SEN06842-06

Shop Manual

BULLDOZER

D71EXi -24
D71EXi -24E0
D71PXi -24
D71PXi -24E0

SERIAL NUMBERS D71EXi- 70002 and up
D71PXi- 70002

KOMATSU

- When there are thatched houses, dry leaves or pieces of paper near the work site, set the system to disable the regeneration before starting work to prevent fire hazards due to highly heated exhaust gas caused by KDPF regeneration.
  See the Operation and Maintenance Manual for the setting procedure.

Explosion caused by lighting equipment

- When checking fuel, oil, battery electrolyte, or coolant, always use lighting equipment with anti-explosion specifications.
- When taking the electrical power for the lighting equipment from the machine, follow the instructions in the Operation and Maintenance Manual.

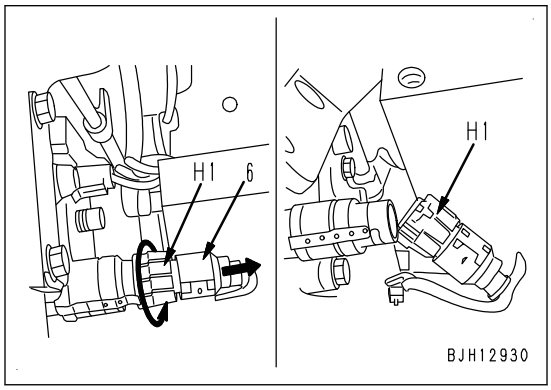
METHOD FOR DISCONNECTING AND CONNECTING CONNECTOR WITH HOUSING TO ROTATE

Method for disconnecting connector with housing to rotate

Turn housing (H1) to the left, and pull it out.

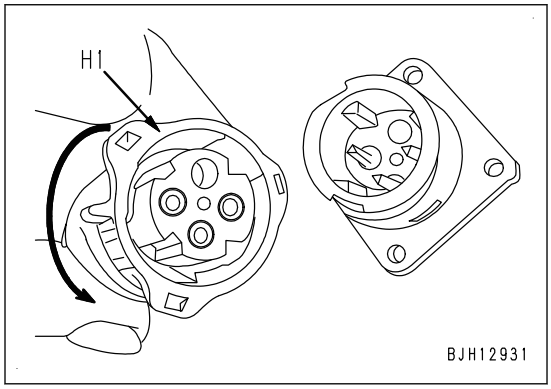
REMARK

Housing (H1) is left on the wiring harness side.



Method for connecting connector with housing to rotate

1. Insert the connector to the end while aligning its groove to the other.
2. Turn housing (H1) clockwise until it clicks.



Item	Unit	D71EXI-24, D71EXI-24E0
Cooling fan motor		
Type	-	Variable displacement swash plate type piston motor
Motor capacity	cm^3/rev	28
Control valve		
Type	-	5-spool valve
Operating method	-	Hydraulic pilot type
Blade lift cylinder		
Type	-	Double-acting piston
Inside diameter of cylinder bore	mm	120
Outside diameter of piston rod	mm	65
Piston stroke (maximum)	mm	502
Max. distance between pins	mm	1447
Min. distance between pins	mm	945
Stroke and reset sensing blade lift cylinder		
Type	-	Double-acting piston
Inside diameter of cylinder bore	mm	120
Outside diameter of piston rod	mm	65
Piston stroke (maximum)	mm	502
Max. distance between pins	mm	1447
Min. distance between pins	mm	945
Blade tilt cylinder with stroke sensor		
Type	-	Double-acting piston
Inside diameter of cylinder bore	mm	130
Outside diameter of piston rod	mm	70
Piston stroke (maximum)	mm	160
Max. distance between pins	mm	1200
Min. distance between pins	mm	1040
Blade angle cylinder		
Type	-	Double-acting piston
Inside diameter of cylinder bore	mm	110
Outside diameter of piston rod	mm	65
Piston stroke (maximum)	mm	555
Max. distance between pins (maximum)	mm	1563
Min. distance between pins (maximum)	mm	1008
Blade angle cylinder with stroke sensor		
Type	-	Double-acting piston
Inside diameter of cylinder bore	mm	110

  - At engine start-up if the Engine Controller judges AdBlue/DEF is frozen, it automatically commands heating the AdBlue/DEF injection system.
  - The AdBlue/DEF pump and the AdBlue/DEF injector hold their operation till the Engine Controller judges the completion of AdBlue/DEF thawing operation.
- The other operation mode is “Freeze Prevention mode”.
  - While the machine is in operation if the Engine Controller judges AdBlue/DEF is likely to freeze, it automatically commands heating the AdBlue/DEF system.
  - While the heating is on during machine operation if the Engine Controller judges that cooling by the ambient exceeds the heating capacity of the system, it automatically starts AdBlue/DEF purging and shuts down the operation of the AdBlue/DEF pump and the AdBlue/DEF injector. However, the heating system is kept on as long as the machine is in operation.
- “Thaw mode” and “Freeze Prevention mode” are controlled by utilizing information by temperature sensors. The temperature sensors used for the control of two modes are different and the temperature Freeze Prevention modesensors utilized by the comprising devices are different. The following table shows which comprising device uses which heating system and which temperature sensors in relation to which operation mode.

	Heating system	Thawing mode	Freeze prevention mode
AdBlue/DEF suction and purge hose AdBlue/DEF pressure hose	Heater around hose	Ambient temperature sensor	Ambient temperature sensor
AdBlue/DEF pump	Pump built-in heater	AdBlue/DEF pump temperature sensor	Ambient temperature sensor
AdBlue/DEF tank	Circulation of coolant	AdBlue/DEF tank temperature sensor	AdBlue/DEF tank temperature sensor

INDUCEMENT STRATEGY

- The purpose of inducement is to prompt the operator to perform maintenance or repair on the emissions control system.
- Inducement strategy is a control action to ensure prompt correction of various failures in the engine emissions control system. It requires actions to limit engine performance and defines required indication such as warning lamps and messages, as well as alarms while the control actions are imposed.
  The warning steps of Inducement are different between for North America and for European Union.
- The categories of abnormalities that have triggered Inducement are displayed on the “SCR Information” screen of the machine monitor.

INDUCEMENT STRATEGY WHEN THE AdBlue/DEF LEVEL IN THE TANK BECOMES LOW (FOR NORTH AMERICA)

- When the AdBlue/DEF level in the tank becomes low, AdBlue/DEF level caution lamp on the machine monitor lights up, the Audible alert sounds, the action level is displayed and Inducement strategy including engine power deration is activated.
- The Inducement strategy progresses in 5 levels from Warning, Escalated Warning, Mild Inducement, Severe Inducement and Final Inducement.
- Up to the start of Severe Inducement the start of each warning step is triggered by the amount of AdBlue/DEF in the AdBlue/DEF tank. Final Inducement starts at 1 hour after the start of Severe Inducement if the machine continues its operation without adding AdBlue/DEF into the tank, and reduces the engine speed to low idle and keeps it at low idle.
- The Inducement strategy status can be checked on “SCR Information” screen of the user menu.
- The table shows warning indications and engine power derations by each Inducement strategy status.

q: Sensor signal
1: Battery disconnect switch
2: Battery
3: Starting switch
4: Engine shutdown secondary switch
5: Engine controller
6: HST controller
7: Machine monitor
8: Gateway function controller
9: Fuel control dial
10: Deceleration/brake pedal
11: Parking brake switch
12: Work equipment lock switch
13: Steering electric lever
r: Monitor display signal
14: Joystick (steering, directional, and gear shift lever) (PCCS lever)
15: Neutral safety relay
16: Personal lock relay
17: Engine
18: Starting motor
19: Safety relay
20: Engine speed sensor
21: Coolant temperature sensor
22: Engine oil pressure switch
23: Injector
24: Supply pump

FUNCTION OF ENGINE CONTROL SYSTEM

- This machine has the neutral safety circuit and secures the safety when the engine starts.

  REMARK

  The HST controller (6) controls the neutral safety relay (15) to let the engine start only when the parking brake switch (11) and work equipment lock switch (12) are in the “LOCK” position and the joystick (steering, directional, and gear shift lever) (PCCS lever) (14) is in the “NEUTRAL” position.
- This machine also has the KOMTRAX engine cut circuit. When the gateway function controller (8) receives the engine cut command from the external operation, the engine cannot be started.
- The HST controller (6) calculates the applicable engine speed by the information such as setting and travel speed of the operating mode, fuel dial signal, and deceleration/brake pedal signal, and transmits it as a 3rd throttle signal to the engine controller (5).
- The information of the engine controller (5) is shared with other controllers via network, and it is communicated to control the engine and machine effectively.
- You can stop the engine by the operation of the engine shutdown secondary switch (4) even when the starting switch (3) is stuck and the engine cannot be stopped.

Start engine

- When the starting switch (3) is turned to the “ON” position, the engine controller (5) transmits the command current to the supply pump (24).
  Thus, the fail safe system is applied to stop the engine if a problem is found in the electrical system.
- It has the neutral safety system that stops the engine as the neutral safety relay (15) operates and the starting current to the starting motor (18) is blocked when the parking brake switch (12) or work equipment lock switch (12) is in the “FREE” position and the joystick (steering, directional, and gear shift lever) (PCCS lever) (14) is in the position other than the “NEUTRAL” position.
- When the gateway function controller (8) receives the engine cut commend from the external operation, the received signal is sent to the machine monitor (7).
  The machine monitor (7) activates the personal lock relay (16) and shuts off the starting current to the starting motor (20). The engine cannot be started.

Engine speed control

The engine controller (5) transmits the 2nd throttle signal (fuel control dial) (k) to the HST engine controller (6). The HST controller (6) calculates the applicable engine speed by the information such as the 1st throttle signal (deceleration/brake pedal) (j), 2nd throttle signal (fuel control dial) (k), settings of the operating mode, travel speed, and pedal mode, and state of turn, and sends it as a 3rd throttle signal (controller control signal) (l) to the

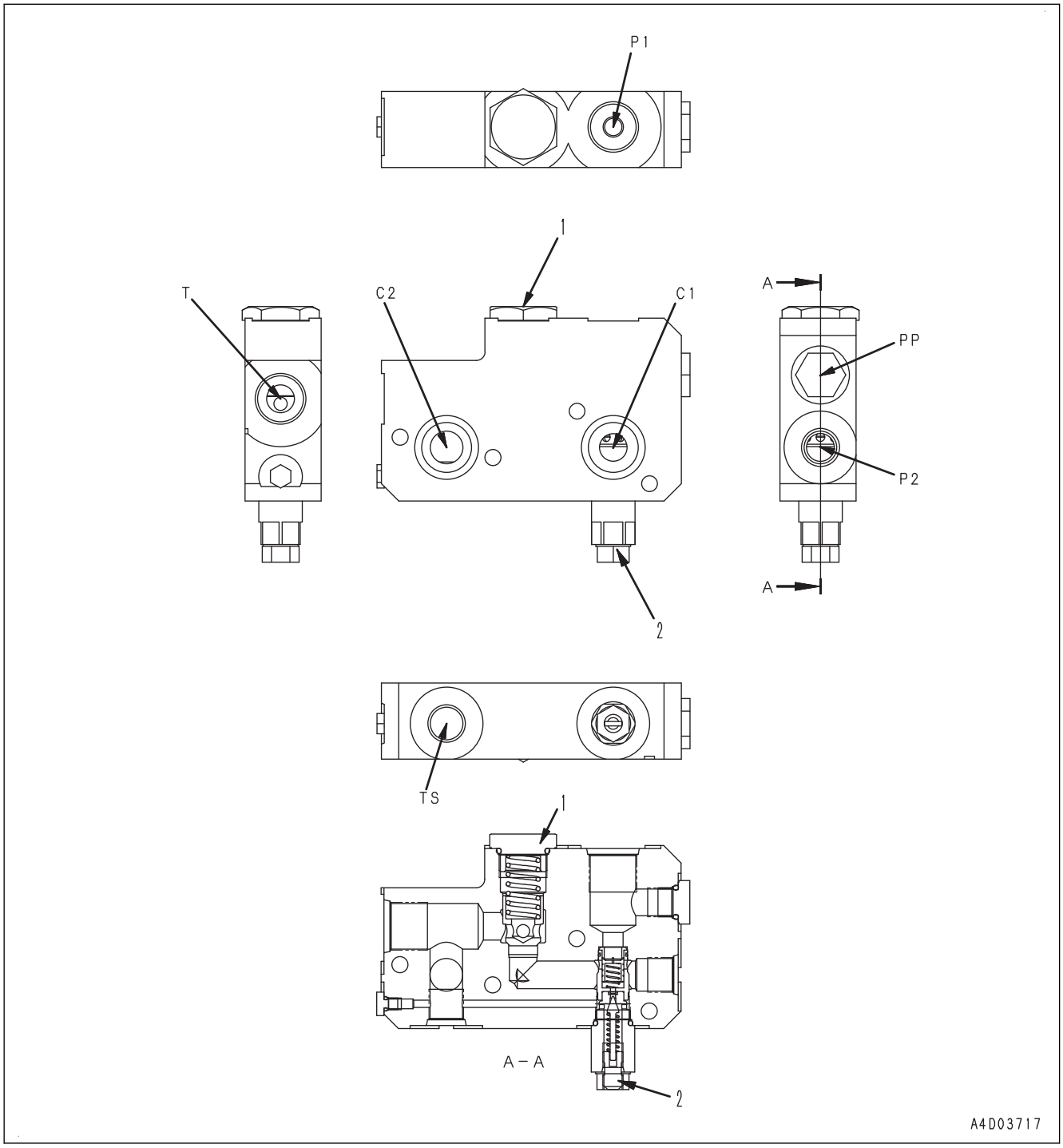
HYDRAULIC OIL COOLER BYPASS AND HST CHARGE SAFETY VALVE

HST

Abbreviation for Hydro Static Transmission

STRUCTURE OF HYDRAULIC OIL COOLER BYPASS AND HST CHARGE SAFETY VALVE

Structure drawing

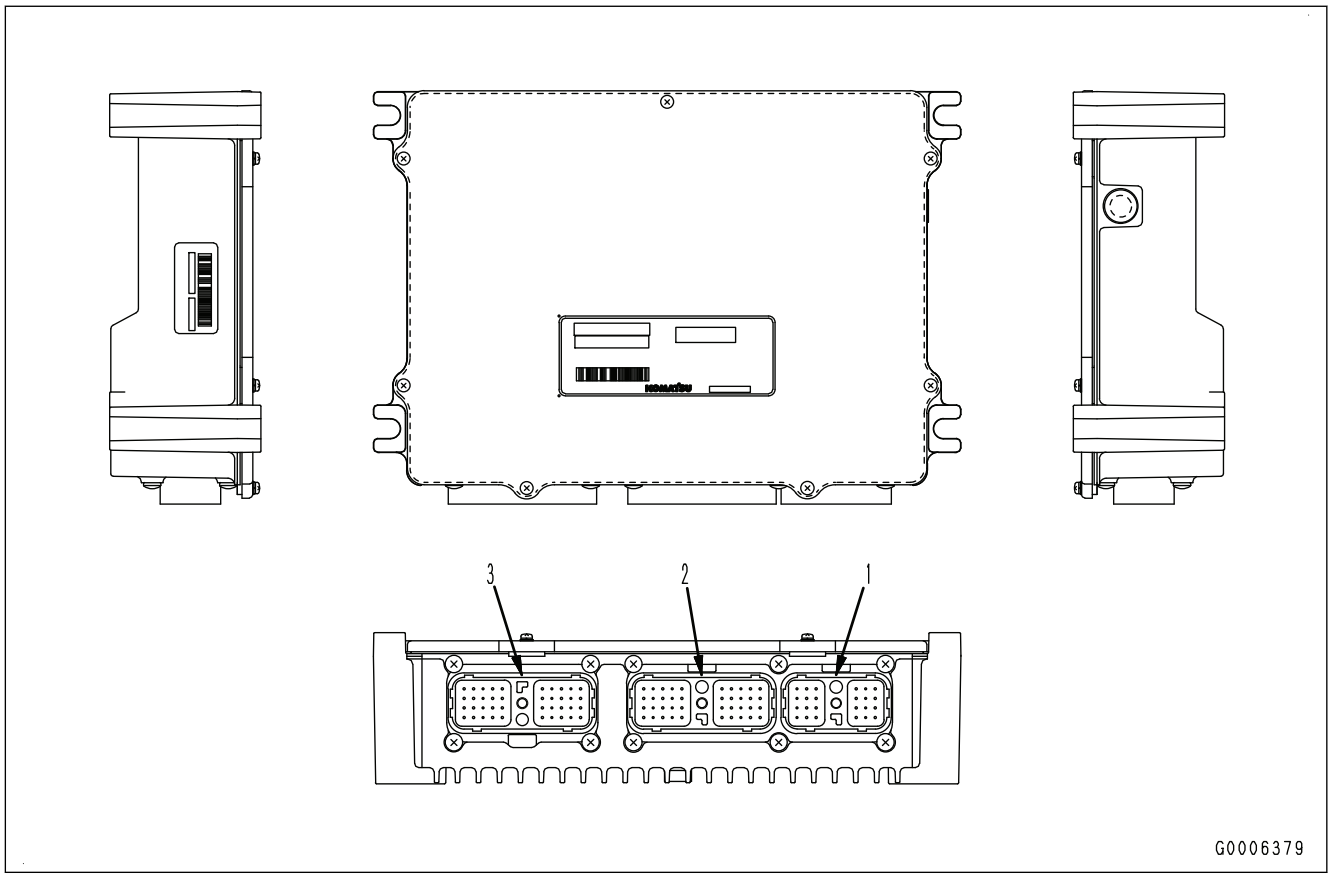


C1: To hydraulic oil cooler inlet
C2: From hydraulic oil cooler outlet
P1: From charge filter
P2: From cooling fan motor
T: To hydraulic tank
TS: Plug

WORK EQUIPMENT CONTROLLER

STRUCTURE OF WORK EQUIPMENT CONTROLLER

General view

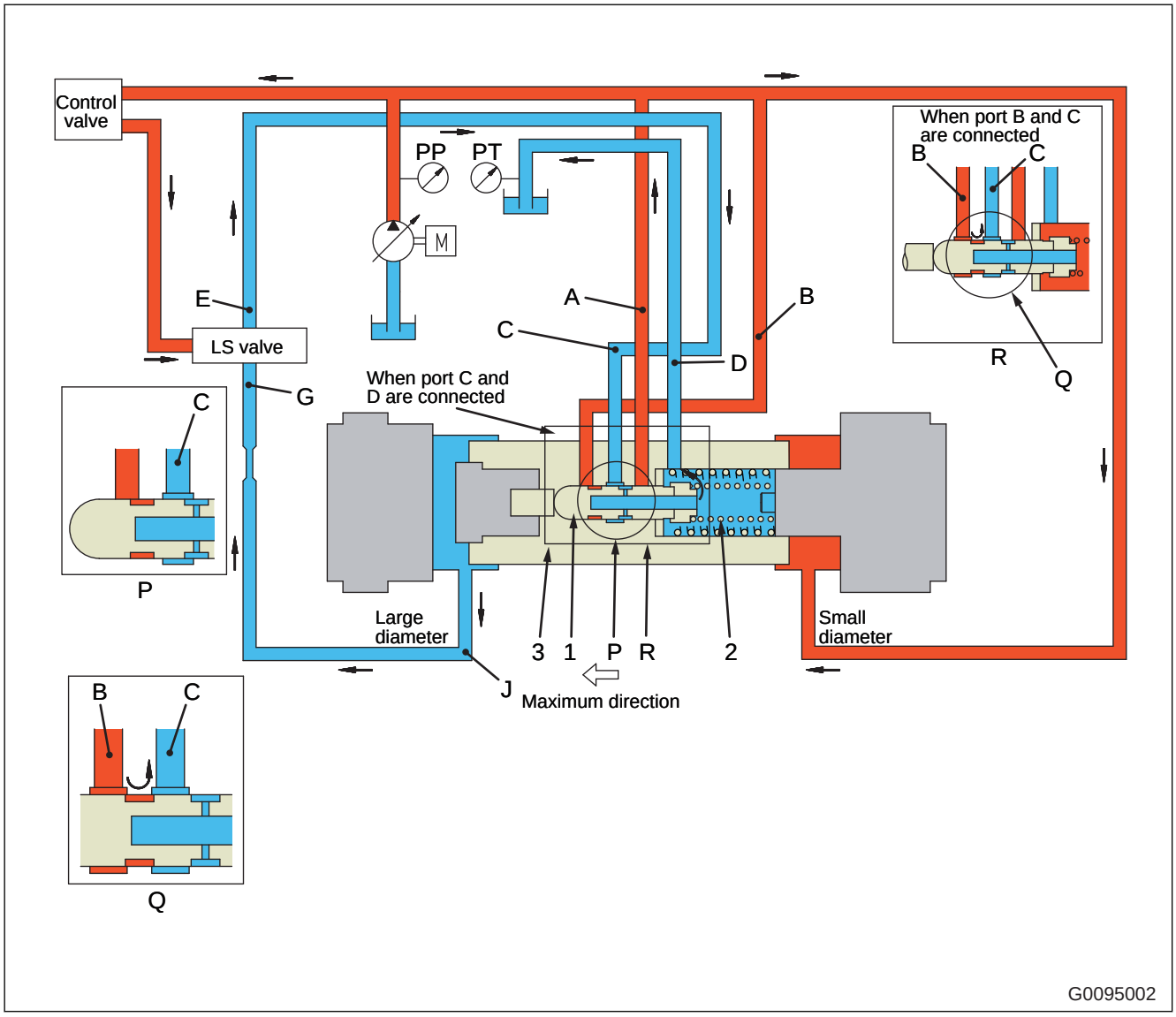


1: CN1
2: CN2
3: CN3

INPUT AND OUTPUT SIGNALS OF WORK EQUIPMENT CONTROLLER

CN1 WE1

Pin No.	Signal name	Input/output signal
1	(*2)	-
2	(*2)	-
3	Work equipment oil pressure sensor	Input
4	GND (analog)	-
5	(*1)	-
6	(*1)	-
7	(*2)	-
8	(*2)	-
9	(*1)	-
10	GND (signal)	-
11	(*1)	-
12	(*1)	-

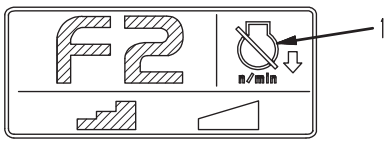


Action of spring

1. The load of the spring (2) in the PC valve is set by the swash plate position.
2. As the servo piston (3) expands or compresses the spring (2), the spring loads changes.
3. The port (C) of the PC valve is connected to the port (E) of the LS valve.
4. The pump pressure (PP) is applied to the small diameter side of the servo piston (3), port (A), and port (B).
5. When the pump pressure (PP) is low, the spool (1) is at the left position.
6. The port (C) is connected to the port (D), and the pressure to the LS valve becomes the drain pressure (PT).
7. When the port (E) and port (G) of the LS valve are connected, the pressure from the port (J) to the large diameter piston side becomes the drain pressure (PT), and the servo piston (3) moves to the left.
8. The pump discharged volume increases.
9. As the servo piston (3) moves, the spring (2) expands, and the spring force decreases.
10. When the spring force decreases, the spool (1) moves to the right. The port (C) is blocked from the port (D), and the pump discharged pressure port (B) is connected to the port (C).
11. As the pressure in the port (C) increases and the pressure at the large diameter side of the piston increases, the servo piston (9) stops and does not move to the left.
12. The servo piston (3) stops at the position (= pump discharged volume) where the thrust caused by the pressure (PP) applied to the spool (1) is balanced with the force of the spring (4).

1: Deceleration mode symbol

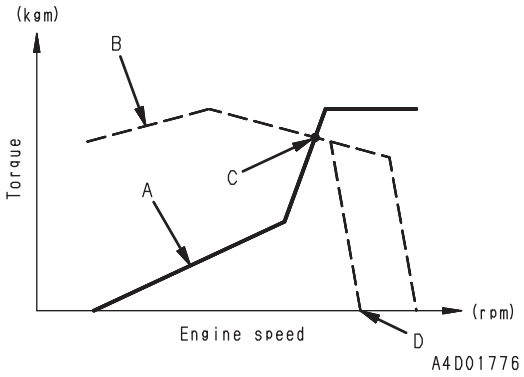
Brake mode



1: Brake mode symbol

GEAR SHIFT CONTROL FUNCTION BY LOAD

HST pump control (constant rotation matching control)



A: HSC absorption torque

B: Engine torque

C: Matching

D: Low speed matching engine speed

- When the external load is applied, the HST pump decreases the pump capacity in response to the engine speed and HST circuit pressure. The travel speed is lowered with this operation, and the engine speed is controlled not to decrease.
- This function sets the HST absorption torque (A) based on the engine speed shown in the figure above.
- The upper limit of the HST pump capacity is set from the HST absorption torque (A) and HST circuit pressure in the formula of HST pump capacity = HST absorption torque (A) / HST circuit pressure.

HST pump control (constant rotation matching control)

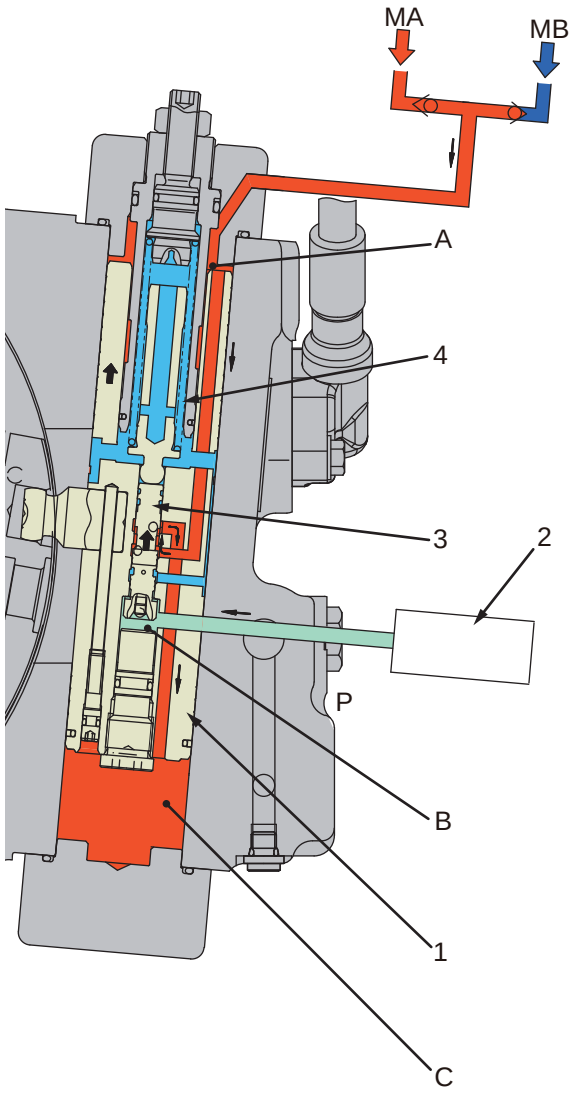
When the external load is applied, the HST motor capacity is increased in response to the HST circuit pressure to lower the travel speed, and the HST circuit pressure is controlled at constant value.

TURN CONTROL FUNCTION

REMARK

The right steering rate means the ratio of right HST pump capacity against the HST pump capacity during straight travel.

When motor capacity is minimum



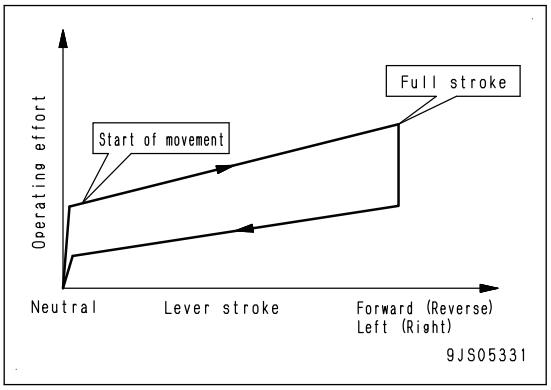
1. The capacity control pressure is supplied from the EPC valve (2) to the chamber (B) in response to the command current to the EPC valve (2).
2. The servo spool (3) supplies the self pressure in the chamber (A) to the chamber (C) until it reaches the set motor capacity with the balance of the force generated by the capacity control pressure in the chamber (B) against the force of the servo spring (4).

FEATURES OF BLADE ELECTRIC LEVER

Operating force property

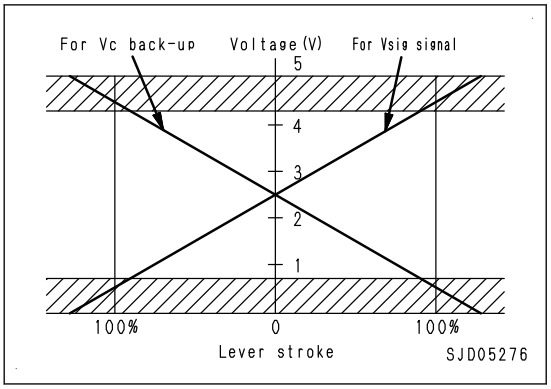
For blade

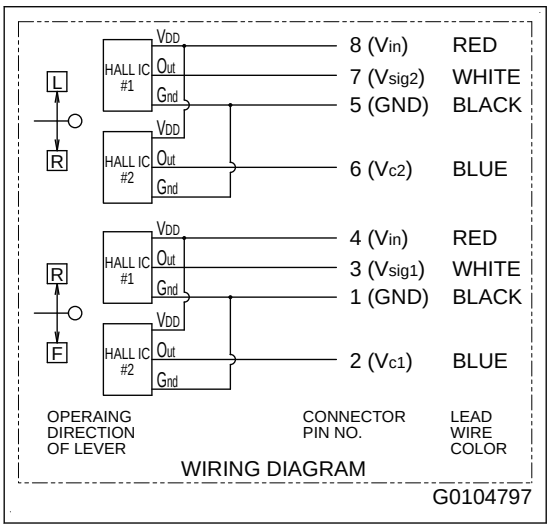
- The properties for the directions (forward, reverse, right, and left) are shown in the figure below.
- Free return



Output voltage property

- The blade electric lever is installed to the control stand at the right, and the control lever is installed to it.
- The operation angle (stroke) of the control lever is sensed by the potentiometer and it is output to the work equipment controller as a signal voltage.
- The potentiometers are installed (1 piece each for front and rear direction and right and left direction), and each potentiometer outputs the two opposite signal voltages shown in the figure below.





11: HST controller

12: Cylinder EPC valve

13: Blade control lever and auto/manual switch (PPCS lever)

14: Joystick (steering, directional and gear shift lever) (PCCS lever)

FUNCTION OF STRAIGHT TRAVEL CORRECTION SYSTEM

- This function is applicable for the cutting work at straight travel.
- This function senses the travel deviation caused by the uneven load during the cutting and carry work with the cut control, and corrects the travel deviation automatically with the blade angle adjustment function. This function keeps the machine direction at the cutting work start point and after the joystick (steering, directional and gear shift lever) (PCCS lever) is operated during the work.
- This function is disabled automatically when the blade edge moves along the construction design surface, and the blade edge is not lowered below the construction design surface.
- This function can be enabled when "Tilt Steering Control" is selected in the "Dozing Control" menu.
- This function is registered as a shortcut on the control box.

OPERATION OF STRAIGHT TRAVEL CORRECTION SYSTEM

1. The work equipment controller (2) calculates the current blade tilt angle based on the length data of each cylinder (j).
2. The control box (10) sends the tilt steering control ON/OFF information (e) to the navigation controller (1).
3. The navigation controller (1) calculates the deviation between current and target coordinates of the blade edge, and sends the tilt steering control permission data (t) and tilt steering control ON/OFF information (e) together to the work equipment controller (2).
4. The navigation controller (1) calculates the machine direction information (h) based on the GNSS antenna position data (b), GNSS antenna direction data (c), and machine posture information (d), and sends it to the work equipment controller (2).
5. The work equipment controller (2) calculates the tilt steering control operation information (q) based on the operation data of the joystick (steering, directional and gear shift lever) (s), operation data of the blade control lever (r), and tilt steering control permission data (t).
6. The work equipment controller (2) saves the machine direction information (h), at the time when the tilt steering control is activated, as the target direction.
7. The work equipment controller (2) calculates the current blade tilt angle.
8. The work equipment controller (2) calculates the target blade tilt angle based on the deviation between the target direction and machine direction information (h), and calculates the deviation against the current blade tilt angle.
9. The work equipment controller (2) calculates the EPC valve drive signal data in response to the deviation.
10. The work equipment controller (2) outputs the cylinder EPC valve drive signal (n) in response to the cylinder EPC valve drive signal value to control the blade.

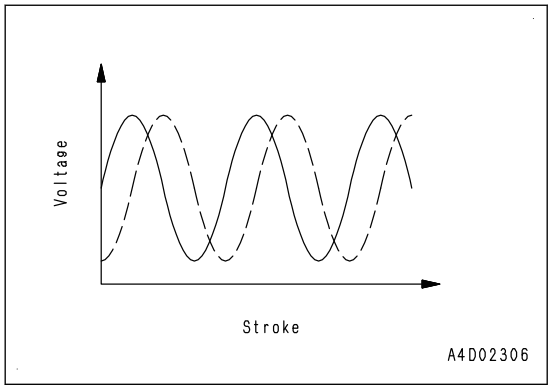
REMARK

- The tilt steering control is disabled while the steering lever is in operation. The tilt steering control is enabled after the steering lever operation is completed, and the target direction is updated.
- The tilt steering control is disabled while the blade control lever is operated in the TILT direction. The tilt steering control is enabled after the lever operation is completed, and the target direction is updated.

- This sensor detects the stroke amount of cylinder rod (1) by the rotation of stroke sensor roller (2) which is pressed onto the surface of cylinder rod (1).

Output characteristics

- The relation between stroke and output voltage is shown in the following graph.



Item	Test condition		Unit	Standard value for new machine	Failure judgment criteria
Ripper control lever (option)	• Fuel control dial: MIN (Low idle) position • HST oil temperature (hydraulic oil temperature): 40 to 60°C • Measuring point: Center of lever grip (knob)	NEUTRAL to RAISE/ LOWER	mm	49 to 65	49 to 65

*1: When the deceleration/brake pedal is pushed to the 2nd level, the operating effort increases and the mechanical brake is applied.

Operation efforts of control levers and pedals

Item	Test condition		Unit	Standard value for new machine	Failure judgment criteria
Forward and reverse side of joystick (steering, directional and gear shift lever)	• Engine is stopped • Measuring point: Center of lever grip (knob)	NEUTRAL to FORWARD/ REVERSE	N {kgf}	36.3 to 75.5 {3.7 to 7.7}	36.3 to 75.5 {3.7 to 7.7}
		FORWARD/ REVERSE to NEUTRAL		36.3 to 75.5 {3.7 to 7.7}	36.3 to 75.5 {3.7 to 7.7}
Steering side of joystick (steering, directional and gear shift lever)		NEUTRAL to L.H. operating effort step	N {kgf}	10.8 to 30.4 {1.1 to 3.1}	10.8 to 30.4 {1.1 to 3.1}
		L.H. operating effort step to L.H. stroke end		26.5 to 51.0 {2.7 to 5.2}	26.5 to 51.0 {2.7 to 5.2}
		NEUTRAL to R.H. operating effort step		13.7 to 33.3 {1.4 to 3.4}	13.7 to 33.3 {1.4 to 3.4}
		R.H. operating effort step to R.H. stroke end		29.4 to 53.9 {3.0 to 5.5}	29.4 to 53.9 {3.0 to 5.5}
Deceleration/ brake pedal	• Engine is stopped • Measuring point: Center of pedal (*1)	NEUTRAL to operating effort step	N {kgf}	52.7 to 71.3 {5.37 to 7.27}	52.7 to 71.3 {5.37 to 7.27}
		Operating effort step to stroke end		171 to 231 {17.4 to 23.6}	171 to 231 {17.4 to 23.6}

Item	Test condition		Unit	Standard value for new machine	Failure judgment criteria
Parking brake solenoid outlet pressure	• HST oil temperature (hydraulic oil temperature): 40 to 60°C • Fuel control dial: MAX (High idle) position • Joystick (steering, directional and gear shift lever) (PCCS lever): NEUTRAL position • Parking brake lever: FREE position	Control brake release mode: OFF	MPa {kgf/cm^2}	0	0
		Control brake release mode: ON		2.74 to 3.72 {28.0 to 38.0}	2.74 to 3.72 {28.0 to 38.0}

Tools to test outlet pressure in solenoid valve

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5130	Gauge	1	Pressure range: 6MPa
	2	799-101-5160	Nipple	2	Size: R1/8
B		790-261-1205	Digital hydraulic tester	1	Pressure range: 70MPa
C		791T-640-1110	Nipple	2	Size: M14×1.5mm
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	Size: M8×1.25mm
H		07002-10823	O-ring	1	
J		799-101-5220	Nipple	1	Size: M10×1.25mm

Tools to test deceleration/brake pedal

Symbol	Part No.	Part name	Q'ty	Remarks
A	79A-264-0021	Push-pull scale	1	Pressure range: 0 to 300N

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	Size: M10×1.25mm
C		07002-11023	O-ring	1	
D		Commercially available	Block	1	

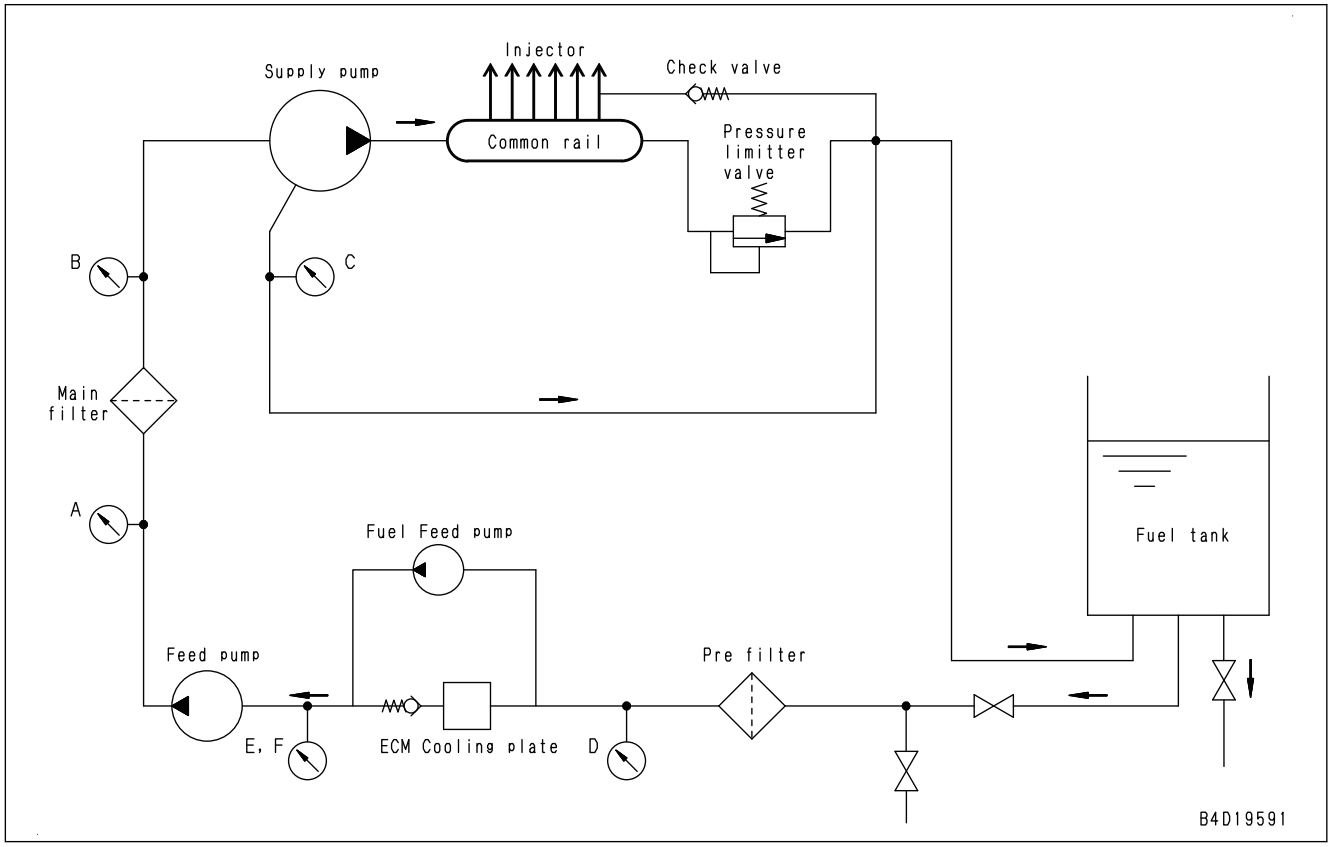
Tools to test and adjust clearance of idler

Symbol	Part No.	Part name	Q'ty	Remarks
A	Commercially available	Feeler gauge	1	

Tools to test track shoe tension

Symbol	Part No.	Part name	Q'ty	Remarks
A	Commercially available	Iron rod	1	L shape steel bar with less deflection

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



A: Measuring position of low-pressure circuit (fuel main filter inlet side)

B: Measuring position of low-pressure circuit (fuel main filter outlet side)

C: Measuring position of return circuit (supply pump drain port)

D: Measuring position of negative pressure circuit (fuel supply connector part)

E: Measuring position of negative pressure circuit (supply pump inlet)

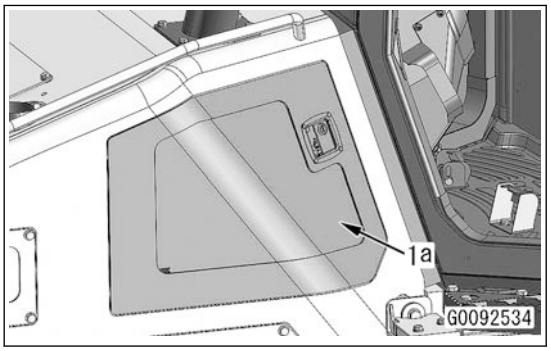
F: Measuring position of fuel feed pump outlet pressure (supply pump inlet)

TEST FUEL PRESSURE

TEST LOW-PRESSURE CIRCUIT (FUEL MAIN FILTER INLET SIDE)

Set the device for testing

1. Open the cover (1a).



TEST INJECTION VOLUME FROM AdBlue/DEF INJECTOR

Do “AdBlue/DEF Injection Quantity Test” of the SCR Service Test to increase the AdBlue/DEF pump pressure and to spray AdBlue/DEF from the AdBlue/DEF injector. The failure of the AdBlue/DEF injector can be checked with the injection rate from this test.

Tools to test injection amount from AdBlue/DEF injector

Symbol	Part No.	Part name	Q'ty	Remarks
A	799-601-4340	Socket	1	
B	Commercially available	Tester	1	
C	Commercially available	Resin container	1	Made of polypropylene/polyethylene, Capacity: Approximately 200ℓ
D	Commercially available	Measuring cylinder	1	Capacity: Approximately 200 to 500mℓ
E	6540-71-1720	Cap kit	1	
F	600-919-5030	Plug	2	Hose inner diameter: 9.5mm
G	Commercially available	Protective eyeglasses	1	
H	Commercially available	Rubber gloves	1	

⚠ Stop the machine on a level ground, lower the work equipment to the ground fully, set the parking brake switch and work equipment lock switch to the LOCK position, and stop the engine.

⚠ For details how to handle AdBlue/DEF, see the Operation and Maintenance Manual, “PRECAUTIONS FOR DEF”.

⚠ When you hold the AdBlue/DEF injector, make sure that you put on protective eyeglasses and rubber gloves.

NOTICE

- **The engine controller cannot sense a KOMNET communication error which does not remain for 1 second. The test by engine controller can be continuously done even when the machine monitor does not continue the test (standard screen) because of such an error. In such a case, turn the starting switch to the OFF position. The system operating lamp goes off, and the engine controller is shut down. And then the test is reset.**
- **If the test of this item is done with the AdBlue/DEF injector installed, it can cause failures. Be sure to remove AdBlue/DEF injector before you start the test.**
- **AdBlue/DEF can freeze when the outside air temperature is low. When you do this test, make sure that AdBlue/DEF is thawed. If you use frozen AdBlue/DEF for this test, equipment damage can result.**

AdBlue/DEF injection quantity test is the function that checks if AdBlue/DEF injector has a failure. The AdBlue/DEF pump runs at high pressure and the AdBlue/DEF injector sprays a certain amount of AdBlue/DEF.

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

TEST INJECTION VOLUME FROM AdBlue/DEF INJECTOR

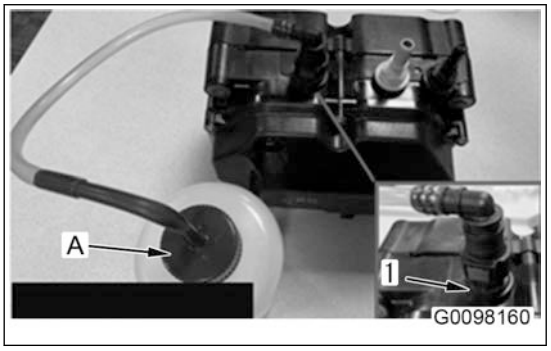
Check the AdBlue/DEF state

1. Start the engine.
2. Check the AdBlue/DEF state.

NOTICE

Be sure not to fill it with tap water. Minerals in tap water accumulates inside the AdBlue/DEF pump, and it can cause the failure.

17. Connect the AdBlue/DEF pump cleaning kit A to the AdBlue/DEF inlet connector (1).



REMARK

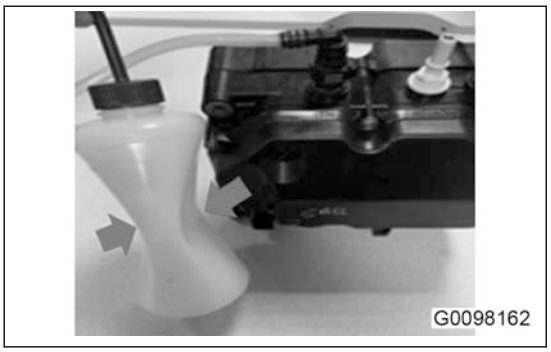
- If necessary, remove the AdBlue/DEF pump mounting bolt and parts around it. For details, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL AdBlue/DEF PUMP”.
- Do not disconnect the connector of the AdBlue/DEF pump. Do the work while it is connected.

18. Put the resin container B below the filter port of the AdBlue/DEF pump.

19. Test the AdBlue/DEF pump raised pressure. For details, see “METHOD FOR TESTING AdBlue/DEF PUMP RAISED PRESSURE”.

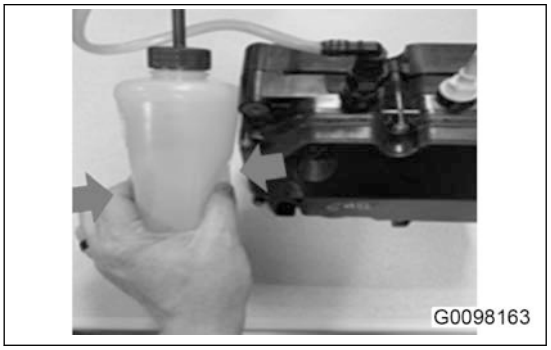
1) Make sure that cleaning liquid is purged in the AdBlue/DEF pump and the container of the AdBlue/DEF pump cleaning kit A becomes dented.

   If cleaning liquid is not purged, push the container of the AdBlue/DEF pump cleaning kit A until cleaning liquid reaches the AdBlue/DEF pump.

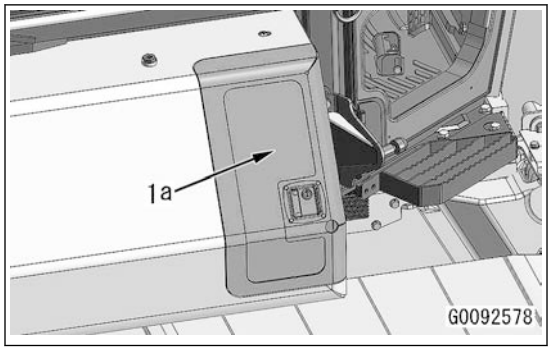


   NOTICE

   If cleaning liquid is not purged even it is pushed, you cannot do the cleaning. Replace the AdBlue/DEF pump. For details, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL AdBlue/DEF PUMP”. After the AdBlue/DEF pump is replaced, go to Step 24.

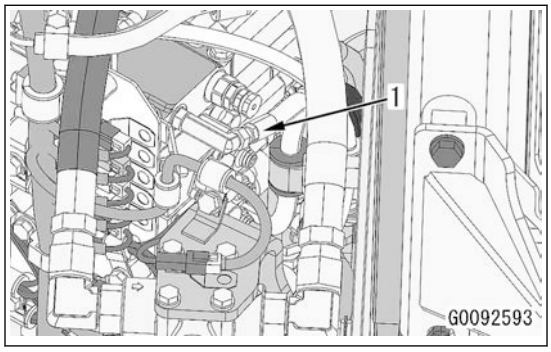


2. Open the cover (1a).



3. Disconnect the hose (1), install the adapter C, and connect it again.

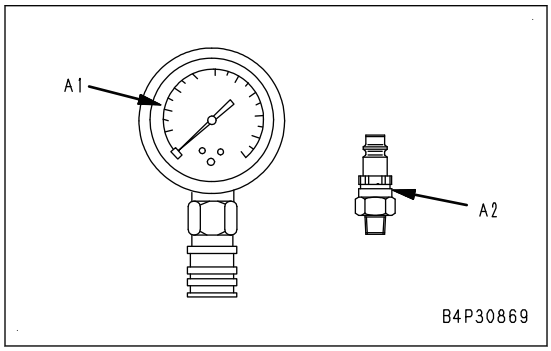
   Adapter C: 34 to 54Nm {3.5 to 5.5kgfm}



4. Install the nipple A2 in the hydraulic tester A to the adapter C, and connect it to the gauge A1.

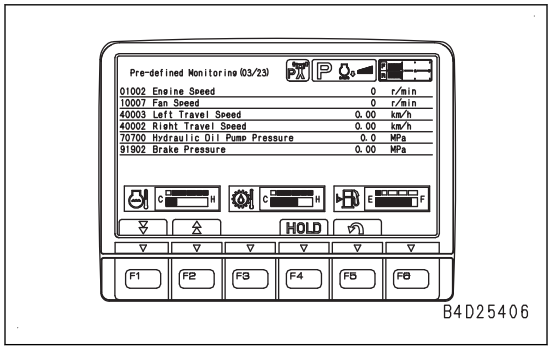
   REMARK

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



Set the measurement condition

5. Start the engine.
6. Set the working mode to P mode.
7. Show the monitoring items that follow. For details, see “SET AND OPERATE MACHINE MONITOR”.
   - Monitoring code: 01002 “Engine Speed”
   - Monitoring code: 10007 “Fan Speed”
   - Monitoring code: 40002 “Right Travel Speed”
   - Monitoring code: 40003 “Left Travel Speed”
   - Monitoring code: 70700 “Hydraulic Oil Pump Pressure”
   - Monitoring code: 91902 “Brake Pressure”



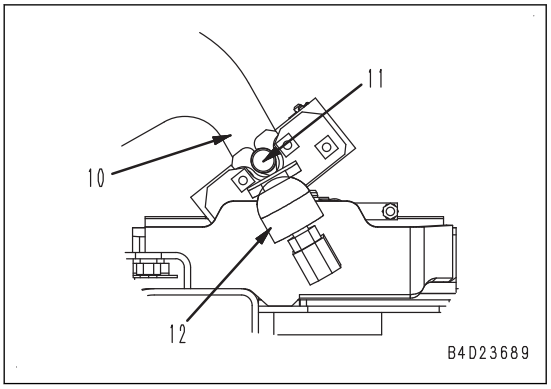
8. Make sure that the HST oil temperature (hydraulic oil temperature) is in the range of the test condition.

   HST oil temperature (hydraulic oil temperature): 40 to 60°C

Check procedure

9. Turn the fuel control dial to the MAX (High idle) position, and check the work equipment circuit oil pressure when the blade lift cylinder and blade tilt cylinder is relieved at the stroke end.

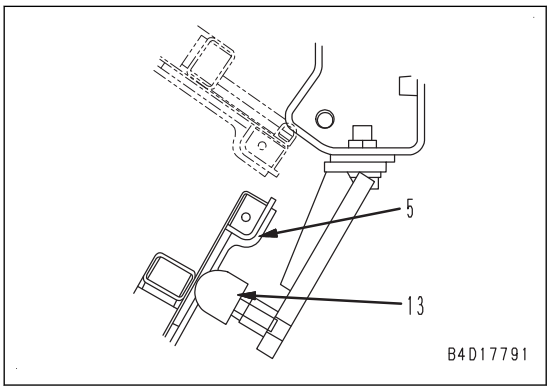
1. Loosen the lock nut in the upper side of the stopper rubber (12).



2. Loosen the lock nut in the bottom side of the stopper rubber (13).
3. Adjust the height of the stopper rubbers (12) and (13) in response to the trouble symptom.

   REMARK

   - When there is backlash, pull out the stopper rubber until backlash is eliminated. (Set to become higher.)
   - If it is not easy to lock or if the release lever operation is heavy, return the stopper rubber in a range that door backlash does not occur. (Set to become lower.)
4. While the stopper rubbers (12) and (13) are fixed, tighten the lock nuts.



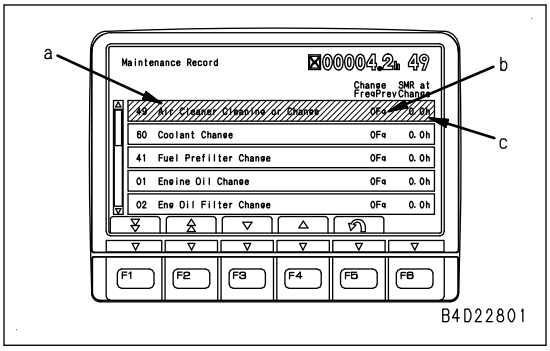
Code	Item
08	Final Drive Case Oil Change
05	Hyd Oil Tank Breather Change
44	Fuel Tank Breather Change
59	DEF Tank Breather Change
04	Hydraulic Oil Filter Change
10	Hydraulic Oil Change
26	HST Oil Filter Change
47	KCCV Filter Change
58	DEF Filter Change
48	KDPF Filter Cleaning
67	DEF Tank Washing

Display information on “Maintenance Record” screen

a: Maintenance items

b: Number of replacements to date

c: Service meter reading (SMR) at the last replacement



MAINTENANCE MODE SETTING

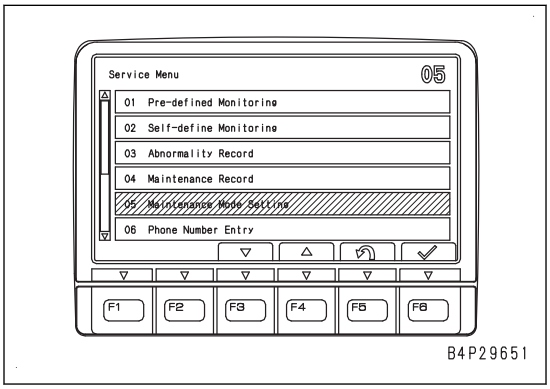
You can use this menu to set and change the operating conditions of the Maintenance Function in the operator mode.

- Set the function to ON or OFF.
- Change the replacement interval setting (by item).
- Initialize all the replacement interval settings.

1. Select “Maintenance Mode Setting” on the “Service Menu” screen.

   REMARK

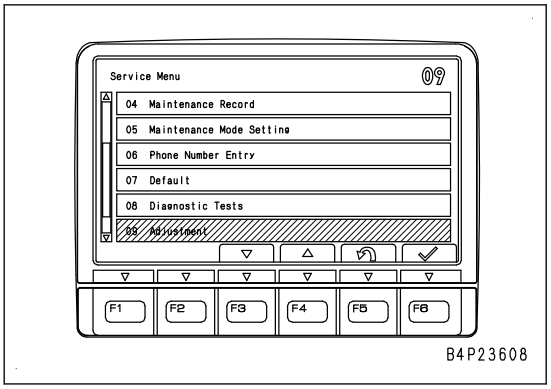
   For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



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

   REMARK

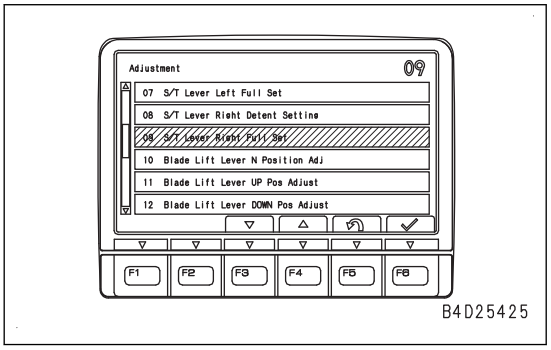
   For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



2. When the “Adjustment” menu screen is shown, select “S/T Lever Right Full Set” with the function switch or numerical input switch.

   REMARK

   - For the adjustment items, see “ADJUSTMENT ITEM TABLE”.
   - For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



3. When the “Adjustment” screen is shown, start “S/T Lever Right Full Set” with the function switch.

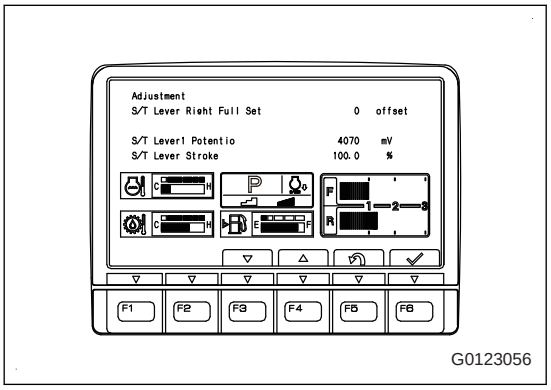
   F3: Not used

   F4: Not used

   F5: Goes back to the adjustment item selection screen.

   F6: Saves the compensation value.

   1) Keep the joystick (steering, directional and gear shift lever) (PCCS lever) at the right maximum position (Steering lever stroke ＝ 100%) (counter-rotation turn range).
   2) Push F6, and make sure that the alarm buzzer operates.



   REMARK

   - This adjustment changes only the compensation value, and other values on the screen stay the same.
   - Even when you turn the starting switch to the OFF position after the adjustment is completed, the saved adjustment value is enabled.
   - “S/T Lever Right Full Set” does not adjust the steering performance.
   - The switch does not operate when F3 or F4 is pushed.

ADJUSTMENT MENU (Blade Lift Lever N Position Adj)

“ADJUSTMENT MENU (Blade Lift Lever N Position Adj)” lets the HST controller recognize and save the voltage when the lift side potentiometer of the blade control lever is at the NEUTRAL position.

When the HST controller or blade control lever is replaced, be sure to do this adjustment.

5. When the “Adjustment” screen is shown, start “Ripper Lift Lever N Position Adj” with the function switch.

   F3: Not used

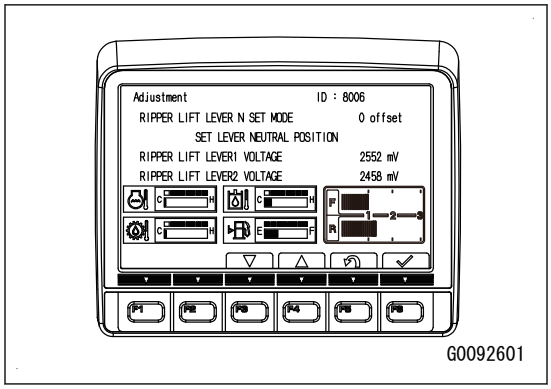
   F4: Not used

   F5: Goes back to the “Input ID” screen.

   F6: Records the adjustment value.

   1) Keep the ripper control lever at the NEUTRAL position.

   2) Push F6, and make sure that the alarm buzzer operates.



REMARK

- This adjustment changes only the adjustment value, and other values on the screen stay the same.
- Even when you turn the starting switch to the OFF position after the adjustment is completed, the saved adjustment value is enabled.
- “Ripper Lift Lever N Position Adj” does not adjust the sensitivity of the ripper control lever.
- When you do the adjustment with “ADJUSTMENT MENU (Ripper Lift Lever N Position Adj)”, see “ADJUSTMENT MENU (Ripper Lift Lever N Position Adj)”.

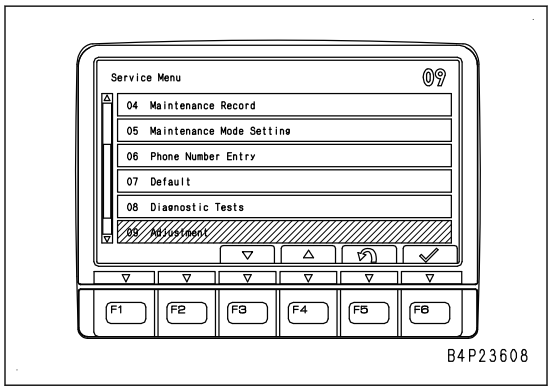
ADJUSTMENT ID: 8007 (RIPPER LIFT LEVER RAISE STROKE END ADJUSTMENT)

“RIPPER LIFT LEVER RAISE STROKE END ADJUSTMENT” lets the work equipment controller recognize the raise maximum position of the lift potentiometer in the ripper control lever.

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

   REMARK

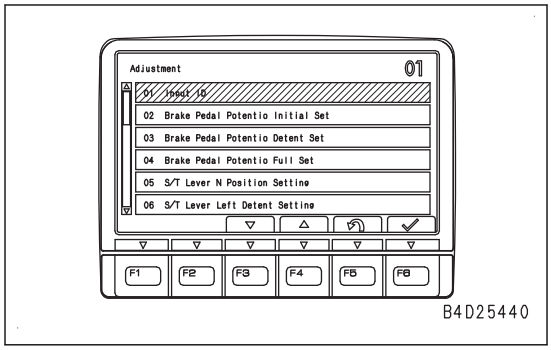
   For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



3. Select “Input ID” on the “Adjustment” menu screen.

   REMARK

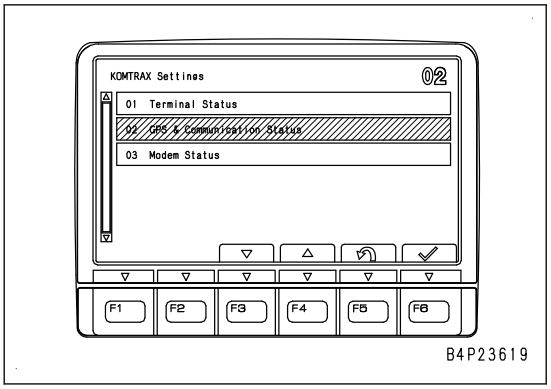
   For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



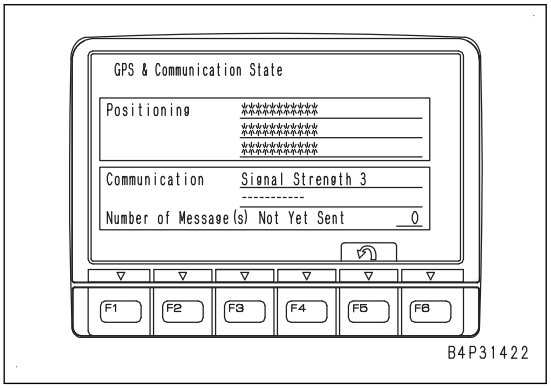
2) When the “KOMTRAX Settings” screen is shown, select “GPS & Communication State” with the function switch or numerical input switch.

REMARK

For the procedure to select this item, see “SERVICE MODE”, “OPERATE SERVICE MODE”.



3) Make sure that the “Communication” item is Signal Strength 1 or more.



Termination of KOMTRAX system operation

When you sell, give over, or discard the machine, stop the operation of the KOMTRAX system as follows.

Machine with multi monitor

Contents of work	Applicable steps	Give over the machine	Sell the machine	Discard the machine
Initialize the setting for the multi monitor	1. to 9.	Required	Required	Not required
Stop the radio waves	10. to 12.	Required	Required	Not required
Cancel the communication contract (submit the terminal replacement sheet)	13.14.	Required	Required	Required

Machine without multi monitor

Contents of work	Applicable steps	Give over the machine	Sell the machine	Discard the machine
Stop the radio waves	11.12.	Required	Required	Not required
Cancel the communication contract (submit the terminal replacement sheet)	13.14.	Required	Required	Required

Initialize the setting for the multi monitor
The KOMTRAX key person does the steps 1 to 9.

1. Cancel the “engine start lock” of the machine.
2. Make sure that the “engine start lock” is cancelled.
3. Cancel the “time period lock”.
4. Make sure that the “time period lock” is cancelled.
5. Initialize the “monitor password lock”.
6. Cancel the “monitor password lock”.
7. Make sure that the “monitor password lock” is cancelled.

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

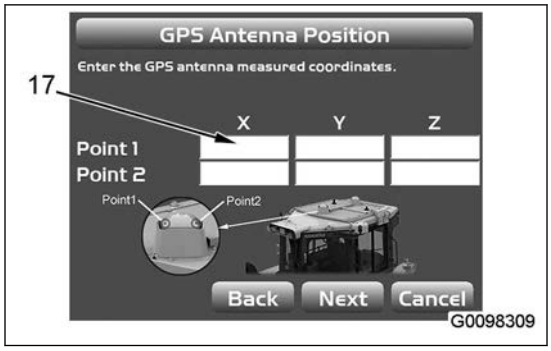
    “Back”: Goes back to the previous screen.

    “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).

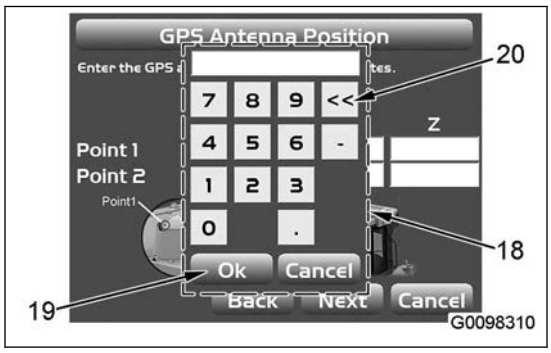
    “Ok” (19): Accepts the input and lets the alphanumeric keyboard (18) go off.

    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.



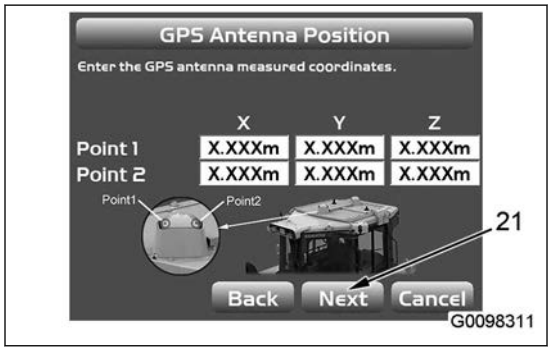
13. Make sure that the coordinates of “GPS Antenna Position” are input, and push “Next” (21).

    “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.

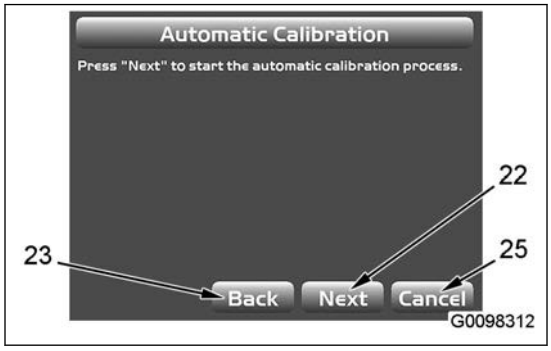
    “Back”(23): Goes back to the previous screen.

    “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.



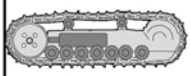
Calculate the correction value of the GNSS antenna location and save the value in the work equipment controller.

Item	Test condition	Unit	Standard value for new machine	Repair limit	Measured value	Good	No good
Blade LEFT tilt	• HST oil temperature (hydraulic oil temperature): 40 to 60°C • Operation mode: P (power mode) • Fuel control dial: MAX position (High idle) • Blade RIGHT tilt stroke end to blade LEFT tilt stroke end • See fig. 4 of “MACHINE POSTURE AND PROCEDURES TO MEASURE PERFORMANCE”.	second	1.7 to 2.1	Max. 2.4			
Blade RIGHT tilt	• HST oil temperature (hydraulic oil temperature): 40 to 60°C • Operation mode: P (power mode) • Fuel control dial: MAX position (High idle) • Blade LEFT tilt stroke end to blade RIGHT tilt stroke end • See fig. 4 of “MACHINE POSTURE AND PROCEDURES TO MEASURE PERFORMANCE”.	second	1.7 to 2.1	Max. 2.4			
Blade LEFT angle	• HST oil temperature (hydraulic oil temperature): 40 to 60°C • Operation mode: P (power mode) • Fuel control dial: MAX position (High idle) • Blade RIGHT angle stroke end to blade LEFT angle stroke end • See fig. 5 of “MACHINE POSTURE AND PROCEDURES TO MEASURE PERFORMANCE”.	second	3.5 to 4.1	Max. 4.7			

Undercarriage Inspection (NORMAL) PLUS specification (Program form NO.:NJLA195001)

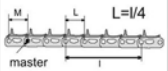
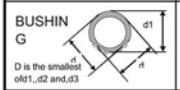
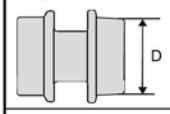
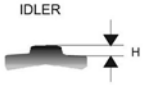
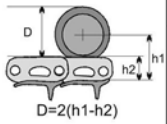
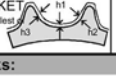
KUC

Komatsu
Undercarriage Inspection



Customer name:
Address:

Model	D71EXI, PXI-24	Serial No		Equip No		Work Order No	
Location		SMR				Wet,AR,HD or Dry	Wet
Soil condition		Dealer				Shoe width (mm)	
Working condition		Inspector				Shoe type	SINGLE
Insp.Date(yy/mm/dd)					(yyyy/m/d)	Wear type	NORMAL

			New	100% Wear	Measured mm	Wear %	SMR New	SMR Rebuilt	Hours on Parts:	Comments/Observation
LINK PITCH 	R	LH	813.8	825.8						
		RH	813.8	825.8						
	M	LH	203.45	206.45						
		RH	203.45	206.45						
		LH	132.0	119.5						
		RH	132.0	119.5						
BUSHING 		LH	73.0	62.8			New	Turned		
		RH	73.0	62.8			New	Turned		
GROUSER HIGHT 		LH	65.0	25.0						
		RH	65.0	25.0						
CARRIER 	Front	LH	185.0	163.0						
		RH	185.0	163.0						
	Rear	LH	185.0	163.0						
		RH	185.0	163.0						
IDLER 	Front	LH	20.0	30.0						
		RH	20.0	30.0						
	Rear	LH	20.0	30.0						
		RH	20.0	30.0						
TRACK ROLLER 	1	LH	210.0	174.0						
	2	LH	210.0	174.0						
	3	LH	210.0	174.0						
	4	LH	210.0	174.0						
	5	LH	210.0	174.0						
	6	LH	210.0	174.0						
	7	LH	210.0	174.0						
	8	LH	210.0	174.0						
	9	LH	210.0	174.0						
	10	LH	210.0	174.0						
	1	RH	210.0	174.0						
	2	RH	210.0	174.0						
	3	RH	210.0	174.0						
	4	RH	210.0	174.0						
	5	RH	210.0	174.0						
	6	RH	210.0	174.0						
	7	RH	210.0	174.0						
	8	RH	210.0	174.0						
	9	RH	210.0	174.0						
	10	RH	210.0	174.0						
SPROCKET 		LH	0.0	9.0						
		RH	0.0	9.0						

Remarks:

G0101433

CHECKS BEFORE TROUBLESHOOTING

Engine, lubricating oil, coolant, and AdBlue/DEF

No.	Item	Criteria	Remedy
1	Check for unusual noise and smell	-	Repair
2	Check around engine and removal of dirt	-	Remove
3	Check around engine for water leakage	-	Repair
4	Check around engine for oil leakage	-	Repair
5	Check of fuel line for leakage	-	Repair
6	Check of radiator for clogging	-	Remove
7	Check of AdBlue/DEF line for leakage	-	Repair
8	Check around aftertreatment devices and removal of dirt	-	Remove
9	Check around aftertreatment devices for exhaust gas leakage	-	Repair
10	Check of fuel level and type	-	Add fuel
11	Check of foreign material in fuel	-	Clean and drain
12	Check of AdBlue/DEF level and type	-	Add
13	Check of fuel prefilter	-	Replace
14	Check of fuel main filter	-	Replace
15	Check of engine oil level (in oil pan) and type	Between H and L	Add engine oil
16	Check of coolant level (in reservoir tank)	Between H and L	Refill with coolant
17	Check of air cleaner for clogging	Clogging is not indicated on monitor	Clean or replace

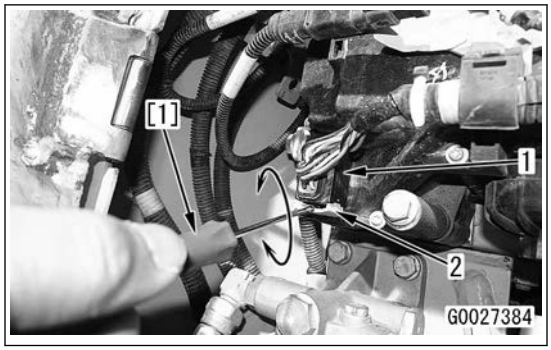
Hydraulic and mechanical equipment

No.	Item	Criteria	Remedy
1	Check for unusual noise and smell	-	Repair
2	Check for oil leakage	-	Repair
3	Check of hydraulic oil level	Between H and L	Refill with oil
4	Check of hydraulic oil strainer	-	Clean or replace
5	Check of hydraulic oil filter	-	Replace
6	Check of oil level in final drive case	Between H and L	Refill with oil
7	Air bleeding	-	Bleed air

Electrical component

No.	Item	Criteria	Remedy
1	Check around battery and removal of dirt	-	Remove
2	Check of battery terminal for looseness and corrosion	-	Retighten or replace
3	Check of alternator terminal for looseness and corrosion	-	Retighten or replace
4	Check of starting motor terminal for looseness and corrosion	-	Retighten or replace
5	Check of battery voltage (with engine stopped)	20 to 30 V	Charge or replace

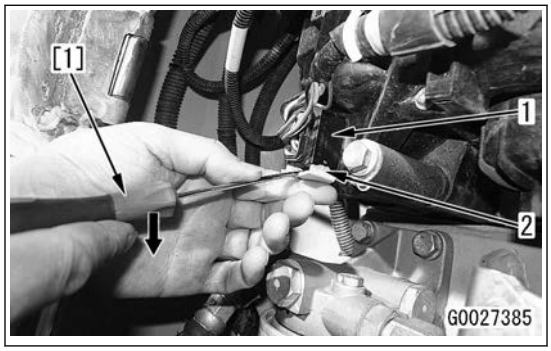
2. Turn the small flat-head screwdriver [1] left and right and to slowly release the lock part (2).



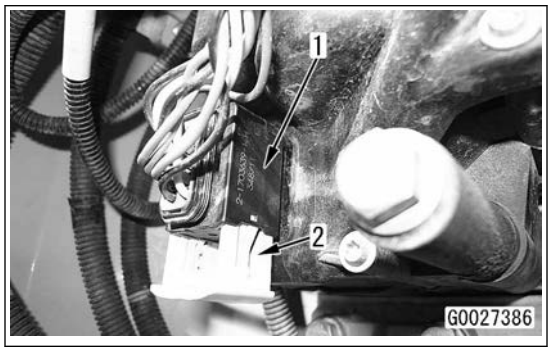
3. When the yellow lock part (2) is released in certain level, lightly hold the lock part (2) by hand not to let it come off, and then release the lock fully.

REMARK

When you release the lock, if you apply too much force on the yellow lock part (2), it will come off. Take care.

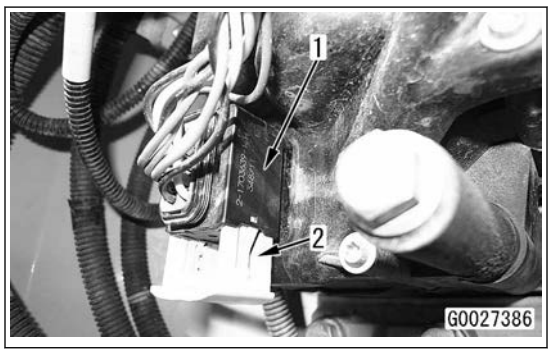


4. Disconnect the connector (1) while the lock part (2) is released fully.

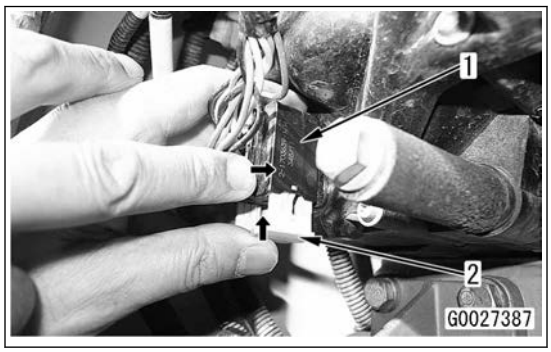


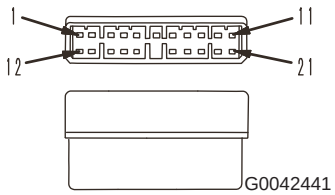
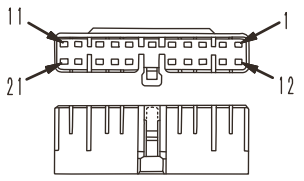
- Procedure of connection of connectors

1. Release the yellow lock part (2) fully, align the mating surfaces, and install the connector (1) straight.



2. Install the connector (1) gradually while you push the yellow lock part (2).



Total number of pins	MIC type connector		Special tool number for connection checks
	Male (concave engaging portion)	Female (convex engaging portion)	
21	 G0042441	 G0042442	799-601-2740 (T-branch)
	Body part number: 79A-222-2750 (Q'ty: 2)	Body part number: 79A-222-2740 (Q'ty: 2)	
	Body part number: 79A-222-2770 (Q'ty: 50)	Body part number: 79A-222-2760 (Q'ty: 50)	

T-BRANCH BOX AND T-BRANCH ADAPTER TABLE

(Rev.2014.11)

The part numbers of the T-boxes and T-adapters are listed in the vertical column, and the part numbers of harness checker assemblies are listed in the horizontal line.

Part No.	Part name	Number of pins	ID marking	T-adapter kit														Non-kit part
				799-601-2500	799-601-2700	799-601-2800	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	799-601-4101	799-601-4201	
799-601-2600	T-box (for ECONO)	21		●		●		●	●		●							
799-601-3100	T-box (for MS)	37																●
799-601-3200	T-box (for MS)	37																●
799-601-3380	Plate for MS (14 pins)																	●
799-601-3410	Adapter for BENDIX (MS)	24	MS-24P															●
799-601-3420	Adapter for BENDIX (MS)	24	MS-24P															●
799-601-3430	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3440	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3450	Adapter for BENDIX (MS)	5	MS-5P															●
799-601-3460	Adapter for BENDIX (MS)	10	MS-10P															●
799-601-3510	Adapter for BENDIX (MS)	5	MS-5P															●
799-601-3520	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3530	Adapter for BENDIX (MS)	19	MS-19P															●
799-601-2910	Adapter for BENDIX (MS)	14	MS-14P															●
799-601-3470	Case																	●
799-601-2710	Adapter for MIC	5	MIC-5P	●	●				●									
799-601-2720	Adapter for MIC	13	MIC-13P	●	●				●									
799-601-2730	Adapter for MIC	17	MIC-17P	●	●	●		●	●		●							
799-601-2740	Adapter for MIC	21	MIC-21P	●	●	●		●	●		●							
799-601-2950	Adapter for MIC	9	MIC-9P				●	●	●		●							
799-601-2750	Adapter for ECONO	2	ECONO 2P	●	●													
799-601-2760	Adapter for ECONO	3	ECONO 3P	●	●													
799-601-2770	Adapter for ECONO	4	ECONO 4P	●	●													
799-601-2780	Adapter for ECONO	8	ECONO 8P	●	●													
799-601-2790	Adapter for ECONO	12	ECONO 12P	●	●													
799-601-2810	Adapter for DLI	8	DLI-8P	●	●													
799-601-2820	Adapter for DLI	12	DLI-12P	●	●													
799-601-2830	Adapter for DLI	16	DLI-16P	●	●													

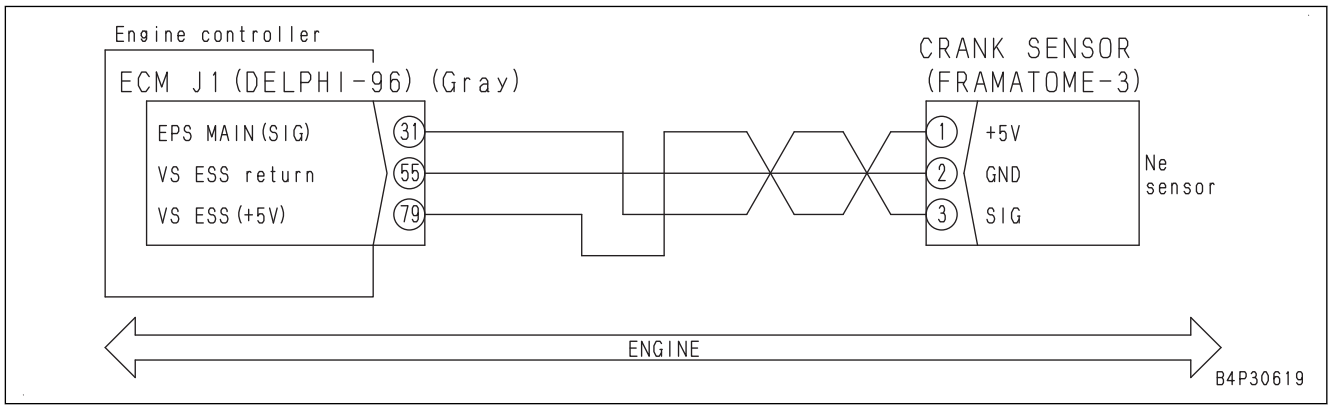
Failure code	Failure (Displayed on screen)	Applicable component	Action level	Category of history	Remarks
DXA6KY	RF HST Pump EPC Hot Short Circuit	HST	L04	Electrical system	
DXA7KA	RR HST Pump EPC Open Circuit	HST	L03	Electrical system	
DXA7KB	RR HST Pump EPC Short Circuit	HST	L03	Electrical system	
DXA7KY	RR HST Pump EPC Hot Short Circuit	HST	L04	Electrical system	
DXE0KA	LS Solenoid Short Circuit	WE	L01	Electrical system	
DXE0KB	LS Solenoid Hot Short Circuit	WE	L01	Electrical system	
DXE0KY	W/E Controller Source Voltage Low Error	WE	L01	Electrical system	
DXHRKA	Blade Lift Raise EPC Solenoid Open Circuit	WE	L01	Electrical system	
DXHRKB	Blade Lift Raise EPC Solenoid Short Circuit	WE	L01	Electrical system	
DXHRKY	Blade Lift Raise EPC Solenoid Hot Short Circuit	WE	L03	Electrical system	
DXHSKA	Blade Lift Lower EPC Solenoid Open Circuit	WE	L01	Electrical system	
DXHSKB	Blade Lift Lower EPC Solenoid Short Circuit	WE	L01	Electrical system	
DXHSKY	Blade Lift Lower EPC Solenoid Hot Short Circuit	WE	L03	Electrical system	
DXHTKA	Blade Tilt Left Head EPC Solenoid Open Circuit	WE	L01	Electrical system	
DXHTKB	Blade Tilt Left Head EPC Solenoid Short Circuit	WE	L01	Electrical system	
DXHTKY	Blade Tilt Left Head EPC Solenoid Hot Short Circuit	WE	L03	Electrical system	
DXHUKA	Blade Tilt Right Bottom EPC Solenoid Open Circuit	WE	L01	Electrical system	
DXHUKB	Blade Tilt Right Bottom EPC Solenoid Short Circuit	WE	L01	Electrical system	
DXHUKY	Blade Tilt Right Bottom EPC Solenoid Hot Short Circuit	WE	L03	Electrical system	
DXHWKA	Ripper Lift Raise EPC Solenoid Short Circuit	WE	L01	Electrical system	
DXHWKB	Ripper Lift Raise EPC Solenoid Hot Short Circuit	WE	L01	Electrical system	
DXHWKY	Ripper Lift Lower EPC Solenoid Open Circuit	WE	L03	Electrical system	
DXHXKA	Ripper Lift Lower EPC Solenoid Short Circuit	WE	L01	Electrical system	

FAILURE CODE [B@BCQA]

Action level	Failure code	Failure	Engine Coolant Level Low (Machine monitor system)
L02	B@BCQA		
Detail of failure	In less than 10 seconds after the starting switch is turned to the ON position, the signal circuit of the expansion tank coolant level sensor is in “OPEN” (disconnected from GND) state continuously for 3 seconds.		
Action of machine monitor	None		
Phenomenon on machine	If the coolant level is low, damage can occur to the engine when operation is continued.		
Related information	• Operation of the coolant level sensor of expansion tank can be checked with monitoring function. (Code: 04500) • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Starting switch ON		

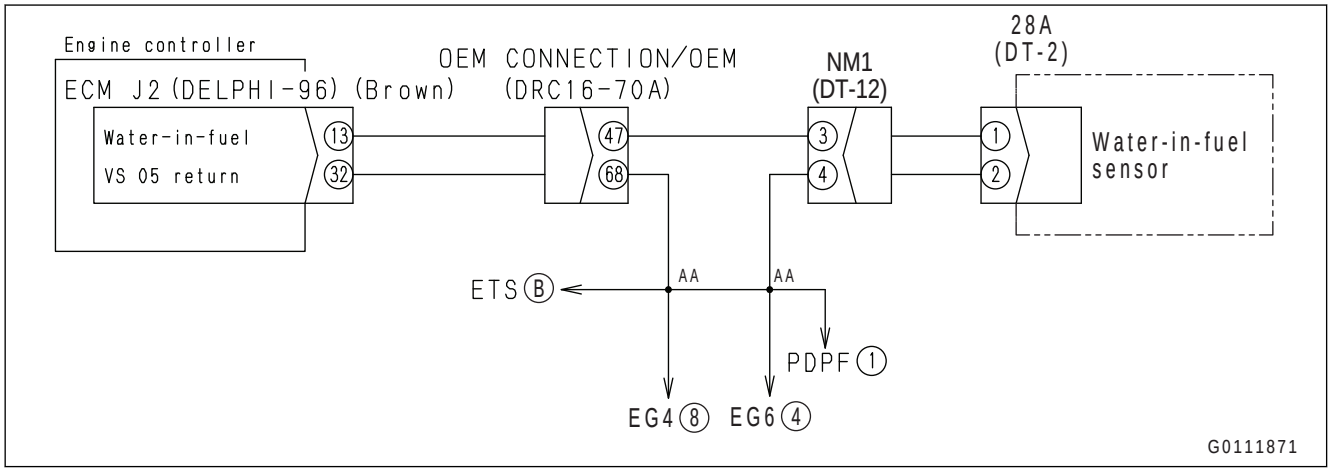
No.	Cause	Procedure, measurement location, criteria and remarks			
1	Radiator (expansion tank) coolant level is low.	Check whether the coolant level of the expansion tank is normal. **NOTICE** **If the coolant level in the expansion tank is low, check whether there is water leakage around the engine, expansion tank, and radiator before refueling.**			
2	Defective expansion tank coolant level sensor	1. Check the coolant level sensor and wash it. 2. Starting switch: OFF 3. Disconnect the connector CLS. Connect a T-adapter to the male side.			
		Resistance	Between CLS (male) (C) and ground	Expansion tank coolant level is normal.	Max. 1 Ω
				Expansion tank coolant level is low.	Min. 1 MΩ
3	Open circuit (wire breakage or defective contact of connector) in wiring harness	1. Starting switch: OFF 2. Battery disconnect switch: OFF 3. Remove the fuse No. 11 in fuse box F01. 4. Disconnect the connectors CM02 and CLS. Connect the T-adapter to each female side.			
		Resistance	Between F01 (11) and CLS (female) (A)		Max. 1 Ω
			Between CM02 (female) (3) and CLS (female) (C)		Max. 1 Ω
			Between CLS (female) (B) and ground		Max. 1 Ω
4	Defective machine monitor	1. Starting switch: OFF 2. Insert the T-adapter into connectors CM01, CM02. 3. Starting switch: ON			
		Voltage	Between CM02 (3) and CM01 (3)	Expansion tank coolant level is normal.	Max. 1 V
				Expansion tank coolant level is low.	Min. 10 V

Circuit diagram of NE speed sensor

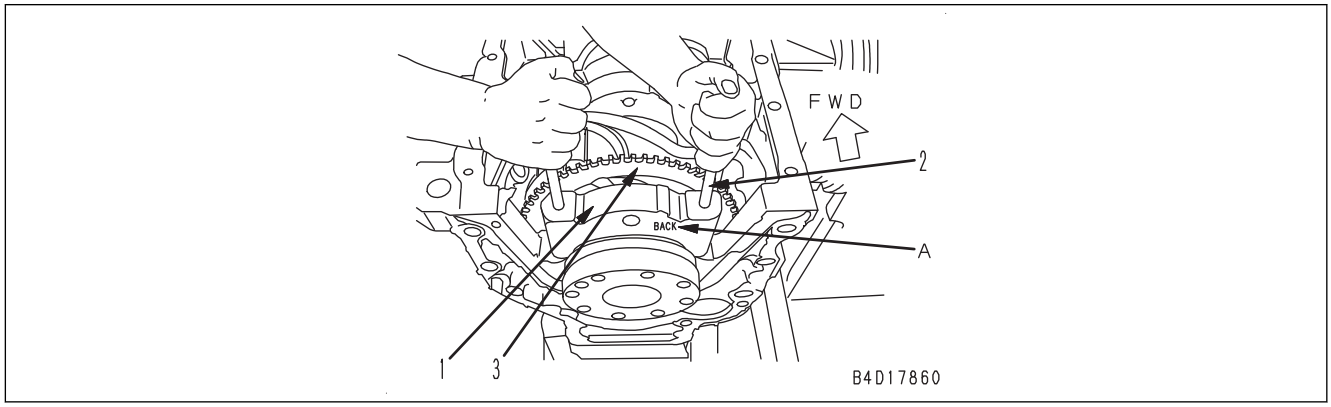


No.	Cause	Procedure, measurement location, criteria and remarks		
5	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connectors ECM J2 and 28A. Connect a T-adapter to the female side of ECM J2.		
		Continuity	Between ECM J2 (female) (13) and each pin other than pin (13)	No continuity (there is no sound)
6	Defective engine controller	If no failure is found by the previous checks, the engine controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)		

Circuit diagram of water sensor



(3): Speed sensing ring



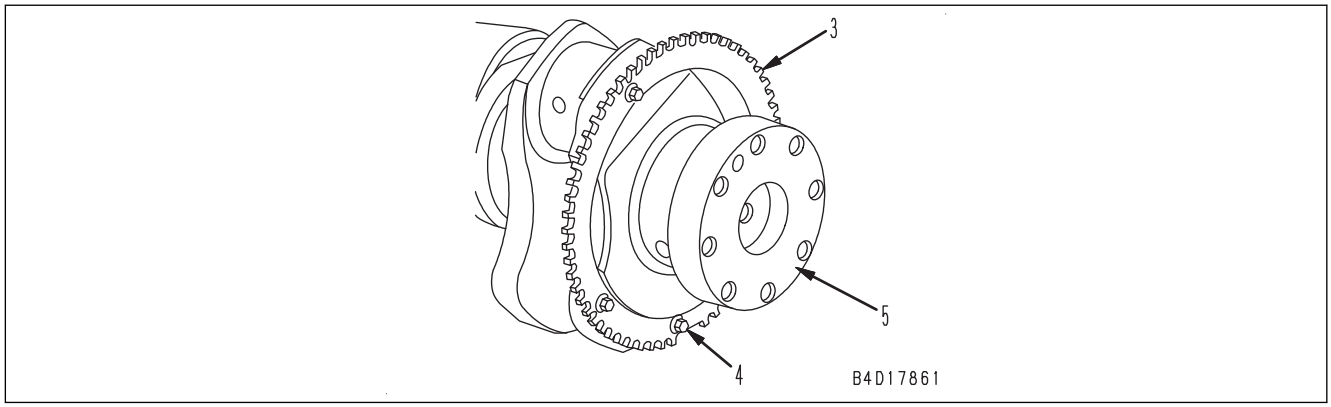
6. Make sure that the mounting bolt (4) of the speed sensing ring (3) of NE speed (crank) sensor is not loosened.

REMARK

- If it is loosened, replace it with a new bolt.
- Tighten the bolts evenly.

Mounting bolt (4) :
8 ± 1 Nm {0.8 ± 0.1 kgfm}

5): Crankshaft



Installation

REMARK

For the figure, see Removal.

1. Face the embossed letter of “BACK” to the rear of cylinder block, and install the main cap (1).

Crankshaft journal face :
Engine oil (EO15W-40)

REMARK

Pound it with a plastic hammer or a rubber hammer to push in.

2. Install the main cap (1) with the mounting bolt (2).

Main cap mounting bolt (1st time) :
50±7 Nm {5.1±0.7 kgfm}

Loosen it by 360 °.

Main cap mounting bolt (2nd time) :
95±6 Nm {9.7±0.6 kgfm}

No.	Cause	Procedure, measuring location, criteria and remarks
3	Defective KDOC (stain, crack, damage on KDOC surface)	⚠ **Perform after KDPF and KDOC cooled down sufficiently.** 1. Remove KDPF. 2. Remove KDOC. 3. Blow air from KDOC outlet and remove stains on ceramic surface inside KDOC. 4. Check if the ceramic inside KDOC has cracks.
		KDOC is defective if any cracks are found in KDOC (change KDOC). **NOTICE** **Perform the following whether or not KDOC is changed:**
4	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 • **Failure codes [CA1691] and [CA2637] are cleared when reset after KDOC change is performed. At this point, a corrective action which is effective when the failure code is displayed and is taken for dozing fuel which is not injected is reset.** • **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.**
5	Defective KDOC (degraded catalyst action of KDOC)	**NOTICE** **Perform if KDOC is not changed:** 1. Turn starting switch to ON position. 2. Take notes on the temperature in initial state and during manual stationary regeneration from the KDOC inlet temperature sensor and the KDPF outlet temperature sensor to check if the KDOC outlet temperature sensor is normal (see Related information). 3. Perform manual stationary regeneration (see Related information). 4. Turn starting switch to OFF position. 5. Start the engine and perform manual stationary regeneration (to check if failure code [CA2637] is displayed).
		NOTICE • **Troubleshooting is complete after making sure that the failure code is cleared.** • **If failure code [CA2637] is displayed after manual stationary regeneration is complete, KDOC is defective (catalyst action of KDOC is degraded. Change KDOC).** • **Perform cause 4 again when KDOC is changed.**

FAILURE CODE [CA1887]

Action level	Failure code	Failure	SCR Outlet NOx Sensor Circuit Error (Engine controller system)
L01	CA1887		
Detail of failure	The engine controller does not receive SCR outlet NOx sensor data due to a communication error with the SCR outlet NOx sensor.		
Action of controller	• Operates at the default NOx value (0 ppm). • Inducement strategy is activated (EU specification).		
Phenomenon on machine	• AdBlue/DEF injection becomes inappropriate. The NOx emission can increase, or ammonia can be discharged. • Engine output is reduced based on Inducement strategy (EU specification).		
Related information	⚠ **SCR assembly, sensor fitting piping, and sensor probe are heated to 400 °C or higher. Be careful not to get burn injury.** ⚠ **For the sensor probe, the sensor itself is hot. Be careful not to get burned even if the things around it are not hot.** • The SCR outlet NOx sensor is a smart sensor which communicates with the engine controller through CAN together with other sensors. • The SCR outlet NOx sensor operates when SCR outlet temperature is 200 °C or above for 70 seconds (70 seconds can be extended to 500 seconds at maximum when the ambient temperature/SCR outlet temperature is low) or more (19210 SCR Outlet NOx Sensor State is “1”). • SCR outlet NOx sensor does not operate when SCR outlet temperature is 200 °C or lower, and correct value is not displayed. (The sensor does not operate by simply turning the starting switch to the ON position even when it is normal.) • On “Pre-defined Monitoring” screen, engine operation state diagnosis, SCR catalyst, NOx sensor, ammonia sensor diagnosis are used. • Troubleshooting for engine operating state 01002 Engine Speed 19200 Exhaust Gas Flow Rate 47300 KDOC Inlet Temperature 19300 SCR Temperature 19302 SCR Outlet Temperature • SCR catalyst, NOx sensor, ammonia sensor diagnosis. 19203 Turbo Outlet NOx Sensor State 19210 SCR Outlet NOx Sensor State 19202 Turbo Outlet Concentration Corrected 19209 SCR Outlet NOx Corrected 19205 NH3 Concentration Corrected 19120 AdBlue/DEF Injection Quantity **NOTICE** **For this failure code, after the cause of failure is found and the repair is done, do a “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure the failure code is cleared.**		

No.	Cause	Procedure, measurement location, criteria and remarks
1	Defective CAN communication system	If failure code [CA2771] is shown, do the troubleshooting for it first.

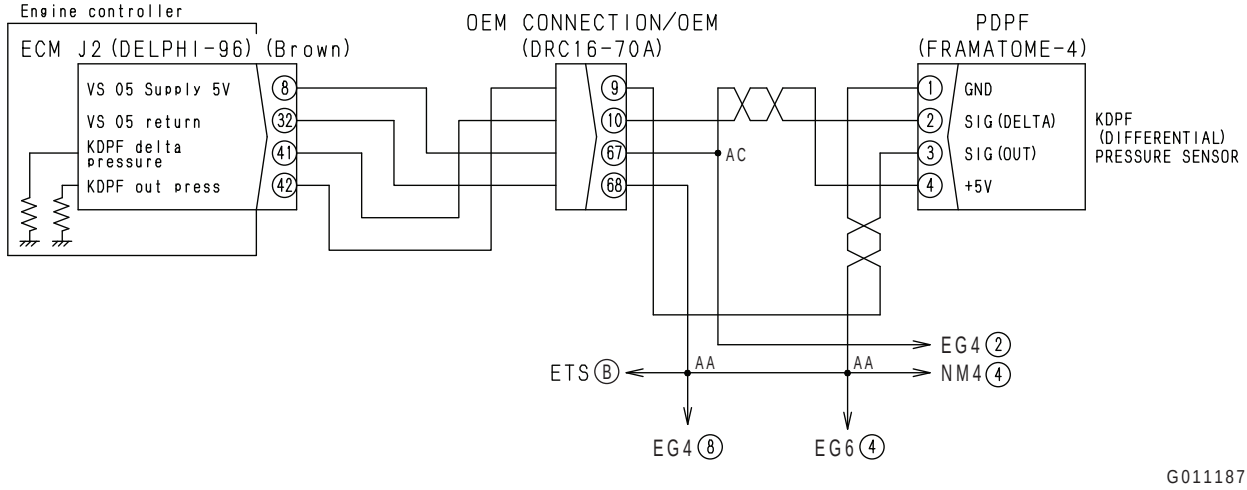
FAILURE CODE [CA2381]

Action level	Failure code	Failure	VGT Position Sensor High Error (Engine controller system)
L03	CA2381		
Detail of failure	High voltage occurs in VGT position sensor signal circuit.		
Action of controller	• Operates the machine with the engine output limited. • Closes EGR valve and fully opens VGT. • Stops regeneration control.		
Phenomenon on machine	Engine output is reduced.		
Related information	• Signal voltage from VGT position sensor can be checked with monitoring function. (Code: 48701 (V)) • Position (mm) detected by VGT position sensor can be checked with monitoring function. (Code: 48700 (mm)) • Engine power deration is canceled by turning the starting switch to the OFF position after this failure code is cleared. (This deration is not canceled by simply failure code being cleared.) • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Turn the starting switch to the ON position.		

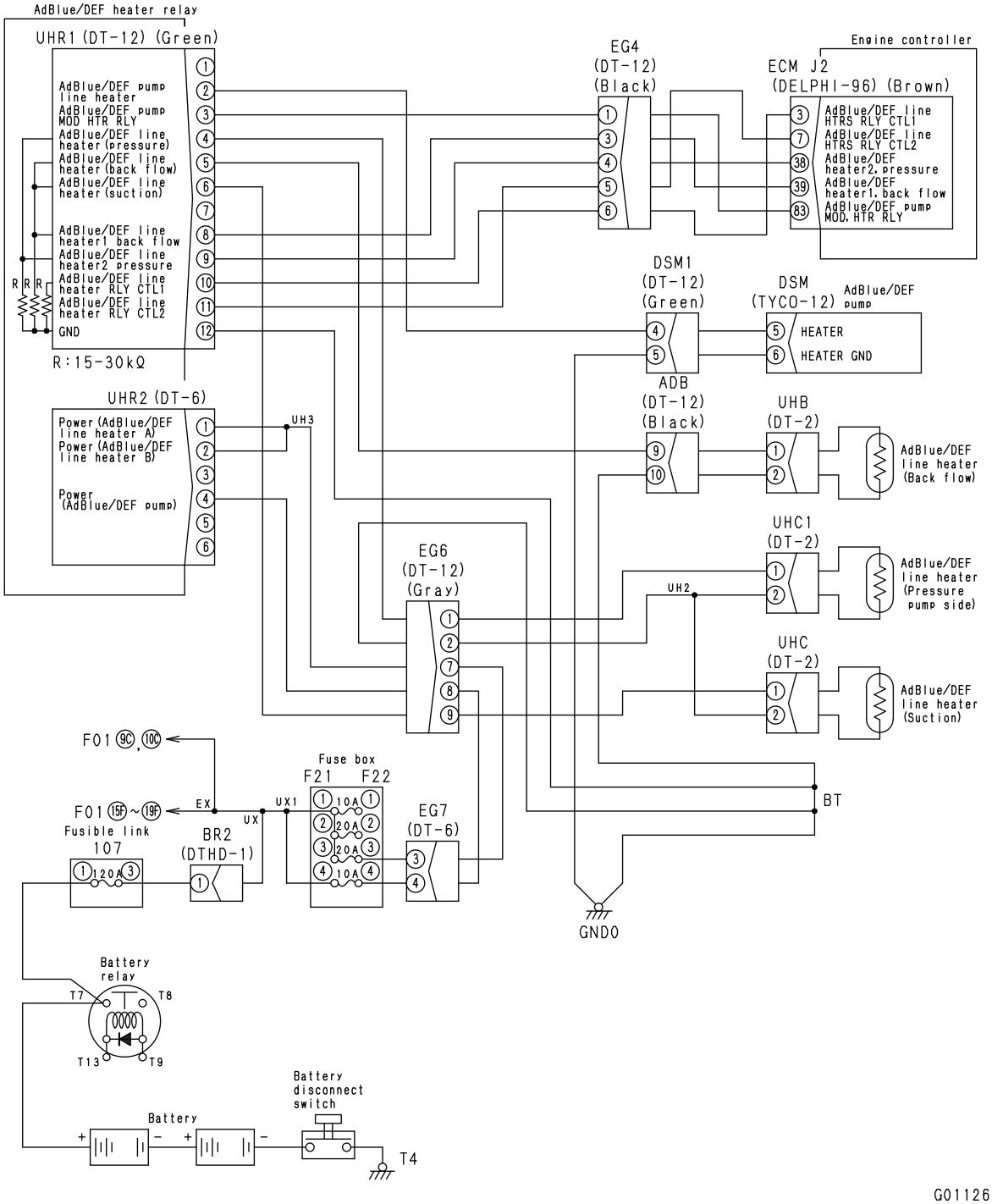
No.	Cause	Procedure, measurement location, criteria and remarks		
1	Defective wiring harness connector	1. Check the wiring harness and connector. For details, see “RELATED INFORMATION ON TROUBLESHOOTING”, “CHECKS BEFORE TROUBLESHOOTING”, “Electrical equipment”. 2. Starting switch: ON		
		If this failure code is cleared, the wiring harness connector is defective.		
2	Defective sensor power supply system	If failure code [CA187] or [CA227] is shown, do the troubleshooting for that code first.		
3	Defective VGT position sensor (internal defect)	1. Starting switch: OFF 2. Disconnect the connector SVGT. 3. Starting switch ON (connector SVGT disconnected)		
		If failure code changes from [CA2381] to [CA2382], the sensor is defective.		
4	Defective connector box (internal short circuit)	1. Starting switch: OFF 2. Disconnect the connector INTER-CONNECT. 3. Starting switch: ON If failure code changes from [CA2381] to [CA2382], the connector box is defective. **REMARK** Ignore other failure codes displayed.		
5	Open circuit in the connector box (open circuit in the GND line or defective contact of connector)	1. Starting switch: OFF 2. Disconnect the connectors INTER-CONNECT and SVGT, and connect the T-adapter to male side of INTER-CONNECT or female side of SVGT.		
		Resistance	Between INTER-CONNECT (male) (9) and SVGT (female) (B)	Max. 10 Ω

No.	Cause	Procedure, measurement location, criteria and remarks		
4	Open circuit in wiring harness (wire breakage in the GND line or defective contact of connector)	If no failure is found by check on cause 2, this check is not required. 1. Starting switch: OFF 2. Disconnect the connectors ECM J2 and PDPF. Connect a T-adapter to each female side.		
		Resistance	Between ECM J2 (female) (32) and PDPF (female) (1)	Max. 10 Ω
5	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connectors ECM J2 and PDPF. Connect a T-adapter to the female side of ECM J2.		
		Continuity	Between ECM J2 (female) (42) and each pin other than pin (42)	No continuity (there is no sound)
6	Hot short circuit in wiring harness (contact with 24V circuit)	1. Starting switch: OFF 2. Disconnect the connector PDPF. 3. Connect a T-adapter to the female side of connector PDPF, or insert a T-adapter into connector ECM J2. 4. Starting switch ON (connector PDPF disconnected)		
		Voltage	Between ECM J2 (female) (42) and (32), or between PDPF (female) (3) and (1)	Max. 1 V
7	Defective engine controller	Starting switch: ON		
		If this failure code is shown and no failure is found by the above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be done.)		

Circuit diagram of KDPF outlet pressure sensor



Circuit diagram of AdBlue/DEF line heater



FAILURE CODE [CA3322]

Action level	Failure code	Failure	KDPF Outlet Temperature Sensor In Range Error (Engine controller system)
L03	CA3322		
Detail of failure	The temperature sensed by KDPF outlet temperature sensor is different from the predicted value. (Signal voltage is in input range.)		
Action of controller	• Uses KDOC outlet temperature for KDPF outlet temperature to run engine. (If failure is sensed in KDOC outlet temperature sensor, too, controller regards the KDPF outlet temperature as the default value (250 °C) and allows engine to run.) • Closes EGR valve. • Operates the machine with the engine output limited. • Stops regeneration control. • Stops fuel dosing. • Shifts to inducement strategy. • Prohibits AdBlue/DEF injection.		
Phenomenon on machine	• Since AdBlue/DEF injection is disabled, the NOx emission increases. • Engine output is reduced. • The engine output is reduced based on inducement strategy.		
Related information	⚠ **The KDPF and KDOC are heated to a temperature of 500 °C or more. Be careful not to get a burn injury.** • The KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor are integrated into one sensor, and controller of integrated sensor communicates with the engine controller through CAN communication. • Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (℃)) • Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (℃)) • Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (℃)) • To access the KDPF temperature sensor, see Chapter 50, DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL KDPF ASSEMBLY” and “DISASSEMBLE AND ASSEMBLE KDPF ASSEMBLY”. • After turning the starting switch to the OFF position, the engine controller purges AdBlue/DEF (for 6 minutes in maximum) and then stops the engine. To restart engine, wait until the system operating lamp goes off after the starting switch was turned to the OFF position. Then turn the starting switch to the ON position. **NOTICE** • **This failure code requires “Loaded Diagnostics Operation To Confirm Failure Correction”. After the cause of the problem is found and the repair is done, do “Loaded Diagnostics Operation To Confirm Failure Correction” to make sure that the failure code is cleared.** • **Engine power deration is canceled when the starting switch is turned to the OFF position after this failure code is cleared. (This deration is not canceled when the failure code is cleared.)**		

No.	Cause	Procedure, measurement location, criteria and remarks
1	Defective KDPF outlet temperature sensor	If failure code [CA3319] or [CA3321] is shown, do the troubleshooting for it.

REMARK

- If this failure code is displayed or active regeneration is started, return to troubleshooting because repair is not completed.
- If active regeneration is started during “Loaded Diagnostics Operation To Confirm Failure Correction”, restart troubleshooting after shutting down the engine controller.
- If active regeneration does not stop, press regeneration disable button to stop active regeneration and then restart troubleshooting.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measurement location, criteria and remarks</th></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective AdBlue/DEF line heater</td><td colspan="3">1. Starting switch: OFF
2. Disconnect the connectors UHB and UHC and connect the T-adapter to each male side.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between UHB (male) (1) and (2)</td><td>5 to 40 Ω</td></tr>
<tr><td>Between UHC (male) (1) and (2)</td><td>5 to 40 Ω</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Hot short circuit in AdBlue/DEF line heater</td><td colspan="3">1. Starting switch: OFF
2. Disconnect the connectors UHB and UHC and connect the T-adapter to each male side.
3. Starting switch: ON</td></tr>
<tr><td rowspan="2">Voltage</td><td>Between UHB (male) (1) and ground</td><td>Max. 3 V</td></tr>
<tr><td>Between UHC (male) (1) and ground</td><td>Max. 3 V</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective AdBlue/DEF heater relay</td><td colspan="3">1. Starting switch: OFF
2. Make sure that the system operating lamp is not lit. Turn the battery disconnect switch to the OFF position.
3. Disconnect the connectors UHR1 and UHR2. Replace the AdBlue/DEF heater relay.
4. Battery disconnect switch: ON
5. Starting switch: ON</td></tr>
<tr><td colspan="3">If this failure code is cleared, the original AdBlue/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 the previous checks, the engine controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)</td></tr>
</table>

FAILURE CODE [CA3933]

Action level	Failure code	Failure	SCR NH3 Sensor Heater Voltage Low Error
L01	CA3933		(Engine controller system)
Detail of failure	The ammonia sensor controller is determined as having heater control under-voltage.		
Action of controller	• Uses AdBlue/DEF injection control without using the ammonia sensor. • Advances to Inducement strategy (EU Specification).		
Phenomenon on machine	• NOx emission may increase or ammonia may be exhausted because AdBlue/DEF injection works inappropriately. • Engine output is reduced based on inducement strategy (EU Specification).		
Related information	⚠ **SCR assembly, 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.** • 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.
3	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. Perform "Loaded Diagnostics Operation To Confirm Failure Correction".
		If the failure code is cleared, the original ammonia sensor controller may be defective.

FAILURE CODE [CA4164]

Action level	Failure code	Failure	SCR Temperature Sensor ECU Voltage High Error (Engine controller system)
L01	CA4164		
Detail of failure	An abnormally high voltage is sensed in the power supply voltage for the SCR temperature sensor controller.		
Action of controller	• Operates the engine based on the last correct values of the SCR temperature and the SCR outlet temperature. • Shifts to inducement strategy. • Prohibits AdBlue/DEF injection.		
Phenomenon on machine	• Detection error of the SCR temperature and the SCR outlet temperature • Since AdBlue/DEF injection is disabled, the NOx emission increases. • The engine output is reduced based on inducement strategy.		
Related information	⚠ **The temperatures of the SCR assembly, sensor fitting piping, and sensor probe become 400 °C or above. Be careful not to get burned.** • The SCR temperature sensor and the SCR outlet temperature sensor communicate with the engine on the CAN through an integrated sensor controller. • For SCR temperature sensor replacement, see DISASSEMBLY AND ASSEMBLY, “REMOVE AND INSTALL SCR TEMPERATURE SENSOR”. • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Starting switch ON		

No.	Cause	Procedure, measurement location, criteria and remarks		
1	Defective wiring harness connector	1. Check the wiring harness and connector. For details, see “RELATED INFORMATION ON TROUBLESHOOTING”, “CHECKS BEFORE TROUBLESHOOTING”, “Electrical equipment”. 2. Starting switch: ON If this failure code is cleared, the wiring harness connector is defective.		
2	High battery voltage	1. Make sure that the system operating lamp is not lit. Turn the battery disconnect switch to the OFF position. 2. Starting switch: OFF 3. Disconnect the connector SSR. Connect a T-adapter to the female side. 4. Battery disconnect switch: ON 5. Starting switch: ON		
		Voltage	Between SSR (female) (1) and (4)	22 to 30 V
			Between SSR (female) (2) and (4)	22 to 30 V
3	Defective SCR temperature sensor (internal defect)	1. Starting switch: OFF 2. Replace SCR temperature sensor. 3. Starting switch: ON If this failure code is not shown, the original SCR temperature sensor is defective. (Since this is an internal defect, troubleshooting cannot be done.)		
4	Defective engine controller	If no failure is found by the previous checks, the engine controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)		

No.	Cause	Procedure, measurement location, criteria and remarks		
4	Open circuit in wiring harness (line heater relay drive signal side)	If no failure is found by the previous checks, this check is not required. 1. Starting switch: OFF 2. Battery disconnect switch: OFF 3. Disconnect the connectors ECM J2 and UHR1. Connect a T-adapter to each female side.		
		Resistance	Between ECM J2 (female) (7) and UHR1 (female) (11)	Max. 10 Ω
5	Ground fault in wiring harness (contact with ground circuit)	1. Starting switch: OFF 2. Battery disconnect switch: OFF 3. Disconnect the connectors ECM J2 and UHR1. Connect a T-adapter to one of them on the female side.		
		Resistance	Between ground and ECM J2 (female) (7) or UHR1 (female) (11)	Min. 100 kΩ
6	Short circuit in wiring harness	1. Starting switch: OFF 2. Battery disconnect switch: OFF 3. Disconnect the connectors ECM J2 and UHR1. Connect a T-adapter to the female side of ECM J2.		
		Continuity	Between ECM J2 (female) (7) and each pin other than pin (7)	No continuity
7	Defective AdBlue/DEF heater relay	1. Starting switch: OFF 2. Make sure that the system operating lamp is not lit. Turn the battery disconnect switch to the OFF position. 3. Disconnect the connectors UHR1 and UHR2. Replace the AdBlue/DEF heater relay. 4. Battery disconnect switch: ON 5. Starting switch: ON		
		If this failure code is cleared, the original AdBlue/DEF heater relay is defective.		
8	Defective engine controller	If no failure is found by the previous checks, the engine controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)		

FAILURE CODE [D811MC]

Action level	Failure code	Failure	KOMTRAX Malfunction (Gateway function controller system)
-	D811MC		
Detail of failure	Gateway Function Controller Malfunction		
Operation of controller	None		
Phenomenon on machine	KOMTRAX system does not operate normally		
Related information	After the repair is completed, do the operation explained below to make sure that the failure code is not shown. Procedure: Starting switch ON		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Gateway Function Controller Malfunction	Gateway function controller is defective. (The troubleshooting cannot be done because this is an internal defect.)

FAILURE CODE [DAJ6KK]

Action level	Failure code	Failure	HST Controller: Sensor Volt 5V (1) Out of Normal Range (HST controller system)
L03	DAJ6KK		
Detail of failure	• Voltage of 5V power supply 1 circuit for HST controller sensors is 4.5 V and below or 5.5 V and above. • Abnormal current flows in 5V power supply 1 circuit for HST controller sensors.		
Action of controller	• Stops the output of the 5V power supply 1 circuit • Stops the travel. • Stops the deviation control.		
Phenomenon on machine	• Machine does not travel straight. • After you stop, engine speed is limited to 50 %. • After you stop, the selectable speed range is limited to 2nd speed.		
Related information	After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Starting switch ON		

No.	Cause	Procedure, measurement location, criteria and remarks		
1	R.H. motor speed sensor or L.H. motor speed sensor is defective (internal defect)	1. Starting switch: OFF 2. Disconnect the following connectors one by one, and turn the starting switch to the ON position each time. 3. When troubleshooting is done, go back to step 1. **REMARK** • If this failure code is cleared, the disconnected sensor or device is defective. • Many other failure codes are displayed at the same time. This happens because the connector is disconnected. So ignore other codes besides this failure code [DAJ6KK].		
		Connector	R.H. motor speed sensor	RRS2
			L.H. motor speed sensor	LRS2
2	Defective HST controller	1. Starting switch: OFF 2. Disconnect the connector PT2. Connect a T-adapter to the male side. 3. Starting switch: ON		
		Voltage	Between PT2 (male) (1) and (39)	4.5 to 5.5 V
3	Ground fault in wiring harness (contact with ground circuit)	1. Starting switch: OFF 2. Disconnect the connectors PT2, RRS2 and LRS2, and connect the T-adapter to any female side.		
		Resistance	Between ground and PT2 (female) (1), RRS2 (female) (A) or LRS2 (female) (A)	Min. 1 MΩ
4	Hot short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connectors RRS2 and LRS2. Connect a T-adapter to one of them on the female side. 3. Starting switch: ON		
		Voltage	Between RRS2 (female) (A) and (B), or between LRS2 (female) (A) and (B)	4.5 to 5.5 V

FAILURE CODE [DB9QKR]

Action level	Failure code	Failure	Defective CAN 2 Communication (W/E controller) (Machine monitor system)
L03	DB9QKR		
Detail of failure	Machine monitor does not recognize the work equipment controller through CAN communication 2 line (KOMNET/c).		
Action of controller	None		
Phenomenon on machine	None		
Related information	• After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Starting switch ON • Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. • 3 different failure codes, [DAJQKR], [DB2QKR] and [D8AQKR], are used for defective CAN communication by CAN 2, which are detected by machine monitor. When all of these 3 failure codes are displayed, ground fault, short circuit or hot short circuit in wiring harness (CAN communication line) is suspected. • Because each controller and machine monitor is connected directly to the battery, the power is supplied even after the starting switch is turned to the OFF position. • Because the signal of active CAN communication line is pulse voltage, it cannot be measured with multimeter.		

No.	Cause	Procedure, measurement location, criteria and remarks
1	Defective power supply to the work equipment controller	Do the troubleshooting for failure code [DB91KK].
2	Defective CAN communication 2 system	Perform the checks on causes 4 to 9 in troubleshooting for failure code [DB2QKR].
3	Defective work equipment controller	If no failure is found by the previous checks, the work equipment controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)
4	Defective machine monitor	If no failure is found by the previous check, the machine monitor is defective. (Because this is an internal defect, troubleshooting cannot be done.)

FAILURE CODE [DDKGL4]

Action level	Failure code	Failure	Right Angle SW Signal Mismatch (Work equipment controller system)
L01	DDKGL4		
Detail of failure	Signals of the 2 NO (Normally Open) lines of SW1 and SW2 in the angle RIGHT lever circuit disagree with each other.		
Action of controller	Recognizes that the angle RIGHT lever is not pressed.		
Phenomenon on machine	Angle RIGHT operation of the work equipment is disabled.		
Related information	• The signal state of the angle RIGHT lever can be checked with monitoring function. (Code: 70306) • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Turn the starting switch to the ON position, and operate the lever to angle RIGHT direction. • When the angle RIGHT lever is FREE, SW1 and SW2 of angle RIGHT lever are both OPEN (illustration shows FREE state).		

No.	Cause	Procedure, measurement location, criteria and remarks			
1	Defective angle RIGHT switch (wiring harness) (internal open circuit)	1. Starting switch: OFF 2. Disconnect the connector BNSW. Connect a T-adapter to the male side. 3. Operate the work equipment control lever to the angle RIGHT direction to troubleshoot.			
		Resistance	Between BNSW (male) (7) and (9)	Free	Min. 1 MΩ
				Angle RIGHT	Max. 1 Ω
			Between BNSW (male) (8) and (9)	Free	Min. 1 MΩ
				Angle RIGHT	Max. 1 Ω
2	Open circuit or hot short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connector BNSW. Connect a T-adapter to the female side. 3. Starting switch: ON **REMARK** • If voltage is 0 V, wiring harness has an open circuit. If it is 24 V, wiring harness has a hot short circuit. • In work equipment controller, approximately 9 V of voltage is applied to 2-line signal line of NO via resistance.			
		Voltage	Between BNSW (female) (7) and (9)		7 to 11 V
			Between BNSW (female) (8) and (9)		7 to 11 V
3	Open circuit in wiring harness (wire breakage or defective contact)	If no failure is found by check on cause 2, this check is not required. 1. Starting switch: OFF 2. Disconnect the connectors WE1, WE2 and BNSW. Connect a T-adapter to each female side.			
		Resistance	Between WE1 (female) (10) and BNSW (female) (9)		Max. 1 Ω
			Between WE2 (female) (13) and BNSW (female) (7)		Max. 1 Ω
			Between WE2 (female) (7) and BNSW (female) (8)		Max. 1 Ω

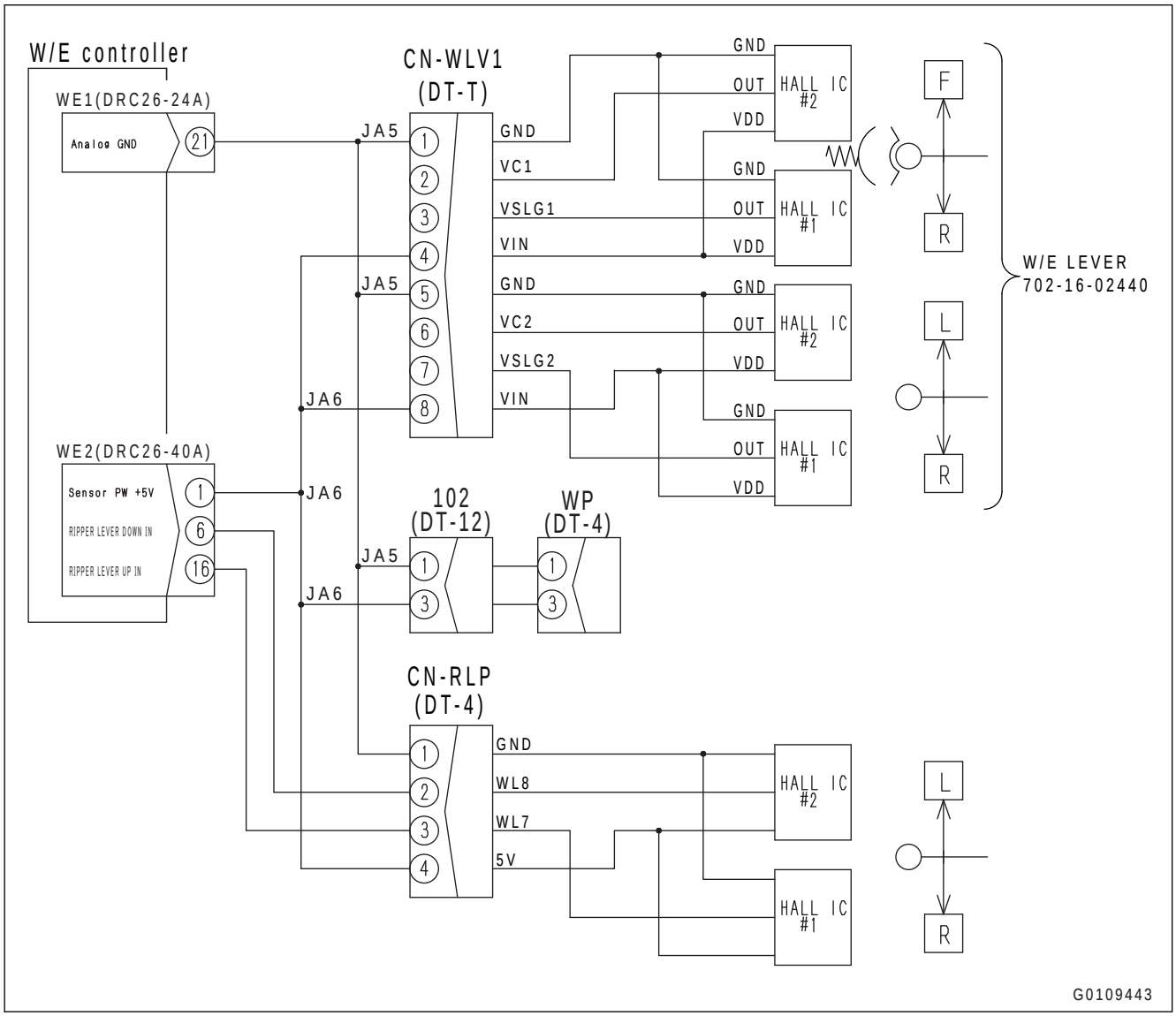
FAILURE CODE [DFA4KZ]

Action level	Failure code	Failure	Blade Lift Lever Potentiometer 1 and 2 Open Circuit or Hot Short Circuit (HST controller system)
L01	DFA4KZ		
Detail of failure	In blade lift lever potentiometer 1 and 2 systems, only one side is abnormal when starting switch is in ON position, and then either failure code [DFA5KA] or [DFA5KB] is displayed with either failure code [DFA6KA] or [DFA6KB] at the same time.		
Action of controller	Recognizes that blade lift lever is in NEUTRAL.		
Phenomenon on machine	Blade lift control is disabled.		
Related information	• Signal state of blade lift lever potentiometer can be checked with monitoring function. (Code: 73400), (Code: 73401) • 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 the blade control lever (lift direction).		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Blade lift potentiometer malfunction	Perform troubleshooting for failure codes [DFA5KA], [DFA5KB], [DFA6KA], and [DFA6KB].

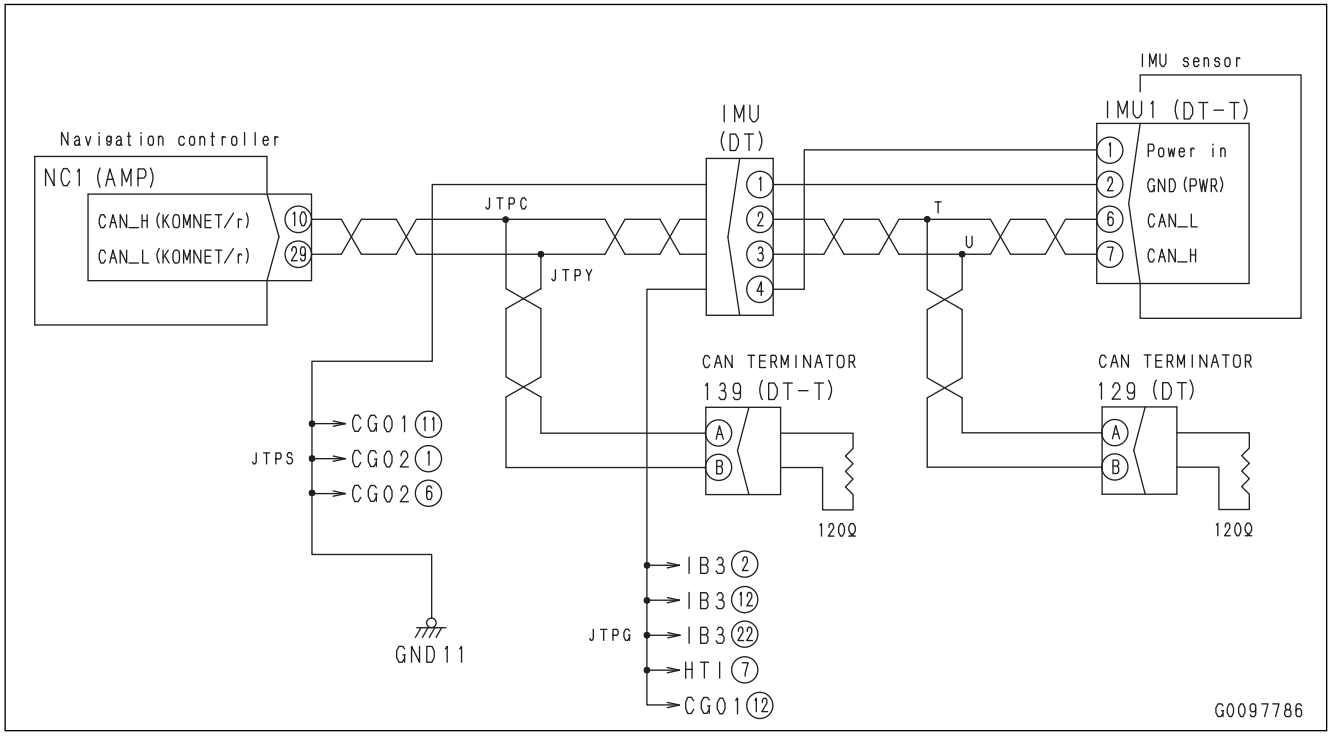
No.	Cause	Procedure, measurement location, criteria and remarks		
5	Defective work equipment controller	If no failure is found by the previous checks, the work equipment controller is defective. • Reference 1. Starting switch: OFF 2. Insert a T-adapter into the connector WE2. 3. Starting switch: ON 4. Operate the ripper control lever (in lift direction) to do the troubleshooting.		
		Voltage	Between WE2 (1) and WE1 (21)	0.96 to 4.04 V

Circuit diagram of ripper lift lever potentiometer



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measurement location, criteria and remarks</th></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Open circuit (wire breakage or defective contact of connector) in wiring harness</td><td colspan="3">1. Starting switch: OFF
2. Disconnect the connectors PT1 and EL. Connect the T-adapter to each female side.</td></tr>
<tr><td rowspan="3">Resistance</td><td>If the power supply voltage on cause 1 is correct, this check is not required.
Between PT1 (female) (22) and EL (female) (5)</td><td>Max. 1 Ω</td></tr>
<tr><td>If the power supply voltage on cause 1 is correct, this check is not required.
Between PT1 (female) (4) and EL (female) (8)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between PT1 (female) (2) and EL (female) (7)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="3">If no failure is found by check on cause 2, this check is not required.
1. Starting switch: OFF
2. Disconnect the connector PT1 and EL, and connect the T-adapter to one of them on the female side.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between PT1 (female) (2) and (4) or between EL (female) (7) and (8)</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and PT1 (female) (2) or EL (female) (7)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Defective HST controller</td><td colspan="3">If no failure is found by preceding checks, HST controller is defective.
Reference
1. Starting switch: OFF
2. Insert a T-adapter into the connector PT1.
3. Starting switch: ON
4. Operate the joystick (steering, directional and gear shift lever) to perform troubleshooting.</td></tr>
<tr><td>Voltage</td><td>Between PT1 (2) and (4)</td><td>0.5 to 4.5 V</td></tr>
</table>

Circuit diagram of IMU sensor power supply

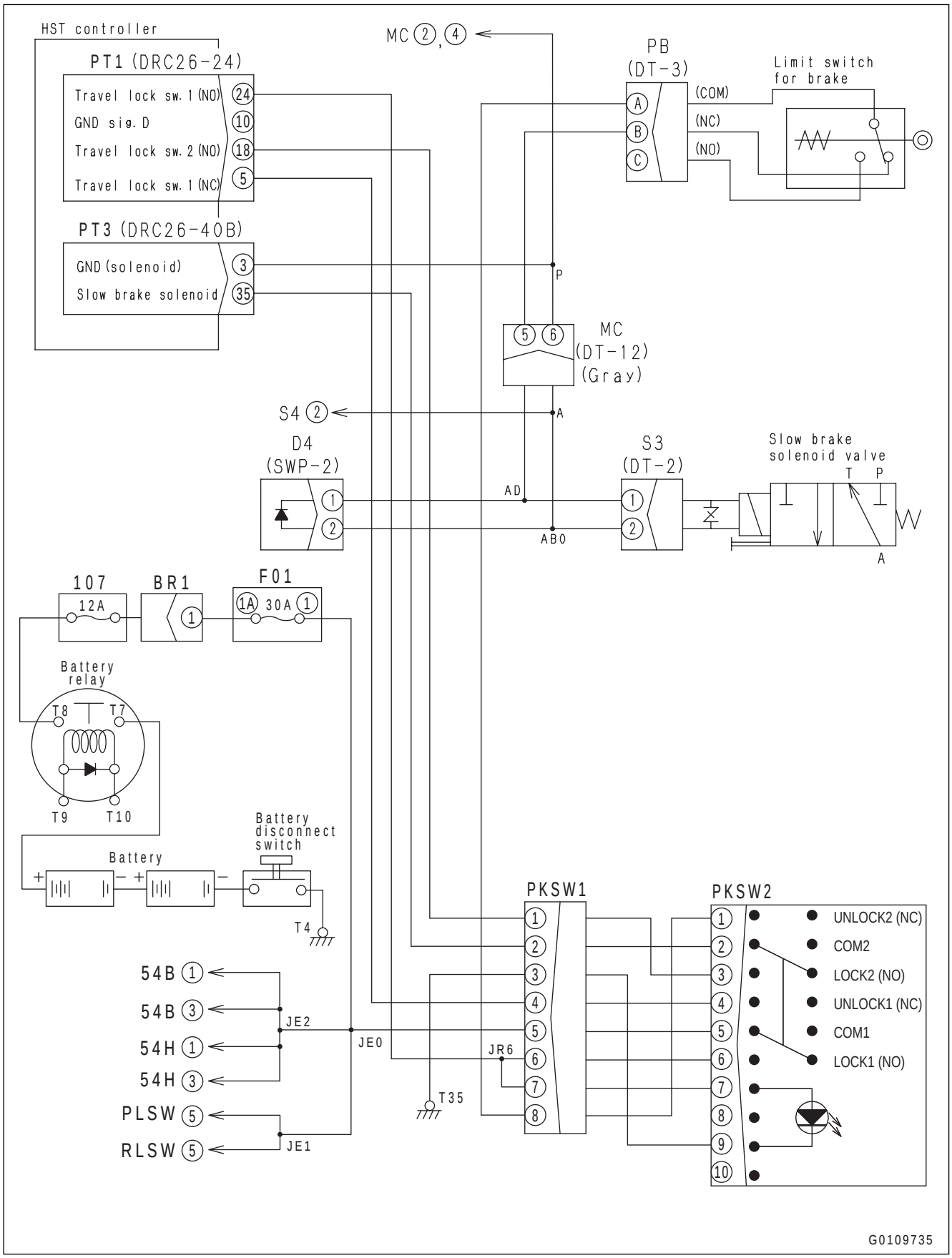


FAILURE CODE [DKSFMB]

Action level	Failure code	Failure	Angle LEFT Cylinder Stroke Reset Sensor Mismatch Error (ICT Sensor Controller System)
-	DKSFMB		
Detail of failure	Blade angle cylinder moved for more than a certain distance without the stroke end reset performed.		
Action of controller	None in particular		
Phenomenon on machine	• Pop-up command of “Perform cylinder reset! Move angle cylinder to stroke end. Keep that state for 2 seconds.” is displayed on the control box. • Finishing accuracy of the blade automatic control may be decreased.		
Related information	• After completion of repair work, check the following operation. Procedure: Perform the stroke end reset of angle. The pop-up command of “Cylinder Sensor Reset Request!” disappears. • Device name of “blade angle cylinder stroke sensor” is displayed on the machine monitor with failure code. It is described as “stroke and reset sensor for blade angle cylinder” in the table of troubleshooting and other chapter.		

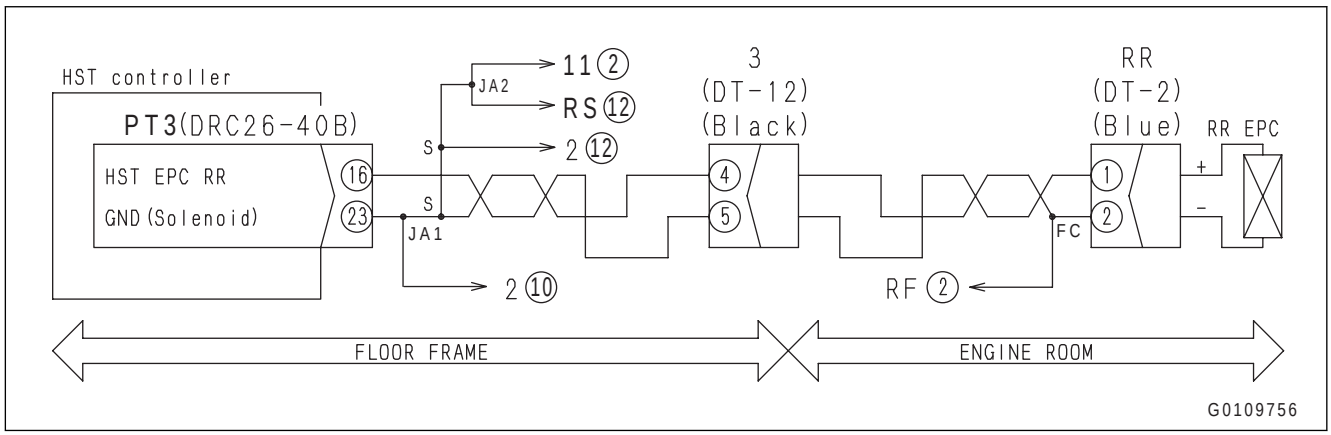
No.	Cause	Procedure, measuring location, criteria and remarks
1	The machine is used in a manner that the stroke and reset sensor for angle cylinder detects nothing.	If the machine is operated in a manner that angle cylinder does not pass the position of stroke and reset sensor for angle cylinder (approx. 240 mm position of angle cylinder stroke), this failure code may be displayed. In this case, perform stroke end reset of angle. If pop-up command of “Perform cylinder reset! Move angle cylinder to stroke end. Keep that state for 2 seconds.” disappears, no other action is required.

Circuit diagram of slow brake solenoid

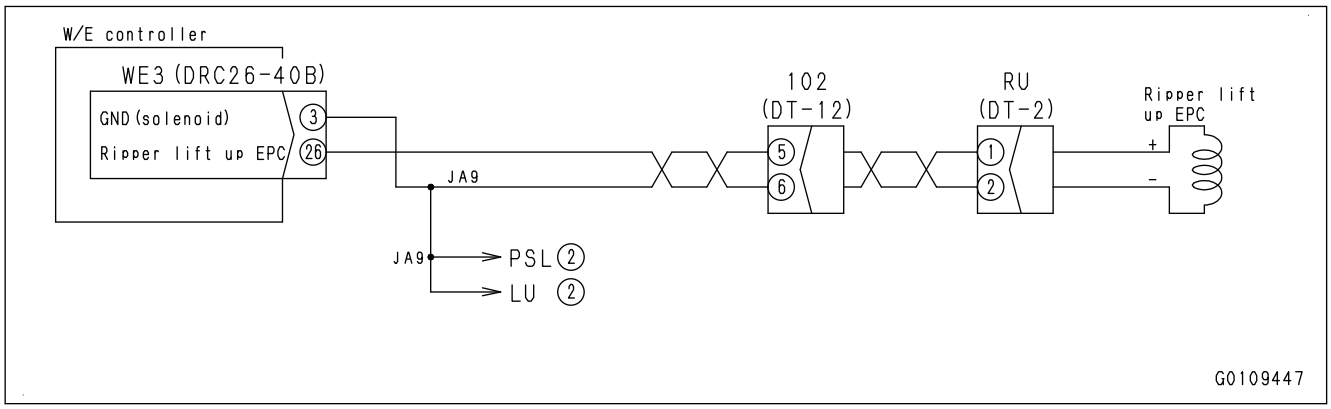


No.	Cause	Procedure, measurement location, criteria and remarks
5	Defective HST controller	If no failure is found by the checks above, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be done.)

Circuit diagram of RR HST pump EPC



Circuit diagram of ripper RAISE EPC solenoid



FAILURE CODE [DXK1KY]

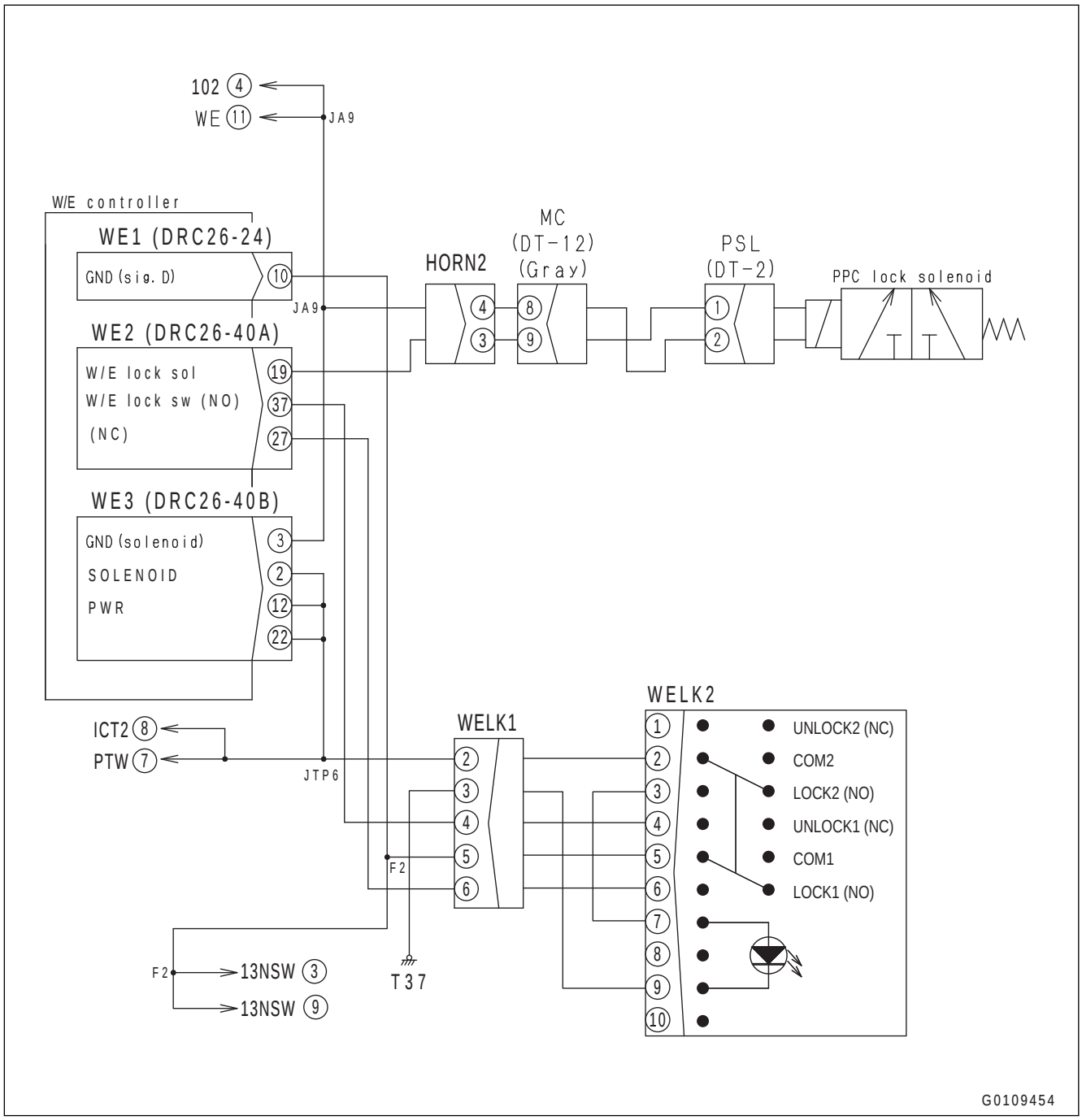
Action level	Failure code	Failure	Left HST Motor EPC Hot Short Circuit (HST controller system)
L04	DXK1KY		
Detail of failure	When the controller stops driving the L.H. HST motor EPC solenoid valve circuit, abnormal current flows through the circuit.		
Action of controller	• Partly restricts the function. • Even if the cause of the failure no longer exists, the machine does not become normal until the starting switch is turned to the OFF position one time.		
Phenomenon on machine	• While traveling, only the travel speed of left track becomes fast. • When you temporarily stop the machine, engine speed is limited to medium (half) speed. • If the machine stops once, it cannot move off again.		
Related information	• Output current of L.H. HST motor EPC solenoid valve can be checked with monitoring function. (Code: 52304) • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Starting switch ON		

No.	Cause	Procedure, measurement location, criteria and remarks		
1	Hot short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connector LME. Connect a T-adapter to the female side. 3. Starting switch: ON		
		Voltage	Between LME (female) (1) and (2)	Max. 4.5 V
2	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the connectors PT3 and LME, and connect the T-adapter to female side of PT3. **REMARK** Do the check with multimeter in continuity mode.		
		Continuity	Between PT3 (female) (26) and each pin other than (26)	No continuity (No sound is heard.)
		1. Starting switch: OFF 2. Disconnect the connectors PT3, MC and LME. Connect a T-adapter to either female side or male side of MC. **REMARK** Do the check with multimeter in continuity mode.		
		Continuity	Between MC (female) (3) and each pin other than (3)	No continuity (No sound is heard.)
			Between MC (male) (3) and each pin other than (3)	No continuity (No sound is heard.)

No.	Cause	Procedure, measurement location, criteria and remarks		
23	Blow-out of fuse circuit	If the fuse and fusible link is blown out, replace them. 1. Starting switch: OFF 2. Disconnect the connectors KEY, 11, PLR, CM01, 4, D1 and D2. 3. Connect a T-adapter to each female side of KEY, 11, PLR, CM01, 4, D1 and D2. 4. Remove the fuse No.5 in fuse box F01.		
		Resistance	Between KEY (female) (3) and 11 (female) (3)	Max. 1 Ω
			Between 11 (female) (5) and PLR (female) (3)	Max. 1 Ω
			Between PLR (female) (1) and F01-5	Max. 1 Ω
			Between PLR (female) (2) and CM01 (female) (6)	Max. 1 Ω
			Between PLR (female) (6) and 4 (female) (1)	Max. 1 Ω
			Between alternator terminal B and starting motor B	Max. 1 Ω
			Between starting motor B and battery relay T8	Max. 1 Ω
			Between alternator T16 (terminal R) and 4 (female) (2)	Max. 1 Ω
			Between alternator T16 and D2 (female) (2)	Max. 1 Ω
24	Defective battery relay (not turned ON)	If voltage of T8 terminal only is unusual in battery relay checks on cause 22, battery relay is defective.		
25	Ground fault 2 in wiring harness (contact with GND circuit)	1. Starting switch: OFF 2. Disconnect the connectors KEY, 11, PLR, 4, CM01, ST1, CK02. 3. Connect a T-adapter to each female side of KEY, 11, PLR, and 4. 4. Remove the fuse No.5 in fuse box F01.		
		Resistance	Between ground and KEY (female) (3) or 11 (female) (3)	Min. 1 MΩ
			Between ground and 11 (female) (5) or PLR (female) (3)	Min. 1 MΩ
			Between ground and PLR (female) (6) or 4 (female) (1)	Min. 1 MΩ
			Between PLR (female) (2) and ground	Min. 1 MΩ
26	Hot short circuit in wiring harness	1. Starting switch: OFF 2. Starting switch: ON		
		Voltage	Between T16 terminal and ground	Max. 1 V

No.	Cause	Procedure, measurement location, criteria and remarks		
6	Ground fault in wiring harness (contact with ground circuit)	If no failure is found by check on cause 4, this check is not required. 1. Starting switch: OFF 2. Disconnect the connectors PSL, WE2, WE3, WELK2, and connect the T-adapter to female side of PSL and WELK2.		
		Resistance	Between PSL (female) (1) and ground	Min. 1 MΩ
			Between WELK2 (female) (6) and ground	Min. 1 MΩ
			Between WELK2 (female) (4) and ground	Min. 1 MΩ

Circuit diagram of work equipment lock switch



No.	Cause	Procedure, measuring location, criteria and remarks		
11	Open circuit in ground wiring harness of R.H. wiper switch	1. Turn the starting switch to OFF position. 2. Disconnect connector CB13 and connect T-adapter to female side.		
		Resistance	Between CB13 (female) (2) and ground	Max. 1 Ω
12	Open circuit in wiring harness of wiper motor	1. Turn the starting switch to OFF position. 2. Disconnect connector CB17 and connect T-adapter to female side. 3. Turn the starting switch to ON position.		
		Voltage	Between CB17 (4) and (1)	20 to 30 V
		1. Turn the starting switch to OFF position. 2. Remove fuse No.6 in fuse box FUSE (in cab). 3. Disconnect connector CB17 and connect T-adapter to female side.		
		Resistance	If no failure is found by check on wiper motor power, this check is not required. Between CB17 (female) (4) and FUSE-6	Max. 1 Ω
			If no failure is found by check on wiper motor power, this check is not required. Between CB17 (female) (1) and ground	Max. 1 Ω
			Between CB17 (female) (2) and (3)	Max. 1 Ω
13	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect connectors CB11, CB13, CB15, CB17, CB24, and CB27, and connect T-adapter to each female side.		
		Resistance	Between CB17 (female) (2) and ground	Min. 1 MΩ
			Between CB17 (female) (3) and ground	Min. 1 MΩ
			Between ground and FUSE-6 or CB17 (female) (4)	Min. 1 MΩ
			Between CB11 (female) (3) and ground	Min. 1 MΩ
			Between CB11 (female) (6) and ground	Min. 1 MΩ
14	Defective right door wiper motor (failure in stop position detection)	If no failure is found by preceding checks, right door wiper motor is defective. Reference 1. Turn the starting switch to OFF position. 2. Insert T-adapter into connector CB17. 3. Turn the starting switch to ON position. 4. Turn on right door wiper switch. **REMARK** Voltage is applied when operating windshield wiper (GND at wiper stop position and during wiper intermittent).		
		Voltage	Between CB17 (2) and (1)	20 to 30 V
			Between CB17 (3) and (1)	20 to 30 V

E-63 CONTROL BOX TOUCH PANEL IS INACCURATE

Failure	Touch panel coordinates of control box does not match.
Related information	

No.	Cause	Procedure, measurement location, criteria and remarks
1	Touch panel coordinates misaligned	1. On the control box screen, push the Power/menu switch to show the main menu → push “File” → “Exit 3DMC” to complete the 3DMC. 2. Do the touch panel calibration.
2	Defective control box	If no failure is found by previous checks, control box is defective. (Because this is an internal defect, troubleshooting cannot be done.)

H-3 R.H. OR L.H. TRACK CANNOT TRAVEL FORWARD OR REVERSE (ONLY ONE OF THE TRAVEL SYSTEMS CANNOT OPERATE IN ONE DIRECTION)

Failure	R.H. or L.H. track cannot travel FORWARD or REVERSE (only one of the travel systems cannot operate in one direction).

Related information	• If failure code is shown, do the troubleshooting for that failure code first.
	[DXA4KA], [DXA4KB]: If machine is traveling forward, HST brake is applied without modulation, and the machine stops suddenly.
	After that, the machine can only travel in reverse (left front pump becomes N).
	[DXA5KA], [DXA5KB]: If machine is traveling in reverse, HST brake is applied without modulation, and the machine stops suddenly.
	After that, the machine can only travel forward (left rear pump becomes N).
	[DXA6KA], [DXA6KB]: If machine is traveling forward, HST brake is applied without modulation, and the machine stops suddenly.
	After that, the machine can only travel in reverse (right front pump becomes N).
	[DXA7KA], [DXA7KB]: If machine is traveling in reverse, HST brake is applied without modulation, and the machine stops suddenly.
	After that, the machine can only travel forward (right rear pump becomes N).
	• If the machine is disabled to travel immediately after the adjustment of HST pump, the adjustment of HST pump is probably defective. Select the applicable items of the adjustment menu on the machine monitor again, and adjust the HST pump.
	  • At idle turn of track (“HST pump forward adjustment”, “HST pump reverse adjustment”)
	  • At self-propelled travel (Adjustment ID: 3423 HST pump forward adjustment and self-propelled travel 1, 3424 HST pump reverse adjustment and self-propelled travel 1, 3425 HST pump forward adjustment and self-propelled travel 2, 3426 HST pump reverse adjustment and self-propelled travel 2)
	• Command value of HST pump capacity and EPC output current of HST pump can be checked with monitoring function.

	Capacity command value	EPC output current	
RF (Right Forward)	52404	52408	RF PUMP
LF (Left Forward)	52405	52409	LF PUMP
RR (Right Reverse)	52406	52410	RR PUMP
LR (Left Reverse)	52407	52411	LR PUMP

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measurement location, criteria and remarks</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of HST pump (suction safety valve)</td><td colspan="4">Be prepared with the starting switch in the ON position. Do the troubleshooting while the engine runs at high idle.
Set the machine monitor to ADJUSTMENT MENU, “Stall Pressure Test Mode”</td></tr>
<tr><td rowspan="2">HST main circuit oil pressure</td><td rowspan="2">Joystick (steering, directional, and gear shift lever)</td><td>NEUTRAL</td><td>3.0 to 3.6 MPa {30 to 37 kgf/cm^2}</td></tr>
<tr><td>At FORWARD or REVERSE</td><td>39.2 to 45.1 MPa {400 to 460 kgf/cm^2}</td></tr>
<tr><td colspan="4">If the above oil pressure is low, check that the suction valve is not stuck (left open).</td></tr>
</table>

S-3 FUEL IS BEING INJECTED BUT ENGINE DOES NOT START (MISFIRING: ENGINE CRANKS BUT DOES NOT START)

Failure	Fuel is being injected but engine does not start (misfiring: engine cranks but does not start).
Related information	If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Defective battery	Gravity of electrolyte and voltage of battery are low.	Filling of battery electrolyte
2	Fuel level is low.	If fuel tank is checked, it is empty.	Refueling
3	Clogging fuel tank cap air bleeding hole	Fuel tank cap air bleeding hole is clogged.	Flush air breather hole in fuel tank cap surrounding area.
4	Clogged fuel filter element	Check used hours of fuel filter element. If it is used over specified time, fuel filter element may be clogged.	Fuel filter element replacement
5	Foreign materials are mixed into fuel.	If drain fuel from fuel tank, rust or water comes out.	Fuel replacement
6	Air mixed in fuel piping system	When performing bleeding air from the fuel system, air comes out. (For details, see Testing and adjusting, “Bleeding air from fuel system”).	• Perform air bleeding operation • Correct or replace fuel piping
7	Leakage from fuel piping system	Fuel leaks from fuel piping. (For details, see Testing and adjusting, “Test fuel circuit for leakage”).	Correct or replace fuel piping related parts
8	Fuel leakage at Injector and inlet connector	Return rate from injector is high. (See TESTING AND ADJUSTING, “METHOD FOR TESTING FUEL DISCHARGE, RETURN AND LEAKAGE”)	Tighten or replace inlet connector
9	Seizure of check valve of cooling plate	Seizure of check valve	Clean or replace check valve
10	Defective fuel feed pump	No fuel from fuel feed pump	Replace the fuel feed pump or fuel feed pump switch.
11	Clogged air cleaner element	Air cleaner dust indicator is at caution level.	Air cleaner element check and cleaning
12	Defective intake air heater	• Installation part of intake air heater is not warmed during preheat operation. • Engine preheating monitor does not operate normally during preheat operation or when it is low temperature.	Intake air heater replacement
13	Worn valve, rocker arm, etc.	• Check valve clearance (Reference: See Testing and adjusting, “Testing and adjusting valve clearance”). • When engine is operated, unusual noise is heard from around cylinder head.	Valve or rocker arm replacement
14	Defective piston ring	Check compression pressure (Reference: See “TESTING AND ADJUSTING”, “Testing compression pressure”).	Piston ring and piston replacement

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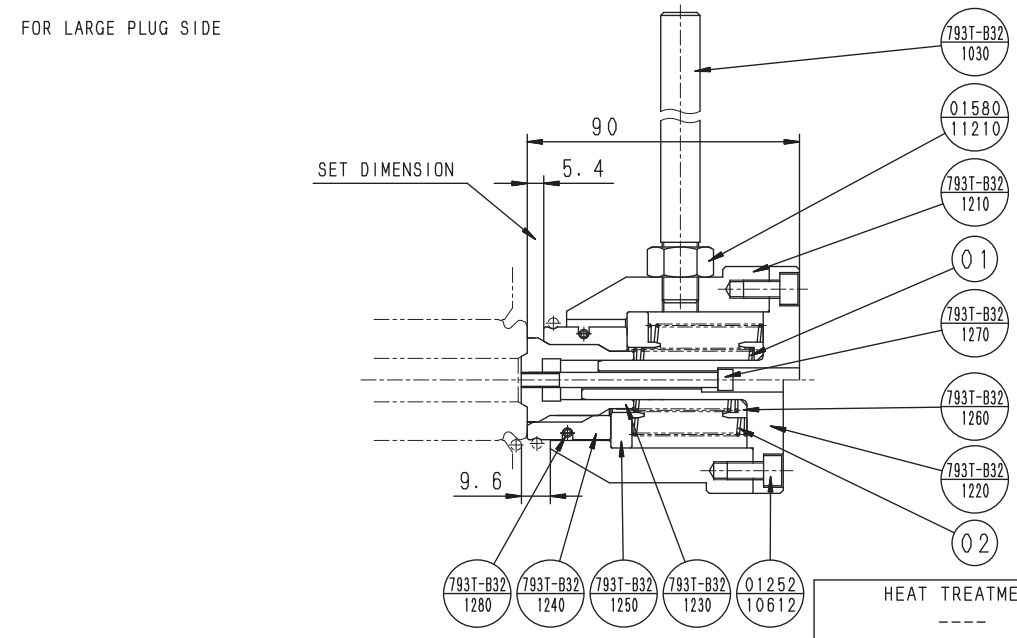
793T-B32–1200: Push tool assembly

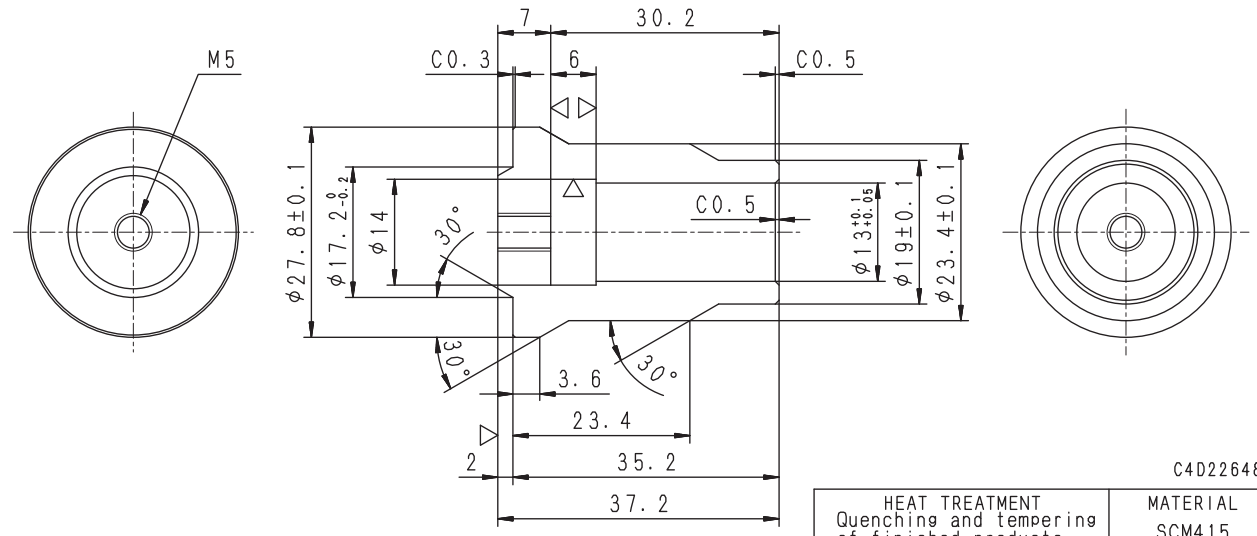


C4D22647

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
01	SPRING	SWOSC-V	1	-	SWR37-45 (MISUMI)
02	SPRING	SWOSC-V	1	-	SWR21-50 (MISUMI)

HEAT TREATMENT	MATERIAL
----	SCM435H
PART NAME	Q'TY
PUSH TOOL ASSEMBLY	1
793T-B32-1200 △	

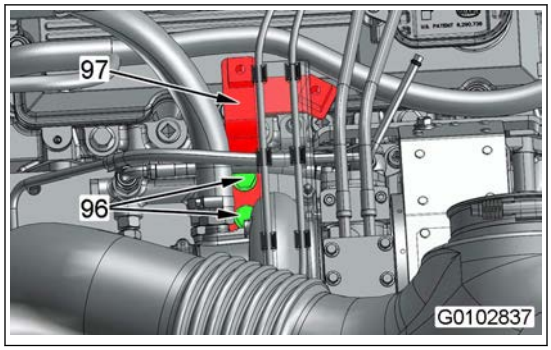
793T-B32–1230: Adapter



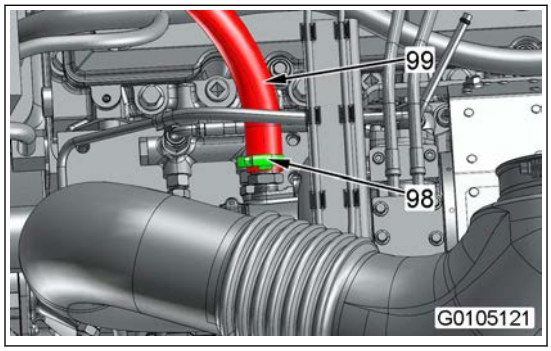
C4D22648

HEAT TREATMENT Quenching and tempering of finished products	MATERIAL
	SCM415
PART NAME	Q'TY
ADAPTER	1
793T-B32-1230 △	

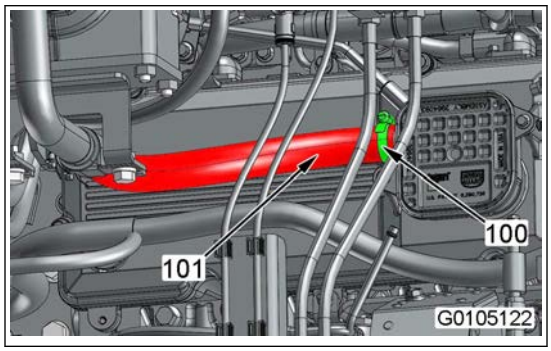
19. Remove the 2 bolts (96), and remove the bracket (97).
    Tool: Ratchet handle, socket
    Bolt (96): Width across flats 17mm, M10



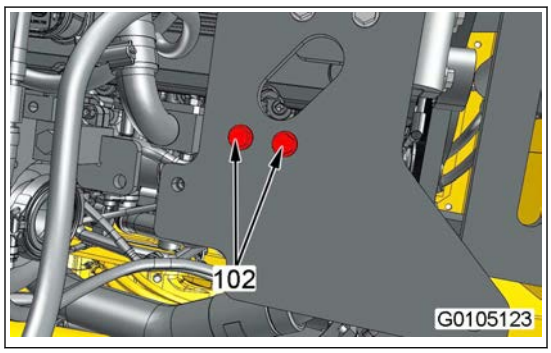
20. Remove the clamp (98), and disconnect the hose (99).
    Tool: Ratchet handle, socket
    Clamp (98): Width across flats 6mm



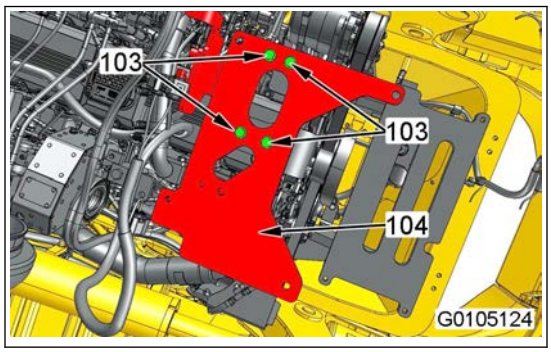
21. Remove the clamp (100), and disconnect the hose (101).
    Tool: Ratchet handle, socket
    Clamp (100): Width across flats 6mm



22. Remove the 2 bolts (102).
    Tool: Ratchet handle, socket
    Bolt (102): Width across flats 19mm, M12



23. Remove the 4 bolts (103), and remove the bracket (104).
    Tool: Ratchet handle, socket
    Bolt (103): Width across flats 19mm, M12



Rocker arm, crosshead

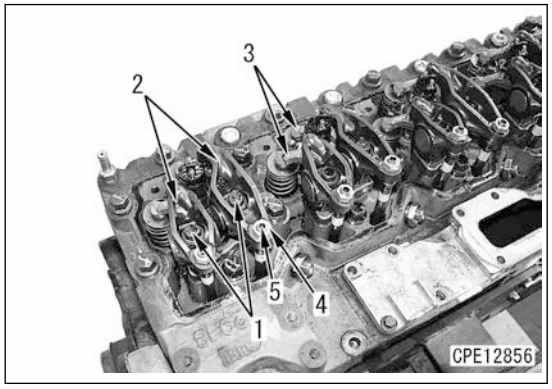
82. Loosen the lock nut (4) not to apply tension of the valve spring on the rocker arm mounting bolts (1), and then loosen the adjustment screw (5) by 2 to 3 turns.
83. Remove the 12 bolts (1), and remove the rocker arm assembly (2).

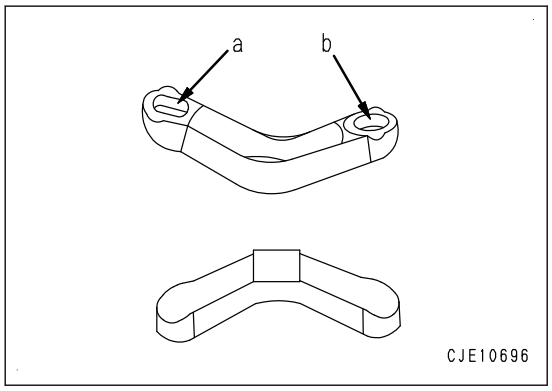
    Tool: Ratchet handle, socket

    Bolt (1): Width across flats 12.8mm, M10
84. Remove the crosshead (3).

    REMARK

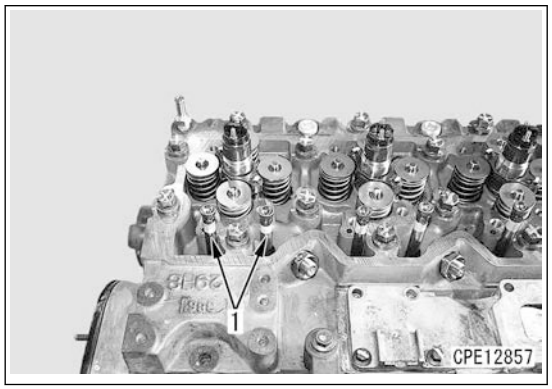
    Write down the installation position and the hole shape of the parts (a) and (b).





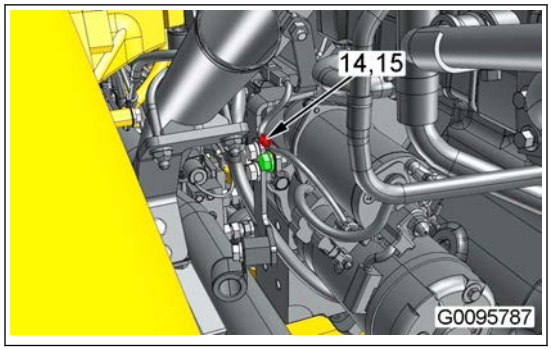
Push rod

85. Remove the 12 push rods (1).

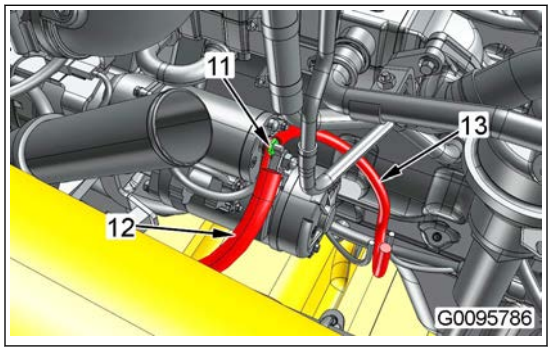


Injector assembly

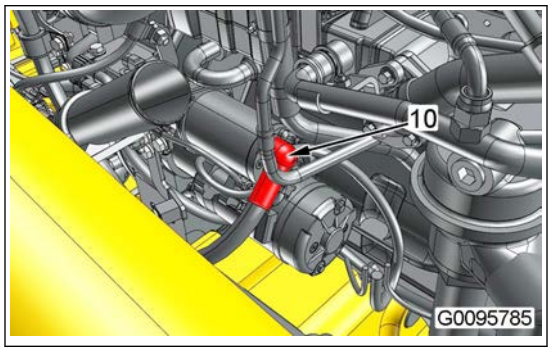
3. Install the clamp (15) with the bolt (14).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (14): Width across flats 17mm, M10
   Bolt (14): 59 to 74Nm {6 to 7.5kgfm}



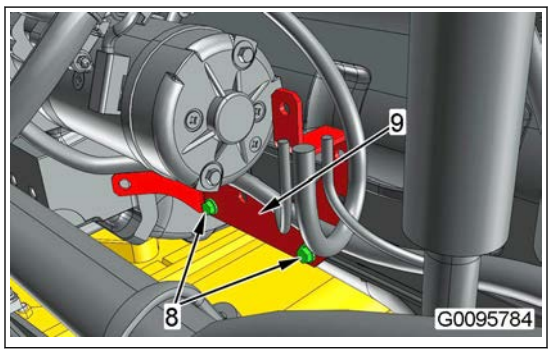
4. Connect the wiring harnesses (12) and (13) with the nut (11).
   Tool: Ratchet handle, socket, torque wrench
   Nut (11): Width across flats 17mm
   Nut (11): 17.7 to 24.5Nm {1.8 to 2.5kgfm}



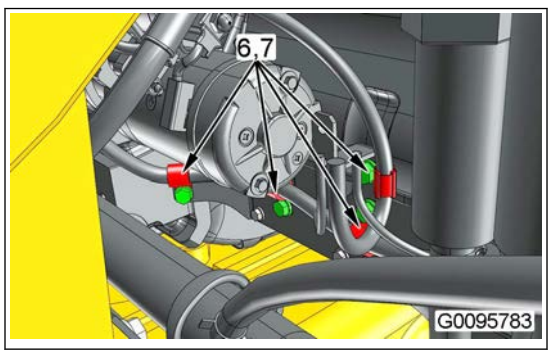
5. Install the rubber cover (10).



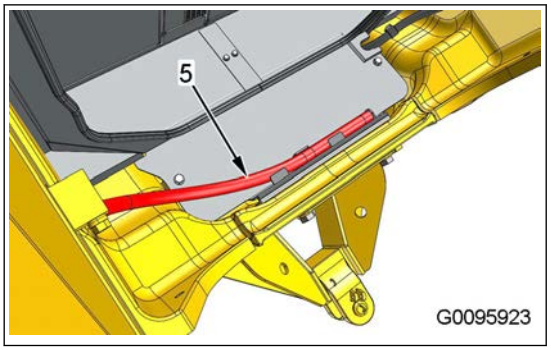
6. Install the bracket (9) with the 2 bolts (8).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (8): Width across flats 13mm, M8
   Bolt (8): 27 to 34Nm {2.8 to 3.5kgfm}



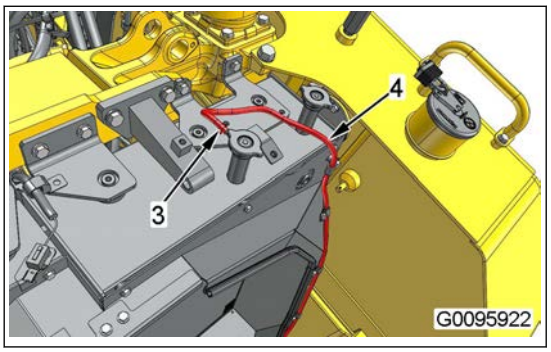
7. Install the 4 clamps (7) with the 4 bolts (6).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (6): Width across flats 17mm, M10
   Bolt (6): 59 to 74Nm {6 to 7.5kgfm}



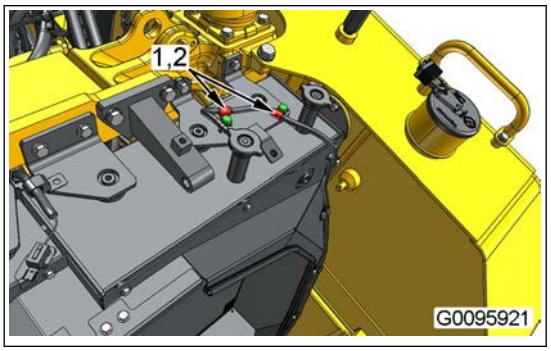
10. Connect the hose (5).



11. Connect the hose (4), and install the clip (3).
    Tool: Needle-nose pliers



12. Install the 2 clamps (2) with the 2 bolts (1).
    Tool: Ratchet handle, socket, torque wrench
    Bolt (1): Width across flats 17mm, M10
    Bolt (1): 59 to 74Nm {6 to 7.5kgfm}



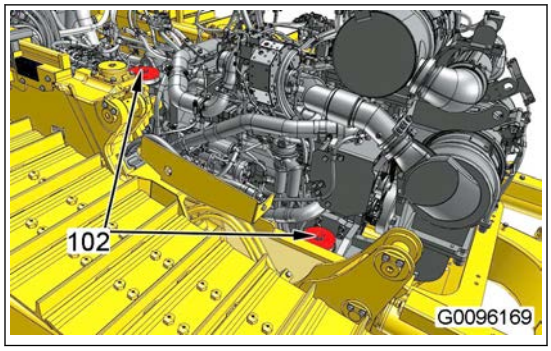
Cooling fan drive assembly

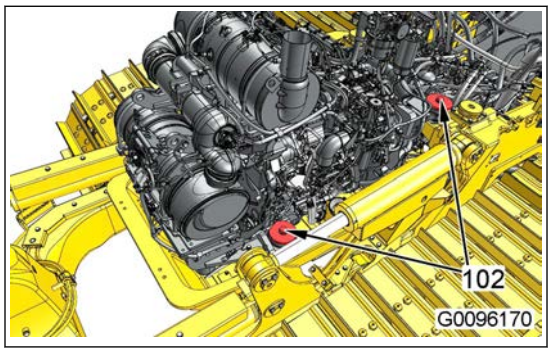
13. Install the cooling fan drive assembly.
    For installation, see “INSTALL COOLING FAN DRIVE ASSEMBLY”.

Operator cab assembly

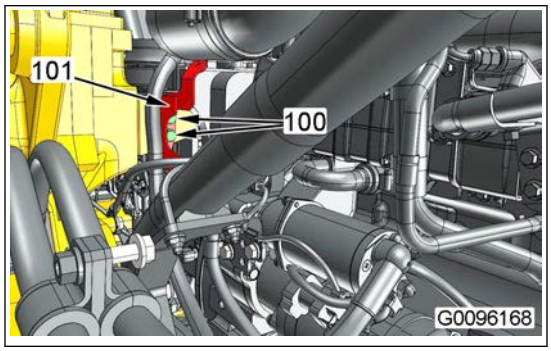
14. Install the operator cab assembly.
    For installation, see “INSTALL OPERATOR CAB ASSEMBLY”.

2. Install the 4 bolts (102).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (102): Width across flats 36mm, M24
   Bolt (102): 785 to 980Nm {80 to 100kgfm}

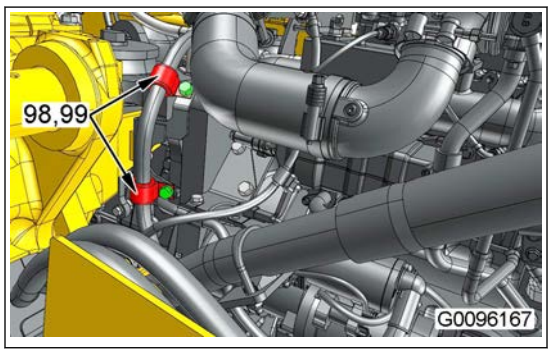




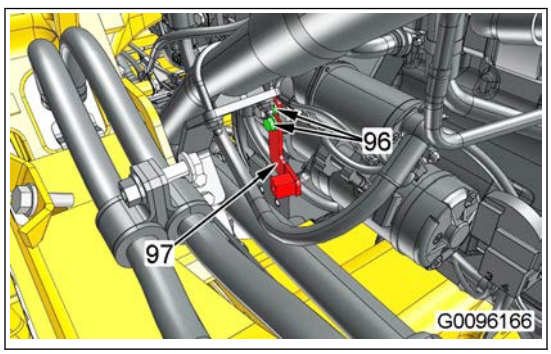
3. Install the bracket (101) with the 2 bolts (100).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (100): Width across flats 17mm, M10
   Bolt (100): 59 to 74Nm {6 to 7.5kgfm}



4. Install the 2 clamps (99) with the 2 bolts (98).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (98): Width across flats 17mm, M10
   Bolt (98): 59 to 74Nm {6 to 7.5kgfm}



5. Install the bracket (97) with the 2 bolts (96).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (96): Width across flats 17mm, M10
   Bolt (96): 59 to 74Nm {6 to 7.5kgfm}



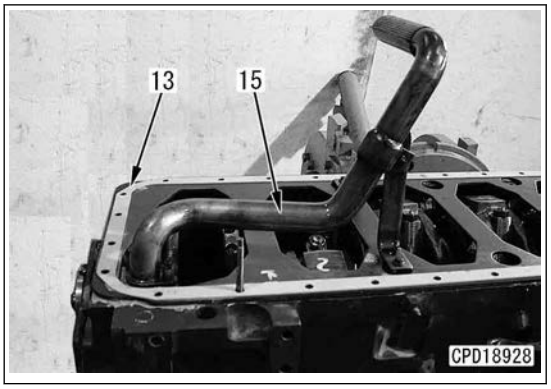
44. Install the gasket (14) to the flange at the end part, and then install the suction tube (15).

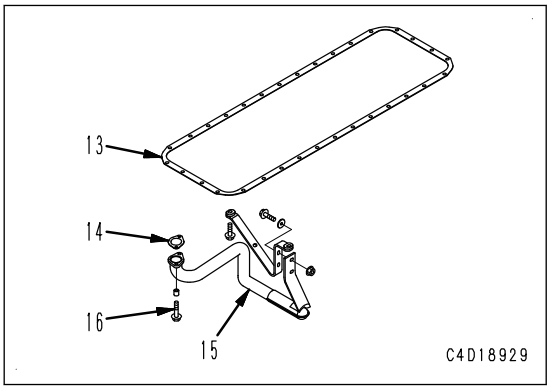
    Tool: Ratchet handle, socket, torque wrench

    Mounting bolt (16) for flange: Width across flats 8mm, M6

    Flange at end part: Liquid gasket (LG-7)

    Mounting bolt (16) for flange: 10±2Nm {1.02±0.2kgfm}

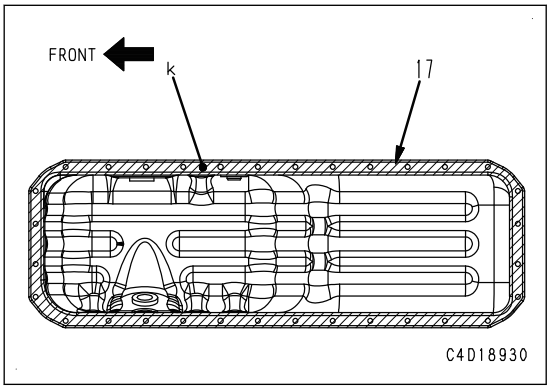




45. Apply liquid gasket on the hatched area (k) of the mounting surface of the engine oil pan (17).

    Hatched area (k) of mounting surface of engine oil pan (17): Liquid gasket (LG-7)

46. Install the engine oil pan (17) to the cylinder block.

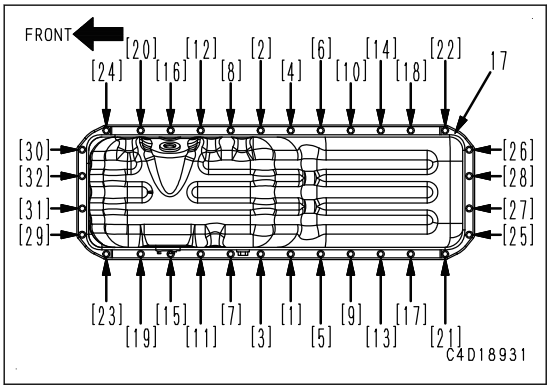


47. Tighten the mounting bolts in the sequence shown in the figure.

    Tool: Ratchet handle, socket, torque wrench

    Mounting bolt for engine oil pan (17): Width across flats 10mm, M8

    Mounting bolt for engine oil pan (17): 28±4Nm {2.86±0.4kgfm}



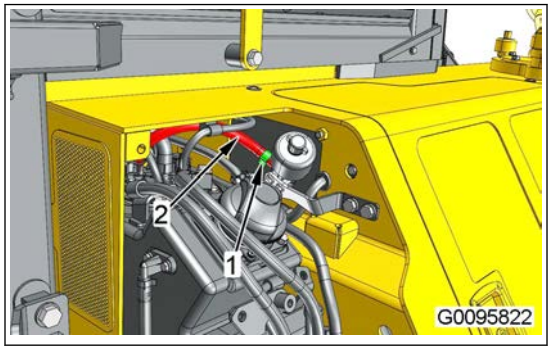
Damper assembly

48. Install the damper assembly.

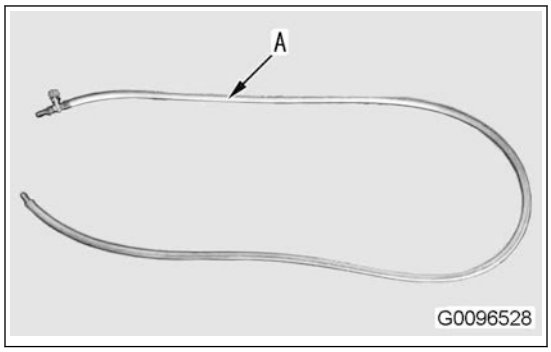
    For installation, see “INSTALL DAMPER ASSEMBLY”.

AdBlue/DEF tank assembly

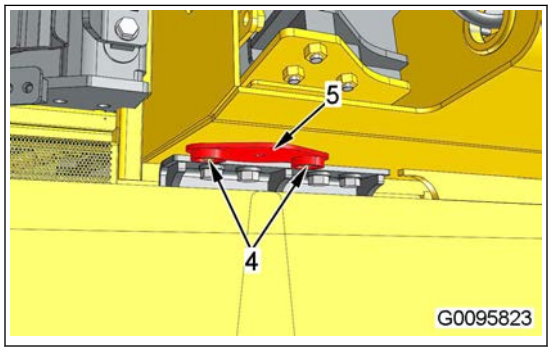
3. Remove the clip (1), and disconnect the breather hose (2).
   Tool: Needle-nose pliers



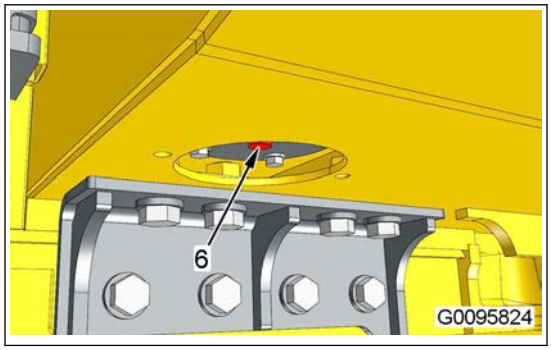
4. Connect the remote breather hose (A) to the breather hose (2).
   Tool: Remote breather hose (A)



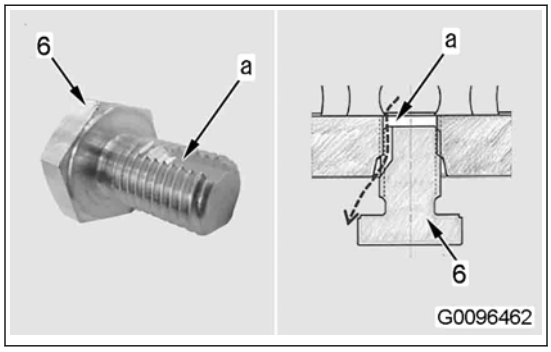
5. Remove the 2 bolts (4), and remove the cover (5).
   Tool: Ratchet handle, socket
   Bolt (4): Width across flats 17mm, M10



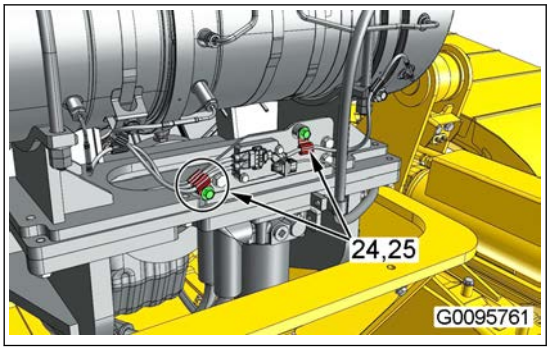
6. Loosen the drain plug (6), and drain AdBlue/DEF.
   REMARK
   There is a slit (a) on the thread part of the drain plug. It prevents AdBlue/DEF drainage not to splash too much.
   Tool: Ratchet handle, socket, AdBlue/DEF container (B), rubber gloves (C)
   Drain plug (6): Width across flats 17mm
   AdBlue/DEF tank: 29.7ℓ



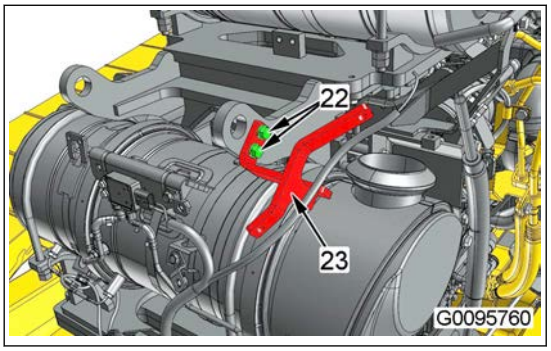
7. Tighten the drain plug (6) after you drain AdBlue/DEF.
   Tool: Ratchet handle, socket, torque wrench
   Drain plug (6): Width across flats 17mm
   Drain plug (6): 9.8 to 12.7Nm {1.0 to 1.3kgfm}



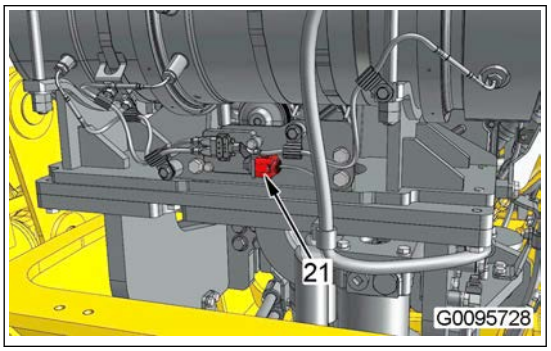
5. Install the 3 clamps (25) with the 2 bolts (24).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (24): Width across flats 14mm, M10
   Bolt (24): 59 to 74Nm {6 to 7.5kgfm}



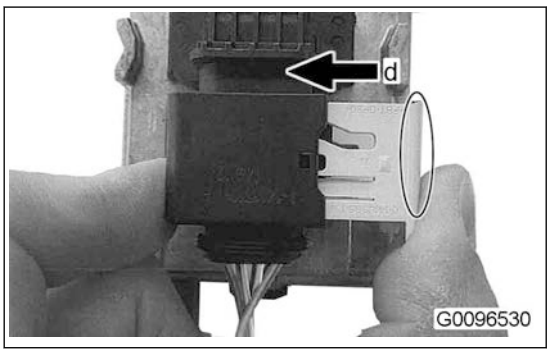
6. Install the bracket (23) with the 2 bolts (22).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (22): Width across flats 17mm, M10
   Bolt (22): 59 to 74Nm {6 to 7.5kgfm}



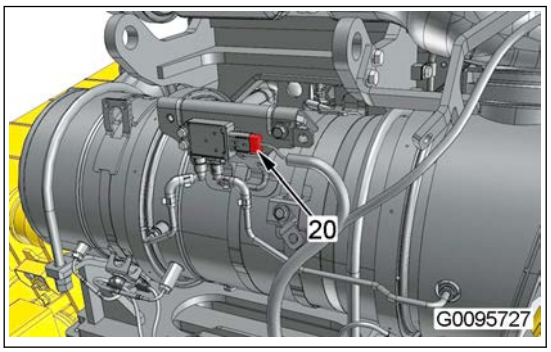
7. Connect the connector TDPF (21) as follows.



   1) Slide the connector lock in the direction (d) to lock it.



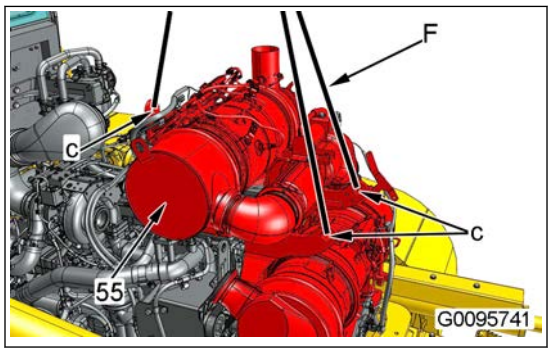
8. Connect the connector PDPF (20).



INSTALL KDPF AND SCR ASSEMBLY

KDPF, SCR assembly

1. Install the wire sling (F) at the 3 sling points (c), and set the KDPF and SCR assembly (55) to the installation position.



NOTICE

- **The lifting tools which are installed to the KDPF and SCR assembly with bands are tools to lift each of the KDPF assembly and SCR assembly.**
- **Do not use them when you lift the KDPF and SCR assembly together.**

Tool: Wire sling (F)

KDPF, SCR assembly (55): 240kg

REMOVE AND INSTALL AdBlue/DEF INJECTOR

Standard tools to be used when you remove and install the AdBlue/DEF injector

The listed tools are for reference, and other tools that are not on the list can also be used if the function is the same.

No.	Part name	Specification	Q'ty	Remarks
1	Socket	10mm	1	
2	Socket	17mm	1	
3	Socket	19mm	1	
4	Ratchet handle		1	
5	Torque wrench	11.8 to 14.7Nm	1	
6	Torque wrench	59 to 74Nm	1	
7	Torque wrench	98 to 123Nm	1	
8	Needle-nose pliers		1	

Special tools to be used when you remove and install the AdBlue/DEF injector

Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
A		600-919-5050	Plug (for 5/16 inch diameter hose)	1		
B	-	6540-71-1720	AdBlue/DEF injector, cap kit	1		
	1		AdBlue/DEF injector, cap kit (yellow)	1		Disconnection and connection of AdBlue/DEF hose
	2		AdBlue/DEF injector cap	1		Removal and installation of AdBlue/DEF injector
C		Commercially available	Rubber gloves	1		Disconnection and connection of AdBlue/DEF hose
D		6540-71-1310	AdBlue/DEF injector, connector cover	1		Disconnection and connection of AdBlue/DEF injector, connector

Obey the items that follow when you make the machine stable.

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

⚠ **Set the parking brake switch to the LOCK position.**

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

Obey the items that follow when you stop the engine.

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

⚠ **Make sure that the system operating lamp is not lit, and set the battery disconnect switch to the OFF position.**

REMARK

For details, see TESTING AND ADJUSTING, “BATTERY DISCONNECT SWITCH”.

Obey the items that follow before you start the work.

REMOVE AND INSTALL AIR CLEANER ASSEMBLY

Standard tools to be used when you remove and install the air cleaner assembly

The listed tools are for reference, and other tools that are not on the list can also be used if the function is the same.

No.	Part name	Specification	Q'ty	Remarks
1	Socket	17mm	1	
2	Socket	19mm	1	
3	Ratchet handle		1	
4	Torque wrench	59 to 74Nm	1	
5	Torque wrench	98 to 123Nm	1	
6	Torque wrench	9.8 to 12.7Nm	1	
7	Needle-nose pliers		1	

Obey the items that follow when you make the machine stable.

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

⚠ **Set the parking brake switch to the LOCK position.**

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

Obey the items that follow when you stop the engine.

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

⚠ **Make sure that the system operating lamp is not lit, and set the battery disconnect switch to the OFF position.**

REMARK

For details, see TESTING AND ADJUSTING, “BATTERY DISCONNECT SWITCH”.

Obey the items that follow before you start the work.

⚠ **Immediately after the engine stops, the temperature of the coolant, oil, and parts around the engine is very hot and they can cause burn injury. Wait until the temperature decreases, and then start the work.**

REMARK

Special caution is necessary because the temperature of the aftertreatment devices and area around them is 400℃ or above.

⚠ **The remaining pressure in the hydraulic tank can cause an accident. Release the remaining pressure carefully.**

REMARK

For details, see TESTING AND ADJUSTING, “RELEASE REMAINING PRESSURE IN HYDRAULIC SYSTEM”.

⚠ **Check for flammable materials such as dry leaves and twigs stuck to the aftertreatment devices. If dirt or flammable materials are found, remove them.**

⚠ **The aftertreatment devices can be damaged by the shock if they fall. Handle them carefully. Do not use the damaged parts again.**

Obey the items that follow when you handle the wirings and hoses.

REMOVE AND INSTALL HST MOTOR AND FINAL DRIVE ASSEMBLY

Standard tools to be used when you remove and install the HST motor and final drive assembly

The listed tools are for reference, and other tools that are not on the list can also be used if the function is the same.

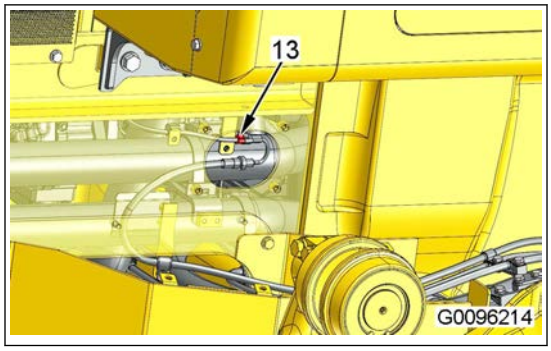
No.	Part name	Specification	Q'ty	Remarks
1	Socket	12mm	1	
2	Socket	17mm	1	
3	Socket	22mm	1	
4	Socket	24mm	1	
5	Socket	27mm	1	
6	Socket	30mm	1	
7	Ratchet handle		1	
8	Open-end wrench	19mm	1	
9	Open-end wrench	22mm	1	
10	Open-end wrench	55mm	1	
11	Torque wrench	24.5 to 34.3Nm	1	
12	Torque wrench	59 to 74Nm	1	
13	Torque wrench	153 to 190Nm	1	
14	Torque wrench	235 to 285Nm	1	
15	Torque wrench	320 to 400Nm	1	
16	Torque wrench	490 to 608Nm	1	
17	Torque wrench (open-end)	34 to 54Nm	1	
18	Torque wrench (open-end)	54 to 93Nm	1	
19	Torque wrench (open-end)	127.4 to 176.4Nm	1	
20	Hexagonal wrench		1	
21	Needle-nose pliers		1	

Special tools to be used when you remove and install the HST motor and final drive assembly

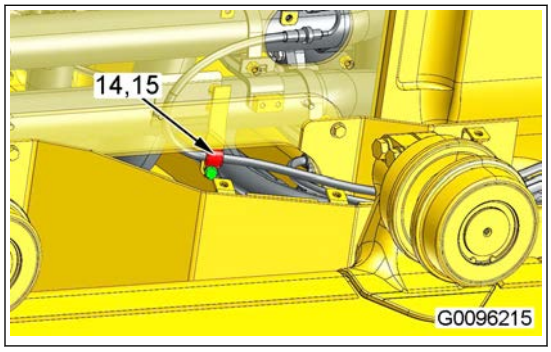
Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
A	1	07376-70210	Plug (Nominal 02)	2		Removal and installation of HST motor and final drive assembly
	2	02789-00210	Cap (Nominal 02)	2		
	3	02896-11008	O-ring (Nominal 02)	2		
B	1	07376-70315	Plug (Nominal 03)	2		
	2	02789-00315	Cap (Nominal 03)	2		
	3	02896-11009	O-ring (Nominal 03)	2		
C		Commercially available	Webbing sling	2		

Obey the items that follow when you make the machine stable.

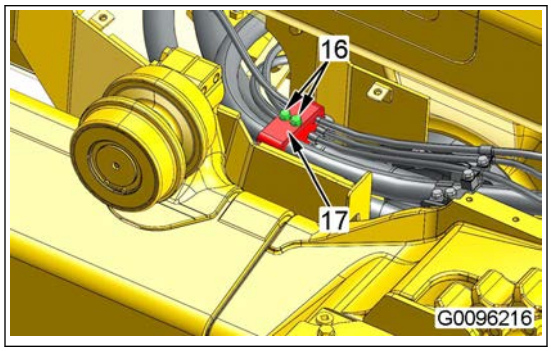
10. Disconnect the connector LRS2 (13).



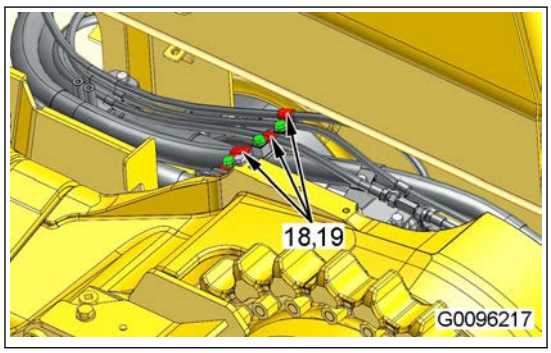
11. Remove the bolt (14), and remove the clamp (15).
    Tool: Ratchet handle, socket
    Bolt (14): Width across flats 17mm, M10



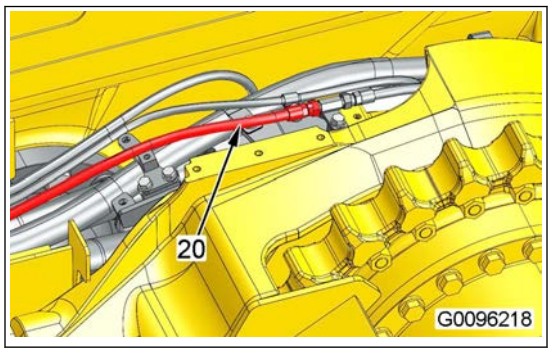
12. Remove the 2 bolts (16), and remove the clamp (17).
    Tool: Ratchet handle, socket
    Bolt (16): Width across flats 17mm, M10



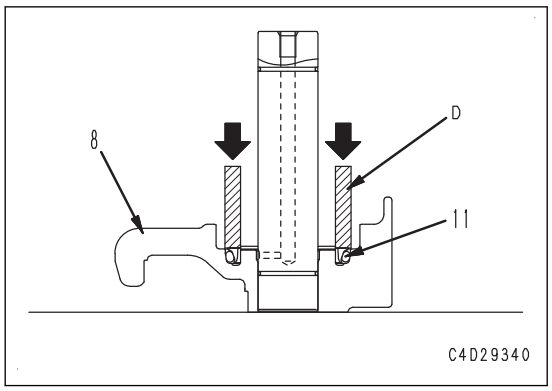
13. Remove the 3 bolts (18), and remove the 4 clamps (19).
    Tool: Ratchet handle, socket
    Bolt (18): Width across flats 17mm, M10



14. Disconnect the hose (20).
    Tool: Open-end wrench, plug (B1), cap (B2), O-ring (B3)
    Hose (20): Width across flats 22mm, nominal 03



4. Attach the floating seal (11) to the shaft and support assembly (8) as follows, and assemble the O-ring to the shaft.

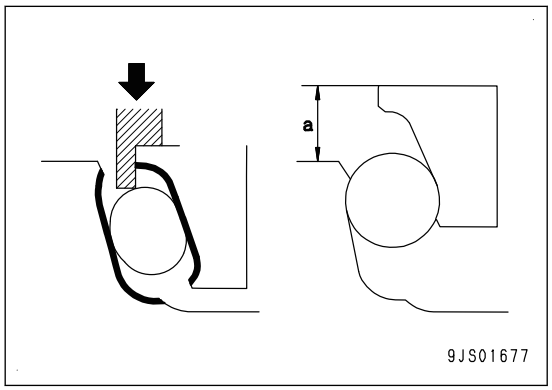


REMARK

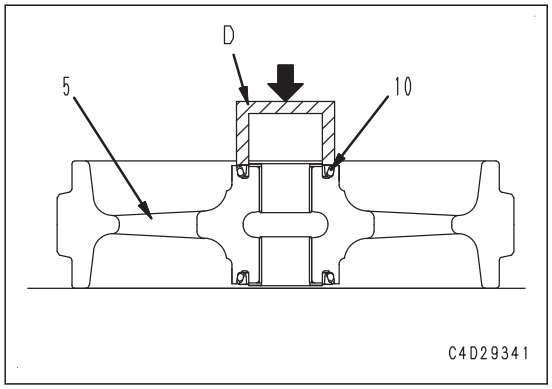
When you install the floating seal, clean the thick line area (O-ring and contact surface of the O-ring) to fully remove grease and then dry the area.

Tool: Installer (D)

1) After you insert it, make sure that the inclination of the floating seal (11) is 1 mm or less.
2) After you insert it, make sure that the protrusion (a) of the floating seal (11) is 7 to 11 mm.



5. Install the floating seal (10) to the idler (5) with the installer (D) as follows.



REMARK

When you install the floating seal, clean the thick line area (O-ring and contact surface of the O-ring) to fully remove grease and then dry the area.

Tool: Installer (D)

1) After you insert it, make sure that the inclination of the floating seal (10) is 1 mm or less.
2) After you insert it, make sure that the protrusion (a) of the floating seal (10) is 7 to 11 mm. (See the above 4.)

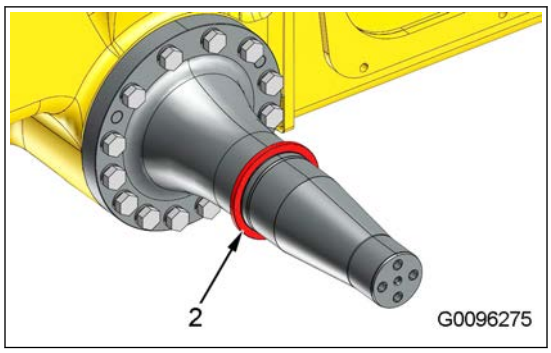
3. Install the ring (2).

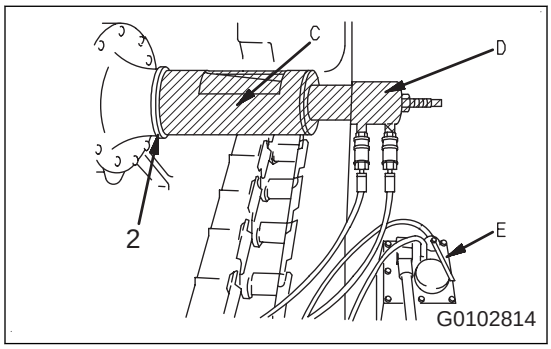
   REMARK

   Press-fit the ring (2) with the installer assembly (C), the puller (D), and the pump assembly (E).

   Press-fit force: 18.6kN {1.9t}

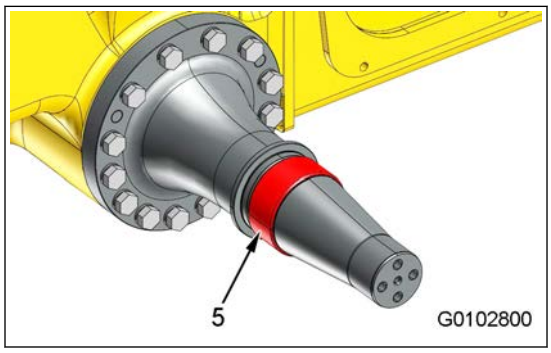
   Tool: Installer assembly (C), puller (D), pump assembly (E)





4. Press fit the bushing (5).

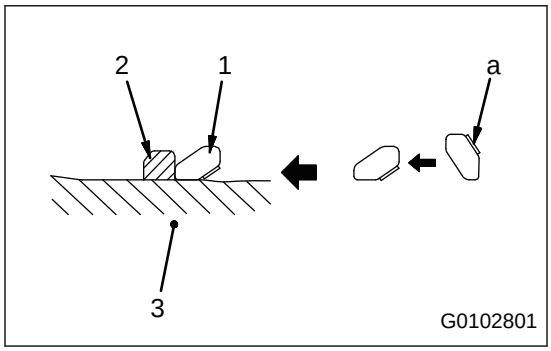
   Press-fit surface of bushing (5): Molybdenum disulfide lubricant (LM-P)

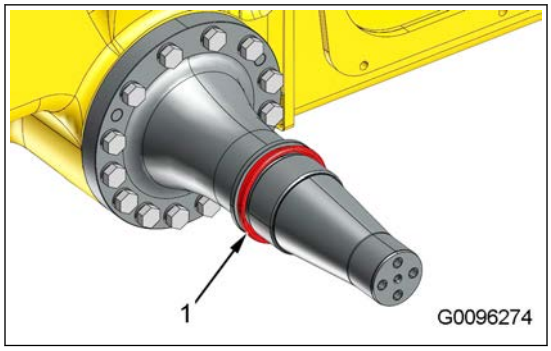


5. Turn over the seal (1) to let the embossed letter (a) of the seal (1) come on the inner side.
6. While the seal (1) is turned over, insert it into the pivot shaft assembly (3).

   REMARK

   Be careful not to cause damage to the seal surface during insertion of the seal.
7. Install the opposite pivot shaft assembly (3) in the same procedure.

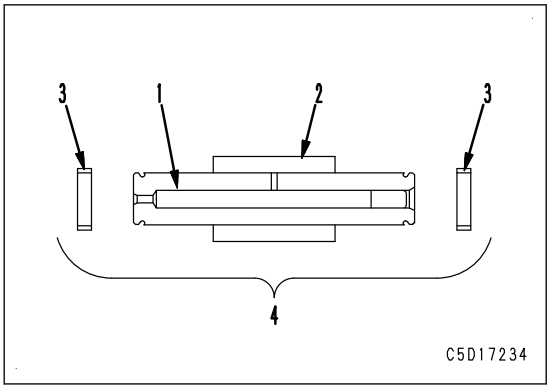




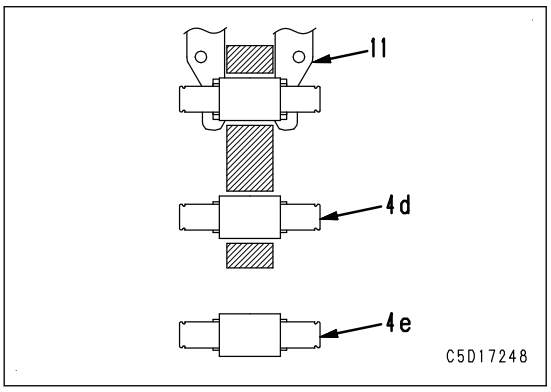
Track frame assembly

8. Install the track frame assembly.

24. Temporarily assemble the pin (1), the bushing (2), and the 2 spacers (3) to prepare the 2 pin sub-assemblies (4).



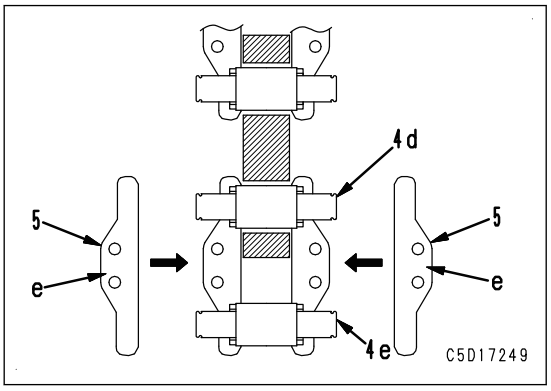
25. Send the assembled link assembly (11) to the front of the link press bed.
26. Set the pin sub-assembly (4d) on the center of the jaw. Set the pin sub-assembly (4e) on the before the jaw.



27. Place the inner link (5) with seals installed to the right and left sides of the pin sub-assemblies (4d) and (4e) to let the shoe installation surface (e) face upward.

    REMARK

    Adjust the position not to allow the spacer and seal to bite each other.



⚠ Check the connector numbers and installation positions before you disconnect the wirings, hoses, and clamps, and write them down.

⚠ If it is possible for wirings and hoses to be deformed or damaged, remove clips and clamps before the work.

⚠ Prepare a container to receive oil before you disconnect the hoses.

⚠ Install a plug or a flange to the parts where a hydraulic hose is disconnected to not let oil flow out.

⚠ Replace the O-ring, seal washer, and gasket with new ones.

REMOVE SEGMENT TEETH

Track assembly

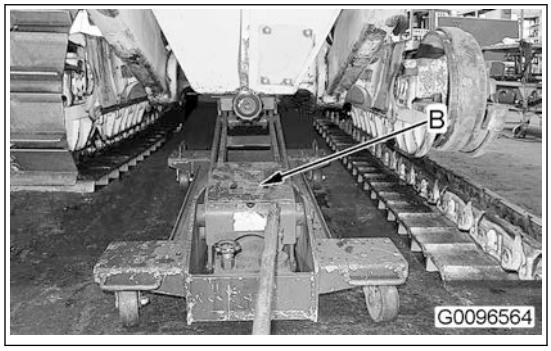
1. Separate the track shoe assembly.
   For separation, see “SEPARATE TRACK ASSEMBLY”.

Segment teeth

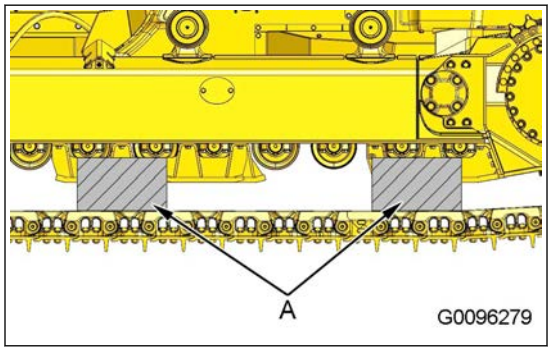
2. Lift the machine body with the jack (B) at the front and rear of the frame.

   NOTICE

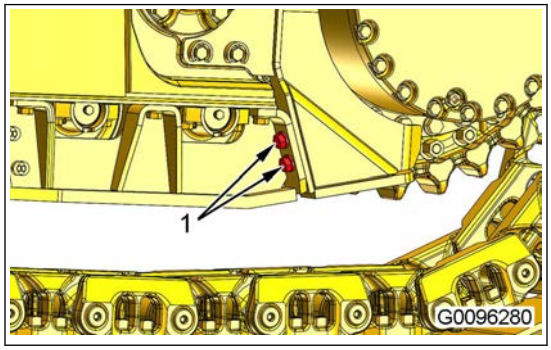
   Be sure to set the jack (B) securely.



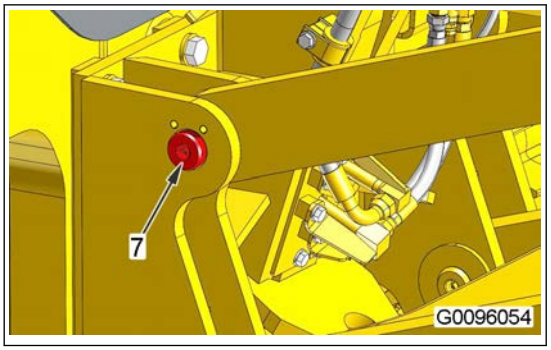
3. Put the block (A) under the track frame.
   Tool: Block (A)



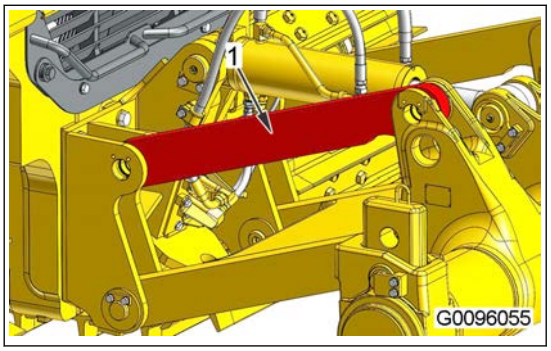
4. Remove the 2 bolts (1).
   Tool: Ratchet handle, socket
   Bolt (1): Width across flats 27mm, M18



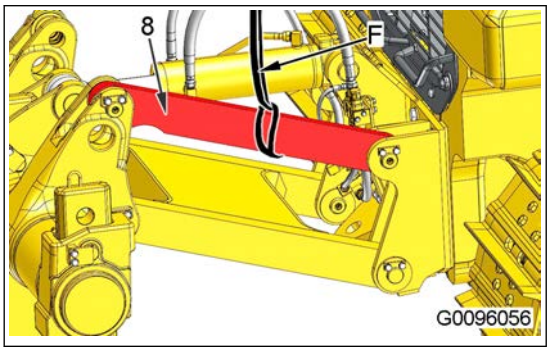
7. Remove the pin (7).
   Tool: Hammer (H), punch (J)



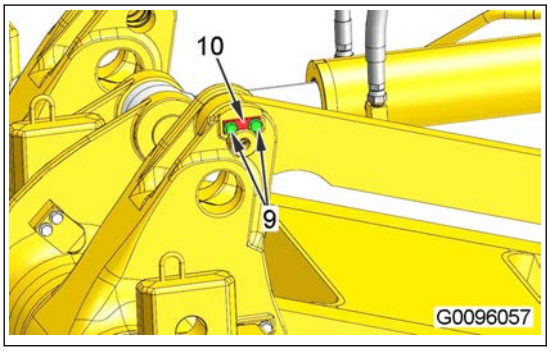
8. Remove the eye link (1) at the left side of the machine.



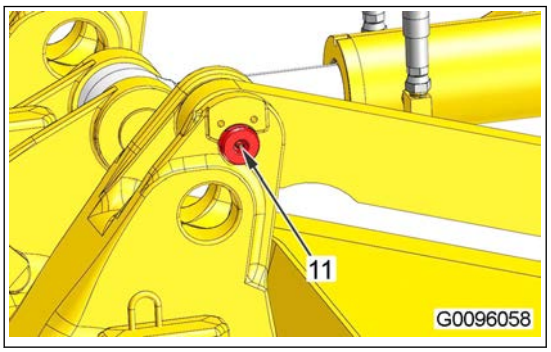
9. Lift the eye link (8) at the right side of the machine, and hold it.
   Tool: Webbing sling (F)
   Eye link (8): 46kg



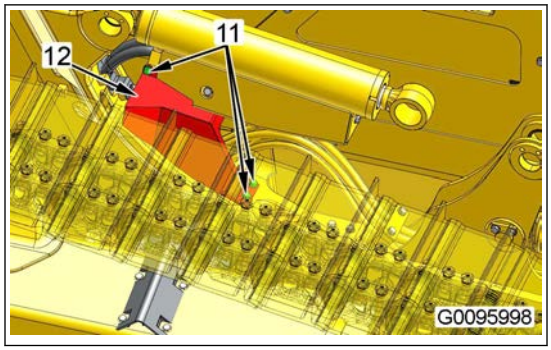
10. Remove the 2 bolts (9), and remove the plate (10).
    Tool: Ratchet handle, socket
    Bolt (9): Width across flats 19mm, M12



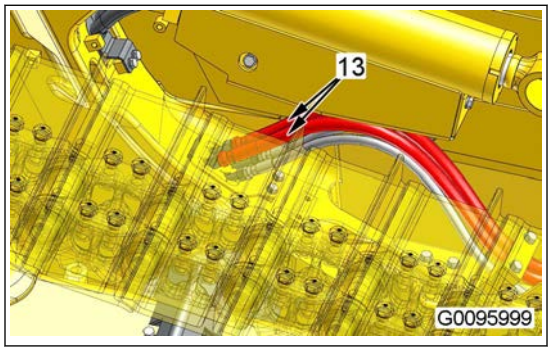
11. Remove the pin (11).
    Tool: Hammer (H), punch (J)



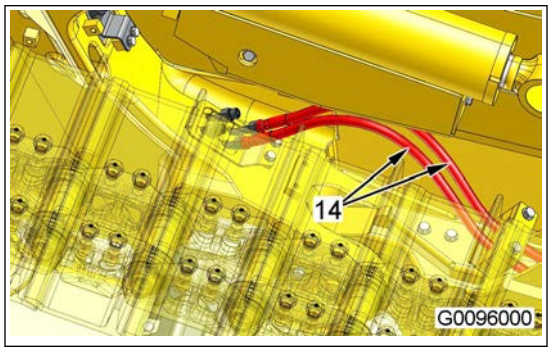
8. Remove the 3 bolts (11), and remove the cover (12).
   Tool: Ratchet handle, socket
   Bolt (11): Width across flats 19mm, M12



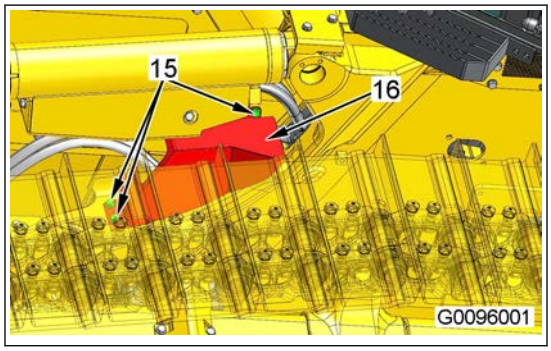
9. Disconnect the 2 hoses (13).
   Tool: Open-end wrench, plug (C1), cap (C2), O-ring (C3)
   Hose (13): Width across flats 27mm, nominal 04



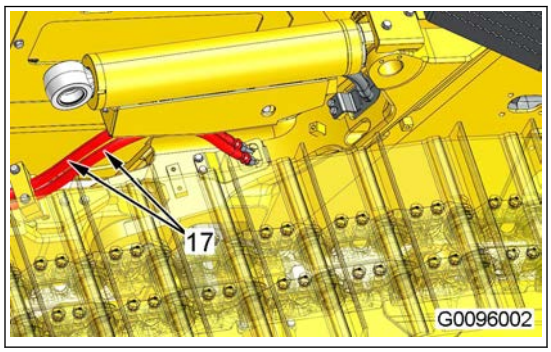
10. Disconnect the 2 hoses (14).
    Tool: Open-end wrench, plug (B1), cap (B2), O-ring (B3)
    Hose (14): Width across flats 22mm, nominal 03



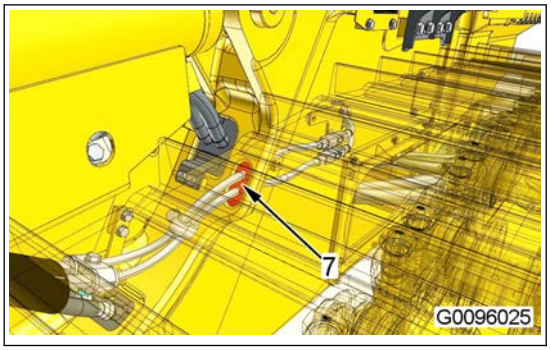
11. Remove the 3 bolts (15), and remove the cover (16).
    Tool: Ratchet handle, socket
    Bolt (15): Width across flats 19mm, M12



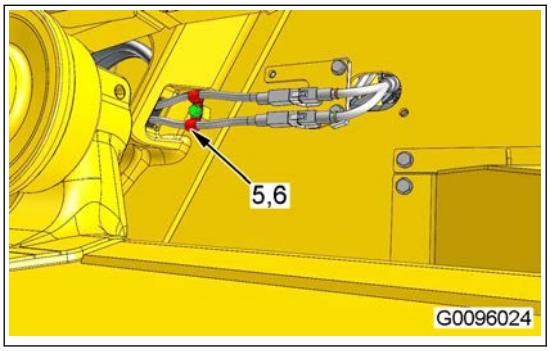
12. Disconnect the 2 hoses (17).
    Tool: Open-end wrench, plug (C1), cap (C2), O-ring (C3)
    Hose (17): Width across flats 27mm, nominal 04



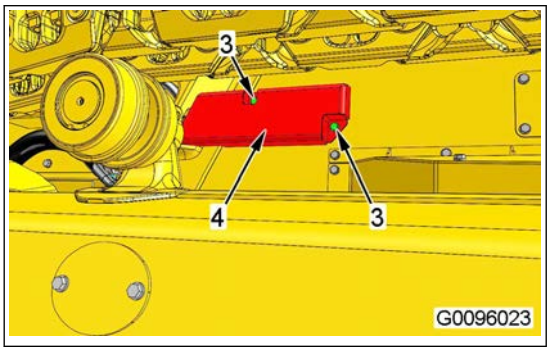
16. Install the rubber cover (7).



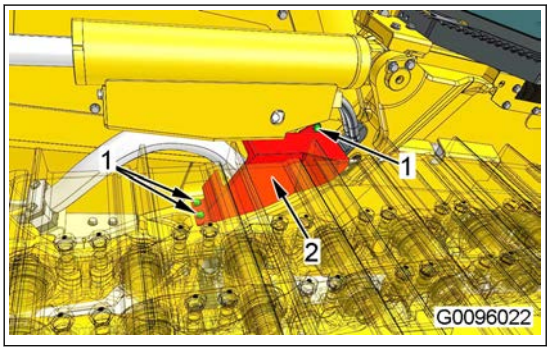
17. Install the 2 clamps (6) with the bolt (5).
    Tool: Ratchet handle, socket, torque wrench
    Bolt (5): Width across flats 19mm, M12
    Bolt (5): 98 to 123Nm {10 to 12.5kgfm}



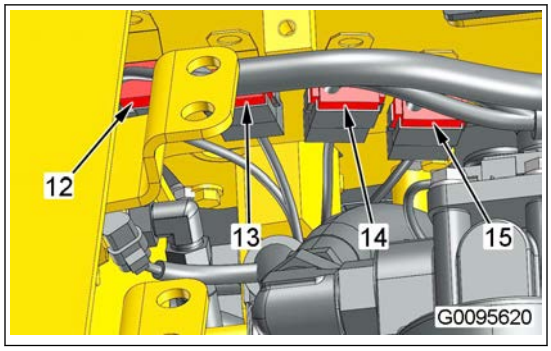
18. Install the cover (4) with the 2 bolts (3).
    Tool: Ratchet handle, socket, torque wrench
    Bolt (3): Width across flats 19mm, M12
    Bolt (3): 98 to 123Nm {10 to 12.5kgfm}



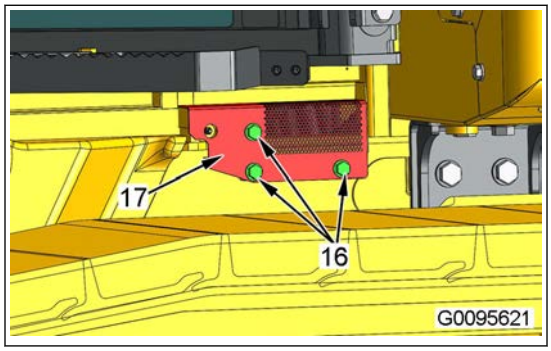
19. Install the cover (2) with the 3 bolts (1).
    Tool: Ratchet handle, socket, torque wrench
    Bolt (1): Width across flats 19mm, M12
    Bolt (1): 98 to 123Nm {10 to 12.5kgfm}



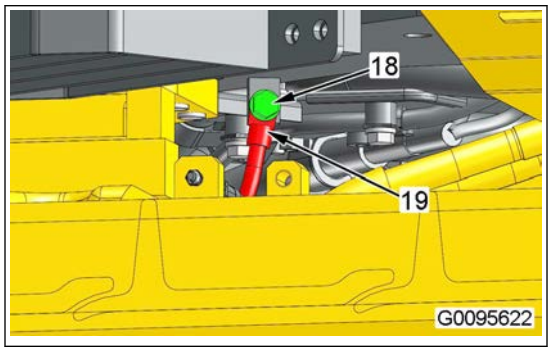
9. Disconnect the connectors FTW (12), 102 (13), RS (14), and WE (15).



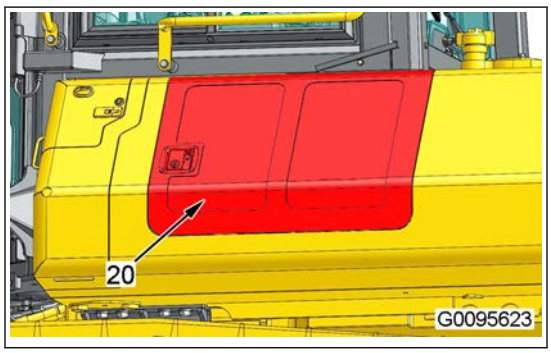
10. Remove the 3 bolts (16), and remove the cover (17).
    Tool: Ratchet handle, socket
    Bolt (16): Width across flats 19mm, M12



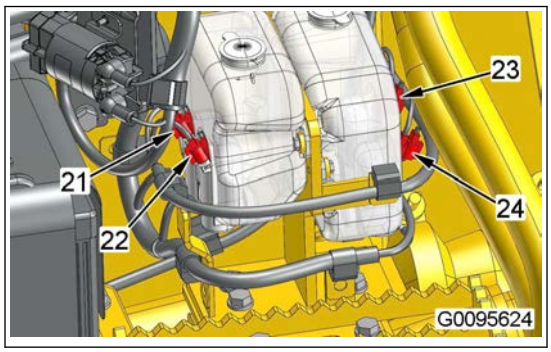
11. Remove the bolt (18), and disconnect the ground cable (19).
    Tool: Ratchet handle, socket
    Bolt (18): Width across flats 17mm, M10



12. Open the cover (20).



13. Disconnect the connectors 362 (21), 364 (22), 361 (23), and 363 (24).

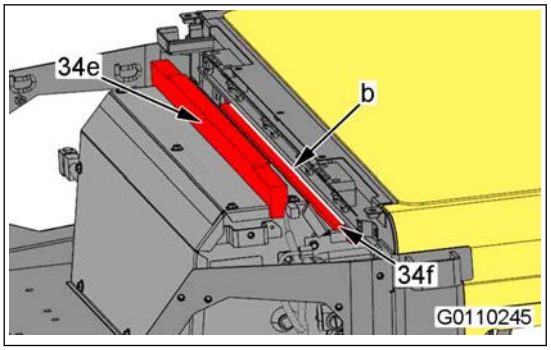


2. Attach silicon seal around the area (b) of the sponge (34f).

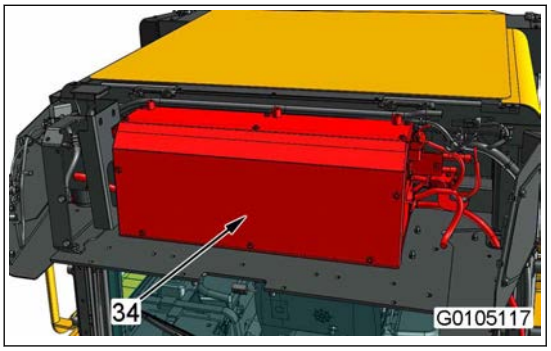
   REMARK

   Use the new sponges (34e) and (34f).

   Area around (b): Silicon seal

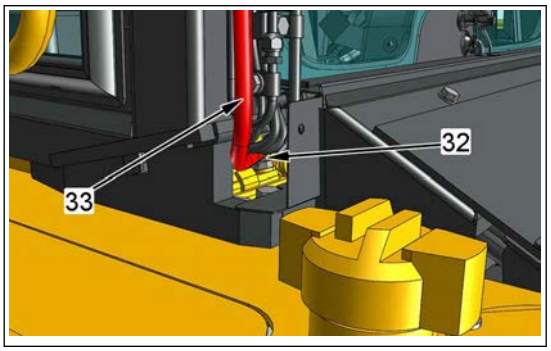


3. Install the air conditioner unit assembly (34).



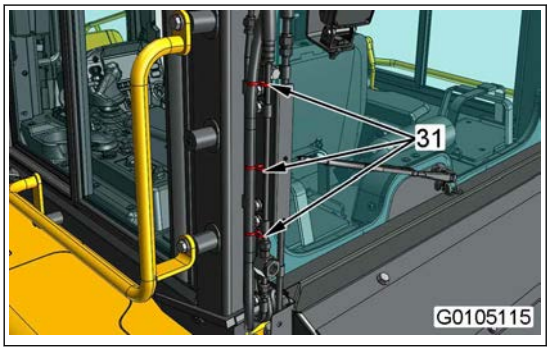
4. Connect the hose (33), and install the clip (32).

   Tool: Needle-nose pliers



5. Install the 3 bands (31).

   Tool: Diagonal pliers

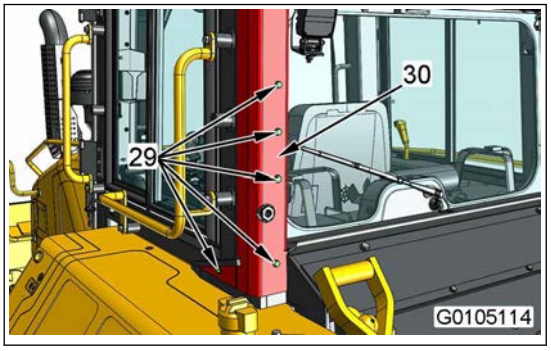


6. Install the cover (30) with the 5 bolts (29).

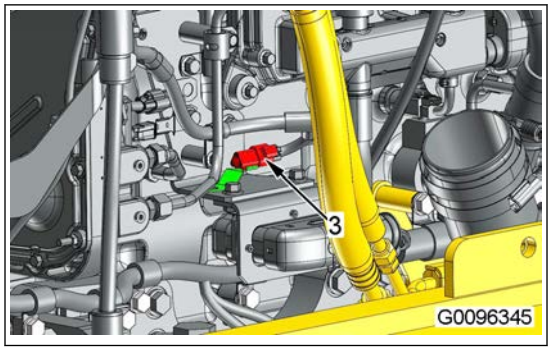
   Tool: Ratchet handle, socket, torque wrench

   Bolt (29): Width across flats 13mm, M8

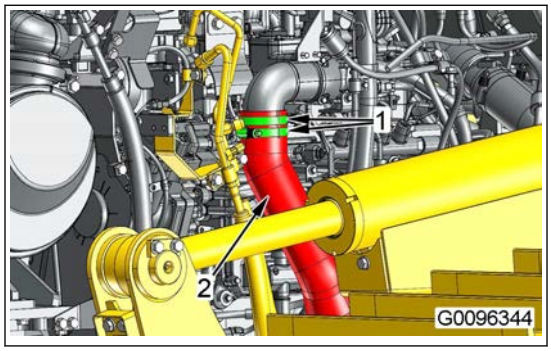
   Bolt (29): 27 to 34Nm{2.8 to 3.5kgfm}



8. Install the connector C23 (3) to the connector block.



9. Connect the hose (2), and install the 2 clamps (1).
   Tool: Ratchet handle, socket, torque wrench
   Clamp (1): Width across flats 9.5mm
   Clamp (1): 10.5±0.5Nm {1.07±0.05kgfm}



Engine hood assembly

10. Install the engine hood assembly.
    For installation, see “INSTALL ENGINE HOOD ASSEMBLY”.

⚠ **Check the connector numbers and installation positions before you disconnect the wirings, hoses, and clamps, and write them down.**

⚠ **If it is possible for wirings and hoses to be deformed or damaged, remove clips and clamps before the work.**

⚠ **Prepare a container to receive oil before you disconnect the hoses.**

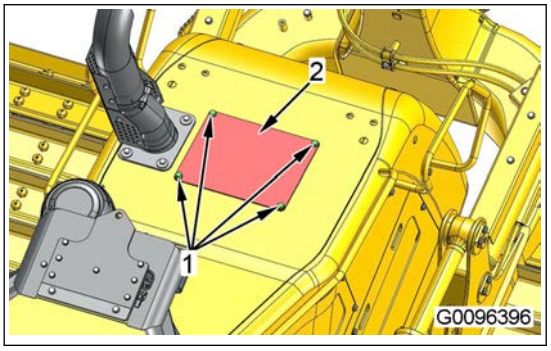
⚠ **Install a plug or a flange to the parts where a hydraulic hose is disconnected to not let oil flow out.**

⚠ **Replace the O-ring, seal washer, and gasket with new ones.**

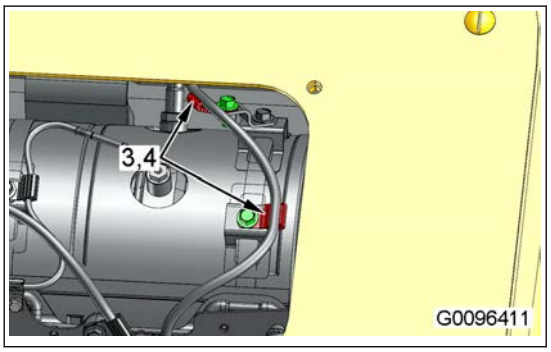
REMOVE AMMONIA SENSOR

Ammonia sensor

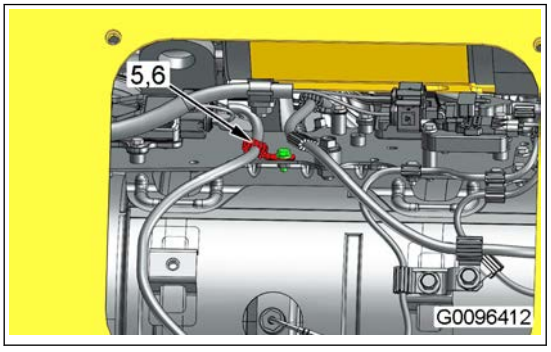
1. Remove the 4 bolts (1), and remove the cover (2).
   Tool: Ratchet handle, socket
   Bolt (1): Width across flats 19mm, M12



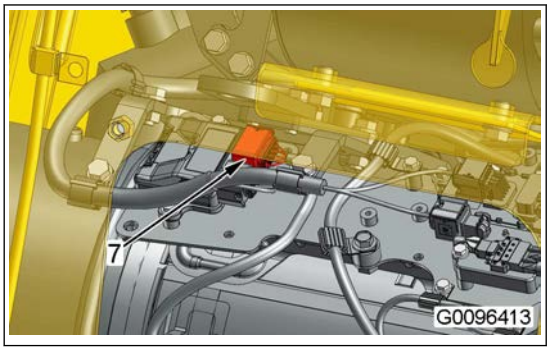
2. Remove the 2 bolts (3), and remove the 2 clamps (4).
   Tool: Ratchet handle, socket
   Bolt (3): Width across flats 14mm, M10



3. Remove the bolt (5), and remove the clamp (6).
   Tool: Ratchet handle, socket
   Bolt (5): Width across flats 10mm, M6



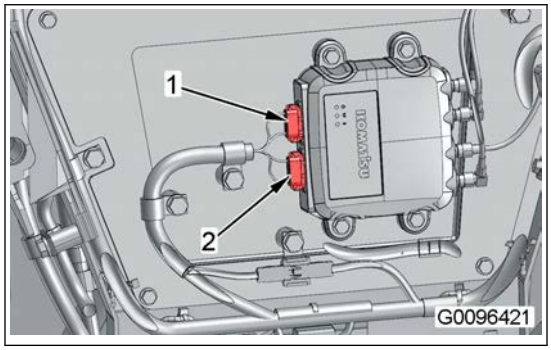
4. Disconnect the connector NH3 (7).



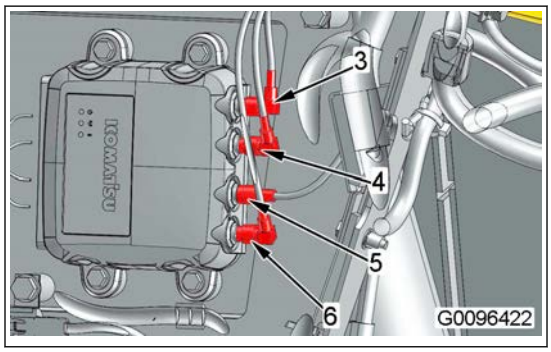
REMOVE GNSS RECEIVER

GNSS receiver

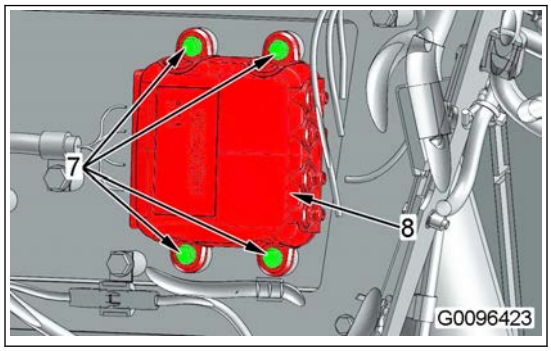
1. Disconnect the connectors CG01 (1) and CG02 (2).



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



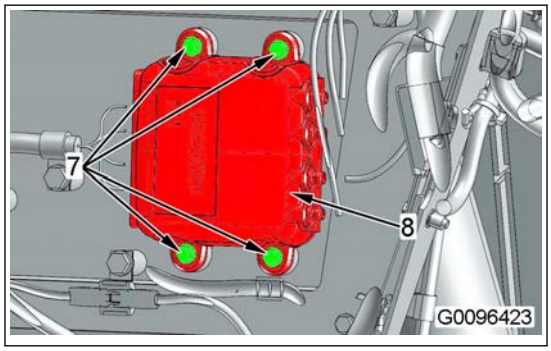
3. Remove the 4 bolts (7), and remove the GNSS receiver (8).
   Tool: Ratchet handle, socket
   Bolt (7): Width across flats 13mm, M8



INSTALL GNSS RECEIVER

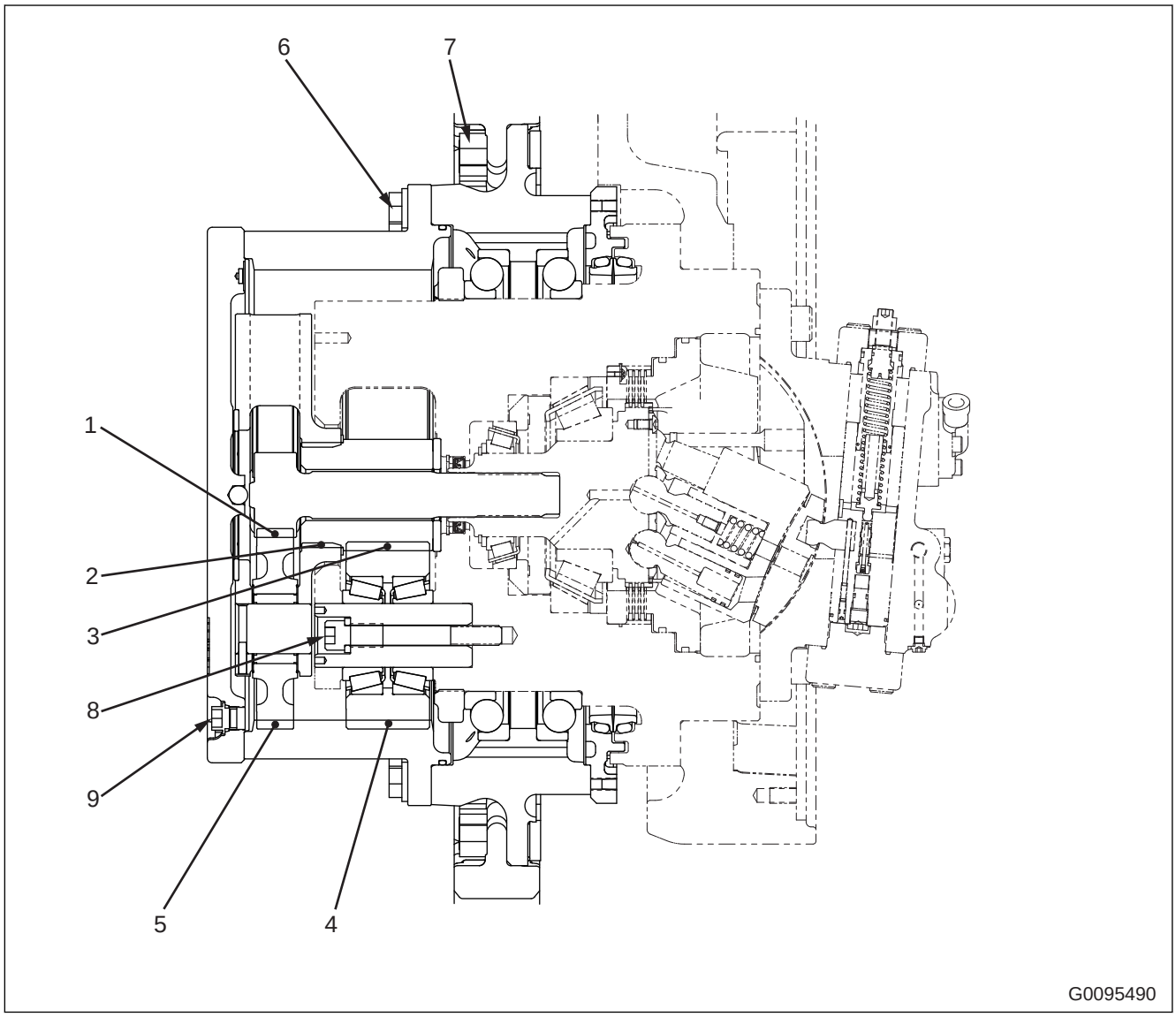
GNSS receiver

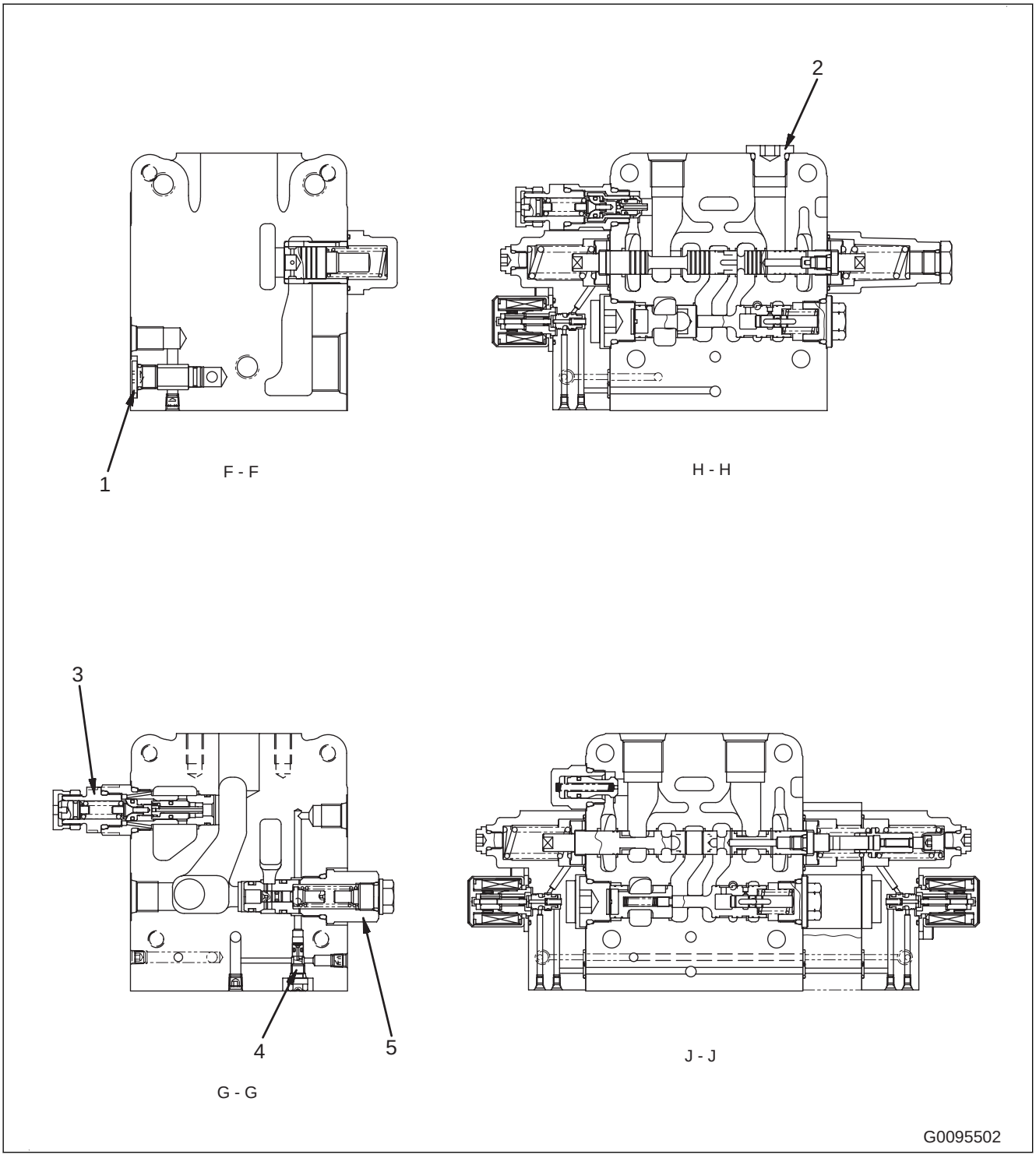
1. Install the GNSS receiver (8) with the 4 bolts (7).
   Tool: Ratchet handle, socket, torque wrench
   Bolt (7): Width across flats 13mm, M8
   Bolt (7): 27 to 34Nm{2.8 to 3.5kgfm}



MAINTENANCE STANDARD OF FINAL DRIVE

This figure shows D71EXI-24.





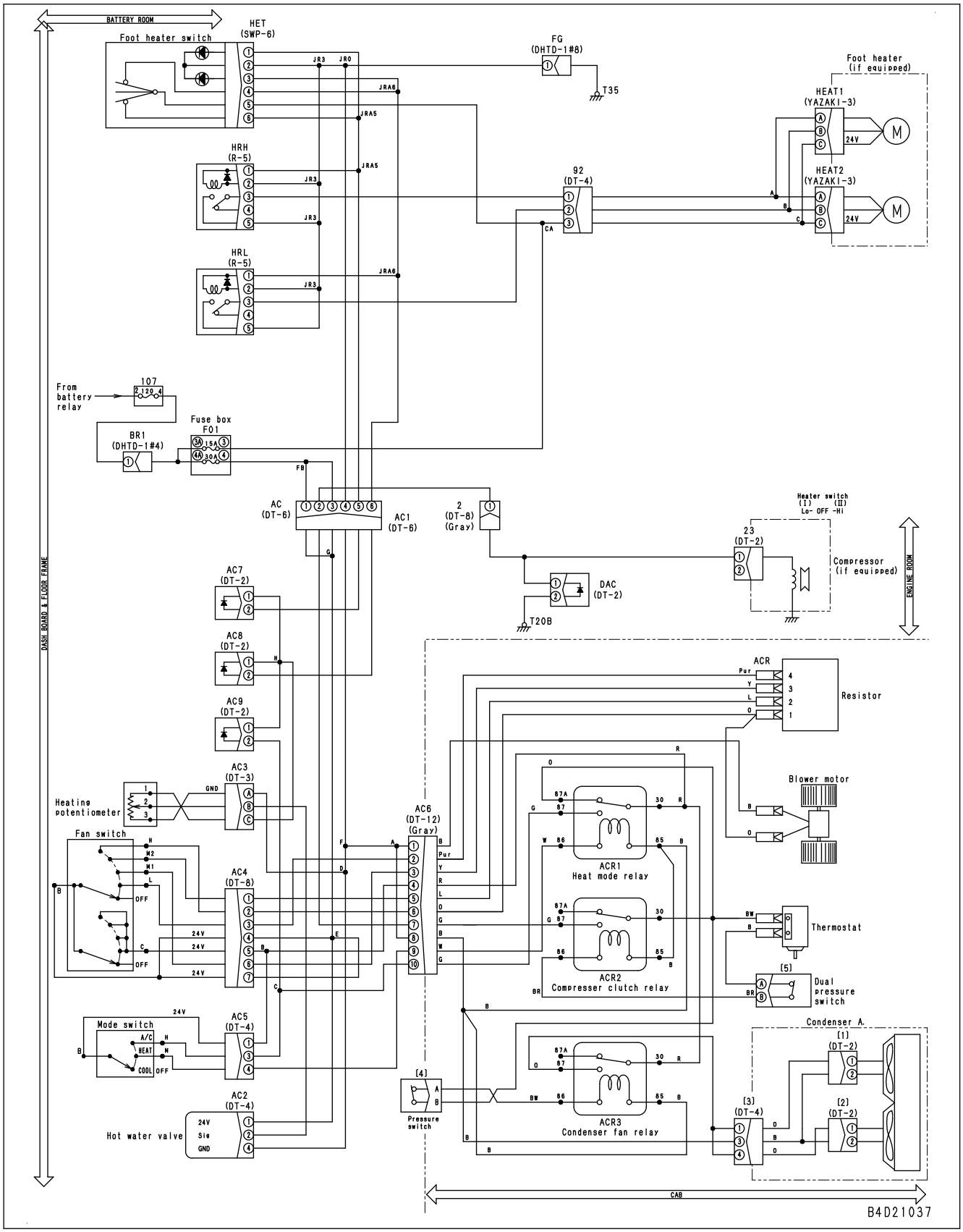
No.	Item	Judgment criteria	Remedy
1	Tightening torque of filter	21.6 to 31.4Nm{2.2 to 3.2kgfm}	Retighten
2	Tightening torque of plug	45.9 to 56.1Nm{4.5 to 5.5kgfm}	
3	Tightening torque of main relief valve	49 to 58.8Nm{5 to 6kgfm}	
4	Tightening torque of LS by-pass valve	14.7 to 19.6Nm{1.5 to 2.0kgfm}	
5	Tightening torque of unload valve	147 to 186.3Nm{15 to 19kgfm}	

- To evaporate the liquid refrigerant at lower temperature, the pressure in the evaporator must be kept as low as possible. For this purpose, the compressor sucks in the evaporated refrigerant.

Relation between refrigerant and cooling trouble

- While repeating the refrigeration cycle, the refrigerant circulates in the refrigeration circuit and dissipates the heat in the cab to the outside of the cab.
- If there is an insufficient quantity of refrigerant, all of it is evaporated while it is passing through the evaporator. This causes evaporator efficiency to deteriorate, which will result in defective air conditioning.
- If there is excessive refrigerant, not all of it is evaporated and part of it will be sucked into the compressor in liquid form, which causes the compressor to compress the liquid and may damage the components.
- If water is contained in the refrigerant circuit, it freezes in the small hole of the expansion valve and blocks the refrigerant flow to cause a cooling trouble.

Circuit diagram related to compressor and refrigerant system



Symbol	Content
 G0009658	Buzzer
 G0009659	Antenna