve (8) when the machine is stopped. Then slow brake solenoid valve (8) gradually drains the selector oil pressure, and actuates the parking brake built in HST motor.
- When R.H. HST motor EPC valve (6) and L.H. HST motor EPC valve (7) receive the signal of joystick (steering, directional and gear shift lever), they output oil pressure according to that signal in order to increase or decrease HST motor capacity.
- Work equipment lock solenoid valve (5) is installed between the charge filter outlet and work equipment PPC valve.
- When the work equipment lock lever is set in “FREE” position, work equipment lock solenoid valve (5) actuates as it links with work equipment lock switch to open the work equipment control circuit, then the work equipment becomes operable.
- Tow receiving valve (2) is installed between parking brake solenoid valve (9) and HST motor.
- When the parking brake cannot be released because of engine failure, the operator can release it by removing tow receiving plate (3), screw in tow receiving valve (2), and applying parking brake release pressure from outside.

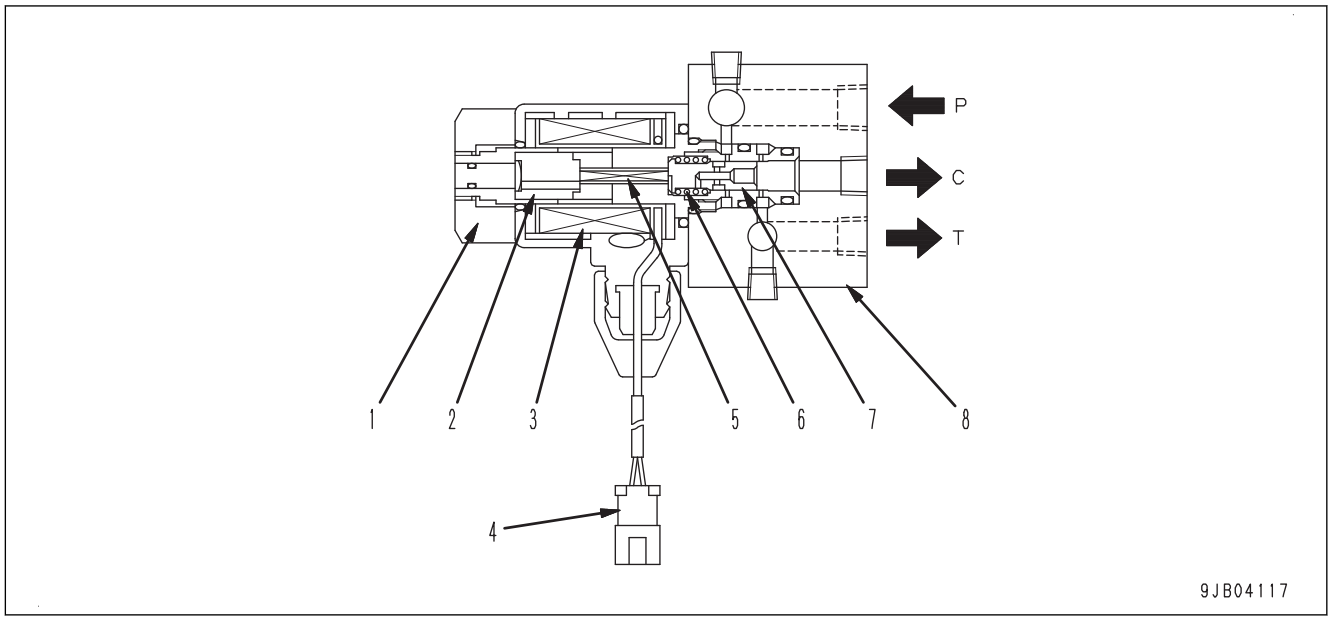


REMARK

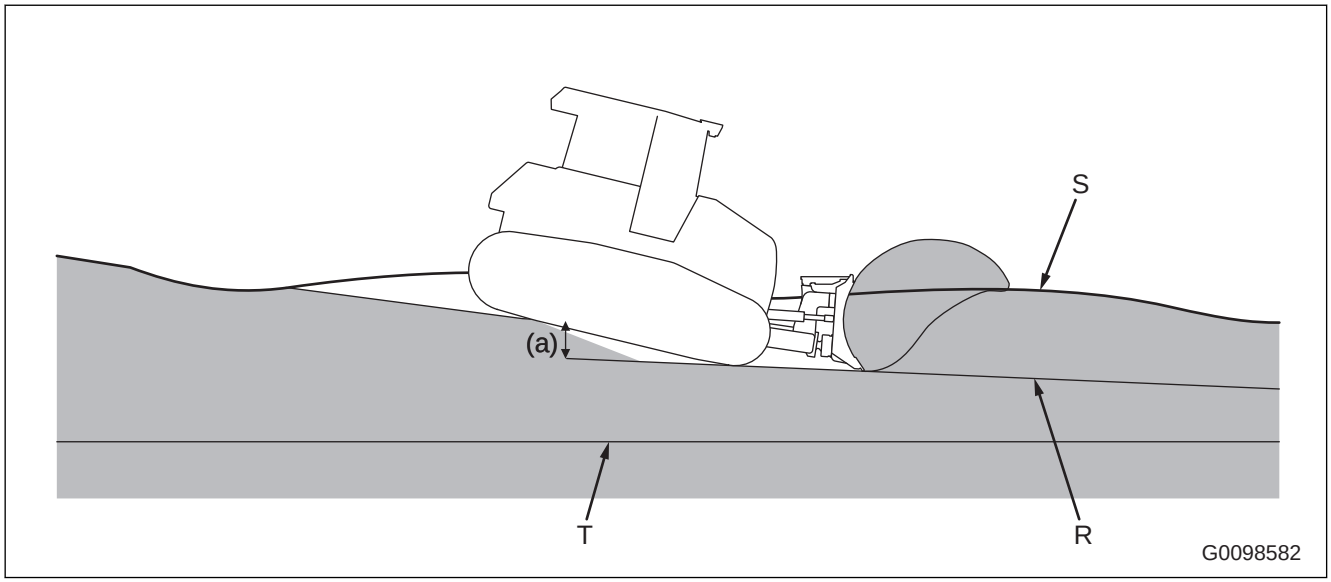
For the procedure for releasing the parking brake, see TESTING AND ADJUSTING, “PROCEDURE FOR RELEASING PARKING BRAKE”.

Structure of Solenoid Valve

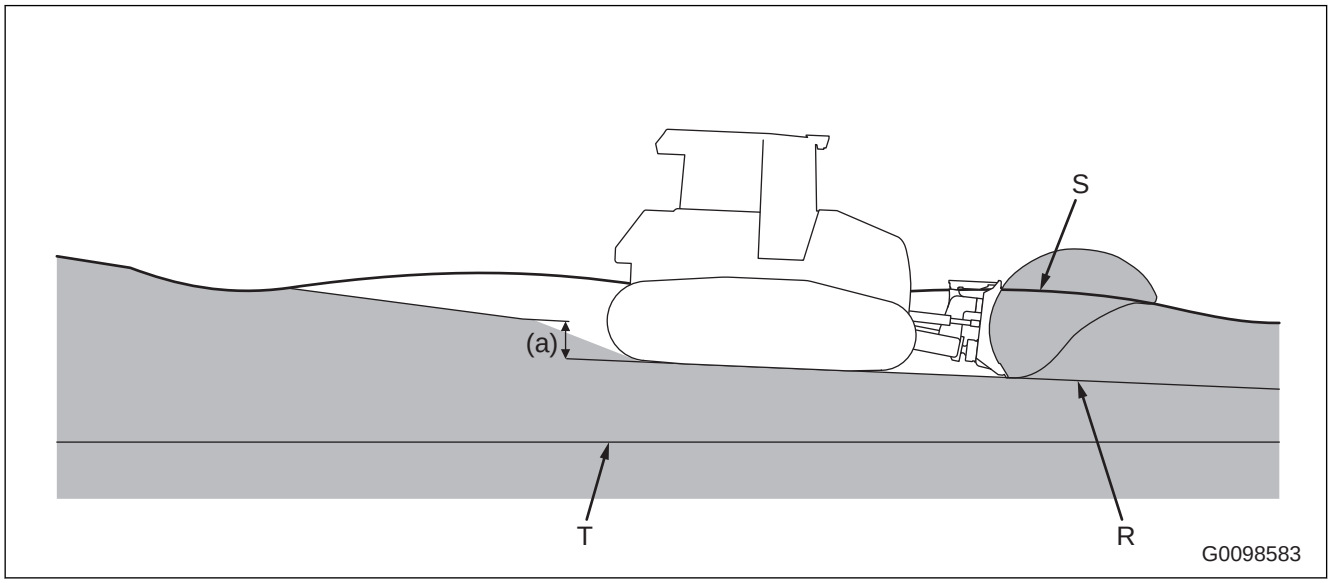
General View and Sectional View



C: To work equipment PPC valve P: From charge filter outlet



R: Cut shape after operation
T: Construction design surface
S: Current terrain
(a): Adjustment value of cut depth



R: Cut shape after operation
T: Construction design surface
S: Current terrain
(a): Adjustment value of cut depth

Pin No.	Signal name	Input/output signal
E	Power supply (switch signal)	Output
F	(*1)	-
G	(*1)	-
H	(*1)	-
J	ENET RX+	Input
K	ENET RX-	Input
L	ENET TX+	Output
M	ENET TX-	Output
N	RX RS232	Input
P	(*1)	-
R	TX RS232	Output
S	(*1)	-
T	(*1)	-
U	(*1)	-
V	(*1)	-

*1: Do not connect these pins. Malfunctions or failures can occur.

20 Standard Value Table

Oil Leakage Quantity from Work Equipment Cylinder

Machine model			D61EXI-24	
Engine			SAA6D107E-3	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Blade lift cylinder	• HST oil temperature (hydraulic oil temperature)40 to 60 °C • Fuel control dial: MAX (High idle) position • Oil leakage for 1 minute while relieving cylinder to be measured	mℓ	Max. 4	Max. 16
Blade tilt cylinder			Max. 4	Max. 16

ICT Related Items

Machine model				D61EXI-24	
Engine				SAA6D107E-3	
Item	Measurement condition		Unit	Standard value for new machine	Repair limit
Accuracy of blade edge elevation	Perform the items of “CALIBRATE BLADE EDGE POSITION” up to the Machine Cal Step A.		mm	0 ± 25	0 ± 50
	Perform all “CALIBRATE BLADE EDGE POSITION”			0 ± 20	0 ± 40
Accuracy of stroke sensor for lift cylinder	Work equipment: Perform blade raise stroke end operation	Before resetting	mm	0 ± 3	0 ± 3
		After resetting		0	0
	Work equipment: During blade lower stroke end operation	Before resetting		461 ± 3	461 ± 3
		After resetting		461	461
Accuracy of stroke sensor for tilt cylinder	Work equipment: During left tilt stroke end operation	Before resetting	mm	0 ± 3	0 ± 3
		After resetting		0	0
	Work equipment: During right tilt stroke end operation	Before resetting		164 ± 3	164 ± 3
		After resetting		164	164

Hydraulic drift of work equipment

Machine model			D61PXI-24	
Engine			SAA6D107E-3	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Hydraulic drift of lifted blade	• Level ground • HST oil temperature (hydraulic oil temperature)40 to 60 °C • Engine: Stopped • Joystick (steering, directional, and gear shift lever): NEUTRAL position • Measure the amount of blade drop (H) 15 minutes after the stop of engine • See “Machine Posture and Procedures to Measure Performance”, Fig. 6.	mm	Max. 100	Max. 100
Hydraulic drift of tilted blade	• Level ground • HST oil temperature (hydraulic oil temperature)40 to 60 °C • Engine: Stopped • Joystick (steering, directional, and gear shift lever): NEUTRAL position • Measure the amount of blade drop (H) 15 minutes after the stop of engine • See “Machine Posture and Procedures to Measure Performance”, Fig. 7.	mm	Max. 200	Max. 200
Hydraulic drift amount of ripper (if equipped)	• Level ground • HST oil temperature (hydraulic oil temperature)40 to 60 °C • Move the ripper down to 100 mm from the rising end • Engine: Stopped • Joystick (steering, directional, and gear shift lever): NEUTRAL position • Measure the amount of shank ripper drop (H) 15 minutes after the stop of engine	mm	-	-

Tools to Clean DEF Pump

Symbol	Part No.	Part name	Q'ty	Remarks
A	790-361-1000	DEF pump cleaning kit	1	
A1	6540-71-2720	Cap	3	
B	Commercially available	Resin container	1	• Made with polypropylene/polyethylene • Capacity:Approx.1ℓ
C	600-919-5030	Plug	3	

Tools to Examine HST Oil Pressure

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5130	Gauge	1	Pressure range6 MPa
	2	799-101-5140	Gauge	1	Pressure range2.5 MPa
B		790-261-1205	Digital hydraulic tester	1	Pressure range70 MPa
C		799-101-5220	Nipple	1	SizeM10 x 1.25 mm
D		07002-11023	O-ring	1	

Tools to Examine Solenoid Valve Outlet Pressure

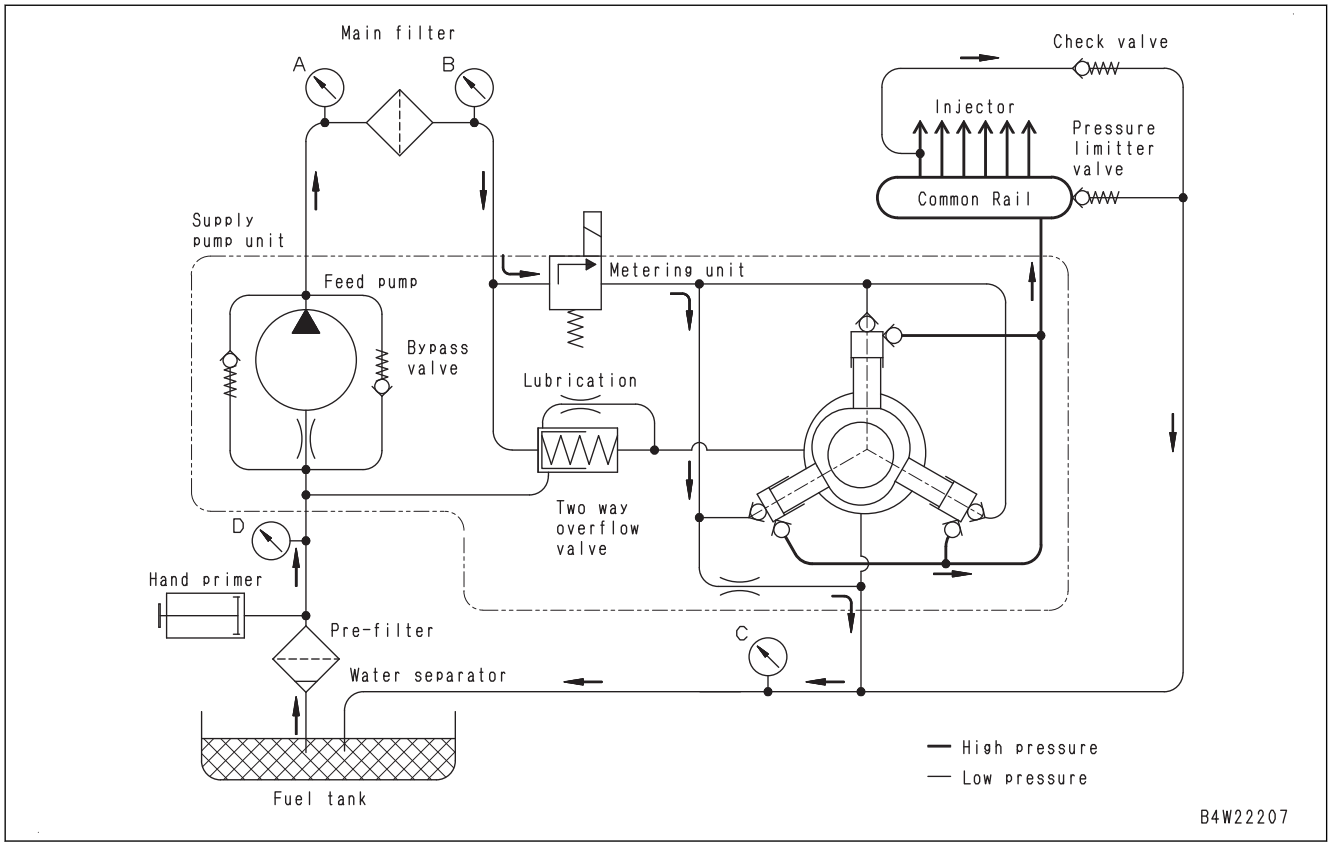
Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5130	Gauge	1	Pressure range6 MPa
	2	799-101-5160	Nipple	2	Size: R1/8
B		790-261-1205	Digital hydraulic tester	1	Pressure range70 MPa
C		791T-640-1110	Nipple	2	SizeM14 x 1.5 mm
D		07002-11023	O-ring	2	
E		799-401-3100	Adapter	1	Size: 02
F		799-401-3200	Adapter	1	Size: 03
G		795-471-1450	Adapter	1	SizeM8 x 1.25 mm
H		07002-10823	O-ring	1	
J		799-101-5220	Nipple	1	SizeM10 x 1.25 mm

Tools to Examine Decelerator/Brake Pedal

Symbol	Part No.	Part name	Q'ty	Remarks
A	79A-264-0021	Push-pull scale	1	Pressure range0 to 500 N

Tools to Release Parking Brake

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	790-190-1601	Pump assembly	1	
	1	790-190-1510	Volume pump	1	
	2	790-190-2400	Adapter kit	1	
B		799-101-5220	Nipple	1	SizeM10 x 1.25 mm



A: Low-pressure circuit measuring position (fuel main filter inlet side)

B: Low-pressure circuit measuring position (fuel main filter outlet side)

C: Return circuit measuring position (supply pump drain port)

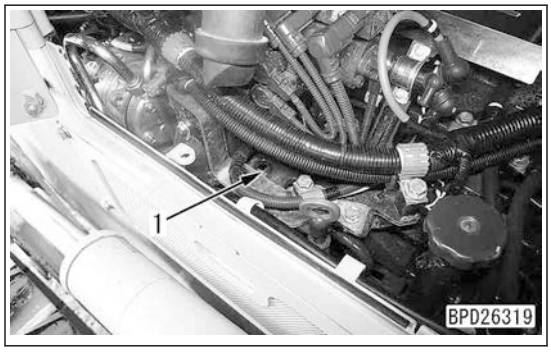
D: Negative pressure circuit measuring position (supply pump inlet)

For testing of fuel pressure to perform troubleshooting or others, refer to this section.

How to Examine Fuel Pressure

How to Examine of Low-Pressure Circuit (Fuel Main Filter Inlet Side)

1. Open the L.H. engine side cover, and remove the fuel pressure pickup plug (1) on the inlet side of the fuel main filter.



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

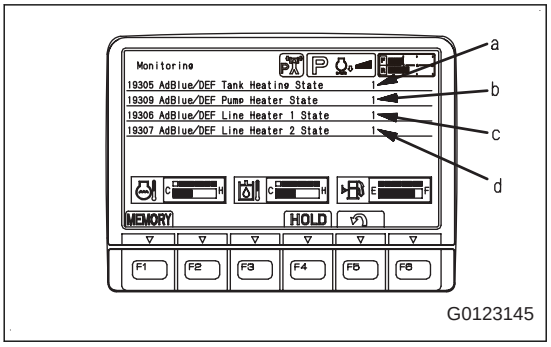
Details of monitoring information are as follows.

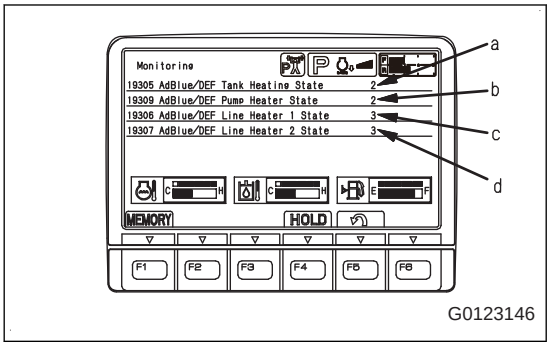
1: Being thawed

2: Being kept warm

3: OFF

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

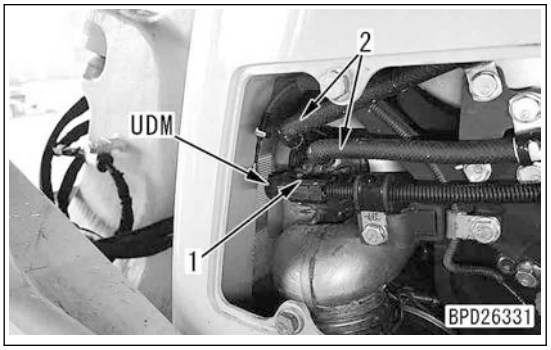




3. Stop the engine.

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

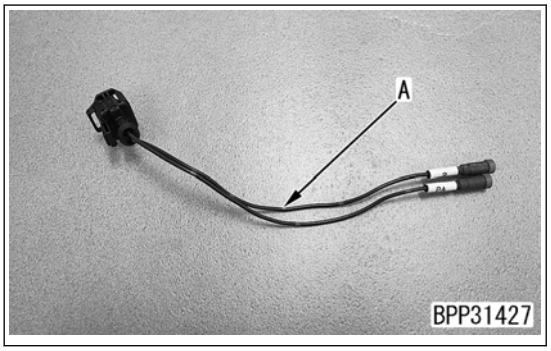
4. Check that the system operating lamp is off, turn the battery disconnect switch to OFF position, and remove the key.
5. Remove the cover on the left side of the machine.
6. Check that there is neither crack nor dissolution on DEF injector (1).



7. Disconnect the connector (UDM), connect the socket A, and measure the resistance value.

REMARK

- The resistance value becomes high when it is at high temperature. Cool it down completely, and perform the measurement.
- Measure the resistance between pin 1 and pin 2. For standard values, see Standard Value Table, "Standard Value Table for Machine".



8. After the measurement is completed, remove measuring instrument, and connect connector (UDM).
9. Turn the battery disconnect switch to ON position.
10. Disconnect the coolant hoses (2) (2 pieces), and remove the DEF injector (1).

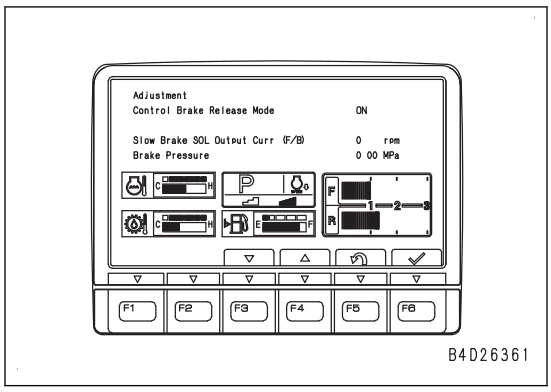
REMARK

If joystick (steering, directional and gear shift lever) (PCCS lever) is operated to the forward or reverse position, HST stalls. If the joystick is returned to the neutral position, HST stall is canceled.

How to Examine HST Charge Circuit Pressure by Machine Monitor

1. Turn the starting switch to ON position.
2. Set “Control Brake Release Mode” of adjustment menu to ON. For details, see “Set and Operate Machine Monitor”, “VARIOUS SETTINGS OF MACHINE”.
3. Start the engine and set the parking brake lever to FREE position.
4. Set the operating mode to P (Power Mode).
5. Set the fuel control dial to MAX (High idle) position.
6. Set joystick (steering, directional and gear shift lever) (PCCS lever) to the neutral position and forward or reverse position, and measure “Brake Pressure” in each position.

   For standard values, see Standard Value Table, “Standard Value Table for Machine”.



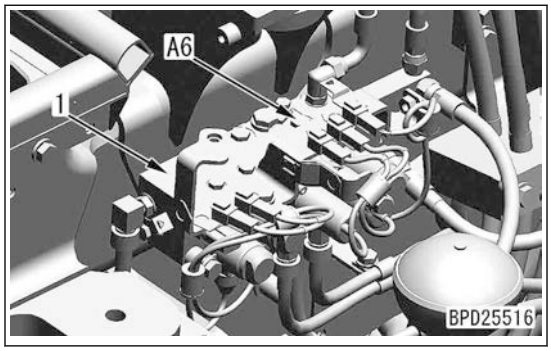
REMARK

- Displayed “Brake Pressure” is the same as that of the HST charge circuit pressure.
- When joystick (steering, directional and gear shift lever) (PCCS lever) is in the neutral position, only the charge safety valve on the hydraulic oil cooler bypass valve/ HST safety valve (made in one) side operates. During the travel, the charge relief valve on HST motor side operates as well.
- “Brake Pressure” is displayed by the unit of 0.01 MPa.

How to Examine HST Charge Circuit Pressure by Test Tools

1. Release the remaining pressure in the circuit. For details, see “Release Remained Pressure in Hydraulic Circuit”.
2. Set the work equipment lock lever to LOCK position, then turn the starting switch to OFF position.
3. Remove the inspection cover of the floor, and remove HST charge circuit pressure pickup plug A6 of solenoid valve assembly (1).

   A6: HST charge circuit pressure pickup port



4. Install the nipple C and connect it to gauge A1 of hydraulic tester A.

   REMARK

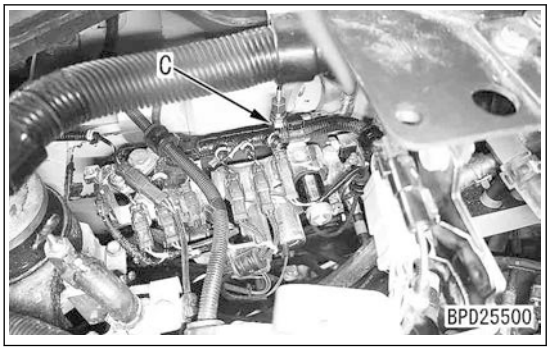
   Gauge in digital hydraulic tester B can also be used in place of gauge A1.

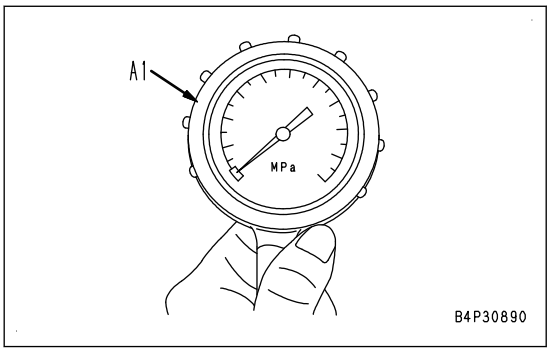
5. Start the engine and set the parking brake lever to FREE position.
6. Measure the oil pressure when all the control levers are in neutral.

   For standard values, see Standard Value Table, “Standard Value Table for Machine”.

   REMARK

   The control circuit oil pressure is the same as HST charge circuit pressure when joystick (steering, directional and gear shift lever) (PCCS lever) is in neutral.





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

How to Adjust Oil Pressure in Control Circuit

REMARK

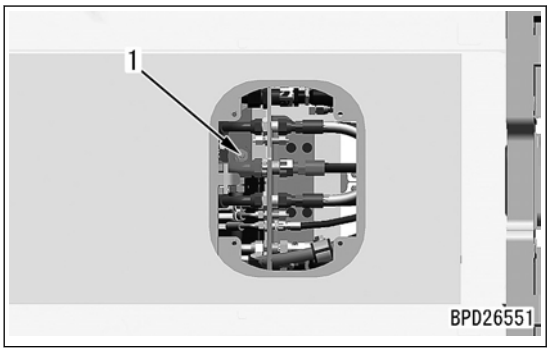
The adjustment method is the same as “Method for adjusting HST charge circuit pressure (in neutral)”.

1. Remove the cover from the bottom of the radiator.
2. While fixing adjustment screw (2) of charge safety valve (1) of hydraulic oil cooler bypass/ HST charge safety valve (made in one), loosen lock nut (3).
3. Turn adjustment screw (2) to adjust oil pressure.

   REMARK

   - If adjustment screw (2) is turned clockwise, the pressure increases.
   - If adjustment screw (2) is turned counterclockwise, the pressure decreases.

   Quantity of pressure adjustment per turn of adjustment screw (2): Approximately 1.55 MPa {15.38 kgf/cm^2}

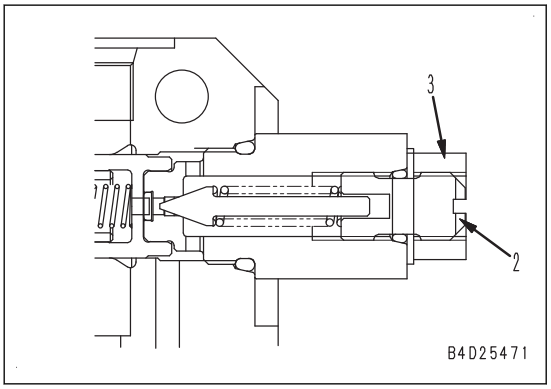


4. With adjustment screw (2) fixed, tighten lock nut (3).

   Lock nut (3):
   58.8 to 78.5 Nm {6 to 8 kgfm}

   REMARK

   After adjustment, check that the control circuit pressure is normal. For details, see “Examine Oil Pressure in Control Circuit”.



Code	Item		Reference item
03	Abnormality Record	Mechanical Sys Abnormality Record	CHECK ABNORMALITY RECORD (MECHANICAL SYSTEMS)
		Electrical Sys Abnormality Record	CHECK ABNORMALITY RECORD (ELECTRICAL SYSTEMS)
04	Maintenance Record		CHECK MAINTENANCE RECORD
05	Maintenance Mode Setting		MAINTENANCE MODE SETTING
06	Phone Number Entry		SET PHONE NUMBER ENTRY
07	Default	Key-on Mode	DEFAULT SETTING MENU (KEY-ON MODE)
		Unit	DEFAULT SETTING MENU (UNIT SELECTION)
		Camera	DEFAULT SETTING MENU (CAMERA)
		Auto Idle Stop Time Fixing	DEFAULT SETTING MENU (AUTO IDLE STOP TIMER FIXING)
		Manual Stationary Regeneration time	DEFAULT SETTING MENU (Manual Stationary Regeneration time)
		Privacy (GDPR)	DEFAULT SETTING MENU (GDPR DISPLAY SETTING)
08	Diagnostic Tests	Cylinder Cutout Mode Operation	TESTING MENU (Cylinder Cutout Mode Operation)
		Active Regeneration for Service	TESTING MENU (Active Regeneration for Service)
		KDPF Memory Reset	TESTING MENU (KDPF Memory Reset)
		SCR Service Test	TESTING MENU (SCR Service Test)
		Engine Controller Active Fault Clear	TESTING MENU (Engine Controller Active Fault Clear)
		Reset Number of Abrupt Engine Stop by AIS	TESTING MENU (RESET NUMBER OF ABRUPT ENGINE STOP BY AIS)
09	Adjustment		VARIOUS SETTINGS OF MACHINE
10	No-Injection Cranking		OPERATE NO-INJECTION CRANKING
11	KOMTRAX Settings	Terminal Status	KOMTRAX Settings (Terminal State)
		GPS & Communication State	KOMTRAX Settings (GPS & Communication State)
		Modem Information	KOMTRAX Settings (Modem Information)
12	Service Message		SHOW SERVICE MESSAGE

How to See Pre-defined Monitoring Information

The machine monitor can monitor the condition of the machine in real time by receiving signals from switches, sensors, and actuators installed to various parts of the machine and the information from the controllers which is controlling them.

In “Pre-defined Monitoring”, monitoring items which are commonly used are selected beforehand.

5. When the “Guide Line Position Setting” screen is shown, select the item to adjust.

   F3: Moves the selection downward.

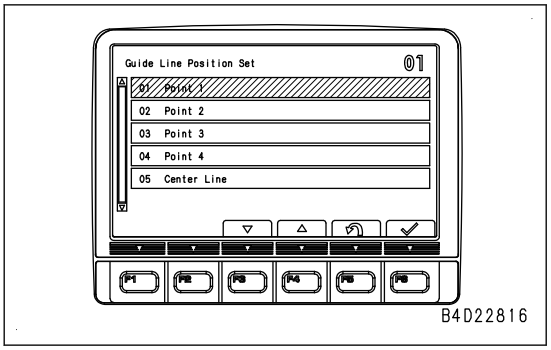
   F4: Moves the selection upward.

   F5: Cancels the setting and goes back to the “Camera” screen.

   F6: Accepts the selected item.

   REMARK

   - Set the display of the guide line in the Guide Line Display Mode in the operator mode.
   - The guide line can be selected from OFF, Outline, Center Line, or Outline and Center Line.
   - Select the item as you did on the “Service Menu” screen.
   - When it is not set, “Guide Line Position Setting” is shown.



6. After you select the adjustment item, set each point and center line to adjust.

   Point selection screen

   F1: Moves the selected point downward.

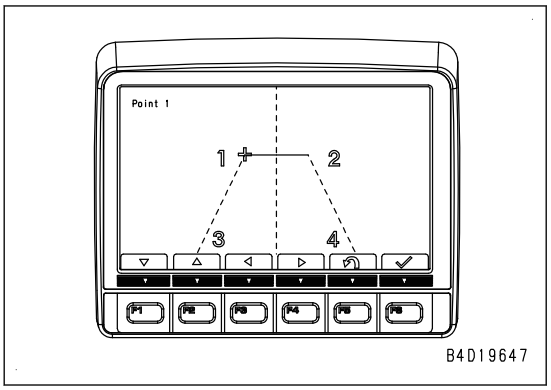
   F2: Moves the selected point upward.

   F3: Moves the selected point or center line to the left.

   F4: Moves the selected point or center line to the right.

   F5: Goes back to the “Guide Line Position Setting” screen.

   F6: Accepts the point.



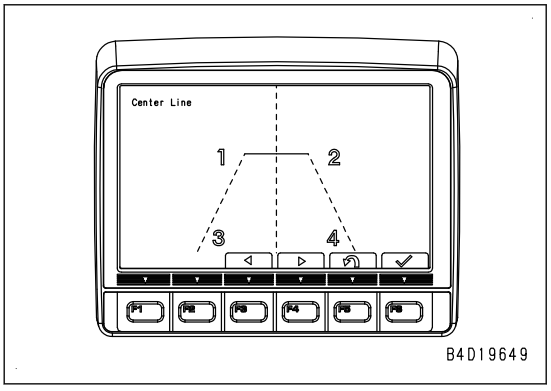
   Center line selection screen

   F3: Moves the selected point or center line to the left.

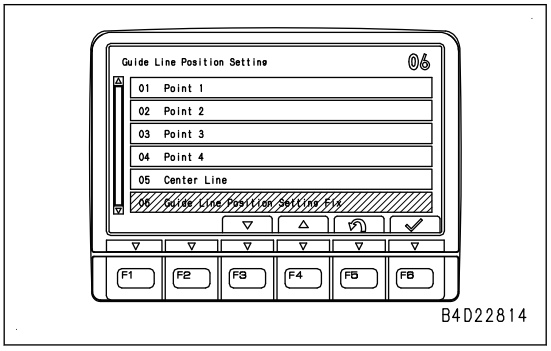
   F4: Moves the selected point or center line to the right.

   F5: Goes back to the “Guide Line Position Setting” screen.

   F6: Accepts the point.



7. Set each point and center line, and select “Guide Line Position Setting Fix”.



REMARK

- The alarm buzzer keeps sounding during adjustment.
- After the adjustment starts, display (a) of adjustment changes from “1/6” to “6/6” automatically.
- When the track shoe stops and “6/6” appears in display (a) of “F HST Pump Setting”, the adjustment is completed.
- When interrupting the adjustment, return joystick (steering, directional and gear shift lever) to the NEUTRAL position.
- When restarting the adjustment after an interruption, repeat the procedure from step 4.
- During the adjustment, the steering of joystick (steering, directional and gear shift lever), decelerator/brake pedal, and fuel control dial do not function.
- If the adjustment is interrupted automatically and “ERR1” is displayed in display (a), check the following devices. (An error message appears when the track shoe does not move even if HST pump EPC current increases.)

  When track shoe does not move: HST pump

  When track shoe moves: HST motor speed sensor

8. After the adjustment is completed, set the steering, directional and gear shift levers to NEUTRAL position and the parking brake lever to LOCK position.

REMARK

In this adjustment mode, the save adjustment values are effective even when the starting switch is turned to OFF position after the adjustment is completed.

Adjustment Menu (R HST Pump Setting)

This adjustment mode makes the HST controller recognize and save the relationship between EPC current and capacity on REVERSE side of HST pump.

⚠ **Before selecting this adjustment mode, jack up the under surface of frame at the rear of machine. Push the ground surface by blade in the LOWER direction and float the whole track shoe and run it off the ground.**

⚠ **Track shoe runs idle at high speed during adjustment. Ensure that the whole track shoe floats off the ground and the machine is surely stabilized.**

REMARK

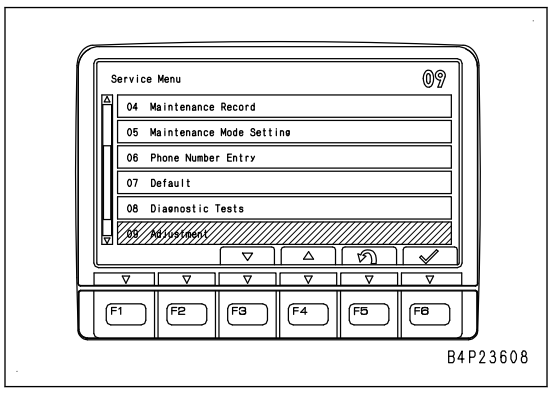
Perform this adjustment while running the track shoe idle. If you cannot run the track shoe idle and are required to adjust by traveling, perform “Adjustment IDs: 3423 to 3246”.

When HST controller, HST pump assembly, or HST pump EPC valve is replaced, always perform this adjustment.

1. Start the engine.
2. Select “Adjustment” on “Service Menu” screen.

   REMARK

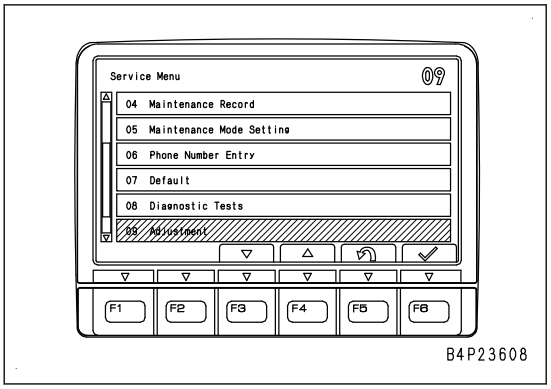
   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



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

   REMARK

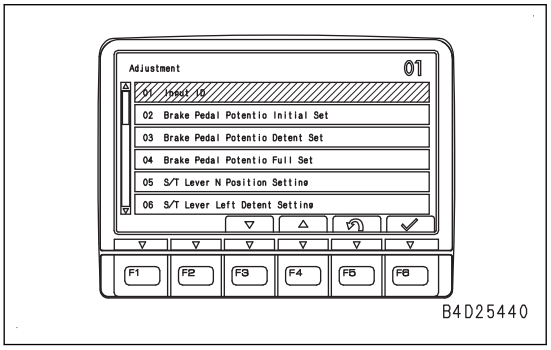
   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



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

   REMARK

   For selecting method, see “How to Operate Service Mode” in “SERVICE MODE”.



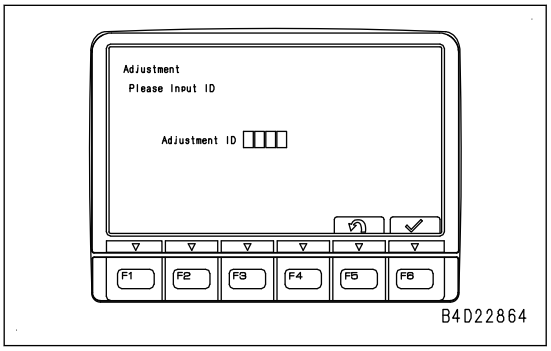
3. On “Input ID” screen, directly input Adjustment ID “8024” by using the numeral input switches.

   F5: Returns the screen to “Adjustment” screen

   F6: Enters input Adjustment ID

   REMARK

   - For details of Adjustment ID and adjustment items, see “Adjustment Item Table”.
   - When the input Adjustment ID is incorrect, “Adjustment not allowed” 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 “Blade Tilt LEFT Current Correction” with the function switches.

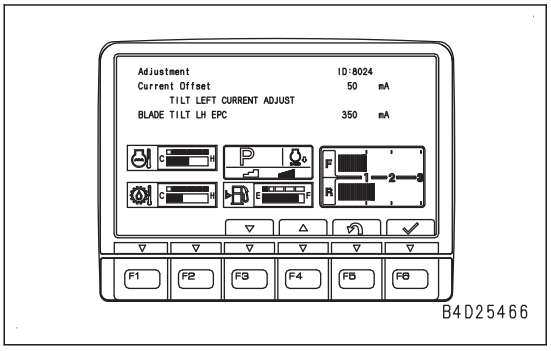
   F3: Decreases the adjustment value

   F4: Increases the adjustment value

   F5: Returns the screen to “Input ID” screen

   F6: Saves the adjustment value

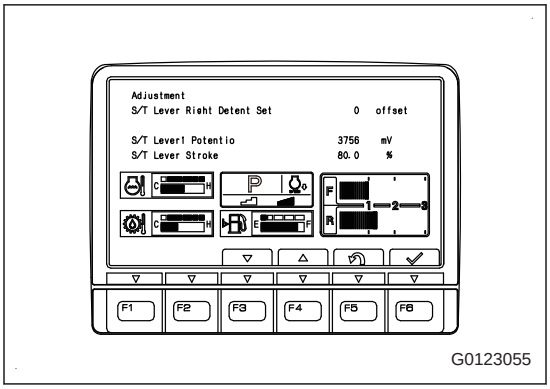
   1) Press F3 or F4, and select an adjustment value.
   2) Press F6, and check that warning buzzer sounds.



10. Make the HST controller recognize and save the voltage of the steering potentiometer of joystick (steering, directional and gear shift lever) (PCCS lever) at rightward operating effort detent position. For details, see “Adjustment Menu (S/T Lever Right Detent Setting)”.

    REMARK

    For “METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (S/T LEVER RIGHT DETENT SETTING)”, see “Set and Operate Machine Monitor”, “VARIOUS SETTINGS OF MACHINE”.

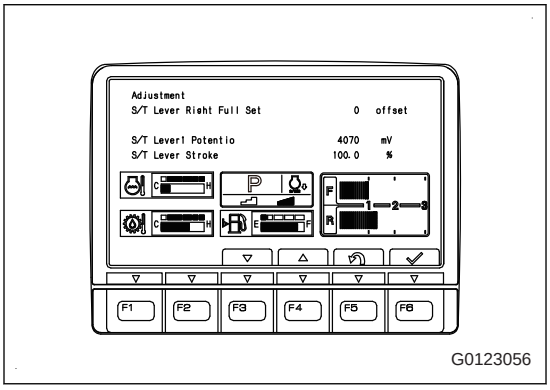


G0123055

11. Make the HST controller recognize and save the voltage of the steering potentiometer of joystick (steering, directional and gear shift lever) (PCCS lever) at rightward operating effort detent position. For details, see “Adjustment Menu (S/T Lever Right Full Set)”.

    REMARK

    For “METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (S/T LEVER RIGHT FULL SET)”, see “Set and Operate Machine Monitor”, “VARIOUS SETTINGS OF MACHINE”.

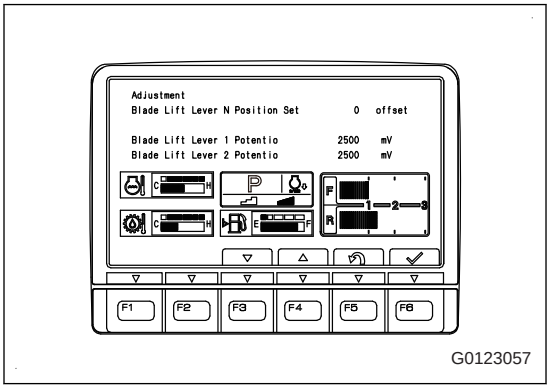


G0123056

12. Make the HST controller recognize and save the voltage of the lift potentiometer of blade control lever in the neutral position. For details, see “Adjustment Menu (Blade Lift Lever Neutral Position Adjustment)”.

    REMARK

    For “METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (BLADE LIFT LEVER N POSITION ADJ)”, see “Set and Operate Machine Monitor”, “VARIOUS SETTINGS OF MACHINE”.

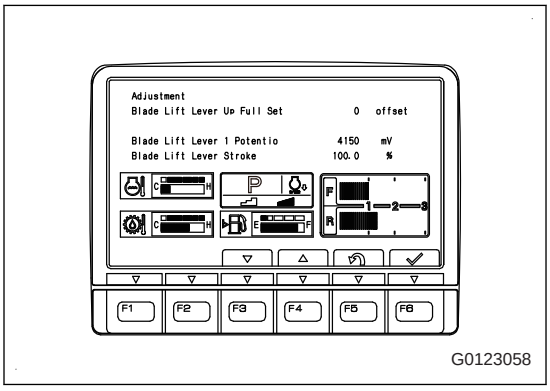


G0123057

13. Make the HST controller recognize and save the voltage of the lift potentiometer of blade control lever at maximum RAISE stroke position. For details, see “Adjustment Menu (Blade Lift Lever Up Pos Adjust)”.

    REMARK

    For “METHOD FOR ADJUSTING WITH ADJUSTMENT MENU (BLADE LIFT LEVER UP POS ADJUST)”, see “Set and Operate Machine Monitor”, “VARIOUS SETTINGS OF MACHINE”.



G0123058

11. When the “GPS Antenna Position” screen is shown, push the input area (17).

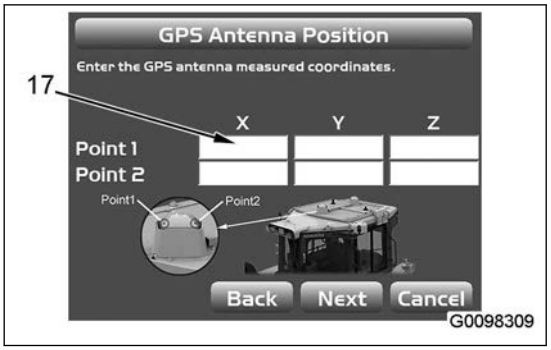
    “Back”: Goes back to the previous screen.

    “Next”: Goes to the next screen.

    “Cancel”: Cancels “Machine Cal Step B” and goes back to the main screen.

    REMARK

    Input the coordinates of the corner (e) at the front side of the machine in “Point 1”, and input the coordinates of the corner (f) at the left side of the machine in “Point 2”.



12. When the alphanumeric keyboard (18) is shown, input the saved coordinates, and push “Ok” (19).

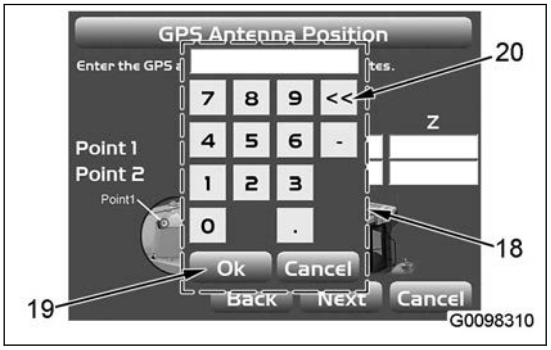
    “Ok” (19): Accepts the input and lets the alphanumeric keyboard (18) go off.

    Back space key (20): Deletes the input value by one.

    “Cancel”: Cancels the input and lets the alphanumeric keyboard (18) go off.

    REMARK

    You can change the input value if “Ok” (19) is not pushed. When you change the value, push the back space key (20) to delete the input value and input the value again.



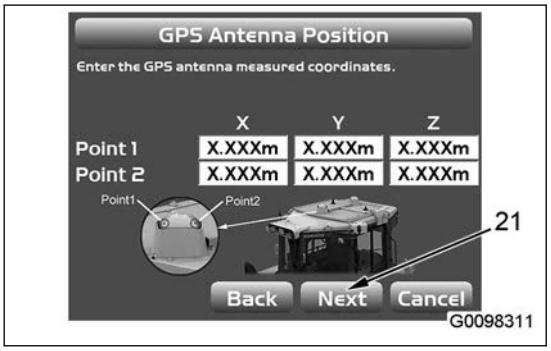
13. Make sure that the coordinates of “GPS Antenna Position” are input, and push “Next” (21).

    “Back”: Goes back to the previous screen.

    “Next” (21): Goes to the next screen.

    “Cancel”: Cancels “Machine Cal Step B” and goes back to the main screen.

    When “Next” (21) is pushed, the “Automatic Calibration” screen is shown.



14. When the “Automatic Calibration” screen is shown, push “Next” (22) to start the calibration of the GNSS antenna location.

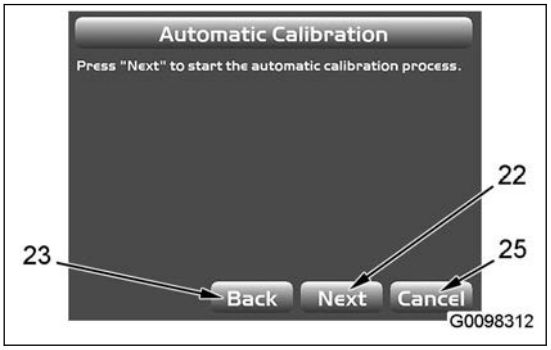
    “Back”(23): Goes back to the previous screen.

    “Next” (22): Goes to the next screen.

    “Cancel” (25): Cancels “Machine Cal Step B” and goes back to the main screen.

    NOTICE

    You can change or input the value again, if “Next” (22) is not pushed on the “Automatic Calibration” screen. Push “Back” (23) to go back to the previous screen.



Calculate the correction value of the GNSS antenna location and save the value in the work equipment controller.

Work Equipment Speed

Machine model			D61EXI-24			Good	No good
Engine			SAA6D107E-3				
Item	Measurement condition	Unit	Standard value for new machine	Repair limit	Measured value		
Blade RAISE	• HST oil temperature (hydraulic oil temperature)40 to 60 °C • Operating Mode: P (Power mode) • Fuel control dial: MAX (High idle) position • Time required to move blade from ground to RAISE stroke end • See, “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, Fig. 3.	Sec.	2.1 to 2.5	Max. 2.9			
Blade LOWER	• HST oil temperature (hydraulic oil temperature)40 to 60 °C • Operating Mode: P (Power mode) • Fuel control dial: MAX (High idle) position • Time required to move blade from RAISE stroke end to ground • See, “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, Fig. 3.	Sec.	1.4 to 2.0	Max. 2.4			
Blade LEFT tilt	• HST oil temperature (hydraulic oil temperature)40 to 60 °C • Operating Mode: P (Power mode) • Fuel control dial: MAX (High idle) position • From blade RIGHT tilt stroke end to blade LEFT tilt stroke end • See, “MACHINE POSTURE AND PROCEDURE FOR MEASURING PERFORMANCE”, Fig. 4.	Sec.	1.7 to 2.1	Max. 2.4			

Pm Clinic Check Sheet for Undercarriage: D61PXI-24E0

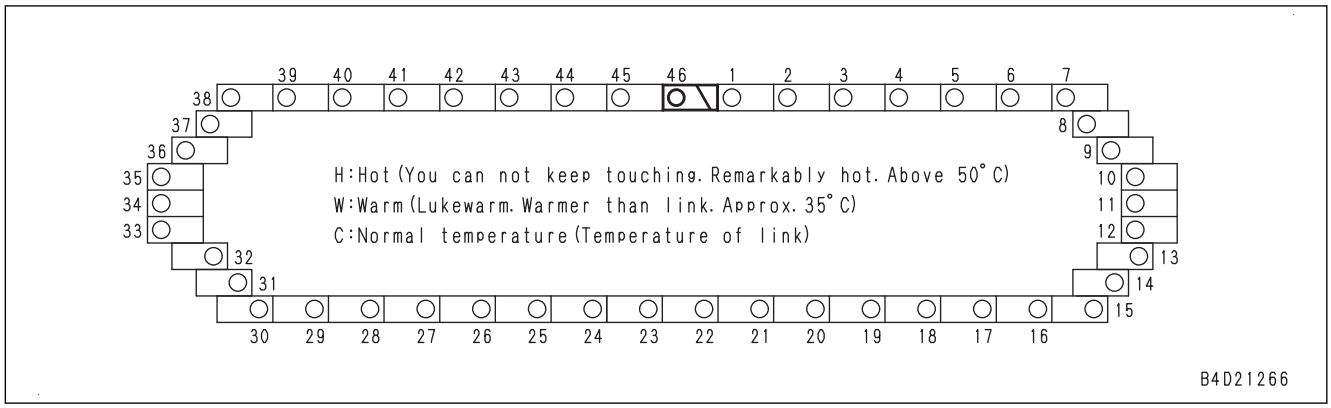
Undercarriage Check Sheet

Model	Serial No.	Service meter	User name	Date of inspection	Inspector
□D61PXI-24E0				/ /	

Bushing

Machine model			D61PXI-24E0	Good	No good
Engine			SAA6D107E-3		
Item	Testing conditions		Measurement result		
Bushing temperature	Measure just after work	Left side of machine			
		Right side of machine			

Left side of the machine



REMARK

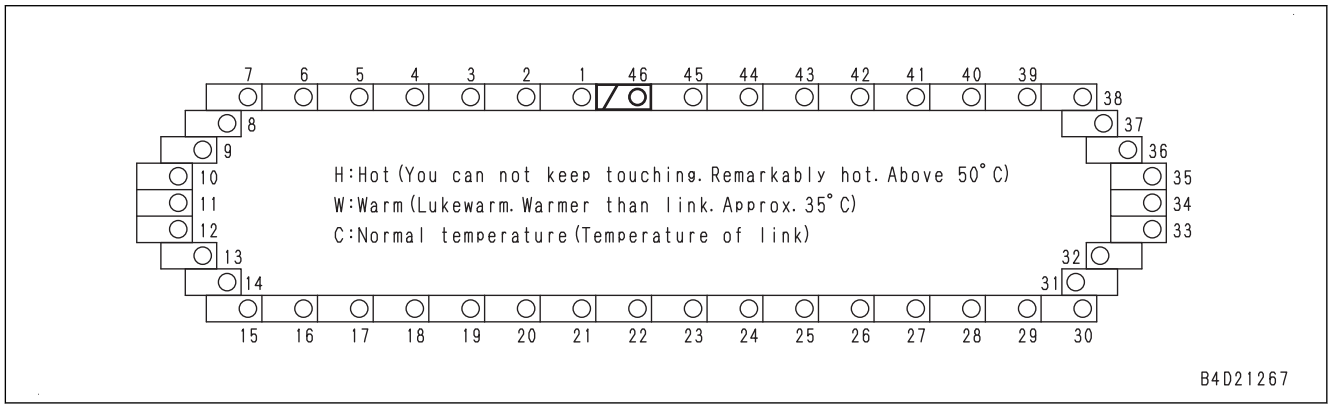
Symbols to be entered in drawing

H: Hot (You cannot keep touching, Remarkably hot, Above 50 °C)

W: Warm (Lukewarm, Warmer than link, Approximately 35 °C)

C: Normal temperature (Temperature of link)

Right side of the machine



REMARK

Symbols to be entered in drawing

H: Hot (You cannot keep touching, Remarkably hot, Above 50 °C)

W: Warm (Lukewarm, Warmer than link, Approximately 35 °C)

C: Normal temperature (Temperature of link)

Table of Failure Codes that is Applied to Inducement

- "●" mark in the below table shows failure codes which activate Inducement strategy in each territory.
- When activating Inducement strategy, the following failure code is displayed with one of "DEF level Low Error", or "Urea SCR system devices abnormality" on "Current Abnormality" screen of the machine monitor.
- "Urea SCR system devices abnormality" is displayed as Urea SCR System Abnormality on the Abnormality Record screen.
- For the Engine with EU+EPA/CARB dual labelling name-plate, "DEF level Low Error" is the target error code for the North American specification, and "Urea SCR system devices abnormality" applies to error codes that are targeted by either North American or EU specifications.

Failure code	Detail of failure	North America		EU		The Engine with EU+EPA/CARB dual labelling name-plate	
		DEF level Low Error	Urea SCR system devices abnormality	DEF level Low Error	Urea SCR system devices abnormality	DEF level Low Error	Urea SCR system devices abnormality
AS00ZK	DEF Level Low Error 5	●	-	-	-	●	-
CA249	Ambient Air Temp Sensor High Error	-	-	-	●	-	●
CA256	Ambient Air Temp Sensor Low Error	-	-	-	●	-	●
CA1669	DEF Level Sensor Voltage High Error	-	-	-	●	-	●
CA1673	DEF Level Low Error 3	●	-	●	-	●	-
CA1677	DEF Temperature Sensor Low Error	-	-	-	●	-	●
CA1678	DEF Temperature Sensor High Error	-	-	-	●	-	●
CA1682	DEF Pump Priming Error	-	●	-	●	-	●
CA1683	DEF Tank Heating Valve Voltage High Error	-	●	-	●	-	●
CA1684	DEF Tank Heating Valve Voltage Low Error	-	●	-	●	-	●
CA1686	DEF Quality Sensor Voltage High Error	-	-	-	●	-	●
CA1714	DEF Quality Sensor Out of Calibration Error	-	-	-	●	-	●
CA1715	DEF Quality Sensor Internal Circuit Error	-	-	-	●	-	●
CA1885	Turbo Outlet NOx Sensor Circuit Error	-	-	-	●	-	●
CA1887	SCR Outlet NOx Sensor Circuit Error	-	-	-	●	-	●
CA2271	EGR Valve Position Sensor High Error	-	-	-	●	-	●
CA2272	EGR Valve Position Sensor Low Error	-	-	-	●	-	●
CA2349	EGR Valve Solenoid Open Circuit Error	-	-	-	●	-	●
CA2353	EGR Valve Solenoid Short Circuit Error	-	-	-	●	-	●

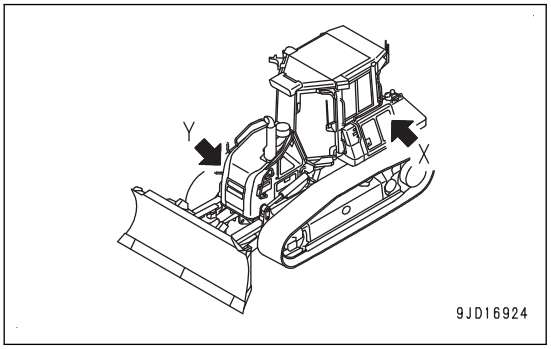
Check of fusible link for blowing out and corrosion

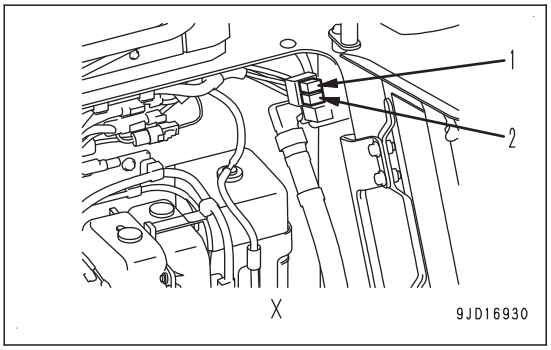
22. When the starting switch is turned to ON position, if the power supply is not turned on, the fusible link probably has an open circuit. Check it and replace it if needed.

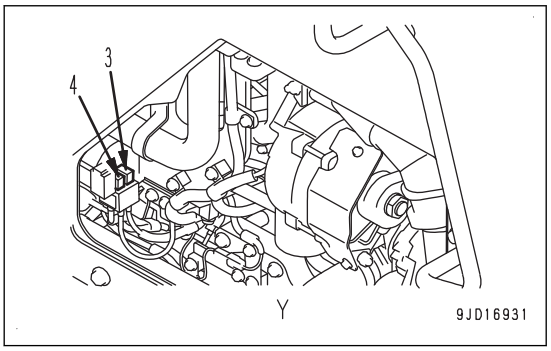
    REMARK

    - Make sure to turn off the power supply (starting switch in OFF position) before performing replacement of the fusible link.
    - A fusible link is a large-capacity fuse installed in the circuit where large current flows.
    - The fusible link protects electrical component and wiring from burning due to abnormal current.
    - Replace each fusible link with the same capacity ones.
    - Open the hydraulic tank inspection cover at the left side of machine, and open the fusible link case cover, and you will see fusible links (1) and (2).
    - Open the engine side cover at the right side of machine, and open the fusible link case cover, and you will see fusible links (3) and (4).

    Fusible link
    - For main power supply (1)
    - For continuous power supply (2)
    - For intake air heater (3)
    - For alternator (4)

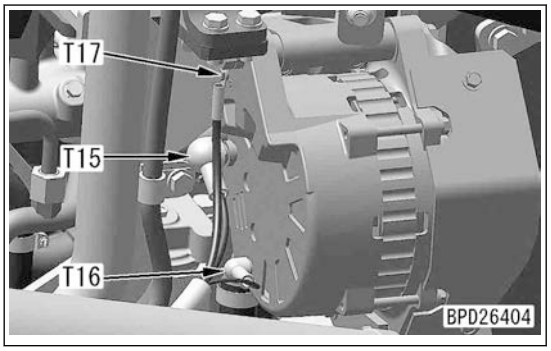






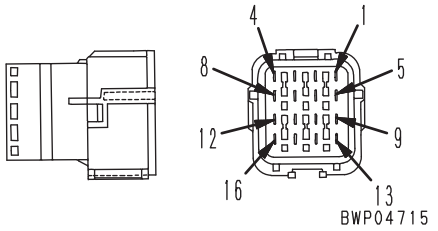
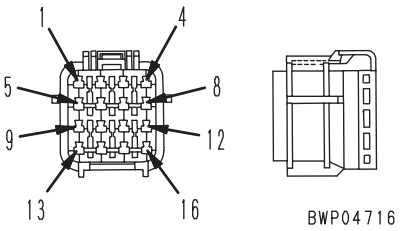
Check of alternator voltage (when engine speed is medium or higher)

23. Open the engine hood.
24. Connect the positive (+) lead of the multimeter to alternator B terminal (T15) and connect the negative (-) lead to the chassis ground.
25. Start the engine and warm it up, and measure the voltage while running the engine at a medium or a higher speed.
    - If the voltage is abnormal, repair or replace the alternator.



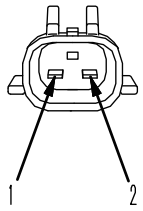
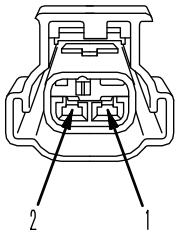
Check of battery relay operation sound

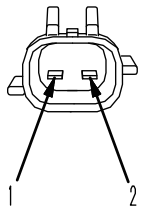
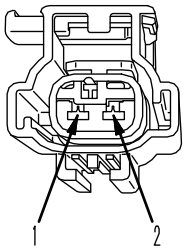
26. Open the battery cover.
27. Turn the starting switch to ON and OFF positions, and check whether the battery relay operation sound is heard or not.
    - If the operation sound is not heard, see “Engine Does Not Start (Engine Does Not Crank)” in E mode.
    - If the relating circuit is normal, replace the battery relay.

No. of pins	SWP type connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
16	 BWP04715	 BWP04716	799-601-7320 (T-adapter)
	Part No. : 08055-11681	Part No. : 08055-11691	
—	Terminal part No. : 79A-222-3510 ·Electric wire size: 0.85 ·Grommet: Black ·Q'ty: 20	Terminal part No. : 79A-222-3530 ·Electric wire size: 0.85 ·Grommet: Black ·Q'ty: 20	—
—	Terminal part No. : 79A-222-3520 ·Electric wire size: 1.25 ·Grommet: Red ·Q'ty: 20	Terminal part No. : 79A-222-3540 ·Electric wire size: 1.25 ·Grommet: Red ·Q'ty: 20	—

B4D18192

FRAMATOME connector for engine

No. of pins	Dosing fuel solenoid 1, 2 and fuel doser injector (125, 140 engine) KDOC inlet temperature sensor (TEMP1) (107, 114, 125, 140 engine)		
	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
2			799-601-4640 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
	—	—	

No. of pins	KDOC outlet temperature sensor (TEMP2), KDPF outlet temperature sensor (TEMP3) (107, 114, 125, 140 engine) EGR orifice temperature sensor (107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	
2			799-601-4630 (T-adapter) (Kit: 799-A65-4600)
	—	—	

B4W21628

Failure code	Failure (Displayed on screen)	Applicable component	Action level	Category of history	Remarks
DAJ0KQ	HST Controller:Type Select Signal Error	HST	L03	Electrical system	*
DAJ0KT	HST Controller:Abnormality in Controller	HST	L03	Electrical system	*
DAJ0MC	HST Controller Error	HST	-	Electrical system	
DAJ1KK	HST Controller:Source Voltage Low	HST	L04	Electrical system	*
DAJ2KK	HST Controller:Output Voltage Low	HST	L04	Electrical system	*
DAJ2KT	HST controller:Output port Hot Short Circuit or Abnormality in Cutoff circuit	HST	L03	Electrical system	*
DAJ5KK	HST Controller:Sensor Volt 5V (0) Out of Normal Range	HST	L04	Electrical system	*
DAJ6KK	HST Controller:Sensor Volt 5V (1) Out of Normal Range	HST	L03	Electrical system	*
DAJLKA	Operating Lamp Open Circuit (HST Controller)	HST	-	Electrical system	
DAJLKB	Operating Lamp Short Circuit (HST Controller)	HST	-	Electrical system	
DAJPMA	Inconsistency of Option Selection (HST Controller)	HST	L01	Electrical system	*
DAJQKR	CAN 2 Defective Communication (HST Controller)	MON	L03	Electrical system	*
DAJRKR	CAN 1 Defective Communication (HST Controller)	MON	L03	Electrical system	*
DB2QKR	CAN 2 Defective Communication (Engine Controller)	MON	L03	Electrical system	*
DB2RKR	CAN 1 Defective Communication (Engine Controller)	MON	L03	Electrical system	*
DBR0KT	ICT controller:Abnormality in controller	ICT	L01	Electrical system	
DBR0MC	ICT Con Error	ICT	-	Electrical system	
DBR1KK	ICT controller:Source volage low	ICT	L01	Electrical system	
DBR2KK	ICT controller:Output voltage low	ICT	L01	Electrical system	
DBR5KK	ICT:5 Volt Sensor (0) Out of normal range	ICT	L01	Electrical system	
DBRLKA	Operating Lamp Open Circuit (ICT Controller)	ICT	-	Electrical system	
DBRLKB	Operating Lamp Short Circuit (ICT Controller)	ICT	-	Electrical system	
DBRPMA	Inconsistency of Option Selection(ICT Con)	ICT	L01	Electrical system	

Failure Code [AS00R4]

Action level	Failure code	Failure	Inducement 2 (SCR Device Abnormality)
L04	AS00R4		(Engine controller system)
Detail of failure	• A certain time has passed since AS00R3 occurs. • An abnormality of SCR system has occurred again within a certain time since abnormality repair of SCR system. (EU Specification)		
Action of controller	• The information related to this failure code is displayed on the monitor screen. • Controls engine output significantly for operation. • [AS00R5] occurs and operates with engine speed is fixed at low idle speed after a certain time.		
Phenomenon on machine	• Engine output reduces heavily. • Engine speed is fixed at low idle speed.		
Related information	• From the machine monitor, it is possible to perform a temporary restoration from inducement to clear engine output low temporarily. • This failure code is detected during engine operation. • If this failure code displays after SCR system abnormality is repaired and the engine controller is shut down, run the engine for 1 minute to clear the failure code. • After this failure code is cleared, engine power deration continues until the starting switch is turned to OFF position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	SCR system abnormality	Failure codes of SCR system abnormality are displayed. Perform troubleshooting for them.
2	Engine system abnormality	If any other failure codes than SCR system abnormality are displayed, perform troubleshooting for them.

Failure Code [CA187]

Action level	Failure code	Failure	Sensor 2 Supply Voltage Low Error (Engine controller system)
L03	CA187		
Details of failure	Low 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. • 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 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. See descriptions of wiring harness and connectors in “c: Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position.		
		If this failure code is cleared, wiring harness connector is defective.		
2	Defective sensor or wiring harness	1. Turn starting switch to OFF position. 2. Disconnect following connectors one by one and turn starting switch to ON position each time. 3. Each time troubleshooting is finished, return to step 1. If this failure code is cleared, disconnected sensor or engine wiring harness is defective. **REMARK** Other failure codes are also displayed. This is because connector is disconnected. Ignore all failure codes except for [CA187].		
		Connector	EGR valve lift sensor	SEGR
			VGT position sensor	SVGT
			Engine wiring harness	ECM J1
3	Defective engine controller	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1, and connect T-adapter to male side. 3. Turn starting switch ON with connector ECM J1 disconnected. 4. If no failure is found by this check, perform troubleshooting again from cause 1 before replacing the engine controller.		
		Voltage	Between ECM J1 (male) (81) and (57)	4.75 to 5.25 V
		If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Failure Code [CA351]

Action level	Failure code	Failure	Injectors Drive Circuit Error (Engine controller system)
L03	CA351		
Details of failure	Error occurs in injector drive circuit		
Action of controller	Restricts engine output for operation (restricts common rail pressure).		
Phenomenon on machine	Engine power deration		
Related information	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 (for injector system) are also displayed, perform troubleshooting for them.
2	Defective engine controller system	Perform troubleshooting for failure code [CA441].

No.	Cause	Procedure, measuring location, criteria and remarks		
7	Fuel leakage from inlet connector (inside head) (note 2)	For check of return rate from injector, see Testing and Adjusting, “Examine Fuel Return Rate and Leakage”.		
		If fuel return rate is excessive, check the tightening of high-pressure pipe connecting part referring to “Note 2”.		
8	Defective injector	For check of return rate from injector, see Testing and Adjusting, “Examine Fuel Return Rate and Leakage”.		
		Return rate from injector	At cranking (Min. 150 rpm, for 30 seconds)	Max. 45 cc/30 sec
			At low idle (For 30 seconds)	Max. 125 cc/30 sec
9	Defective supply pump	For details of testing return rate from supply pump, see Testing and Adjusting, “Examine Fuel Return Rate and Leakage”.		
		Return rate from supply pump	At cranking (Min. 150 rpm, for 30 seconds)	Max. 575 cc/30 sec
			At low idle (For 30 seconds)	Max. 575 cc/30 sec
10	Defective pressure limiter	For details of testing pressure limiter leakage amount, see Testing and Adjusting, “Examine Fuel Return Rate and Leakage”.		
		Leakage from pressure limiter	At low idle (for 30 seconds)	Max. 8 cc/30 sec
11	Air in low-pressure circuit	Air may be in low-pressure circuit. Check it according to the following procedure. 1. Remove pressure pickup plug (outlet side) of fuel main filter. 2. Operate feed pump of fuel prefilter. 3. Check pressure pickup plug for leakage of fuel and air. If this error occurs during air bleeding after fuel filter is replaced, air may remain in fuel circuit. Keep running engine at low idle speed for approximately 3 minutes. As air is bled from fuel circuit, engine speed is stabilized, and error display disappears.		
12	Defective common rail pressure sensor system	Perform troubleshooting for failure code [CA451] and [CA452].		

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

1. Clogging of fuel tank breather
2. Leakage from or clogging of low-pressure fuel piping
3. Clogging of fuel prefilter
4. Clogging of fuel main filter
5. Replace fuel filter when problem is not removed even if no clogging is found.

Failure Code [CA1683]

Action level	Failure code	Failure	DEF Tank Heating Valve Voltage High Error (Engine controller system)
L01	CA1683		
Detail of failure	High voltage error is detected in signal circuit of DEF tank heating valve.		
Action of controller	Advances to Inducement strategy.		
Phenomenon on machine	• Failure to thaw DEF. • Engine power deration according to inducement strategy.		
Related information	• For the inducement failure codes, refer “List of failure codes related to Inducement” of “Troubleshooting Points for Urea SCR System”. • This failure code is displayed when DEF tank heating valve connector is disconnected. • DEF tank heating valve is driven when DEF is thawed and engine starts with the temperature of engine coolant 45 °C or below. • DEF tank heating value can also be driven at “DEF tank heater valve test”. • This failure code is detected only when DEF tank heating value stops. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position.		
		If this failure code is cleared, wiring harness connector is defective.		
2	Defective DEF tank heating valve	1. Turn starting switch to OFF position. 2. Disconnect connector UHV, and connect T-adapter to male side.		
		Resistance	Between UHV (male) (1) and (2)	15 to 30 Ω
3	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J2, and connect T-adapter to female side.		
		Resistance	Between ECM J2 (female) (82) and (57) **REMARK** The resistance value is the same as the value for an DEF tank heating valve	15 to 30 Ω
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. If failure code is still displayed after above checks on cause 3, this check is not required. 2. Turn starting switch to OFF position. 3. Disconnect connectors ECM J2 and UHV and connect T-adapters to each female side.		
		Resistance	Between ECM J2 (female) (82) and UHV (female) (1)	Max. 10 Ω
			Between ECM J2 (female) (57) and UHV (female) (2)	Max. 10 Ω

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Defective KDPF differential pressure sensor</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector PDPF.
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is changed to [CA1881], the KDPF differential pressure sensor is defective.
NOTICE
• If this failure code is displayed, the wiring harness or engine controller is defective.
• Ignore other failure codes displayed.</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Open circuit in wiring harness (wire breakage of GND line or defective contact of connector)</td><td colspan="3">If failure code is still displayed after above checks on cause 2, this check is not required.
1. Turn starting switch to OFF position.
2. Disconnect connectors ECM J2 and PDPF, and connect T-adapters to each female side.</td></tr>
<tr><td>Resistance</td><td>Between ECM J2 (female) (32) and PDPF (female) (1)</td><td>Max. 10 Ω</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Short circuit in wiring harness</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors ECM J2 and PDPF, and connect T-adapter to female side of ECM J2.</td></tr>
<tr><td>Continuity</td><td>Between ECM J2 (female) (41) and each pin other than pin (41)</td><td>No continuity (no sound is heard)</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Hot short circuit in wiring harness</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector PDPF.
3. Connect T-adapter to female side of connector PDPF, or insert T-adapter to connector ECM J2.
4. Turn starting switch to ON position (with connector PDPF disconnected).</td></tr>
<tr><td>Voltage</td><td>Between ECM J2 (female) (42) and (32), or between PDPF (female) (2) and (1)</td><td>Max. 1 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>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Open circuit of connector box (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adapter to male side of INTER-CONNECT and female side of SEGR.		
		Resistance	If power supply voltage in check on cause 2 is normal, this check is not required. Between INTER-CONNECT (male) (3) and SEGR (female) (A)	Max. 10 Ω
			If power supply voltage in check on cause 2 is normal, this check is not required. Between INTER-CONNECT (male) (4) and SEGR (female) (B)	Max. 10 Ω
			Between INTER-CONNECT (male) (5) and SEGR (female) (C)	Max. 10 Ω
4	Ground fault of connector box (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adapter to male side of INTER-CONNECT and female side of SEGR.		
		Resistance	Between ground and INTER-CONNECT (male) (5) or SEGR (female) (C)	Min. 100 kΩ
			Between ground and INTER-CONNECT (male) (3) or SEGR (female) (A)	Min. 100 kΩ
5	Short circuit of connector box (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adapter to male side of INTER-CONNECT or female side of SEGR.		
		Resistance	Between INTER-CONNECT (male) (4) and (5), or between SEGR (female) (B) and (C)	Min. 100 kΩ
6	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and ECM J1, and connect T-adapters to each female side.		
		Resistance	If power supply voltage in check on cause 2 is normal, this check is not required. Between ECM J1 (female) (81) and INTER-CONNECT (female) (3)	Max. 10 Ω
			If power supply voltage in check on cause 2 is normal, this check is not required. Between ECM J1 (female) (57) and INTER-CONNECT (female) (4)	Max. 10 Ω
			Between ECM J1 (female) (88) and INTER-CONNECT (female) (5) (sensor output)	Max. 10 Ω
7	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and INTER-CONNECT, and connect T-adapter to either female side.		
		Resistance	Between ECM J1 (female) (88) and ground, or between INTER-CONNECT (female) (5) and ground	Min. 100 kΩ

No.	Cause	Procedure, measuring location, criteria and remarks
5	Defective exhaust gas color	1. Suddenly accelerate the engine from low idle to high idle two times, and then keep the engine running at high idle speed for 5 seconds. If an excess black smoke is seen at high idle speed during acceleration, perform “S-9 KDPF GETS CLOGGED IN A SHORT TIME”. **REMARK** Even excessive black smoke is exhausted during engine acceleration, if it is not at engine high idle, it is not defective.
6	Reset after KDOC change	1. Attach KDOC and KDPF. 2. Turn starting switch to ON position. 3. On the Service screen of the machine monitor, display “Diagnostic Tests” screen, open 03 “KDPF Memory Reset”, and perform 03 “KDOC Change” (Reset after KDOC change).
		NOTICE • **Check that reset after KDOC change is complete successfully (by reset count). If not, perform troubleshooting again.** • **If KDOC is changed, troubleshooting is complete without performing manual stationary regeneration.**
7	Defective KDOC	1. Remove KDPF. 2. Remove KDOC. **NOTICE** • **Check if KDOC has any cracks (change KDOC if any).** • **Check if KDOC inlet surface is clogged with soot 50 % or more (Cleaning of KDOC).** • **Perform cause 7 when KDOC is changed, and perform causes 7 and 8 when it is cleaned.**
8	Manual stationary regeneration performed	1. Perform manual stationary regeneration from active regeneration for service. 2. Turn starting switch to OFF position. 3. Perform manual stationary regeneration from active regeneration for service again (to confirm the completion of the repair).
		NOTICE **If failure code [CA2637] is displayed after performing active regeneration for service, KDOC's efficiency is degraded. Change KDOC and perform the reset after KDOC change (see cause 7).**

No.	Cause	Procedure, measuring location, criteria and remarks
2	Defective SCR outlet NOx sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA1887], [CA2771], [CA3545], [CA3583], [CA3681], or [CA3717] is displayed, perform troubleshooting for these failure codes first.
3	Defective SCR temperature sensor system (Open circuit, Internal defect)	If failure code [CA3142] or [CA3143] or [CA3144] or [CA3146] or [CA3147] or [CA3148] or [CA3165] or [CA3229] or [CA3231] or [CA3235] or [CA4152] or [CA4159] or [CA4164] or [CA4165] or [CA4166] is displayed, perform troubleshooting for these failure codes first.
4	Defective ammonia sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA3899], [CA3911], [CA3912], [CA3932], [CA3933], [CA3934], [CA3935], [CA3936] or [CA4281] is displayed, perform troubleshooting for these failure codes first.
5	Clogged DEF injector	1. If failure code [CA4658] or [CA3568] is displayed, or failure code [CA4658] or [CA3568] is displayed on the service meter display of the abnormality record within 2 hours, perform “Loaded Diagnostics Operation To Confirm Failure Correction”, check if failure code [CA3151], [CA3543], or [CA3582] is displayed. 2. If 19205 “ Ammonia concentration (compensation value) ” indicates a normal value (5 to 100 ppm) and the failure code is cleared, the repair is completed (“Loaded Diagnostics Operation To Confirm Failure Correction” has resolved the clogging problem and the machine has restored normal operation). 3. If the ammonia concentration indicates an abnormal value or either failure code [CA3151], [CA3543], or [CA3582] is displayed, proceed to the next step.
6	Defective mixing tube (exhaust gas leakage)	1. Visually check the piping from the KDPF outlet to the SCR outlet for damage or defective connection. 2. Visually check for white crystallized DEF deposits on the surrounding area. 3. If defective connections or damages are found, fix or replace parts.
7	Damaged DEF hose, DEF leakage at connection	If crystallized DEF is adhered to the surrounding of hose, tank, pump, or engine compartment, it shows DEF may be leaking. Refer to “TESTING AND ADJUSTING”, “SETTING AND OPERATION OF MACHINE MONITOR”, “METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)” to perform DEF Pump Pressure Up Test and find the location of the DEF leak. Replace parts as necessary.

Failure Code [CA3255]

Action level	Failure code	Failure	KDPF Temperature Error - Non Regeneration (Engine controller system)
L03	CA3255		
Details of failure	KDPF outlet temperature remains at high level when active regeneration is not performed.		
Action of controller	• EGR valve closed. • Engine power deration • Regeneration control stops. • Fuel dosing stops.		
Phenomenon on machine	Engine power deration		

Related information	**⚠ The turbocharger outlet, KDPF, sensor fitting piping, and sensor probe become hot (Min. 500 °C). Be careful not to get burned.** **⚠ The DEF mixing piping, SCR assembly, sensor fitting piping, and sensor probe become hot (Min. 400 °C). Be careful not to get burned.** **⚠ Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.** **⚠ Be careful that DEF leaks when removing DEF mixing piping or DEF injector.** **NOTICE** **This failure code applies to the machines made in 2016 and before.** • For the inducement failure codes, refer “List of failure codes related to Inducement” of “Troubleshooting Points for Urea SCR System”. • This failure code [CA3543] is displayed after the engine controller implements “clearing active regeneration (approximately one hour) of urea deposit accumulation” when the failure code [CA3582] is displayed. • Make sure the failure code [CA3582] is not displayed when confirming the completion of repair. • If the ambient pressure is 80 kPa or less and the ambient temperature is -7 °C or less, the engine controller does not troubleshoot this failure code (Under this condition, performimg “Loaded Diagnostics Operation To Clear Failure Code” does not clear this failure code). Confirm on the Pre-defined Monitoring screen. • Even if loaded diagnostics operation to clear failure code is performed, it cannot be canceled when it is under the following condition. 1. When active regeneration is performed 2. DEF injection is stopped by other failure code. • For the procedure to remove and change the DEF injector, see “Remove and Install DEF Injector”. • On the “ Pre-defined Monitoring ”screen, these 4 diagnosis are displayed. Engine operation state diagnosis, environment state diagnosis, SCR catalyst and NOx sensor and ammonia sensor diagnosis, DEF level and DEF quality sensor diagnosis. (The following numbers are the displayed 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 • Environmental state diagnosis 37400 Ambient Pressure 19400 Ambient Temperature 18400 Intake Temperature 19133 Engine Room Temperature 19115 DEF Temperature in Tank

REMARK

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

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Hot short circuit in DEF line heater</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors UHB, and connect T-adapter to male side of UHB.
3. Turn the starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between UHB (male) (1) and ground</td><td>Max. 3 V</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective DEF heater relay</td><td colspan="3">1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn the battery disconnect switch OFF.
3. Disconnect connector UHR1 and UHR2, and replace DEF heater relay.
4. Turn the battery disconnect switch ON.
5. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is cleared, the original DEF heater relay is defective.</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>
</table>

Failure Code [CA3932]

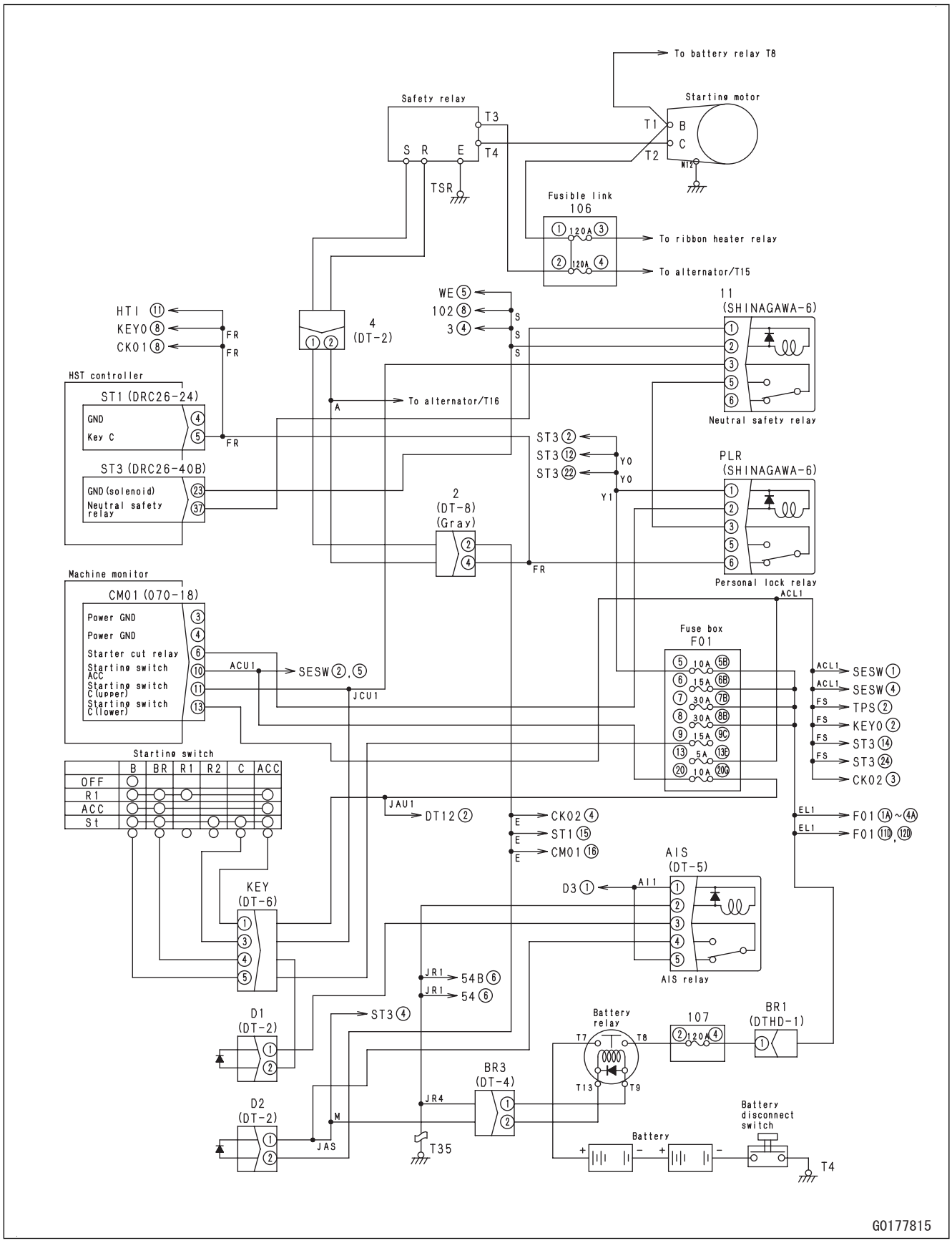
Action level	Failure code	Failure	SCR NH3 Sensor Heater Voltage High Error
L01	CA3932		(Engine controller system)
Detail of failure	The ammonia sensor controller is determined as having excessive heater control voltage.		
Action of controller	• Uses DEF injection control without using the ammonia sensor. • Advances to Inducement strategy.		
Phenomenon on machine	• NOx emission may increase or ammonia may be exhausted because DEF injection works inappropriately. • Engine output is reduced based on inducement strategy.		
Related information	⚠ **SCR Ass'y, the sensor installation piping, and the sensor probe become hot (Min. 400 °C). Be careful not to get burned.** ⚠ **Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.** • For the inducement failure codes, refer “List of failure codes related to Inducement” of “Troubleshooting Points for Urea SCR System”. • If the ammonia sensor controller detects a circuit error of the ammonia sensor, the error is sent to the engine controller via CAN communication, and this failure code is displayed. • On the Pre-defined Monitoring screen troubleshooting for the engine operation state is used (the figures below denote monitoring codes). • Engine operation state troubleshooting 01002 Engine Speed 19200 Exhaust Gas Flow Rate 47300 KDOC Inlet Temperature 19300 SCR Temperature 19302 SCR Outlet Temperature **NOTICE** **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.**		

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. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
		If this failure code is cleared, wiring harness connector is defective.
2	Defective ammonia sensor	If the failure code persists after the above checks, the sensor may be defective. 1. Turn starting switch to OFF position. 2. Replace the ammonia sensor. 3. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
		If the failure code is cleared, the original ammonia sensor may be defective.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Low battery voltage</td><td colspan="3">1. Check that system operating lamp is not illuminated, and then turn the battery disconnect switch to OFF position.
2. Turn starting switch to OFF position.
3. Disconnect connector SSR, and connect T-adapter to female side.
4. Turn the battery disconnect switch to ON position.
5. Turn starting switch to ON position.</td></tr>
<tr><td rowspan="2">Voltage</td><td>Between SSR (female) (1) and (4)</td><td>22 to 30 V</td></tr>
<tr><td>Between SSR (female) (3) and (4)</td><td>22 to 30 V</td></tr>
<tr><td>4</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>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks
3	Defective ammonia sensor (improper installation)	1. Turn starting switch to OFF position. 2. Check if the ammonia sensor probe is correctly installed on SCR catalyst and is not loose. 3. After repair is completed, perform “Loaded Diagnostics Operation To Clear Failure Code”.
4	Low DEF concentration	1. Check that the “DEF concentration” displayed on the Pre-defined Monitoring screen is in the normal range (29 to 36 %). 2. If the “DEF concentration” is out of the normal range, replace the DEF in the DEF tank, and perform “Loaded Diagnostics Operation To Clear Failure Code”.
5	Clogged DEF injector (temporarily clogged)	1. Start engine. 2. When SCR temperature is 200 °C or higher on the Pre-defined Monitoring screen, check for ammonia concentration. 1) If ammonia concentration indicates approximately 5 to 150(ppm), perform “Loaded Diagnostics Operation To Clear Failure Code” because a clogged DEF injector failure is cleared. (DEF injector is not clogged anymore.) 2) If ammonia concentration stays at 0ppm, perform “Testing and adjusting”, “SPECIAL FUNCTIONS OF MACHINE MONITOR”, “Testing”, “Active Regeneration for Service”. (Clogged DEF injector)
6	Defective ammonia sensor	If the failure code persists after the above checks, the sensor may be defective. 1. Turn starting switch to OFF position. 2. Replace the ammonia sensor. 3. Performing “Loaded Diagnostics Operation To Clear Failure Code”.
		If the failure code is cleared, the original ammonia sensor may be defective.
7	Defective ammonia sensor controller	1. Turn starting switch to OFF position. 2. If this failure code is displayed in above diagnosis, replace an ammonia sensor controller. 3. Performing “Loaded Diagnostics Operation To Clear Failure Code”.
		If the failure code is cleared, the original ammonia sensor controller may be defective.
8	Defective turbocharger outlet NOx sensor	If failure code is still displayed after above checks, the turbocharger outlet NOx sensor may be defective. (Offset/drift due to sulfur-poisoned turbocharger outlet NOx sensor) 1. Turn starting switch to OFF position. 2. NOx sensor fails, therefore, replace the turbocharger outlet NOx sensor. 3. Turn starting switch to ON position. 4. Performing “Loaded Diagnostics Operation To Clear Failure Code”.
9	Defective air intake system	If failure code is still displayed after above checks, the intake system may be defective. (Offset/drift due to the deteriorated and aged MAF sensor, distorted intake system, damaged rectifier) 1. Check for a defective air intake pipe and repair or replace any damaged or defective rectifier, if any. 2. Replace mass air flow (MAF) sensor. 3. Turn starting switch to ON position. 4. Performing “Loaded Diagnostics Operation To Clear Failure Code”.

Circuit Diagram of Neutral Safety Relay



Failure Code [D8AQKR]

Action level	Failure code	Failure	CAN 2 Defective Communication (KOMTRAX) (Detected by machine monitor.) (Machine monitor system)
—	D8AQKR		
Detail of failure	Machine monitor does not recognize gateway function controller over CAN communication-2 line (KOMNET/c).		
Action of machine monitor	None		
Phenomenon on machine	None		
Related information	• After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. • 4 different failure codes, [DAJQKR], [DB2QKR], [D8AQKR], and [DBRQKR], are used for defective CAN communication by CAN2 when it is detected by machine monitor. When all of these 4 failure codes are displayed, ground fault, short circuit or hot short in wiring harness (CAN communication circuit) can be suspected. • Since each controller and machine monitor are connected directly to battery, they are supplied with power even after starting switch is turned to OFF position. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective fuse	If fuse No.15 in fuse box F01 is blown out, circuit probably has ground fault, etc.
2	Defective CAN communication 2 system	Perform checks on causes 4 to 9 in troubleshooting for failure code [DB2QKR].
3	Defective gateway function controller	If no failure is found by the above checks, gateway function controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)
4	Defective machine monitor	If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Failure Code [DAJRKR]

Action level	Failure code	Failure	Controller Area Network 1 Defective Communication (Hydrostatic Transmission Controller) (Machine monitor system)
L03	DAJRKR		
Detail of failure	Machine monitor does not recognize HST controller through CAN communication 1 line (KOMNET/r).		
Action of controller	• Does not update communication information of CAN1. • Restricts operations of engine and HST. • If cause of failure disappears, machine becomes normal by itself.		
Phenomenon on machine	• Information to be obtained from HST controller is not displayed and special functions that need information do not work. Or update of received data is stopped. • Hydraulic oil temperature gauge pointer disappears on machine monitor screen. • Engine speed is restricted to medium (half) speed. • Once machine stops, speed range is restricted to F2.		
Related information	• After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position. • Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. • Monitor controller uses failure codes [DB2RKR], [DAJRKR], and [DBRRKR] to indicate failure in CAN communication through CAN 1 line. • CAN1 terminating resistor is located in the machine monitor for cab side. • Since each controller and machine monitor are connected directly to battery, they are supplied with power even after starting switch is turned to OFF position. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective power supply to HST controller	Perform troubleshooting for failure code [DAJ1KK].
2	Defective CAN communication 1 system	Perform checks on causes 2 to 8 in troubleshooting for failure code [DB2RKR].
3	Defective HST controller	If no failure is found by preceding checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
4	Defective machine monitor	If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

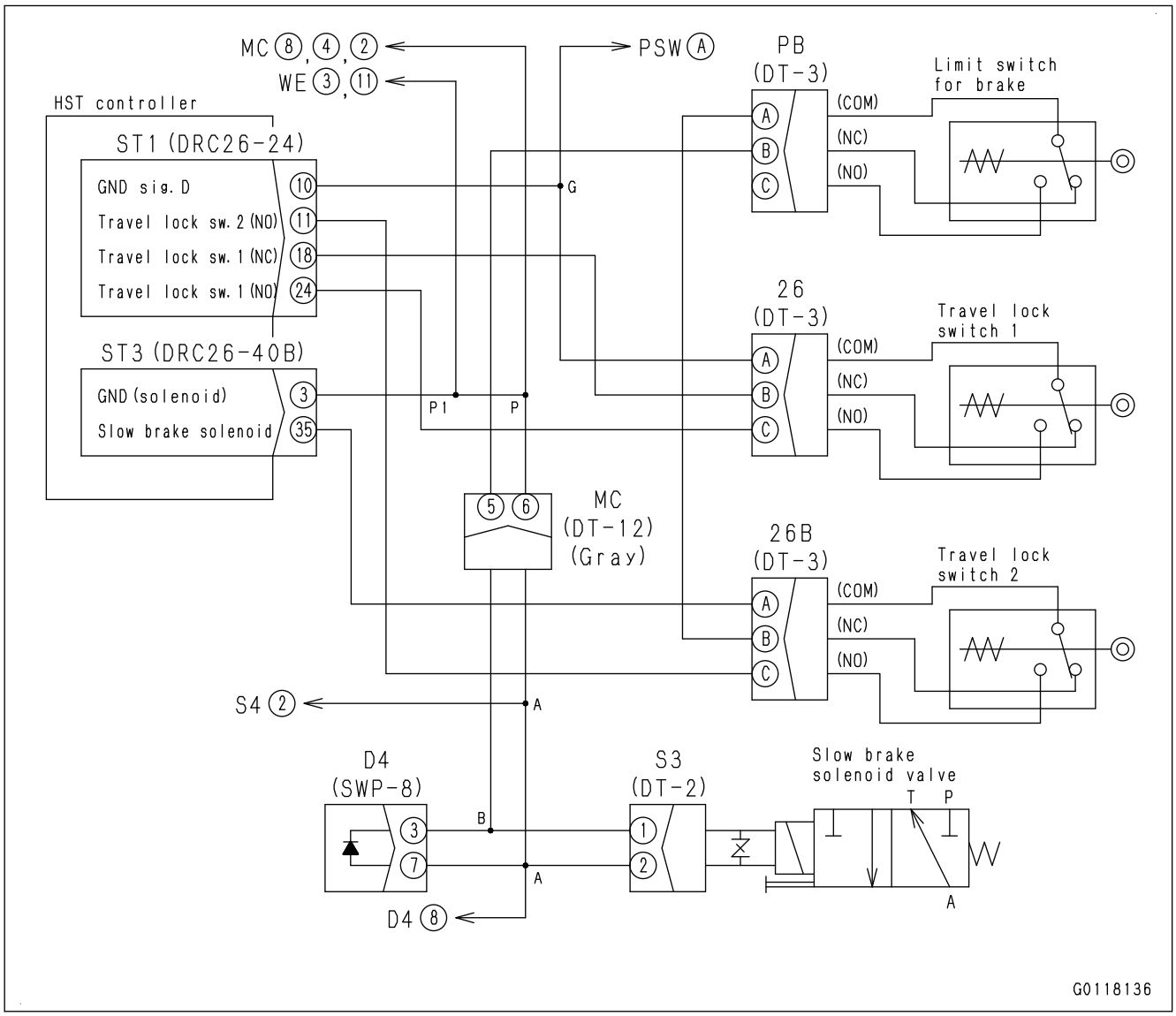
No.	Cause	Procedure, measurement location, criteria and remarks		
8	Ground fault in GNSS receiver power signal wiring harness (contact with ground circuit)	1. Starting switch: OFF 2. Control box: OFF 3. Battery disconnect switch: OFF 4. Disconnect the connectors CG01 and CG02. Connect a T-adapter to the female side.		
		Resistance	Between CG01 (female) (12) and (6) or ground	Min. 1MΩ
			Between CG01 (female) (12) and (11) or ground	Min. 1MΩ
			Between CG01 (female) (12) and CG02 (female) (1) or ground	Min. 1MΩ
			Between CG01 (female) (12) and CG02 (female) (6) or ground	Min. 1MΩ
9	Open circuit in GNSS receiver ground wiring harness	1. Starting switch: OFF 2. Control box: OFF 3. Battery disconnect switch: OFF 4. Disconnect the connectors CG01 and CG02. Connect a T-adapter to one of them on the female side.		
		Resistance	Between CG01 (female) (6) and ground	Max. 1Ω
			Between CG01 (female) (11) and ground	Max. 1Ω
			Between CG02 (female) (1) and ground	Max. 1Ω
			Between CG02 (female) (6) and ground	Max. 1Ω
10	Open circuit in Ethernet wiring harness between GNSS receiver and navigation controller (wire breakage or defective contact of connector)	1. Procedure: Turn the starting switch to the OFF position, and turn off the power supply of the control box. 2. Battery disconnect switch: OFF 3. Disconnect the connectors CG02 and NC4. Connect a T-adapter to the female side of CG02 and male side of NC4.		
		Resistance	Between CG02 (female) (9) and NC4 (male) (3)	Min. 1Ω
			Between CG02 (female) (10) and NC4 (male) (4)	Min. 1Ω
			Between CG02 (female) (11) and NC4 (male) (1)	Min. 1Ω
			Between CG02 (female) (12) and NC4 (male) (2)	Min. 1Ω
11	Open circuit in Ethernet wiring harness between navigation controller and control box (wire breakage or defective contact of connector)	1. Procedure: Turn the starting switch to the OFF position, and turn off the power supply of the control box. 2. Battery disconnect switch: OFF 3. Disconnect the connectors NC3 and MON1. Connect a T-adapter to the male side of NC3 and the male side of MON1.		
		Resistance	Between NC3 (male) (1) and MON1 (male) (J)	Min. 1Ω
			Between NC3 (male) (2) and MON1 (male) (K)	Min. 1Ω
			Between NC3 (male) (3) and MON1 (male) (L)	Min. 1Ω
			Between NC3 (male) (4) and MON1 (male) (M)	Min. 1Ω

Failure Code [DDKHKA]

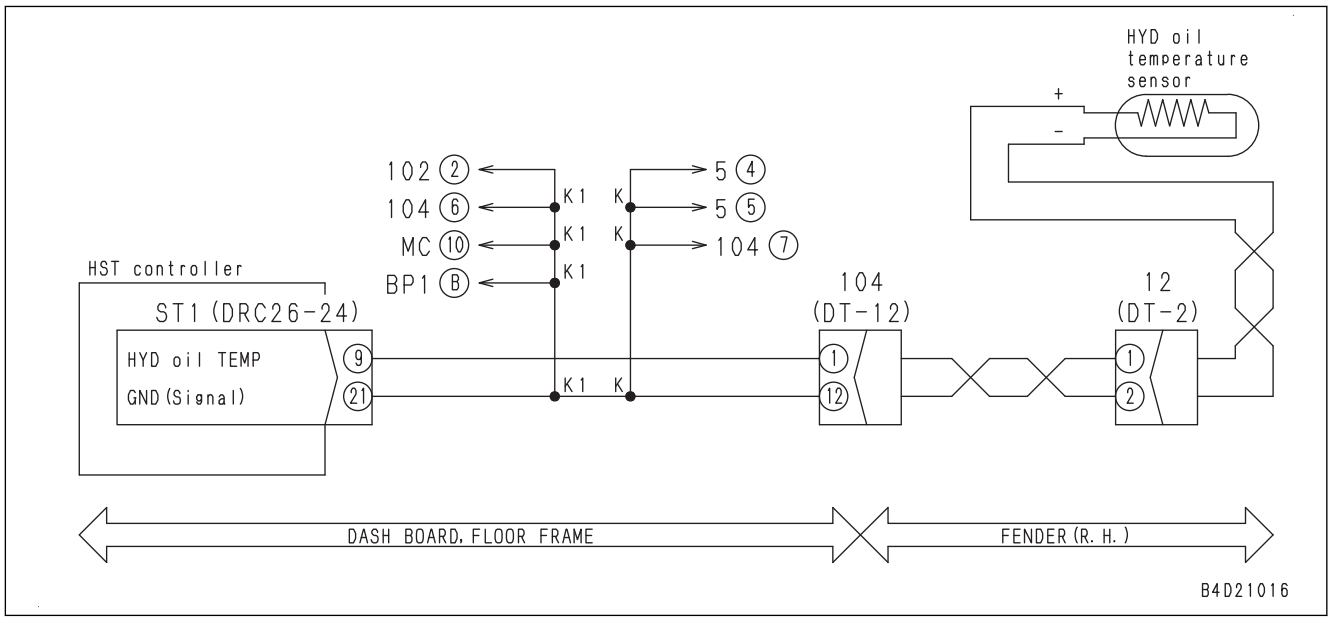
Action level	Failure code	Failure	iB Switch Open Circuit (HST controller system)
L01	DDKHKA		
Detail of failure	2 lines of NO (Normally Open) and NC (Normally Closed) of iB switch circuit become open (switch: OFF) simultaneously.		
Action of controller	Recognizes that iB switch is not pressed.		
Phenomenon on machine	ON/OFF control of iB switch is disabled.		
Related information	• NO line is for detecting operation, and NC line is for detecting errors. • Signal state of iB switch can be checked with monitoring function. (Code: 70306) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and operate iB switch.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective iB switch (wiring harness) (internal open circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connector BNSW, and connect T-adapter to male side. 3. Turn on and off iB switch to perform troubleshooting. **REMARK** Switch OFF: Release, Switch ON: Press			
		Resistance	Between BNSW (male) (1) and (3)	Switch OFF	Max. 1 Ω
				Turn on the switch.	Min. 1 MΩ
			Between BNSW (male) (2) and (3)	Switch OFF	Min. 1 MΩ
				Turn on the switch.	Max. 1 Ω
2	Open circuit or hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect connector BNSW, and connect T-adapter to female side. 3. Turn the starting switch to ON position. **REMARK** • If voltage is 0 V, wiring harness has open circuit. If it is 24 V, wiring harness has hot short circuit. • In HST controller, approximately 9 V of voltage is applied to signal lines of NO and NC through resistance. • Ignore other failure codes displayed.			
		Voltage	Between BNSW (female) (1) and (3)		7 to 11 V
			Between BNSW (female) (2) and (3)		7 to 11 V
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connectors ST2 and BNSW, and connect T-adapter to each female side.			
		Resistance	Between ST2 (female) (2) and BNSW (female) (1)		Max. 1 Ω
			Between ST2 (female) (12) and BNSW (female) (2)		Max. 1 Ω
			Between ST2 (female) (29) and BNSW (female) (3)		Max. 1 Ω

Circuit Diagram of Parking Brake Lever Switch

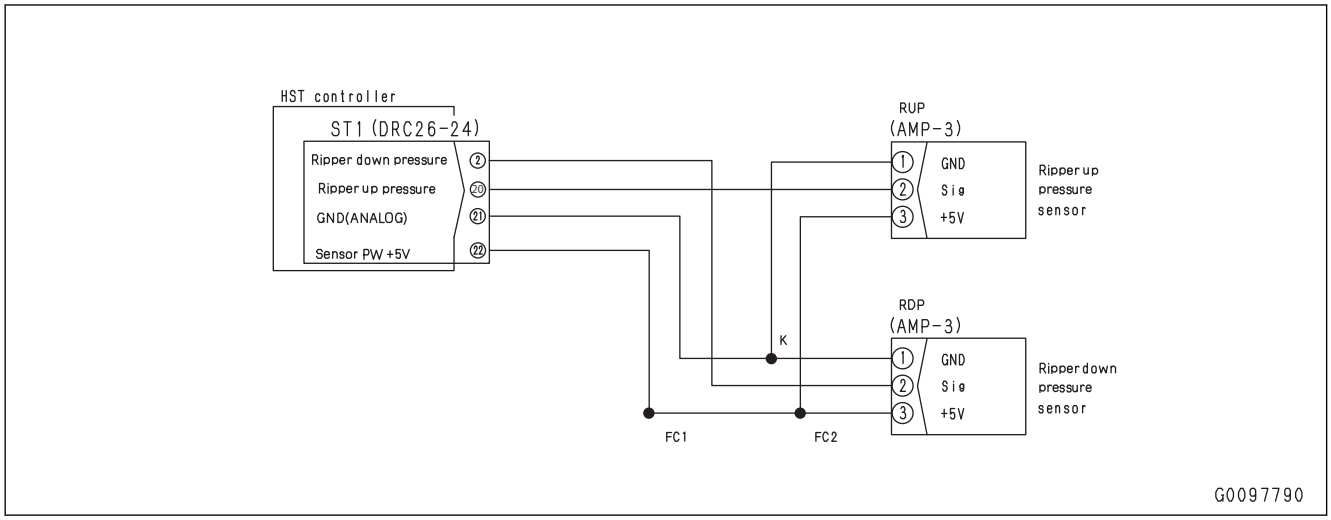


Circuit Diagram of HST Oil Temperature Sensor



No.	Cause	Procedure, measurement location, criteria and remarks		
4	Ground fault in wiring harness (contact with ground circuit)	If no failure is found by check on cause 2, this check is not required. 1. Starting switch: OFF 2. Disconnect the connectors ST1 and RUP. Connect a T-adapter to one of them on the female side.		
		Resistance	Between ST1 (female) (20) and (21) or RUP (female) (2) and (1)	Min. 1 MΩ
			Between ground and ST1 (female) (20) or RUP (female) (2)	Min. 1 MΩ
5	Defective HST controller	If no failure is found by the previous checks, the HST controller is defective. Reference 1. Starting switch: OFF 2. Insert a T-adapter into the connector ST1. 3. Starting switch: ON		
		Voltage	Between ST1 (20) and (21)	0.5 to 4.5 V

Circuit Diagram of Ripper PPC Pressure Sensor



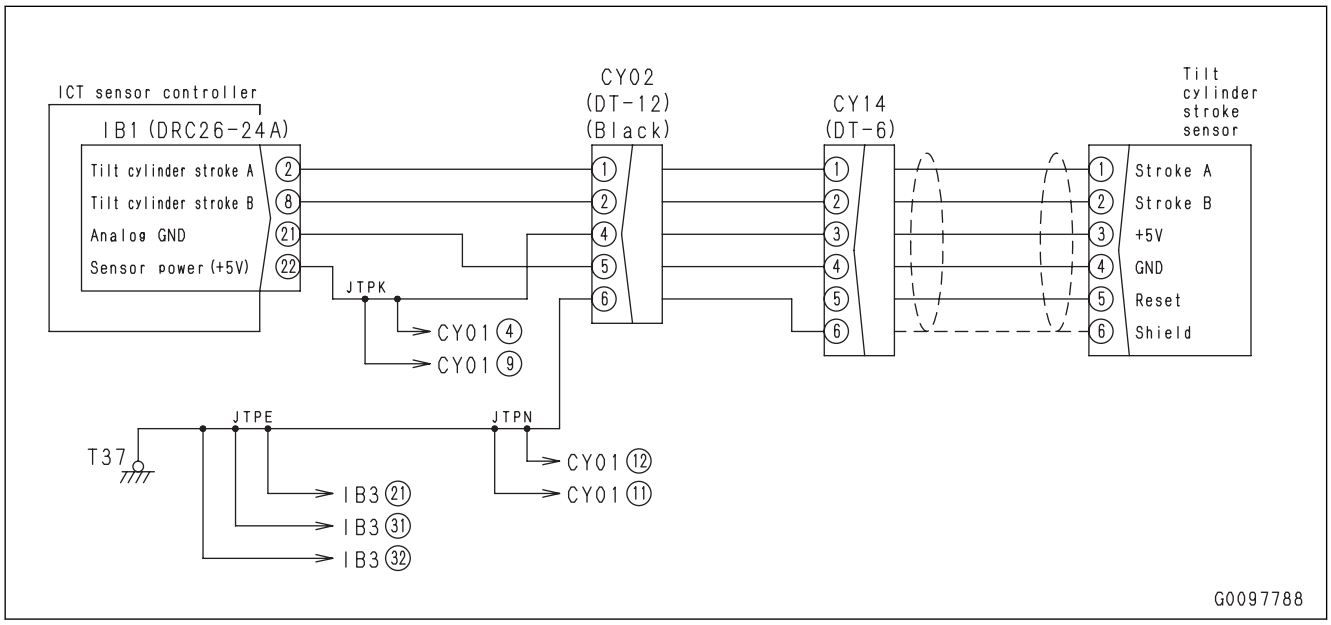
Failure Code [DK57KA]

Action level	Failure code	Failure	Forward/Reverse Potentiometer 2 Open Circuit (HST controller system)
L03	DK57KA		
Detail of failure	Signal voltage of joystick (steering, directional and gear shift lever) potentiometer 2 (FR 2) becomes 0.5 V and below.		
Action of controller	• Continues control by using signal from joystick (steering, directional and gear shift lever) potentiometer 1 (FR 1). • Restricts operations of engine.		
Phenomenon on machine	• Once machine stops, engine speed is restricted to medium (half) speed. • Once machine stops, selectable speed ranges are restricted to F1 and R1.		
Related information	• Signal voltage of joystick (steering, directional and gear shift lever) potentiometer 2 can be checked with monitoring function. (Code: 50203) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the stsring switch to the ON podion, and operate the joystick (steering, directional and gear shift lever) (F/R direction).		

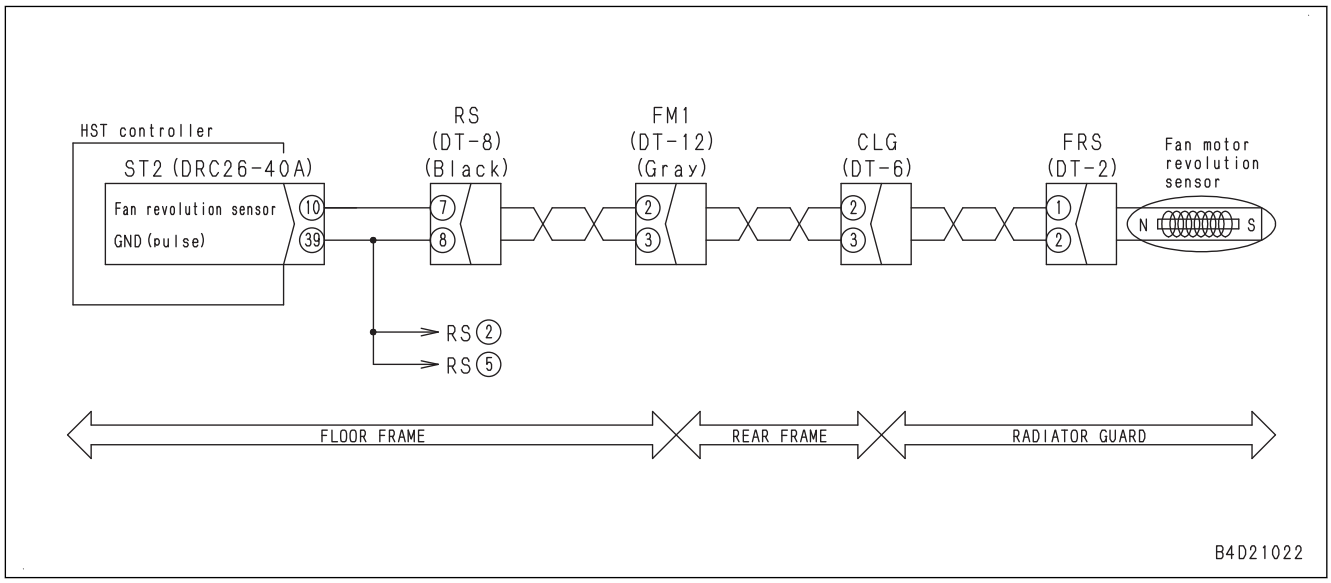
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor power supply system	If failure code [DAJ5KK] is also displayed, perform troubleshooting for it first.			
		1. Turn the starting switch to OFF position. 2. Disconnect connector EL, and connect T-adapter to female side. 3. Turn the starting switch to ON position. **REMARK** If power supply voltage is abnormal, go to check on cause 3 and after.			
		Voltage	Between EL (female) (4) and (1)	Power supply	4.5 to 5.5 V
2	Defective joystick (steering, directional and gear shift lever) potentiometer 2 (internal open circuit or ground fault)	1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector EL. 3. Turn the starting switch to ON position. 4. Operate the joystick (steering, directional and gear shift lever) (forward and reverse) to perform troubleshooting. **REMARK** • If power supply voltage is normal and potentiometer output voltage is abnormal (0.5 V and below), it cannot be determined whether ground fault or defective potentiometer is the cause. In this case, proceed to check on cause 4. • If no failure is found by check on cause 4, joystick (steering, directional and gear shift lever) potentiometer 2 is defective.			
		Voltage	Between EL (2) and (1)		0.5 to 4.5 V

No.	Cause	Procedure, measurement location, criteria and remarks		
3	Open circuit in wiring harness (wire breakage or defective contact)	1. Starting switch: OFF 2. Disconnect the connectors IB1 and CY14. Connect a T-adapter to each female side.		
		Resistance	If the power supply voltage on cause 1 is correct, this check is not required. Between IB1 (female) (22) and CY14 (female) (3)	Max. 1 Ω
			If the power supply voltage on cause 1 is correct, this check is not required. Between IB1 (female) (21) and CY14 (female) (4)	Max. 1 Ω
			Between IB1 (female) (2) and CY14 (female) (1)	Max. 1 Ω
4	Ground fault in wiring harness (contact with ground circuit)	If the power supply voltage on cause 2 is correct, this check is not required. 1. Starting switch: OFF 2. Disconnect the connectors IB1 and CY14. Connect a T-adapter to one of them on the female side.		
		Resistance	Between IB1 (female) (2) and (21) or between CY14 (female) (1) and (4)	Min. 1 MΩ
			Between IB1 (female) (2) and ground or between CY14 (female) (1) and ground	Min. 1 MΩ
5	Defective ICT sensor controller	If no failure is found by previous checks, ICT sensor controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)		
		1. Starting switch: OFF 2. Insert a T-adapter into the connector IB1. 3. Starting switch: ON		
		Voltage	Between IB1 (2) and (21)	0.5 to 4.5 V

Circuit Diagram of Stroke Sensor for Blade Tilt Cylinder

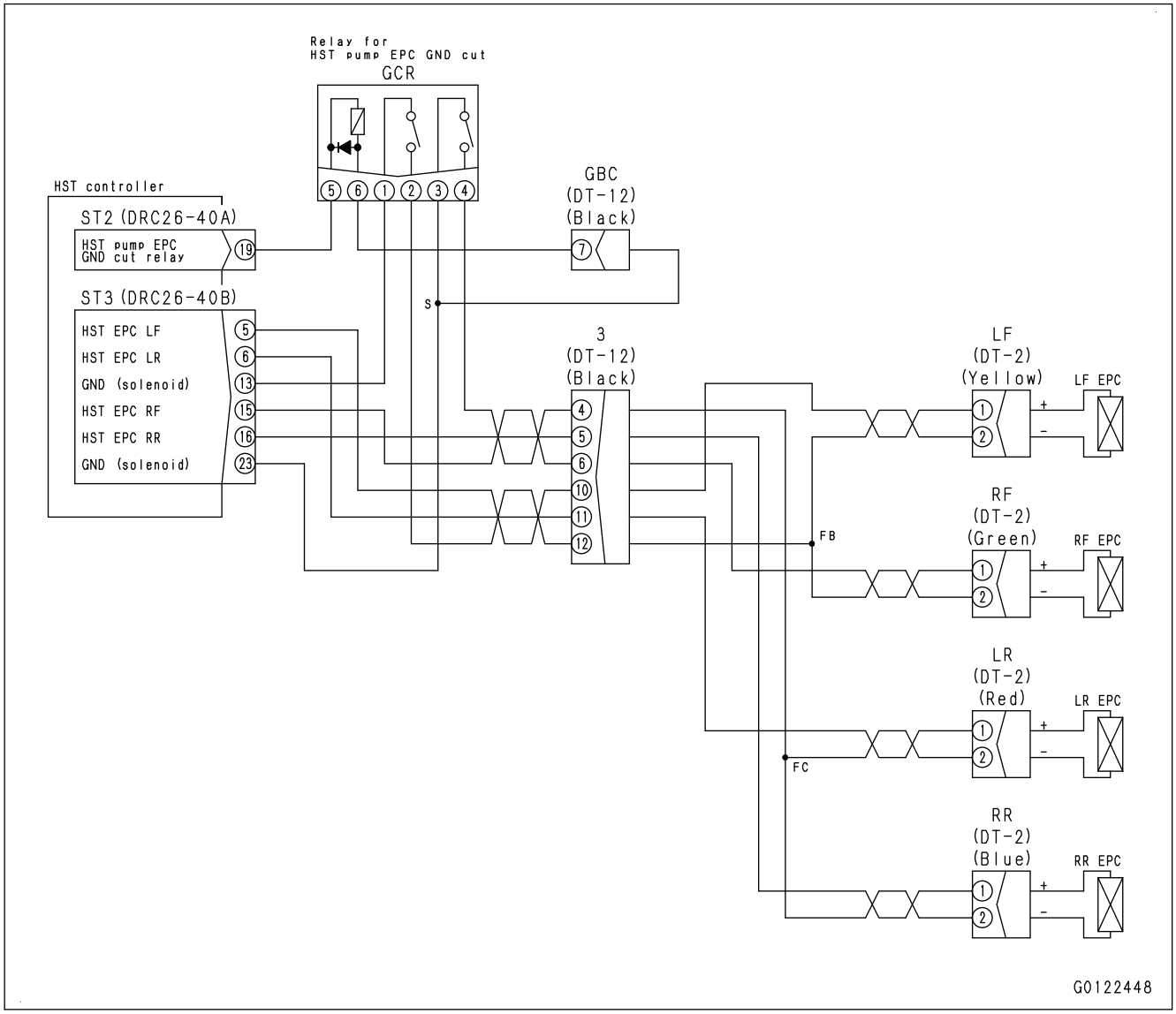


Circuit Diagram of Fan Speed Sensor



No.	Cause	Procedure, measuring location, criteria and remarks		
5	Open circuit in wiring harness (wire breakage or defective contact of connector)	If no failure is found by check on cause 3, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connectors ST3, GCR, and LF, and connect T-adapter to each female side.		
		Resistance	Between ST3 (female) (5) and LF (female) (1)	Max. 1Ω
			Between LF (female) (2) and GCR (female) (2)	Max. 1Ω
			Between GCR (female) (1) and ST3 (female) (13)	Max. 1Ω
6	Defective HST controller	If no failure is found by preceding checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to left forward HST pump EPC solenoid

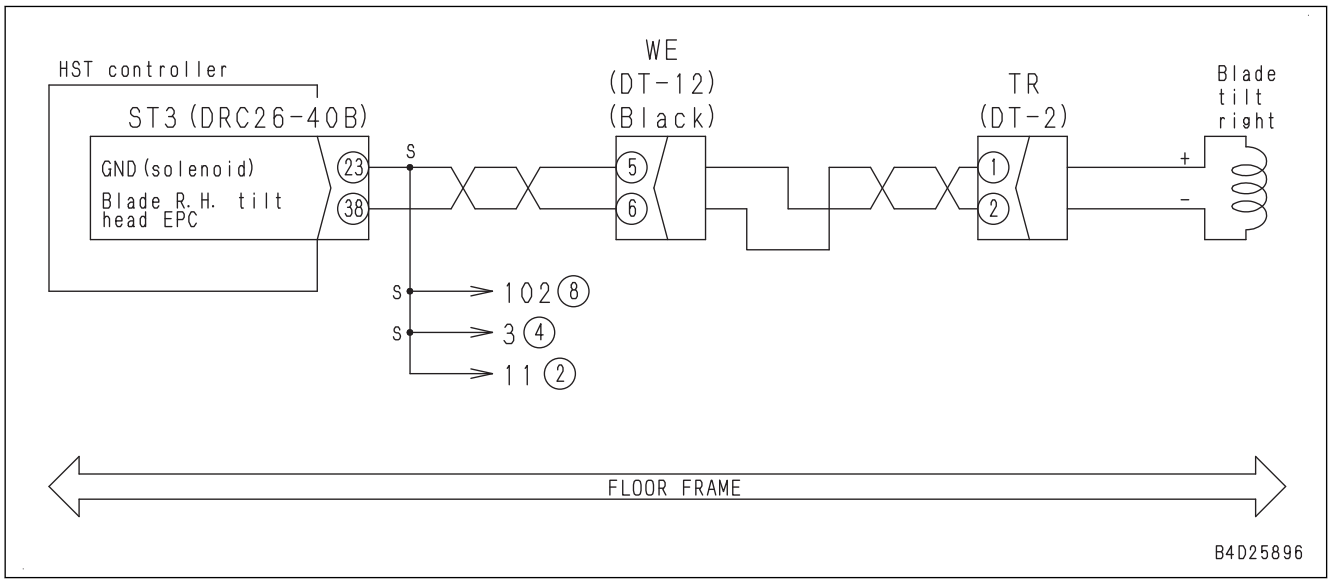


Failure Code [DXA7KA] (Applicable Machine: 45001 to 46273)

Action level	Failure code	Failure	Right Reverse Hydrostatic Transmission Pump Electromagnetic Proportional Control Open Circuit (HST controller system)
L03	DXA7KA		
Detail of failure	When controller drives RR HST pump EPC solenoid valve circuit, no current flows through circuit.		
Action of controller	• Stops driving RR HST pump EPC solenoid valve circuit. • Stops driving LR HST pump EPC solenoid valve circuit as well. • Restricts a part of functions. • Even if cause of failure is eliminated, machine does not become normal until starting switch is turned to OFF position.		
Phenomenon on machine	• The machine stops during reverse travel. • The machine cannot start in reverse after stopping. • Once machine stops, engine speed is restricted to medium (half) speed. • Once machine stops, travel speed after restart is restricted to 50 %.		
Related information	• Output current to RR HST pump EPC solenoid valve can be checked with monitoring function. (Code: 52410) • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Start the engine, and operate the joystick (steering, directional and gear shift lever) (reverse).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective right reverse HST pump EPC solenoid	1. Turn the starting switch to OFF position. 2. Disconnect connector RR, and connect T-adapter to male side.		
		Resistance	Between RR (male) (1) and (2)	5 to 15 Ω
2	Open circuit, short circuit, ground fault, hot short circuit of wiring harness, or defective HST controller	1. Turn the starting switch to OFF position. 2. Disconnect connector RR, and connect T-adapter to female side. 3. Turn the starting switch to ON position. 4. Shake the wiring harness by hand while measuring the voltage. If the voltage becomes approximately 0 V while shaking, wiring harness has open circuit at around this point.		
		Voltage	Between RR (female) (1) and (2)	1 to 4.5 V
3	Open circuit or short circuit in wiring harness	If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connector ST3, and connect T-adapter to female side.		
		Resistance	Between ST3 (female) (16) and (23) Coil resistance of solenoid	5 to 15 Ω
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	If no failure is found by check on cause 2, this check is not required. 1. Turn the starting switch to OFF position. 2. Disconnect connectors ST3 and RR, and connect T-adapter to each female side.		
		Resistance	Between ST3 (female) (16) and RR (female) (1)	Max. 1 Ω
			Between ST3 (female) (23) and RR (female) (2)	Max. 1 Ω

Circuit Diagram of Blade Tilt RIGHT Bottom EPC Solenoid



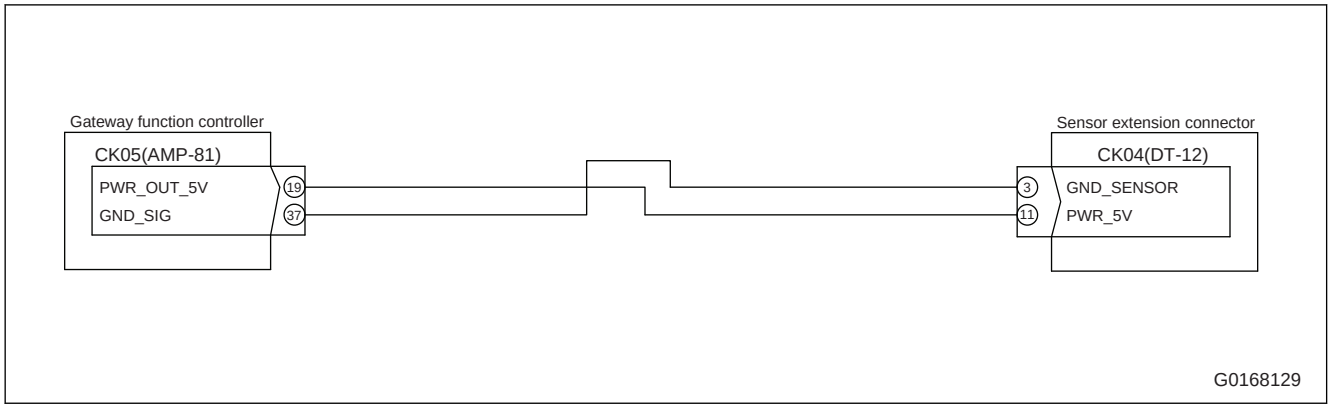
Failure Code [F311KB]

Detail of failure	Because the voltage of the Centralized Warning Lamp Signal 1 signal output line from the gateway function controller is 5.37V or more while the command is ON, a short circuit is found.
Action level	-
Action of controller	• Centralized Warning Lamp Signal 1 signal is turned OFF. • Even if the cause of the abnormality is removed, the machine will not go back to the correct condition until the starting switch is turned to the OFF position one time.
Phenomenon on machine	KOMTRAX system does not operate correctly.
Related information	

<table>
<tr><th>No.</th><th>Check item</th><th colspan="3">Procedure of troubleshooting</th><th colspan="2">Judgment and remedy</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td colspan="3" rowspan="2">1. Do the check in accordance with the descriptions of wiring harnesses and connectors in RELATED INFORMATION FOR TROUBLESHOOTING, CHECKS BEFORE TROUBLESHOOTING, ELECTRICAL EQUIPMENT.
2. Are the wiring harnesses and connectors in the correct state?</td><td>YES</td><td>• The wiring harnesses and connectors are in the correct state.
• Go to the next check item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or a connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Short circuit in wiring harness</td><td colspan="3">1. Turn the starting switch to the OFF position.
2. Disconnect the connectors CK05 and DT12, and connect a T-adapter to the female side of CK05.
3. Measure the resistance.
4. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The wiring harness does not have a short circuit.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td>Measurement position, condition</td><td>Standard value</td><td rowspan="2">NO</td><td rowspan="2">• The wiring harness has a short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td>Resistance</td><td>Between CK05 (female) (66) and each pin other than pin (66)</td><td>Min. 1MΩ</td></tr>
</table>

<table>
<tr><th>No.</th><th>Check item</th><th colspan="4">Procedure of troubleshooting</th><th colspan="2">Judgment and remedy</th></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Short circuit in wiring harness</td><td colspan="4">1. Turn the starting switch to the OFF position.
2. Disconnect the connectors CK05 and CK04. Connect a T-adapter to the female side of CK05.
3. Measure the resistance.
4. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The wiring harness does not have a short circuit.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td colspan="2">Measurement position, condition</td><td>Standard value</td><td rowspan="2">NO</td><td rowspan="2">• The wiring harness has a short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td>Resistance</td><td colspan="2">Between CK05 (female) (19) and each pin other than pin (19)</td><td>Min. 1MΩ</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Confirmation of check results</td><td colspan="4" rowspan="2">1. Do the troubleshooting above again.
2. Can you find the cause by the check?</td><td>YES</td><td>The repair is done.</td></tr>
<tr><td>NO</td><td>• The gateway function controller can be defective.
• Replace the gateway function controller.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Confirmation of repair</td><td colspan="4" rowspan="2">1. Turn the starting switch to the OFF position.
2. Connect all the component parts.
3. Turn the starting switch to the ON position. Then, do the troubleshooting.
4. Is this failure code shown?</td><td>YES</td><td>Go back to the first check item.</td></tr>
<tr><td>NO</td><td>The repair is done.</td></tr>
</table>

Circuit Diagram of Gateway Function Controller



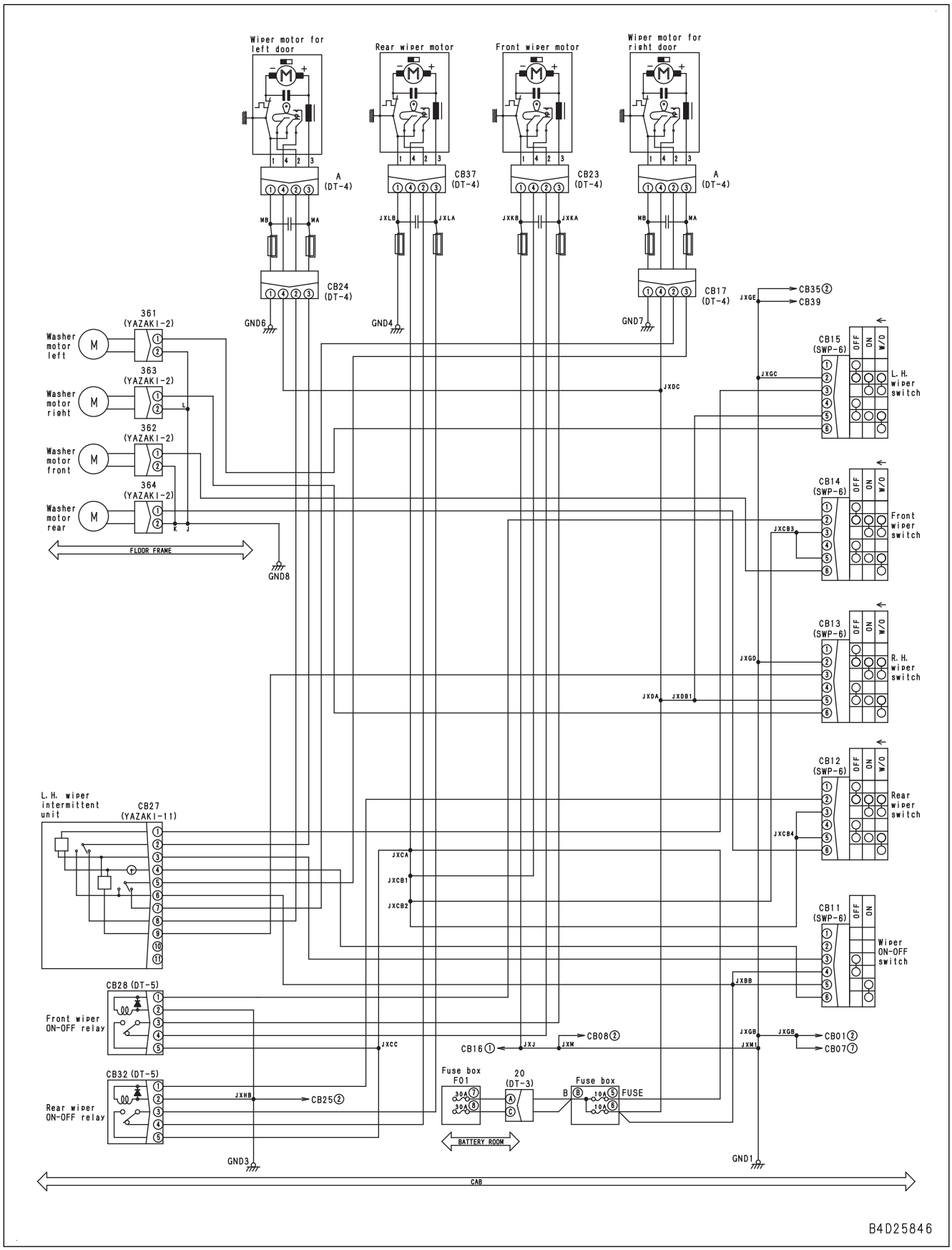
<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="6">26</td><td rowspan="6">Ground fault in wiring harness 2 (contact with ground circuit)</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Disconnect connectors KEY, 11, PLR, 4, CM01, ST1, CK02.
3. Connect T-adapter to each female side of KEY, 11, PLR, and 4.
4. Remove fuse No.5 in fuse box F01.</td></tr>
<tr><td rowspan="4">Resistance</td><td>Between ground and KEY (female) (3) or 11 (female) (3)</td><td>Min. 1MΩ</td></tr>
<tr><td>Between ground and 11 (female) (5) or PLR (female) (3)</td><td>Min. 1MΩ</td></tr>
<tr><td>Between ground and PLR (female) (6) or 4 (female) (1)</td><td>Min. 1MΩ</td></tr>
<tr><td>Between PLR (female) (2) and ground</td><td>Min. 1MΩ</td></tr>
<tr><td rowspan="2">27</td><td rowspan="2">Hot short circuit in wiring harness</td><td colspan="3">1. Turn the starting switch to OFF position.
2. Turn the starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between T16 terminal and ground</td><td>Max. 1V</td></tr>
</table>

E-23 Foot Heater Does Not Operate

Failure	Foot heater does not operate.
Related information	• Trouble shooting procedure is described for the case that blower motor does not rotate and the case that hot water valve is defective. • When blower motor rotates but air is not warmed up, hot water may not be supplied from engine. Check hot water valve system (cause 11 and after). • Air is not warmed up and temperature cannot be controlled until coolant temperature is increased. • Temperature is controlled by changing volume of hot water entering into foot heater by using hot water valve under the floor. • When foot heater does not operate normally, check whether temperature control is available when turning air conditioner mode switch to HEAT position. When temperature control starts operating normally after air conditioner mode switch is turned to HEAT position, hot water valve body and diode AC9 are considered to be normal. • Start troubleshooting of blower motor from intermediate connector 92.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective fuse	If fuses No.3 and 4 in fuse box F01 are blown out, circuit probably has ground fault. (See check on cause 16.)		
2	Defective foot heater Hi relay	Check in advance that air comes out when foot heater is set to Lo. 1. Turn the starting switch to OFF position. 2. Replace connector HRH with HRL. (Replace the relay for foot heater Hi with the relay for foot heater Lo.) 3. Turn the starting switch to ON position. 4. Set the foot heater to Hi.		
		If air comes out the foot heater, original relay for foot heater Hi is defective.		
3	Defective foot heater Lo relay	Check in advance that air comes out when foot heater is set to Hi. 1. Turn the starting switch to OFF position. 2. Replace connector HRH with HRL. (Replace the relay for foot heater Hi with the relay for foot heater Lo.) 3. Turn the starting switch to ON position. 4. Set the foot heater to Lo.		
		If air comes out the foot heater, original relay for foot heater Lo is defective.		
4	Defective diode AC7 or AC8	1. Turn the starting switch to OFF position. 2. Disconnect connectors AC7 and AC8. 3. Turn the starting switch to ON position. 4. Switch the foot heater switch between Hi and Lo.		
		If air blows out foot heater, diode AC7 or AC8 is defective.		
5	Defective blower motor system	1. Turn the starting switch to OFF position. 2. Disconnect connector 92, and connect T-adapter to male side. If check result is unusual, go to check on causes 8 and 9.		
		Resistance	Between 92 (male) (1) and (3)	1 to 5 Ω
			Between 92 (male) (2) and (3)	1 to 5 Ω

Circuit Diagram of Windshield Washer



E-62 Cylinder Stroke Reset Indication Does Not Go Out

Failure	Cylinder stroke reset indication does not go out.
Related information	Make sure that the related failure code is not shown, and do the troubleshooting.

No.	Cause	Procedure, measurement location, criteria and remarks
1	Time held at stroke end is too short.	Move the cylinder until it touches the stroke end, and keep the contact state for 2 seconds or more.
2	Cylinder speed is slow.	Turn the fuel control dial to Max. position from where the cylinder is kept at before its stroke end to a small degree, and operate the blade control lever fully.
3	When the starting switch is turned to the OFF position, the cylinder stroke end position changes largely.	Move the cylinder until it touches the stroke end at opposite side, and keep that state for 2 seconds or more.
4	Inappropriate position of blade at resetting (angle cylinder only)	Move the blade to the stroke end position of tilting LEFT in advance before you reset the angle cylinder. When the length of pitch rod is long, you can reset the angle cylinder only by angle RIGHT. When the length of pitch rod is short, you can reset the angle cylinder only by angle LEFT. If the stroke is largely out of standard and it is required to reset at opposite side of stroke, adjust the pitch rod length to the standard length one time.
5	Defective stroke sensor	Do “CHECK AND ADJUST STROKE SENSOR”. For details, see TESTING AND ADJUSTING.
6	Defective reset sensor	Do “CHECK AND ADJUST RESET SENSOR”. For details, see the chapter TESTING AND ADJUSTING.
7	Defective ICT sensor controller	If no failure is found by previous checks, ICT sensor controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)

Troubleshooting for Hydraulic and Mechanical Systems (H Mode)

Information Shown in Troubleshooting Table (H-Mode)

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

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

No.	Cause	Procedure, measuring location, criteria, and remarks
1	Probable cause of failure (Each number is serial number, not priority sequence.)	<Contents of description> • Criteria to determine probable causes • Remarks for determination of probable cause
2		
3		
4		
5		

H-15 Blade Tilt Speed or Power is Low

Failure	Blade tilt speed or power is low.
Related information	• Check that oil level in hydraulic tank is normal before performing troubleshooting. • Before performing troubleshooting, check that blade is not modified. • Blade tilt EPC current can be checked on the monitor as well. (Monitoring code: 71005 (left), 71007 (right)) • Work equipment pump pressure can be checked on the monitor as well. (Monitoring code: 94700)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective strainer of work equipment pump	Check strainer for clogging.			
2	Air sucked in on suction side of work equipment pump	Check suction side piping for crack, etc.			
3	Defective operation of EPC valve for blade tilt	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		EPC valve outlet pressure (reference)	Blade tilt control lever	Tilting operation	3.23 MPa {33 kgf/cm^2}
		If EPC output current is normal and outlet pressure is low, check EPC valve spool for sticking.			
4	Defective work equipment main relief valve	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Work equipment main relief pressure	Blade lift cylinder	At relief	27.5 MPa {280 ± 10 kgf/cm^2}
		If pressure does not rise even if main relief valve is adjusted, unload valve or safety valve may be defective. Since unload valve and safety valve cannot be adjusted, replace them.			
5	Malfunction of blade tilt control valve spool	When no failure is found by checks on causes 3 and 4, if main circuit oil pressure does not exceed unload valve set pressure when blade is tilted, malfunction of work equipment spool is suspected. Check that the spool is not stuck.			
6	Defective operation of blade tilt control valve pressure compensation valve	Although lift operates normally and tilt operates when lift has no load, if tilt cannot operate when load is applied to lift, tilt pressure compensation valve may be defective.			
7	Defective blade tilt cylinder	Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Cylinder leakage	Blade tilt cylinder	At relief	8 cc/min
		If relief oil pressure is low, disconnect hydraulic hose at the blade tilt cylinder head side. If oil flows out from cylinder when cylinder is relieved at its stroke end, cylinder piston ring is defective.			

S-17 Coolant Temperature Increases Too High (Overheat)

Failure	Coolant temperature rises too high (overheating)
Related information	If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Clogged radiator core	Check for clogging of radiator core and crushing of fin.	Cleaning of radiator core
2	Malfunction of thermostat	Thermostat does not open at cracking temperature. **REMARK** Cracking temperature of thermostat: 79.4 ± 83.3 °C (Full open temperature: 95 °C)	Thermostat replacement
3	Defective coolant temperature gauge	The error is detected in coolant temperature gauge system, but measured coolant temperature in radiator is normal.	Coolant temperature sensor, monitor or wiring harness replacement
4	Increase of fuel injection amount	Fuel injection amount is excessive.	Perform troubleshooting of “FUEL CONSUMPTION IS EXCESSIVE” in S mode, and take corrective action.
5	Low coolant level	Check coolant level for decrease.	Refilling with coolant
6	Coolant leakage	Check coolant piping for coolant leakage.	Coolant piping replacement
7	Broken water pump	Visually check water pump (check of water leakage through shaft seal, breakage of impeller, breakage of shaft)	Water pump replacement
8	Overheat due to increase in EGR ratio (EGR amount against fresh air intake amount) caused by defective mass air flow and temperature sensor	Check for defective mass air flow and temperature sensor.	Mass air flow and temperature sensor replacement
9	Overheat caused by increase of EGR ratio (quantity of EGR to fresh intake air) caused by deformation of air cleaner	Check air cleaner and rectifying wire net for deformation.	Air cleaner repair or replacement
10	Defective cylinder head or head gasket	Check if there are many bubbles in radiator and if coolant blows back.	Perform troubleshooting of “OIL IS IN COOLANT” in S mode, and take corrective action.
11	Defective piston ring	• Remove plug of bore for measuring the exhaust gas color in front of KDPF, and check color of the exhaust gas coming out of the bore. (Reference: See Testing and Adjusting “Examine Exhaust Gas Color”) • Measure compression pressure (See standard value table). (Reference: See “TESTING AND ADJUSTING”, “Testing compression pressure”.) • Check piston ring and piston ring groove.	Piston ring and piston replacement

Tools for Disassembly and Assembly of Final Drive Assembly

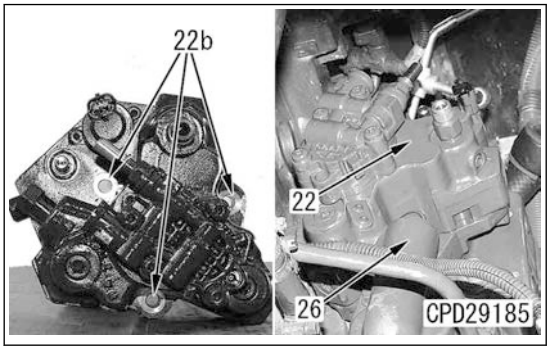
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available	Forcing screw	●	1			Removal of cover
B	Commercially available	Eyebolt	●	1			
C	Commercially available	Eyebolt	●	1			Removal of ring gear
D	Commercially available	Eyebolt	●	1			Removal of No.1 planetary carrier assembly
E	790-434-1050	Installer	■	1			Pulling out of planetary pinion shaft
	01580-12419	Nut	■	1			
	01643-32460	Washer	■	1			
	790-101-2540	Washer	■	1			
	790-101-2102	Puller assembly	■	1			
	790-201-2850	Spacer	■	1			
	790-101-110	Hydraulic pump	■	1			
F	791T-627-2210	Wrench	■	1			Removal and installation of round nut
G	Commercially available	Eyebolt	●	1			Removal of hub assembly
H	791-140-1030	Installer	■	1			Serial numbers:40001 to 41295 Installation of seal
	791-140-2031	Installer	■	1			Serial numbers:41296 and up Installation of seal
J	791T-627-2220	Spacer	■	1			Press-fit of bearing
K	791T-627-2230	Spacer	■	1			
L	79A-264-0091	Ruler	■	1			Adjustment of bearing preload
M	Commercially available	Block	●	1			Removal and installation of sprocket teeth
N	790-201-1990	Plate	■	1			Press-fit of outer race
	790-101-5021	Grip	■	1			
	01010-50816	Bolt	■	1			

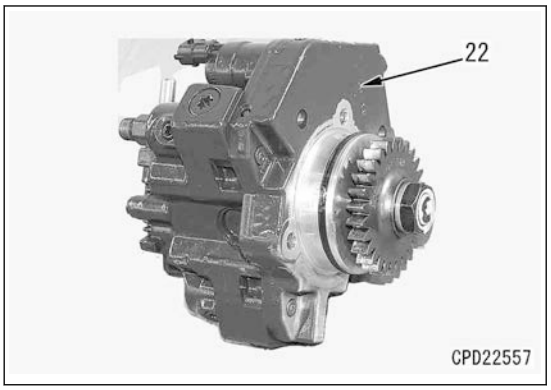
Supply pump assembly

31. Remove the nuts (22b) (3 pieces), and remove the supply pump assembly (22).

    REMARK

    - Pull the supply pump assembly (22) sideways when removing it. Otherwise the supply pump may interfere with the tip of the boost pump (26).
    - The supply pump assembly (22) comes off together with the gear. The gear is not machined on its teeth (no missing tooth) to align the mark for 1.6 TOP adjustment.



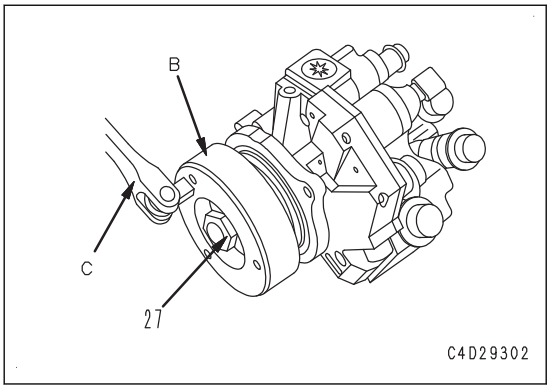


Gear removal procedure

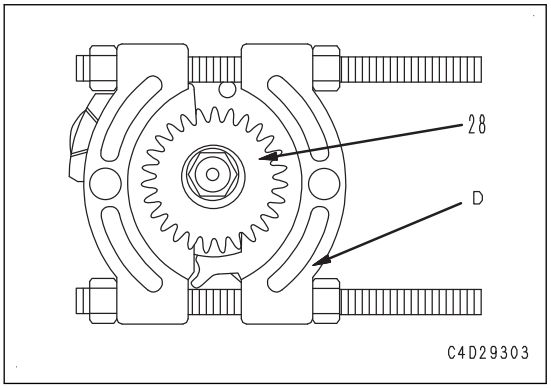
32. Fix the gear by using the support (B) and 2/1 spinner handle (C), and loosen the nut (27).

    NOTICE

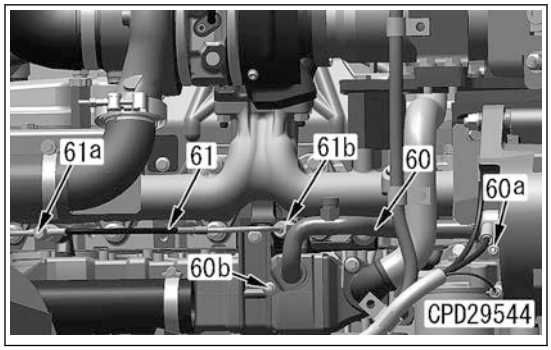
    Do not remove the nut (27) from the shaft.



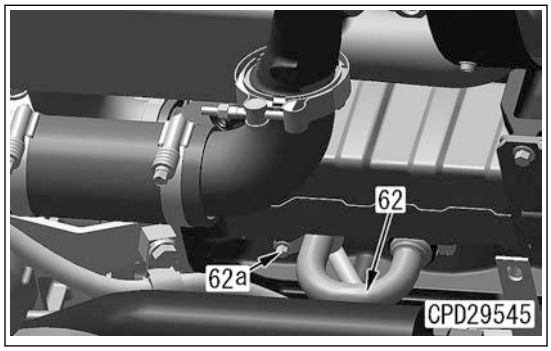
33. Install the puller (D) between the flange and the gear (28).



49. Remove the clamp (60a).
50. Remove the bolt (60b), and disconnect the tube (60).
51. Remove the joint bolt (61a), loosen the sleeve nut (61b), and remove the tube (61).

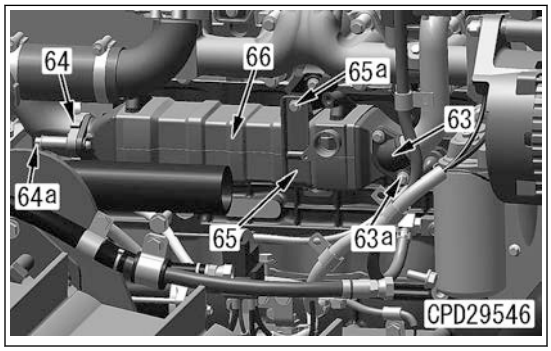


52. Remove the bolt (62a), and disconnect the tube (62).

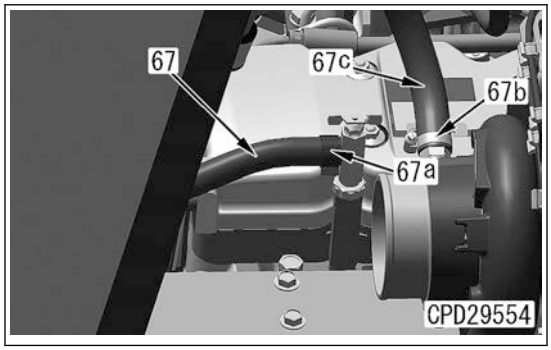


EGR cooler assembly

53. Remove the bolts (63a) (2 pieces), and disconnect the tube (63).
54. Remove the bolts (64a) (2 pieces), and disconnect the exhaust manifold (64).
55. Remove the bolts (65a) (2 pieces), and remove the bracket (65).
56. Remove EGR cooler assembly (66).



57. Remove the clamp (67a), and disconnect the water hose (67).
58. Remove the clamp (67b), and disconnect the hose (67c).

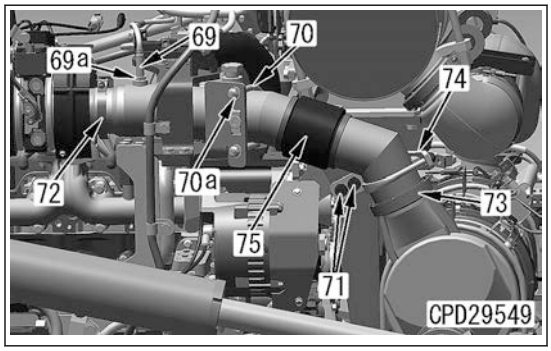


59. Loosen the nut (69a), and disconnect the controller sensor outlet (69).
60. Remove the nuts (70a) (2 pieces), and remove U-bolt (70).
61. Remove the bolts (71) (2 pieces).
62. Remove V-clamps (72) and (73).

    REMARK

    Mark V-clamps (72) and (73) to indicate their correct directions.

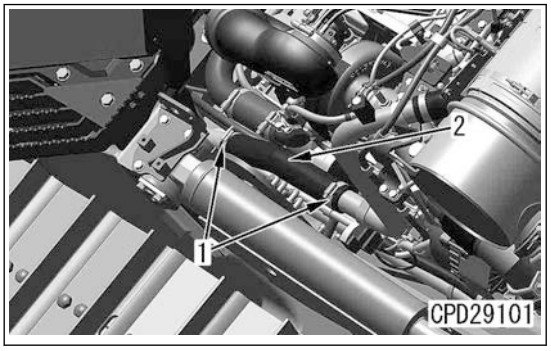
63. Remove the bracket (74) together with bellows pipe (75) as a unit.



Hose

3. Install the hose (2), and fasten it with the clamps (1) (2 places).

   Clamp (1):
   8.8±0.5 Nm {0.9±0.05 kgfm}

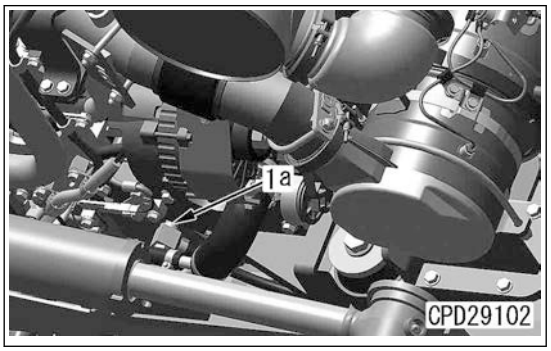


Engine hood assembly

4. Install the engine hood assembly. For details, see “Remove and Install Engine Hood Assembly”.

   REMARK

   Check that the drain valve (1a) is securely tightened.

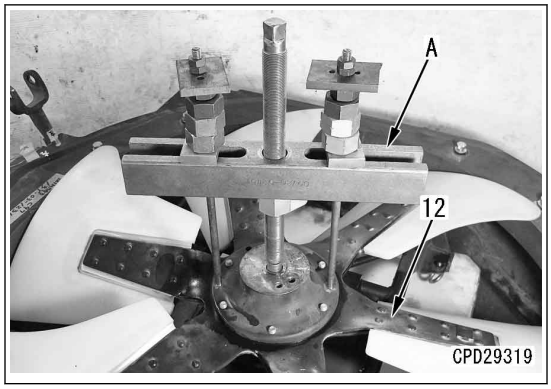


Refilling radiator with coolant

5. Refill the radiator with coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant, and then check the coolant level again.

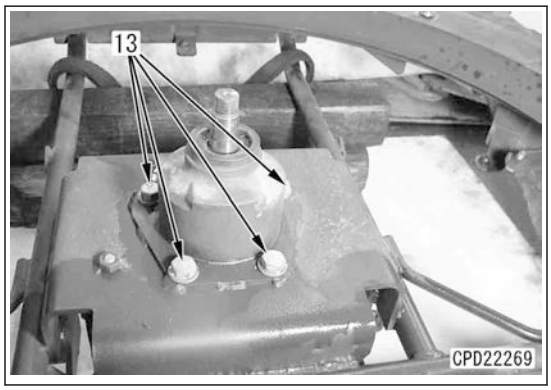
   Radiator:
   45 ℓ

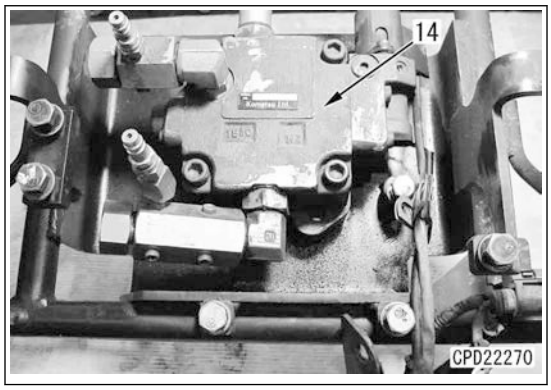
11. Disconnect the cooling fan (12) from the motor shaft by using the puller (A).
12. Remove the nut (11), and remove the cooling fan (12).

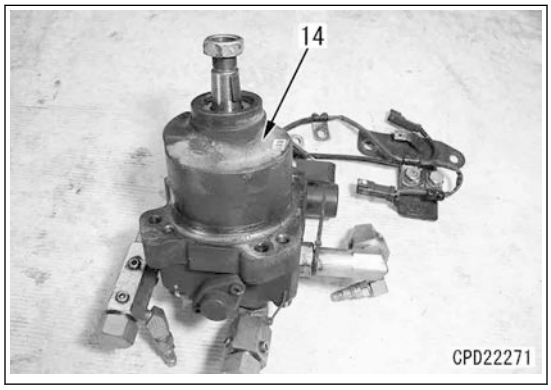


Cooling fan motor assembly

13. Loosen the bolts (13) (4 pieces).
14. Invert the cooling fan drive assembly.
15. Remove the bolts (13), and remove the cooling fan motor assembly (14).







Remove and Install Engine Hood Assembly

⚠ **Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.**

⚠ **Set the work equipment lock lever to LOCK position.**

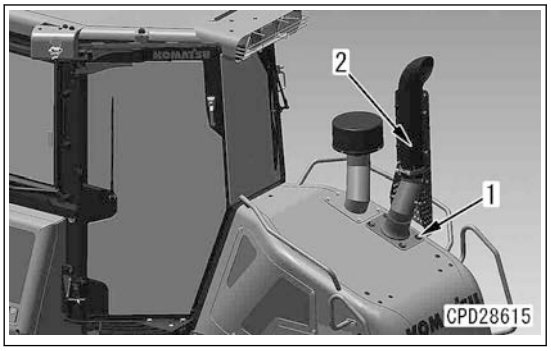
⚠ **Turn the starting switch to OFF position to stop the engine.**

⚠ **Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and Adjusting, "Handle Battery Disconnect Switch".)**

How to Remove Engine Hood Assembly

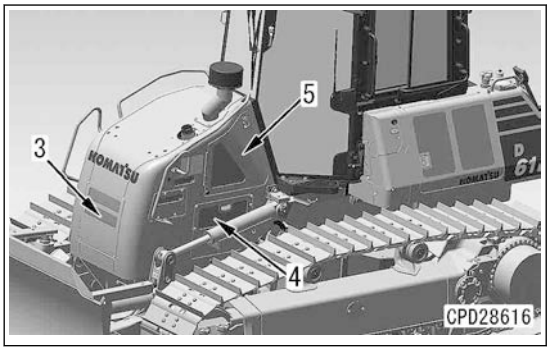
Exhaust pipe

1. Remove the bolts (1) (4 pieces), and remove the exhaust pipe (2).

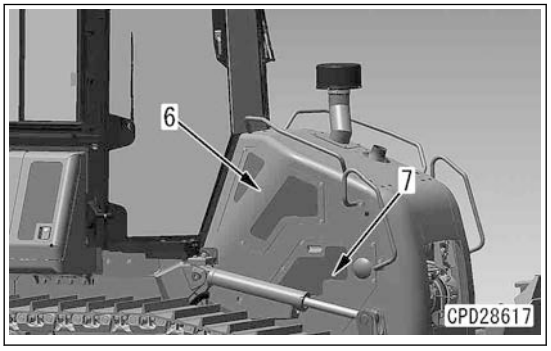


Cover

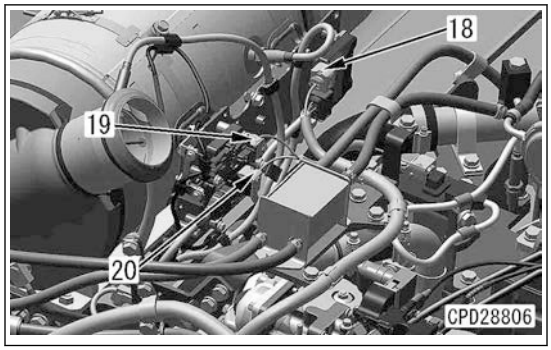
2. Remove the covers (3) and (4).
3. Open the cover (5).

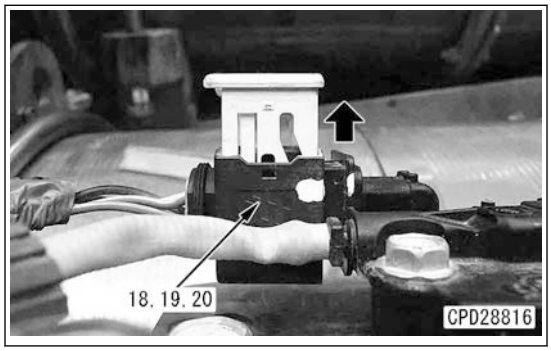


4. Remove the covers (6) and (7).

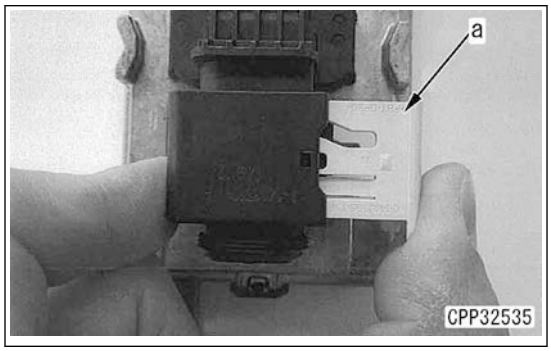


4. Slide the lever (yellow) in the direction of the arrow, insert each connector NH3 (18), NOx2 (19), and SCRT (20) with the lock unlocked, and slide it in the opposite direction to that of the arrow to lock it. (For details, see the following.)

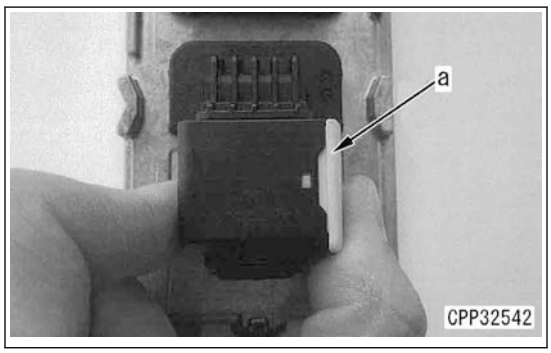




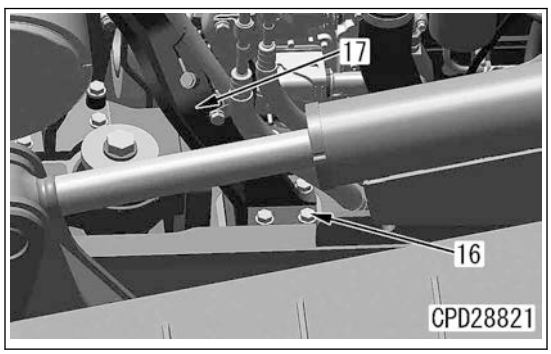
1) While keeping the levers (yellow) (a) pulled out, insert connectors NH3 (18), NOx2 (19), and SCRT (20) into the sensor side.



2) Push the lever (yellow) (a) with fingers until click sound is heard, then connector is locked.



5. Install the bracket (17) with the bolts (16) (4 pieces).

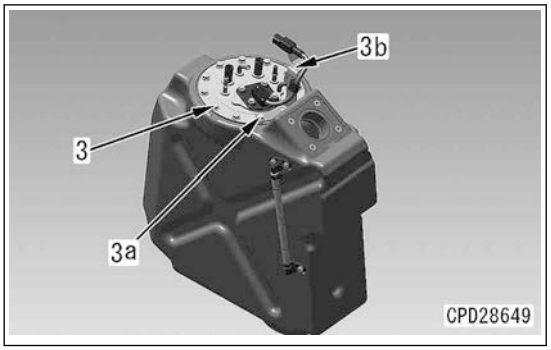


5. Install the bolts (3) (10 pieces).

   Bolt (3):
   9.5 to 10.5 Nm {0.97 to 1.07 kgfm}

6. Install the bracket (3b) with the bolts (3a) (2 pieces).

   Bolt (3a):
   9.5 to 10.5 Nm {0.97 to 1.07 kgfm}



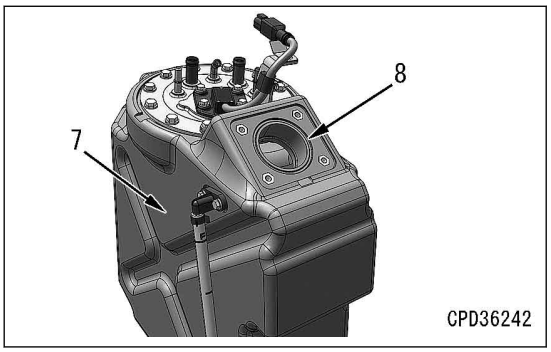
7. Apply distilled water for lubricating O-ring (8).

   REMARK

   - Use the new O-ring (8).
   - If any foreign material is mixed into DEF tank, it may cause failures. Do not use grease, lubricating oil or any lubricating substance.

   O-ring (8):
   Distilled water

8. Install O-ring (8) to DEF tank (7).



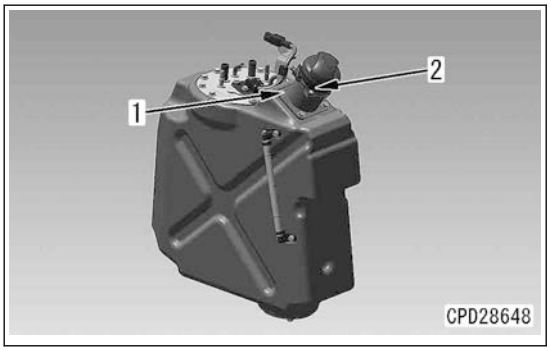
9. Align DEF tank filler port tube assembly (2) with the installing position.

   NOTICE

   - **Install DEF tank filler port tube assembly (2) slowly to prevent the filter at the tip from damaging.**
   - **Align DEF tank filler port tube assembly (2) with the installing position, and install it straight without turning to prevent O-ring (8) from falling off or twisting.**
   - **When installing the DEF tank filler port tube assembly (2), make sure that the direction of the protrusion (c) is appropriate.**

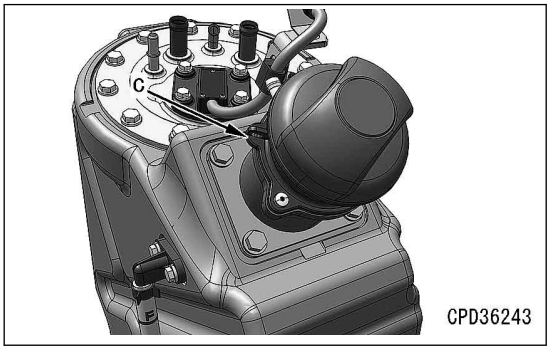
   REMARK

   Take care not to get O-ring (8) caught when installing it.



10. Install the bolts (1) (4 pieces).

    Bolt (1):
    9.5 to 10.5 Nm {0.97 to 1.07 kgfm}



Wiring, hose

2. Remove the clamps (4), (5), and (6).
3. Disconnect the coolant hoses (7) and (8).

   NOTICE

   - **Be sure that coolant does not splash to KDPF and SCR assembly when disconnecting the hoses (7) and (8).**
   - **After disconnecting the hoses (7) and (8), install the caps (C2) on the coolant side to DEF injector side.**

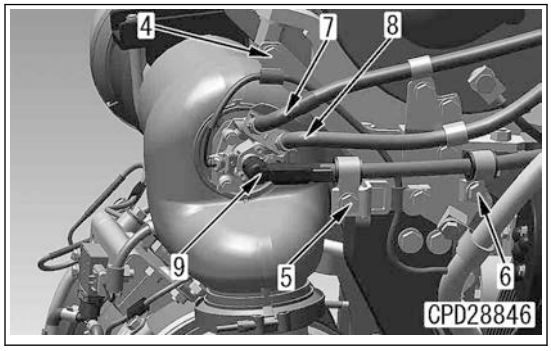
4. Be sure to use the vinyl gloves (A) to disconnect DEF hose (9).

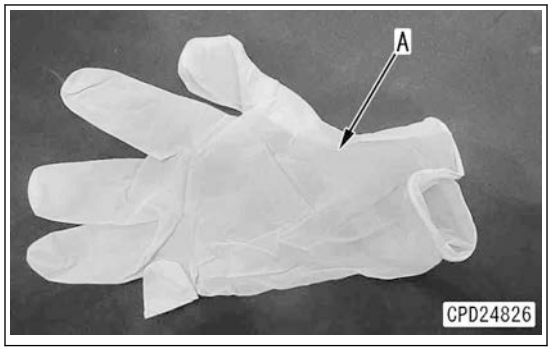
   NOTICE

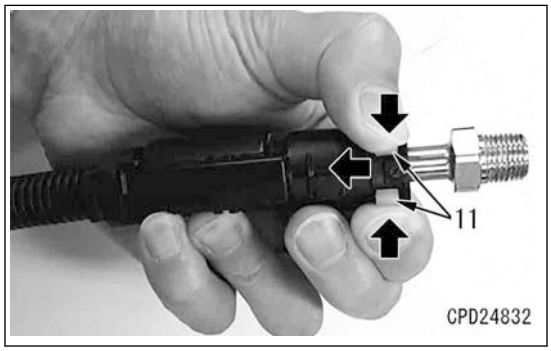
   - **Before disconnecting DEF hose (9), wash the connecting portions with clean tap water to remove the sticking materials.**
   - **After disconnecting DEF hose (9), install the plug (for 5/16 inch of hose diameter) (D) on the hose side, and install DEF cap (C1) on DEF injector side to prevent leakage.**

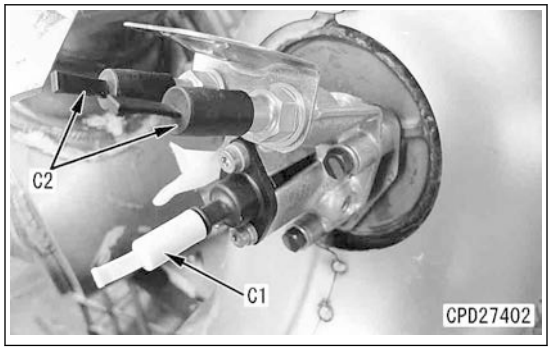
   REMARK

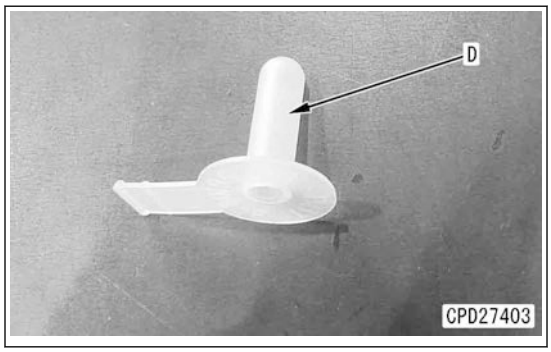
   Pinch protruding portions (11) of clip with your fingers, and the lock is unlocked. While they are kept pinched, pull out DEF hose (9) in the opposite direction to that of the DEF injector side, and remove it.



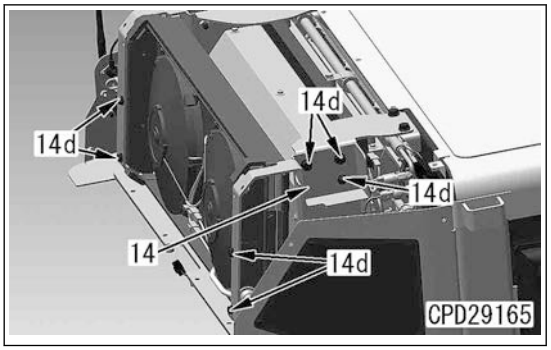


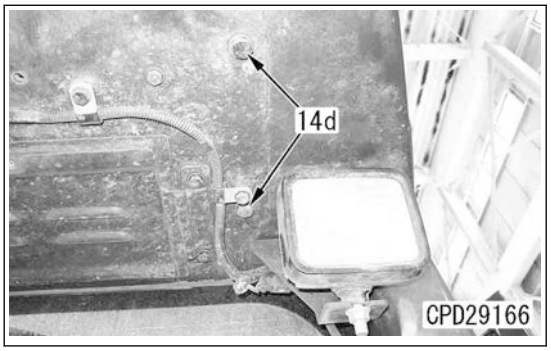




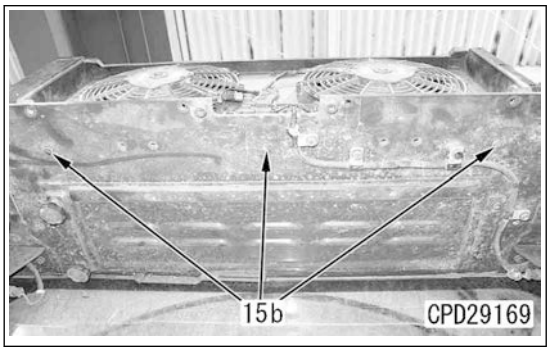


14. Remove the bolts (14d) (7 pieces), and remove the bracket (14).





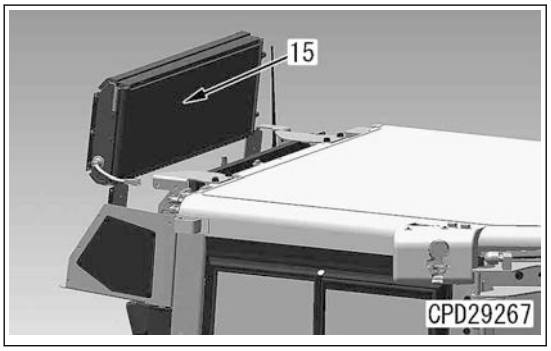
15. Remove the bolts (15b) (3 pieces).

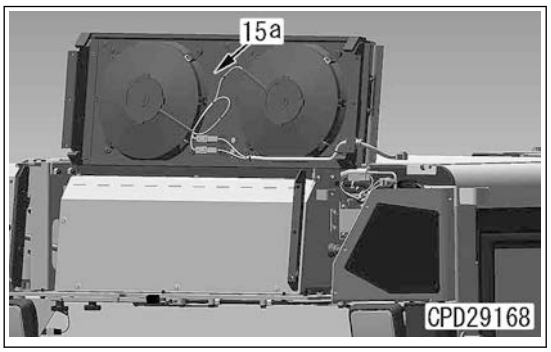


16. Remove the air conditioner condenser assembly (15) while sliding it to the rightward.

REMARK

Air conditioner condenser assembly (15) is integrated with the fan shroud (15a).





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	Commercially available	Block	●	2			Removal and installation of track frame assembly
B	790-337-1001	Lifting tool	■	1			
C	Commercially available	Jack	●	1			

⚠ Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.

⚠ 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. (For details, see Testing and Adjusting, “Handle Battery Disconnect Switch”.)

How to Remove Track Frame Assembly

Track assembly

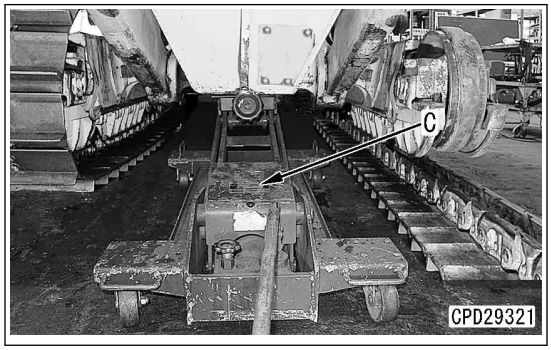
1. Separate the track assembly. For details, see “Separate and Connect Track Assembly”.

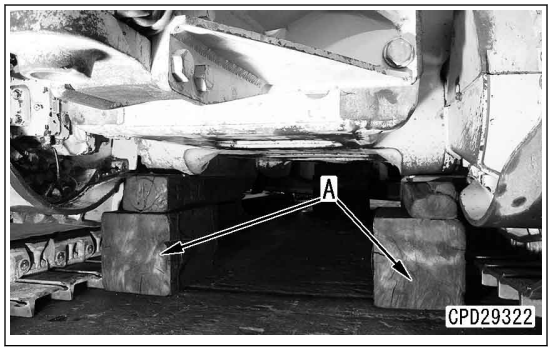
Track frame assembly

2. Lift the machine with the jack (C) at the front and rear of the frame, and set the blocks (A) to support the front and rear of the frame.

   NOTICE

   Set the block (A) securely.





Disassemble and Assemble Track Roller Assembly

Draining – Collar – Floating seal – Roller – Shaft assembly

Tools for Disassembly and Assembly of Track Roller Assembly

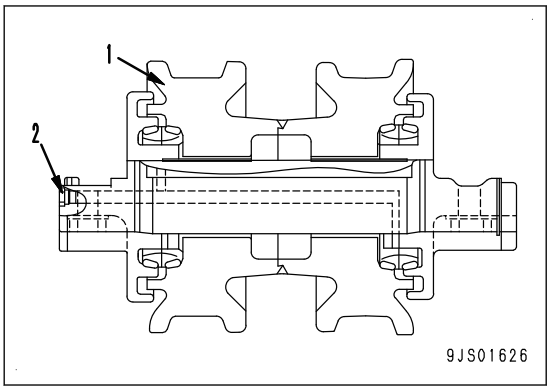
Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	Commercially available or 790-101-3501	Puller	●	1			Removal and installation of collar
	790-201-1420	Spacer	■	1			
B	790-201-2650	Plate	■	1			Press-fit of bushing
C	791-515-1520	Installer	■	1			Installation of floating seal
D	Commercially available	Block	●	1			Fixing of track roller assembly

How to Disassemble Track Roller Assembly

Draining

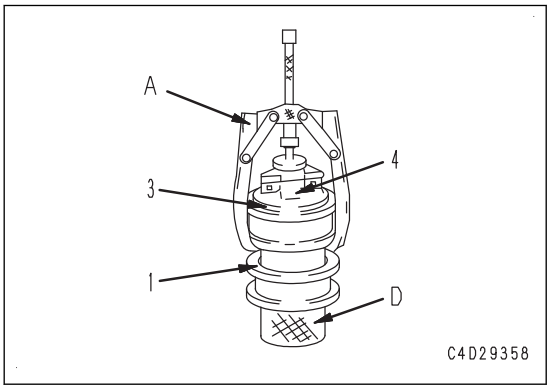
1. Remove the plug (2), and drain the oil from the track roller assembly (1).

   Track roller:
   0.24 to 0.26 ℓ



Collar

2. Set the track roller assembly (1) on the block (D).
3. Push in the collar (3) by using the puller (A), pull out the lock (4), and remove the collar (3).



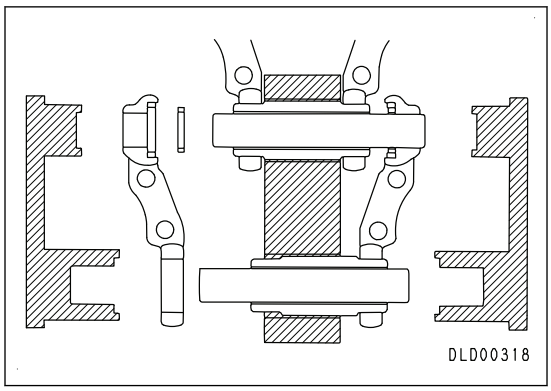
Floating seal

4. Remove the floating seal (5) from the collar (3).

19. Set the L.H. link, and install the spacer to the pin.

    REMARK

    Similarly to the R.H. link, apply oil.

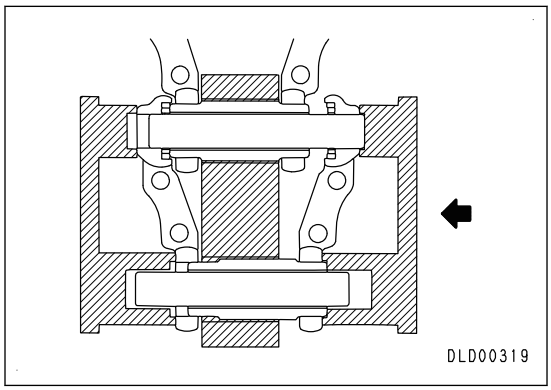


20. Set the right side jig on the pressing side and the left side jig on the receiving side, and press-fit the left side link.

    REMARK

    - Press fit the link carefully to avoid removal of right and left seals and spacers.
    - Secure the escaping space at the L.H. jig so that the pin end surface does not interfere with the jig bottom.

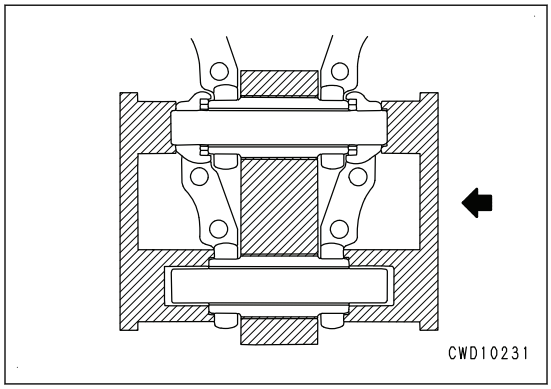
    Link press-fitting force: 196 to 392 kN {20 to 40 t}



21. Press fit the link until the link, spacer and bushing closely contact each other.

    REMARK

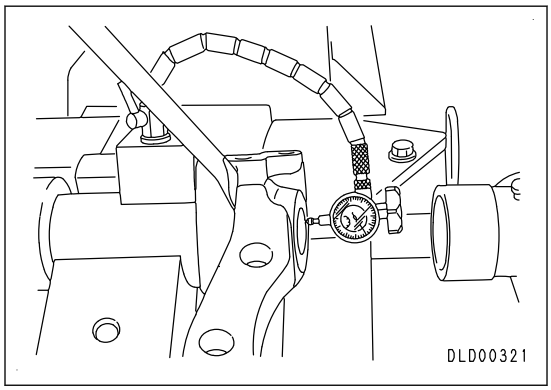
    - Whether the parts are closely contacted or not is not visible on the surface. Therefore, manage it by the oil pressure of the link press. Set the relief pressure to the fixed value, apply the oil pressure and press fit fully until it reaches the pressure.
    - For details of setting the relief pressure, see “Preparatory work”.
    - Check that adjacent links are rotated each other.



22. Measure the end play between the link having just been assembled and the one assembled last time by using a dial gauge, pinch bar, etc. each time the link is assembled, and check that the links are assembled within the specified range.

    REMARK

    - If the end play is not within 0 to 0.13 mm even by fully pushing until the relief valve operates, increase the relief pressure setting gradually to adjust the end play.
    - Set the relief pressure slowly to prevent the pressing force of the link press from increasing unnecessarily.

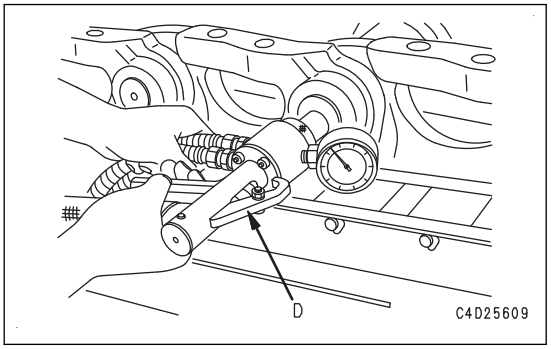


Sealing oil

30. Refill with oil (GO80W90) through the small plug hole of the pin by using the lubricator (D).

    REMARK

    - If the oil refilling pressure is raised excessively, it negatively affects the seal.
    - Considering the thermal expansion of oil, be careful not to refill with oil excessively.

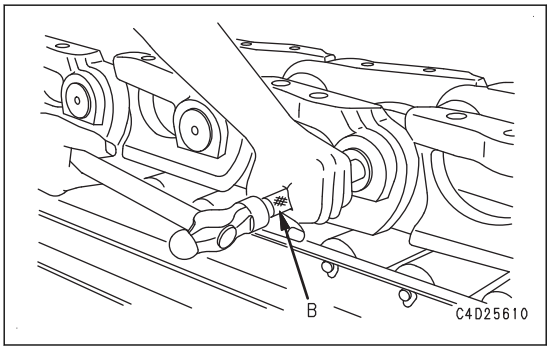


31. Drive in the smaller plug quickly up to the following specified position by using the plug push tool (B).

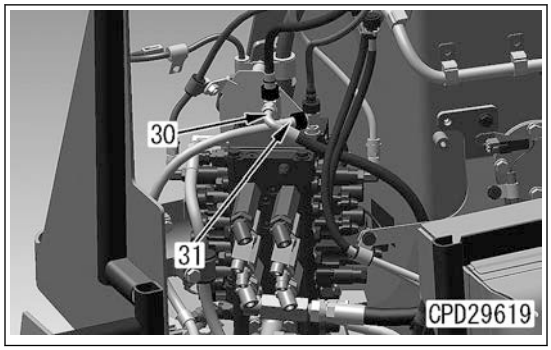
    REMARK

    Apply oil (GO80W90) to the outer periphery of the small plug.

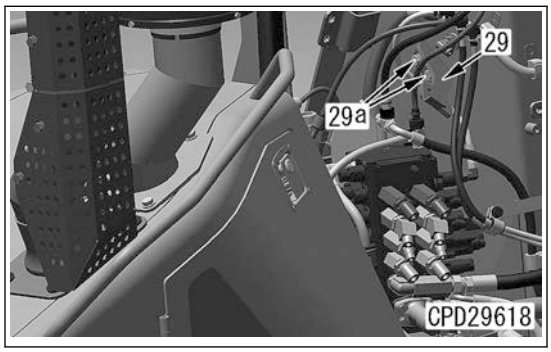
    Driving-in depth from end surface: 2.5±1 mm



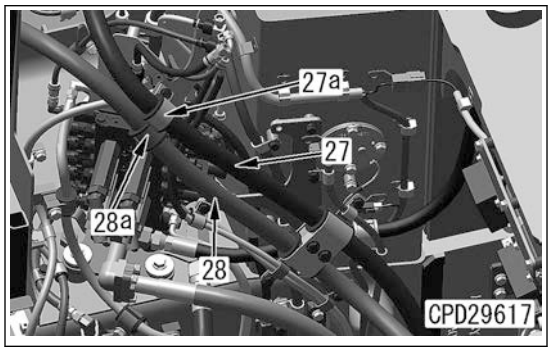
8. Connect the hoses (31) and (30).



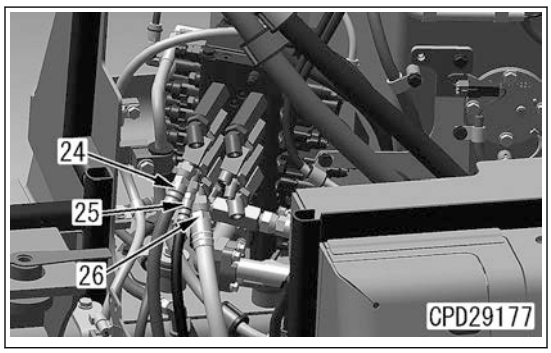
9. Install the bracket (29) with the bolts (29a) (2 pieces).



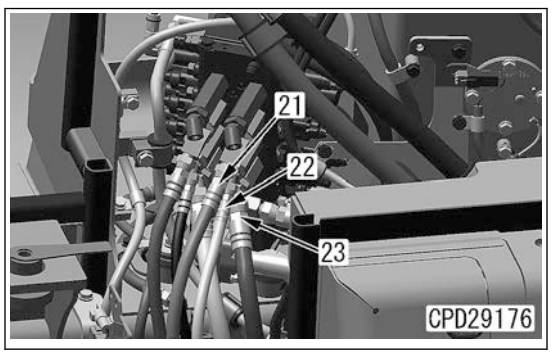
10. Return the hoses (28) and (27) to the original positions, and install the clamps (28a) and (27a).



11. Connect the hoses (26), (25) and (24).
    - Hose (26): Ripper bottom
    - Hose (25): Tilt left
    - Hose (24): Angle left



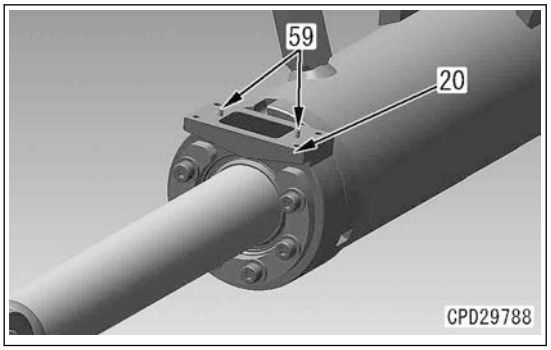
12. Connect the hoses (23), (22) and (21).
    - Hose (23): Ripper top
    - Hose (22): Tilt right
    - Hose (21): Angle right



29. Drive in the pins (59) (2 pieces) into the housing assembly (20).

REMARK

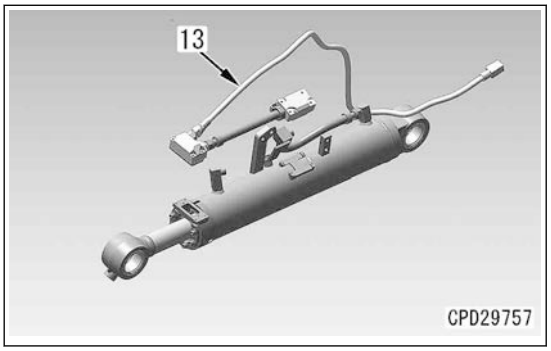
Replacement of the pins (59) is not necessary when reusing the housing assembly (20).

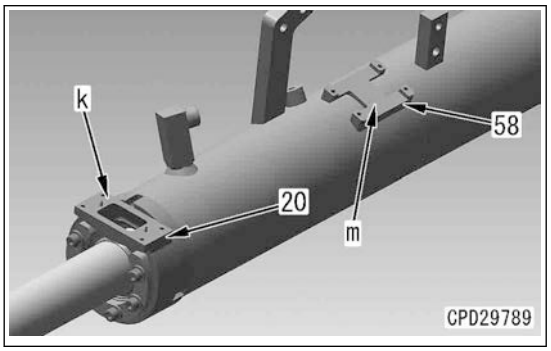


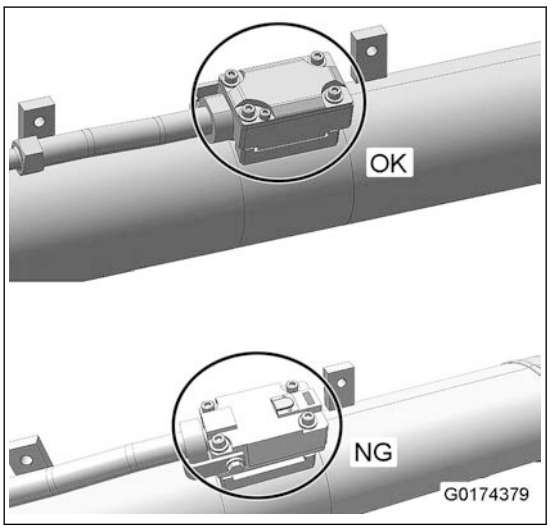
30. Set the stroke and reset sensor assembly (13).

NOTICE

- **Clean the end surface (k) of the housing assembly (20) and the end surface (m) of the reset sensor housing (58) thoroughly, and sufficiently degrease them.**
- **Install the reset sensor assembly in the correct direction.**



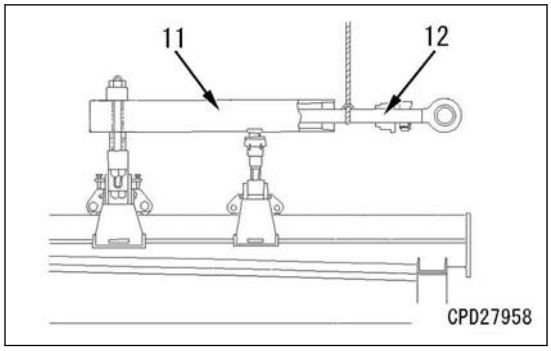


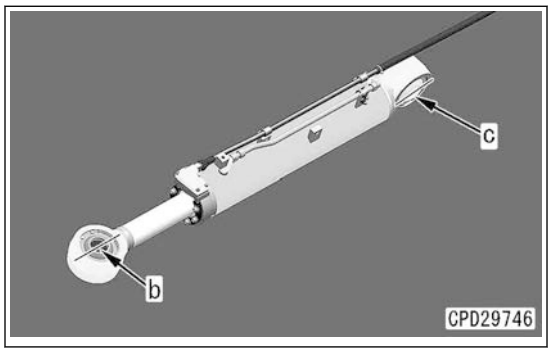


22. Insert the piston rod assembly (12) to the cylinder tube (11).

REMARK

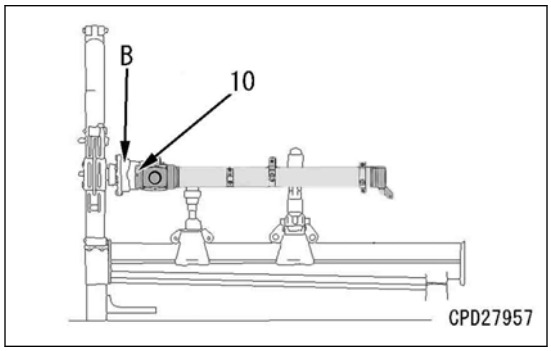
Set the rod head direction (b) 90 ° to the bottom side (c). (Direction when it is installed to the machine)





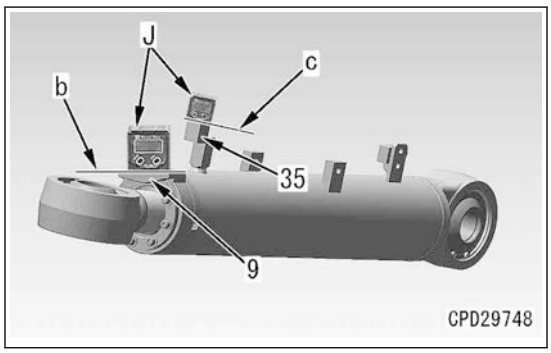
23. Tighten the head assembly (10) by using the wrench assembly (B).

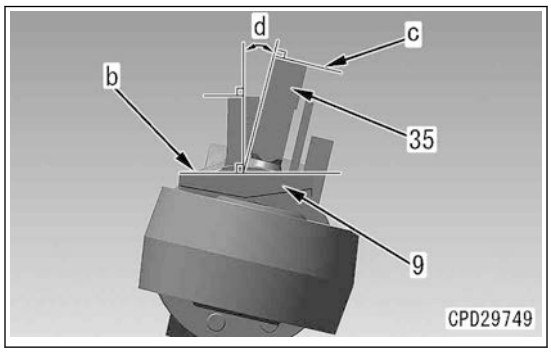
Head assembly (10) :
932±93 Nm {95±9.5 kgfm}



24. Adjust the mounting angle of the end surface (b) of the housing assembly (9) and the end surface (c) of the elbow (35) by using the digital angle gauge (J).

Adjusting angle (d) made by the end surface (b) of the housing assembly (9) and the end surface (c) of the elbow (35): 12±2 °





Glass position alignment

4. Set the window glass to the mounting position by using the lifter (suction cup) (F), check the clearance between the window glass and the operator's cab from all directions, and adjust the window glass so that the clearance is even.

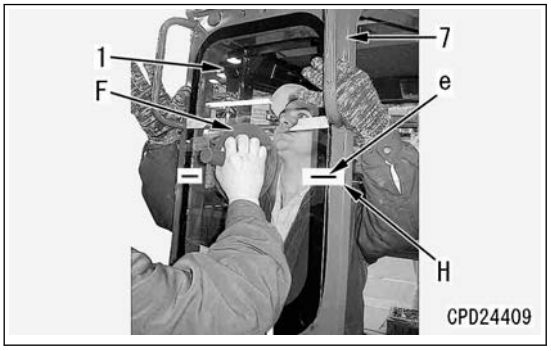
   REMARK

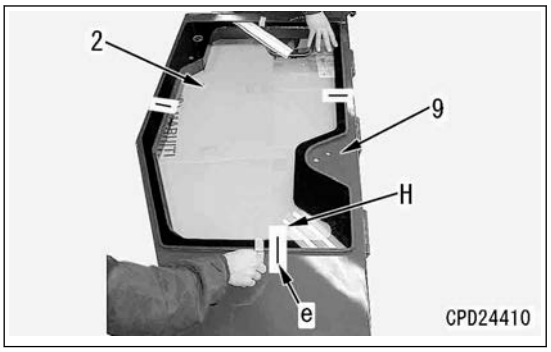
   - Position the front window glass (1) from inside of operator's cab (7), and adjust the front window glass so that the gaps between the black coating (black ceramic) part and the sheet metal of the operator's cab (7) is even from all directions.
   - To position right and left door window glasses (2), adjust the door window glasses so that the glass and the door sheet metal are positioned evenly in all directions.

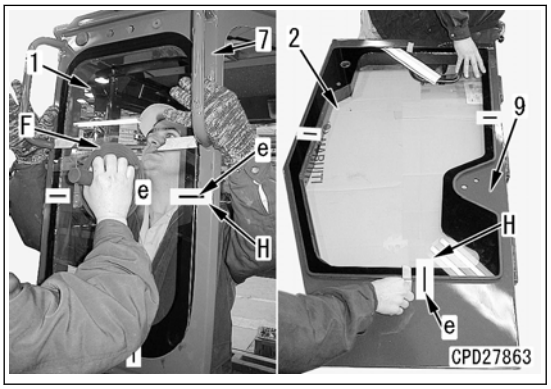
5. After positioning, stick the tape (H) to the following areas (between the front window glass (1) and the operator's cab (7), and at 3 positions of the right, left, and bottom of right and left door window glasses (2) and right and left doors (9)). Draw the positioning line (e) on each tape.

   REMARK

   Do not remove the tapes left on the window glass and the operator's cab until the window glass is installed.







Application of adhesive

6. Apply adhesive.

   Adhesive:
   Sika Japan (Sika Tack-Go)

   REMARK

   - Do not use a primer.
   - The use limit of adhesive is 6 months after its production. Do not use the adhesive after this limit.
   - Adhesives must be stored at 25 °C or lower in a dark and cool place.
   - Do not heat the adhesive 30 °C or higher.
   - When reusing the adhesive, remove the hardened adhesive at the nozzle tip end completely.

Remove and Install HST Controller Assembly

⚠ Place the machine on a level ground, and lower the work equipment to the ground in a stable posture.

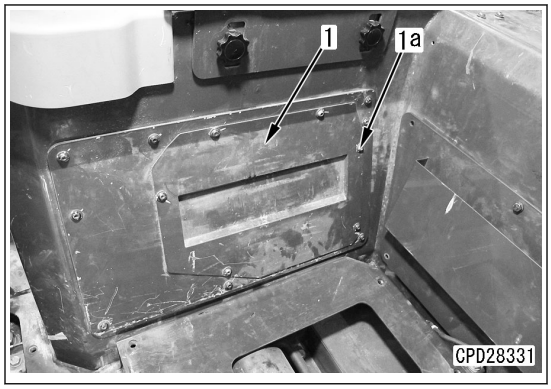
⚠ Set the work equipment lock lever to LOCK position.

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

⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and Adjusting, “Handle Battery Disconnect Switch”.)

How to Remove HST Controller Assembly

1. Remove the operator's seat assembly. For details, see “Remove and Install Operator Seat”.
2. Remove the bolts (1a) (6 pieces), and remove the cover (1) on the right side of the operator's seat.

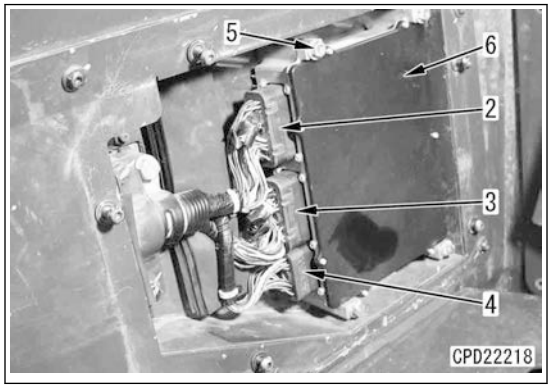


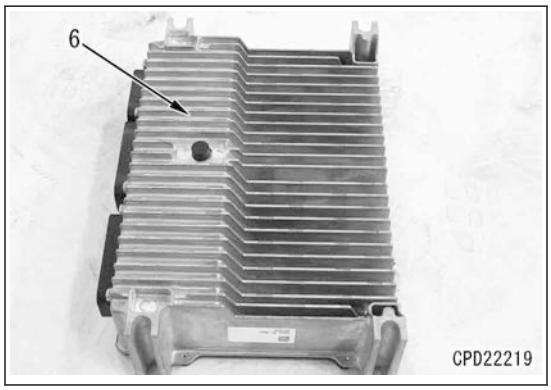
3. Disconnect the connectors ST-3 (2), ST-2 (3), and ST-1 (4).

   REMARK

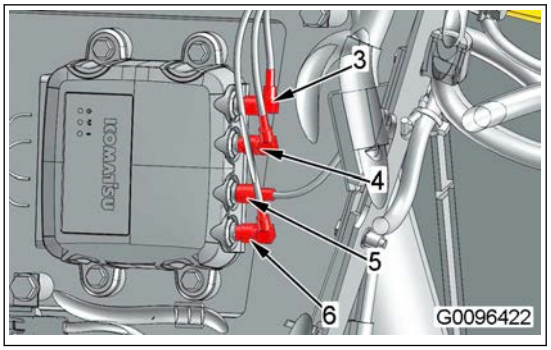
   - Remove dusts, etc. sticking to each connector before removing.
   - Loosen hexagonal socket head bolts (4 mm) at each connector center, and remove them.

4. Remove the bolts (5) (4 pieces), and remove HST controller assembly (6).

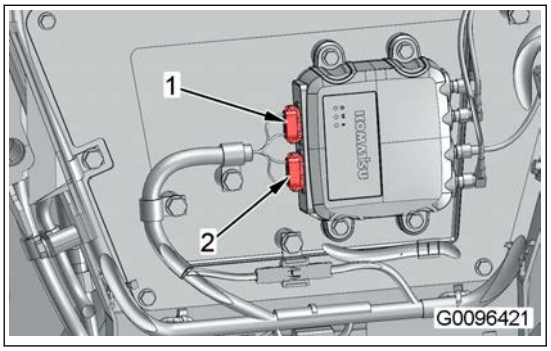




2. Connect the connectors GAM1 (3), GAA1 (4) and (5), and LTEA1 (6).



3. Connect the connectors CG01 (1) and CG02 (2).



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

*1: Code for applicable machine model

D: Bulldozer

HD: Dump truck

HM: Articulate dump truck

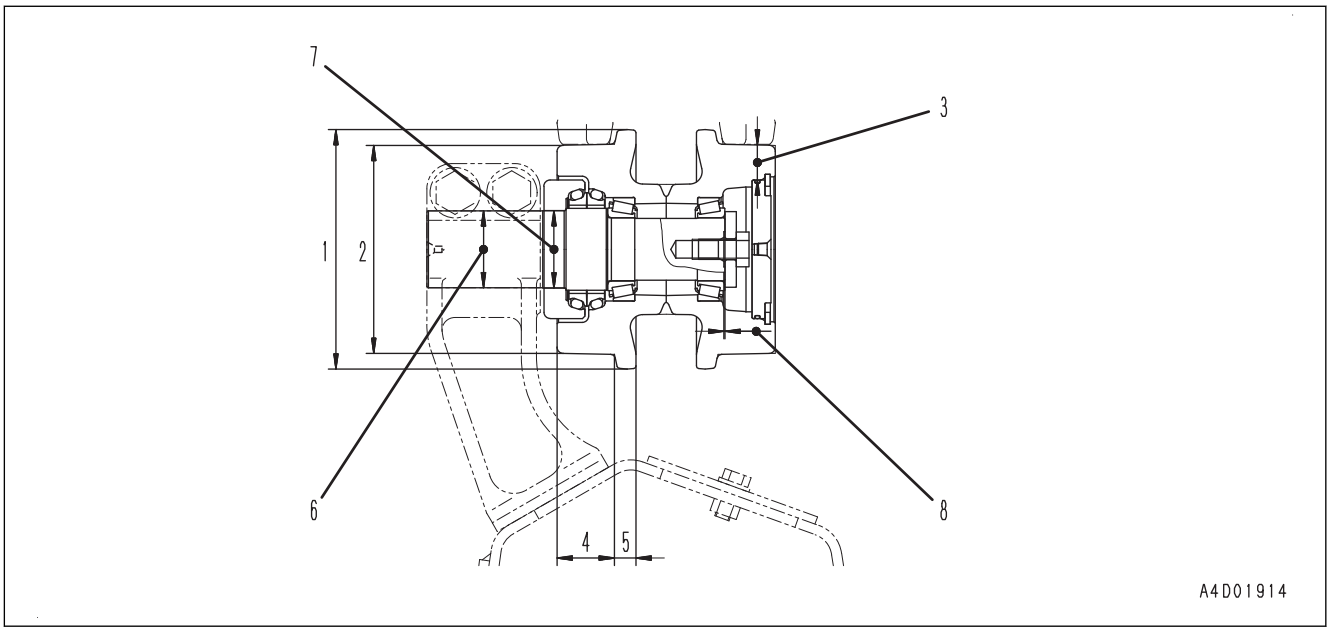
PC: Hydraulic excavator

WA: Wheel loader

List of Abbreviations Used in the Circuit Diagrams

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

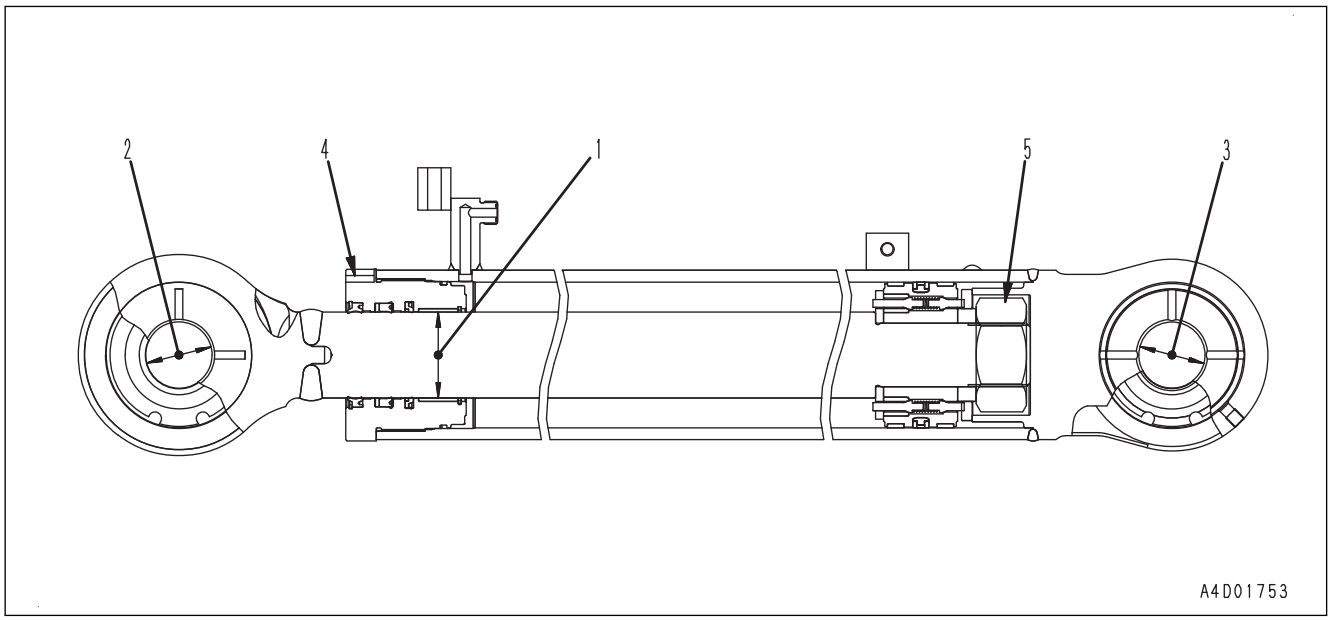
Maintenance Standard for Carrier Roller for Conventional Type Track Shoes



Unit: mm

No.	Item	Judgment criteria					Remedy
1	Outside diameter of flange	Standard dimension			Repair limit		Repair by build-up welding or replace
		190			-		
2	Outside diameter of tread	165			143		
3	Thickness of tread	27.5			16.5		
4	Width of tread	45.5			-		
5	Width of flange	17			11		
6	Clearance between shaft and support	Standard dimension	Tolerance		Standard clearance	Allowable clearance	Replace
			Shaft	Hole			
		61	-0.100 -0.200	+0.300 0	0.100 to 0.500	-	
7	Interference between shaft and seal guard	Standard dimension	Tolerance		Standard interference	Allowable interference	
			Shaft	Hole			
		61.5	+0.150 +0.130	+0.030 0	0.100 to 0.150	-	
8	Axial play of roller	Standard clearance			Allowable clearance		
		0 to 0.32			-		

Maintenance Standard for Blade Angle Cylinder



Unit: mm

No.	Item	Judgment criteria					Remedy
		Standard dimension	Tolerance		Standard clearance	Allowable clearance	
			Shaft	Hole			
1	Clearance between piston rod and bushing	65	-0.030 -0.076	+0.250 +0.055	0.085 to 0.326	0.626	Replace the bushing
2	Clearance between piston rod support shaft and bushing	50	-0.025 -0.064	+0.039 0	0.025 to 0.103	0.5	
3	Clearance between cylinder bottom support shaft and bushing	50	-0.025 -0.064	+0.039 0	0.025 to 0.103	0.5	
4	Tightening torque of cylinder head	932±93.0 Nm {95±9.5 kgfm}					Retighten
5	Tightening torque of cylinder piston fixing nut	4120±412 Nm {420±42.0 kgfm} (Width across flats: 75 mm)					

Explanation of Procedure for Test of and Troubleshooting of Air Conditioner

After finding failure component, check of each part of that component is required.

1. After basic checks are performed, narrowing down of failure place is performed based on phenomenon of failure on air conditioner.
2. Narrowing down is performed through operating the relevant switches.

   REMARK

   The troubleshooting chart is also used to find the failure place.
3. After narrowing down, check the corresponding component parts and find out the failure place, and repair it.

Connect Service Tool

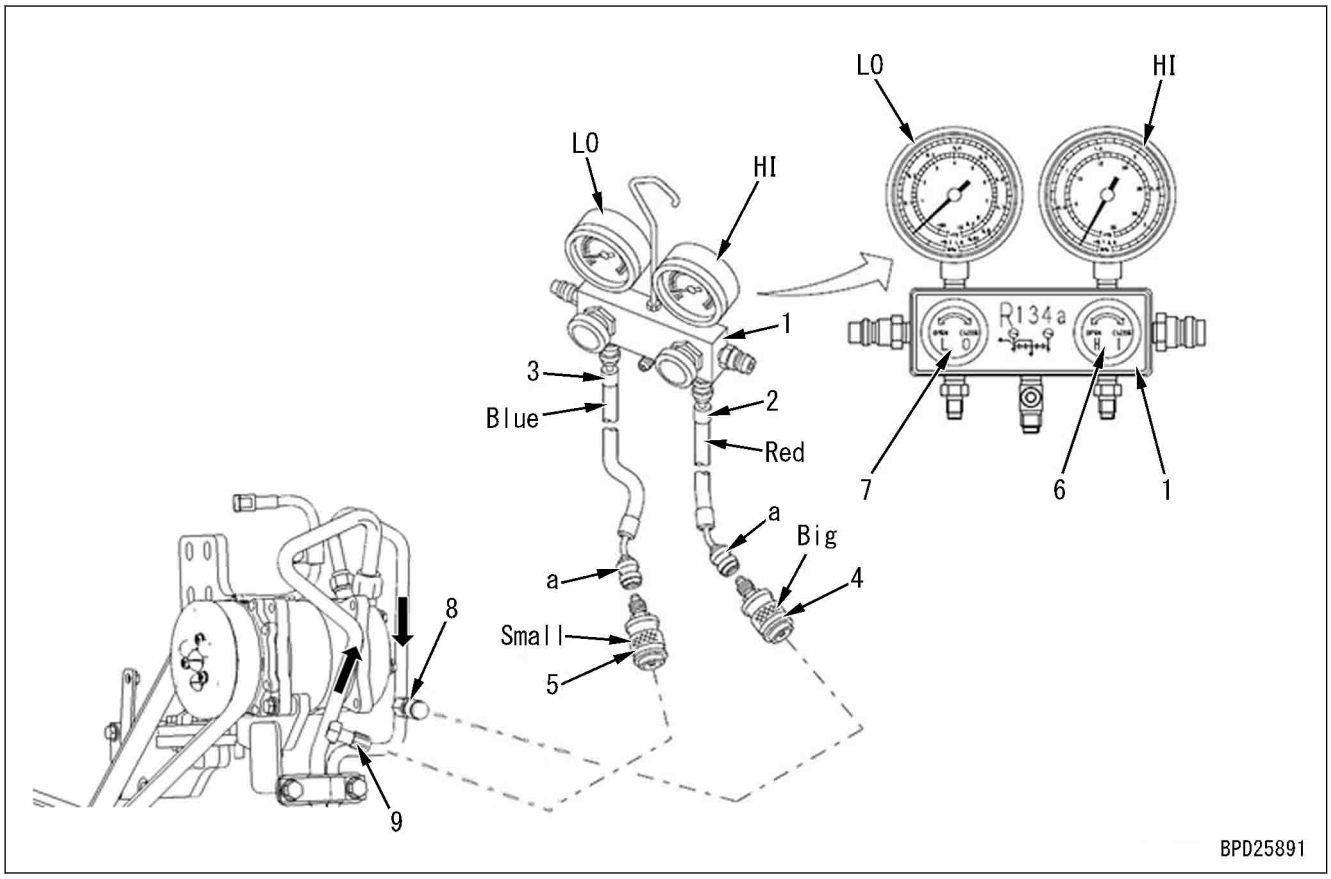
⚠ Place the machine on a level ground, lower the work equipment completely to the ground in a stable posture, set the lock lever to LOCK position, and then stop the engine.

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

Use the following service tool kit for R134a.

Symbol	Part No.	Part name
-	799-703-1200	Service tool kit

Service Tool Kit



1: Gauge manifold
2: Red high-pressure line charging hose
3: Blue low-pressure line charging hose
4: Large diameter quick joint (for high-pressure line)
5: Small diameter quick joint (for low-pressure line)
6. High-pressure valve
7. Low-pressure valve
8. Service valve (high-pressure)
9. Service valve (low-pressure)

⚠ a: Note that the threads are coarse and the hoses are relatively easy to loosen.

How to Connect Service Tool

1. Close high-pressure line valve (6) and low-pressure line valve (7) of gauge manifold (1).
2. Connect red high-pressure line charging hose (2) to the gauge manifold (1) (HI side) .
3. Connect blue low-pressure line charging hose (3) to the gauge manifold (1) (LO side).
4. Connect quick joints (4) and (5) to each hose.
5. Connect quick joint (4) to service valve (8) of high-pressure piping.
6. Connect quick joint (5) to service valve (9) of low-pressure piping.