SEN06701-00-NI-01-DSO-00

Shop Manual

HYDRAULIC
EXCAVATOR

PC210 -10MO
PC210LC -10MO

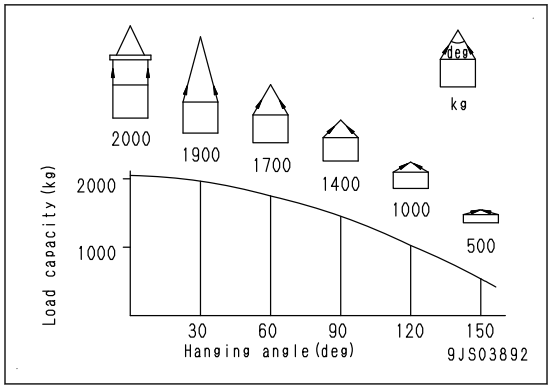
SERIAL NUMBERS N730475 and up

VOLUME 1 OF 3

KOMATSU

REMARK

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



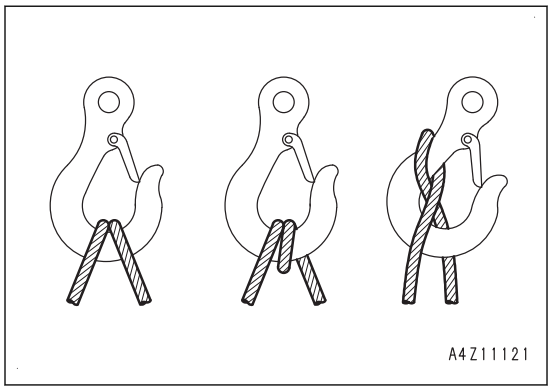
- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle part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

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

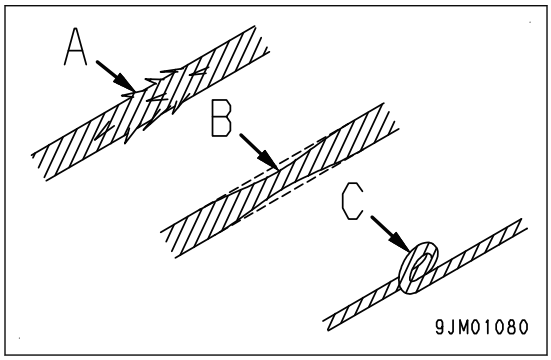
  ⚠ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting.

  REMARK

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



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



Precautions for slinging up

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

Precautions for slinging down

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

Precautions for using mobile crane

REMARK

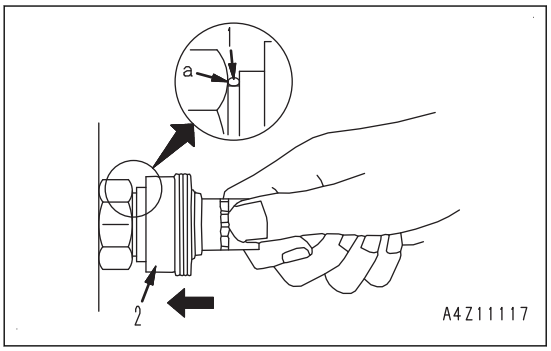
Read Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

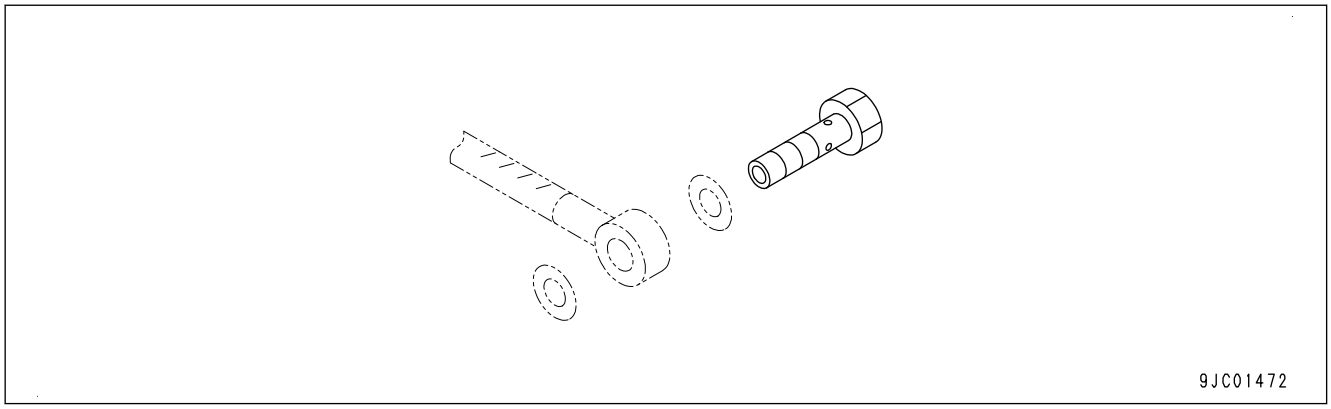
Precautions for using overhead traveling crane

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

Connection

Hold the tightening adapter part, and push body (2) straight until sliding prevention ring (1) contacts contact surface (a) of the hexagonal part at the male end.





Thread diameter (mm)	Tightening torque (Nm { kgm})
6	8±2 {0.81±0.20}
8	10±2 {1.02±0.20}
10	12±2 {1.22±0.20}
12	24±4 {2.45±0.41}
14	36±5 {3.67±0.51}

Tightening torque table for tapered screws on 102, 107, and 114 series engines (National taper pipe thread (NPT))

REMARK

Tighten the National taper pipe threaded (NPT) screws used on the 102, 107, and 114 series engines to the torques shown in the following table unless otherwise specified.

Material of female screw	In cast iron or steel	In aluminum
Nominal thread size	Tightening torque (Nm { kgm})	Tightening torque (Nm { kgm})
$^{1}/_{16}$	15±2 {1.53±0.20}	5±1 {0.51±0.10}
$^{1}/_{8}$	20±2 {2.04±0.20}	15±2 {1.53±0.20}
$^{1}/_{4}$	25±3 {2.55±0.31}	20±2 {2.04±0.20}
$^{3}/_{8}$	35±4 {3.57±0.41}	25±3 {2.55±0.31}
$^{1}/_{2}$	55±6 {5.61±0.61}	35±4 {3.57±0.41}
$^{3}/_{4}$	75±8 {7.65±0.82}	45±5 {4.59±0.51}

WEIGHT TABLE

WEIGHT TABLE: PC210-10M0

- This weight table is for reference for handling the component or transporting them.
- This weight table shows the dry weight.

Unit: kg

Item	PC210-10M0
Engine assembly	761
• Engine	565
• Damper	6
• Main pump	190
Radiator and oil cooler assembly	140
Hydraulic tank and filter assembly	140
Fuel tank assembly	141
Revolving frame	1908
Operator cab (including head guard and front guard)	540
Operator's seat	38.6
Counterweight	3920
Swing machinery	220
Control valve	231
	51.5
Travel motor	93 x 2
Center swivel joint	30
Track frame assembly (excluding piping)	4193
• Track frame	2278
• Swing circle	267
• Idler	101 x 2
• Idler cushion	106 x 2
• Carrier roller	13 x 4
• Track roller	36 x 14
• Final drive (including travel motor and sprocket)	339 x 2
Track shoe assembly Triple shoe (600 mm)	1300 x 2
Boom assembly	1544
Arm assembly	846
Bucket assembly	633
Boom cylinder assembly	176 x 2
Arm cylinder assembly	228

FUNCTION OF OVERHEAT PREVENTION SYSTEM

The overheat prevention system monitors the coolant temperature and hydraulic oil temperature to prevent overheat of the engine and hydraulic component.

It also lowers the pump capacity or engine speed to decrease the load if necessary.

OPERATION OF OVERHEAT PREVENTION SYSTEM

Operating condition	→	Operation and remedy	→	Condition to cancel
Working mode: Travel Hydraulic oil temperature: 95 °C or more	→	Engine speed: Kept as it is Pump flow rate: Throttled	→	Hydraulic oil temperature: below 93 °C • When above conditions are satisfied, it goes back to the state before operation. (automatic restoration)

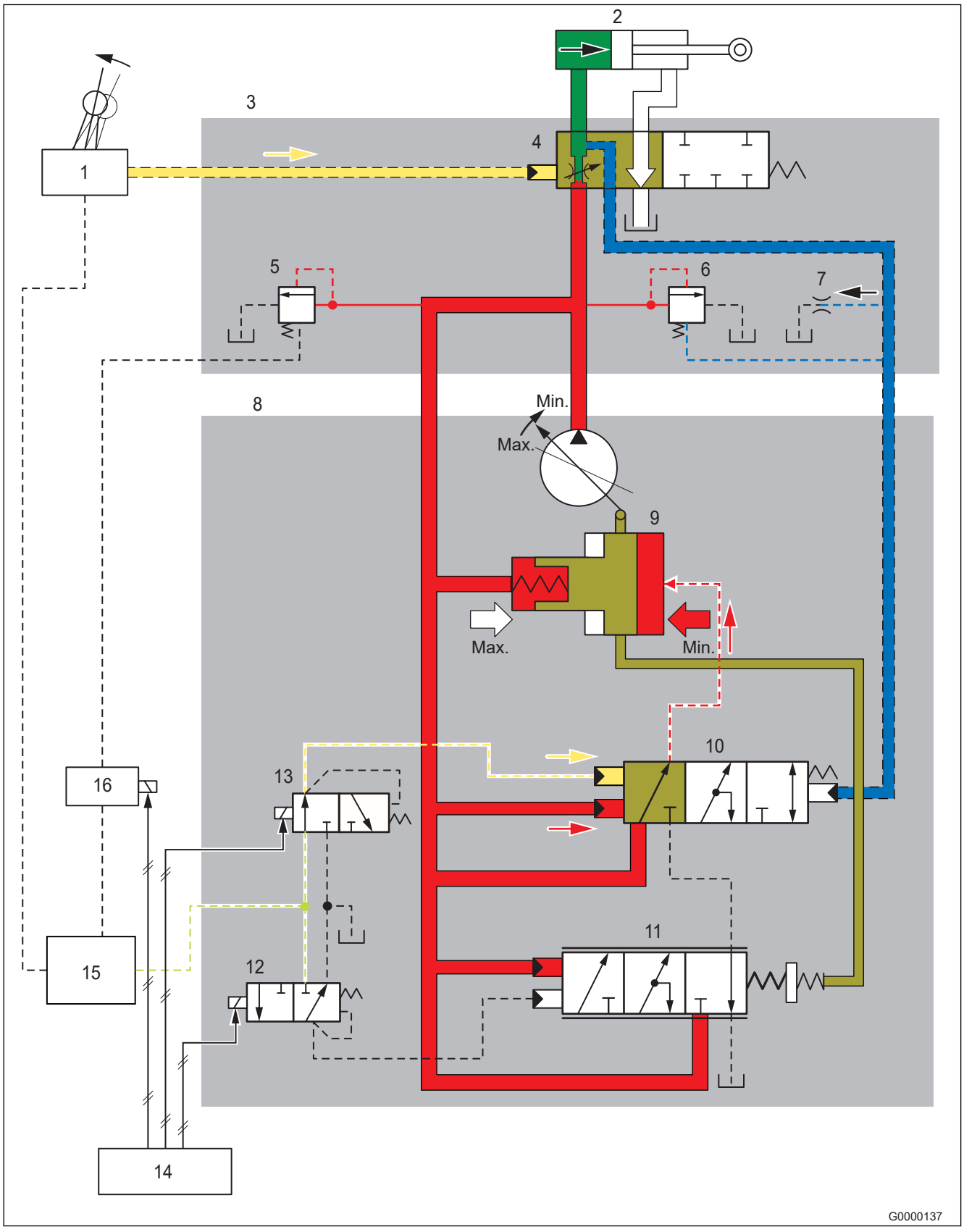
Operating condition	→	Operation and remedy	→	Condition to cancel
Working mode: P, E, ATT-P, or ATT-E mode Coolant temperature: 100 °C or more or Hydraulic oil temperature: 100 °C or more	→	Engine speed: Kept as it is Pump flow rate: Throttled • Lowers the pump absorption torque to decrease the engine load by the torque control signal.	→	Coolant temperature: below 100 °C Hydraulic oil temperature: below 100 °C • When above conditions are satisfied, it goes back to the state before operation. (automatic restoration)

Operating condition	→	Operation and remedy	→	Condition to cancel
Working mode: P, E, ATT-P, or ATT-E mode Coolant temperature: 102 °C or more or Hydraulic oil temperature: 102 °C or more	→	Engine speed: Kept as it is Pump flow rate: Throttled • Lowers the pump absorption torque to decrease the engine load by the torque control signal.	→	Coolant temperature: below 102 °C Hydraulic oil temperature: below 102 °C • When above conditions are satisfied, it goes back to the state before operation. (automatic restoration)

Operating condition	→	Operation and remedy	→	Condition to cancel
Working mode: B mode Coolant temperature: 102 °C or more or Hydraulic oil temperature: 102 °C or more	→	Engine speed: Kept as it is Pump flow rate: Throttled Alarm monitor: Lights up	→	Coolant temperature: below 102 °C Hydraulic oil temperature: below 102 °C • When above conditions are satisfied, it goes back to the state before operation. (automatic restoration)

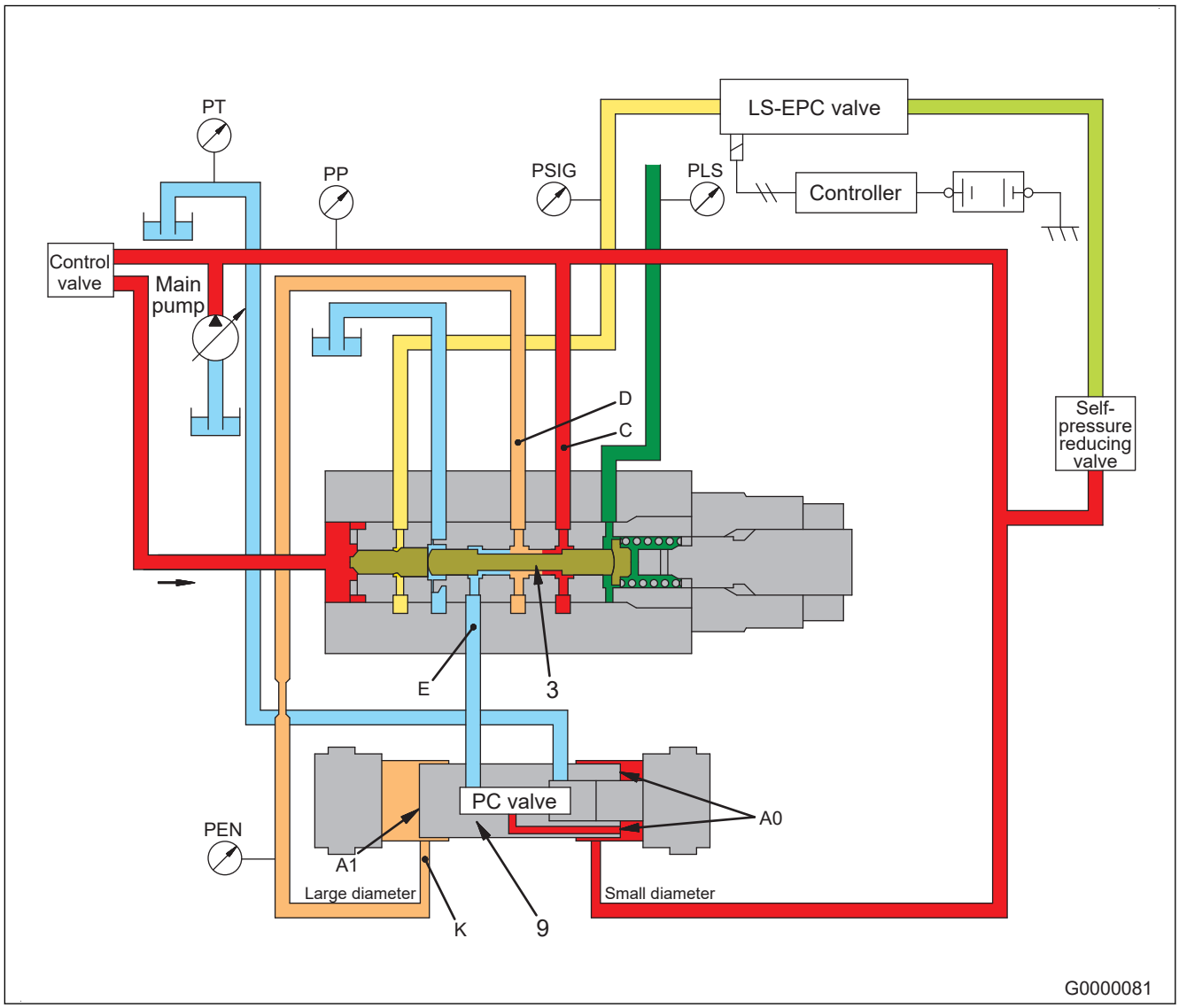
Pin No.	Signal name	Input and output signals
8	Service pressure sensor	Input
9	Water in fuel	Input
10	(*1)	-
11	Pressure sensor (front pump)	Input
12	Pressure sensor (right swing)	Input
13	Pressure sensor (boom LOWER)	Input
14	Pressure sensor (arm IN)	Input
15	Pressure sensor (left travel reverse)	Input
16	(*1)	-
17	Additional hyd oil filter clog switch	Input
18	GND (analog signal)	Input
19	(*1)	-
20	Swing lock switch	Input
21	Model selection 3	Input
22	(*1)	-
23	(*1)	-
24	Starting switch ACC signal	Input
25	(*1)	-
26	CAN_L (KOMNET/r)	Input and output
27	(*1)	-
28	Hydraulic oil temperature sensor	Input
29	(*1)	-
30	Pressure sensor (rear pump)	Input
31	Pressure sensor (left swing)	Input
32	Pressure sensor (boom RAISE)	Input
33	(*1)	-
34	Pressure sensor (left travel forward)	Input
35	Service oil pressure switch	Input
36	(*1)	-
37	(*1)	-
38	Fan speed sensor	Input
39	Swing parking brake cancel switch	Input
40	Model selection 2	Input
41	(*1)	-
42	One-touch power maximizing switch	Input
43	Starting switch ACC signal	Input
44	Pulse signal GND	Input
45	CAN_H (KOMNET/c)	Input and output
46	GND (analog signal)	Input

When the control lever is moved to fine control postiio



When the control lever is returned to the lifting position, the opening area of the spool (4) decreases. Pressure losses increase when the flow passes through the spool, and the LS differential pressure (ΔPLS) increases.

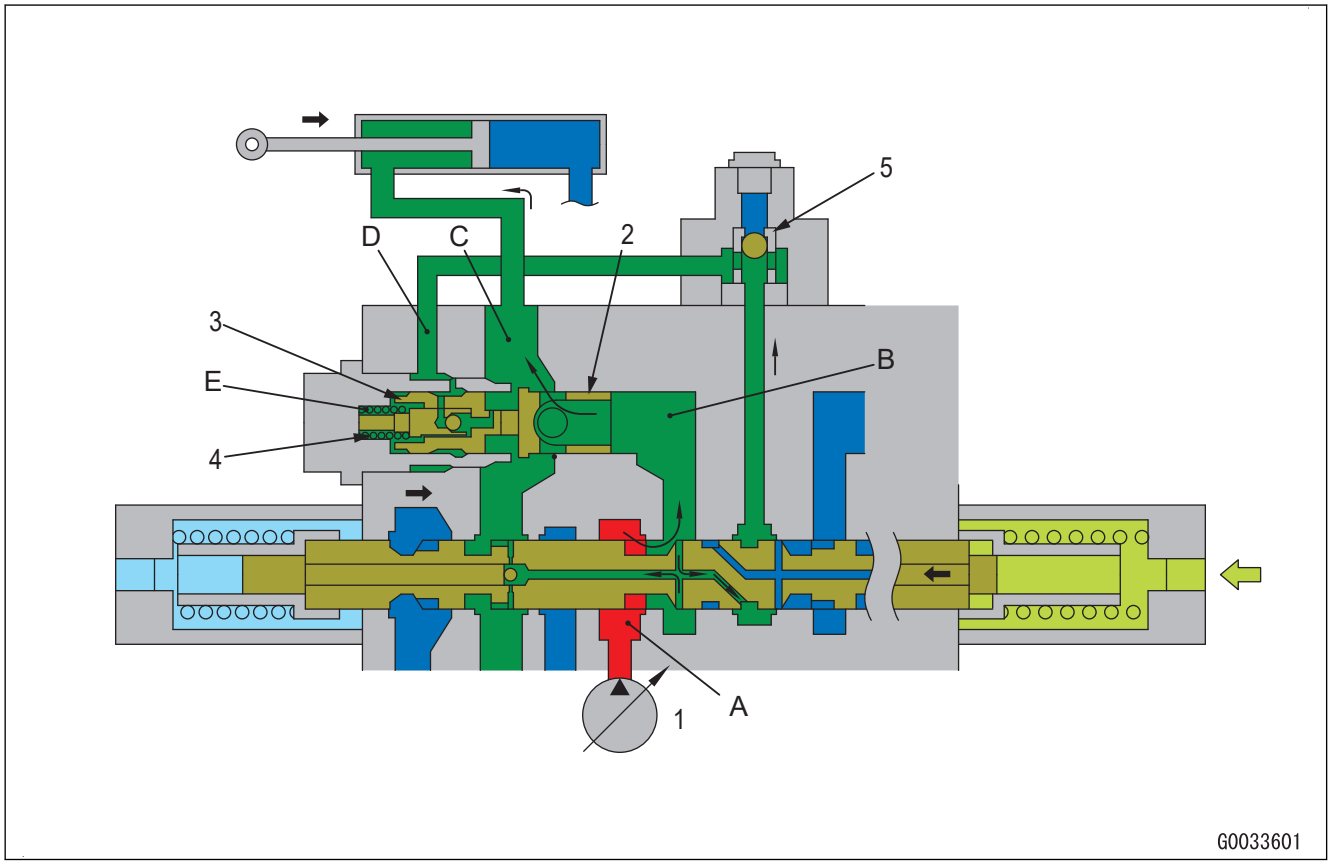
When LS differential pressure is balanced with LS set pressure



When the LS differential pressure (ΔPLS) is equal to the LS set pressure in the normal state of machine operation, the spool (3) stops at the position where the force is balanced. At this time, the port (D) is connected to the port (C) and the port (E). Some of the pump discharged pressure (PP) transmitted from the port (C) flows into the tank through the port (E) and the PC valve. The reduced pressure (PEN) is transmitted to the port (K) of the servo piston (9).

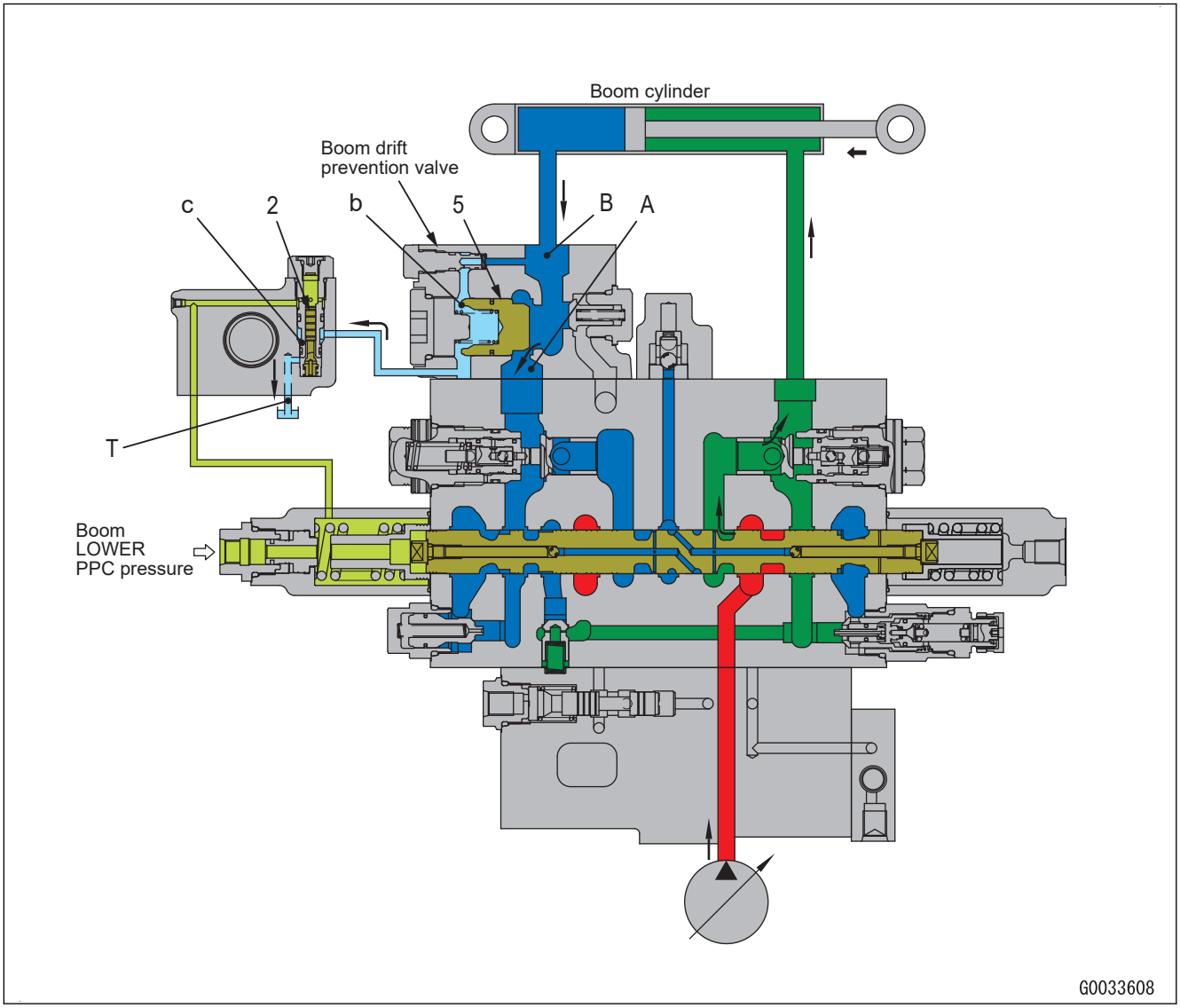
The servo piston (9) stops at the position where the ratio between the area receiving the pressure on the large diameter side and the area receiving the pressure on the small diameter side (A0:A1) is equal to the ratio between the load performance on the small diameter side and the load performance on the large diameter side (PP:PEN). The pump discharged volume is kept constant.

When load pressure is higher than other actuator in combined operation, in single operation, or at maximum load pressure



If load pressure of the port (C) is higher than the LS pressure of the port (D), the ball in the shuttle valve (3) of the pressure compensation valve moves to the left. The spring chamber (E) and the port (C) are connected. The pressure oil from the pump passes through the port (A) to the port (B), overcomes the force of the spring (4), and the valve (2) pushes the shuttle valve (3) to the left. The opening of the port (B) and the port (C) expands

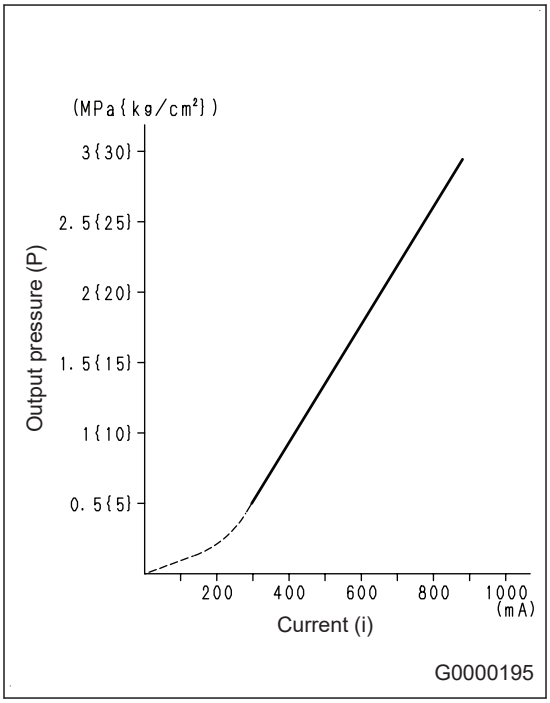
When lowering boom



At boom LOWER, the pilot pressure from the PPC valve pushes the pilot piston (2). The pressurized oil in the cylinder bottom flows from the orifice (c) to the drain port (T) through the orifice (a) and the chamber (b). The chamber (b) is connected to the drain port (T), and the pressure in the chamber (b) decreases. When the pressure in the chamber (b) decreases below the pressure in the port (B), the poppet (5) opens. The pressurized oil from the port (B) flows into the port (A) through the opening of the poppet (5).

FUNCTION OF ATTACHMENT OIL FLOW ADJUSTER EPC VALVE

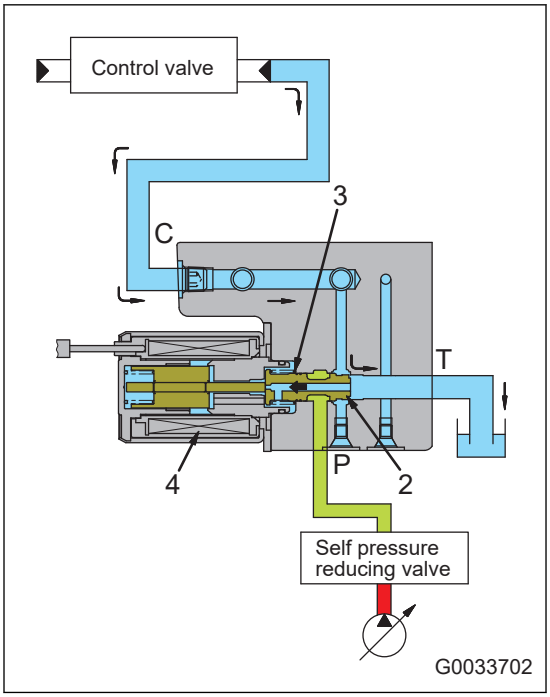
When the signal current (i) from the controller is received, the EPC output pressure in proportion to the magnitude of current is generated.



OPERATION OF ATTACHMENT OIL FLOW ADJUSTER EPC VALVE

When signal current does not flow (coil de-energized)

When the signal current from the controller does not flow into the EPC valve, the coil (4) is de-energized. The spool (2) is pushed to the right by the spring (3). The pressurized oil from the self-pressure reducing valve is blocked. The pressurized oil from the control valve flows into the hydraulic tank through the port (C) and the port (T).



When signal current is minute (coil is energized)

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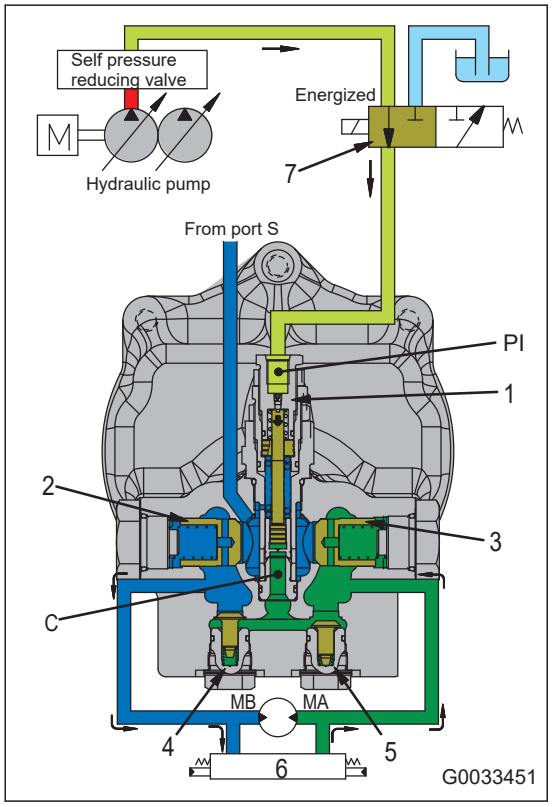
OPERATION OF SUCTION VALVE, SHUTTLE VALVE, AND 2-STAGE SWING RELIEF VALVE OF SWING MOTOR

When starting swing

When you operate the control lever to RIGHT, the pressurized oil from the pump flows into the port (MA) through the control valve (6). When the pressure in the port (MA) increases, starting torque is generated, and the motor starts rotating. The pressurized oil from the motor's outlet returns to the hydraulic tank through the port (MB) and the control valve (6).

During swing acceleration, the pilot pressure from the 2-stage swing relief solenoid valve (7) is applied to the port (PI), reducing the relief flow rate.

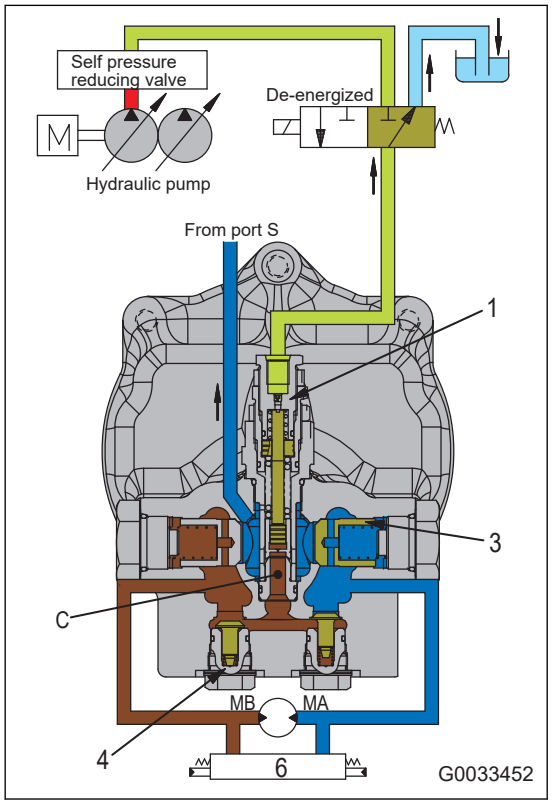


When stopping swing

When you operate the control lever to the NEUTRAL position, the pump stops supplying the pressurized oil to the port (MA). Since the control valve (6) closes the return circuit to the hydraulic tank, the pressure in the port (MB), the motor's outlet, increases. At this time, rotational resistance occurs in the motor, and the brake starts working.

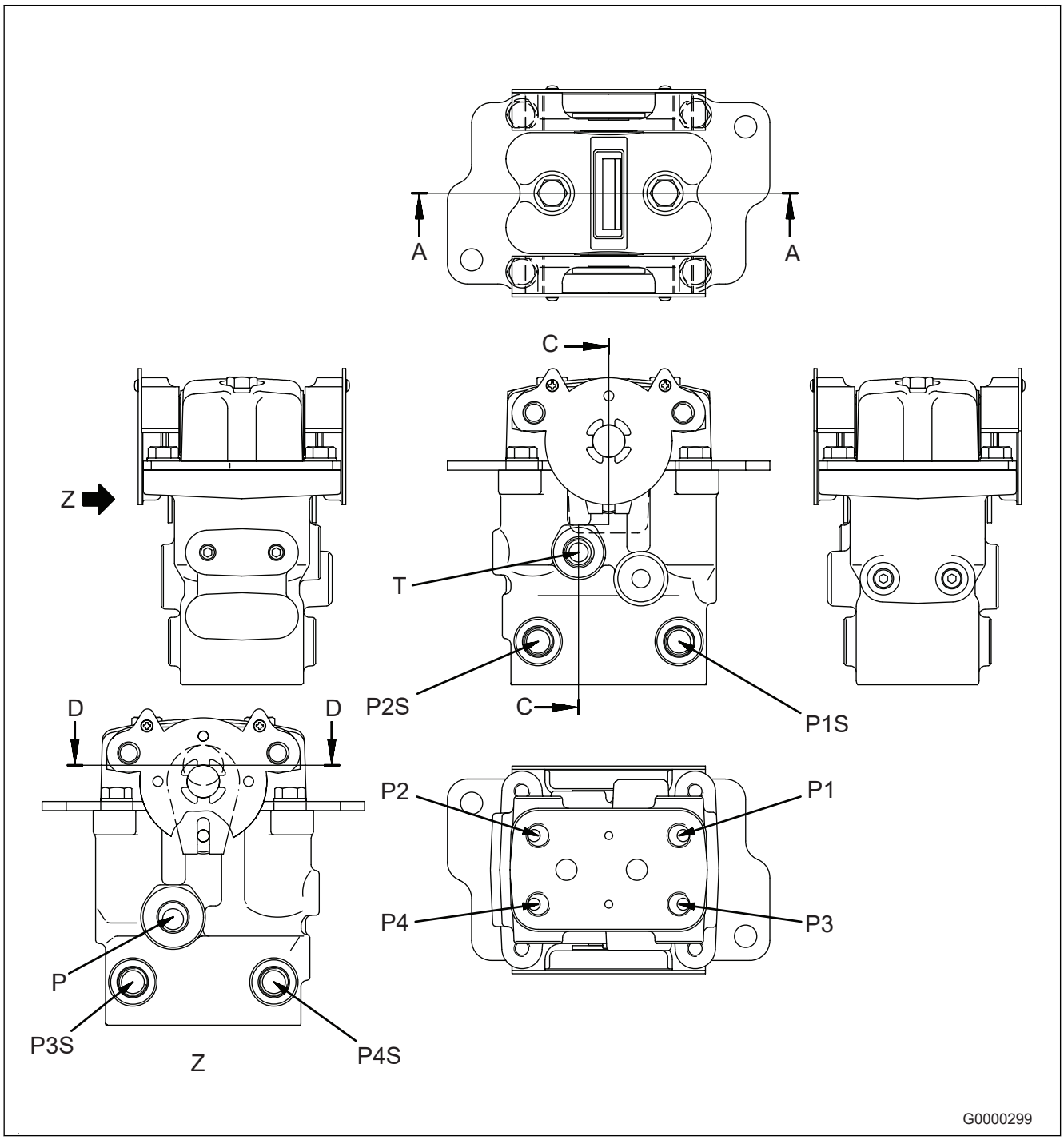
When the pressure in the port (MB) exceeds that in the port (MA), it pushes the shuttle valve (4). The port (MB) connects to the chamber (a). High braking torque acts on the motor, and the motor stops.

The pressure in the chamber (a) becomes equal to or more than the relief pressure. Then, the oil is discharged from the 2-stage swing relief valve (1) into the hydraulic tank through the port (S). While the 2-stage swing relief valve (1) is in operation, relieved pressurized oil and pressurized oil from port (S) are supplied to port (MA) through suction valve (3). As a result, the occurrence of cavitation in the port (MA) is prevented.



STRUCTURE OF TRAVEL PPC VALVE

General view



P: From self-pressure reducing valve
P1: To control valve (left travel reverse port)
P2: To control valve (left travel forward port)
P3: To control valve (right travel reverse port)
P4: To control valve (right travel forward port)
T: To hydraulic tank
P1S: Pressure sensor port
P2S: Pressure sensor port
P3S: Pressure sensor port
P4S: Pressure sensor port

Item	Test condition		Unit	Standard value for new machine	Repair limit
Fuel pressure	• Engine coolant temperature: 60 to 100 °C • Pressure in the low pressure circuit (inlet side of the fuel main filter)	Fuel control dial: MIN (Low idle) position	kPa {kg/cm^2}	500 to 1300 {5.1 to 13.3}	500 to 1300 {5.1 to 13.3}
		At cranking		304 to 1109 {3.1 to 11.3}	304 to 1109 {3.1 to 11.3}
	• Engine coolant temperature: 60 to 100 °C • Pressure difference between inlet side and outlet side of the fuel main filter	Fuel control dial: MAX (High idle) position		Max. 81 {Max. 0.83}	Max. 81 {Max. 0.83}
		At cranking		Max. 81 {Max. 0.83}	Max. 81 {Max. 0.83}
	• Engine coolant temperature: 60 to 100 °C • Pressure in the return circuit	Fuel control dial: MIN (Low idle) position		Max. 18.6 {Max. 0.19}	Max. 18.6 {Max. 0.19}
		At cranking		Max. 18.6 {Max. 0.19}	Max. 18.6 {Max. 0.19}
	• Engine coolant temperature: 60 to 100 °C • Pressure in the negative pressure circuit	Fuel control dial: MAX (High idle) position	kPa {mmHg}	Max. -50.7 {Max. -380}	Max. -40.5 {Max. -305}
Fuel discharged volume, return volume, and leakage	Discharge volume of the supply pump	At cranking	mℓ	Min. 70	Min. 70
	Return volume from the supply pump	Fuel control dial: MIN (Low idle) position		Max. 575	Max. 575
		At cranking		Max. 575	Max. 575
	Leakage from the pressure limiter	Fuel control dial: MIN (Low idle) position		Max. 8	Max. 8
		At cranking	-	Max. 5 drops	Max. 5 drops
	Return volume from the injector	Fuel control dial: MIN (Low idle) position	mℓ	Max. 150	Max. 150
		At cranking		Max. 45	Max. 45

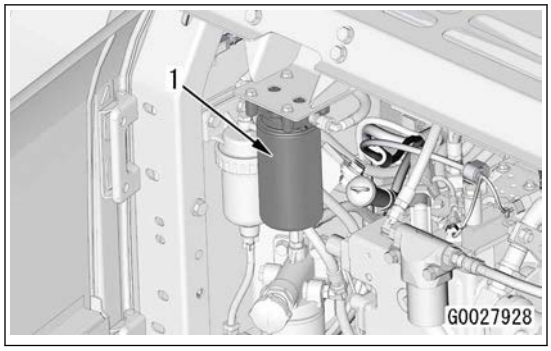
Item	Test condition		Unit	Standard value for new machine	Repair limit
LS-EPC valve outlet pressure (PSIG)	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P mode • Auto-deceleration: OFF • Travel lever: Fine control	Travel speed: Lo	MPa {kg/cm^2}	Approximately 2.45 {Approximately 25}	Approximately 2.45 {Approximately 25}
		Travel speed: Mi		Approximately 0.7 {Approximately 7}	Approximately 0.7 {Approximately 7}
		Travel speed: Hi		0 {0}	0 {0}
Solenoid valve outlet pressure	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position	OFF (de-energized)	MPa {kg/cm^2}	0 {0}	0 {0}
		ON (energized)		Approximately 2.9 {Approximately 30}	Approximately 2.9 {Approximately 30}
PPC valve outlet pressure	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P mode	Control lever and control pedal: NEUTRAL	MPa {kg/cm^2}	0 {0}	0 {0}
		Control lever and control pedal: Full stroke		Approximately the same as the control circuit oil pressure	Approximately the same as the control circuit oil pressure

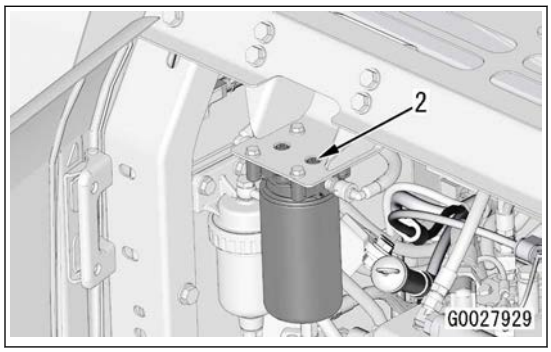
Swing

Item	Test condition	Unit	Standard value for new machine	Repair limit
Overrun when stopping swing	• Hydraulic oil temperature: 45 to 55 °C • Fuel control dial: MAX (High idle) position • Working mode: P mode • Measuring posture See:"MACHINE POSTURE AND PROCEDURES TO MEASURE PERFORMANCE", "SWING 1". How much angle swing circle is displaced from the original position when it stops after one swing	° (angle)	Max. 100	Max. 130

Symbol	Part number	Part name	Q'ty	Remarks
B	07379-00640	Flange	2	Size: 06
C	07376-70522	Plug	2	Size: 05
D	07376-70422	Plug	1	Size: 04
E	Commercially available	Plate	1	Size: 250 x 260 x 32
F	Commercially available	Pin	1	Size: φ 200 x 80

2. Remove the fuel pressure pickup plug (2) on the inlet of the fuel main filter (1).

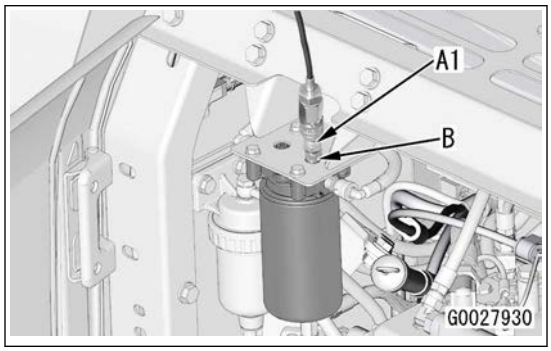


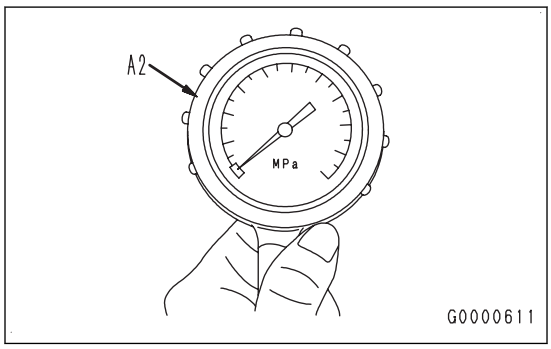


3. Install the adapter B. Insert the O-ring C into the mounting portion.

   Adapter B: 32±4 Nm {3.26±0.41 kgm}

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





Setting measurement conditions

5. Start the engine.
6. Select and show "Pre-defined Monitoring" (01/11). For details, see "SETTING AND OPERATION OF MACHINE MONITOR".

Check procedure

7. Test the pressure when the fuel control dial is set in the MAX (high idle) position.

   NOTICE

   If the engine cannot be started, you can do diagnostic tests while cranking the engine by using the starting motor. Do not crank the engine continuously for 20 seconds or more to protect the starting motor.

Restoring the machine

Test and adjust oil pressure in work equipment, swing, and travel circuits

Test and adjust the oil pressure in work equipment, swing, and travel circuits, according to the procedure below.

TOOLS TO TEST AND ADJUST OIL PRESSURE IN WORK EQUIPMENT, SWING, AND TRAVEL CIRCUITS

Symbol		Part number	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5110	Gauge	1	Pressure range: 0 to 60 MPa
	2	799-101-5130	Gauge	1	Pressure range: 0 to 6 MPa
B		790-261-1205	Digital hydraulic tester	1	Pressure range: 70 MPa
C		799-101-5220	Nipple	2	Size: M10 x 1.25 mm
D		07002-11023	O-ring	2	
E		Commercially available	Plate	1	Size: 250 x 260 x 32
F		Commercially available	Pin	1	Size: φ 200 x 80

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

See STANDARD VALUE TABLE, "STANDARD VALUE TABLE FOR MACHINE" for standard values.

When the oil flow is divided at pumps, the front and rear pumps act to each actuator as shown in the table below. The valve to be released differs depending on the actuator.

When the pressure is released singly from the work equipment and swing circuits, the pressurized oil flows from the pumps are merged. When the pressure in the travel circuit is released singly, the pressurized oil flows from the pumps are divided.

The actuators in the table below are arranged in the order that the control valves are viewed from the front of the machine (the service valve of the actuator when 1ATT is installed).

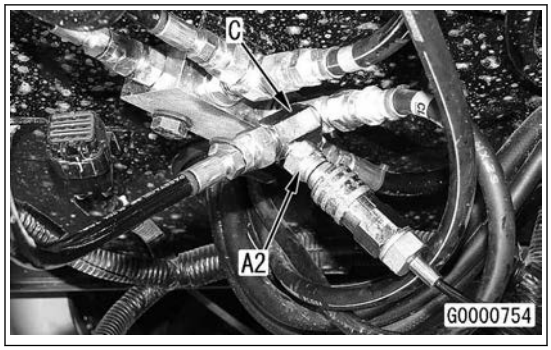
Pump	Actuator	Valve to be relieved
Rear	(R unload valve) (R main relief valve)	
	Service	Safety valve (for service)
	Bucket	R main relief valve
	L.H. travel	R main relief valve
	Boom	R main relief valve
(Merge-divider valve) (Travel junction valve)		
Front	(Self-pressure reducing valve)	
	Swing	Swing motor safety valve
	R.H. travel	F main relief valve
	Arm	F main relief valve
	(F unload valve) (F main relief valve)	
(Safety valve for hydraulic drift prevention valve) (Back pressure valve)		

Test oil pressure in work equipment, swing, and travel circuits

Method for testing the unload pressure by using machine monitor

1. Start the engine.

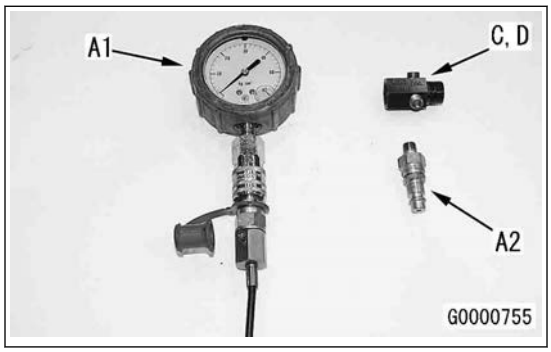
2. Install the adapter C or the adapter D, and connect the disconnected hoses.



3. Install the nipple A2 to the adapter C or the adapter D, and connect it to the gauge A1.

   REMARK

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



Setting measurement conditions

4. Start the engine.
5. Select and display the monitoring items below on "Monitoring Selection Menu" by referring to the "SET AND OPERATE MACHINE MONITOR".

   Monitoring code: 04401 "Hydraulic Oil Temperature"

   Monitoring code: 02300 "Solenoid Valve 1"

   Monitoring code: 02301 "Solenoid Valve 2"
6. Set the hydraulic oil temperature within the range of test conditions.

   Hydraulic oil temperature: 45 to 55 ℃
7. Turn the fuel control dial to the MAX (high idle) position.

Doing diagnostic tests

8. Move the lock lever to FREE position.
9. Operate each control lever and switches, and measure the outlet pressure when the solenoid valve is energized and de-energized.

   REMARK

   - When each control lever and switches are operated, the display of the machine monitor also changes.
   - For the conditions for turning the solenoid valve ON or OFF, see "OPERATING CONDITION OF SOLENOID VALVE".

Restoring the machine

1. Stop the engine.

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

   ⚠ **Release the remaining pressure by referring to "Release remaining pressure from hydraulic system".**
2. Remove the adapter C or the adapter D.
3. Install the oil pressure hose, and restore the machine.

2. If you cannot visually identify persons, loosen the mounting bolt (2) to adjust the angle.

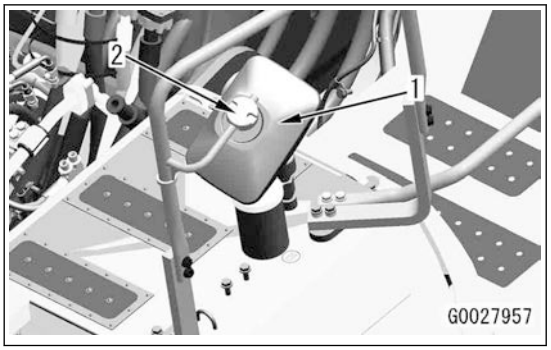
   The specified position of the mirror (1) is described below.

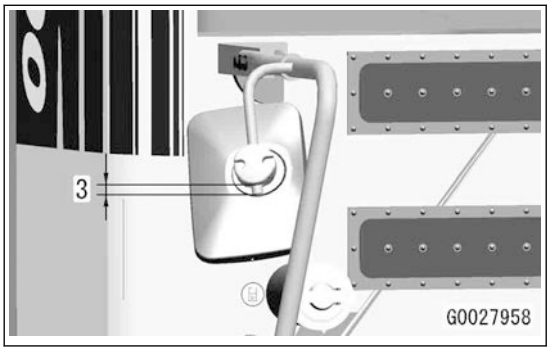
   Tightening torque of the mounting bolt (2): 6.0 to 7.0 Nm {0.61 to 0.71 kgm}

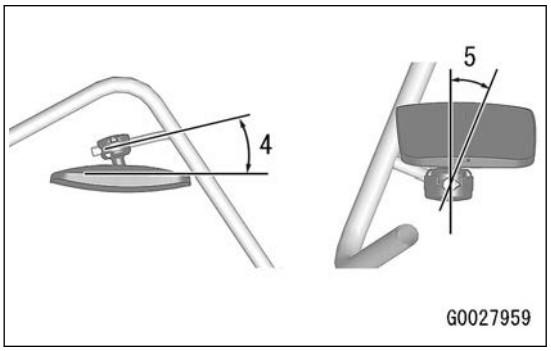
   Mounting position (3): 55 mm

   Mounting angle (4): 5°

   Mounting angle (5): 27°

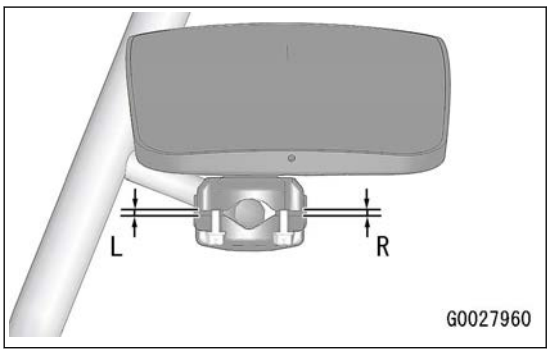






NOTICE

- **Tighten the bolts on the right and left sides of the brackets alternately, and make sure the clearance (L) and the clearance (R) are equal.**
- **Tighten the mounting bolt with the specified torque. If it is tightened too much, the bracket can break.**



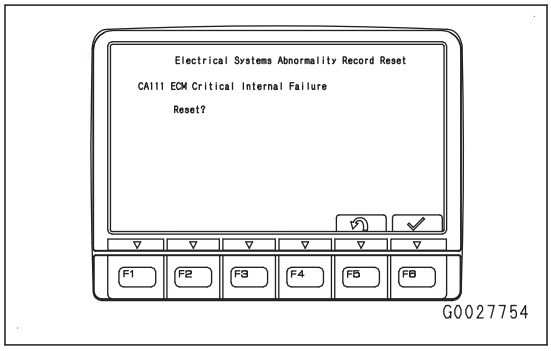
3. When the "Electrical Sys Abnormality Rec Reset" screen is shown, operate the function switches to delete the record.

   F5: Returns the screen to the "Electrical Sys Abnormality Record" screen (deletion mode)

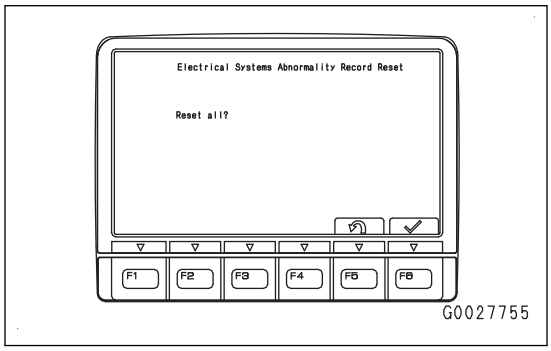
   F6: Deletes abnormality records

   REMARK

   - This is the screen when individual abnormality records are going to be deleted.



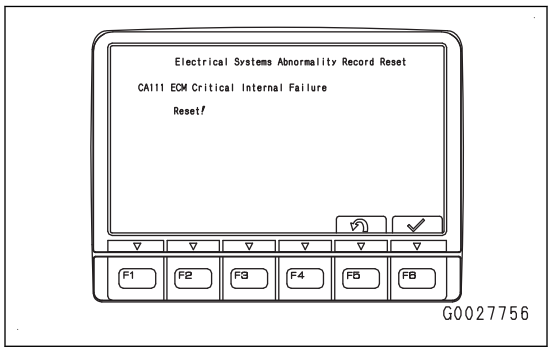
   - This is the screen when all the abnormality records are going to be deleted.



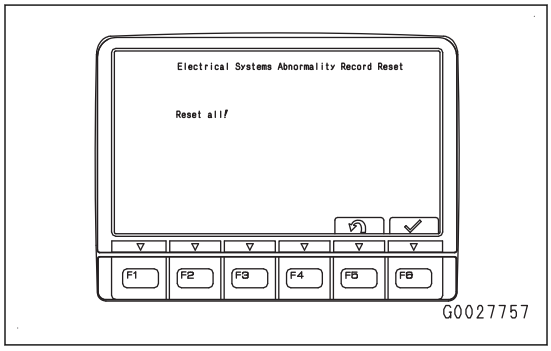
4. After the abnormality records were deleted, the screen notifying the end of the deletion is shown. Then, the screen returns to the "Electrical Sys Abnormality Record" (deletion mode) screen.

   REMARK

   - This is the screen displayed after the individual abnormality records were deleted.



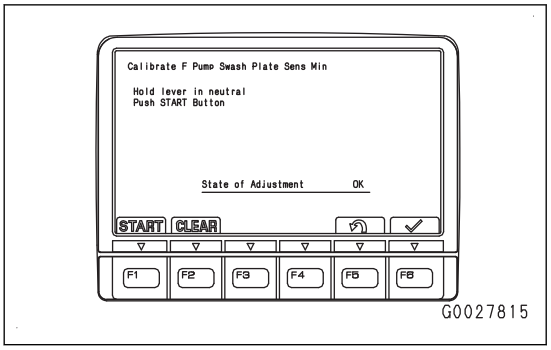
   - This is the screen displayed when all abnormality records have been deleted.



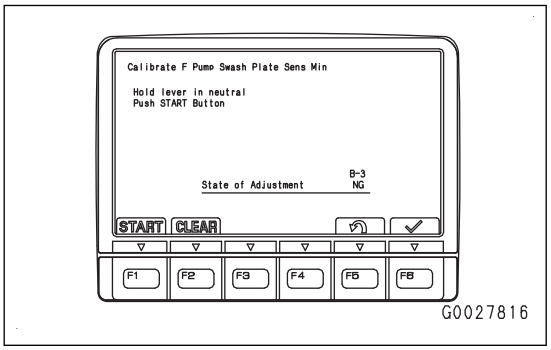
CHECK MAINTENANCE RECORD

The machine monitor records the maintenance information of the filters and oils. Do the operations that follow to display and check.

7. When the Min calibration was successful, "OK" is displayed in "State of Adjustment". Push F6. The screen returns to the "Adjustment" screen.



If the Min calibration was failed, "NG" and failure code are shown on the "State of Adjustment". See the failure code table, and find out the cause of failure. Push F5. The screen returns to the "Adjustment" screen. Do the calibration again.



Failure code table

Failure code	Object			Content	Action
	Min calibration	Max calibration	Pump calibration		
A-1	●	●	●	The engine speed signal is 0 rpm.	Check that the engine is started.
A-2	●	●	●	Hydraulic oil temperature is low.	Check hydraulic oil temperature (40 °C or below).
A-3	●	●	●	Hydraulic oil temperature is high.	Calibration of the swash plate sensor: Check hydraulic oil temperature (90 °C or above). Calibration of the pump: Check hydraulic oil temperature (60 °C or above).
A-4	●	●	●	Overheating	Check engine coolant temperature and hydraulic oil temperature.
A-6	●	●	●	Abnormal pump pressure sensor (F, R)	Test the pump pressure sensor.
A-7	●	●	-	Abnormal pump swash plate sensor (F, R)	Test pump swash plate sensor
A-8	-	-	●	Abnormal pressure sensor (arm IN)	Test the pressure sensor (arm IN).
A-9	-	-	●	Abnormal PC-EPC valve	Test the PC-EPC valve.
A-A	-	-	●	Abnormal CAN communication (engine, monitor, pump)	Test CAN communication.
A-B	-	-	●	Abnormal pressure sensor (bucket CURL)	Test the pressure sensor (bucket CURL).
B-1	●	-	-	Pump pressure on the calibration side over a specified value	Test the relief valve and the pump.

PM CLINIC CHECK SHEET: PC210-10M0

Engine: SAA6D107E-1

Machine model	Serial number	Service meter	User name	Date of inspection	Inspector
PC210-10M0					

Engine

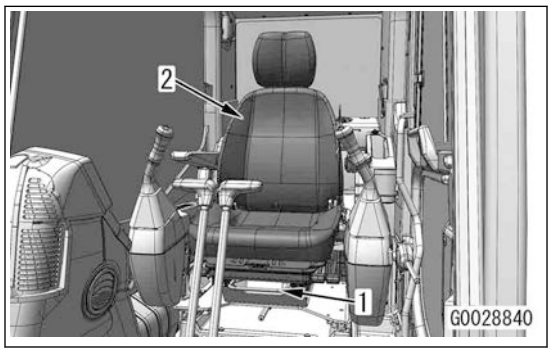
Item	Testing conditions	Unit	Standard value for new machine	Repair limit	Measured value	Good	No good
Engine speed at high idle (*1)	• Engine coolant temperature: 60 to 100 °C • Hydraulic oil temperature: 45 to 55 °C • Working mode: P Mode • Fuel control dial: MAX (High idle) position • Each control lever and control pedal: NEUTRAL • Auto-deceleration: OFF • Swing lock switch: ON	rpm	(1780 to 1920)	(1780 to 1920)			
Engine speed at low idle (*1)	• Engine coolant temperature: 60 to 100 °C • Hydraulic oil temperature: 45 to 55 °C • Working mode: P Mode • Fuel control dial: MIN (Low idle) position • Each control lever and control pedal: NEUTRAL	rpm	(1000 to 1100)	(1000 to 1100)			
Engine speed when the oil pressure at 2-pump relief (*1)	• Engine coolant temperature: 60 to 100 °C • Hydraulic oil temperature: 45 to 55 °C • Working mode: P Mode • Swing lock switch: ON • Fuel control dial: MAX (High idle) position • Oil pressure in arm IN circuit is relieved	rpm	(1600 to 1800)	(1600 to 1800)			

CONNECT ADAPTER TO TROUBLESHOOT KOMTRAX TERMINAL

REMOVE OPERATOR SEAT

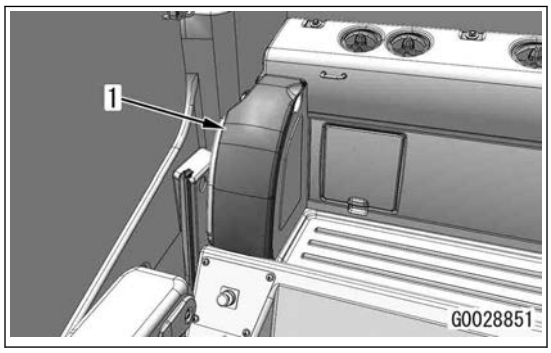
Operator's seat

1. Pull the lever (1). Move the operator's seat (2) forward.

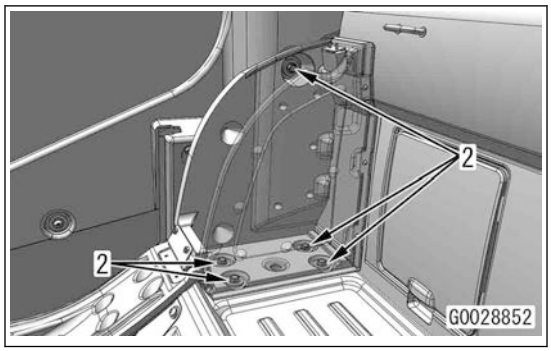


Cover

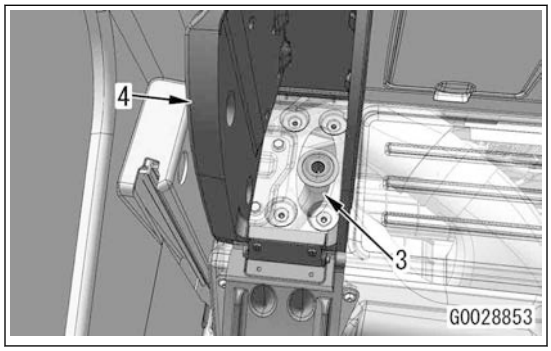
2. Open the cover (1).



3. Remove the bolts (2) (5 pieces).
   Tool: Impact wrench, socket
   Bolt (2): Width across flats 10 mm, M6



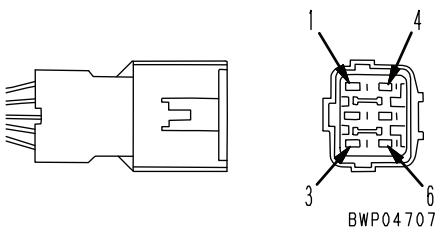
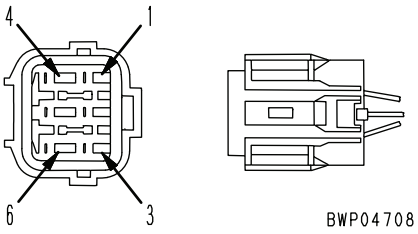
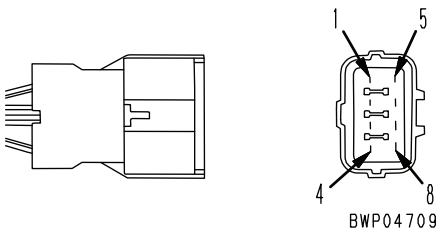
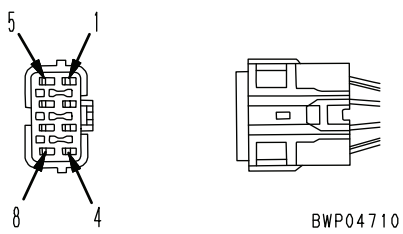
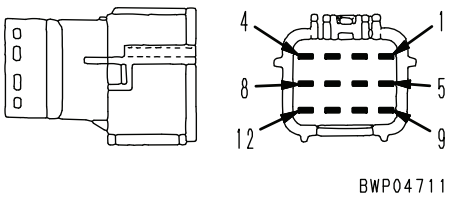
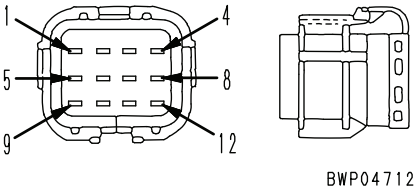
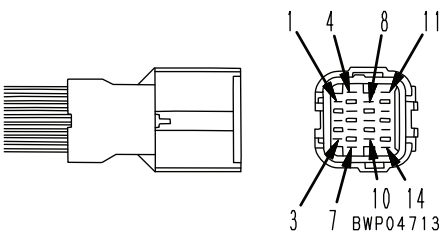
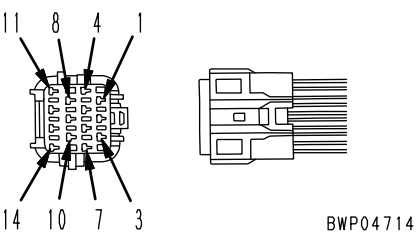
4. Disconnect the hose (3). Remove the box (4).



Connector (from)							Connector (to)		Diameter and color of wire
Connector (terminal) No.	Address		Equipment name	Type	Number of pins	Pin number	Connector (terminal) No.	Pin number	
	CONNECTOR LAYOUT	Wiring harness diagram							
AC95 (male)	C24	-	Intermediate connector (floor harness) (when GW controller is connected)	S090	22	1	CK05	1	1.25R
						2	CK05	3	1.25R
						3	CK05	2	1.25B
						4	CK05	4	1.25B
						5	CK05	24	0.5LR
						6	CK05	62	0.5GW
						7	CK05	63	0.85RL
						8	CK05	41	0.5L
						9	CK05	22	0.5RW
						10	CK05	45	0.5W
						11	CK05	64	0.5L
						12	CK05	7	0.5WB
						13	CK05	26	0.5LB
						14	CK05	20	0.5L
						15	CK05	66	0.5WB
						16	CK05	9	0.5LB
						17	CK05	58	0.5GW
						20	G (when GW controller is connected)	-	2RL
						21	F (when GW controller is connected)	-	2B
						22	CK08	2	1.25G
AF	-	M278	Joint	-	-	-	A17 (female)	3	0.85B
							LC	-	1.25B
							T06	-	1.25B
AG	-	-	Alternator terminal G	Terminal	1	-	E12 (male)	2	-
AL	-	-	Alternator terminal L	Terminal	1	-	E12 (male)	1	-

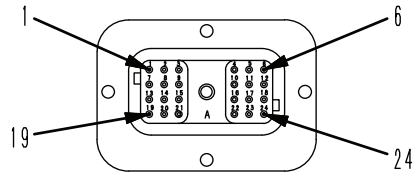
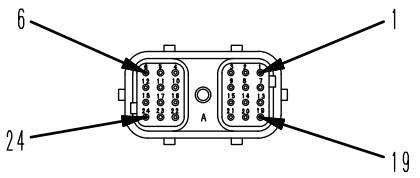
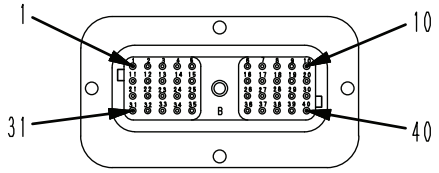
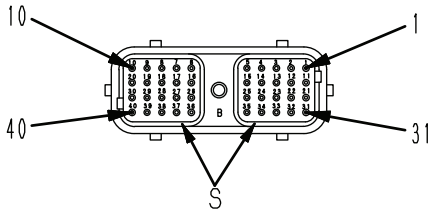
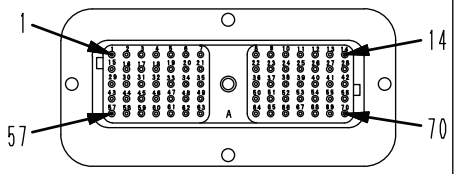
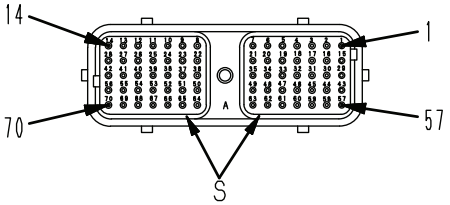
Connector (from)							Connector (to)		Diameter and color of wire
Connector (terminal) No.	Address		Equipment name	Type	Number of pins	Pin number	Connector (terminal) No.	Pin number	
	CONNECTOR LAYOUT	Wiring harness diagram							
FP	-	K204	Joint	-	-	-	J04	4	0.85B
							LE	-	0.85B
							S25 (female)	15	0.5B
FQ	-	G228	Joint	-	-	-	BJ	-	0.85GR
							L03	2	0.85GR
							L19	1	1.25GR
FR	-	K215	Joint	-	-	-	CP02	100	0.85RL
							J05	20	1.25RL
							N08	4	1.25RL
FS	-	J212	Joint	-	-	-	K01	2	0.85WL
							S25 (female)	1	0.85GR
							S25 (female)	7	0.85GR
FT	-	K216	Joint	-	-	-	J04	8	1.25B
							N08	9	1.25B
							N08	12	1.25B
FUEL RAIL PRESS.	E36	-	Common rail pressure sensor	BOSCH	3	1	CE01	47	0.85B
						2	CE01	25	0.85G
						3	CE01	37	0.85W
FW	-	E233	Joint	-	-	-	F01	8	2LR
							R05	3	1.25LR
							R10	3	1.25LR
FX	-	K274	Joint	-	-	-	A13 (male)	1	1.25R
							L02	1	1.25R
							R05	5	1.25R
G	-	-	Joint (L.H. console wiring harness)	-	-	-	H16 (male)	4	0.85GY
							M23	1	0.85GY
							S11	1	0.85GY
G	-	-	Joint (when GW controller is connected)	-	-	-	AC95 (male)	20	2RL
							CK07	1	1.25RL
							CK08	1	1.25RL

Connector (from)							Connector (to)		Diameter and color of wire
Connector (terminal) No.	Address		Equipment name	Type	Number of pins	Pin number	Connector (terminal) No.	Pin number	
	CONNECTOR LAYOUT	Wiring harness diagram							
P15	-	I415	R.H. attachment control pedal reverse tilt PPC oil pressure switch (service PPC oil pressure switch)	X	2	1	A (service PPC oil pressure switch)	-	0.85L
						2	B (service PPC oil pressure switch)	-	0.85B
P15	-	N413	R.H. attachment control pedal reverse tilt PPC oil pressure switch (2ATT service PPC oil pressure switch)	X	2	1	A (2ATT service PPC oil pressure switch)	-	0.85L
						2	B (2ATT service PPC oil pressure switch)	-	0.85B
P16	-	L415	Left attachment control pedal forward tilt PPC oil pressure switch	X	2	1	C (2ATT service PPC oil pressure switch)	-	0.85L
						2	D (2ATT service PPC oil pressure switch)	-	0.85B
P17	I22	H287	Air conditioner high-low pressure switch	S090	2	1	AC01	6	0.5GB
						2	J04	12	0.5B
P18	G12	G339	Air conditioner outside air temperature sensor	090	2	1	AC01	7	0.85BrR
						2	AC01	8	0.85RW

No. of pins	SWP type connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
6			799-601-7050 (T-adapter)
	Part No. : 08055-10681	Part No. : 08055-10691	
8			799-601-7060 (T-adapter)
	Part No. : 08055-10881	Part No. : 08055-10891	
12			799-601-7310 (T-adapter)
	Part No. : 08055-11281	Part No. : 08055-11291	
14			799-601-7070 (T-adapter)
	Part No. : 08055-11481	Part No. : 08055-11491	

G0026132

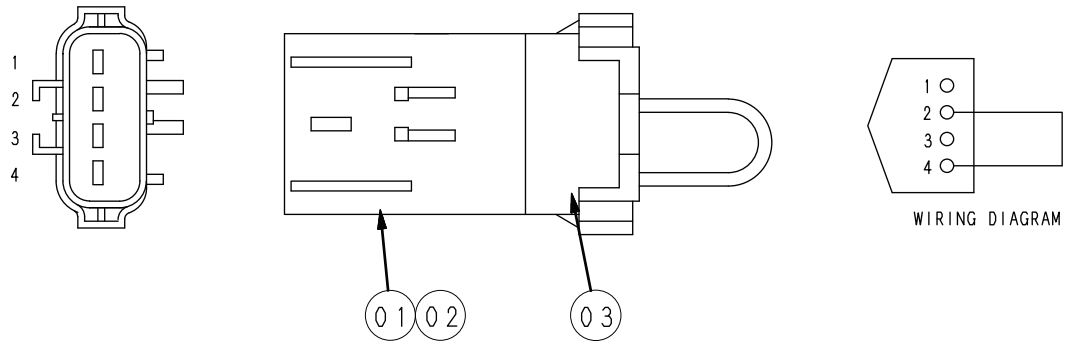
[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DRC12, 16 Series connector		
	DRC12:Male pin (female housing)	DRC16:Female pin (male housing)	Testing connection use special tool Part No.
24			–
	–	–	
40			–
	–	Seal (S) Part No. : 17A-06-41830	
70			–
	–	Seal (S) Part No. : 17A-06-41840	

G0026157

DRAWING OF SHORT CIRCUIT ELECTRICAL CONNECTOR FOR TROUBLESHOOTING

Short socket adapter for KDPF differential pressure sensor



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

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

G0026176

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
03	WIRE	PURCH	1		AVSO.5 G
02	TERMINAL	PURCH	1		FRAMATOME 54001819
01	BODY	PURCH	1		FRAMATOME 54200414

HEAT TREATMENT	MATERIAL
----	SEE DWG
PART NAME	Q'TY
CONNECTOR	----
799T-601-4611 △	

REMARK

- This is used for the troubleshooting for failure code [CA1883].
- The KDPF differential pressure sensor and KDPF outlet pressure sensor are integrated.
- This is included in kit part number 799-A65-4600.

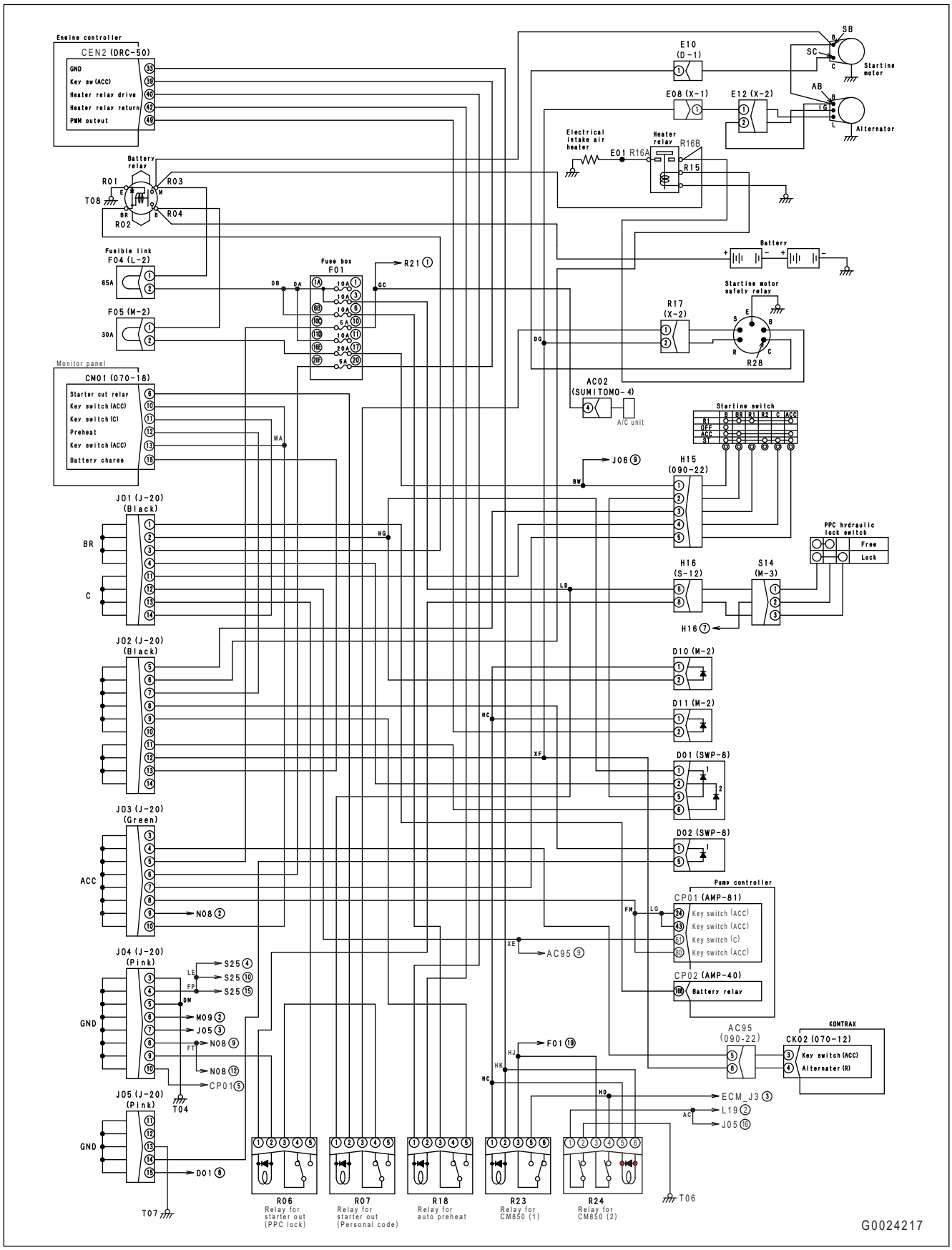
<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector AC01 and connector P18.
3. Connect the T-adapter to the female side of one of the connectors.
4. Measure the resistance.
5. Does the measurement result match with the judgment criteria?
<table><tr><th>Item</th><th>Measurement position/condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between AC01 (female) (8) or P18 (female) (2) and ground</td><td>Min. 1 MΩ</td></tr></table></td><td>YES</td><td>• The wiring harness has no ground faults.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a ground fault.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector AC01 and connector P18.
3. Connect the T-adapter to the female side of connector AC01.
4. Measure the resistance.
5. Does the measurement result match with the judgment criteria?
<table><tr><th>Item</th><th>Measurement position/condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between AC01 (female) (8) and each pin other than (8)</td><td>Min. 1 MΩ</td></tr></table></td><td>YES</td><td>• The wiring harness has no short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Air conditioner controller</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Replace the air conditioner controller.
3. Turn the starting switch to the ON position.
4. Delete the abnormality record of the electrical system.
REMARK
For the operating method, see TESTING AND ADJUSTING, "Setting and operation of machine monitor", "Method for confirming abnormality record (electrical systems)".
5. Turn the starting switch to the OFF position.
6. Shut down the engine controller. (See "PROCEDURE FOR TROUBLESHOOTING" in this chapter.)
7. Turn the starting switch to the ON position.
8. Check the abnormality record.
9. Is this failure code shown in the record?</td><td>YES</td><td>• The removed air conditioner controller is normal.
• Restore the removed air conditioner controller.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>The repair is completed.</td></tr>
</table>

FAILURE CODE [AB00KE]

Details of failure	While the engine is running, the voltage from alternator drops. The machine monitor senses a low charge voltage.
Action level	L03
Action of controller	Shows the battery charge level monitor in red on the machine monitor.
Phenomenon on machine	If machine is used as it is, the battery will possibly be not charged.
Associated information	**Monitoring code** The battery voltage can be monitored. (Code: 04300)

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors.
REMARK
For details of checking method, see "RELATED INFORMATION TO TROUBLESHOOT", "CHECKS BEFORE TROUBLESHOOTING", "Electrical equipment".
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Diode</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector D01.
3. Connect the T-adapter to the female side of connector D01.
4. Measure the continuity.
5. Does the measurement result agree with the standard value?
<table>
<tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr>
<tr><td rowspan="2">Continuity</td><td>Between D01 (male) (6) (+) and (2) (-)</td><td>Continuity</td></tr>
<tr><td>Between D01 (male) (2) (+) and (6) (-)</td><td>No continuity</td></tr>
</table></td><td>YES</td><td>• The diode is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The diode is defective.
• Replace the diode.
• Go to "Confirmation of repair".</td></tr>
</table>

Circuit diagram associated with engine controller power supply



<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Hot short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector COOLANT TEMP.
3. Connect the T-adapter to the female side of connector COOLANT TEMP.
4. Turn the starting switch to the ON position.
5. Measure the voltage to troubleshoot.
6. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between COOLANT TEMP (female) (B) and (A)</td><td>Max. 5.25V</td></tr></table></td><td>YES</td><td>• The wiring harness has no hot short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a hot short circuit.
• Repair or replace the wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Reconfirmation of inspection item</td><td rowspan="2">1. Do the preceding troubleshooting again.
2. Have you identified the cause when the inspection is done again?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>• The engine controller can be defective.
• Replace the engine controller.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Confirmation of repair</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Restore the machine. Install all the configuration equipment and connect them.
3. Turn the starting switch to the ON position.
4. Delete the abnormality record of the electrical system.
REMARK
For the operating method, see TESTING AND ADJUSTING, "SETTING AND OPERATION OF MACHINE MONITOR", "CHECK ABNORMALITY RECORD (ELECTRICAL SYSTEMS)".
5. Turn the starting switch to the OFF position.
6. Shut down the engine controller. (See "PROCEDURE FOR TROUBLESHOOTING" in this chapter.)
7. Turn the starting switch to the ON position.
8. Check the abnormality record.
9. Is this failure code shown in the record?</td><td>YES</td><td>Return to the first inspection item.</td></tr>
<tr><td>NO</td><td>The repair is completed.</td></tr>
</table>

FAILURE CODE [CA227]

Details of failure	A high voltage error occurs in the sensor power supply 2 (5V) circuit.
Action level	L03
Action of controller	The engine controller ignores the signals from the common rail pressure sensor, charge (boost) pressure sensor, and Bkup speed sensor. The engine controller fixes the values at the one before detecting the error, and runs the engine.
Phenomenon on machine	The engine output is reduced.
Associated information	-

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors.
REMARK
For details of the inspection method, see "RELATED INFORMATION TO TROUBLESHOOT", "CHECKS BEFORE TROUBLESHOOTING", "Electrical equipment".
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Hot short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector FUEL RAIL PRESS, BOOST PRESS & IMT, CAM SENSOR. Connect the T-adapter to one of the female sides.
3. Turn the starting switch to the ON position to troubleshoot.
4. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between FUEL RAIL PRESS (female) (3) and (1), BOOST PRESS & IMT (female) (2) and (4), or CAM SENSOR (female) (1) and (2)</td><td>4.75 to 5.25V</td></tr></table></td><td>YES</td><td>• The wiring harness has no hot short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a hot short circuit.
• Repair or replace the wiring harness.
• Go to "Confirmation of repair".</td></tr>
</table>

FAILURE CODE [CA325]

Details of failure	An open circuit or short circuit occurs in the injector #6 circuit.
Action level	L03
Action of controller	None in particular.
Phenomenon on machine	• The engine output is reduced. • The engine does not run stably.
Associated information	**Reference information** • While engine runs normally, pulses of approximately 24 V are supplied to the injector (+) side. The voltage of pulses cannot be measured with a multimeter. • If a ground fault or hot short circuit is sensed, failure codes [CA323], [CA325], and [CA332] are shown at the same time.

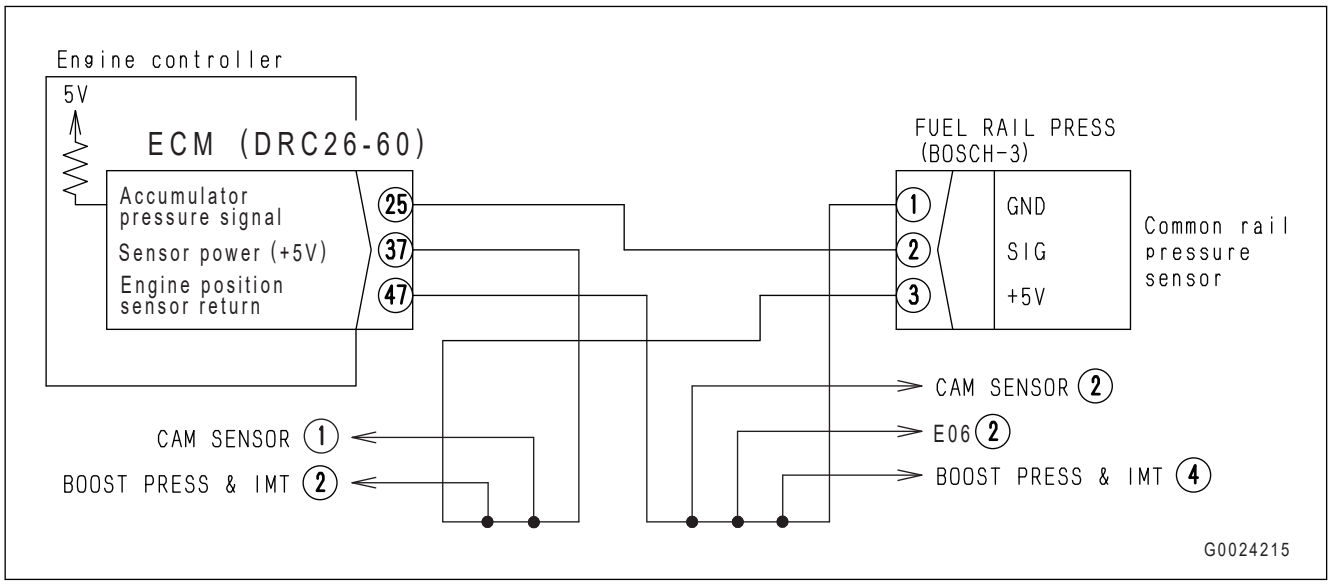
<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors.
REMARK
For details of checking method, see "RELATED INFORMATION TO TROUBLESHOOT", "CHECKS BEFORE TROUBLESHOOTING", "Electrical equipment".
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Injector #6</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector INJECTOR CYL 5 & 6.
3. Connect the T-adapter to the female side of connector INJECTOR CYL 5 & 6.
4. Measure the resistance to troubleshoot.
5. Does the troubleshooting result agree with the standard value?
<table>
<tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr>
<tr><td rowspan="2">Resistance</td><td>Between INJECTOR CYL 5 & 6 (male) (2) and (1)</td><td>Max. 2 Ω</td></tr>
<tr><td>Between INJECTOR CYL 5 & 6 (male) (2) and ground</td><td>Min. 100 kΩ</td></tr>
</table></td><td>YES</td><td>• Injector #6 is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• Injector #6 is defective.
• Replace injector #6.
• Go to "Confirmation of repair".</td></tr>
</table>

FAILURE CODE [CA386]

Details of failure	A high voltage error occurs in the sensor power supply 1 (5V) circuit.
Action level	L03
Action of controller	The engine controller ignores the signals from the ambient pressure sensor. The engine control sets the ambient pressure to a fixed value (52.44 kPa {0.53 kg/cm2}), and runs the engine.
Phenomenon on machine	The engine output is reduced.
Associated information	-

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors.
REMARK
For details of the inspection method, see "RELATED INFORMATION TO TROUBLESHOOT", "CHECKS BEFORE TROUBLESHOOTING", "Electrical equipment".
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Hot short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector AMB. AIR PRESSURE.
3. Connect the T-adapter to the female side of one of the connectors.
4. Turn the starting switch to the ON position.
5. Measure the voltage to troubleshoot.
6. Does the troubleshooting result agree with the standard value?
<table>
<tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr>
<tr><td>Voltage</td><td>Between AMB.AIR PRESSURE (female) (1) and (2)</td><td>4.75 to 5.25V</td></tr>
</table></td><td>YES</td><td>• The wiring harness has no hot short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a hot short circuit.
• Repair or replace the wiring harness.
• Go to "Confirmation of repair".</td></tr>
</table>

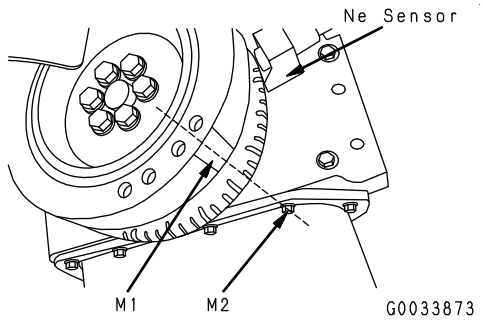
Circuit diagram associated with common rail pressure sensor



No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
8	Reconfirmation of inspection item	1. Do the preceding troubleshooting again. 2. Have you identified the cause when the inspection is done again?	YES	The repair is completed.
			NO	• The engine controller can be defective. • Replace the engine controller. • Go to "Confirmation of repair".
9	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Restore the machine. Install all the configuration equipment and connect them. 3. Turn the starting switch to the ON position. 4. Delete the abnormality record of the electrical system. **REMARK** For the operating method, see TESTING AND ADJUSTING, "SETTING AND OPERATION OF MACHINE MONITOR", "CHECK ABNORMALITY RECORD (ELECTRICAL SYSTEMS)". 5. Turn the starting switch to the OFF position. 6. Shut down the engine controller. (See "PROCEDURE FOR TROUBLESHOOTING" in this chapter.) 7. Start the engine. 8. Check the abnormality record. 9. Is this failure code shown in the record?	YES	Return to the first inspection item.
			NO	The repair is completed.

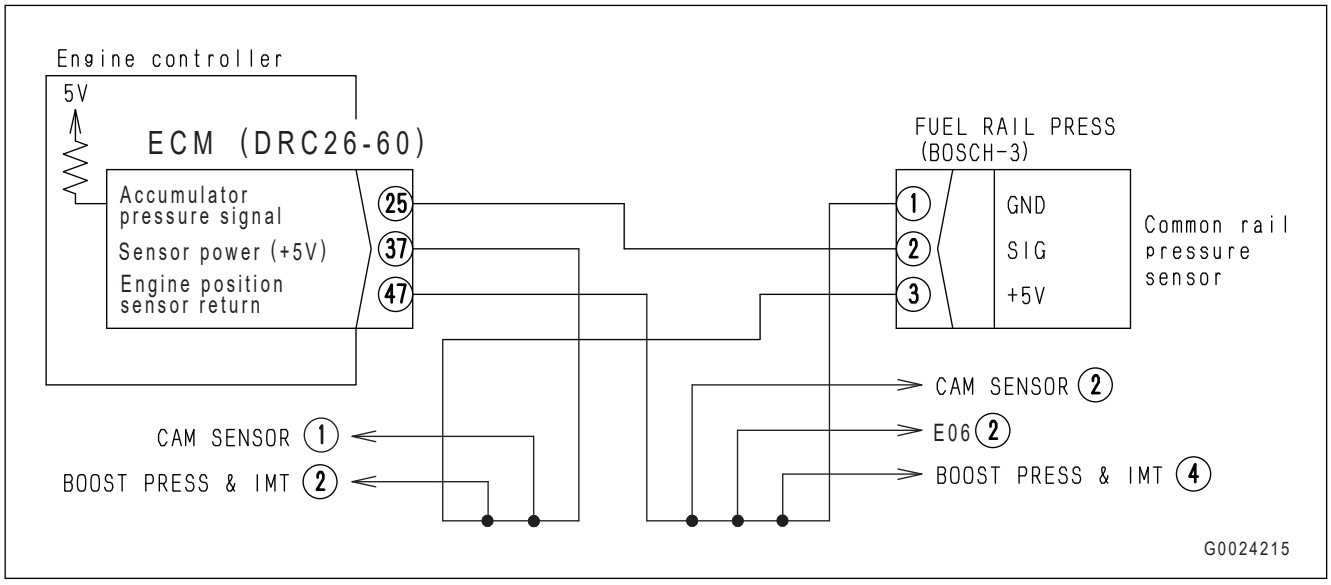
INSTALLATION POINTS OF CRANKSHAFT AND CAMSHAFT SPEED SENSORS

ENGINE Ne (CRANKSHAFT) SPEED SENSOR



No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
17	Reconfirmation of inspection item	1. Do the preceding troubleshooting again. 2. Have you identified the cause when the inspection is done again?	YES	The repair is completed.
			NO	• The engine controller can be defective. • Replace the engine controller. • Go to "Confirmation of repair".
18	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Restore the machine. Install all the configuration equipment and connect them. 3. Turn the starting switch to the ON position. 4. Is this failure code shown again?	YES	Return to the first inspection item.
			NO	The repair is completed.

Circuit diagram associated with common rail pressure sensor



TEST LOW PRESSURE FUEL CIRCUIT DEVICES

Note 1: If there is a problem in the low-pressure fuel circuit, check the items that follow.

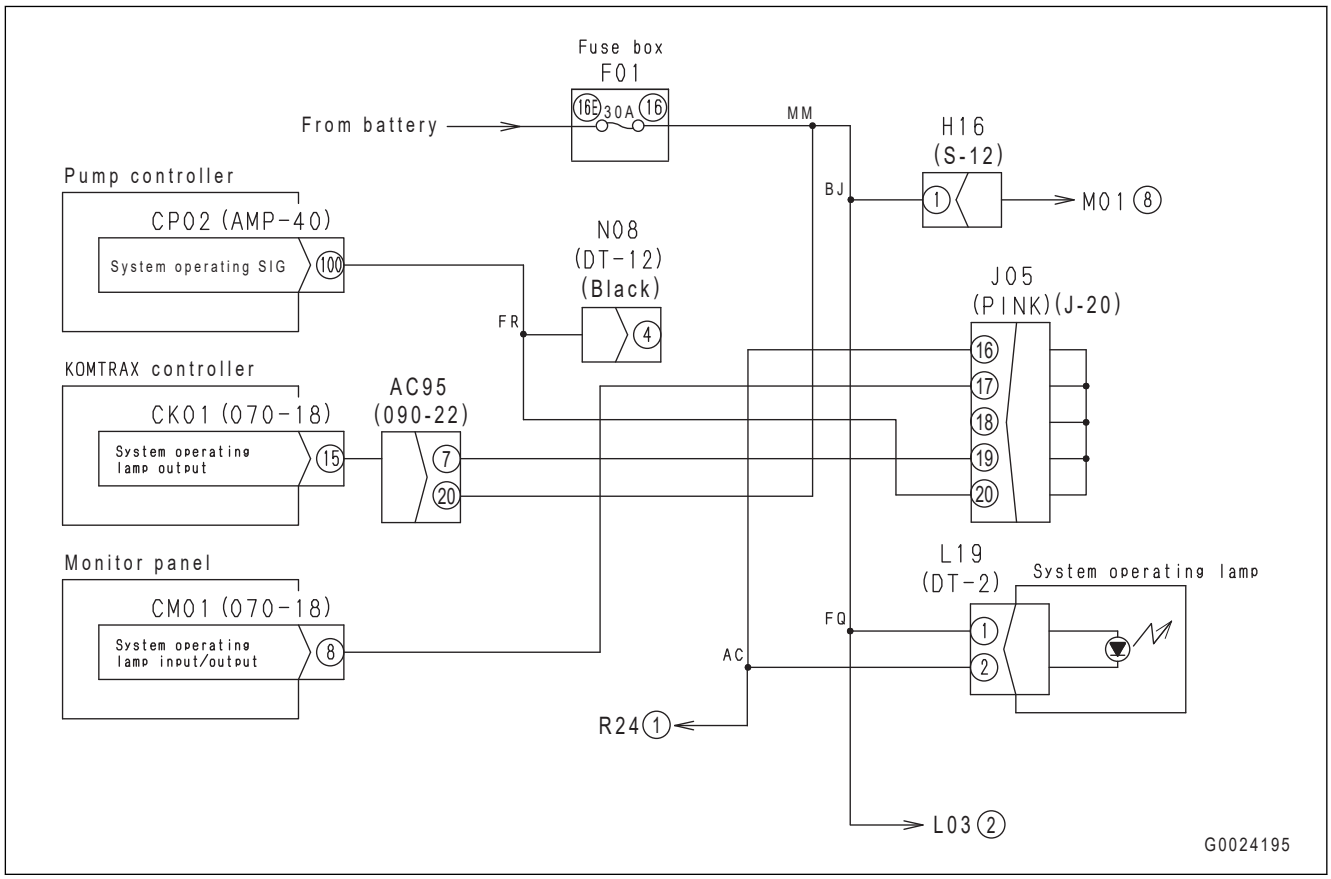
1. Clogged fuel tank breather
2. The low pressure fuel piping has a leak or is clogged.
3. Clogged fuel prefilter
4. Clogged fuel main filter
5. Replace the fuel filter if no restriction is found but the problem is not resolved.

FAILURE CODE [D1N0KA]

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors. For details, see RELATED INFORMATION TO TROUBLESHOOT, CHECKS BEFORE TROUBLESHOOTING, Electrical equipment.
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Fuel feed pump relay</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector R43. Connect the T-adapter to the male side.
3. Measure the voltage.
4. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between R43 (male) (1) and (2)</td><td>200 to 600 Ω</td></tr></table></td><td>YES</td><td>• The fuel feed pump relay is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fuel feed pump relay is defective.
• Replace the fuel feed pump relay.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Open circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector CP02, R43. Connect the T-adapter to each female side.
3. Measure the voltage.
4. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="2">Voltage</td><td>Between CP02 (female) (98) and R43 (female) (1)</td><td>Max. 1 Ω</td></tr><tr><td>Between R43 (female) (2) and ground</td><td>Max. 1 Ω</td></tr></table></td><td>YES</td><td>• The wiring harness has no open circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has an open circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Reconfirmation of inspection item</td><td rowspan="2">1. Do the troubleshooting above again.
2. Can you identify the cause by reconfirmation?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>• The pump controller can be defective.
• Replace the pump controller.
• Go to "Confirmation of repair".</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Battery</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check the battery electrolyte level.
3. Measure the battery voltage.
4. Measure the specific gravity of the battery electrolyte.
5. Do the electrolyte level, voltage and specific gravity agree with the standard value?
<table><tr><th>Judged item</th><th>Standard value</th></tr><tr><td>Battery electrolyte level</td><td>Between UPPER LEVEL and LOWER LEVEL</td></tr><tr><td>Battery voltage (1 battery)</td><td>Min. 12 V</td></tr><tr><td>Battery voltage (2 batteries in series)</td><td>Min. 24V</td></tr><tr><td>Specific gravity of battery electrolyte</td><td>Min. 1.26 (electrolyte temperature: 20°C)</td></tr></table></td><td>YES</td><td>• The battery is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The battery is defective.
• If the battery electrolyte level is low, add electrolyte. After the electrolyte is refilled, charge the battery.
• If the battery voltage is low, charge or replace the battery.
• If the specific gravity of the battery electrolyte is low, charge the battery. After charging, if the specific gravity is lower than the specified value, replace the battery.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Fusible link</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Remove fusible link F04.
4. Check if the fusible link is blown.
5. Check the fusible link for continuity.
6. Is the fusible link normal?</td><td>YES</td><td>The fusible link is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fusible link is defective.
• It blown, go to "Ground fault in wiring harness".
• If the fusible link is not blown but has no continuity, replace it.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Fuse</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Remove fuse No.2 in fuse box F01.
4. Check if the fuse is blown.
5. Check the fuse for continuity.
6. Is the fuse normal?</td><td>YES</td><td>• The fuse is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fuse is defective.
• It blown, go to "Ground fault in wiring harness".
• If the fuse is not blown but has no continuity, replace the fuse.
• Go to "Confirmation of repair".</td></tr>
</table>

Circuit diagram associated with system operating lamp



<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Ground fault in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. When this failure code is active or left in the abnormality record, you cannot check whether the controller shuts down normally even if the system operating lamp is turned off.
In this case, turn the starting switch to the OFF position. Wait for 8 minutes or more. Then turn the battery disconnect switch to the OFF position.
3. Remove fuse No.16 in fuse box F01.
4. Disconnect connector L19, L03, H16, CK01.
5. Connect the T-adapter to the female side of one of the connectors.
6. Measure the resistance.
7. Does the measuring result meet the standard value for the connector?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between F01-16, L19 (female) (1), L03 (female) (2), H16 (female) (1), or CK01 (female) (15) and ground</td><td>Min. 1 MΩ</td></tr></table></td><td>YES</td><td>• The wiring harness has no ground faults.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a ground fault.
• Repair or replace the defective wiring harness.
• Replace the fuse if it is blown.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Reconfirmation of inspection item</td><td rowspan="2">1. Do the preceding troubleshooting again.
2. Have you identified the cause when the inspection is done again?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>• The machine monitor can be defective.
• Replace the machine monitor.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Confirmation of repair</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Install all the configuration equipment and connect them.
3. Turn the starting switch to the ON position.
4. Is this failure code shown?</td><td>YES</td><td>Return to the first inspection item.</td></tr>
<tr><td>NO</td><td>The repair is completed.</td></tr>
</table>

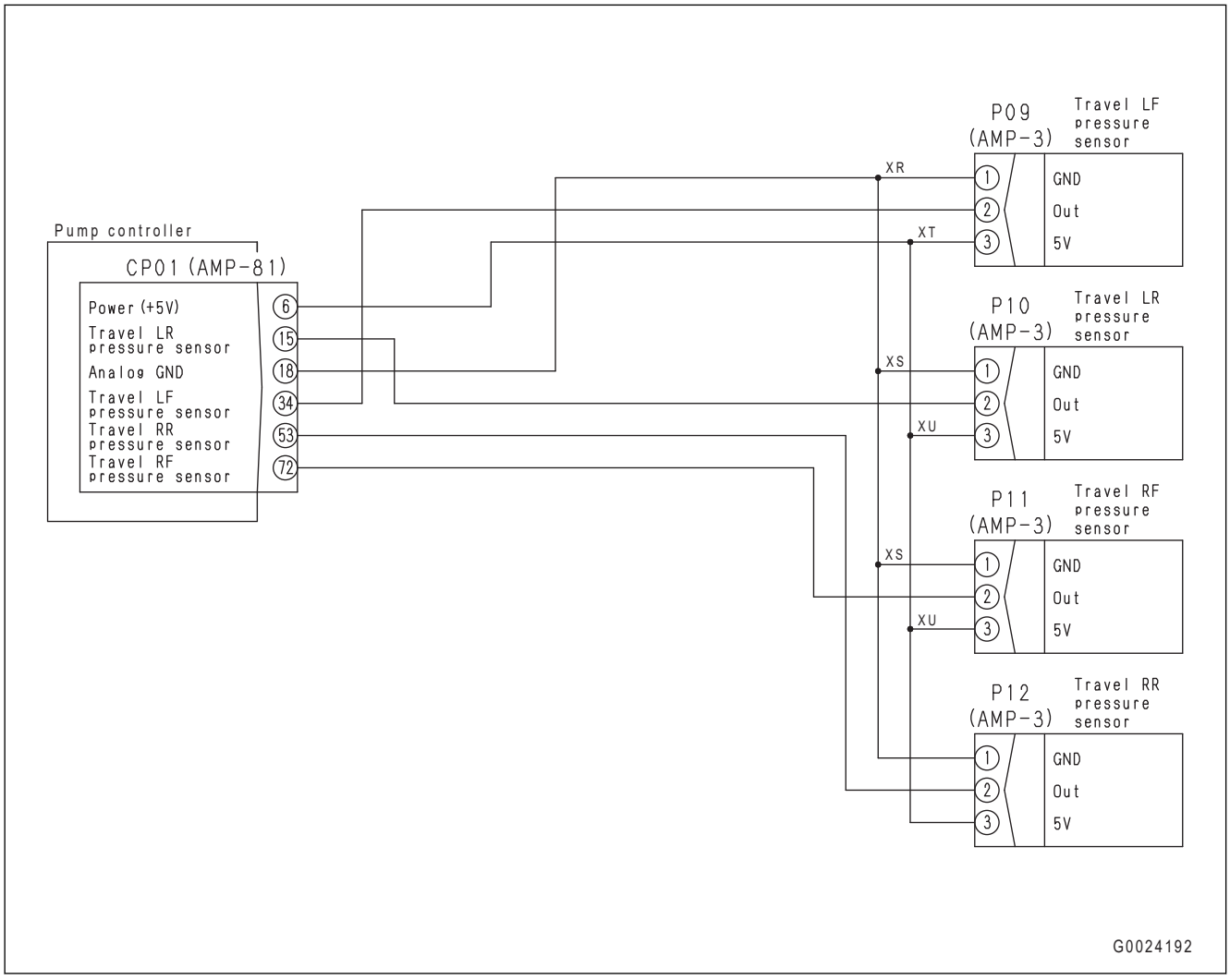
<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Engine controller power supply circuit</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Disconnect connector CE03.
4. Connect the T-adapter to the female side of the connector.
5. Turn the starting switch to the ON position.
6. Measure the voltage.
7. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between CE03 (female) (3) and (1)</td><td>20 to 30V</td></tr></table></td><td>YES</td><td>• The power supply circuit of the engine controller is normal.
• Go to inspection item of "ACC signal circuit of engine controller".</td></tr>
<tr><td>NO</td><td>• The engine controller power supply circuit is defective.
• Go to the next inspection item.</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Open circuit in wiring harness (power supply circuit of engine controller)</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Remove fuse No.19 in fuse box F01.
4. Disconnect connector CE03.
5. Connect the T-adapter to the female side of connector CE03.
6. Measure the resistance.
7. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="5">Resistance</td><td>Between F01-19 and R23 (female) (3)</td><td>Max. 1 Ω</td></tr><tr><td>Between F01-19 and R24 (female) (3)</td><td>Max. 1 Ω</td></tr><tr><td>Between R23 (female) (5) and CE03 (female) (2)</td><td>Max. 1 Ω</td></tr><tr><td>Between R24 (female) (4) and CE03 (female) (2)</td><td>Max. 1 Ω</td></tr><tr><td>Between CE03 (female) (1) and ground</td><td>Max. 1 Ω</td></tr></table></td><td>YES</td><td>• The wiring harness has no open circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has an open circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Open circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Disconnect connector CP01 and connector P25.
4. Connect the T-adapter to the female side of each connector.
5. Measure the resistance.
6. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td rowspan="3">Resistance</td><td>Between CP01 (female) (63) and P25 (female) (3)</td><td>Max. 1 Ω</td></tr><tr><td>Between CP01 (female) (11) and P25 (female) (2)</td><td>Max. 1 Ω</td></tr><tr><td>Between CP01 (female) (18) and P25 (female) (1)</td><td>Max. 1 Ω</td></tr></table></td><td>YES</td><td>• The wiring harness has no open circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has an open circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Ground fault in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Disconnect connector CP01 and connector P25.
4. Connect the T-adapter to the female side of one of the connectors.
5. Measure the resistance.
6. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between CP01 (female) (11) or P25 (female) (2) and ground</td><td>Min. 1 MΩ</td></tr></table></td><td>YES</td><td>• The wiring harness has no ground faults.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a ground fault.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Disconnect connector CP01 and connector P07.
4. Connect the T-adapter to the female side of connector CP01.
5. Measure the resistance.
6. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between CP01 (female) (12) and each pin other than (12)</td><td>Min. 1 MΩ</td></tr></table></td><td>YES</td><td>• The wiring harness has no short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Hot short circuit in wiring harness</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector P07.
3. Connect the T-adapter to the female side of connector P07.
4. Turn the starting switch to the ON position.
5. Measure the voltage.
6. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between P07 (female) (2) and (1)</td><td>Max. 1 V</td></tr></table></td><td>YES</td><td>• The wiring harness has no hot short circuits.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiring harness has a hot short circuit.
• Repair or replace the defective wiring harness.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Swing RIGHT PPC pressure sensor</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Insert the T-adapter into connector P07.
3. Turn the starting switch to the ON position.
4. Measure the voltage.
5. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between P07 (2) and (1)</td><td>0.5 to 4.5V</td></tr></table></td><td>YES</td><td>• The swing RIGHT PPC pressure sensor is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The swing RIGHT PPC pressure sensor is defective.
• Replace the swing RIGHT PPC pressure sensor.
• Go to "Confirmation of repair".</td></tr>
</table>

No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
7	Reconfirmation of inspection item	1. Do the preceding troubleshooting again. 2. Have you identified the cause when the inspection is done again?	YES	The repair is completed.
			NO	• The pump controller can be defective. • Replace the pump controller. • Go to "Confirmation of repair".
8	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Install all the configuration equipment and connect them. 3. Turn the starting switch to the ON position. 4. Is this failure code shown?	YES	Return to the first inspection item.
			NO	The repair is completed.

Circuit diagram associated with travel PPC pressure sensor



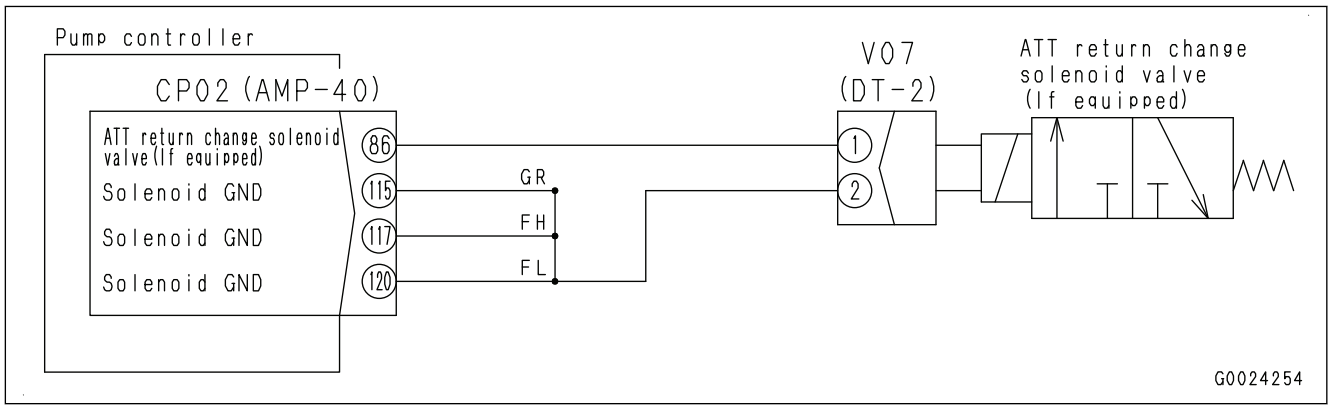
<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Fan speed sensor</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector M16. Connect the T-adapter to the male side.
3. Measure the resistance.
4. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td>Resistance</td><td>Between M16 (male) (1) and (2)</td><td>2 to 3 kΩ</td></tr></table></td><td>YES</td><td>• The fan speed sensor is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fan speed sensor is defective.
• Replace the fan speed sensor.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Reconfirmation of inspection item</td><td rowspan="2">1. Do the troubleshooting above again.
2. Can you identify the cause by reconfirmation?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>• The pump controller can be defective.
• Replace the pump controller.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Confirmation of repair</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Connect all the configuration equipment.
3. Start the engine to troubleshoot.
4. Is this failure code shown?</td><td>YES</td><td>Return to the first inspection item.</td></tr>
<tr><td>NO</td><td>The repair is completed.</td></tr>
</table>

FAILURE CODE [DW45KB]

Details of failure	The pump controller senses a ground fault in the swing parking brake solenoid circuit.
Action level	L03
Action of controller	• Stops to drive the swing parking brake solenoid. (The solenoid does not operate since no current flows.) That is, the swing parking brake is kept applied.) • If the cause of the failure disappears, the machine becomes normal by itself.
Phenomenon on machine	The machine does not swing. (The swing parking brake is not released)
Associated information	**Monitoring code** The command (ON or OFF) from the controller to the swing parking brake solenoid can be monitored. (As long as the command from the controller is ON, the indication on the monitor is ON even if the solenoid is not energized because there is an open circuit.) (Code: 02300) **Reference information** • When the solenoid and wiring harness are normal, swing operation is possible if the swing parking brake cancel switch is set to the RELEASE position. (Note that the swing parking brake is applied when the starting switch is in the OFF position.) • Power for the swing parking brake solenoid is supplied from pin (101) of pump controller CP02 or fuse No.1 in fuse box F01.

No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
1	Wiring harness and connector	1. Check the wiring harnesses and connectors. **REMARK** For details of checking method, see "RELATED INFORMATION TO TROUBLESHOOT", "CHECKS BEFORE TROUBLESHOOTING", "Electrical equipment". 2. Are the wiring harnesses and connectors normal?	YES	• The wiring harnesses and connectors are normal. • Go to the next inspection item.
			NO	• A wiring harness or connector is defective. • Repair or replace the defective wiring harness or connector. • Go to "Confirmation of repair".

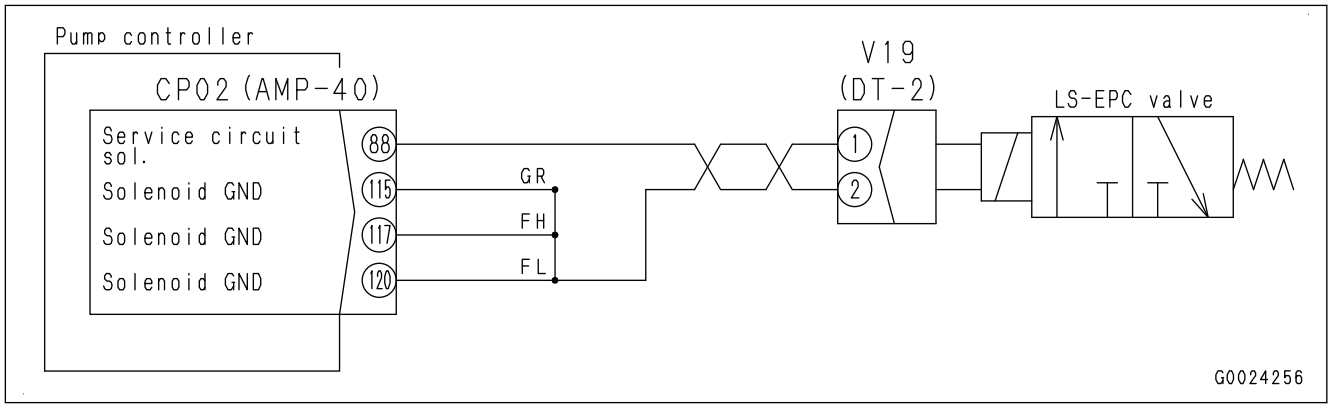
Circuit diagram associated with ATT single/multiple selector solenoid



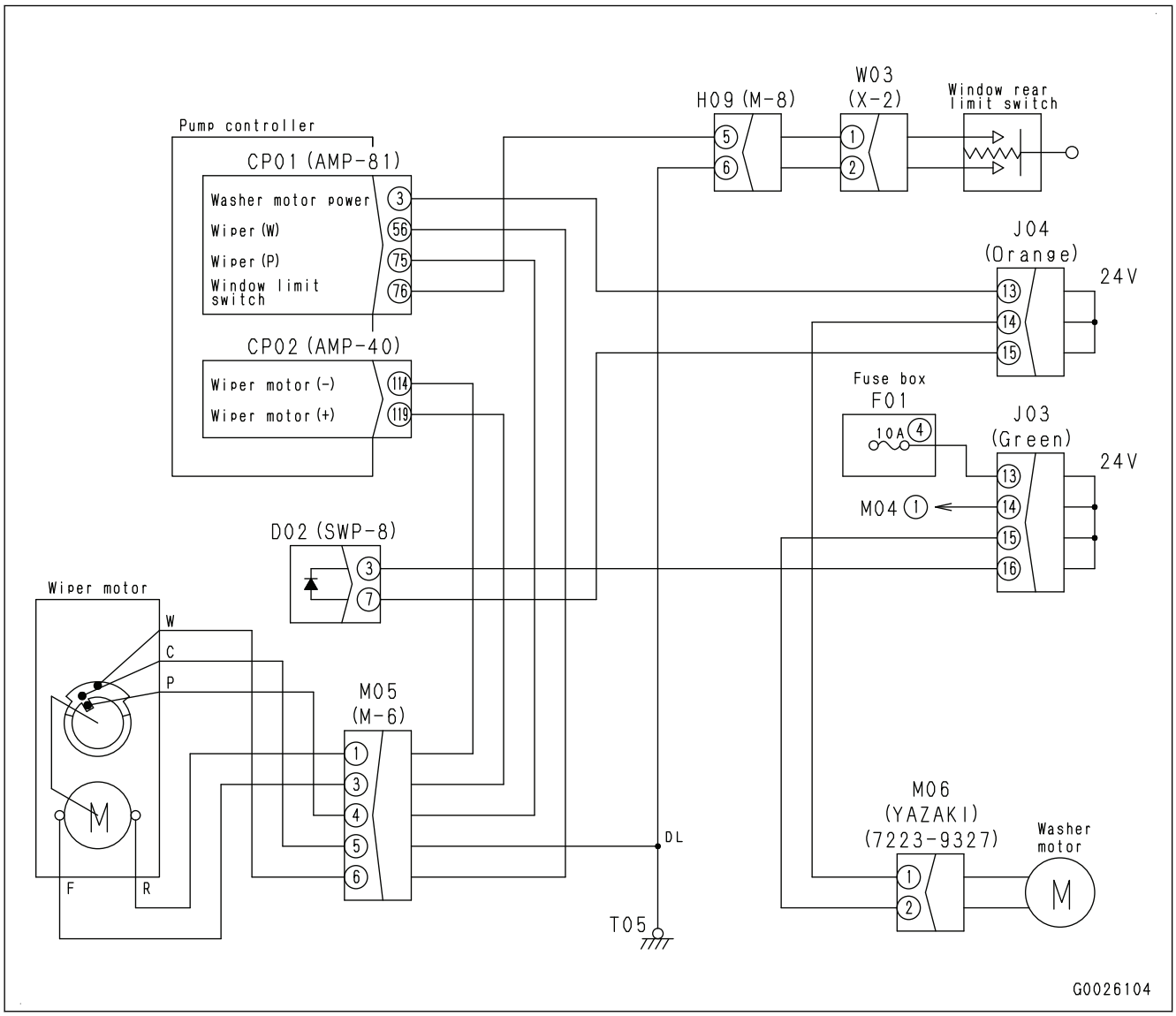
<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Fan clutch solenoid</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector M16. Connect the diagnostic circuit to the male side.
REMARK
• Supply voltage of 5 ~ 24 V to troubleshoot failure of fan clutch solenoid. Because the measurement is possible if the voltage is in this range, it is not necessary to change the voltage.
• Please supply voltage as shown below. A resistance of 100 Ω (rated power 5 W or more) is required for the diagnostic circuit.
3. Measure the power supply voltage between point a, point b in the diagnostic circuit.
REMARK
Measure with the supply voltage connected to the diagnostic circuit.
4. Measure the voltage between point c, point d in the diagnostic circuit.
5. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Voltage</td><td>Between point c in circuit for diagnosis and point d</td><td>Power supply voltage × 0.6 to 0.9 V</td></tr></table></td><td>YES</td><td>• The fan clutch solenoid is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fan clutch solenoid is defective.
• Replace the fan clutch solenoid.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Reconfirmation of inspection item</td><td rowspan="2">1. Do the inspection above again.
2. Can you identify the cause by reconfirmation?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>• The pump controller can be defective.
• Replace the pump controller.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Confirmation of repair</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Connect all the configuration equipment.
3. Turn the starting switch to the ON position to troubleshoot.
4. Is this failure code shown?</td><td>YES</td><td>Return to the first inspection item.</td></tr>
<tr><td>NO</td><td>The repair is completed.</td></tr>
</table>

No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
6	Reconfirmation of inspection item	1. Do the preceding troubleshooting again. 2. Have you identified the cause when the inspection is done again?	YES	The repair is completed.
			NO	• The pump controller can be defective. • Replace the pump controller. • Go to "Confirmation of repair".
7	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Install all the configuration equipment and connect them. 3. Turn the starting switch to the ON position. 4. Is this failure code shown?	YES	Return to the first inspection item.
			NO	The repair is completed.

Circuit diagram associated with LS-EPC solenoid system



Circuit diagram associated with windshield wiper



E-2 MANUAL PREHEATING SYSTEM DOES NOT WORK

Details of failure	The manual preheating system does not work.
Associated information	**Pre-troubleshooting** If a failure code is shown, do the troubleshooting for that code first. **Reference information** This troubleshooting describes the procedures for the case that the area where the electrical intake air heater is mounted is not warmed by the manual preheat function.

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors. For details, see RELATED INFORMATION TO TROUBLESHOOT, CHECKS BEFORE TROUBLESHOOTING, ELECTRICAL EQUIPMENT.
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Fuse</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.
3. Remove fuse No.17 in fuse box F01. Check if the fuse is blown. Check the resistance.
4. Is the fuse normal?</td><td>YES</td><td>• The fuse is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The fuse is defective.
• If blown, go to "Ground fault of wiring harness".
• If the fuse is not blown but has no continuity, replace the fuse.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Diode</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector D02. Connect the T-adapter to the male side.
3. Measure the continuity.
4. Does the measurement result agree with the standard value?
<table><tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="2">Continuity</td><td>Between D02 (male) (1) (+) and (5) (-)</td><td>No continuity</td></tr><tr><td>Between D02 (male) (5) (+) and (1) (-)</td><td>Continuity</td></tr></table></td><td>YES</td><td>• The diode is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The diode is defective.
• Repair or replace the diode.
• Go to "Confirmation of repair".</td></tr>
</table>

No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
3	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Turn the starting switch to the ON position. 3. Is the HYDRAULIC OIL TEMPERATURE MONITOR LIGHTS UP WHILE ENGINE IS IN OPERATION problem resolved?	YES	The repair is completed.
			NO	Return to the first inspection item.

E-22 HYDRAULIC OIL TEMPERATURE GAUGE INDICATES INCORRECT TEMPERATURE

Details of failure	The hydraulic oil temperature gauge indicates an incorrect temperature.
Associated information	**Pre-troubleshooting** If a failure code is shown, do the troubleshooting for that code first. **Monitoring code** The hydraulic oil temperature can be monitored. (Code: 04401) **Associated information** Signals from the hydraulic oil temperature sensor are input to the pump controller and then the data is sent to the machine monitor by CAN communication.

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors. For details, see RELATED INFORMATION TO TROUBLESHOOT, CHECKS BEFORE TROUBLESHOOTING, ELECTRICAL EQUIPMENT.
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Hydraulic oil temperature sensor</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector P22. Connect the T-adapter to the male side.
3. Measure the resistance.
4. Does the measurement result agree with the standard value?
<table>
<tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr>
<tr><td rowspan="5">Resistance</td><td rowspan="4">Between P22 (male) (2) and (1)</td><td>10℃</td><td>Approximately 90 kΩ</td></tr>
<tr><td>30℃</td><td>Approximately 35 kΩ</td></tr>
<tr><td>80℃</td><td>Approximately 6.5 kΩ</td></tr>
<tr><td>100℃</td><td>Approximately 3.5 kΩ</td></tr>
<tr><td>Between P22 (male) (2) and ground</td><td>All</td><td>Min. 1 MΩ</td></tr>
</table></td><td>YES</td><td>• The hydraulic oil temperature sensor is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The hydraulic oil temperature sensor is defective.
• Repair or replace the hydraulic oil temperature sensor.
• Go to "Confirmation of repair".</td></tr>
</table>

E-38 MACHINE DOES NOT SWING WHILE SWING PARKING BRAKE RELEASE SWITCH IS RELEASED

Details of failure	The machine does not swing when the swing parking brake cancel switch is released.
Associated information	**Pre-troubleshooting** If a failure code is shown, do the troubleshooting for that code first. **Monitoring code** The state of the swing lock switch signal can be monitored. (Code: 02200)

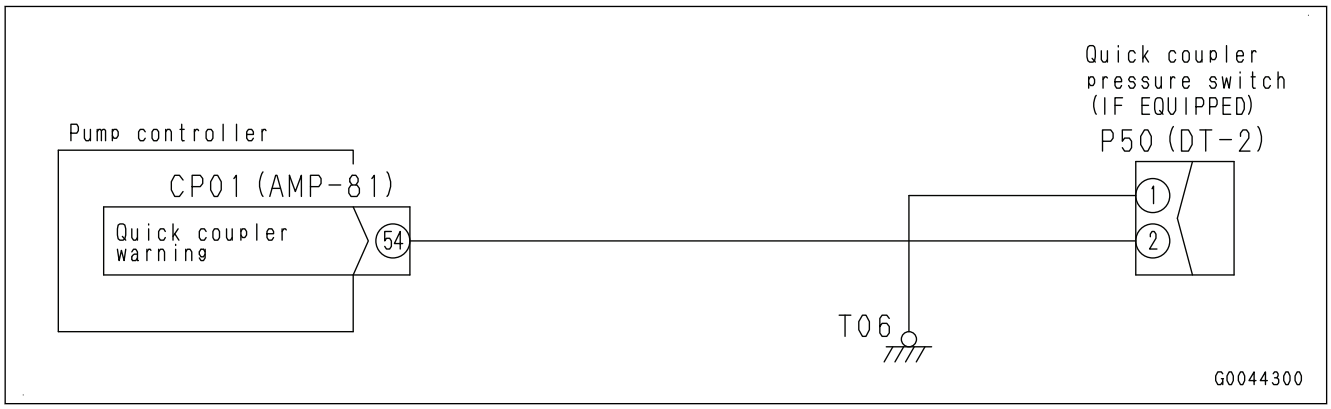
No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
1	Wiring harness and connector	1. Check the wiring harnesses and connectors. For details, see RELATED INFORMATION TO TROUBLESHOOT, CHECKS BEFORE TROUBLESHOOTING, ELECTRICAL EQUIPMENT. 2. Are the wiring harnesses and connectors normal?	YES	• The wiring harnesses and connectors are normal. • Go to the next inspection item.
			NO	• A wiring harness or connector is defective. • Repair or replace the defective wiring harness or connector. • Go to "Confirmation of repair".
2	Fuse	1. Turn the starting switch to the OFF position. 2. Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position. 3. Remove fuse No.1 in fuse box F01. Check if the fuse is blown. Check the resistance. 4. Is the fuse normal?	YES	• The fuse is normal. • Go to the next inspection item.
			NO	• The fuse is defective. • If blown, go to "Ground fault of wiring harness". • If the fuse is not blown but has no continuity, replace the fuse. • Go to "Confirmation of repair".

E-47 WIPER DOES NOT OPERATE WHEN WIPER SWITCH IS OPERATED

Details of failure	The wiper does not operate when the wiper switch is operated.
Associated information	**Pre-troubleshooting** If a failure code is shown, do the troubleshooting for that code first. **Monitoring code** • The state of the wiper switch signal can be monitored. (Code: 04504) • The state of the window rear limit switch signal can be monitored. (Code: 02204)

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Wiring harness and connector</td><td rowspan="2">1. Check the wiring harnesses and connectors. For details, see RELATED INFORMATION TO TROUBLESHOOT, CHECKS BEFORE TROUBLESHOOTING, ELECTRICAL EQUIPMENT.
2. Are the wiring harnesses and connectors normal?</td><td>YES</td><td>• The wiring harnesses and connectors are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• A wiring harness or connector is defective.
• Repair or replace the defective wiring harness or connector.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Window rear limit switch</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector W03. Connect the T-adapter to the male side.
3. Measure the resistance.
4. Does the measurement result agree with the standard value?
<table>
<tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr>
<tr><td rowspan="2">Resistance</td><td rowspan="2">Between W03 (male) (1) and (2)</td><td>Front window: Mounted at front</td><td>Min. 1 MΩ</td></tr>
<tr><td>Front window: Stowed at rear</td><td>Max. 1 Ω</td></tr>
</table></td><td>YES</td><td>• The window rear limit switch is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The window rear limit switch is defective.
• Replace the window rear limit switch.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Wiper motor</td><td rowspan="2">1. Turn the starting switch to the OFF position.
2. Disconnect connector M05. Connect the T-adapter to the female side.
3. Measure the continuity.
4. Does the measurement result agree with the standard value?
<table>
<tr><th>Item</th><th>Measuring point and measurement condition</th><th>Standard value</th></tr>
<tr><td>Continuity</td><td>Between M05 (female) (1) and (3)</td><td>Continuity</td></tr>
</table></td><td>YES</td><td>• Wiper motor is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The wiper motor is defective.
• Replace the wiper motor.
• Go to "Confirmation of repair".</td></tr>
</table>

Circuit diagram associated with quick coupler pressure switch



<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Rear pump swash plate sensor</td><td rowspan="2">1. Do a test. For details, see TESTING AND ADJUSTING, TEST PUMP SWASH PLATE SENSOR.
2. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="2">Sensor output voltage</td><td rowspan="2">Monitoring code: 01140R Pump swash plate sensor voltage</td><td>• Fuel dial: Hi
• Control lever: All levers in NEUTRAL
• Hydraulic oil temperature: 45 to 55°C</td><td>0.72 to 1.98 V</td></tr><tr><td>• Fuel dial: Hi
• Running with one-side spinning off the ground
• Hydraulic oil temperature: 45 to 55°C</td><td>2.72 to 3.98 V</td></tr></table></td><td>YES</td><td>• The rear pump swash plate sensor is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The rear pump swash plate sensor is defective.
• Make a repair or replace the rear pump swash plate sensor.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Main relief valve of front pump</td><td rowspan="2">1. Do a test. For details, see TESTING AND ADJUSTING, TEST AND ADJUST OIL PRESSURE IN WORK EQUIPMENT, SWING, AND TRAVEL CIRCUITS.
2. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td>Main relief pressure</td><td>Discharged pressure pick-up port of front pump</td><td>• Boom RAISE relief
• Hydraulic oil temperature: 45 to 55°C</td><td>33.1 to 37.2 MPa {338 to 380 kg/cm^2}</td></tr></table></td><td>YES</td><td>• The main relief valve of ront pump is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The main relief valve of front pump is defective.
• Adjust the main relief valve of the front pump.
• If the oil pressure is not normal after the main relief valve of the front pump is adjusted, make a repair or replace it.
• Go to "Confirmation of repair".</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Pressure compensation valve on IN side of arm control valve</td><td rowspan="2">1. Do a test. For details, see TESTING AND ADJUSTING, TEST AND ADJUST OIL PRESSURE IN WORK EQUIPMENT, SWING, AND TRAVEL CIRCUITS.
2. Does the troubleshooting result of main relief pressure meet the standard value?
3. Do a test. For details, see TESTING AND ADJUSTING, TEST THE PARTS CAUSING HYDRAULIC DRIFT IN WORK EQUIPMENT.
4. Does the diagnosis result of hydraulic drift meet the standard value?
5. Check by relieving the circuit of other work equipment.
6. Is the arm stopped?
7. Check it by interchanging the pressure compensation valves on the IN side and OUT side of the arm control valve.
8. Is the phenomenon reproduced in the same way?
REMARK
The IN side and OUT side compensation valves have a different area ratio. Make sure to restore them after troubleshooting.
<table><tr><th>Item</th><th colspan="2">Measurement position and condition</th><th>Standard value</th></tr><tr><td>Main relief pressure</td><td>Discharged pressure pick-up port of front pump</td><td>• Control lever: Arm IN relief
• Hydraulic oil temperature: 45 to 55°C</td><td>33.1 to 37.2 MPa {338 to 380 kg/cm^2}</td></tr><tr><td>Hydraulic drift</td><td colspan="2">Arm cylinder</td><td>Max. 240 mm</td></tr></table></td><td>YES</td><td>• The pressure compensation valve on the IN side of the arm control valve is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The pressure compensation valve on the IN side of the arm control valve is defective.
• Repair or replace the pressure compensation valve on the IN side of the arm control valve.
• Go to "Confirmation of repair".</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Pressure compensation valve on OUT side of arm control valve</td><td rowspan="2">1. Do a test. For details, see TESTING AND ADJUSTING, TEST AND ADJUST OIL PRESSURE IN WORK EQUIPMENT, SWING, AND TRAVEL CIRCUITS.
2. Does the troubleshooting result of main relief pressure meet the standard value?
3. Check by relieving the circuit of other work equipment.
4. Is the arm stopped?
5. Check it by interchanging the pressure compensation valves on the IN side and OUT side of the arm control valve.
6. Is the phenomenon reproduced in the same way?
REMARK
The IN side and OUT side compensation valves have a different area ratio. Make sure to restore them after troubleshooting.
<table><tr><th>Item</th><th colspan="2">Measurement position and condition</th><th>Standard value</th></tr><tr><td>Main relief pressure</td><td>Discharged pressure pick-up port of front pump</td><td>• Control lever: Arm OUT relief
• Hydraulic oil temperature: 45 to 55°C</td><td>33.1 to 37.2 MPa {338 to 380 kg/cm^2}</td></tr></table></td><td>YES</td><td>• The pressure compensation valve on the OUT side of the arm control valve is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The pressure compensation valve on the OUT side of the arm control valve is defective.
• Repair or replace the pressure compensation valve on the OUT side of the arm control valve.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Confirmation of repair</td><td rowspan="2">1. Stop the engine.
2. Connect all the configuration equipment.
3. Start the engine.
4. Operate the lever to troubleshoot.
5. Does the arm move normally?</td><td>YES</td><td>The repair is completed.</td></tr>
<tr><td>NO</td><td>Return to the first inspection item.</td></tr>
</table>

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">R.H. PPC valve</td><td rowspan="3">1. Do a test. For details, see TESTING AND ADJUSTING, TEST PPC VALVE OUTLET PRESSURE.
2. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="2">PPC valve output pressure</td><td rowspan="2">Hydraulic hose of boom PPC circuit</td><td>• Fuel dial: Hi
• R.H. travel lever in NEUTRAL
• Hydraulic oil temperature: 45 to 55°C</td><td>0 MPa {0 kg/cm^2}</td></tr><tr><td>• Fuel dial: Hi
• R.H. travel lever in FORWARD/REVERSE
• Hydraulic oil temperature: 45 to 55°C</td><td>2.84 to 3.43 MPa {29 to 35 kg/cm^2}</td></tr><tr><td>Difference between R.H. and L.H. of PPC valve outlet pressure</td><td colspan="2">-</td><td>Max. 0.4 MPa {max. 4 kg/cm^2}</td></tr></table></td><td>YES</td><td>• The R.H. PPC valve is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td rowspan="2">• The R.H. PPC valve is defective.
• Make a repair or replace the R.H. PPC valve.
• Go to "Confirmation of repair".</td></tr>
</table>

H-23 TRAVEL SPEED IS SLOW

Details of failure	The travel speed is slow.
Associated information	**Pre-troubleshooting** If a failure code is displayed, do the troubleshooting for that code first. **Monitoring code** • The F pump pressure can be monitored. (Code: 01100) • The R pump pressure can be monitored. (Code: 01101) • The travel PPC pressure can be monitored. (Code: 01882) • The current of the LS-EPC solenoid can be monitored. (Code: 01500)

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Main pump pressure</td><td rowspan="2">1. Open the Pump pressure screen. For details, see TESTING AND ADJUSTING, SERVICE MODE, MONITORING.
2. Start the engine.
3. Operate the work equipment control lever for swing to troubleshoot.
4. Does the measurement result agree with the standard value?<table><tr><th>Item</th><th>Measurement position and condition</th><th>Standard value</th></tr><tr><td>Front pump pressure</td><td>Monitoring code: 01100</td><td>Approximately 4 MPa {approximately 41 kg/cm^2}</td></tr></table></td><td>YES</td><td>Go to the inspection item of "Swing control valve".</td></tr>
<tr><td>NO</td><td>Go to the inspection item of "Safety valve of swing motor".</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Swing control valve</td><td rowspan="2">1. Release the remaining pressure in the hydraulic tank and piping to troubleshoot. For details, see TESTING AND ADJUSTING, RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM.
2. Are the control valve body and the swing spool clean and free of twisting, sticking, scratches and dirt? (The spool must move smoothly.)
REMARK
When the parts are restored, be careful not to let dirt to enter.</td><td>YES</td><td>• The body and spool of the swing control valve are normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The body and spool of the swing control valve are defective.
• Replace the body and spool of the swing control valve.
• Go to "Confirmation of repair".</td></tr>
</table>

H-33 LARGE UNUSUAL NOISE IS HEARD WHEN UPPER STRUCTURE STOPS

Details of failure	A large unusual noise is heard when the upper structure stops swinging.
Associated information	**Pre-troubleshooting** If a failure code is shown, do the troubleshooting for that code first.

<table>
<tr><th>No.</th><th>Cause</th><th>Procedures, Measurement, Values, Note</th><th colspan="2">Diagnosis and treatment</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">Solenoid valve of variable back pressure valve</td><td rowspan="2">1. Do a test. For details, see TESTING AND ADJUSTING, TEST OUTLET PRESSURE OF SOLENOID VALVE.
2. Does the troubleshooting result agree with the standard value?
<table><tr><th>Item</th><th colspan="2">Measuring point and measurement condition</th><th>Standard value</th></tr><tr><td rowspan="2">Solenoid outlet pressure</td><td rowspan="2">Outlet hose of solenoid valve of variable back pressure valve</td><td>• Fuel dial: Hi
• NEUTRAL
• Hydraulic oil temperature: 45 to 55°C</td><td>0 MPa {0 kg/cm^2}</td></tr><tr><td>• Fuel dial: Hi
• Control lever: Swing LEFT, swing RIGHT
• Hydraulic oil temperature: 45 to 55°C</td><td>2.84 to 3.43 MPa {29 to 35 kg/cm^2}</td></tr></table></td><td>YES</td><td>• The solenoid valve of the variable back pressure valve is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The solenoid valve of the variable back pressure valve is defective.
• Replace the solenoid valve of the variable back pressure valve.
• Go to "Confirmation of repair".</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Back pressure valve</td><td rowspan="2">1. Release the remaining pressure in the hydraulic tank and piping to troubleshoot. For details, see TESTING AND ADJUSTING, RELEASE REMAINING PRESSURE FROM HYDRAULIC SYSTEM.
2. Is the spool in the back pressure valve clean and free of sticking, seizure and fatigue of the spring?</td><td>YES</td><td>• The back pressure valve is normal.
• Go to the next inspection item.</td></tr>
<tr><td>NO</td><td>• The back pressure valve is defective.
• Make a repair or replace the back pressure valve.
• Go to "Confirmation of repair".</td></tr>
</table>

Symbol	Item	Summary
REMARK	Remarks	Information contained in this signal word is useful to know.

Reading the unit

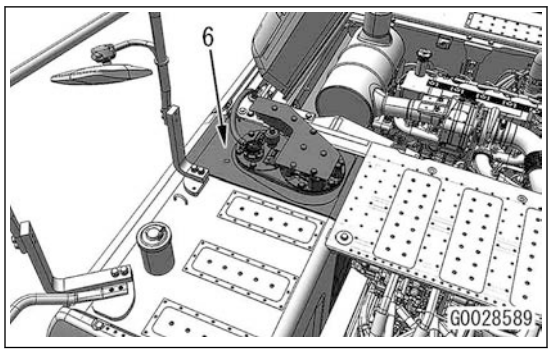
International System of Units (SI) is used in this manual. For reference, units that have been used in the past are given in { }.

2. Refill the hydraulic oil tank (6) to the specified level through the oil filler port. Start the engine to circulate the oil through the piping, and check the oil level again. (For details, see OVERVIEW, "TABLE OF FUEL, COOLANT, AND LUBRICANTS".)

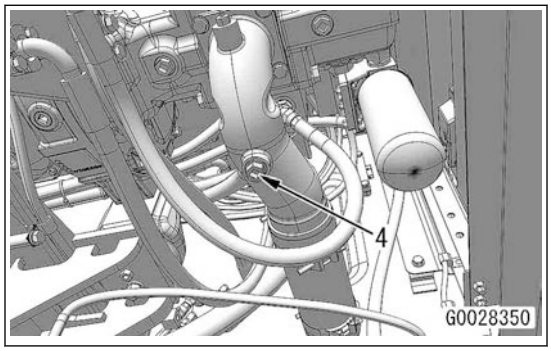
   REMARK

   Before you fill with hydraulic oil, make sure the drain plug (4) is tightened.

   Hydraulic tank: 190 ℓ



3. Install the oil fill caps (5).



Air bleeding

4. Bleeding air from the hydraulic circuit

   REMARK

   Make adjustments. See TESTING AND ADJUSTMENT "BLEED AIR FROM Hydraulic pressure CIRCUIT".

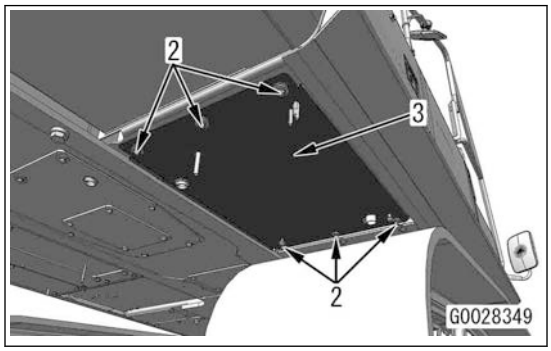
Cover

5. Install the cover (3) with the bolts (2) (6 pieces).

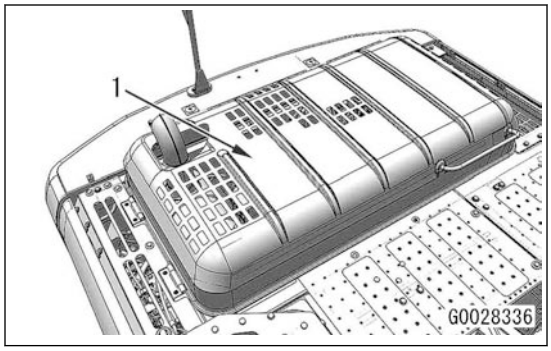
   Tool: Socket, torque wrench

   Bolt (2): width across flats 19 mm, M12

   Bolt (2): 98 to 123 Nm {10.0 to 12.5 kgm}

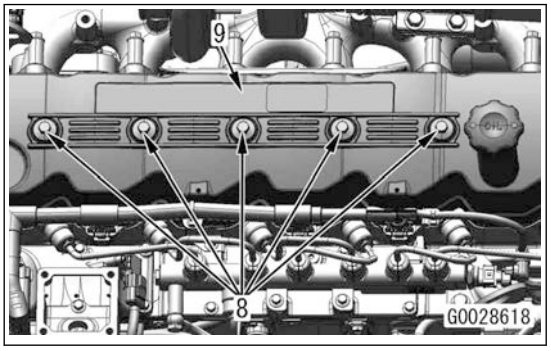


6. Close the engine hood (1).



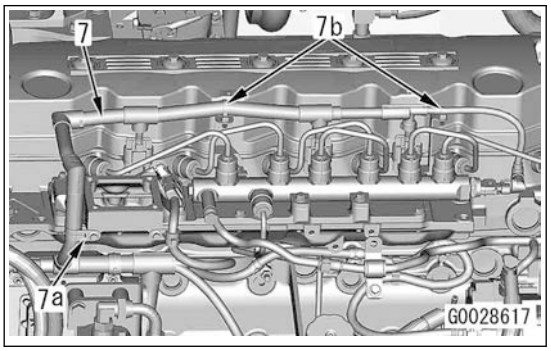
Head cover

12. Install the head cover (9) with the bolts (8) (5 pieces).
    Tools: ratchet handle, socket, torque wrench
    Bolt (8): Width across flats 13 mm, M8
    Bolt (8): 24 ± 4 Nm {2.45 ± 0.41 kgm}



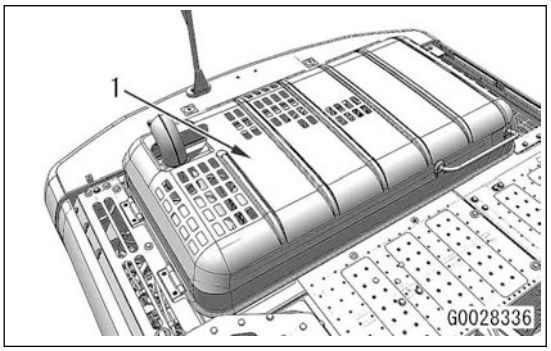
Clamp

13. Install the bands (7b) (2 pieces) of the engine wiring harness (7), and install the clamp (7a).
    REMARK
    Use a new band (7b).
    Tools: ratchet handle, socket, torque wrench
    Bolt for clamp (7a): Width across flats 8 mm, M6
    Clamp (7a) bolt: 10 ± 2 Nm {1.02 ± 0.2 kgm}



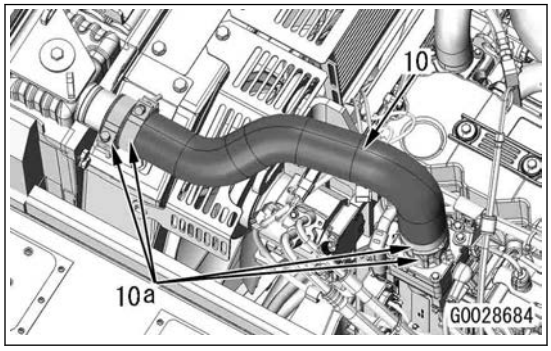
Engine hood

14. Close the engine hood (1).



Hose

52. Install the hose (10) by use of the procedure below.



NOTICE

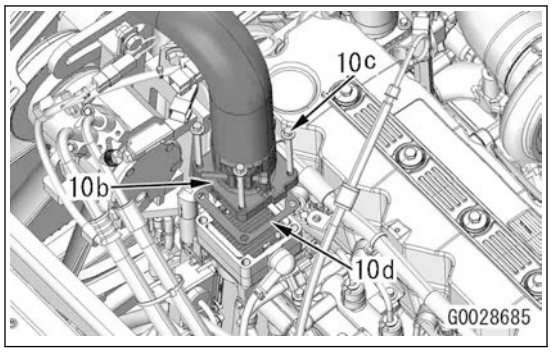
- **Use a new clamp (10a).**
- **Install clamps (10a) (2 pieces) at installation angle (f).**
  Installation angle (f): 15°

Tools: ratchet handle, socket, torque wrench

Clamp (10a): Width across flats 8 mm

Clamp bolt threaded part (d): lubricating oil (ThreeBond PANDO18B)

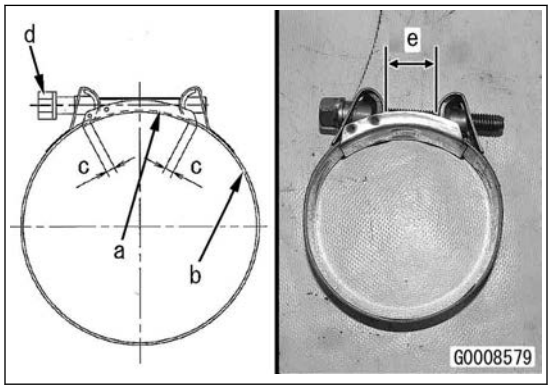
1) Connect the hose (10) to the marked position, and install the clamp (10a).

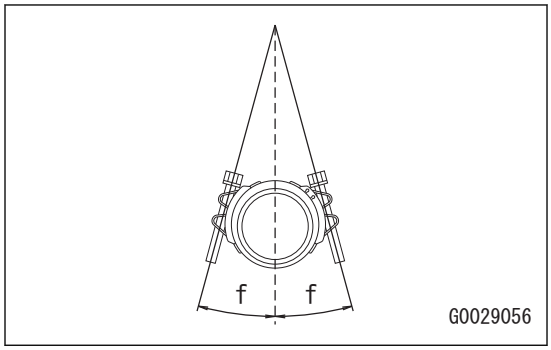


NOTICE

- **Apply sealant to the (10) entire circumference of the hose equally.**
- **Hose (10): inner seal material (ThreeBond 2720C or equivalent)**

2) Set bridge (a) of the clamp (10a) under the bolt (d). Tighten the bolt so that the overlap distance (c) of the bridge (a) and band (b) is 5 mm or more.





REMARK

- When reusing hose
  Align the clamp (10a) with the mark of the clamp on the hose.
  Clamp (10a): 6 Nm {0.6 kgm} or more
- When using a new hose
  Tighten until the distance (e) of the clamp (10a) is 7 to 10 mm.

53. If you connect at the air intake connector (10b), use the procedure below.

INSTALL HYDRAULIC COOLER ASSEMBLY

Hydraulic oil cooler assembly

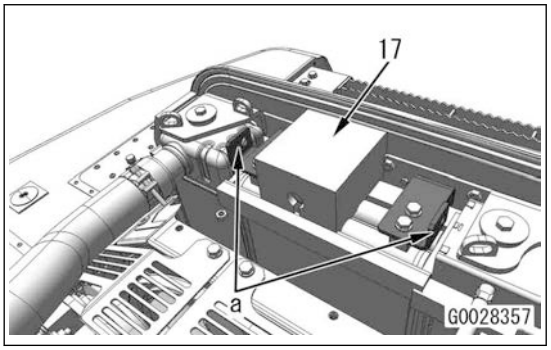
1. Lift the hydraulic oil cooler assembly (17) to the suspension position (a) and align with the install position.

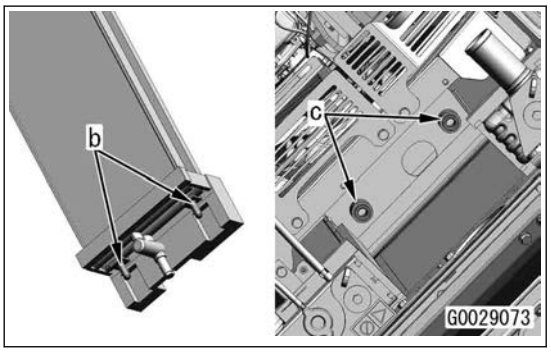
   NOTICE

   - **Make sure that the heat insulator sealant (sponge) on the periphery of the hydraulic oil cooler assembly (17) is not damaged.**
   - **If the heat insulator sealant (sponge) is damaged, replace it.**
   - **When you install the hydraulic oil cooler assembly (17), be careful not to damage the heat insulator sealant (sponge) on the periphery.**
   - **Check from below the machine that the protruding part (b) of the bottom of the hydraulic oil cooler assembly (17) is correctly aligned with the concave part (c) on the machine side.**

   Tool: wire

   Hydraulic oil cooler assembly (17): 16 kg



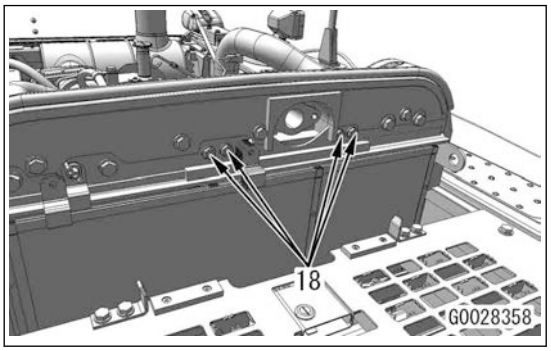


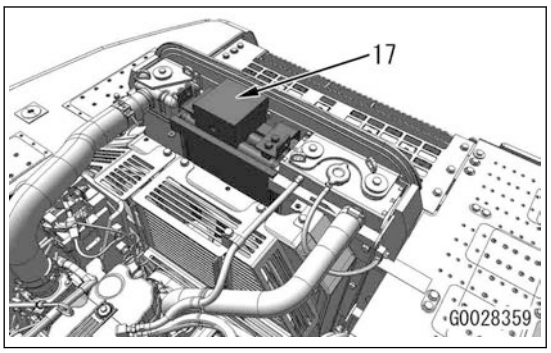
2. Install the hydraulic oil cooler assembly (17) by use of bolts (18) (4 pieces).

   Tools: Ratchet handle, torque wrench, socket

   Bolt (18): width across flats 17 mm, M10

   Bolt (18): 59 to 74 Nm {6.0 to 7.5 kgm}





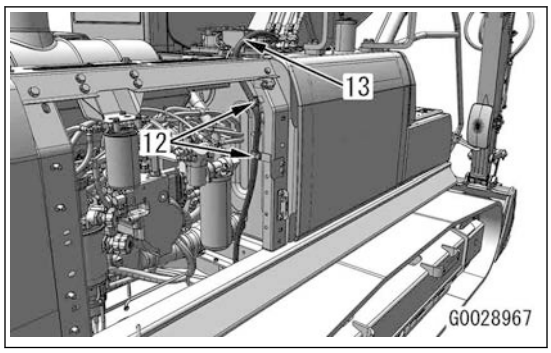
10. Remove clamps (12) (2 pieces) and then remove the hose (13).

    REMARK

    Move the removed hose to a safe place so that it does not interfere with the work.

    Tools: impact wrench, socket

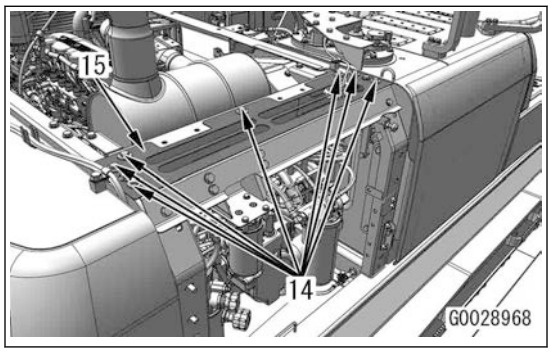
    Clamp (12) bolt: width across flats 19 mm, M12



11. Remove the bolts (14) (7 pieces) and remove the cover (15).

    Tools: impact wrench, socket

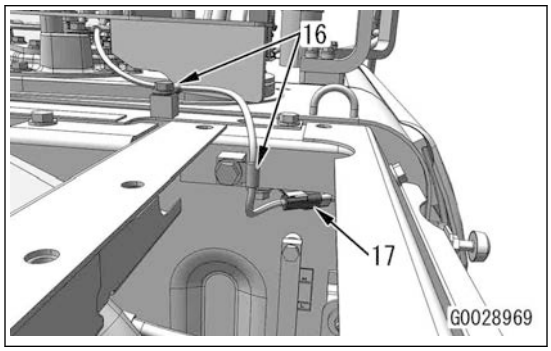
    Bolt (14): width across flats 19 mm, M12



12. Remove clamps (16) (2 pieces) and disconnect the connector P67 (17).

    Tools: impact wrench, socket

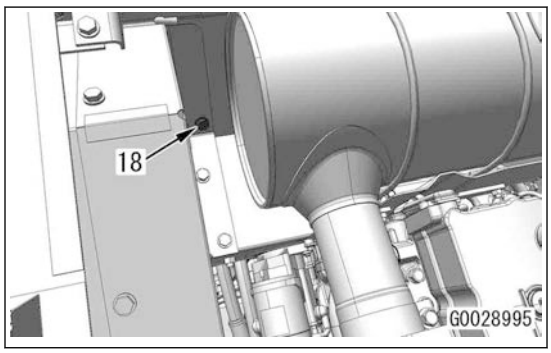
    Clamp (16) bolt: width across flats 19 mm, M12

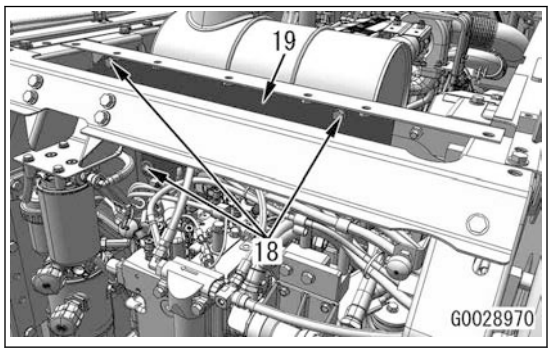


13. Remove the bolts (18) (4 pieces) and remove the cover (19).

    Tools: impact wrench, socket

    Bolt (18): width across flats 19 mm, M12



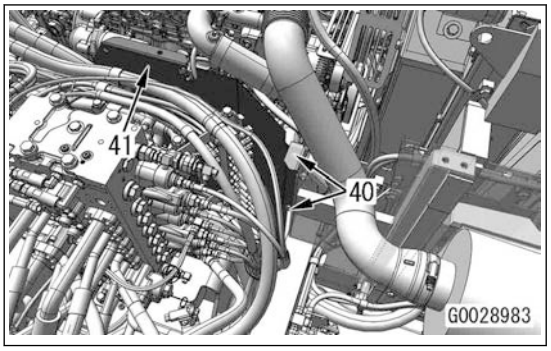


Air cleaner assembly

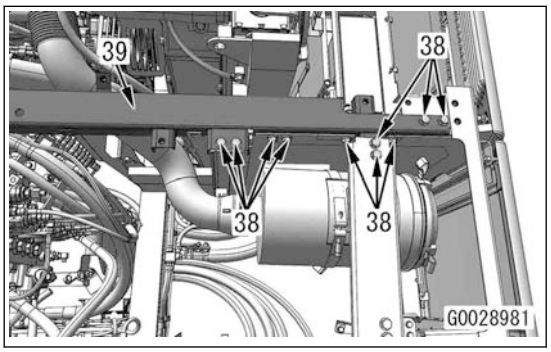
52. Install the air cleaner assembly. See REMOVE AND INSTALL AIR CLEANER ASSEMBLY.

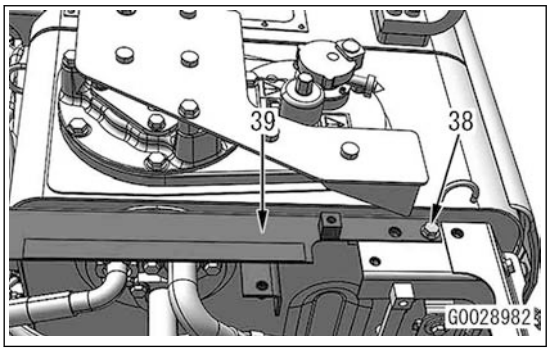
Cover, Hose, and Wiring Connector

53. Install the cover (41) with the bolts (40) (2 pieces).
    Tools: ratchet handle, socket, torque wrench
    Bolt (40): width across flats 19 mm, M12
    Bolt (40): 98 to 123 Nm {10.0 to 12.5 kgm}

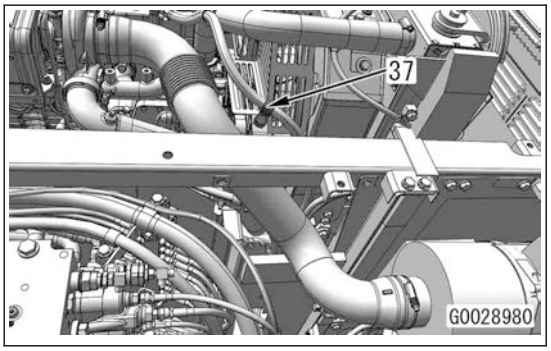


54. Install the cover (39) with the bolts (38) (11 pieces).
    Tools: ratchet handle, socket, torque wrench
    Bolt (38): width across flats 19 mm, M12
    Bolt (38): 98 to 123 Nm {10.0 to 12.5 kgm}





55. Attach the clamp (37).
    Tools: ratchet handle, socket, torque wrench
    Clamp (37): width across flats 19 mm, M12
    Clamp (37) bolt: 98 to 123 Nm {10.0 to 12.5 kgm}



REMOVE AND INSTALL FUEL TANK ASSEMBLY

Draining fuel - Engine hood - Cover, handrail - Wiring connector - Fuel tank assembly

List of standard tools

The tools noted are for reference and other tools can be used if that is what the tool is meant to be used for.

No.	Part name	Part number	SPECIFICATION	Q'ty	Remarks
1	Socket	Commercially available	19 mm	1	
2	Socket	Commercially available	24 mm	1	
3	Ratchet handle	Commercially available		1	
4	Wrench	Commercially available	22 mm	1	
5	Impact wrench	Commercially available		1	
6	Torque wrench	Commercially available	20 to 200 Nm	1	
7	Needle-nose pliers	Commercially available		1	
8	Webbing sling	Commercially available	Width 25 mm × length 3 m	1	For 0.8 t
9	Wire	Commercially available		1	
10	Fuel container	Commercially available		As required	

List of Special Tools

Symbol		Part name	Part number	SPECIFICATION	Q'ty	Remarks
A	1	Plug	07376-70315	Nominal 03	1	
	2	Cap	02789-00315	Nominal 03	1	

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

⚠ Set the work equipment lock lever to LOCK position.

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

⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "".)

NOTICE

- **Install a plug or flange in the place where a fuel hose is disconnected to prevent oil from flowing out.**
- **Write down the connector numbers and installed positions before disconnecting electric wirings and hoses.**

POWER TRAIN

REMOVE AND INSTALL TRAVEL MOTOR AND FINAL DRIVE ASSEMBLY

Standard tool list

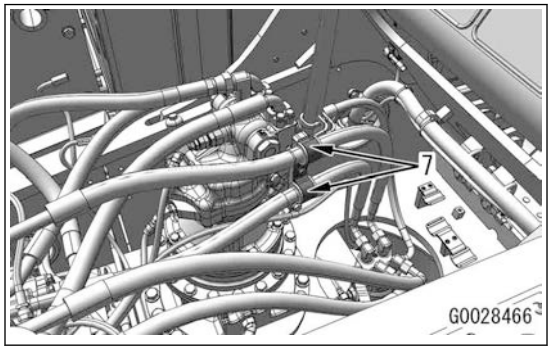
No.	Part name	Part No.	Specifications	Q'ty	Remarks
1	Impact wrench	Commercially available		1	
2	Ratchet handle	Commercially available		1	
3	Socket	Commercially available	19 mm	1	
4	Socket	Commercially available	24 mm	1	
5	Open-end wrench	Commercially available	17 mm	1	
6	Open-end wrench	Commercially available	27 mm	1	
7	Open-end wrench	Commercially available	41 mm	1	
8	Torque wrench	Commercially available	3 to 15 Nm	1	
9	Torque wrench	Commercially available	10 to 50 Nm	1	
10	Torque wrench	Commercially available	40 to 280 Nm	1	
11	Torque wrench	Commercially available	100 to 1000 Nm	1	

Special tool list

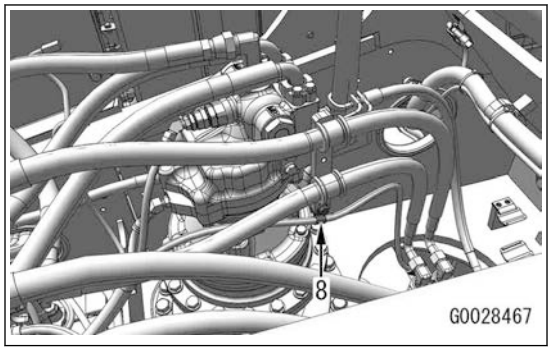
Symbol	Part name	Part No.	Specifications	Q'ty	Remarks
A	Plug	21W-629-9895	#10	2	Removal and installation of travel motor and final drive assembly
B	Cap	21W-629-9915	#10	2	
C	Plug	07376-70210	#02	1	
D	Cap	02789-00210	#02	1	
E	Plug	07376-70422	#04	1	
F	Cap	02789-00422	#04	1	

Hose, clamp

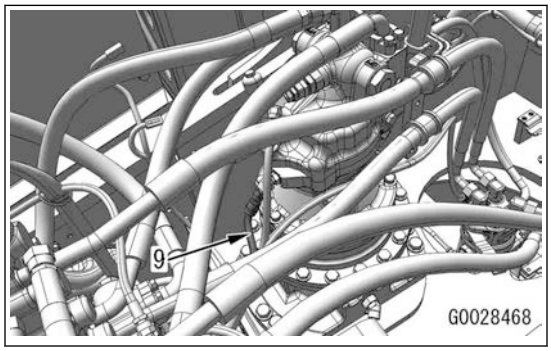
4. Remove the clamp (7).
   Tools: Impact wrench, socket
   Clamp (7) bolt: width across flats 17 mm, M10



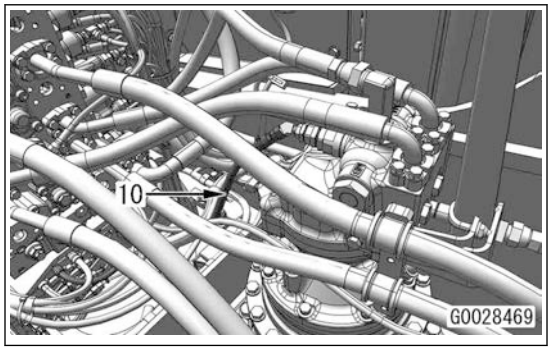
5. Remove the clamp (8).
   Tools: Impact wrench, socket
   Clamp (8) bolt: width across flats 17 mm, M10



6. Loosen the sleeve nut and then disconnect the hose (9).
   REMARK
   Install plugs on the hose and fitting to prevent oil and grease from leaking out.
   Tools: Wrench, plug (A)
   Hose (9): width across flats 19 mm, nominal 02

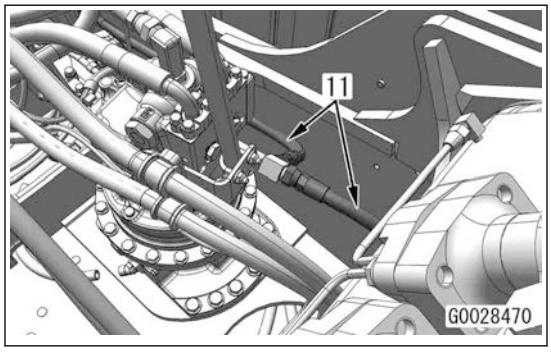


7. Loosen the sleeve nut and then disconnect the hose (10).
   REMARK
   Install plugs on the hose and fitting to prevent oil and grease from leaking out.
   Tools: Wrench, plug (A)
   Hose (10): width across flats 19 mm, nominal 02



8. Loosen the sleeve nuts and disconnect the hoses (11) (2 pieces).
   REMARK
   - Mark the connection position to prevent connection mistakes.
   - Install plugs on the hose and fitting to prevent oil and grease from leaking out.

   Tools: Wrench, plug (B)
   Hose (11): width across flats 32 mm, nominal 05



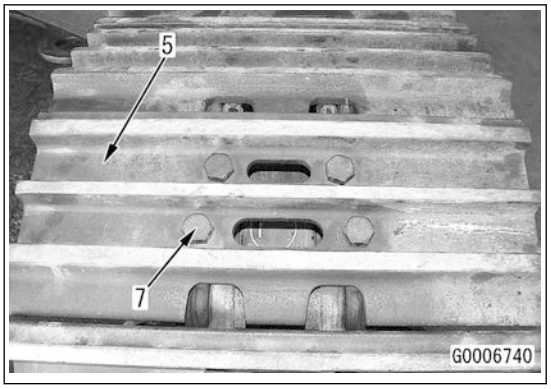
6. Remove bolts (7) (4 pieces) and then remove the shoes (5) in front of and behind the master pin (2) from the track shoe assembly (3).

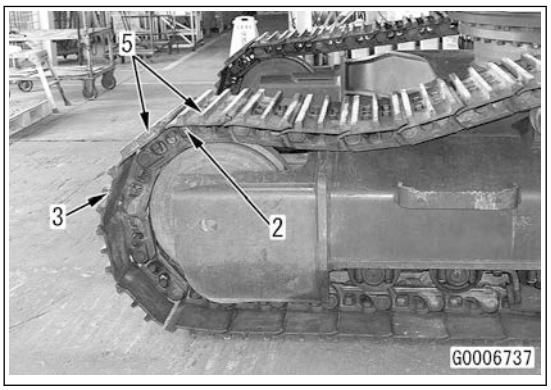
   Tool: Impact wrench, socket

   Bolt (7): width across flats 27 mm, M18

   NOTICE

   - **Loosen the bolts (7) (4 pieces) 1 to 2 turns each. Check that all 4 rotate lightly, and then pull them out.**
   - **If a bolt does not turn smoothly and it is forcibly rotated, the threads of the bolt and link can be damaged.**





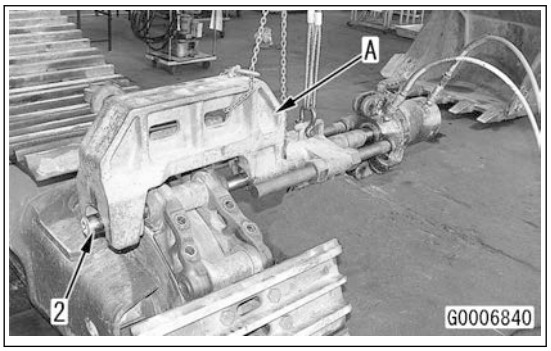
Master pin

7. Remove the master pin (2) by use of a remover & installer (A).

   Tool: Remover and installer (A)

8. Pull out the master pin (2) by use of the guide pin (B).

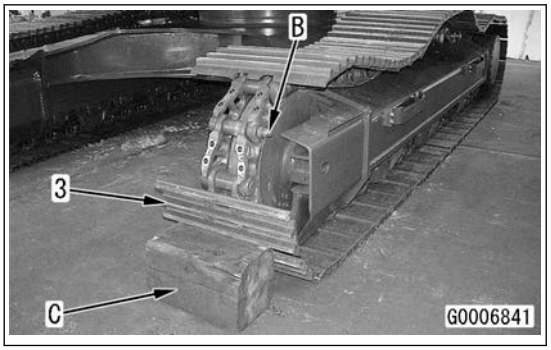
   Tool: Guide pin



Track shoe

9. Move the installed position of the guide pin (B) and place a block (C), etc. under the track shoe assembly (3) as support.

   Tool: Guide pin, block



ASSEMBLE TRACK ROLLER ASSEMBLY

1. Press-fit the bushings (9) and (10) into the roller (4) with the push tool (B).

   Tool: Push tool (B)

2. Install the O-ring (11), install the collar (8) to the shaft (5), and install the pin (7).
3. Install the floating seal (6a) to the collar (8) with the installer (A).

   REMARK

   - Completely clean, degrease, and dry the floating seal and the O-ring contact surface (hatched area).
   - Make sure no dirt sticks to the contact face of the floating seal.
   - After you inserted the floating seal, check that the tilt of the seal is 1 mm or below and the seal protrusion (a) is within the range of 7 to 11 mm.

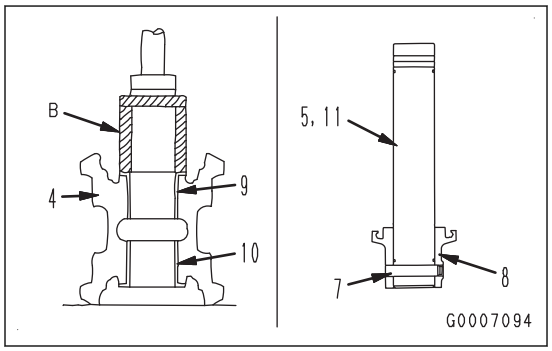
   Tool: Installer (A)

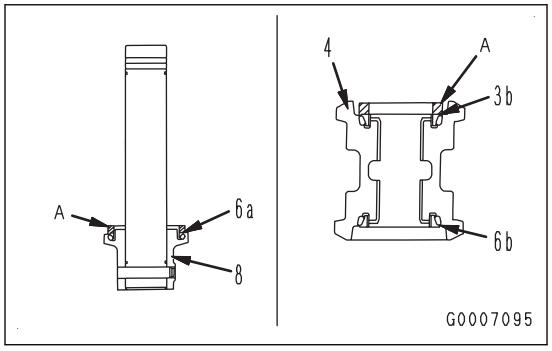
4. Install the floating seals (6b) and (3b) to the roller (4) with the installer (A).

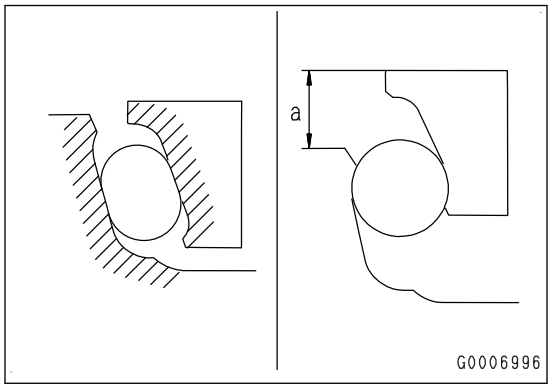
   REMARK

   For the installation of the floating seals (6b) and (3b), see the precautions in step 3.

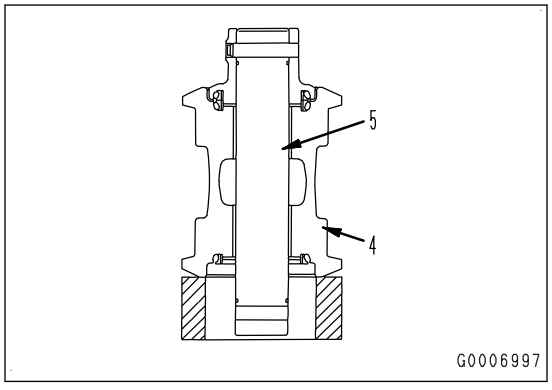
   Tool: Installer (A)







5. Install the shaft (5) to the roller (4).



DISASSEMBLE AND ASSEMBLE CENTER SWIVEL JOINT ASSEMBLY

Standard tool list

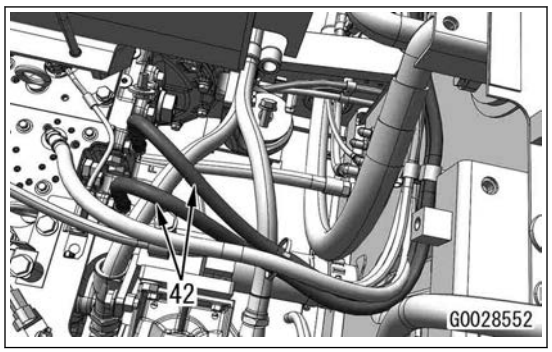
No.	Part name	Part No.	Specifications	Q'ty	Remarks
1	Impact wrench	Commercially available		1	
2	Ratchet handle	Commercially available		1	
3	Socket	Commercially available	13 mm	1	
4	Socket	Commercially available	22 mm	1	
5	Socket	Commercially available	36 mm	1	
6	Torque wrench	Commercially available	10 to 50 Nm	1	
7	Torque wrench	Commercially available	40 to 280 Nm	1	
8	Torque wrench	Commercially available	100 to 1000 Nm	1	
9	Snap ring pliers	Commercially available		1	

Special tool list

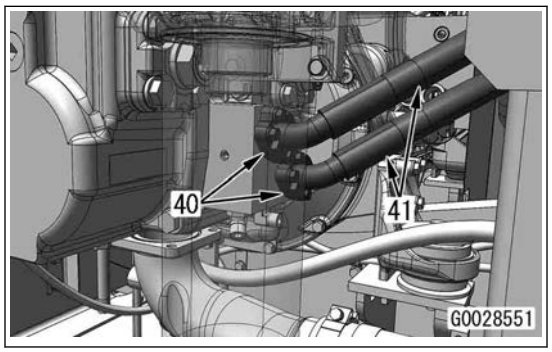
Symbol	Part name	Part No.	Specifications	Q'ty	Remarks
A	Push puller	790-101-2501		1	Disassembly and assembly of center swivel joint assembly
	• Block	790-101-2510		1	
	• Screw	790-101-2520		1	
	• Nut	790-112-1180		1	
	• Washer	790-101-2540		1	
	• Leg	790-101-2630		2	
	• Plate	790-101-2570		4	
	• Nut	790-101-2560		2	
	• Adapter	790-101-2560		2	
	• Plate	790-201-1410		1	

Hose (43b): 34 to 54 Nm {3.5 to 5.5 kgm}

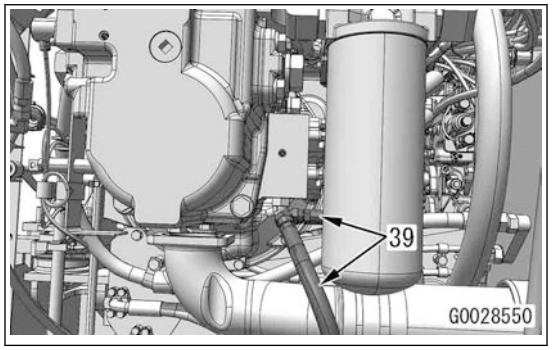
9. Connect the hoses (42) (2 pieces) with the sleeve nuts.
   Tool: Wrench, torque wrench
   Hose (42): 19-mm width across flats, nominal 02
   Hose (42): 34 to 54 Nm {3.5 to 5.5 kgm}



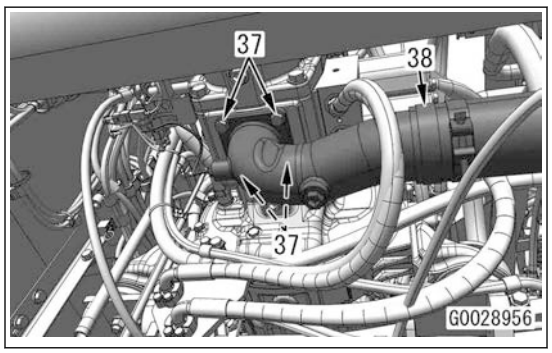
10. Connect the hoses (41) (2 pieces) with the flanges (40) (2 pieces).
    Tool: Ratchet handle, socket, torque wrench
    Flange (40) bolt: 17-mm width across flats, M10
    Flange (40): 59 to 74 Nm {6.0 to 7.5 kgm}



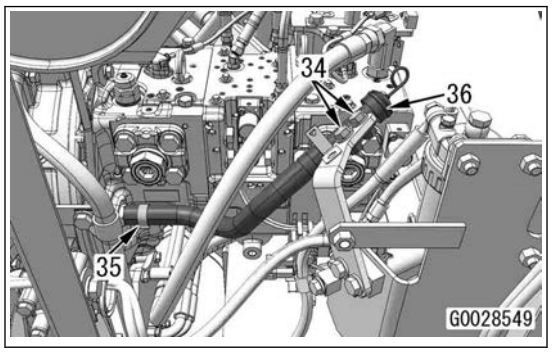
11. Connect the hoses (39) (2 pieces) with the sleeve nuts.
    Tool: Wrench, torque wrench
    Hose (39): 27-mm width across flats, nominal 04
    Hose (39): 84 to 132 Nm {8.5 to 13.5 kgm}



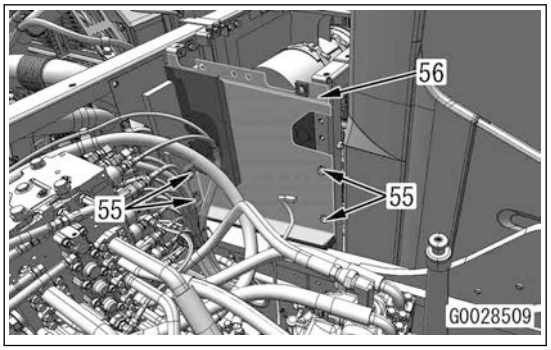
12. Connect the tube (38) with the bolts (37) (4 pieces).
    Tool: Ratchet handle, socket, torque wrench
    Bolt (37): 19-mm width across flats, M12
    Bolt (37): 98 to 123 Nm {10.0 to 12.5 kgm}



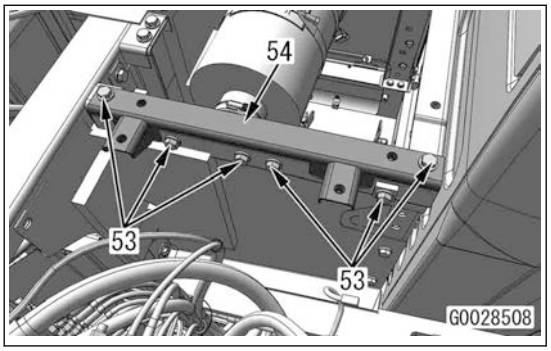
13. Connect the dipstick pipe (36) with the bolts (34) (2 pieces) and the clip (35).
    Tool: Ratchet handle, socket, torque wrench, needle-nose pliers
    Bolt (34): 19-mm width across flats, M12
    Bolt (34): 98 to 123 Nm {10.0 to 12.5 kgm}



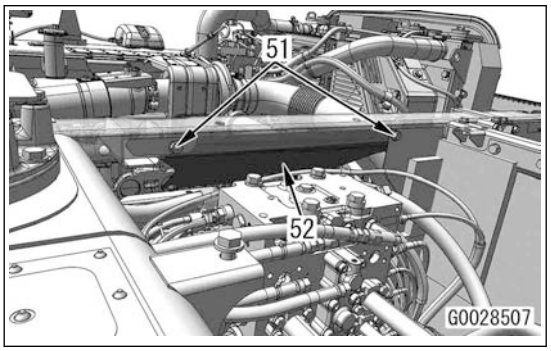
30. Install the cover (56) with the bolts (55) (4 pieces).
Tools: ratchet handle, socket, torque wrench
Bolt (55): width across flats 19 mm, M12
Bolt (55): 98 to 123 Nm {10.0 to 12.5 kgm}



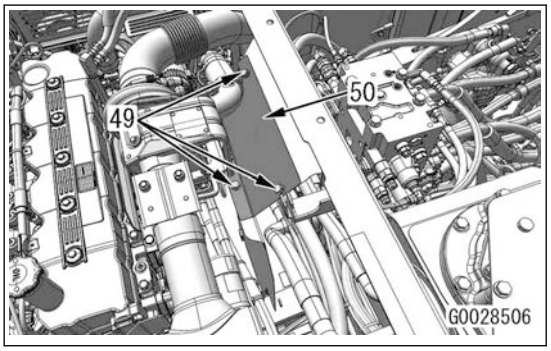
31. Install the cover (54) with the bolts (53) (6 pieces).
Tools: ratchet handle, socket, torque wrench
Bolt (53): width across flats 19 mm, M12
Bolt (53): 98 to 123 Nm {10.0 to 12.5 kgm}



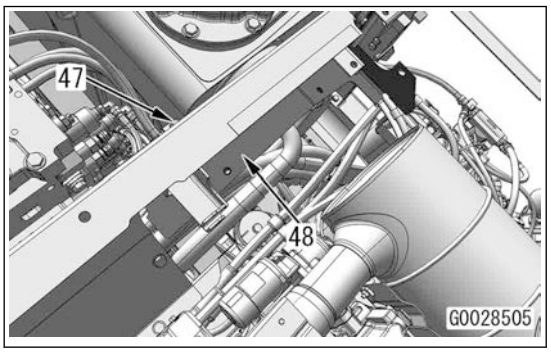
32. Install the cover (52) with the bolts (51) (2 pieces).
Tools: ratchet handle, socket, torque wrench
Bolt (51): width across flats 19 mm, M12
Bolt (51): 98 to 123 Nm {10.0 to 12.5 kgm}



33. Install the cover (50) with the bolts (49) (3 pieces).
Tools: ratchet handle, socket, torque wrench
Bolt (49): width across flats 19 mm, M12
Bolt (49): 98 to 123 Nm {10.0 to 12.5 kgm}

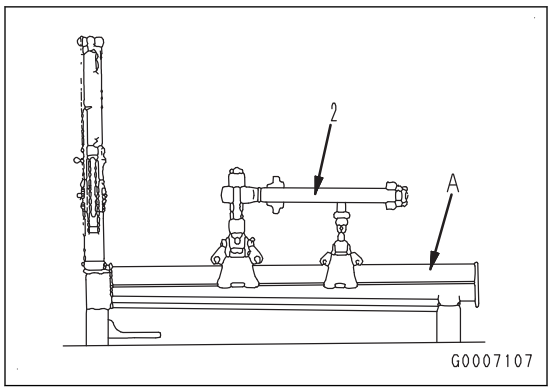


34. Install the cover (48) with the bolt (47).
Tools: ratchet handle, socket, torque wrench
Bolt (47): width across flats 19 mm, M12
Bolt (47): 98 to 123 Nm {10.0 to 12.5 kgm}



5. Set the piston rod assembly (2) on the cylinder repair stand (A).

   Tool: Cylinder repair stand (A)



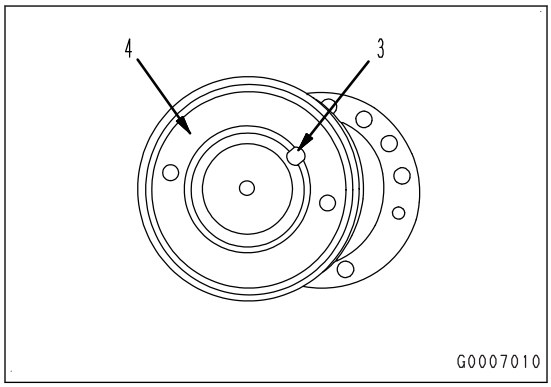
Lock screw

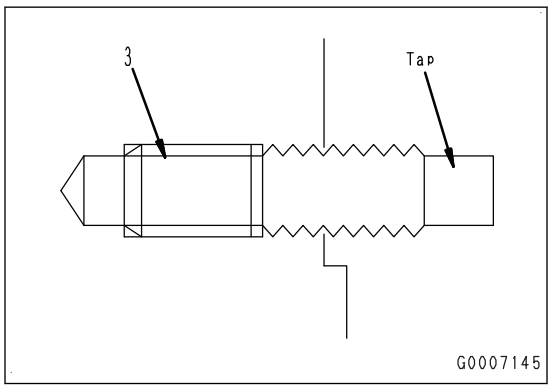
6. Remove the lock screw (3) from the end of the piston rod assembly (2).

   REMARK

   - This is the same for the boom, arm, and bucket cylinders.
   - If screw (3) crimp is too firm to remove, tighten the screw further (3), apply a tap to the threads, and remove the crimp.
   - Screw (3): M12 x 1.75 mm

   Tool: hexagonal wrench, tap





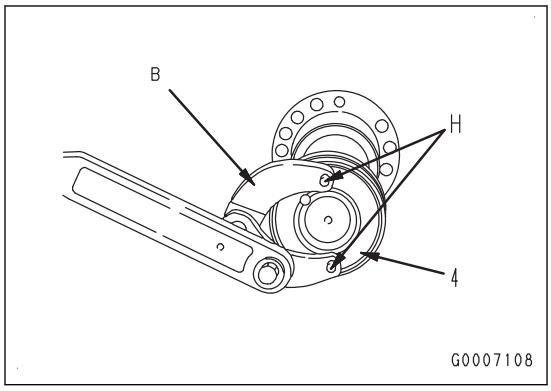
Piston assembly

7. Remove the piston assembly (4) by use of a wrench assembly (B).

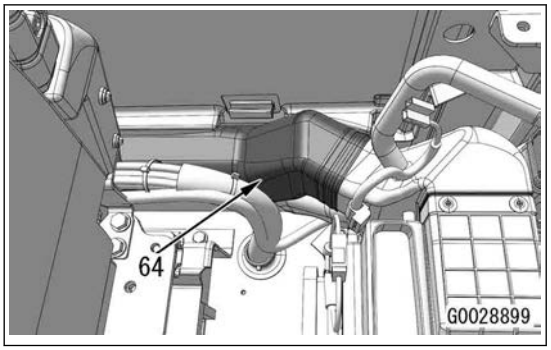
   REMARK

   - If you do not use a wrench assembly (B), loosen the piston assembly (4) by use of a drilled hole with the dimensions below.
     - Boom, arm, bucket cylinder (diameter 10 mm, 2 locations)
   - The drawing shows the state with the wrench assembly (B) pins (H) inserted.

   Tool: Wrench assembly (B), pin (H)



9. Install the duct (64).

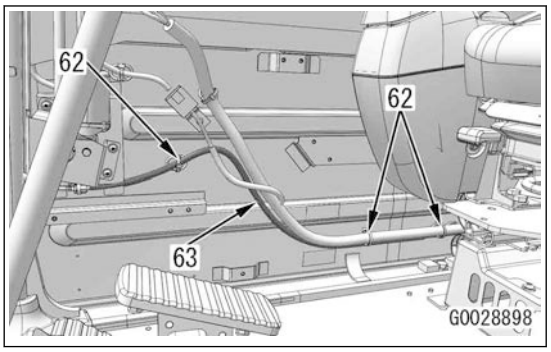


Window washer hose

10. Connect the hose (63).
11. Install the bands (62) (3 pieces).

    REMARK

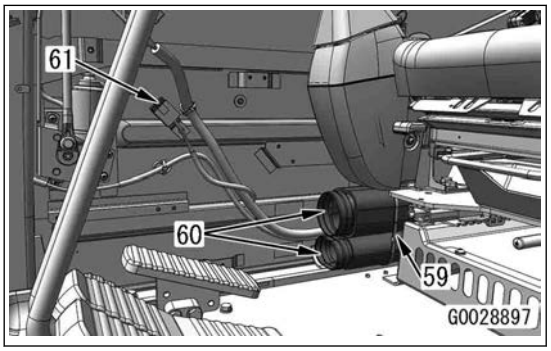
    Use new bands (62).



12. Connect the connector M05 (61).
13. Install the ducts (60) (2 pieces) with the band (59).

    REMARK

    Use a new band (59).



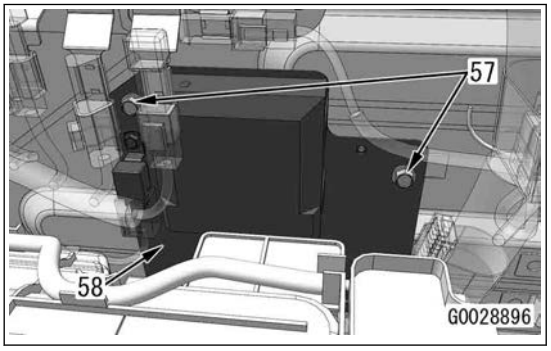
Air conditioner controller assembly

14. Install the air conditioner controller assembly (58) with the bolt (57).

    Tool: Ratchet handle, socket, torque wrench

    Bolt (57): 12-mm width across flats, M8

    Bolt (57): 27 to 34 Nm {2.8 to 3.5 kgm}



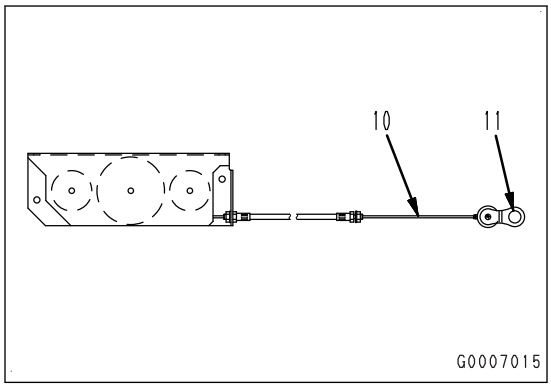
INSTALL FRONT WINDOW ASSEMBLY

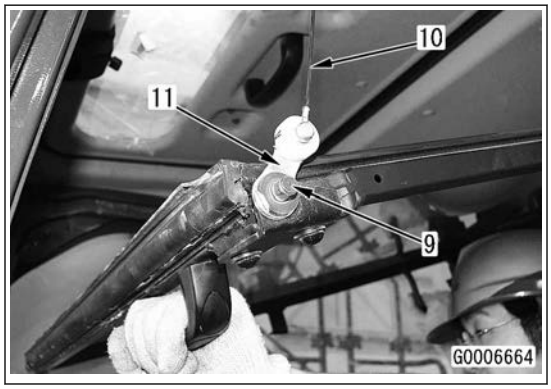
1. Apply liquid adhesive to the threads of the pin (9).

   Pin (9) threads: liquid adhesive (LT-2)

2. Install the pull-up cable (10) and plate (11) by use of pin (9).

   Pin (9): 27 to 34 Nm {2.8 to 3.5 kgm}





3. Open and close the front window assembly (1) to make sure there is no interference between the front window assembly (1) and rail and that the roller does not get caught.
4. If there is any problem in opening and closing of the front window assembly (1), loosen the bolts (16) (2 pieces) of the roller positioning adjustment bracket (15) for adjusting and then re-tighten the bolts.

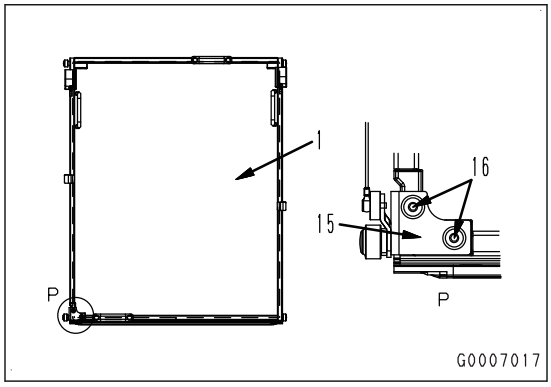
   REMARK

   Do not to install the bracket (15) at an angle.

   Tools: Hexagonal socket, torque wrench, extension bar (L75 mm)

   Bolt (16): Width across flats 8 mm, M6

   Bolt (16): 19.6 to 25.0 Nm {2.0 to 2.5 kgm}

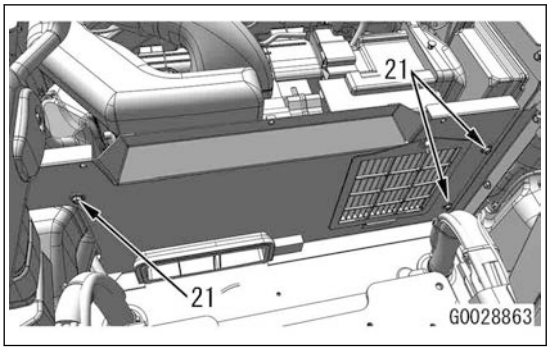


5. Lift the front window assembly (1) up to the ceiling, and lock it.

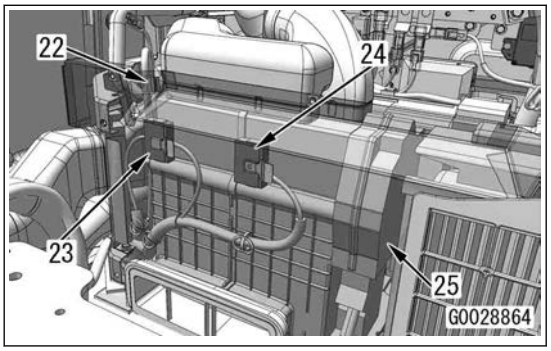
   NOTICE

   Check that the lock is securely engaged.

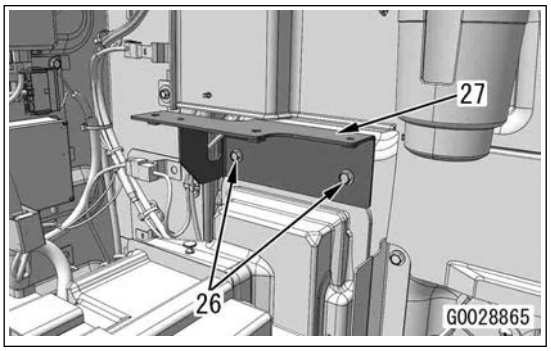
16. Remove bolts (21) (3 pieces).
    Tools: Impact wrench, socket
    Bolt (21): width across flats 12 mm, M8



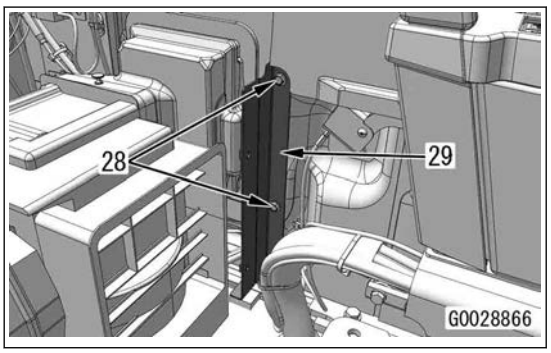
17. Remove the clips (22).
18. Disconnect the connectors H15 (23), H28 (24) and then remove the cover (25).



19. Remove the bolts (26) (2 pieces) and remove the cover (27).
    Tools: Impact wrench, socket
    Bolt (26): width across flats 12 mm, M8

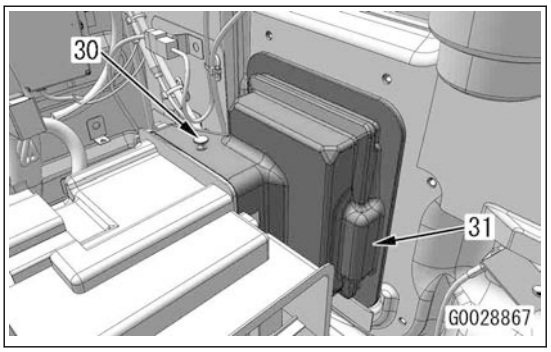


20. Remove the bolts (28) (2 pieces) and remove the cover (29).
    Tools: Impact wrench, socket
    Bolt (28): width across flats 12 mm, M8



Duct

21. Pull up the lock pin (30) to unlock the lock and then remove the duct (31).



2. Install the packing (31) and washer (30) and tighten the nut (29).

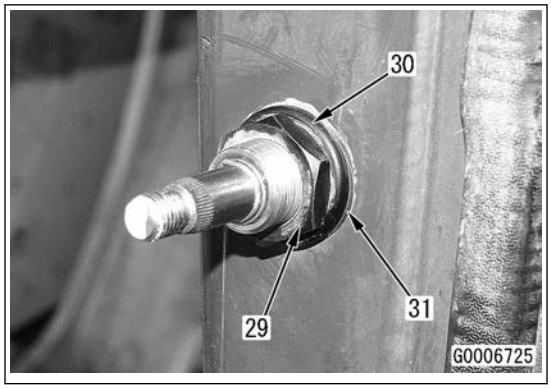
   REMARK

   Install the washer (30) so that the chamfered side faces the front of the cab.

   Tool: Box-end wrench, torque wrench

   Nut (29): Width across flats 27 mm

   Nut (29): 10.8 to 12.7 Nm {1.10 to 1.30 kgm}



3. Install the cap (28) and wiper arm (27).
4. Install the wiper arm (27) so that the clearance dimension (a) between the washer nozzle (34) and wiper blade (35) is that indicated below.

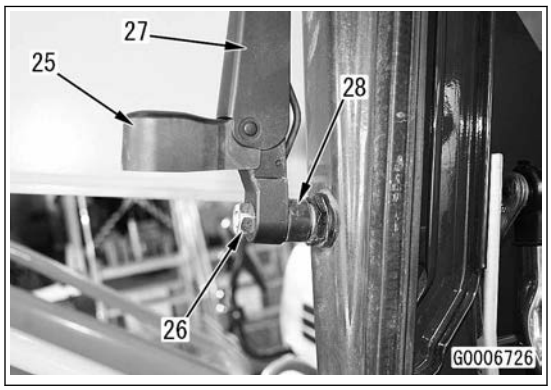
   Clearance (a): 7 mm

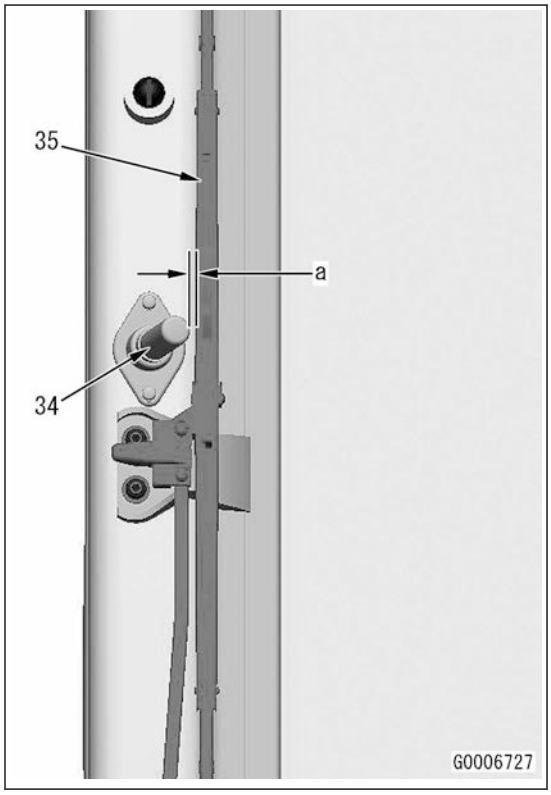
5. Tighten the nut (26), and close the cap (25).

   Tool: Box-end wrench, torque wrench

   Nut (26): Width across flats 17 mm

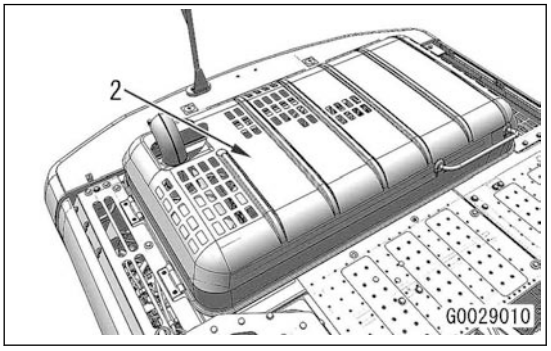
   Nut (26): 11.8 to 15.7 Nm {1.20 to 1.60 kgm}





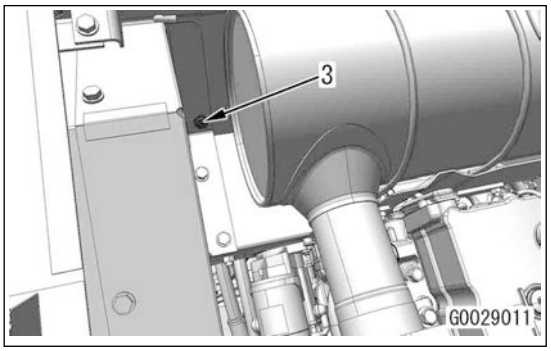
Engine Hood

2. Open the engine hood (2).

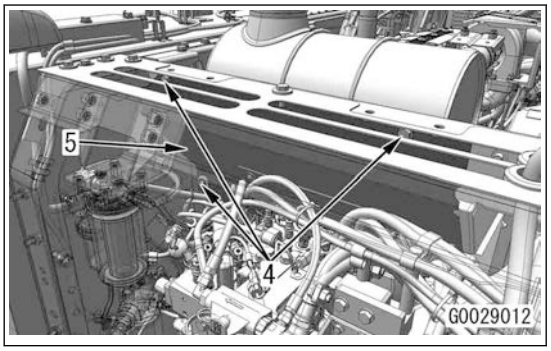


Cover

3. Remove the bolt (3).
   Tool: Impact wrench, socket
   Bolt (3): Width across flats 19 mm, M12

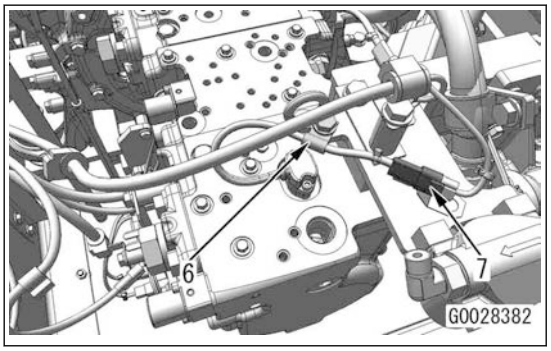


4. Remove the bolts (4) (3 pieces), and remove the cover (5).
   Tool: Impact wrench, socket
   Bolt (4): Width across flats 19 mm, M12



Pump swash plate sensor

5. Remove the clamp (6).
   Tool: Ratchet handle, socket
   Bolt for clamp (6): Width across flats 17 mm, M10
6. Disconnect the connector P28 (7).

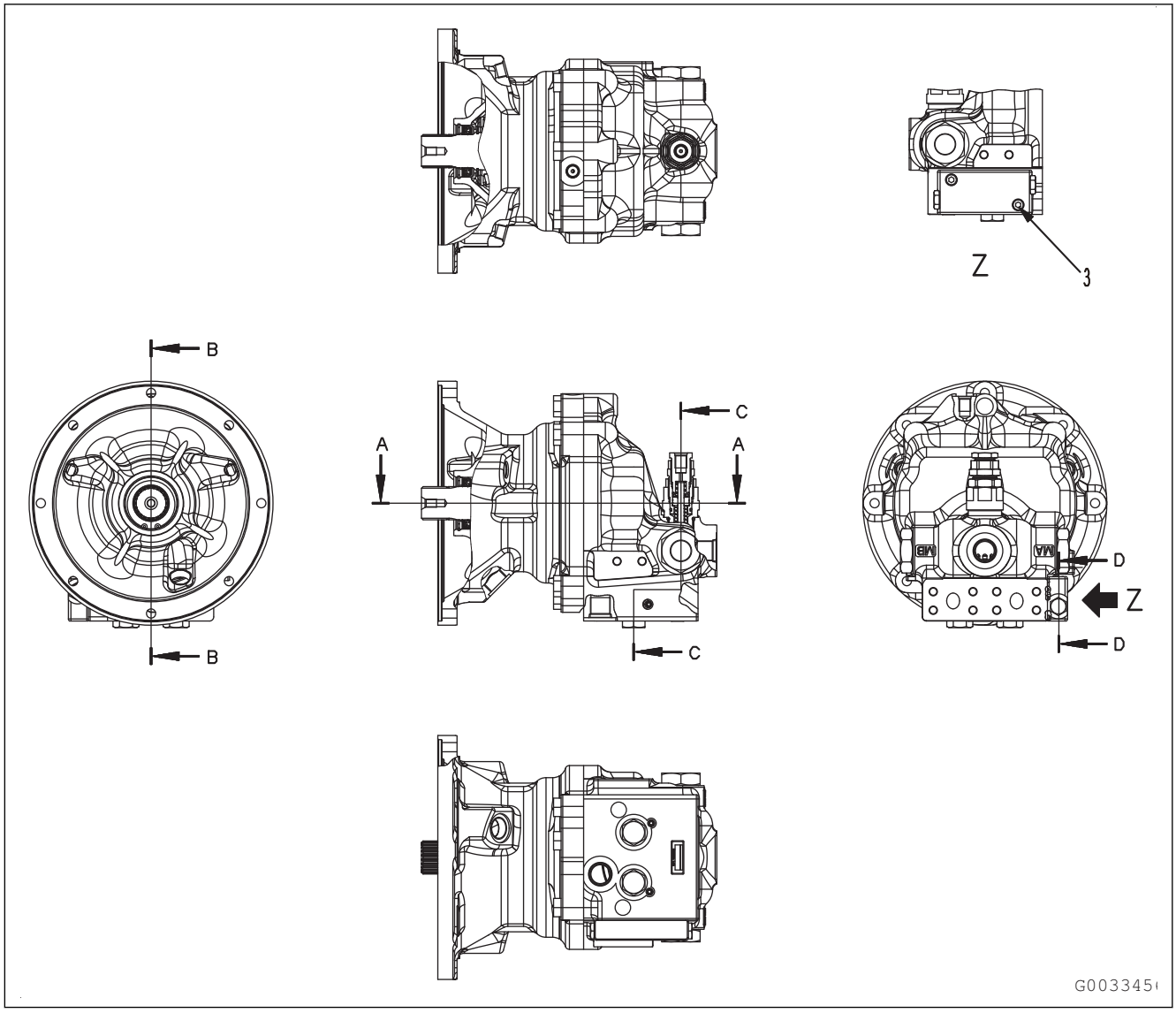


Unit mm

No.	Item	Judgment criteria			Remedy
1	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Allowable clearance		Replace
		0.18 to 0.28	-		
2	Backlash between No. 1 sun gear and No. 1 planetary gear	0.12 to 0.44	0.90		
3	Backlash between No. 1 planetary gear and ring gear	0.14 to 0.51	1.00		
4	Backlash between No. 1 planetary carrier and No. 2 sun gear	0.40 to 0.71	1.40		
5	Backlash between No. 2 planetary gear and ring gear	0.14 to 0.51	1.00		
6	Backlash between No. 2 sun gear and No. 2 planetary gear	0.12 to 0.44	0.90		
7	Backlash between No. 2 planetary carrier and swing pinion	0.07 to 0.23	-		
8	Backlash between swing pinion and swing circle	0.22 to 1.32	2.00		
9	Clearance between plate and No. 2 planetary carrier	0.9±0.42	-		
10	Clearance between plate and No. 2 sun gear	2.3±0.64	-		
11	Outside diameter of oil seal contact surface of swing pinion	Standard dimensions	Tolerance	Repair limit	Repair hard chrome plating or replace it
		125	0 -0.100	-	
12	Tightening torque of bolt	59 to 74 Nm {6.0 to 7.5 kgm}			Retighten
13	Tightening torque of bolt	490 to 608 Nm {50 to 62 kgm}			
14	Tightening torque of bolt	59 to 74 Nm {6.0 to 7.5 kgm}			
15	Tightening torque of bolt	157 to 196 Nm {16 to 20 kgm}			
16	Tightening torque of connector	157 to 196 Nm {16 to 20 kgm}			
17	Tightening torque of elbow	128 to 186 Nm {13.0 to 19.0 kgm}			
18	Tightening torque of elbow	128 to 186 Nm {13.0 to 19.0 kgm}			
19	Tightening torque of plug	19.6 to 24.5 Nm {2.0 to 2.5 kgm}			
20	Tightening torque of elbow	34.3 to 63.7 Nm {3.5 to 6.5 kgm}			

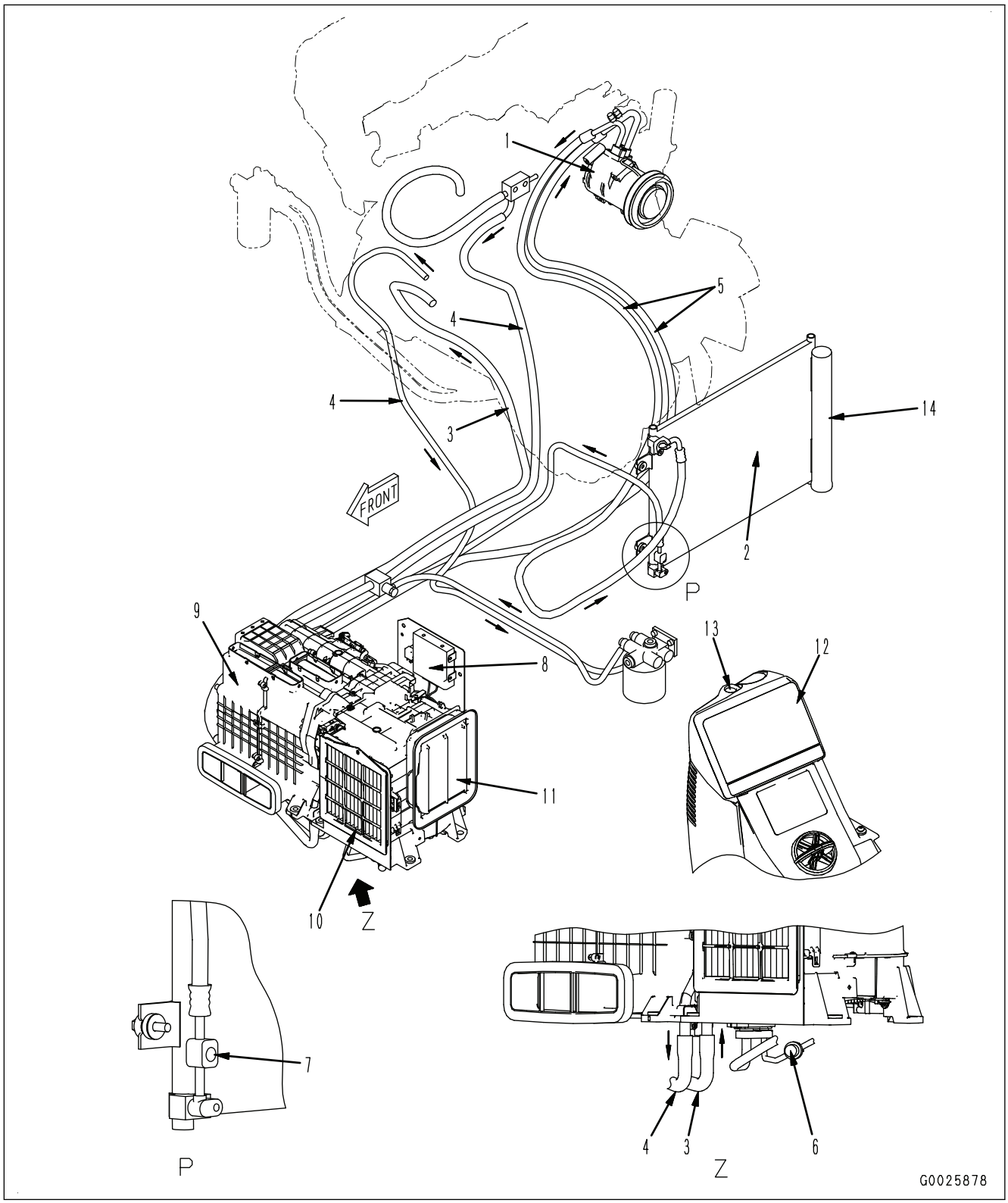
MAINTENANCE STANDARD OF SWING MOTOR

General view



No.	Item	Judgment criteria	Remedy
1	Tightening torque of plug	8.83 to 10.79 Nm {0.9 to 1.1 kgm}	Retightening
2	Tightening torque of bolt	3.53 to 4.31 Nm {0.36 to 0.44 kgm}	
3	Tightening torque of plug	18.9 to 23.1 Nm {1.93 to 2.35 kgm}	
4	Tightening torque of plug	23.85 to 29.15 Nm {2.43 to 2.97 kgm}	

LAYOUT DRAWING OF AIR CONDITIONER SYSTEM



1: Compressor
2: Condenser
3: Hot water piping (inlet)
4: Hot water piping (outlet)
5: Refrigerant piping
6: Dual pressure switch
7: Sight glass
8: Air conditioner controller
9: Air conditioner unit
10: Recirculation air filter

TEST AIR LEAKAGE (DUCT CONNECTION)

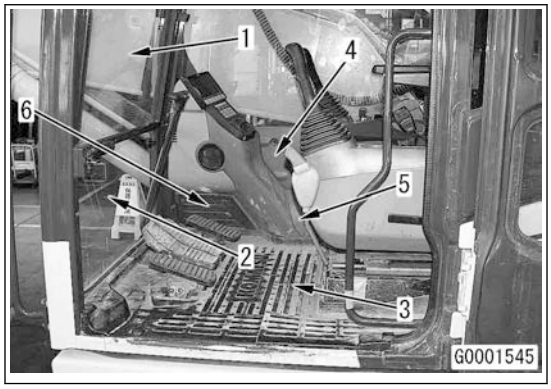
⚠ Park the machine on a level ground. Lower the work equipment fully to the ground in a stable position. Set the lock lever to the LOCK position. Stop the engine.

⚠ Check that the system operating lamp is turned off. Turn the battery disconnect switch to the OFF position.

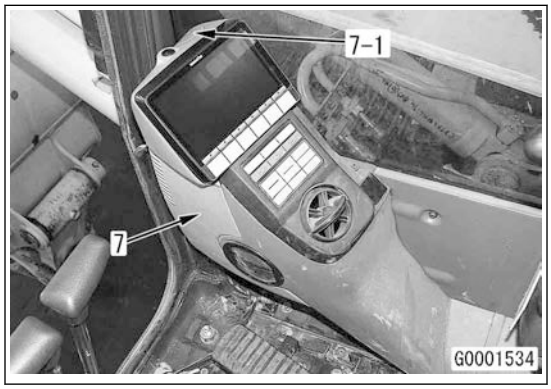
When you disconnect the wiring harnesses and hoses, record the connector numbers and installed positions.

TEST AIR LEAKAGE (DUCT CONNECTION)

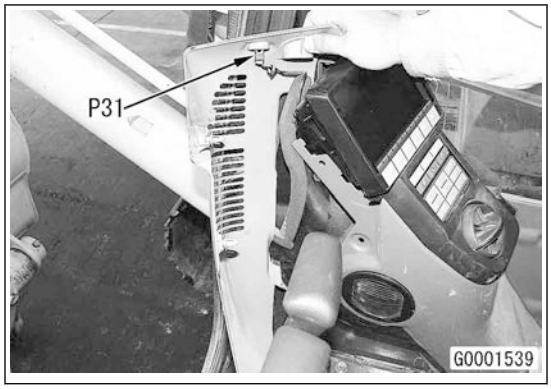
1. Raise the front window (1) to the ceiling, and lock it.
2. Remove the front lower window (2).
3. Remove the floor mat (3).
4. Remove the bolts (3 pieces). Remove the cover (4).
5. Remove the bolts (2 pieces). Remove the cover (5).
6. Remove the bolts (2 pieces). Remove the cover (6).



7. Remove the cap (7 -1).
8. Remove the bolts (3 pieces). Remove the cover (7).

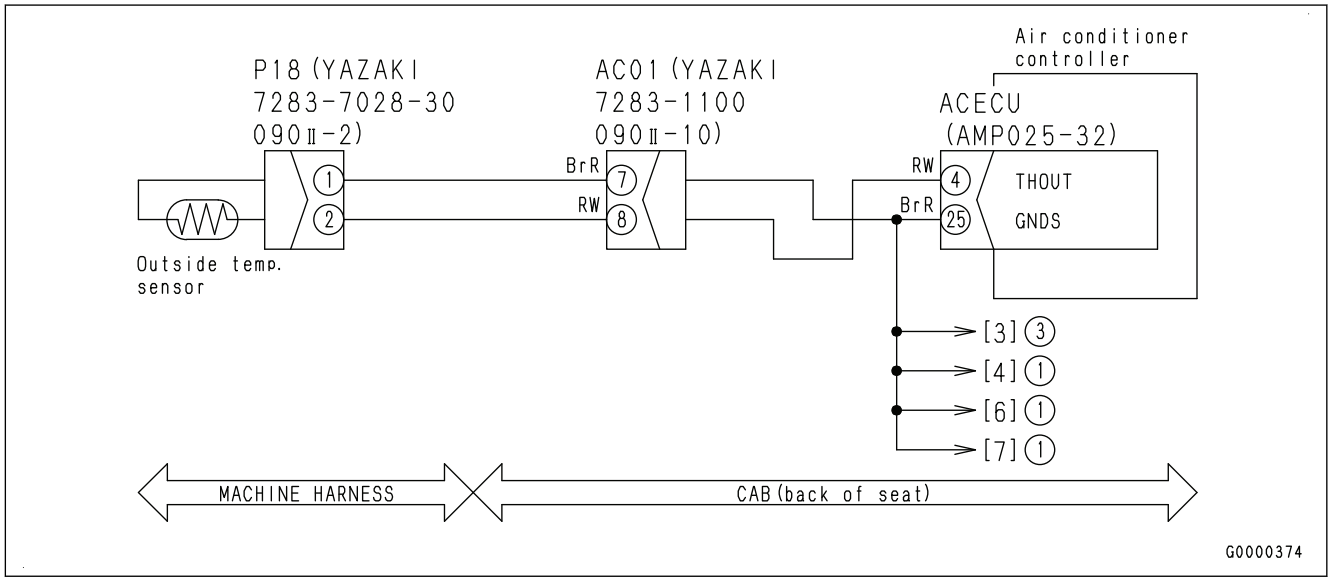


9. Disconnect the connector (P31) of sunlight sensor from the back side of the cover (7).
10. Remove the bolts (5 pieces). Remove the box (8).
    To remove the box (8), disconnect the bottom hose.



No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
6	Reconfirmation of inspection item	1. Do the inspection above again. 2. Have you identified the cause when the inspection is done again?	YES	The repair is completed.
			NO	• The air conditioner unit can be defective. • Replace the air conditioner unit. • Go to "Confirmation of repair".
7	Confirmation of repair	1. Turn the starting switch to the OFF position. 2. Install all the configuration equipment and connect them. 3. Turn the starting switch to the ON position. 4. Check the abnormality record. 5. Is "E" shown in the record of this failure code?	YES	Return to the first inspection item.
			NO	The repair is completed.

Circuit diagram associated with air conditioner outside air temperature sensor



No.	Cause	Procedures, Measurement, Values, Note	Diagnosis and treatment	
16	Adjustment of expansion valve (valve is opened too wide)	1. Turn the starting switch to the ON position. 2. Turn the A/C switch to the ON position. 3. Check if the evaporator is frozen. 4. Is the evaporator temperature sensor normal?	YES	• The evaporator temperature sensor is normal. • Go to the next inspection item.
			NO	• If the evaporator is frozen, the evaporator temperature sensor is defective. • Replace the evaporator temperature sensor. • Go to "Confirmation of repair".
17	Adjustment of expansion valve (valve is opened too wide)	1. Turn the starting switch to the ON position. 2. Turn the A/C switch to the ON position. 3. Check if the bubbles are seen through sight glass. Note 1 and 3 4. Is expansion valve normal?	YES	• The expansion valve is normal. • Go to the next inspection item.
			NO	• If the bubbles are seen through sight glass, adjustment of expansion valve is incorrect. • Replace the expansion valve. • Go to "Confirmation of repair".
18	Air mixing in refrigerant circuit	1. Turn the starting switch to the ON position. 2. Turn the A/C switch to the ON position. 3. Check if the bubbles are seen through sight glass. Note 1 and 3 4. Is the inside of refrigerant circuit normal?	YES	• The inside of refrigerant circuit is normal. • Go to the inspection item in "INCORRECT ADJUSTMENT OF TEMPERATURE".
			NO	• · If the bubbles are seen through sight glass, air is mixing in the refrigerant circuit. • Evacuate the refrigerant. Refill with normal quantity of refrigerant again. Note 2 • Go to "Confirmation of repair".

HANDLE COMPRESSOR OIL

Management of compressor oil (for DENSO: ND-OIL8 R134a)

You do not have to check and refill compressor oil frequently. However, if the oil quantity is too small or too much, it can cause problems that follows. Refill with oil to the specified capacity.

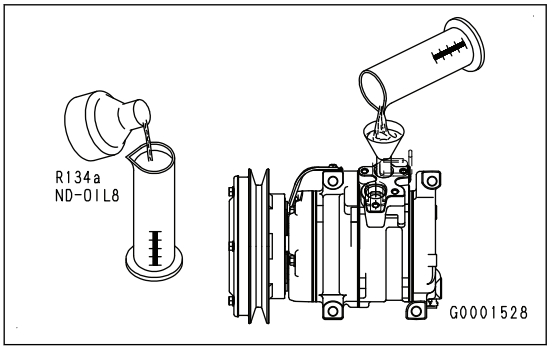
Condition	Problem
Lack of oil	Defective lubrication and breakage or seizure of compressor
Excess of oil	Defective cooling (Excess oil sticks to each part and decreases heat exchange efficiency)

Add compressor oil

⚠ **When disconnecting the air conditioner hoses, always collect the refrigerant before disconnecting. For details, see "PRECAUTIONS FOR DISCONNECTING AND CONNECTING HOSES AND TUBES IN AIR CONDITIONER PIPINGS".**

NOTICE

- **If you use oil for CFC-12 (R-12), lubrication trouble will occur and the compressor can break or seize. Be sure to use oil for R134a (DENSO: ND-OIL8).**
- **Oil for R134a has an extremely high moisture absorption property. After you refill oil, put the cap immediately in order to block them from the air. Store the oil container in a dry and permeability place.**
- **Oil for R134a can dissolve painting surfaces (except a baked finish) of acrylic plastic or polystyrene. Do not allow oil to contact painting surfaces of acrylic plastic or polystyrene parts.**

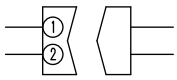
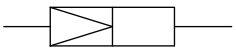
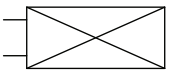
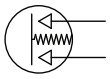
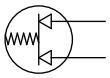
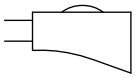
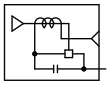


In the cases that follow, check the oil level. If the level is low, add oil.

- When there is a leakage of large quantity of refrigerant
- When the compressor has a trouble and it is replaced
- When the parts for a refrigeration cycle unit such as the condenser, the evaporator, etc. are replaced.

Quantity of oil to be added when refrigerating cycle parts are replaced.

Replacement parts	Quantity to be added
Air conditioner unit (evaporator)	Approximately 40 cc
Condenser (including modulator)	Approximately 60 cc
Desiccating agent	Approximately 20 cc
Hose (compressor to cab)	Approximately 35 cc
Hose (condenser to compressor)	Approximately 30 cc
Hose (condenser to cab)	Approximately 10 cc

Symbol	Content
 G0009646	Connector • Concave side (left on the figure): female • Convex side (right on the figure): male **REMARK** The figure shows the disconnected state.
 G0009647	QQ type connector (left: male, right: female) **REMARK** The figure shows the connected state.
 G0009648	Solenoid
 G0009649	Motor
 G0009650	Lamp
 G0009651	Pressure switch (NO type) NO: Normally Open
 G0009652	Pressure switch (NC type) NC: Normally Close
 G0009653	Potentiometer, fuel control dial
 G0009654	Temperature sensor
 G0009655	Starting switch
 G0009656	Backup alarm
 G0009657	Horn