UENBM00590

Shop Manual

HYDRAULIC EXCAVATOR

PC360LCI-11E0
PC360NLCI-11E0

SERIAL NUMBERS 91258 and up
K77001 and up

KOMATSU

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

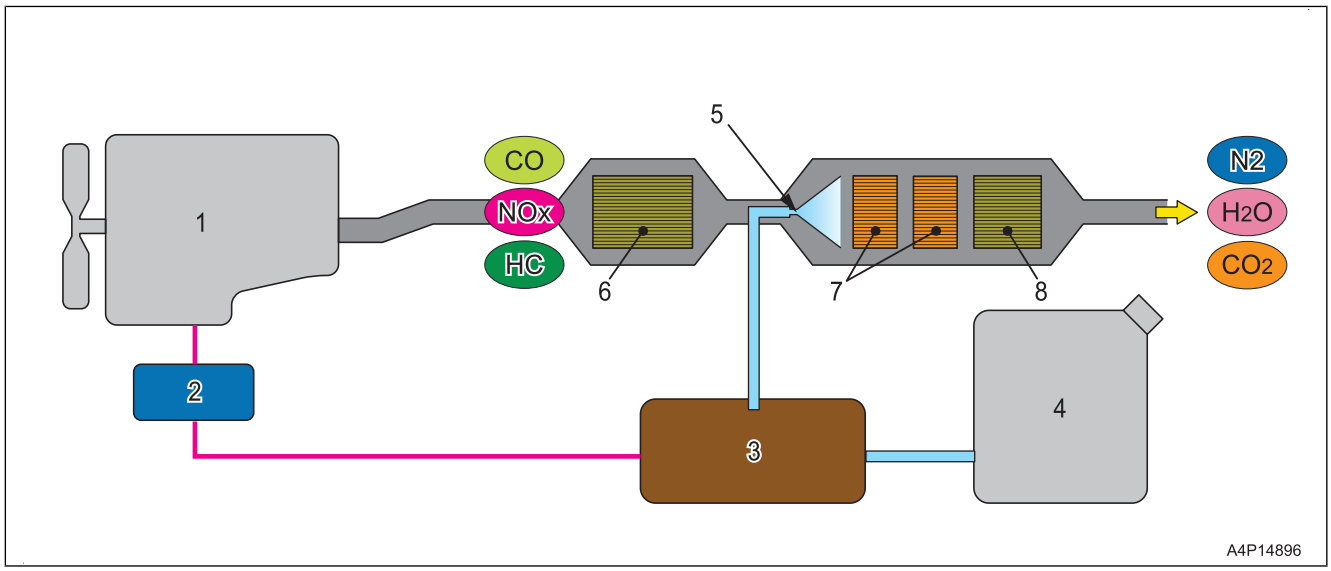
Explosion caused by lighting equipment

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

Types of circuits and color codes

Type of wire		AVS, AV, CAVS						AEX	
Type of circuit	Charge	R	WG	-	-	-	-	R	-
	Ground	B	-	-	-	-	-	B	-
	Start	R	-	-	-	-	-	R	-
	Light	RW	RB	RY	RG	RL	-	O	-
	Instrument	Y	YR	YB	YG	YL	YW	Y	Gr
	Signal	G	GW	GR	GY	GB	GL	G	Br
	Others	L	LW	LR	LY	LB	-	L	-
		Br	BrW	BrR	BrY	BrB	-	-	-
		Lg	LgR	LgY	LgB	LgW	-	-	-
		O	-	-	-	-	-	-	-
		Gr	-	-	-	-	-	-	-
		P	-	-	-	-	-	-	-
		Sb	-	-	-	-	-	-	-
		Dg	-	-	-	-	-	-	-
		Ch	-	-	-	-	-	-	-

FUNCTION OF UREA SCR SYSTEM

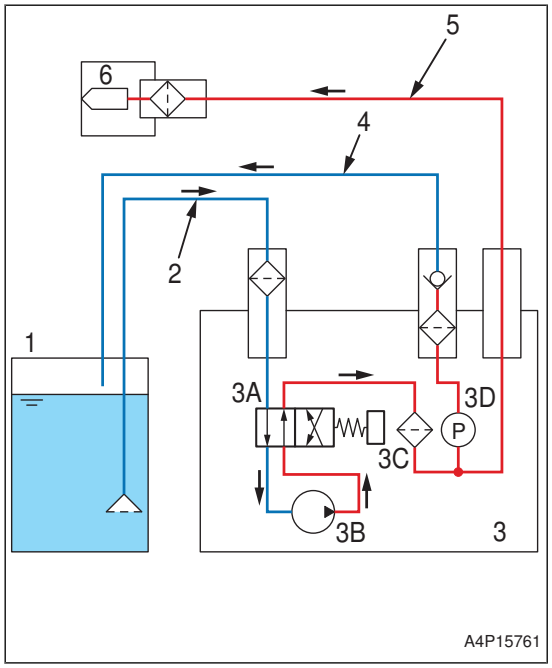


1: Engine
2: Engine controller
3: AdBlue/DEF pump
4: AdBlue/DEF tank
5: AdBlue/DEF injector
6: KDPF
7: SCR catalyst
8: Ammonia oxidation catalyst

- Urea SCR system is a device which converts toxic nitrogen oxides (NOx) in the exhaust gas into harmless nitrogen and water.
- By spraying AdBlue/DEF into the exhaust gas, it decomposes and hydrolyzes to form ammonia (NH_3) and the ammonia selectively reacts with nitrogen oxides for the conversion to nitrogen and water.

FUNCTION OF AdBlue/DEF SYSTEM

1: AdBlue/DEF tank
2: AdBlue/DEF suction hose
3: AdBlue/DEF Pump
3A: Selector valve
3B: Pump
3C: AdBlue/DEF filter
3D: Pressure sensor
4: AdBlue/DEF return hose
5: AdBlue/DEF pressure hose
6: AdBlue/DEF injector



- AdBlue/DEF system consists of AdBlue/DEF tank (1), AdBlue/DEF hoses (2), (4), (5), AdBlue/DEF pump (3), and AdBlue/DEF injector (6). It injects AdBlue/DEF into mixing tube.
- This system automatically starts operation after starting the engine.
- This system has a heating function to thaw AdBlue/DEF and to prevent AdBlue/DEF from freezing since AdBlue/DEF freezes at -11 °C.

- The failure code is recorded in the mechanical system abnormality record.
- If abrupt engine stop is sensed, the auto-deceleration function is turned ON automatically.
- The failure code displayed at abrupt engine stop varies with the number of occurrence, and the message displayed on the machine monitor varies according to the failure code.

Action level	Failure code	Failure (displayed on screen)
L00	A900N6	Abrupt Engine Stop by Auto Idle Stop 1
L01	A900NY	Abrupt Engine Stop by Auto Idle Stop 2
L03	A900FR	Abrupt Engine Stop by Auto Idle Stop 3

- When failure code “A900FR” of action level “L03” is sent, the turbocharger assembly must be replaced since the durability of the engine may decrease.
- After replacing the turbocharger assembly, reset the number of occurrence by using “Reset number of abrupt stops by auto idle stop” in “Inspection” on the service menu.

REMARK

If the number of occurrence is not reset by using “Reset number of abrupt stops by auto idle stop”, failure code “A900FR” is sent again next time and after. Accordingly, be sure to reset after replacing the turbocharger assembly.

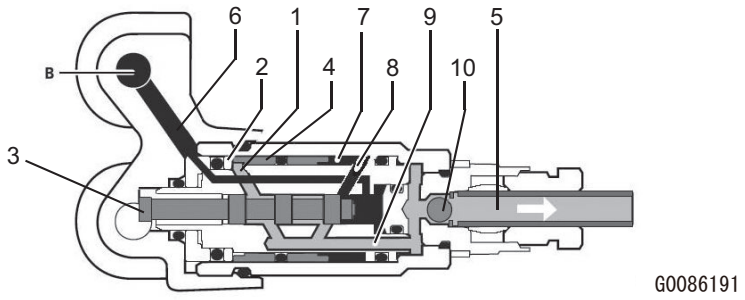


Figure 4.4 Principle of operation of the metering unit - third phase

After a while, the pressure drops in primary channel B (during the pressure decrease phase of the greasing cycle). This has no influence on the metering unit.

Phase 4

In this phase the same happens as in phase 2. However chamber (7) (see figure 4.4) is now filled with grease. Plunger (4) is pushed to the right (see figure 4.5) while chamber (2) is filled. The complete grease volume of chamber (7) is pressed through channel (8), plunger (3) and channel (9) and the secondary grease line (5) to the greasing point. Sphere (10) in the non-return valve is pushed back to clear the path to the secondary grease line.

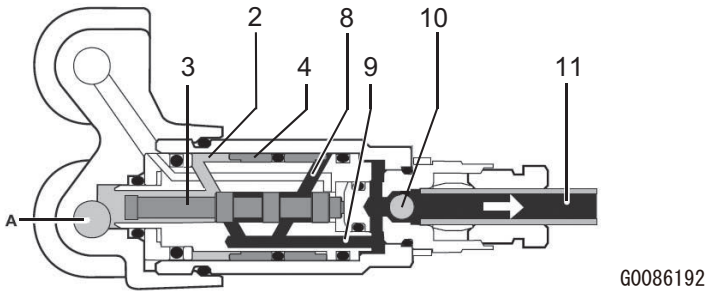


Figure 4.5 Principle of operation of the metering unit - fourth phase

(c) Grease pressure switch

The principle of operation of the grease pressure switch is explained in three phases.

Phase 1

During this phase both channels A and B are not under pressure (see figure 4.6). There is also no pressure in chamber (1). Spring (10) pushes switch plunger (2) to the left. The electrical contact (3 and 4) is open.

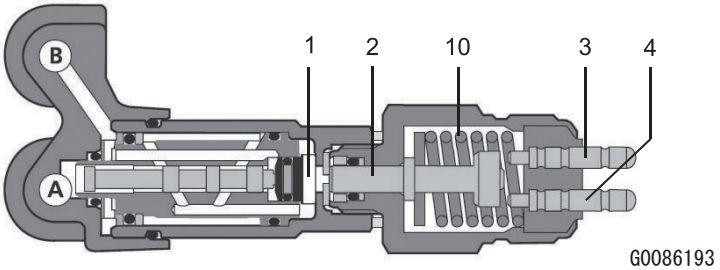


Figure 4.6 Principle of operation of grease pressure switch - rst phase

Phase 2 (pumping phase A)

During pumping phase A grease is pressed into channel A (see figure 4.7). While the grease pressure is built up, piston (6) is pushed to the right. Chamber (1) is connected to channel A (through the channels 7, 8 and 9). As soon as the pressure in chamber (1) is more than the pressure force of the spring (10), plunger (2) goes to the right. The electrical contact (3 and 4) is closed by the contact plate (5).

During the pressure decrease phase, as soon as the grease pressure in channel A is lower than the pressure force of the spring, the connection of contacts is broken.

Pin No.	Signal name	Input/Output
11	(*1)	-
12	(*1)	-
13	Water-in-fuel sensor	Input
14	(*1)	-
15	(*1)	-
16	AdBlue/DEF pump pressure sensor	Input
17	(*1)	-
18	(*1)	-
19	(*1)	-
20	(*1)	-
21	Datalink4 (+) (Sensor controller)	Communication
22	Datalink4 (+) (KOMNET/c)	Communication
23	(*1)	-
24	(*1)	-
25	Power supply (+24 V, continuous)	Power supply
26	Power supply (+24 V, continuous)	Power supply
27	Power supply (+24 V, continuous)	Power supply
28	Power supply (+24 V, continuous)	Power supply
29	(*1)	-
30	(*1)	-
31	(*1)	-
32	GND	Ground/Shield/ Return
33	GND	Ground/Shield/ Return
34	(*1)	-
35	(*1)	-
36	(*1)	-
37	(*1)	-
38	AdBlue/DEF line heater 2	Input
39	AdBlue/DEF line heater 1	Input
40	(*1)	-
41	KDPF differential pressure sensor	Input
42	KDPF outlet pressure sensor	Input
43	(*1): Machine equipped with fuel control dial Idle validation switch 2: Machine with accelerator pedal	-
44	(*1): Machine equipped with fuel control dial Idle validation switch 1: Machine with accelerator pedal	-
45	Datalink4 (-) (Sensor controller)	Communication

FUNCTION OF AUTO GREASE PRESSURE SWITCH

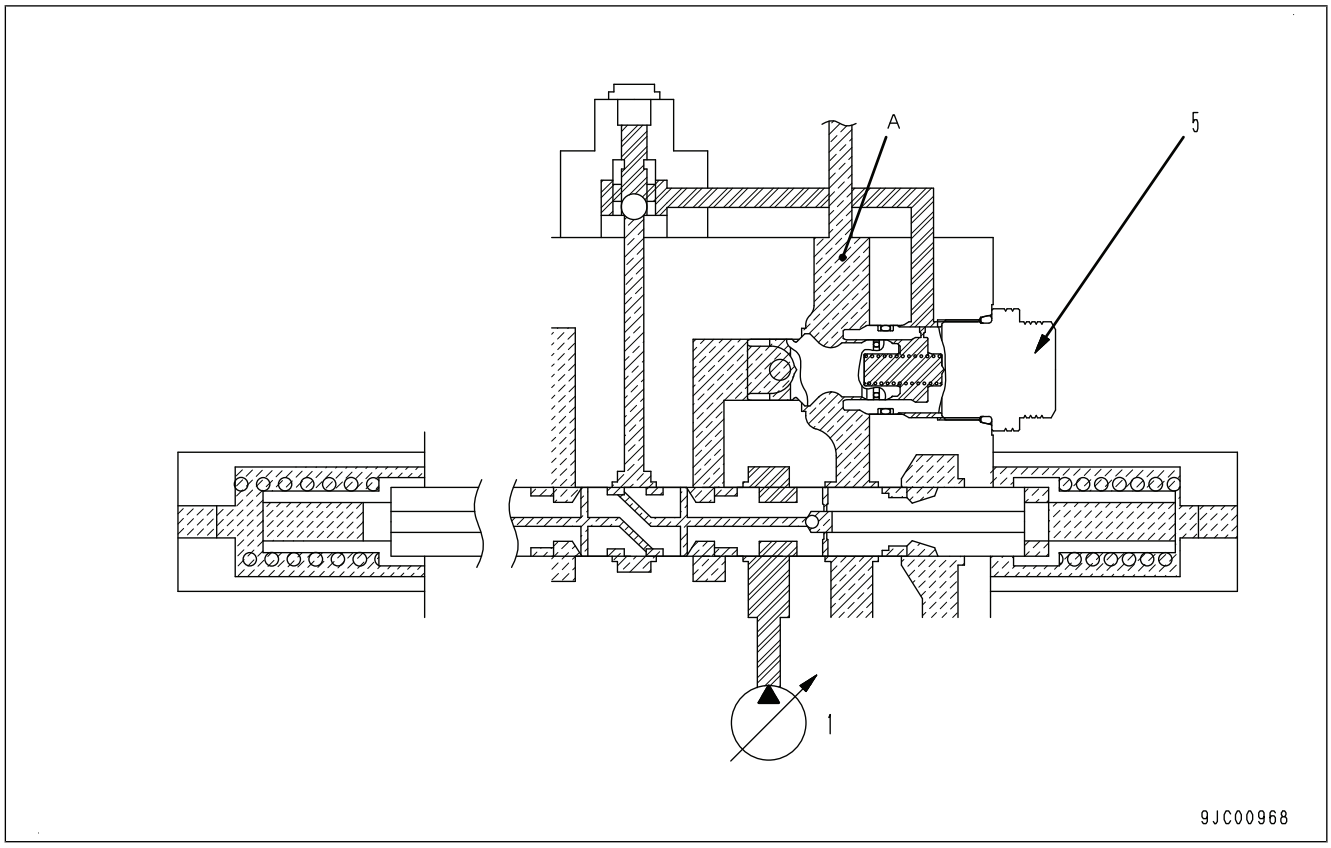
The auto grease circuit has one pressure switch.

OCP: Oil level check port
PAF: Front pump discharge port
PAR: Rear pump discharge port
PBF: Front pump pressure input port
PBR: Rear pump pressure input port
PD1F: Air bleeder
PD1R: Case drain port
PD2F: Drain plug
PD2R: Drain plug
PENF: Front pump control pressure pickup port
PENR: Rear pump control pressure pickup port
PEPC: EPC source pressure input port
PEPB: EPC source pressure pickup port
1: Front pump
2: Rear pump
3: LS valve
4: PC valve
5: LS-EPC valve
PFC: Front pump discharged pressure pickup port
PSIG: LS set selector pressure pickup port
PLSF: Front pump load pressure input port
PLSFC: Front pump load pressure pickup port
PLSR: Rear pump load pressure input port
PLSRC: Rear pump load pressure pickup port
PMF: Front pump PC mode selector pressure pickup port
PMR: Rear pump PC mode selector pressure pickup port
PRC: Rear pump discharged pressure pickup port
PS: Pump suction port
6: Front pump PC-EPC valve
7: Rear pump PC-EPC valve
8: Front pump swash plate sensor
9: Rear pump swash plate sensor

SHUTTLE VALVE IN PRESSURE COMPENSATION VALVE OF CONTROL VALVE

STRUCTURE OF SHUTTLE VALVE IN PRESSURE COMPENSATION VALVE OF CONTROL VALVE

During travel

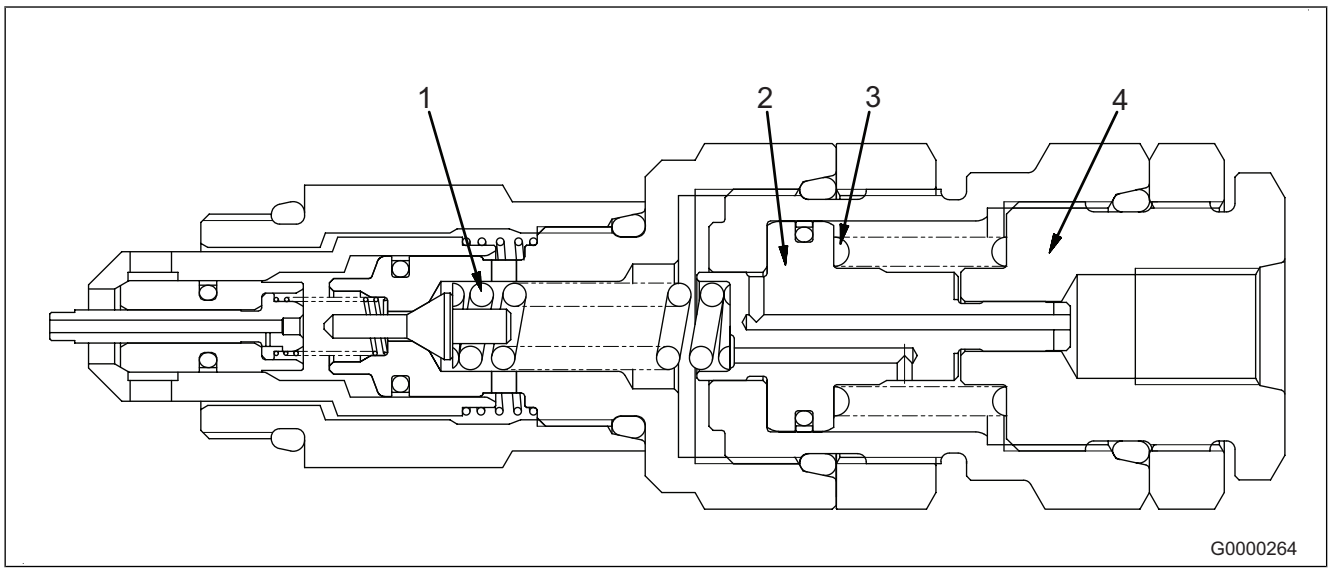


1: Main pump 5: Pressure compensation valve

Since no holding pressure occurs in port (A) of the travel circuit, pressure compensation valve (5) having no shuttle valve is employed.

FUNCTION OF 2-STAGE SUCTION-SAFETY VALVE OF CONTROL VALVE

Port (B) of service valve



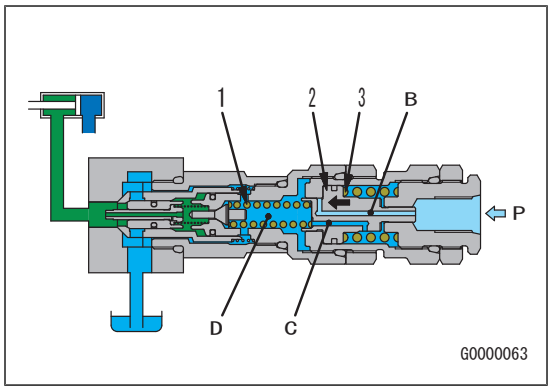
1: Spring
2: Piston
3: Spring
4: Holder

The 2-stage suction safety valve can switch the set pressure in two stages. The set pressure is switched by the pilot pressure from the attachment selector solenoid valve. When the pilot pressure is connected to the hydraulic oil tank, the set pressure is determined by the mounting load of the spring (1). When the pilot pressure is loaded, the mounting load of the spring (1) decreases and the set pressure is reduced.

OPERATION OF 2-STAGE SUCTION-SAFETY VALVE OF CONTROL VALVE

When the pilot pressure (P) is connected to the tank. (high pressure setting)

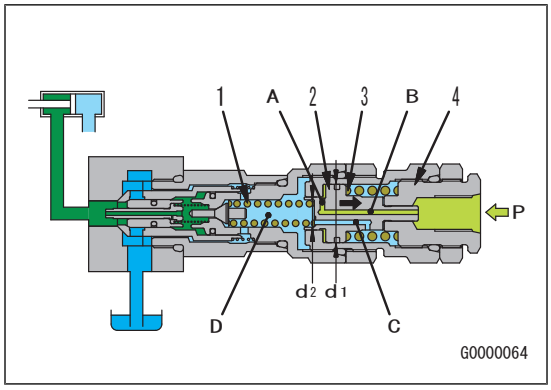
Since the pilot pressure from the attachment selector solenoid valve is connected to the tank, the piston (2) is pushed to the left by the reaction force of spring (3). Load at installed height of spring (1) is maximum. This is high pressure setting.



When pilot pressure (P) is supplied (low pressure setting)

Since the pilot pressure from the attachment selector solenoid valve flows through the route (B), and is supplied to the (A) part. The pilot pressure is applied to the pressure receiving diameter (d1-d2), and the piston (2) is pushed against the spring (3) until it touches the holder (4). The installing load of the spring (1) becomes small by the movement of the piston (2). This is low pressure setting.

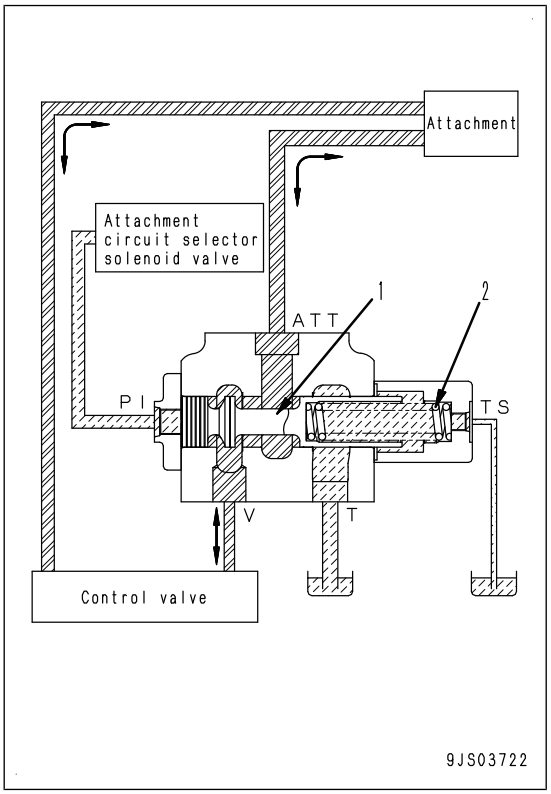
The pressurized oil caused by the stroke of piston (2) is drained through the passage (C) and the chamber (D).



OPERATE ATTACHMENT CIRCUIT SELECTOR VALVE

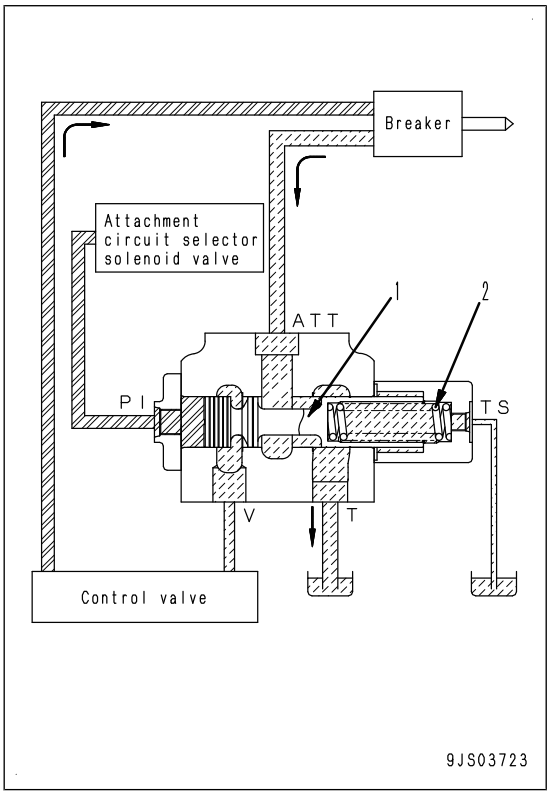
When attachment other than breaker is installed

1. Spool (1) is pressed to the left by the force of spring (2).
2. Port (ATT) is connected to port (V), and port (ATT) is disconnected from port (T), and the attachment is connected to the control valve.



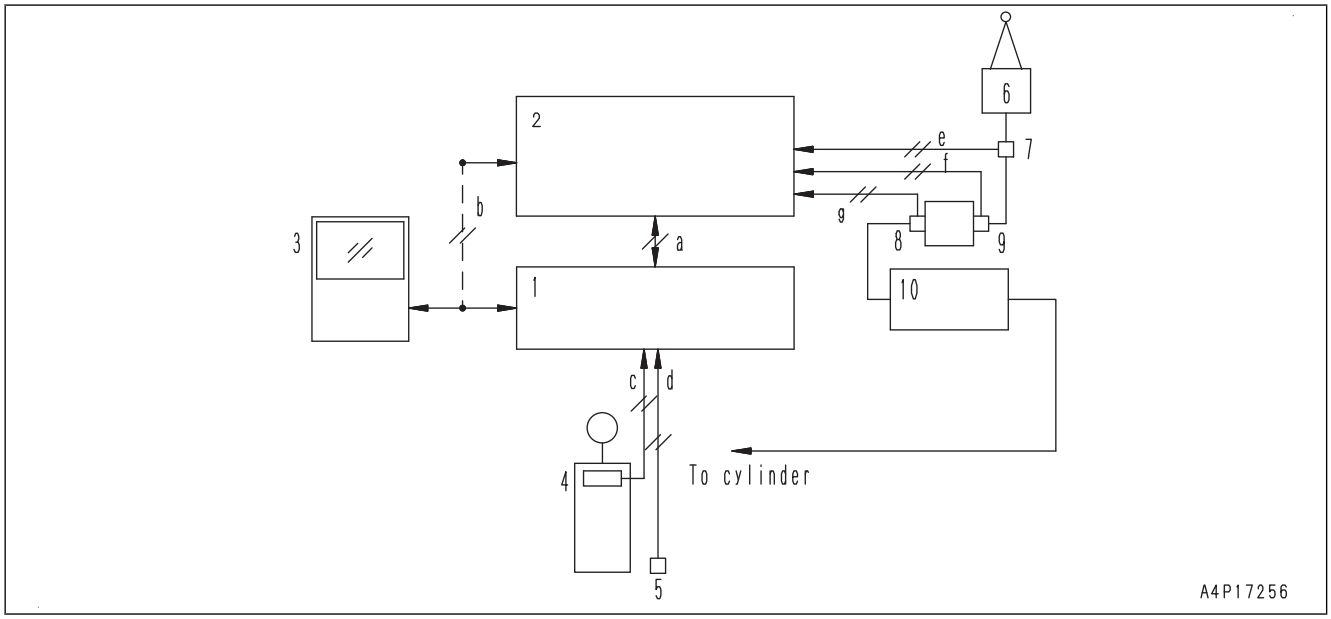
When breaker is installed

1. Pilot pressure (PI) from the attachment circuit selector solenoid valve compresses spring (2), and spool (1) moves rightward to the stroke end.
2. Port (ATT) is disconnected from port (V), and port (ATT) is connected to port (T).
3. The pressurized oil returning from the breaker returns directly to the hydraulic tank through port (T) without passing through the control valve.



CUSHION SYSTEM FOR BOOM RAISE END

CUSHION SYSTEM FOR BOOM RAISE END DIAGRAM



Input and output signals

a: Control Area Network signal 1 (Komnet/r)

b: Control Area Network signal 2 (Komnet/c)

c: Cylinder stroke signal

1: ICT sensor controller

2: Work equipment controller

3: Machine monitor

4: Stroke sensor for cylinder

5: Reset sensor for cylinder

d: Stroke and reset sensor signal for cylinder

e: PPC Pressure signal (lever side)

f: PPC pressure reduce pressure EPC drive signal

g: PPC pressure signal (control valve side)

6: PPC valve

7: PPC pressure sensor (lever side)

8: PPC pressure sensor (control valve side)

9: EPC valve for intelligent Machine Control

10: Control valve

REMARK

Devices and systems used in the cushion system for boom RAISE end are common to those described in the ICT control function.

FUNCTION OF CUSHION SYSTEM FOR BOOM RAISE END

- The cushion system for boom RAISE end operates when the boom RAISE operation is performed.
- The cushion system for boom RAISE end reduces the impact caused when it reaches the stroke end of boom RAISE operation by decreasing the speed of the arm cylinder around the stroke end.
- The boom RAISE PPC pressure is set not to be 0 MPa so that the warm-up operation can be operated even after the arm cylinder reaches to the boom RAISE end.

OPERATION OF CUSHION SYSTEM FOR BOOM RAISE END

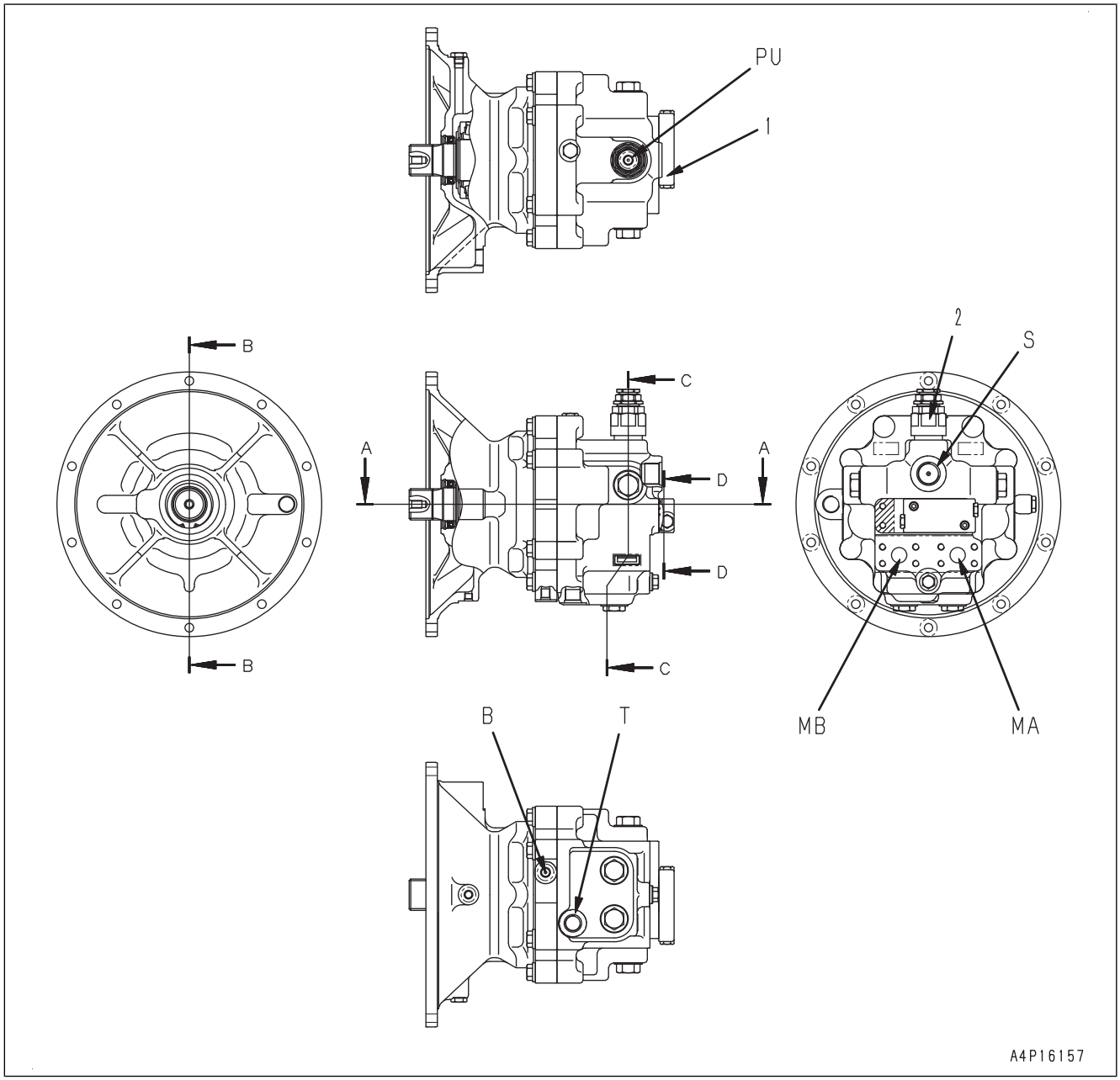
1. The ICT controller (1) figures out the distance to the current boom RAISE end by calculating the information from the cylinder stroke sensor (4) and the cylinder reset sensor (5), and transmits the data to the work equipment controller (2).
2. The work equipment controller figures out the target speed for the boom cylinder by calculating the distance information to the boom RAISE end.
3. The work equipment controller (2) outputs the EPC drive signal (PPC reducing pressure) corresponding to the cylinder target speed which is figured out.
4. The boom RAISE reducing pressure EPC is operated by the EPC drive signal.

COMPONENT PARTS OF SWING SYSTEM

SWING MOTOR

STRUCTURE OF SWING MOTOR

General view



MA: From control valve (swing RIGHT port)
MB: From control valve (swing LEFT port)
B: From swing parking brake solenoid valve
1: Reverse prevention valve
S: From control valve (variable back pressure valve)
T: To hydraulic tank
PU: From 2-stage swing relief solenoid valve
2: 2-stage swing relief valve

FUNCTION OF CENTER SWIVEL JOINT

Center swivel joint sends the oil from main pump installed to the the upper structure to travel motor installed to the lower structure while rotating. Center swivel joint would not be twisted unlike hoses or tubes which would be twisted if they are installed, for the upper structure rotating relative to the lower structure.

Machine model					PC360LCI-11E0	
Engine					SAA6D114E-6	
Item		Measurement condition		Unit	Lower limit	Upper limit
Bucket CURL reducing pressure EPC	PPC pressure	• Hydraulic oil temperature: 40 to 60 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Work equipment machine posture: See “characteristic map calibration”	EPC current500 mA	MPa	1.04	1.68
			EPC current700 mA		1.85	2.53
Bucket DUMP reducing pressure EPC	PPC pressure	• Hydraulic oil temperature: 40 to 60 °C • Fuel control dial: MAX (High idle) position • Working mode: P (Power Mode) • Work equipment machine posture: See “characteristic map calibration”	EPC current500 mA	MPa	1.04	1.68
			EPC current700 mA		1.85	2.53

*2: Displayed as minus (-) in the monitor screen.

TEST ENGINE OIL PRESSURE

Testing tools for engine oil pressure

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5160	Nipple	1	Size: R1/8
B		799-401-2320	Gauge	1	Pressure range1 MPa
C		6732-81-3170	Nipple	1	Size: M10×1.0mm
D		6215-81-9710	O-ring	1	

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

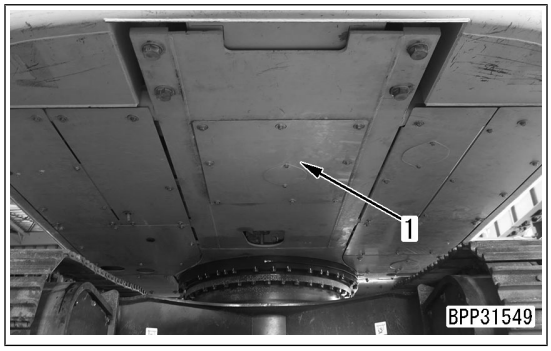
Check this item under the following conditions.

Engine coolant temperature: 75 to 85 °C

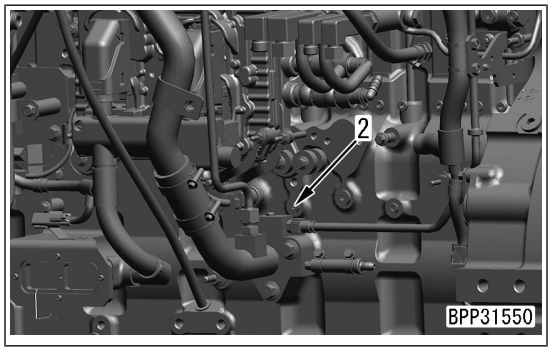
For testing of engine oil pressure to perform troubleshooting or Pm Clinic, refer to this section.

METHOD FOR TESTING ENGINE OIL PRESSURE

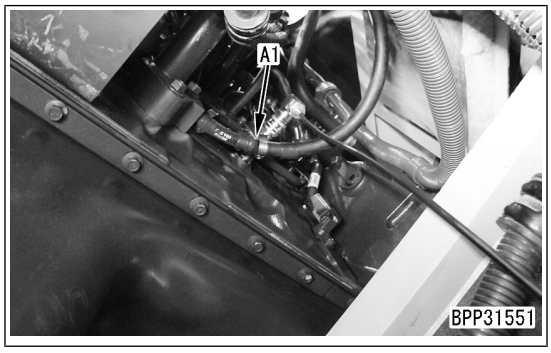
1. Remove undercover (1).



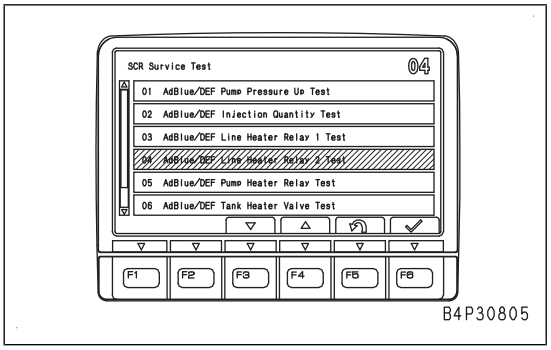
2. Remove oil pressure pickup plug (2) of the cylinder block.



3. Install nipple A1 of hydraulic tester A and connect them to gauge B.



7. Select “AdBlue/DEF Line Heater Relay 2 Test” by referring “SET AND OPERATE MACHINE MONITOR”.



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

REMARK

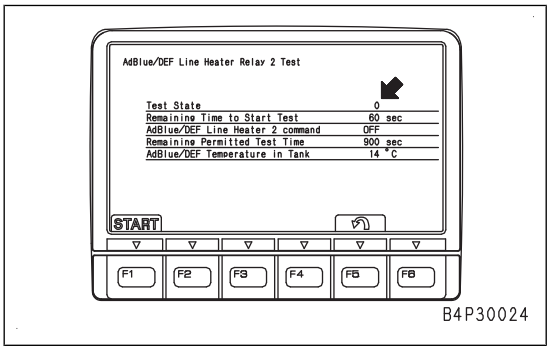
Flashing of “0” indicates “Waiting for the start (default)”, and test can be performed. Screen other than “0” is displayed, follow “Parameter list of Test State”.

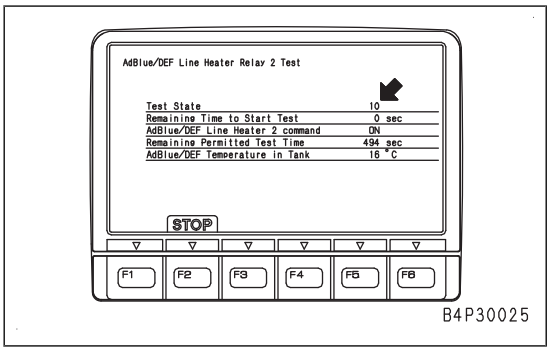
9. Press F1 to start “AdBlue/DEF Line Heater Relay 2 Test”.

F1: Starts “AdBlue/DEF Line Heater Relay 2 Test”.

F2: Stops “AdBlue/DEF Line Heater Relay 2 Test”. (When “STOP” is displayed.)

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





NOTICE

- **“Test State” does not change to “10” and test does not start even if F1 is pressed, turn starting switch to OFF position once, and repeat the testing procedure from step 5.**
- **If you turn starting switch to OFF position by mistake during test, do not turn starting switch to ON position immediately. Check that system operating lamp is off, and turn starting switch to ON position again after engine controller shuts down.**
- **When KOMNET communication error which the engine controller can not detect occurs within 1 second, the test may be continued although the machine monitor does not continue the test (standard screen). In that case, turn the starting switch to OFF position once, and system operating lamp goes out, and the engine controller shuts down to reset the test.**

REMARK

- Display of “Test State” changes to flashing of “10”, and display of “Remaining Time to Start Test” is counted down from “60” to “0 sec”, and when it reaches to “0 sec”, the power is supplied automatically.
- When the display of “Test State” shows the number between “11” to “41”, follow “Parameter list of test state”.
- When the display of “Remaining Time to Start Test” becomes “0 sec”, “AdBlue/DEF Line Heater 2 Command” is “ON” and voltage will be outputted.
- The test stops automatically in the elapsed time of 16 minutes after F1 is pressed.

10. Measure the voltage between pin 1 and pin 2.

TEST AND ADJUST OIL PRESSURE IN PUMP PC CONTROL CIRCUIT

Testing and adjusting tools for oil pressure in pump PC control circuit

Symbol		Part No.	Part name	Q'ty	Remarks
A	-	799-101-5002	Hydraulic tester	1	
	1	799-101-5110	Gauge	1	Pressure range 60 MPa
	2	799-101-5130	Gauge	1	Pressure range 6 MPa
B	-	790-261-1205	Digital hydraulic tester	1	Pressure range 70 MPa
C		799-101-5220	Nipple	4	Size: M10 x 1.25 mm
D		07002-11023	O-ring	4	

⚠ 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.

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

⚠ Lower the work equipment to the ground, and stop the engine. Operate the control levers several times to release the remaining pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure.

Test this item under the following conditions.

Hydraulic oil temperature : 45 to 55 °C

Before testing this item, check that the oil pressure in the work equipment, swing, and travel circuits and control circuit oil pressure is normal.

For testing of pump PC control circuit source pressure to perform troubleshooting or others, refer to this section.

TEST PC VALVE OUTPUT PRESSURE (SERVO PISTON INLET PRESSURE)

To measure the PC valve outlet pressure (servo piston inlet pressure), measure the pump discharge pressure simultaneously and compare them.

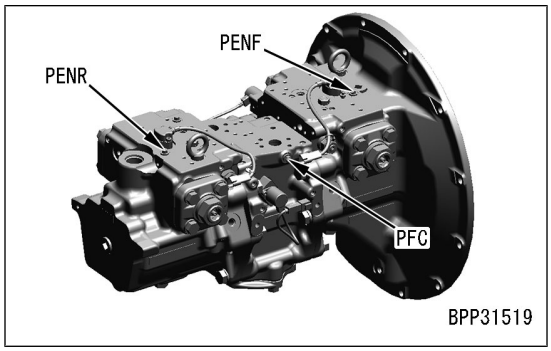
1. Open the cover on the left side of the machine, and remove oil pressure pickup plugs (PFC), (PRC), (PENF), and (PENR).

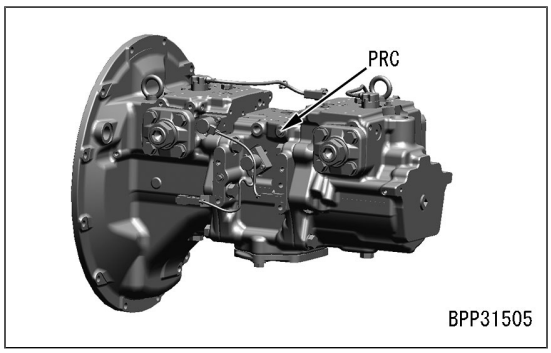
   (PFC): Front pump discharge pressure pickup port

   (PRC): Rear pump discharge pressure pickup port

   (PENF): Front control pressure pickup port

   (PENR): Rear control pressure pickup port





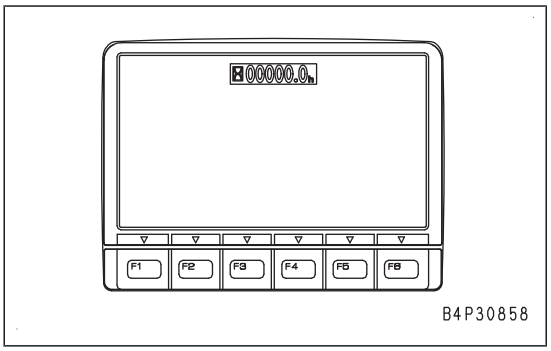
CHECKING FUNCTION OF SERVICE METER

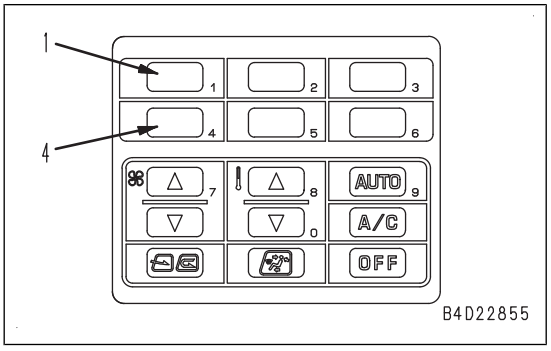
When checking the service meter with the starting switch in OFF position, operate the numeral input switches as follows to display only the service meter section.

Operate the switches (simultaneously): 4 + 1

REMARK

- There is some time lag in start of the LCD, so hold down the switches until the service meter is displayed.
- If you release one of the switches, the monitor goes off.





METHOD FOR SETTING USAGE LIMITATION AND CHANGING PASSWORD

On the machine monitor, a password can be set as a user limitation setting. If the password has been set, a password enter screen is displayed for resetting of maintenance items.

For the operating method for “Operator ID Change” see Operation and Maintenance Manual

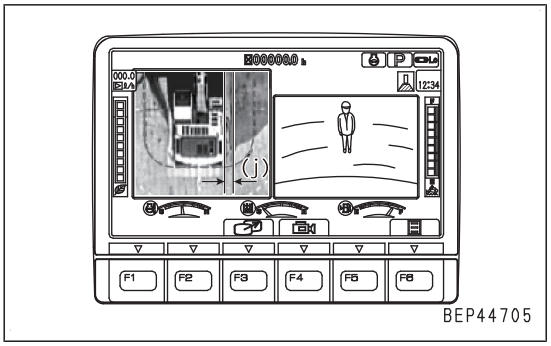
Perform the Usage Limitation Setting and Change Password functions according to the following procedure.

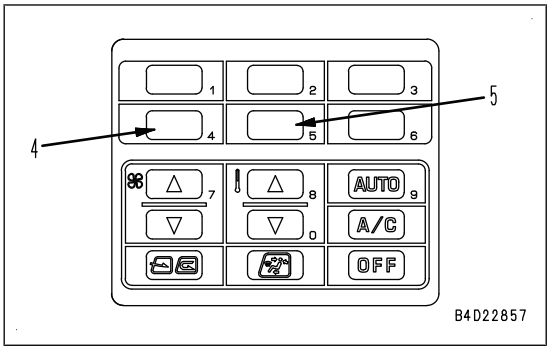
1. While the standard screen is displayed, perform the following operation by using the numeral input switches.

   Switch operation (While pressing 4, press other switches in order): 4 + 5 → 5 → 5

   REMARK

   This operation of the switches is not accepted until 10 minutes elapsed after the starting switch is turned to ON position.

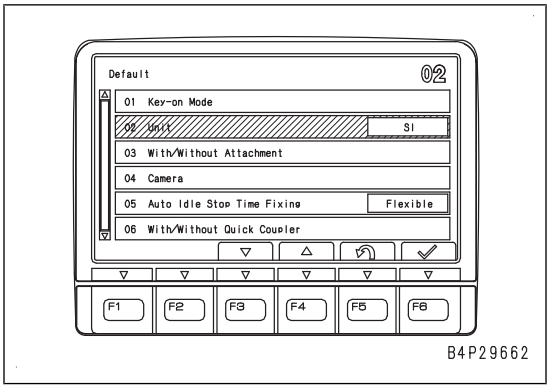




2. Select “Unit” with the function switches or numeral input switches on “Default” screen.

   REMARK

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



3. Select the unit to be set with the function switches on “Unit” screen.

   F3: Moves the selection downward

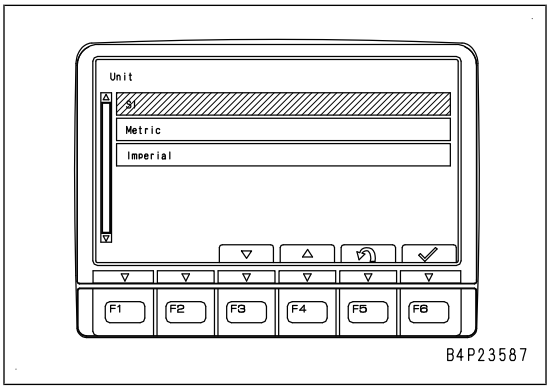
   F4: Moves the selection upward

   F5: Cancels the selection. Screen returns to “Default” screen

   F6: Enters the selection, and the screen returns to “Default” screen

   REMARK

   Default value at the shipment is SI Unit.



METHOD FOR SETTING DEFAULT (WITH/WITHOUT ATTACHMENT)

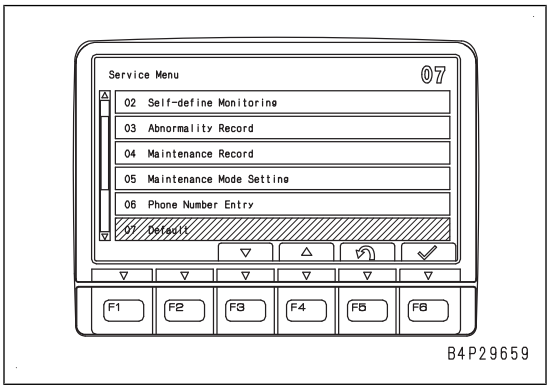
Default setting menu is used to check or change default values of the machine monitor and the machine.

Use the sub menu of “With/Without Attachment” function to configure attachment setting when the attachment is installed or removed.

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

   REMARK

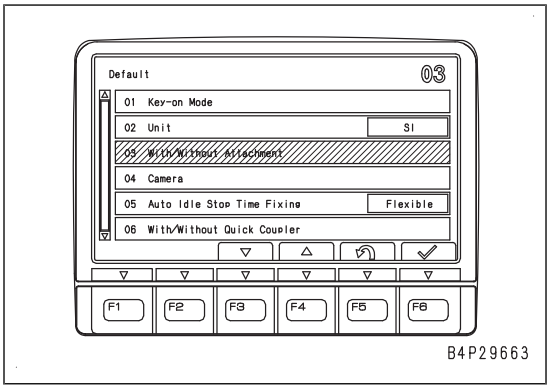
   For selecting method, see “METHOD FOR OPERATING SERVICE MODE” in “SERVICE MODE”.



2. On “Default” screen, select “With/Without Attachment” with function switches or numeral input switches.

   REMARK

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



2. Select “Attachment EPC 2 Adjustment (Tilt)” with the function switches or numeral input switches on “Adjustment” screen.

REMARK

For how to select, see “Operating method of service mode” in “SERVICE MODE”.

G0086064

3. On “Attachment EPC 2 Adjustment (Tilt)” screen, select the desired value at the right side by using the function switches.

Set value: For the actual torque adjustment value, see the table of "Relation between the set value and torque adjustment value".

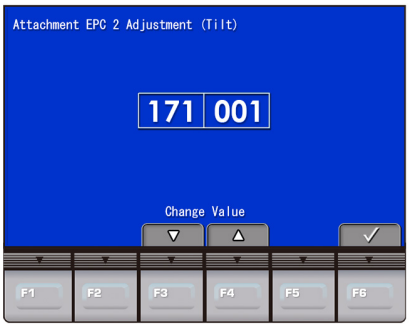
F3: Decreases the set value

F4: Increases the set value

F6: The setting is confirmed or entered. Screen returns to “Adjustment” screen.

REMARK

The 3-digit number in the left column does not change. This is the code for this function.



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Relationship between set value and attachment EPC2 current adjustment value (Auto-tilt bucket)

Code	Set value	Torque adjustment value
171	000	-57.5 mA
	001	-55.0 mA
	002	-52.5 mA
	003	-50.0 mA
	004	-47.5 mA
	005	-45.0 mA
	006	-42.5 mA
	007	-40.0 mA
	008	-37.5 mA
	009	-35.0 mA
	010	-32.5 mA
	011	-30.0 mA
	012	-27.5 mA
	013	-25.0 mA
	014	-22.5 mA
	015	-20.0 mA

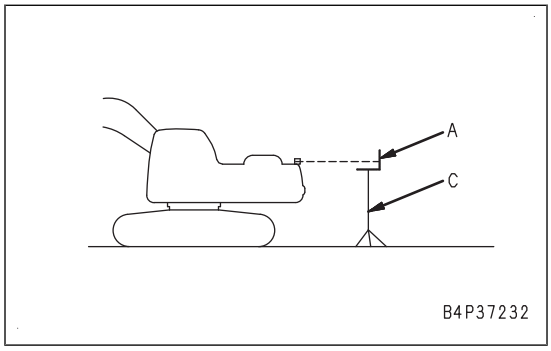
Operation of “angle calibration”

1. Make the angle setting calibration marker A.

   REMARK

   - Make an enlarged photocopy of the angle setting calibration marker A in Fig. 1 found at the end of this section.
   - Ensure the figure size to be large enough to read on the machine monitor screen. The recommended size is A3.

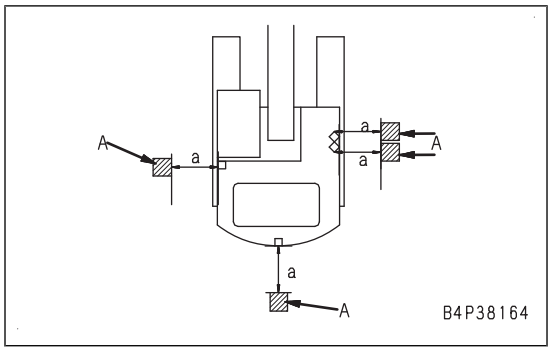
2. Fix the angle setting calibration marker A to the tripod C.



3. Horizontally install the angle setting calibration marker A to the position (a) approximately 1.0 to 1.5 m apart from the camera.

   REMARK

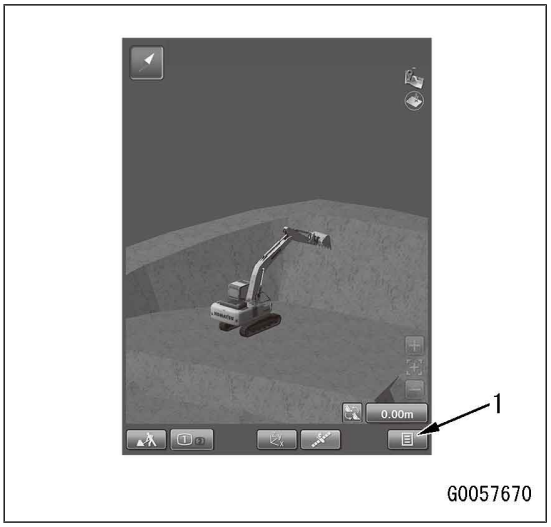
   - “Angle calibration” can be performed from any camera.
   - Perform the “Angle calibration” by each camera.
   - Install the angle setting calibration marker A at the position shown in the figure.
   - Adjust the height of angle setting calibration marker A to the height of the center of the camera lens.
   - Calibration accuracy is assured by setting the center of the angle setting calibration marker A to the center of the camera lens within ±40 mm.
   - The angle calibration accuracy may deteriorate if the angle calibration marker position (a) is below 1.0 m.



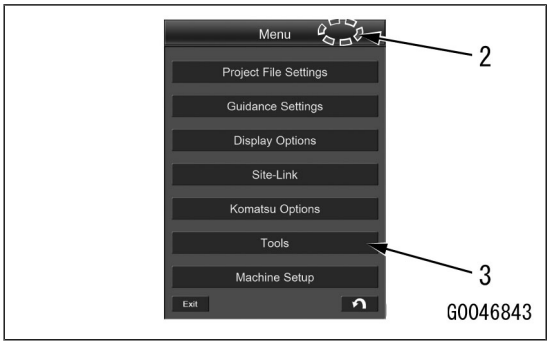
Camera height

Camera position	Camera height (mm)
Rear camera	2206
Rear R.H. camera	2430
Front R.H. camera	2430
Rear L.H. camera	2455

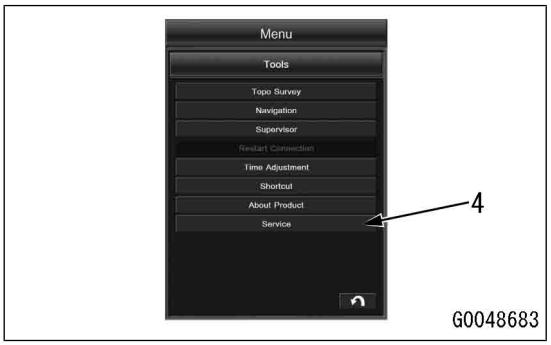
2. Press the main menu button (1) on the control box.



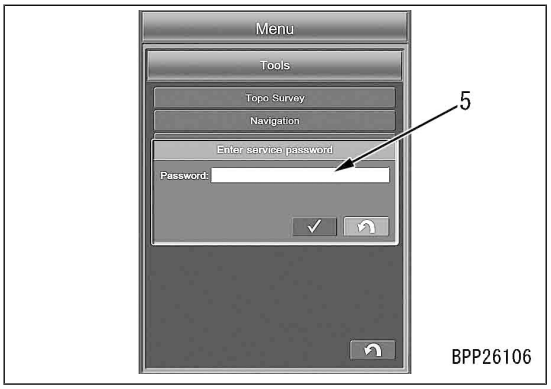
3. Press (2) at the upper right corner on the main menu screen, and then press “Tools” (3).



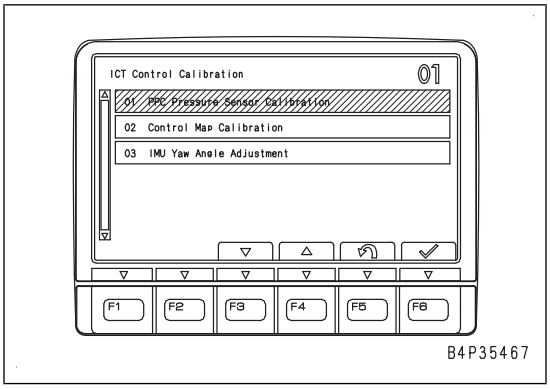
4. Press “Service” (4) on the “Tools” menu screen.



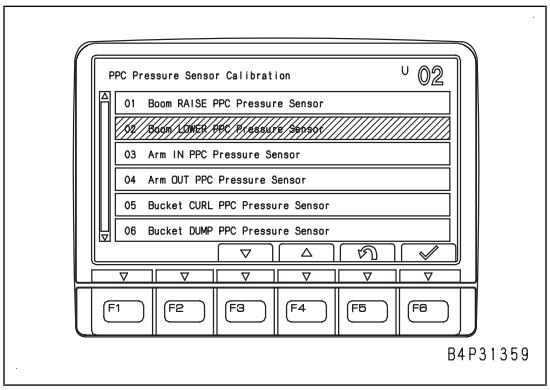
5. After the input screen of password is displayed, press input column (5).



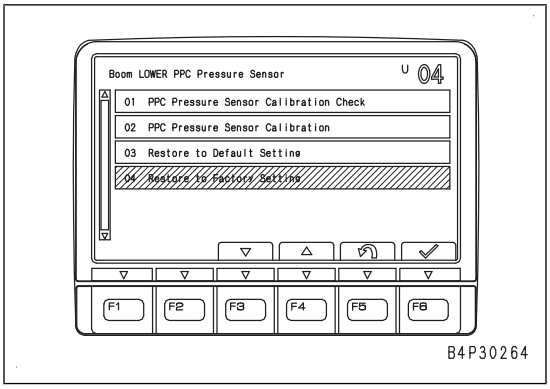
3. On the “ICT Control Calibration” screen, select “PPC Pressure Sensor Calibration” with function switches or numeral input switches.
   F3: Moves the selected item down by one item
   F4: Moves the selected item up by one item
   F5: Returns the screen to the “Adjustment” screen
   F6: Enters the selected item and moves to the “PPC Pressure Sensor Calibration” screen



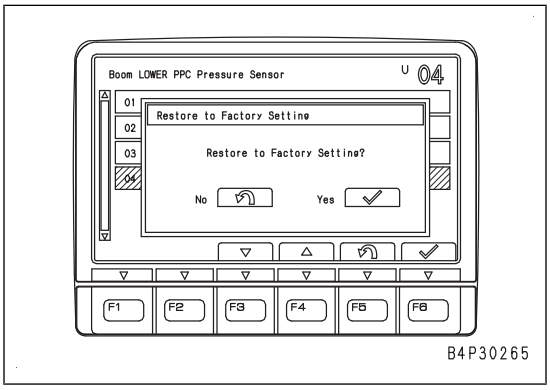
4. On the “PPC Pressure Sensor Calibration” screen, select “Boom LOWER PPC Pressure Sensor” with function switches or numeral input switches.
   F3: Moves the selected item down by one item
   F4: Moves the selected item up by one item
   F5: Returns to the “ICT Control Calibration” screen
   F6: Enters the selected item and moves to the “Boom RAISE PPC Pressure Sensor” screen



5. On the “Boom LOWER PPC Pressure Sensor” screen, select “Restore to Factory Setting” with function switches or numeral input switches.
   F3: Moves the selected item down by one item
   F4: Moves the selected item up by one item
   F5: Returns to the “ICT Control Calibration” screen
   F6: Enters the selected item, and displays the “Restore to Factory Setting” screen



6. Hold down F6 when “Restore to Factory Setting?” screen is displayed.
   F5: Cancels the setting and returns to “Boom LOWER PPC Pressure Sensor” screen
   F6: Confirm the setting



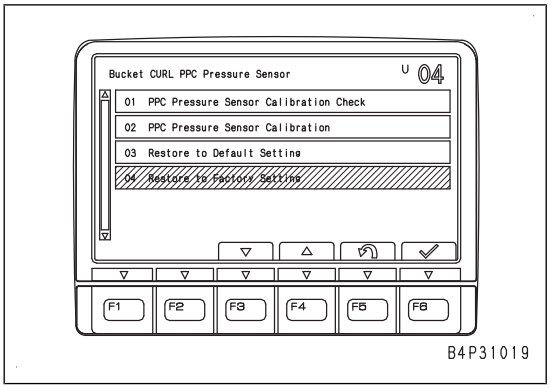
5. On the “Bucket CURL PPC Pressure Sensor” screen, select “Restore to Factory Setting” with function switches or numeral input switches.

   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Returns to the “ICT Control Calibration” screen

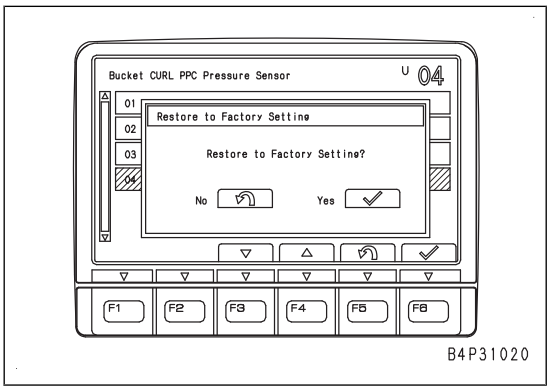
   F6: Enters the selected item, and displays the “Restore to Factory Setting” screen



6. Hold down F6 when “Restore to Factory Setting?” screen is displayed.

   F5: Cancels the setting and returns to “Bucket CURL PPC Pressure Sensor” screen

   F6: Confirm the setting



7. After restoring, check that the alphabet letter at the right top of the “Bucket CURL PPC Pressure Sensor” is “F”.

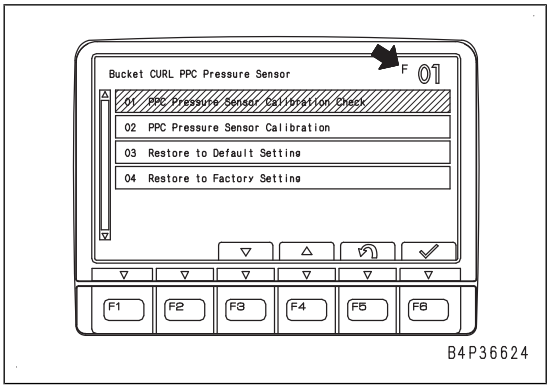
   REMARK

   The alphabet letter at the right top of the screen indicates the value currently saved in the work equipment controller.

   “D”: Default value

   “F”: Factory default value

   “U”: User calibration value (Technician calibration value)



BUCKET DUMP PPC PRESSURE SENSOR CALIBRATION

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

⚠ Secure the safety around the machine before starting calibration because the work equipment moves during the calibration.

NOTICE

Change the setting of the mounted bucket by referring to Operation and Maintenance Manual, “Bucket Weight Setting”.

Perform the calibration under the following conditions.

- Hydraulic oil temperature40 to 60 °C
- Working mode: P (“Power Mode”)

METHOD FOR CHECKING CALIBRATION STATUS OF BUCKET DUMP PPC PRESSURE SENSOR

The vehicle condition is not restricted only for checking the calibration status.

NOTICE

Change the setting of the mounted bucket by referring to Operation and Maintenance Manual, “Bucket Weight Setting”.

Perform the calibration under the following conditions.

- Hydraulic oil temperature40 to 60 °C
- Working mode: P (“Power Mode”)

METHOD FOR CHECKING THE PROGRESS OF BOOM RAISE REDUCE PRESSURE EPC CALIBRATION

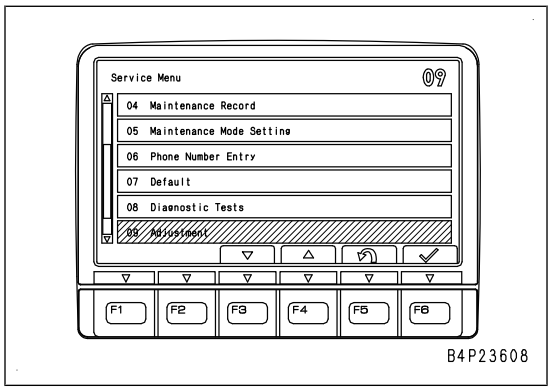
The vehicle condition is not restricted only for checking the calibration status.

If checking data is required due to the aged change, poor operation of the automatic control, etc., refer to this section and check the calibration status.

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

   REMARK

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



2. Enter “45” with the numeral input switches after the “Adjustment” screen is displayed, and press F6.

   F3: Moves the selected item down by one item

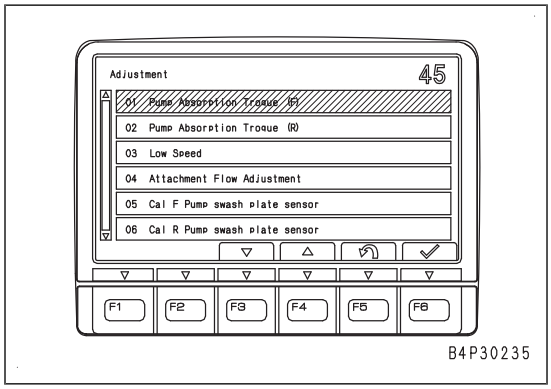
   F4: Moves the selected item up by one item

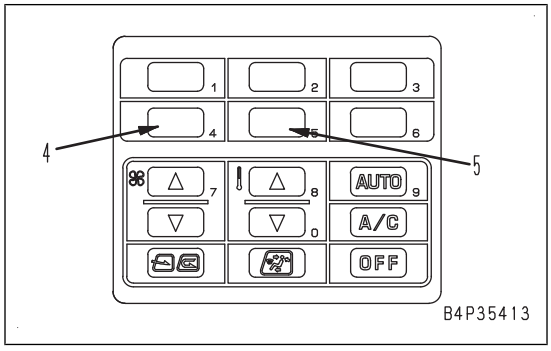
   F5: Returns the display to the “Service Menu” screen

   F6: Enters the input value and moves to the “ICT Control Calibration” screen

   REMARK

   This function is not listed on the menu because it is required only when replacing the PPC pressure sensor, the solenoid valve block, or the work equipment controller.





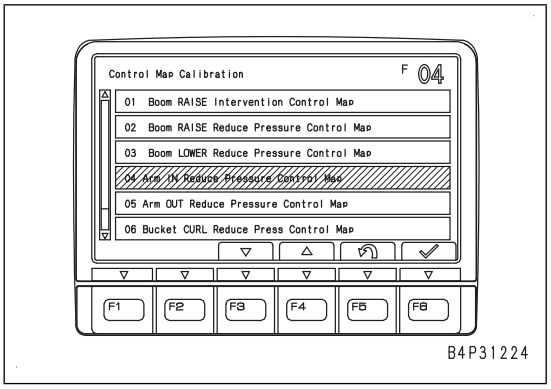
4. On the “Control Map Calibration” screen, select “Arm IN Reduce Pressure Control Map” with function switches or numeral input switches.

   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Returns to the “ICT Control Calibration” screen

   F6: Enters the selected item and moves to the “Arm IN Reduce Pressure Control Map” screen



5. On the “Arm IN Reduce Pressure Control Map” screen, select “Control Map Calibration Check” with function switches or numeral input switches.

   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Returns to the “Control Map Calibration” screen

   F6: Enters the selected item and moves to the “Arm IN Reduce Pressure Map Calib Check” screen

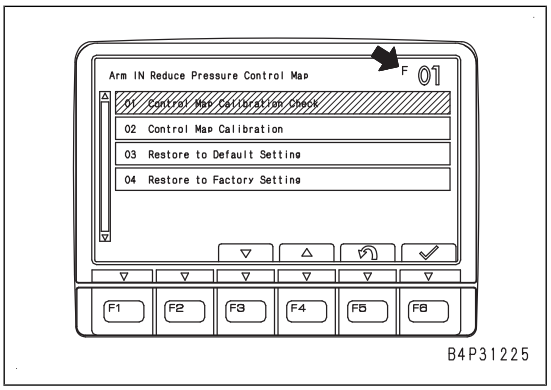
   REMARK

   The alphabet letter at the right top of the screen indicates the current calibration status saved in the work equipment controller.

   D: Default value

   F: Factory default value

   U: User calibration value (Technician calibration value)



6. When the “Arm IN Reduce Pressure Map Calib Check” screen is displayed, check the calibration value of the arm IN reducing pressure control map.

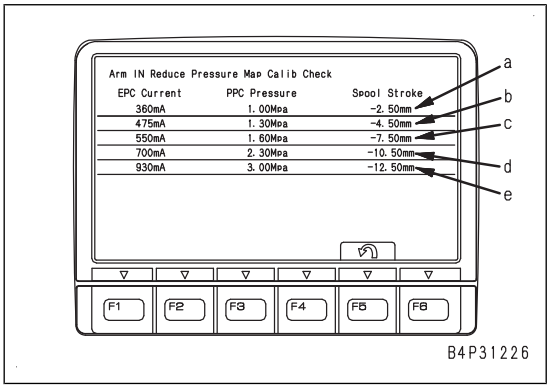
   (a): EPC current and arm IN PPC pressure when the arm IN operation starts

   (b): Arm IN PPC pressure at 500 mA of EPC current when the arm IN operation starts

   (c): Arm IN PPC pressure at 700 mA of EPC current when the arm IN operation starts

   (d): Arm IN PPC pressure at 900 mA of EPC current when the arm IN operation starts

   F5: Returns to the “Arm IN Reduce Pressure Control Map” screen



2. Enter “45” with the numeral input switches after the “Adjustment” screen is displayed, and press F6.

   F3: Moves the selected item down by one item

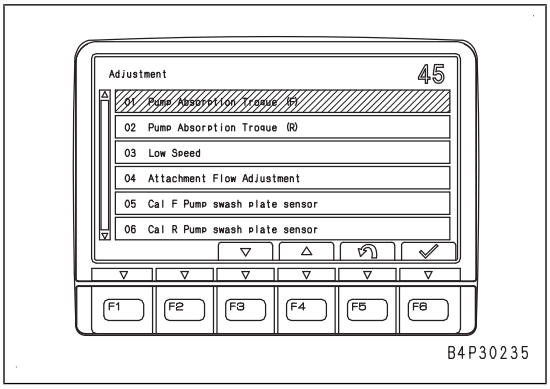
   F4: Moves the selected item up by one item

   F5: Returns the display to the “Service Menu” screen

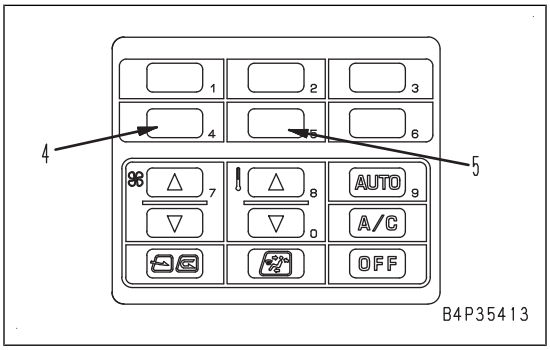
   F6: Enters the input value and moves to the “ICT Control Calibration” screen

   REMARK

   This function is not listed on the menu because it is required only when replacing the PPC pressure sensor, the solenoid valve block, or the work equipment controller.



B4P30235



B4P35413

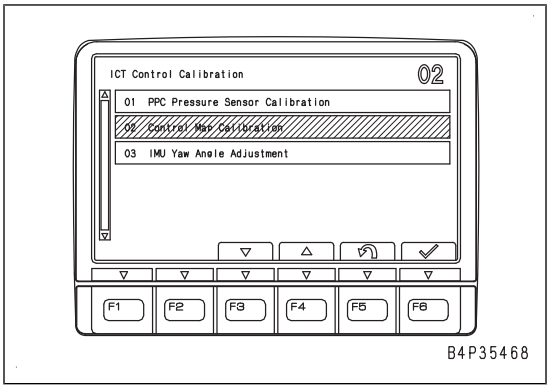
3. On the “ICT Control Calibration” screen, select “Control Map Calibration” with function switches or numeral input switches.

   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Returns the screen to the “Adjustment” screen

   F6: Enters the selected item and moves to the “Control Map Calibration” screen



B4P35468

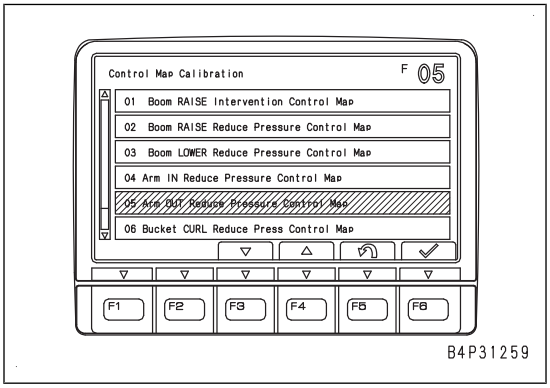
4. On the “Control Map Calibration” screen, select “Arm DUMP Reduce Pressure Control Map” with function switches or numeral input switches.

   F3: Moves the selected item down by one item

   F4: Moves the selected item up by one item

   F5: Returns to the “ICT Control Calibration” screen

   F6: Enters the selected item and moves to the “Arm DUMP Reduce Pressure Control Map” screen



B4P31259

25. When the “Bucket DUMP Control Map Calib 3/ 4” screen of the calibration posture preparation screen is displayed, fully retract the bucket cylinder and press F3.

    F3: Moves to the “Bucket DUMP Control Map Calib 3/ 4” screen of the calibration start screen

    F5: Returns to the calibration result screen when EPC current is 500 mA

G0086139

26. When the “Bucket DUMP Control Map Calib 3/4” screen of the calibration start screen is displayed, move the work equipment control lever to the neutral position and hold down F1 to start the calibration.

    F1: Starts the calibration

    F2: Interrupts the calibration and returns to the “Bucket DUMP Control Map Calib 3/ 4” of the calibration start screen

    F5: Returns to the “Bucket DUMP Control Map Calib 3/ 4” screen of the calibration posture screen

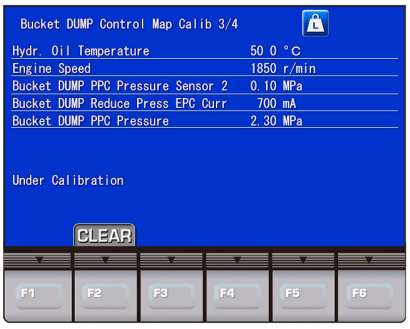
    NOTICE

    Keep the calibration state until the calibration is completed.

    REMARK

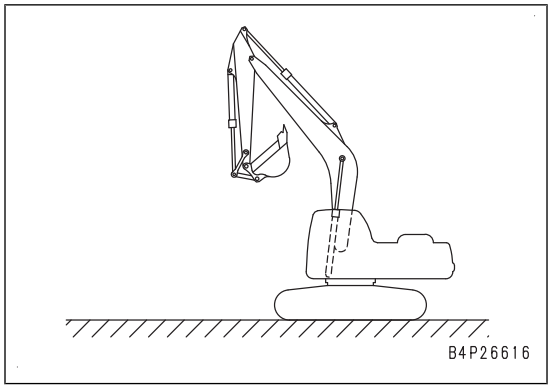
    - The work equipment cannot be moved during the calibration.
    - The calibration when the EPC current is 700 mA is performed.
    - The calibration takes approximately 5.5 seconds.
    - The values of each item are displayed in real time on the machine monitor screen during the calibration.

G0086140

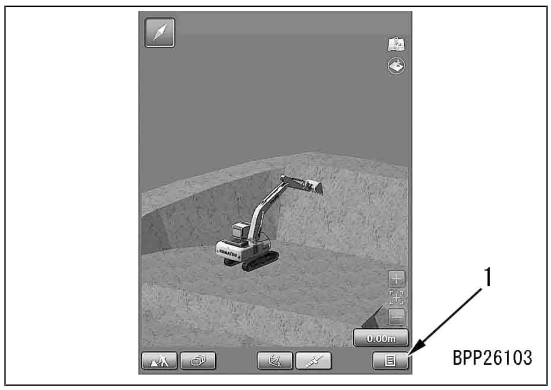


G0086141

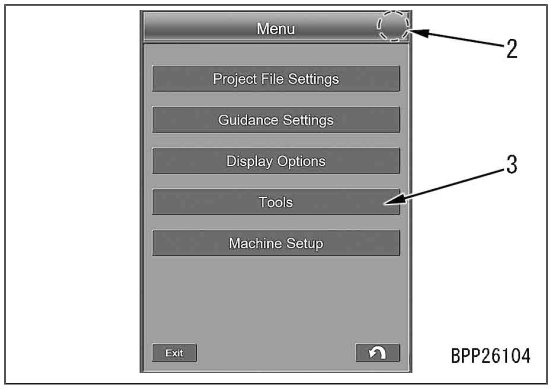
3. Set the upper structure and each cylinder of the work equipment to the following positions.
   - Upper structure: Cab in parallel with track
   - Boom cylinder: Fully extended
   - Arm cylinder: Fully extended
   - Bucket cylinder: Fully extended



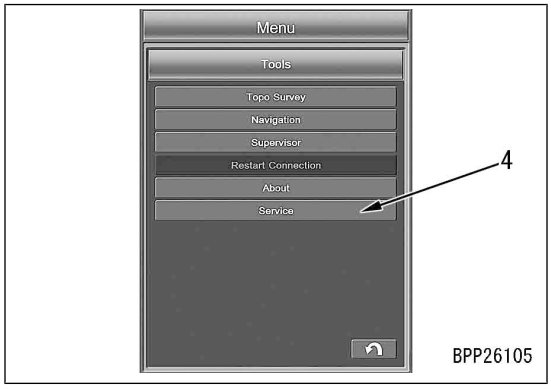
4. Press the menu button (1) on the control box.



5. Press (2) at the upper right corner on the “Menu” screen, and then press “Tools” (3).



6. When the “Tools” screen is displayed, press “Service” (4).



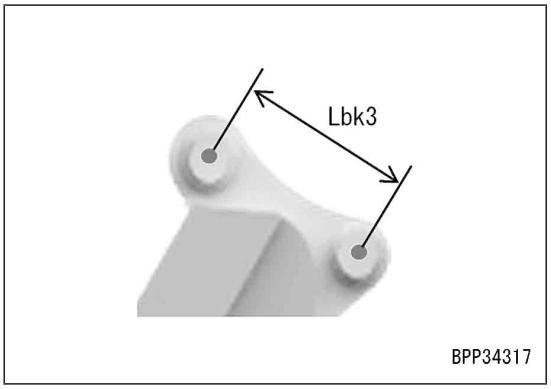
REMARK

- Measure the dimensions as accurately as possible by using the square D, convex rule R, and magnet stand F on R.H. surface of the bucket.
- Measure the dimensions in 1 mm unit.
- Measure the angle in 0.1 ° unit.

1) Measure the dimension “Lbk3” of the bucket.

REMARK

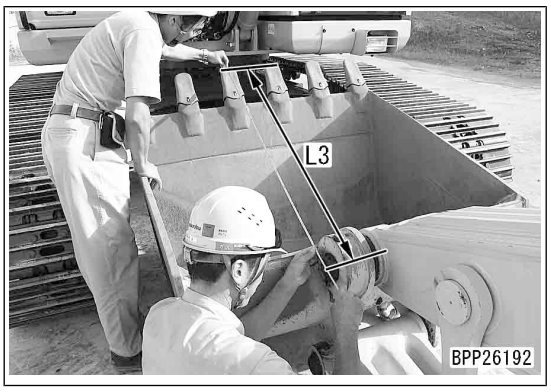
Measure the distance between the center of the arm mounting pin and the boom mounting pin on both sides to the center of the link mounting pin and the bucket mounting pin. Then, input the average value.

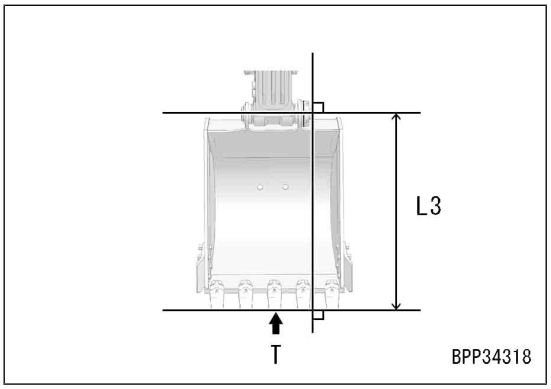


2) Measure the dimension “L3” of the bucket.

REMARK

Measure the distance between the center of the arm mounting pin and the bucket mounting pin to the bucket tooth tip which marked as (T).

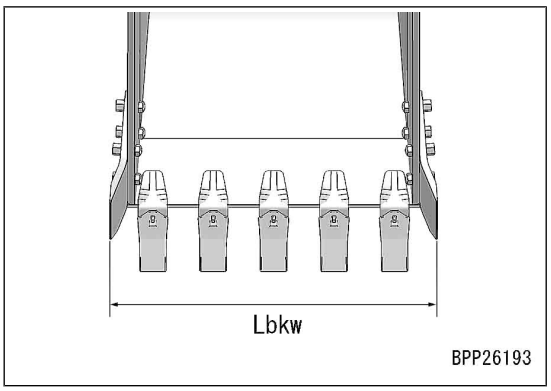




3) Measure the dimension “Lbkw” of the bucket.

REMARK

Measure the length of the side cutters (the widest bucket width if the side cutters are not installed)



CALIBRATION OF BOOM DIMENSIONS AND ARM DIMENSIONS WITH TOTAL STATION

Tools for calibration of boom dimensions and arm dimensions with total station

Symbol		Part No.	Part name	Q'ty	Remarks
A		Commercially available	Total station	1	
B		2A5-98-21210	Measurement target	1	The measurement target B is a component of the special blade edge measuring jig D.
C		Commercially available	Marker	1	
D	-	2A5-98-05011	Special blade edge measuring jig	1	
	1	2A5-98-21111	Bracket	1	
	2	2A5-98-21121	Bracket	1	
	3	2A5-98-21130	Bracket	1	
	4	2A5-98-21140	Bracket	1	
	5	2A5-98-21151	Pin	2	
	6	2A5-98-21161	Block	1	
	7	2A5-98-21220	Magnet	6	
	8	2A5-98-21230	Reflector plate	1	
	9	2A5-98-21240	Adapter	1	
	10	2A5-98-21250	Bolt	2	
	11	2A5-98-21260	Bolt	2	
	12	2A5-98-21270	Bolt	3	
	13	2A5-98-21310	Washer	2	
	14	17A-711-7850	Washer	2	
	15	2A5-98-21330	Pole	1	
	16	2A5-98-21340	Collar	1	
	17	22J-973-3520	Bolt	1	
	18	01252-90616	Washer	3	
	20	01640-20610	Washer	1	

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

⚠ To move the upper structure 180 ° during calibration, secure the safety around the machine before starting calibration.

Be sure to perform this adjustment after replacing the boom, boom cylinder or arm cylinder.

The measurement of the work equipment dimensions must be done in pairs.

This calibration menu calibrates the accuracy of the dimensions between various boom pins and arm pins, and the angles of the boom and the arm which measured by the total station.

“Arm Top Calibration” is for when the conventional bucket is installed. When the tilt bucket is installed, be sure to perform the tilt bucket calibration after completing “Arm Top Calibration”.

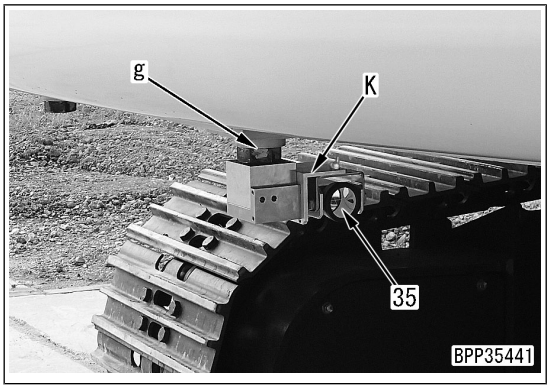
For the calibration method of the tilt bucket, see Operation and Maintenance Manual.

26. Attach the special blade edge measuring jig K assembled in step 23 to the counterweight mounting bolt (g).

    ⚠ **Be careful not to get your fingers in the special blade edge measuring jig K while installing it. The jig is installed by using the attracting force of a powerful magnet.**

    REMARK

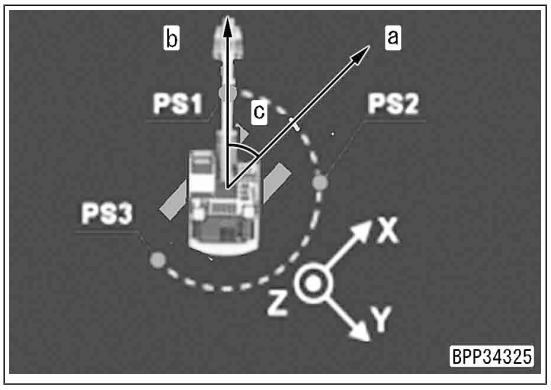
    Install the special blade edge measuring jig K to the counterweight mounting bolt (g) on R.H. of the machine. Direct the prism (35) toward the front of the machine so that the jig can be collimated through the total station A.



27. Swing the upper structure and direct the work equipment toward the “PS1” position on the “Bucket Link Calibration [2/10]” screen.

    REMARK

    - Do not move the work equipment or track when swinging the upper structure.
    - Guide for the “PS1” position
      Angle (c) between track direction (a) and work equipment direction (b): Approx. 60±15 °



28. Rotate the prism (35) so that it faces directly forward to the total station A.

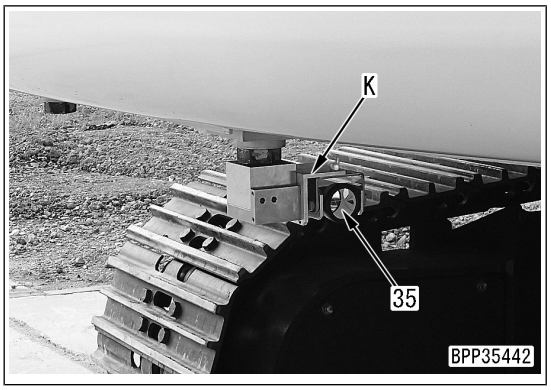
    NOTICE

    When the special blade edge measuring jig K is adjusted by rotation of the prism (35), the measuring jig should not be moved if possible. A few millimeters of displacement should not be a problem.

29. The operator of the total station A must measure the coordinates of the special blade edge measuring jig K, and record it.

    REMARK

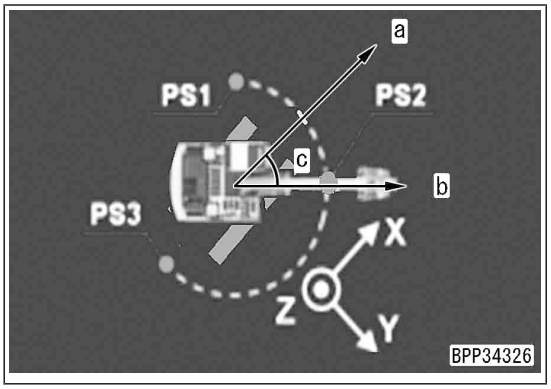
    For the method of measuring the coordinates, see Operation and Maintenance Manual for the total station A.



30. Swing the upper structure and direct the work equipment toward the “PS2” position on the “Bucket Link Calibration [2/10]” screen.

    REMARK

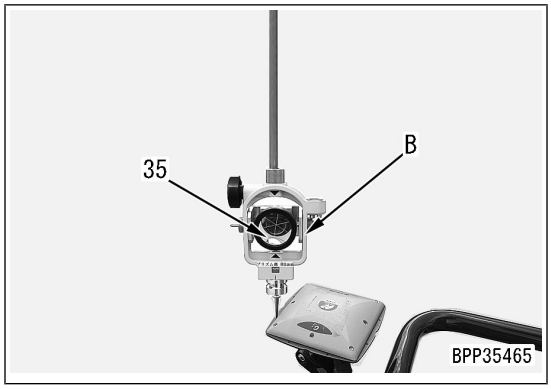
    - Do not move the work equipment or track when swinging the upper structure.
    - Guide for the “PS2” position
      Angle (c) between track direction (a) and work equipment direction (b): Approx. 60±15 °



74. Set the end of the measurement target B to the hole (PA2) at the diagonal position of the position where the measurement target B is installed in step 70. Level it so that the prism (35) faces directly forward to the total station A.

REMARK

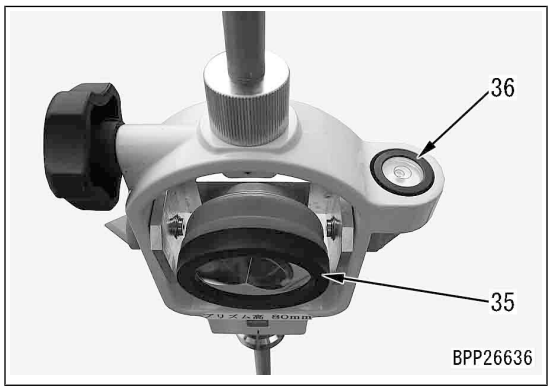
Adjust the levelness so that bubbles of the level (36) are at the center in the standard circle.



75. The operator of the total station A must measure the coordinates of GNSS antenna position, and record the coordinates.

REMARK

For the method of measuring the coordinates, see Operation and Maintenance Manual for the total station A.



76. Set the end of the measurement target B to the hole at the edge of GNSS antenna (Aux) on R.H. of the machine. Level it so that the prism (35) faces directly forward to the total station A as accurately as possible.

REMARK

- GNSS antenna has holes used for setting the ferrule.
- Adjust the levelness so that bubbles of the level (36) are at the center in the standard circle.

77. The operator of the total station A must measure the coordinates of GNSS antenna position, and record the coordinates.

REMARK

For the method of measuring the coordinates, see Operation and Maintenance Manual for the total station A.

78. Set the end of the measurement target B to the hole at the diagonal position of the position where the measurement target B is installed in step 74. Level it so that the prism (35) faces directly forward to the total station A.

REMARK

Adjust the levelness so that bubbles of the level are at the center in the standard circle.

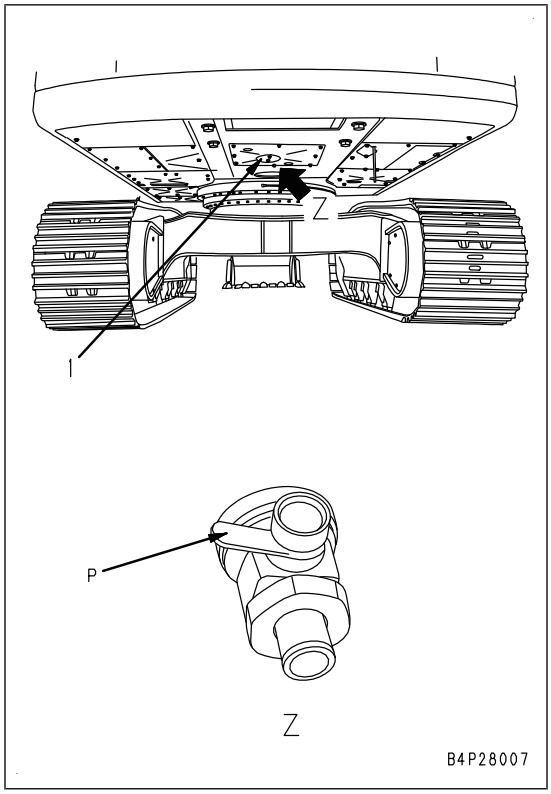
79. An operator of the total station A must measure the coordinates of the GNSS antenna (Aux) position, and record the coordinates.

REMARK

For the method of measuring the coordinates, see Operation and Maintenance Manual for the total station A.

CONTENTS

6. If the oil level is above line H, drain the extra engine oil through drain valve (P) at the bottom of the engine oil pan and check the oil level again.
7. If the oil is at the correct level, tighten the oil filler cap securely and close the engine hood.



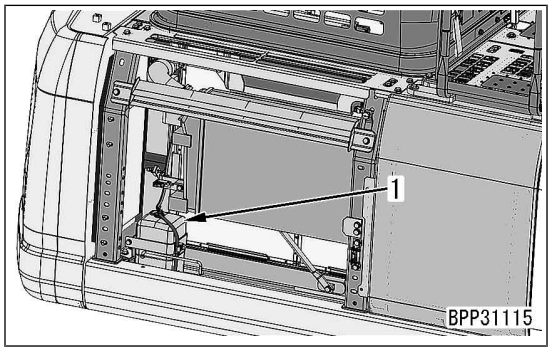
CHECK COOLANT LEVEL (RESERVOIR TANK)

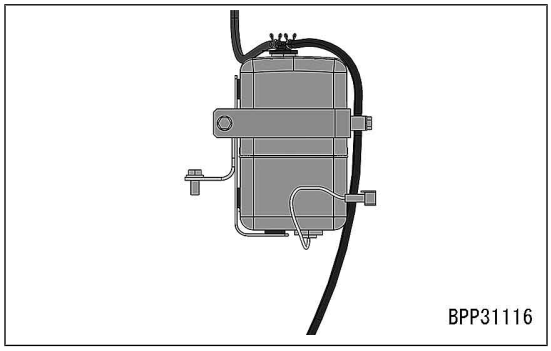
⚠ **The radiator cap does not need to be opened for standard checks. When checking the coolant level, check it in reservoir tank when the engine is cooled down.**

⚠ **Immediately after the engine is stopped, the coolant is still very hot and the pressure is accumulated in the radiator.**
If the cap is opened under these conditions, you may be scalded. If you need to remove the radiator cap, wait until the temperature drops before you do. Then turn the cap slowly to release the pressure and remove it with care.

1. Open side cover on the rear right of the machine, check the coolant level is within “FULL - LOW” range at reservoir tank (1). If coolant is insufficient, add coolant up to FULL level through water filler port at reservoir tank (1).
2. After refilling with coolant, tighten the cap securely.
3. If the reservoir tank is vacant, coolant may have leaked.

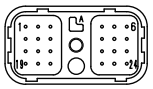
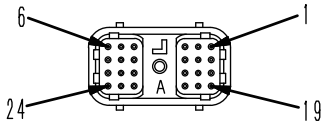
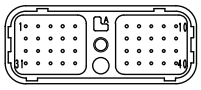
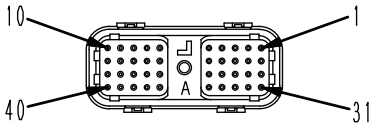
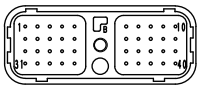
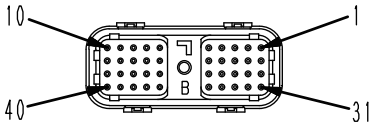
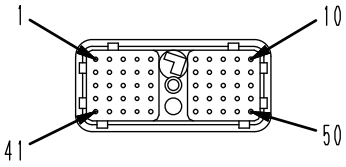
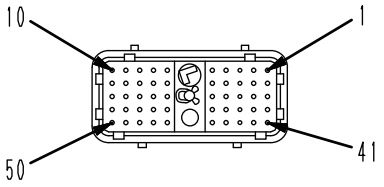
   If any abnormality is found in the check for leakage, repair it immediately. If no abnormality is found, check the level of the coolant in the radiator. If it is low, add coolant to the radiator and then to the reservoir tank.
4. If reservoir tank (1) is dirty and it is difficult to check the coolant level, clean it.





Connector No.	Connector type	Number of pins	Location	Address
AB	Terminal	1	Alternator (terminal B)	A-39
AC01	YAZAKI	10	Air conditioner unit	G-26
AC02	SUMITOMO	4	Air conditioner unit	H-28
AMB. AIR PRESSURE	FRAMATOME	3	Ambient pressure sensor	G-37
AE	Terminal	1	Alternator (terminal E)	A-40
AR	Terminal	1	Alternator (terminal R)	A-41
BOOST PRESS & IMT	SUMITOMO	4	Boost pressure and boost temperature sensor	G-42
CA01	AMP	81	KomVision controller (if equipped)	I-24
CA02	AMP	40	KomVision controller (if equipped)	H-23
CAM SENSOR	FRAMATOME	3	Bkup sensor	I-37
CG01	DRC	40	GNSS controller	A-20
CG02	DRC	40	GNSS controller	A-19
CK01	070	18	KOMTRAX terminal	E-25
CK02	070	12	KOMTRAX terminal	D-25
CM01	070	18	Machine monitor	E-13
CM02	070	12	Machine monitor	E-13
CM04	070	8	Machine monitor (for camera connection)	D-13
COOLANT TEMP	DELPHI	2	Engine coolant temperature sensor	F-37
CP01	AMP	81	Pump controller	C-30
CP02	AMP	40	Pump controller	D-30
CRANK SEN-SOR	FRAMATOME	3	NE speed sensor	I-38
CS01	DRC	24	ICT controller	G-23
CS02	DRC	40	ICT controller	H-22
CS03	DRC	40	ICT controller	H-21
CW01	DRC	24	Work equipment controller	H-22
CW02	DRC	40	Work equipment controller	H-22
CW03	DRC	40	Work equipment controller	I-21
CX01	TYCO	26	ICT monitor	C-13
CX02	TYCO	26	ICT monitor	C-13
CX03	LTW-RJ45	8	ICT monitor	B-15
D01	SWP	8	Diode array	D-25
D02	SWP	8	Diode array	F-25
D03	SWP	8	Diode array	E-30
D04	SWP	8	Diode array	E-30
DX01	DT	4	Load dump module	I-17
E01	Terminal	1	Electric intake air heater (ribbon heater)	B-12

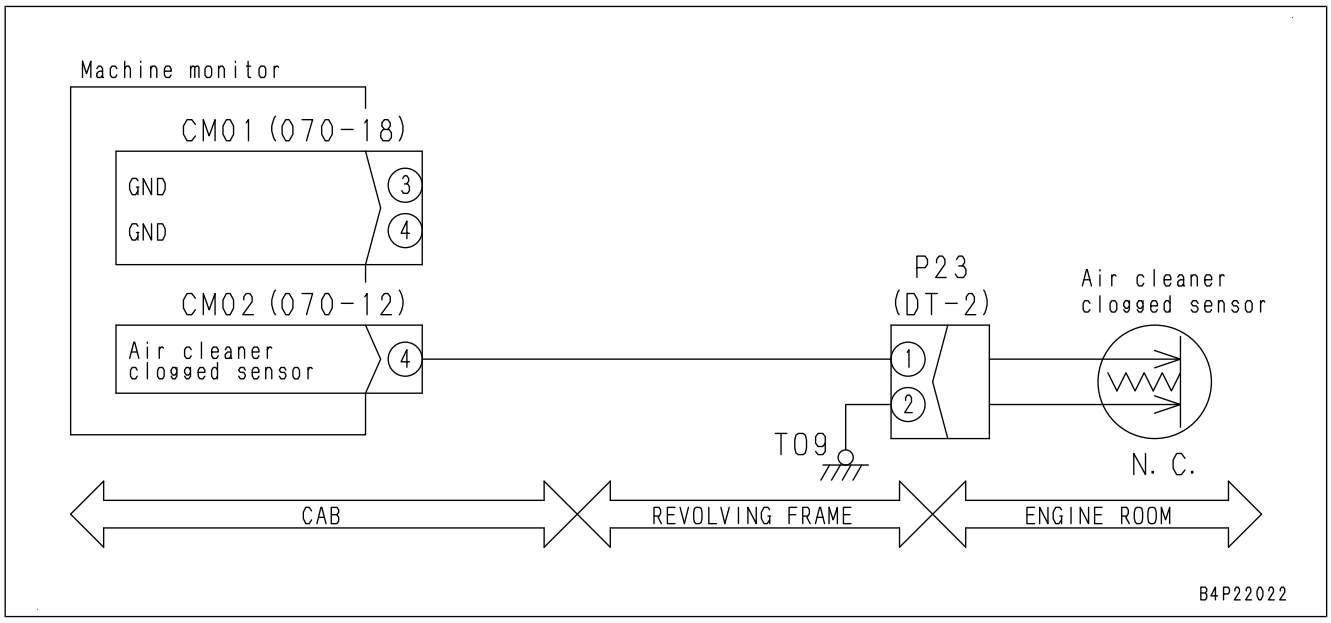
[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DRC26 Series connector		
	Male pin (female housing)	Female pin (male housing)	Testing connection use special tool Part No.
24	 BJD12722	 BJD12723	799-601-9360 (T-adapter) (Kit:799-601-9300)
	–	Part No. :08194-01101	
40 (A)	 BJD12724	 BJD12725	799-601-9350 (T-adapter) (Kit:799-601-9300)
	–	Part No. :08194-02101	
40 (B)	 BJD12726	 BJD12727	799-601-9350 (T-adapter) (Kit:799-601-9300)
	–	Part No. :08194-02102	
50	 9JS02951	 9JS02952	799-601-4211 (T-adapter) (Kit:799-601-4101)
	–	Part No. :08194-03103	

B4D18414

Failure code	Failure (Displayed on screen)	Applicable component	Action level	Category of history	Remarks
CA3419	MAF Sensor Supply Voltage High Error	ENG	L03	Electrical system	
CA3421	MAF Sensor Supply Voltage Low Error	ENG	L03	Electrical system	
CA3497	AdBlue/DEF Level Low Error 1	ENG	—	Electrical system	
CA3498	AdBlue/DEF Level Low Error 2	ENG	—	Electrical system	
CA3543	AdBlue/DEF Quality Error (SCR Catalyst Efficiency Low)	ENG	L01	Electrical system	
CA3545	SCR Outlet NOx Sensor Unstable Error	ENG	L01	Electrical system	
CA3547	AdBlue/DEF Level Low Error 4	ENG	L04	Electrical system	
CA3558	AdBlue/DEF Pump Voltage High Error	ENG	L01	Electrical system	
CA3559	AdBlue/DEF Pump Voltage Low Error	ENG	L01	Electrical system	
CA3562	AdBlue/DEF LineHeater Relay 1 Voltage High Error	ENG	L01	Electrical system	
CA3563	AdBlue/DEF LineHeater Relay 1 Voltage Low Error	ENG	L01	Electrical system	
CA3567	AdBlue/DEF Injector Open Circuit Error or Short Circuit Error	ENG	L01	Electrical system	
CA3568	AdBlue/DEF Injector Malfunction	ENG	L01	Electrical system	
CA3571	AdBlue/DEF Pump Pressure Sensor High Error	ENG	L01	Electrical system	
CA3572	AdBlue/DEF Pump Pressure Sensor Low Error	ENG	L01	Electrical system	
CA3574	AdBlue/DEF Pump Pressure Too Low Error	ENG	L01	Electrical system	
CA3575	AdBlue/DEF Pump Pressure Too High Error	ENG	L01	Electrical system	
CA3577	AdBlue/DEF FCV Voltage High Error	ENG	L01	Electrical system	
CA3578	AdBlue/DEF FCV Voltage Low Error	ENG	L01	Electrical system	
CA3582	SCR Catalyst Efficiency Low Error 1	ENG	—	Electrical system	
CA3583	SCR Outlet NOx Sensor Heater Warming up Error	ENG	L01	Electrical system	
CA3596	AdBlue/DEF Pump Pressure Unstable Error	ENG	L01	Electrical system	
CA3649	Turbo Outlet NOx Sensor Heater Warming up Error	ENG	L01	Electrical system	

CIRCUIT DIAGRAM (AIR CLEANER CLOGGING SENSOR)



FAILURE CODE [CA153]

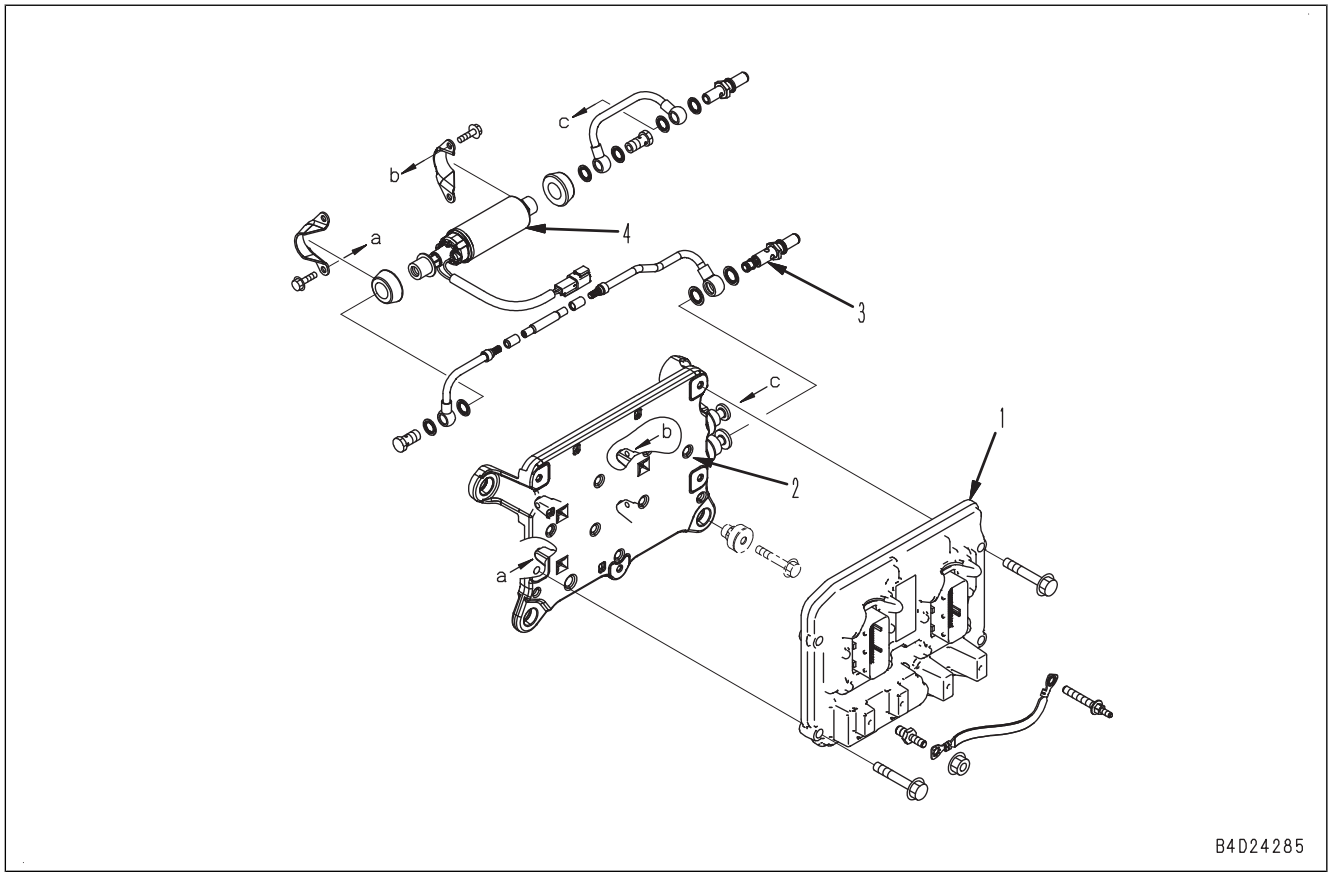
Action level	Failure code	Failure	Charge Air Temperature Sensor High Error (Engine controller system)
L03	CA153		
Details of failure	High voltage occurs in signal circuit of charge (boost) temperature sensor.		
Action of controller	• Sets charge temperature (boost temperature) to fixed value (70 °C) for operation. • EGR valve closed. • Engine power deration • Regeneration control stops.		
Phenomenon on machine	• Engine startability becomes poor in low temperature. • Engine power deration		
Related information	• Signal voltage from charge temperature sensor (boost temperature sensor) can be checked by monitoring function. (Code: 18501 (V)) • Temperature sensed by charge temperature sensor (boost temperature sensor) can be checked with monitoring function. (Code: 18500 (°C)) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position. • Because female connector alone is provided in “Socket” for troubleshooting for this sensor, socket cannot be connected to female connector on wiring harness side of sensor and check for wire breakage cannot be performed (T-adapter is not provided). • This failure code is displayed when temperature sensor connector is disconnected. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note the engine power deration is not canceled right after the failure code is cleared).		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “c: Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position.
		If this failure code is cleared, wiring harness connector is defective.

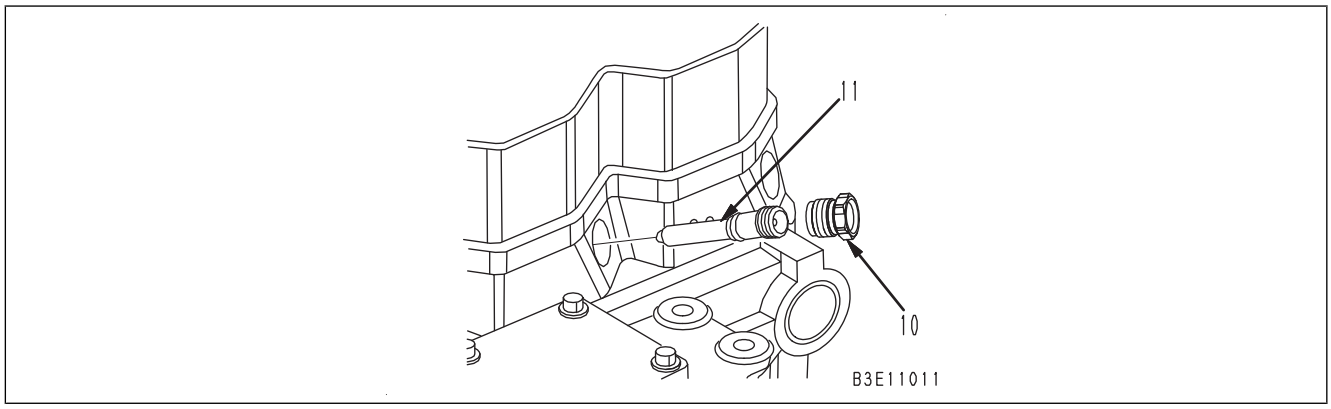
FAILURE CODE [CA343]

Action level	Failure code	Failure	Engine Controller Internal Failure (Engine controller system)
L04	CA343		
Details of failure	Internal defect is detected in engine controller.		
Action of controller	None in particular		
Phenomenon on machine	Engine runs normally. However, engine may be stopped during operation or stopped engine may not be started.		
Related information	• Battery voltage of engine controller can be checked by monitoring function. (Code: 03203) • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective engine controller system	Perform troubleshooting for failure code [CA441].



Note 2



High-pressure pipe from common rail is connected to the injector through inlet connection (11) in the cylinder head.

Inlet connection (11) is fastened by retainer (10), so re-tighten retainer (10).

Retainer:
50 ± 4 Nm {5± 0.4 kgfm}

FAILURE CODE [CA1694]

Action level	Failure code	Failure	SCR Outlet NOx Sensor In Range Error (Engine controller system)
L01	CA1694		
Detail of failure	The value of the NOx sensor of the SCR outlet is abnormal compared with the turbocharger outlet NOx emission value		
Action of controller	None in particular		
Phenomenon on machine	NOx emission may increase or ammonia may be exhausted because AdBlue/DEF injection works inappropriately.		
Related information	⚠ **SCR assembly, sensor fitting piping, and sensor probe become hot (Min. 400 °C). Be careful not to get burned.** ⚠ **Be careful not to get burned by the sensor probe as it is heated by itself even if the ambient temperature is not high.** • If the SCR outlet NOx sensor probe is disconnected from the exhaust pipe or loosened, this failure code may appear. • The SCR outlet NOx sensor and turbocharger outlet NOx sensor are not serviceable, therefore, replace the sensor if it is defective. **NOTICE** • **For this failure code, after investigating the cause of the problem and completing the repair, perform "Loaded Diagnostics Operation To Confirm Failure Correction" to make sure repair is completed. (This failure code is not cleared by only turning ON the starting switch.)** • **If the failure code of active regeneration prohibition or that of AdBlue/DEF injection prohibition is displayed, the failure cannot be cleared. Clear the corresponding failure codes first.**		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective turbocharger outlet NOx sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA1885], [CA3232], [CA3649], [CA3682], [CA3718], [CA3725], or [CA3748] is displayed, perform troubleshooting for these failure codes failure codes first.
2	Defective SCR outlet NOx sensor system (Open circuit, internal defect, defective sensor heater)	If failure code [CA1887], [CA2771], [CA3545], [CA3583], [CA3681], or [CA3717] is displayed, perform troubleshooting for these failure codes first.
3	Defective connection between the SCR outlet NOx sensor probe and an exhaust pipe	Check if the SCR outlet NOx sensor probe is installed securely.
4	Accumulation of urea deposits in AdBlue/DEF mixing tube	1. Check if urea deposits are accumulated in the AdBlue/DEF mixing tube and the AdBlue/DEF injector mount. 2. If deposits are accumulated, remove the AdBlue/DEF mixing tube to remove deposits and clean the tube. 3. Check if urea deposits are accumulated in the SCR inlet case. If accumulated, perform the next item.

FAILURE CODE [CA1922]

Action level	Failure code	Failure	KDPF Soot Accumulation High Error 2 (Engine controller system)
L04	CA1922		
Details of failure	• If soot accumulation is level 8 : Manual stationary regeneration cannot be performed. • Engine must be stopped immediately and perform diagnostic test and maintenance.		
Action of controller	• EGR valve closes and fully opens VGT. • Controls output for operation. • Disables automatic regeneration and manual stationary regeneration.		
Phenomenon on machine	Engine power deration		
Related information	⚠ **Since KDOC and KDPF are heated to 500 °C or above, be careful not to get burned.** • Temperature in KDOC inlet temperature sensor can be checked by monitoring function. (Code: 47300 (°C)) • Temperature in KDOC outlet temperature sensor can be checked by monitoring function. (Code: 47400 (°C)) • Temperature in KDPF outlet temperature sensor can be checked by monitoring function. (Code: 47200 (°C)) • Signal voltage from KDPF differential pressure sensor can be checked by monitoring function. (Code: 47101 (V)) • Differential pressure in KDPF differential pressure sensor can be checked by monitoring function. (Code: 47100 (kPa)) • KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when at low idle speed (KDPF regeneration is not executed) are approximately 100 to 250 °C, and difference between these temperatures is approximately 10 °C. (KDOC inlet temperature > KDOC outlet temperature > KDPF outlet temperature) • When manual stationary regeneration is in progress, KDOC inlet temperature is approximately 250 to 400 °C, and KDOC outlet temperature and KDPF outlet temperature are approximately 450 to 550 °C. • The KDOC inlet temperature sensor, the KDOC outlet temperature sensor, and the KDPF outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • Test exhaust gas color. For details, see “TESTING AND ADJUSTING”, “TEST EXHAUST GAS COLOR”. • Engine power deration is canceled by turning starting switch to OFF position after this failure code is cleared (note the engine power deration is not canceled right after the failure code is cleared). • Soot accumulation amount in KDPF is classified into 8 levels. Current soot accumulation level can be checked in 02 Active Regeneration for Service screen of machine monitor. • Manual stationary regeneration downs soot accumulation level 7 from level 8 by removing soot. • If soot accumulation level is 8, failure code [CA1922] is displayed. At this time, KDPF is completely clogged with soot and inspection, cleaning or replacement is required.		

No.	Cause	Procedure, measuring location, criteria and remarks		
5	Open circuit of connector box (wire breakage or defective contact of connector)	If failure code is still displayed after above checks on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors VGT-SOL and INTER-CONNECT, and connect T-adapter to female side of VGT-SOL or male side of INTER-CONNECT.		
		Resistance	Between INTER-CONNECT (male) (6) and VGT-SOL (female) (1)	Max. 10 Ω
			Between INTER-CONNECT (male) (7) and VGT-SOL (female) (2)	Max. 10 Ω
6	Ground fault of connector box (contact with ground circuit)	If failure code is still displayed after above checks on cause 4, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors VGT-SOL and INTER-CONNECT, and connect T-adapter to female side of VGT-SOL or male side of INTER-CONNECT.		
		Resistance	Between ground and INTER-CONNECT (male) (6) or VGT-SOL (female) (1)	Min. 100 kΩ
			Between ground and INTER-CONNECT (male) (7) or VGT-SOL (female) (2)	Min. 100 kΩ
7	Open circuit in wiring harness (wire breakage or defective contact of connector)	If failure code is still displayed after above checks on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and VGT-SOL, and connect T-adapters to each female side.		
		Resistance	Between ECM J2 (female) (80) and INTER-CONNECT (female) (6)	Max. 10 Ω
			Between ECM J2 (female) (2) and INTER-CONNECT (female) (7)	Max. 10 Ω
8	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and INTER-CONNECT, and connect T-adapters to each female side.		
		Resistance	Between ground and ECM J2 (female) (80) or INTER-CONNECT (female) (6)	Min. 100 kΩ
			Between ground and ECM J2 (female) (2) or INTER-CONNECT (female) (7)	Min. 100 kΩ
9	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and VGT-SOL, and connect T-adapter to female side of ECM J2.		
		Continuity	Between ECM J2 (female) (80) and each pin other than pin (80)	No continuity
10	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

FAILURE CODE [CA3147]

Action level	Failure code	Failure	SCR Outlet Temperature Sensor Low Error
L01	CA3147		(Engine controller system)
Detail of failure	Ground fault or sensor circuit error in SCR outlet temperature sensor measuring section or probe (+)		
Action of controller	• As the SCR outlet temperature cannot be detected, substitute the SCR temperature for the SCR outlet temperature and run the engine (if the SCR temperature sensor also has an error, use the latest normal value). • Advances to Inducement strategy. • AdBlue/DEF injection stops.		
Phenomenon on machine	• NOx emission increases because AdBlue/DEF injection is disabled. • Engine power deration according to inducement strategy.		
Related information	⚠ **The SCR assembly, sensor fitting piping, and sensor probe become hot (Min. 400 °C). be careful not to get burned.** • The SCR temperature sensor and SCR outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • Ground fault or sensor circuit error in SCR outlet temperature sensor measuring section or probe (+) is sent to the engine controller via CAN communication, and this failure code is displayed. • For the replacement procedure of the SCR outlet temperature sensor, see “Disassembly and assembly”, “Remove and install SCR temperature sensor”. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective SCR outlet temperature sensor	1. Turn starting switch to OFF position. 2. Replace SCR temperature sensor. 3. Turn starting switch to ON position. If this failure code is cleared, the original sensor is defective. (Troubleshooting of sensor is impossible.)
2	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Related information	⚠ **The temperature of KDPF and KDOC becomes hot (Min. 500 °C). Be careful not to get burned.** • The KDOC inlet temperature sensor, the KDOC outlet temperature sensor, and the KDPF outlet temperature sensor are integrated into one sensor controller which provides CAN communication with the engine controller. • Temperature in KDOC inlet temperature sensor can be checked by monitoring function. (Code: 47300 (°C)) • Temperature in KDOC outlet temperature sensor can be checked by monitoring function. (Code: 47400 (°C)) • Temperature in KDPF outlet temperature sensor can be checked by monitoring function. (Code: 47200 (°C)) • If the engine runs with poor combustion, (poor fuel spray due to troubles in the fuel injectors is one of the examples of root causes but not limited to it), large amount of unburnt fuel slips out with the exhaust gas and will be trapped in the aftertreatment system. The trapped unburnt fuel can start burning in the aftertreatment system once the exhaust gas becomes hot and it can keep burning. • As to procedure for accessing KDPF temperature sensor, see “50 DISASSEMBLY AND ASSEMBLY”, “REMOVE AND INSTALL KDPF ASSEMBLY” and “DISASSEMBLE AND ASSEMBLE KDPF ASSEMBLY”. • Engine controller does not shut itself down immediately after turning the starting switch to the OFF position. The AdBlue/DEF purging starts after the starting switch is turned to the OFF position and Engine controller keeps working until the purging is completed. The purging lasts for maximun 6 minutes. Do not re-start the engine until the system operating lamp in the battery box goes out even if quick restart becomes necessary. • Engine power deration is canceled when the failure code is cleared and the starting switch is turned OFF (not canceled only by deactivation of the failure code). **NOTICE** **If this failure code is displayed, it indicates that KCSF may be damaged. After completing the repair of the problem, check the following. Replace the KCSF if the black smoke comes out of the exhaust pipe outlet.** • Start the engine, perform the quick acceleration from low idle to high idle two times, and then keep the engine running at high idle for 5 seconds. • Check that the black smoke does not come out of the exhaust pipe outlet during this quick acceleration and high idling. **NOTICE** • **This failure code requires “Loaded Diagnostics Operation To Clear Failure Code”. After investigating the cause of the problem and completing the repair, perform “Loaded Diagnostics Operation To Clear Failure Code” to make sure the failure code is cleared. (This failure code is not cleared by only turning ON the starting switch again.)** • **This failure code is cleared by performing operations indicated in “TESTING AND ADJUSTING”, “SETTING AND OPERATION OF MACHINE MONITOR”, “SERVICE MODE”, “METHOD FOR SETTING WITH TESTING MENU (ENGINE CONTROLLER ACTIVE FAULT CLEAR)”.**

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDPF outlet temperature sensor	If failure code [CA3319], [CA3321] or [CA3322] is displayed, perform troubleshooting for [CA3319], [CA3321] or [CA3322].
2	Defective intake air system	Check intake air system hoses, clamps, and tubes for damage and loosening. Repair as necessary.

FAILURE CODE [CA3558]

Action level	Failure code	Failure	AdBlue/DEF Pump Voltage High Error (Engine controller system)
L01	CA3558		
Detail of failure	High voltage error occurs in the AdBlue/DEF pump drive circuit.		
Action of controller	• AdBlue/DEF pump stops. • AdBlue/DEF purging stops. • Advances to Inducement strategy.		
Phenomenon on machine	• NOx emission increases because AdBlue/DEF injection is disabled. • Engine output is reduced based on inducement strategy.		
Related information	• If the starting switch is turned ON while the AdBlue/DEF pump connector is removed, this failure code is displayed. • The AdBlue/DEF pump operates120 seconds after starting the engine, or it operates, after starting the engine, if not in AdBlue/DEF thawing process, when the KDPF outlet temperature becomes over 150 °C, or when AdBlue/DEF pump pressure raising test is implemented. • After repairing, check if the failure code is cleared by the following procedure. Procedure: Turn starting switch to ON position or operate the AdBlue/DEF pump.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in “Electrical equipment” in “CHECKS BEFORE TROUBLESHOOTING” of the failure code “RELATED INFORMATION ON TROUBLESHOOTING”, and check it. 2. Turn starting switch to ON position. 3. See “SERVICE MODE” and “METHOD FOR SETTING WITH TESTING MENU (SCR SERVICE TEST)” of SETTING AND OPERATION OF MACHINE MONITOR, and perform an AdBlue/DEF Pump Pressure Up Test.		
		If this failure code is cleared, wiring harness connector is defective.		
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and MB02, and connect T-adapter to either female side.		
		Resistance	Between ECM J2 (female) (54) and MB02 (female) (8)	Max. 10 Ω
			Between ECM J2 (female) (79) and MB02 (female) (9)	Max. 10 Ω
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and MB02, and connect T-adapter to female side of ECM J2.		
		Continuity	Between ECM J2 (female) (6) and each pin other than (6)	No continuity
			Between ECM J2 (female) (79) and each pin other than (79)	No continuity
4	Defective AdBlue/DEF pump	If failure code is still displayed after above checks, AdBlue/DEF pump may be defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly.)		
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

No.	Cause	Procedure, measuring location, criteria and remarks
1	CAN communication system error	If failure code [CA3232] is displayed, perform troubleshooting for [CA3232] first.
2	Defective sensor power supply system	If failure code [CA1776] or [CA1777] is displayed, perform troubleshooting for [CA1776] or [CA1777] first.
3	Defective turbocharger outlet NOx sensor system (internal circuit abnormality)	If failure code [CA1885] or [CA3682] or [CA3718] is displayed, perform troubleshooting for these failure codes first.
4	Defective turbocharger outlet NOx sensor	If failure code is still displayed after above checks, the turbocharger outlet NOx sensor may be defective. (Offset/drift due to sulfur-poisoned turbocharger outlet NOx sensor) 1. Turn starting switch to OFF position. 2. NOx sensor fails, therefore, replace the turbocharger outlet NOx sensor. 3. Turn starting switch to ON position. 4. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Loaded Diagnostics Operation to Confirm Failure Correction

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

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

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

1. Turn the starting switch to OFF position, and shut down the engine controller.
2. Turn the starting switch to ON position, and start the engine.
3. Run the engine at high idle speed safely to raise the exhaust temperature. (Keep the engine speed so that monitoring code 47300 “KDOC 1 Inlet Temperature” becomes 150 °C or higher. Check that monitoring code 19203 “Turbo Outlet NOx Sensor State” changes from 0 to 1).
4. Repair is completed if failure code is not displayed after 3 minutes has passed.

REMARK

If the turbocharger outlet NOx sensor does not activate (that is, 19203 “Turbo Outlet NOx Sensor State” remains as 0), return to troubleshooting.

No.	Cause	Procedure, measuring location, criteria and remarks
3	Defective ammonia sensor controller	1. Perform the above checks and “Loaded Diagnostics Operation To Confirm Failure Correction”. 2. If this failure code is displayed in above diagnosis, replace an ammonia sensor controller. 3. Perform “Loaded Diagnostics Operation To Confirm Failure Correction”.
		If the failure code is cleared, the original ammonia sensor controller may be defective.
4	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Loaded Diagnostics Operation to Confirm Failure Correction

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

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

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

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

REMARK

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

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">3</td><td rowspan="5">High battery voltage</td><td colspan="3">1. Turn starting switch to OFF position.
2. Check that system operating lamp is not illuminated, and then turn the battery disconnect switch to OFF position.
3. Disconnect connector R52, and connect T-adapter to female side.
4. Turn the battery disconnect switch to ON position.
5. Turn starting switch to ON position.</td></tr>
<tr><td rowspan="3">Voltage</td><td>Between R52 (female) (1) and (4)</td><td>22 to 30 V</td></tr>
<tr><td>Between R52 (female) (2) and (4)</td><td>22 to 30 V</td></tr>
<tr><td>Between R52 (female) (3) and (4)</td><td>22 to 30 V</td></tr>
<tr><td>4</td><td>Defective engine controller</td><td colspan="3">If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

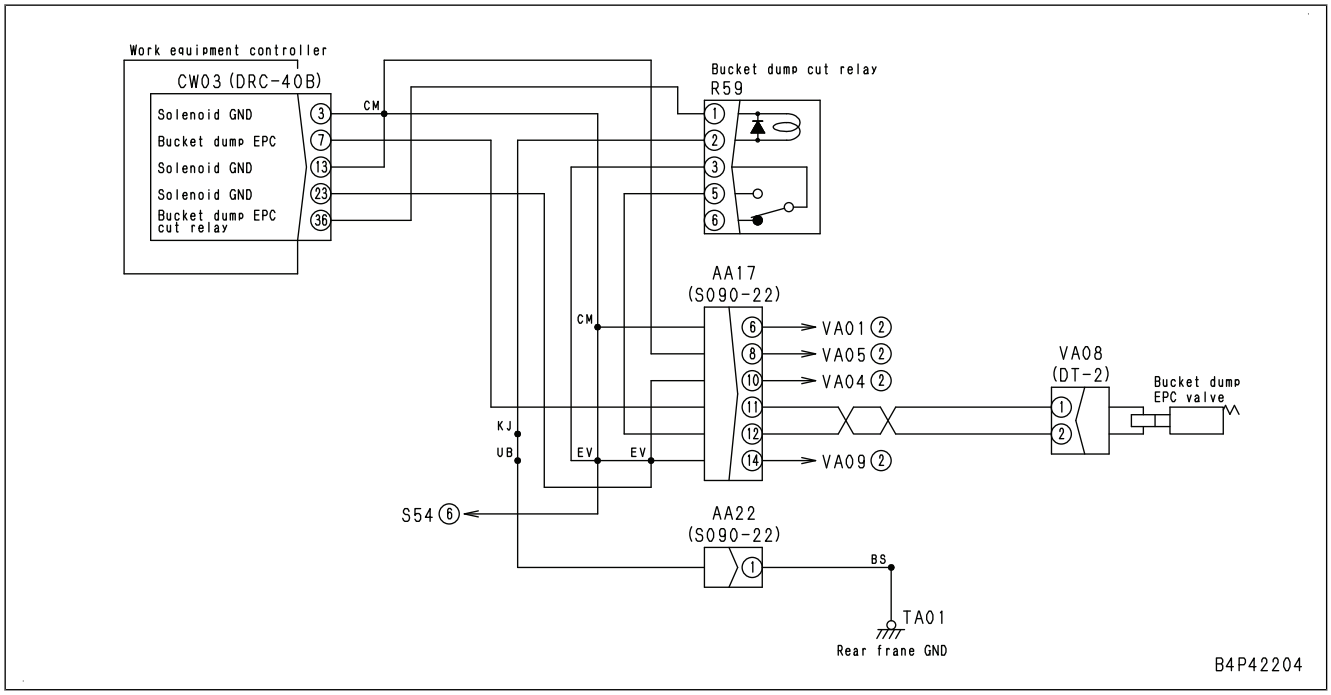
<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Ground fault in wiring harness (contact with ground circuit)</td><td colspan="3">1. Starting switch: OFF
2. Turn the battery disconnect switch to OFF position.
3. Disconnect connectors ECM J2 and R53A, and connect T-adapter to either female side.</td></tr>
<tr><td>Resistance</td><td>Between ground and ECM J2 (female) (7) or R53A (female) (11)</td><td>Min. 100 kΩ</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Short circuit in wiring harness</td><td colspan="3">1. Starting switch: OFF
2. Turn the battery disconnect switch to OFF position.
3. Disconnect connectors ECM J2 and R53A, and connect T-adapter to female side of ECM J2.</td></tr>
<tr><td>Continuity</td><td>Between ECM J2 (female) (7) and each pin other than pin (7)</td><td>No continuity</td></tr>
<tr><td rowspan="2">7</td><td rowspan="2">Defective AdBlue/DEF heater relay</td><td colspan="3">1. Turn starting switch to OFF position.
2. Check that system operating lamp does not light up, and then turn the battery disconnect switch OFF.
3. Disconnect connector R53A and R53B, and replace AdBlue/DEF heater relay.
4. Turn the battery disconnect switch ON.
5. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If this failure code is cleared, the original AdBlue/DEF heater relay is defective.</td></tr>
<tr><td>8</td><td>Defective engine controller</td><td colspan="3">If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

FAILURE CODE [D1M3MA]

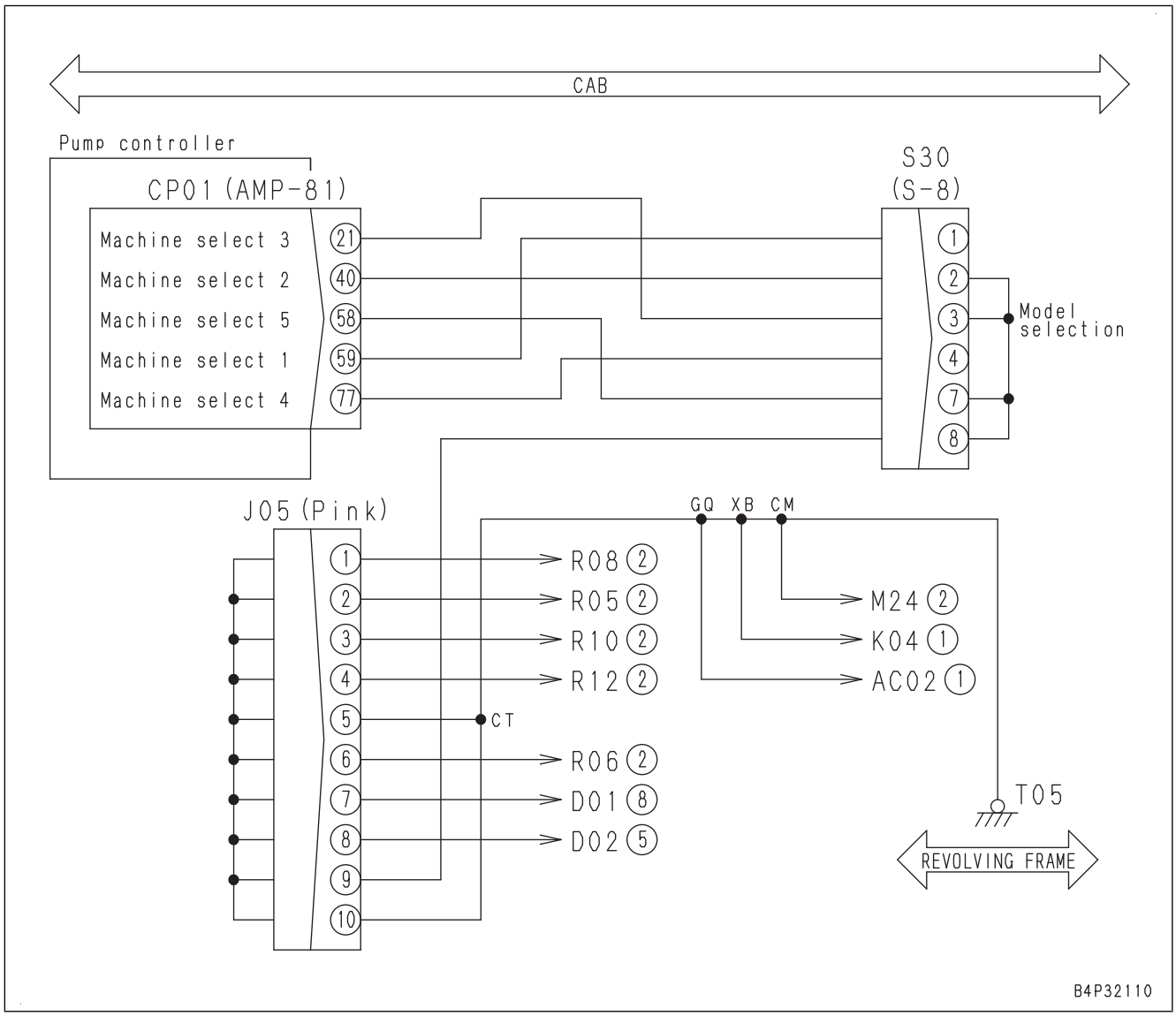
Action level	Failure code	Failure	Bucket DUMP EPC Cut Relay Error (Work equipment controller system)
L01	D1M3MA		
Detail of failure	Bucket DUMP EPC Cut Relay Internal Error		
Action of controller	Stops the output to the bucket DUMP EPC cutoff relay primary side (coil side) circuit.		
Phenomenon on machine	• When there is Bucket DUMP EPC Hot Short Circuit, the bucket DUMP EPC cut relay does not operate correctly, and bucket DUMP does not stop automatically. • Semi-auto mode cannot be selected in manual mode. • Manual mode automatically operates in semi-auto mode.		
Related information	• “Sensors are invalid” is shown in the control box. • Output condition to the primary side (coil side) circuit of bucket DUMP EPC cutoff relay can be checked with monitoring function. (Code: 76006) • This failure code is not shown when failure code [D1M3KA] is shown. • After the repair is done, check that the failure code is not shown with the operation that follows. Procedure: Turn the starting switch to the ON position.		

No.	Cause	Procedure, measurement location, criteria and remarks
1	Abnormal bucket DUMP EPC cutoff relay	Bucket DUMP EPC cutoff relay has an error. (Because this is an internal defect, troubleshooting cannot be done.)
2	Defective work equipment controller	If no failure is found by the previous checks, the work equipment controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)

Circuit diagram of bucket DUMP EPC cutoff relay

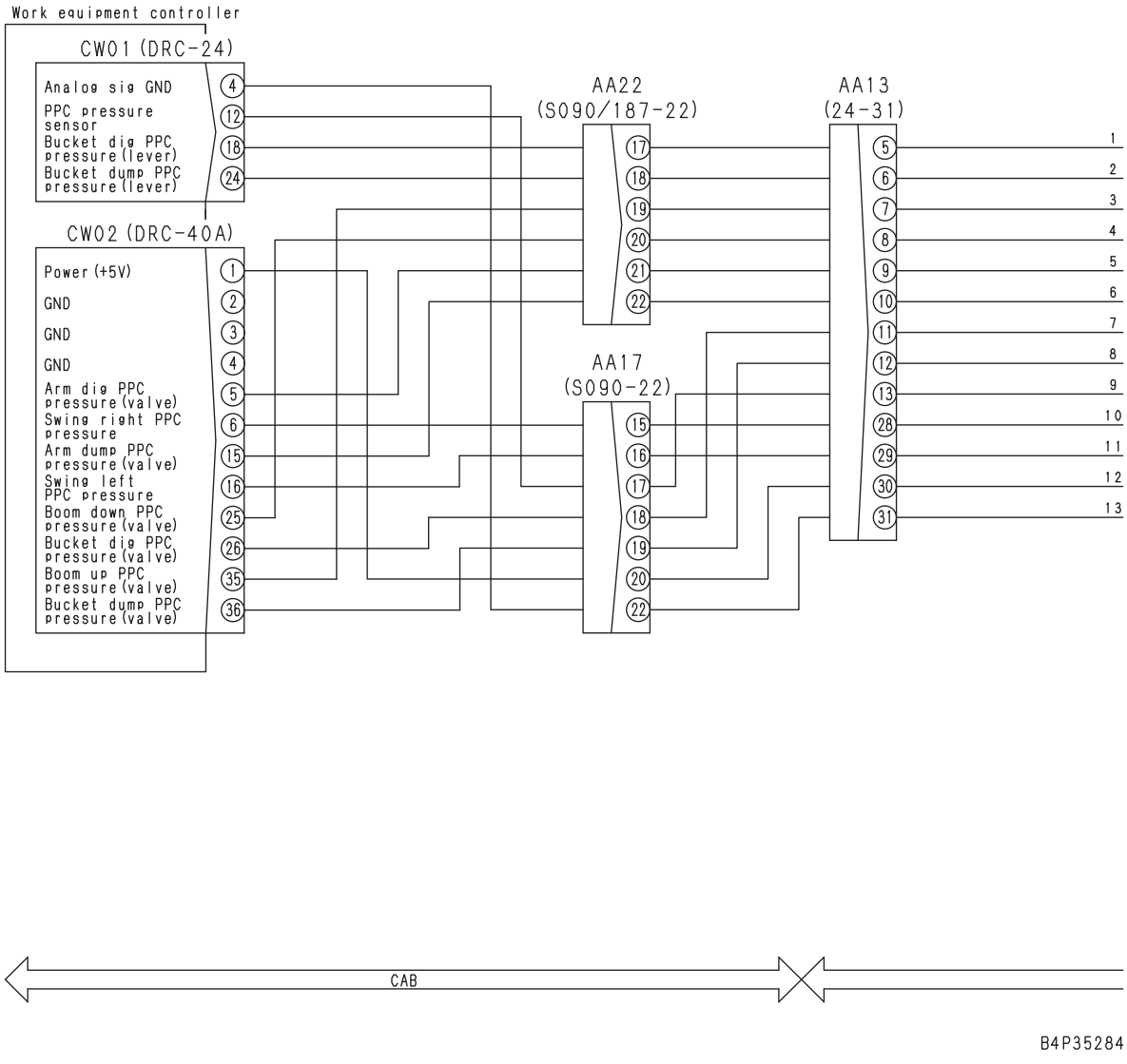


Circuit diagram related to machine model setting system

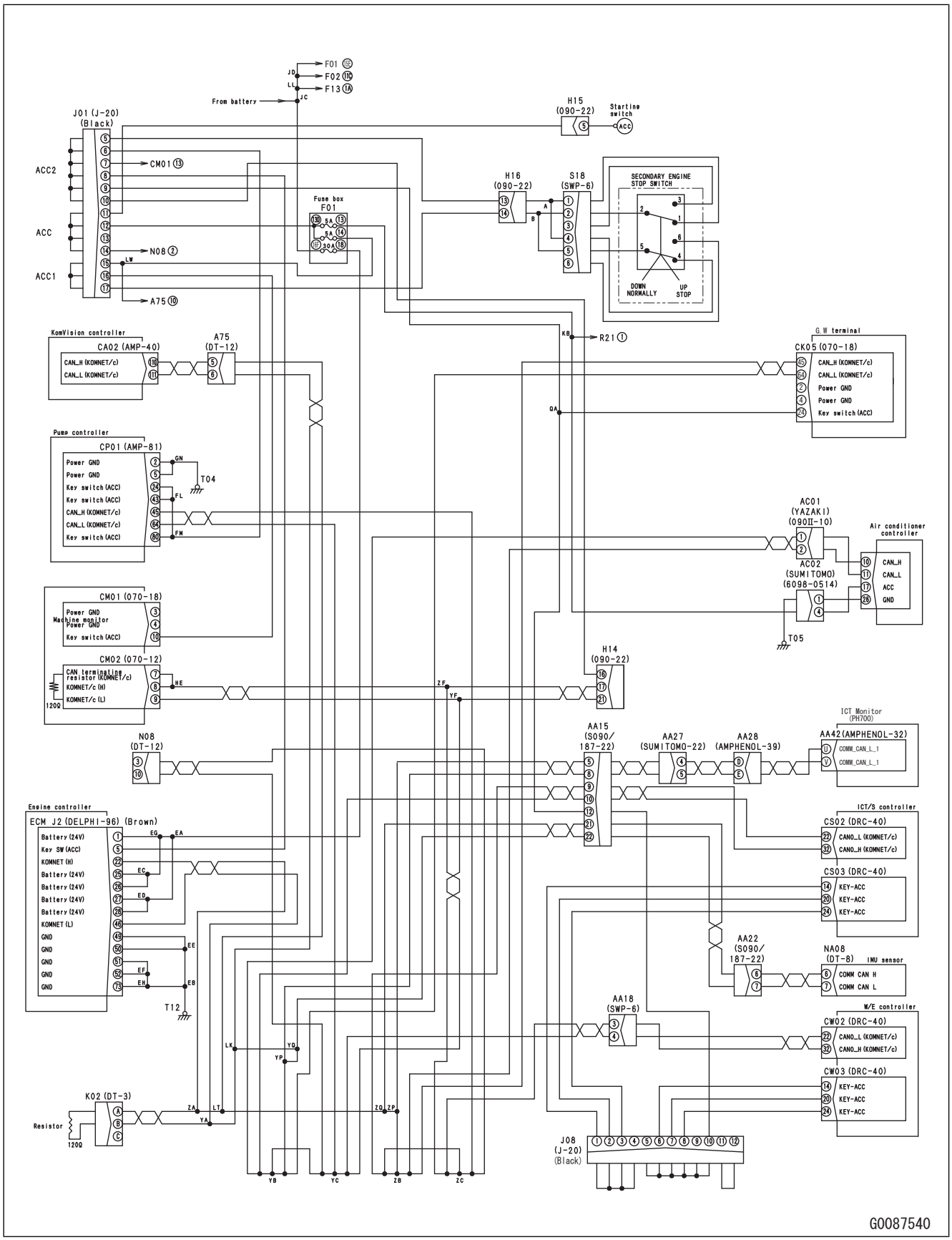


<table>
<tr><th>No.</th><th>Check item</th><th colspan="4">Procedure of troubleshooting</th><th colspan="2">Judgment and remedy</th></tr>
<tr><td rowspan="5">5</td><td rowspan="5">Open circuit in wiring harness (ACC signal circuit of machine monitor)</td><td colspan="4">1. Turn the starting switch to the OFF position.
2. Make sure that the system operating lamp is not lit. Turn the battery disconnect switch to the OFF position.
3. Remove the fuse No.14 in the fuse box F01.
4. Disconnect the connector CM01, and connect the T-adapter to the female side to troubleshoot.
5. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The wiring harness has no open circuit.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td colspan="2">Measurement position/condition</td><td>Standard value</td><td rowspan="4">NO</td><td rowspan="4">• The wiring harness has an open circuit.
• Repair or replace the defective wiring harness.
• Go to “Confirmation of repair”.</td></tr>
<tr><td rowspan="3">Resistance</td><td colspan="2">Between F01-14 and CM01 (female) (10)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between CM01 (female) (3) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between CM01 (female) (4) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="5">6</td><td rowspan="5">CAN terminating resistor</td><td colspan="4">1. Turn the starting switch to the OFF position.
2. Disconnect the connectors CM02 and K02, and connect the T-adapter to each male side to troubleshoot.
3. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The CAN terminating resistor is normal.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td colspan="2">Measurement position/condition</td><td>Standard value</td><td rowspan="3">NO</td><td rowspan="3">• The CAN terminating resistor is defective.
• Replace the CAN terminating resistor.
• Go to “Confirmation of repair”.</td></tr>
<tr><td rowspan="2">Resistance</td><td colspan="2">Between CM02 (male) (7) and (9)</td><td>120 ± 12 Ω</td></tr>
<tr><td colspan="2">Between K02 (male) (A) and (B)</td><td>120 ± 12 Ω</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Open circuit in wiring harness (CAN2 communication circuit)</td><td colspan="4">1. Turn the starting switch to the OFF position.
2. Make sure that the system operating lamp is not lit. Turn the battery disconnect switch to the OFF position.
3. Disconnect the connectors CM02 and K02, and connect the T-adapter to the each female side to troubleshoot.
4. Does the troubleshooting result agree with the standard value?</td><td>YES</td><td>• The wiring harness has no open circuit.
• Go to the next check item.</td></tr>
<tr><td>Item</td><td colspan="2">Measurement position/condition</td><td>Standard value</td><td rowspan="4">NO</td><td rowspan="4">• The wiring harness has an open circuit.
• Repair or replace the defective wiring harness.
• Go to “Confirmation of repair”.</td></tr>
<tr><td rowspan="3">Resistance</td><td colspan="2">Between CM02 (female) (7) and K02 (female) (A)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between CM02 (female) (8) and K02 (female) (A)</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Between CM02 (female) (9) and K02 (female) (B)</td><td>Max. 1 Ω</td></tr>
</table>

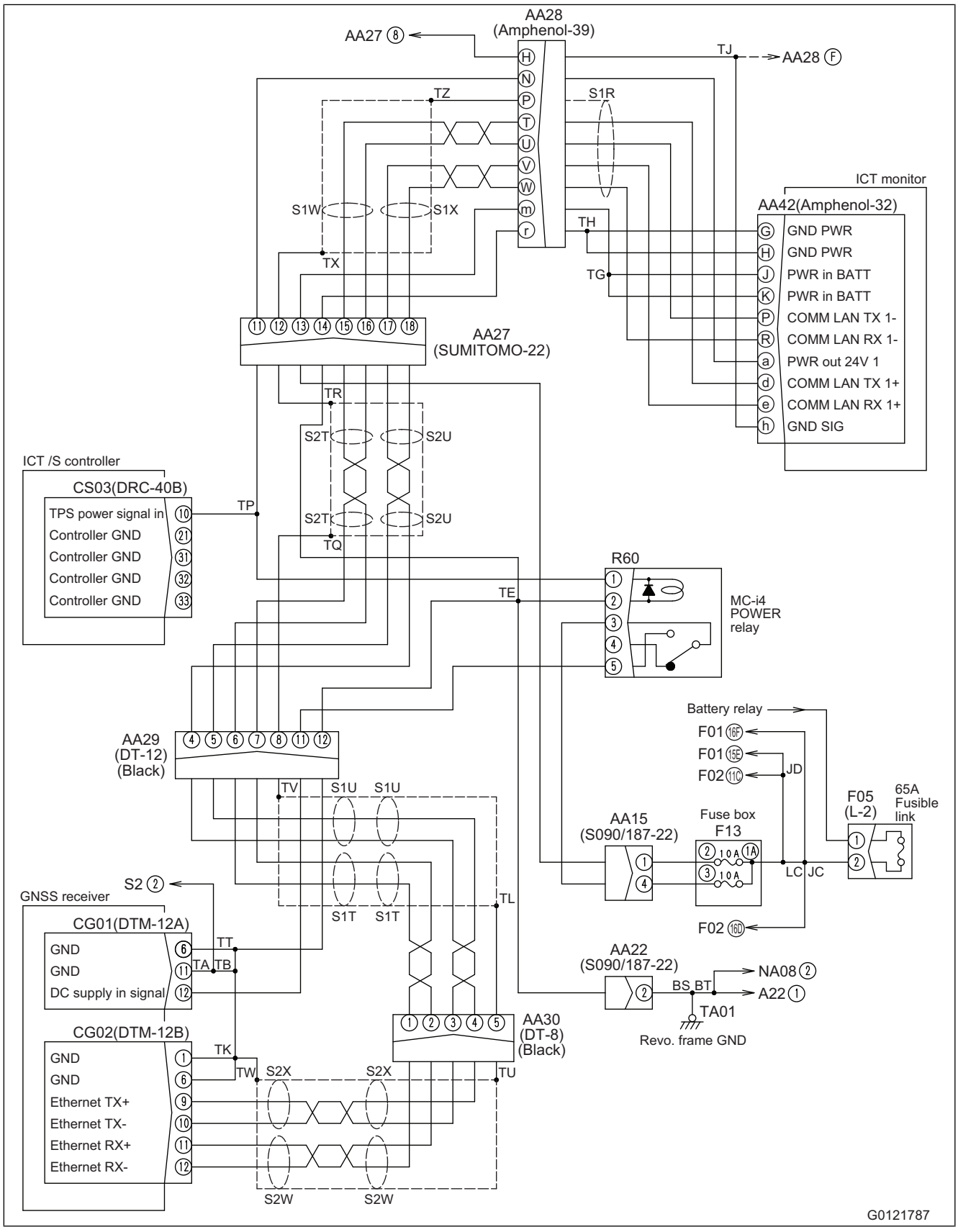
Circuit diagram related to 5 V sensor power supply output (1)



Circuit diagram related to CAN2 communication



Circuit diagram of control box



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">3</td><td rowspan="5">Open circuit in wiring harness
(Wire breakage or defective contact of connector)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P25, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="4">Resistance</td><td>REMARK
If power supply voltage in check on cause 1 is normal, this check is not required.
Between CP01 (female) (18) and P25 (female) (1)</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>REMARK
If power supply voltage in check on cause 1 is normal, this check is not required.
Between CP01 (female) (6) and P25 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Ground fault in wiring harness
(Contact with ground circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P25, and connect T-adapter to either female side.</td></tr>
<tr><td>Resistance</td><td>Between ground and CP01 (female) (11) or P25 (female) (2)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Hot short circuit in wiring harness
(Contact with 5 V circuit and 24 V circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector P25.
3. Connect T-adapter to female side of connector P25.
4. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between P25 (female) (2) and ground</td><td>Max. 1 V</td></tr>
<tr><td>6</td><td>Defective pump controller</td><td colspan="3">If no failure is found by preceding checks, pump controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly).</td></tr>
</table>

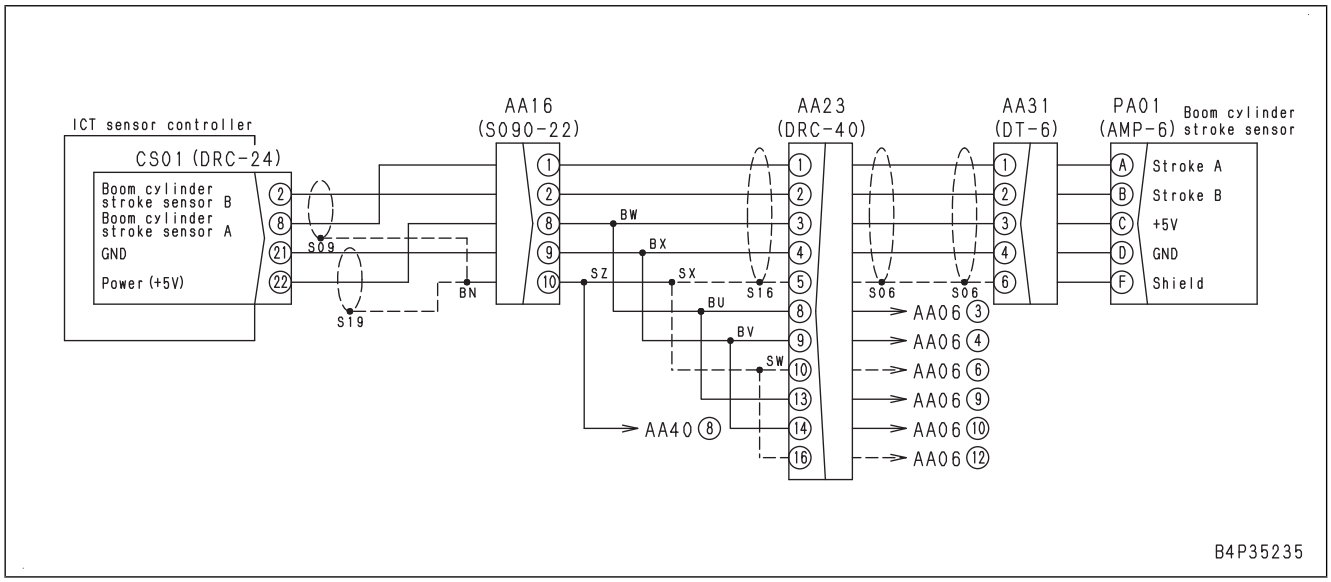
<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">3</td><td rowspan="5">Open circuit in wiring harness
(Wire breakage or defective contact of connector)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P12, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="3">Resistance</td><td>REMARK
If power supply voltage in check on cause 1 is normal, this check is not required.
Between CP01 (female) (18) and P12 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between CP01 (female) (53) and P12 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td>REMARK
If power supply voltage in check on cause 1 is normal, this check is not required.
Between CP01 (female) (6) and P12 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Ground fault in wiring harness
(Contact with ground circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P12, and connect T-adapter to either female side.</td></tr>
<tr><td>Resistance</td><td>Between ground and CP01 (female) (53) or P12 (female) (2)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Hot short circuit in wiring harness
(Contact with 5 V circuit and 24 V circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector P12.
3. Connect T-adapter to female side of connector P12.
4. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between P12 (female) (2) and ground</td><td>Max. 1 V</td></tr>
<tr><td>6</td><td>Defective pump controller</td><td colspan="3">If no failure is found by preceding checks, pump controller is defective. (In case of an internal defect, troubleshooting is impossible as an assembly. Replace whole assembly).</td></tr>
</table>

FAILURE CODE [DKT0L8]

Action level	Failure code	Failure	Boom Cylinder Stroke Sensor In Range Error (ICT sensor controller system)
L01	DKT0L8		
Detail of failure	Rotating angles figured out from phase A and B outputs of stroke sensor for boom cylinder do not match.		
Action of controller	None in particular		
Phenomenon on machine	Posture of the boom of machine image on the screen of control box does not match to the actual machine.		
Related information	• “Sensors are invalid” is displayed in control box. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective stroke sensor for boom cylinder	If the problem is not solved after disconnecting and reconnecting each connector in the circuit 10 times, the stroke sensor for boom cylinder is defective.

Circuit diagram related to stroke sensor for boom cylinder



FAILURE CODE [DKTFMC]

Action level	Failure code	Failure	Arm Cylinder Stroke Reset Encoder Error (ICT sensor controller system)
L01	DKTFMC		
Detail of failure	While failure code [DKTFKX] is being displayed, the arm encoder reset operates.		
Action of controller	None in particular		
Phenomenon on machine	Posture of the arm of machine image on the screen of control box does not match to the actual machine.		
Related information	• “Sensors are invalid” is displayed in control box. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective A and B phases of stroke reset encoder for arm cylinder	If failure code [DKTFKX] is also displayed at the same time, perform troubleshooting for it first.

FAILURE CODE [DKV2KA]

Action level	Failure code	Failure	Boom Spool Stroke Sensor 2 Open Circuit (Work equipment controller system)
L01	DKV2KA		
Detail of failure	Input voltage from boom spool stroke sensor 2 is 0.2 V and below.		
Action of controller	None in particular		
Phenomenon on machine	Accuracy of work equipment control is degraded.		
Related information	• Output state of boom spool stroke sensor can be checked with monitoring function. (Code: 75903) • For the detail of power supply and ground circuit, see the circuit diagram of failure code [DB95KP]. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

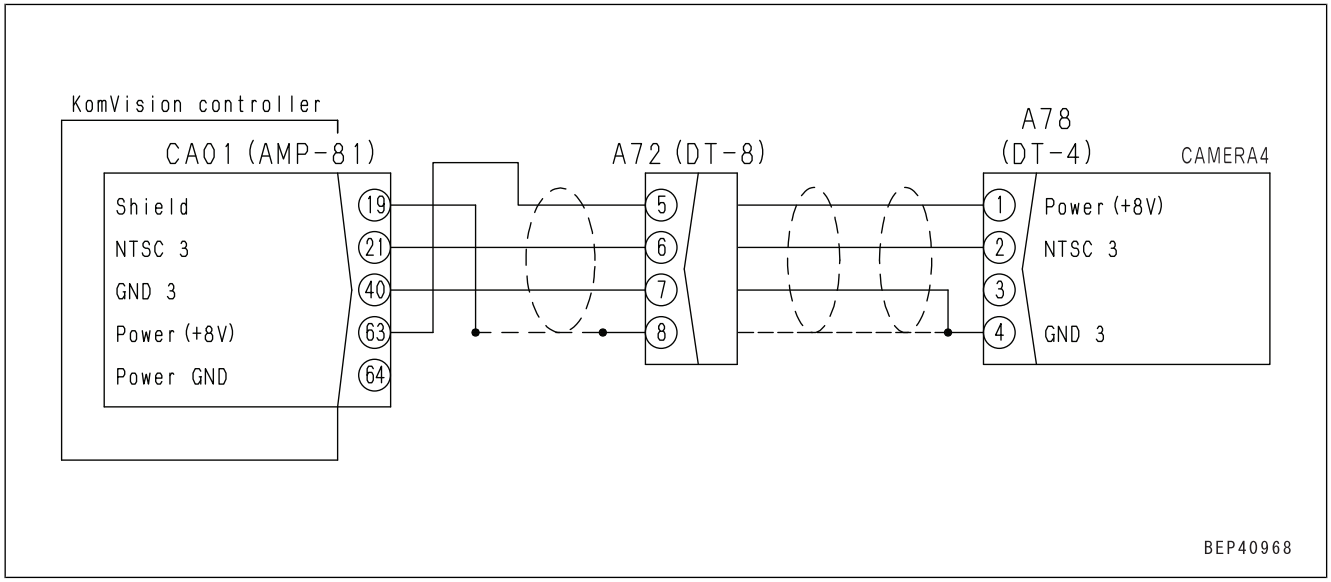
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective sensor 5 V power supply system	If failure code [DB95KP] is also displayed, perform troubleshooting for it first. 1. Turn the starting switch to OFF position. 2. Disconnect the connector PA14, and connect the T-adapter to female side. 3. Turn the starting switch to ON position. **REMARK** If power supply voltage is abnormal, go to check on cause 3 and after.			
		Voltage	Between PA14 (female) (1) and (2)	Power supply	2.5 to 6.0 V
2	Defective boom spool stroke sensor 2 (internal open circuit) or ground fault in wiring harness	1. Turn the starting switch to OFF position. 2. Insert the T-adapter into connector PA14. 3. Turn the starting switch to ON position. **REMARK** If power supply voltage is normal and sensor output voltage is abnormal (0.2 V and below), it cannot be determined whether ground fault or defective sensor is the cause. In this case, proceed to check on cause 4. If no failure is found by check on cause 4, boom spool stroke sensor 2 is defective.			
		Voltage	Between PA14 (4) and (2)	Power supply	0.2 to 4.8 V
3	Open circuit in wiring harness (wire breakage or defective contact)	1. Turn the starting switch to OFF position. 2. Disconnect the connectors CW01 and PA14, and connect the T-adapter to each female side.			
		Resistance	If power supply voltage in check on cause 1 is normal, this check is not required. Between CW01 (female) (22) and PA14 (female) (1)		Max. 1 Ω
			If power supply voltage in check on cause 1 is normal, this check is not required. Between CW01 (female) (21) and PA14 (female) (2)		Max. 1 Ω
			Between CW01 (female) (20) and PA14 (female) (4)		Max. 1 Ω

FAILURE CODE [DKVCKY]

Action level	Failure code	Failure	Boom RAISE PPC Intervention EPC Hot Short Circuit (Work equipment controller system)
L04	DKVCKY		
Detail of failure	Current flows constantly to boom RAISE PPC Intervention EPC solenoid circuit.		
Action of controller	Stops driving boom RAISE PPC intervention EPC solenoid circuit.		
Phenomenon on machine	• Auto grade assist and stop control does not operate normally in semi-auto mode. • Semi-auto mode cannot be selected in manual mode. • Manual mode is automatically selected in semi-auto mode.		
Related information	• Output state to boom RAISE PPC intervention EPC solenoid can be checked with monitoring function. (Code: 75806) • “Sensors are invalid” is displayed in control box. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Hot short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connector VA09, and connect the T-adapter to female side. 3. Turn the starting switch to ON position. 4. Turn on the auto/manual switch. **REMARK** Approximately 25 V just (approx. 0.5 seconds) after starting switch is turned to ON position		
		Voltage	Between VA09 (female) (1) and (2)	Max. 4.5 V
2	Short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors CW03 and VA09, and connect the T-adapter to female side of CW03.		
		Continuity	Between CW03 (female) (27) and each pin other than (27)	No continuity
		1. Turn the starting switch to OFF position. 2. Disconnect the connectors CW03, AA13 and VA09, and connect the T-adapter to either female side or male side of AA13.		
		Continuity	Between AA13 (female) (26) and each pin other than (26)	No continuity
			Between AA13 (male) (26) and each pin other than (26)	No continuity
3	Defective work equipment controller	If no failure is found by preceding checks, the work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to left camera

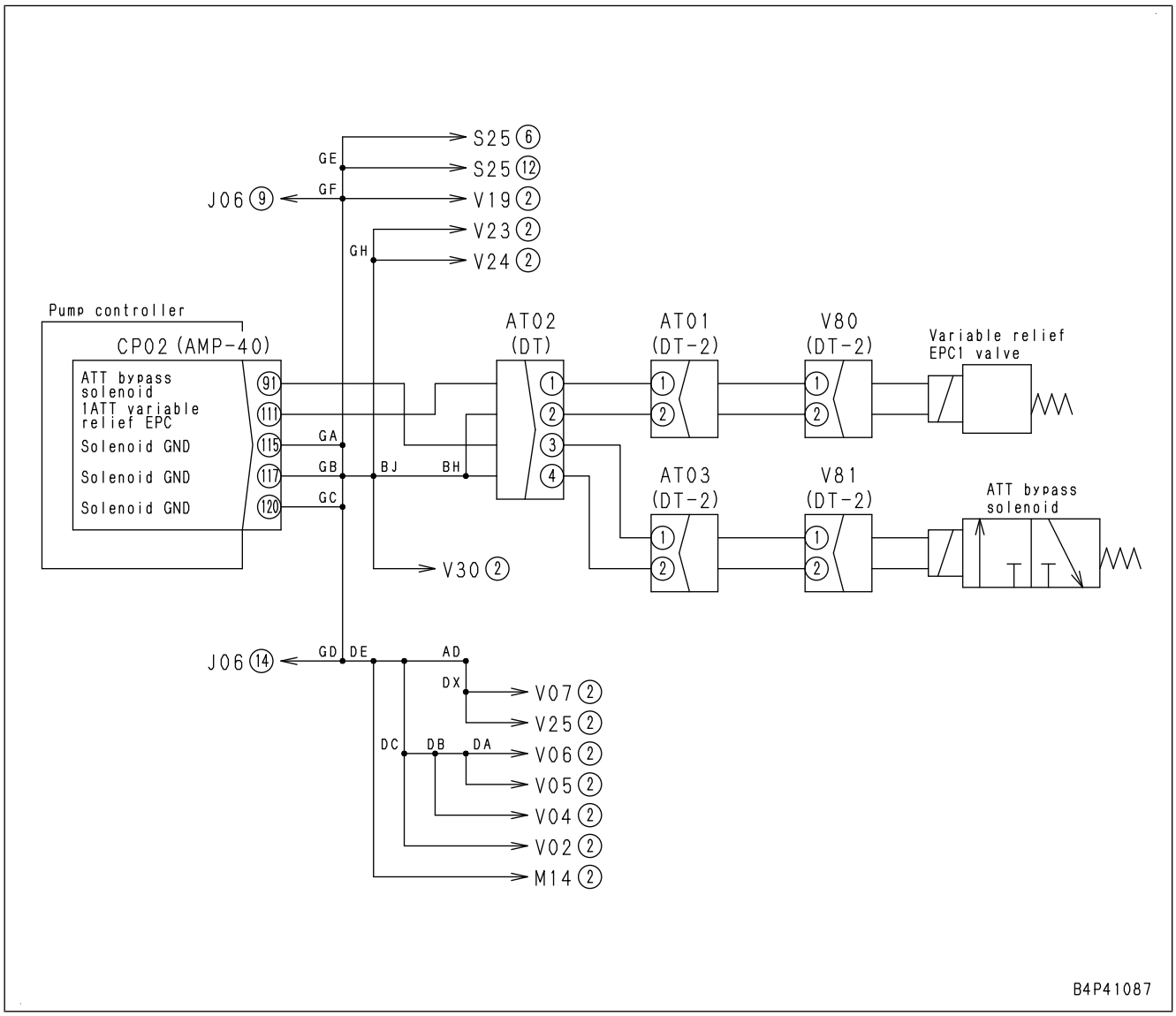


FAILURE CODE [DW4SKB]

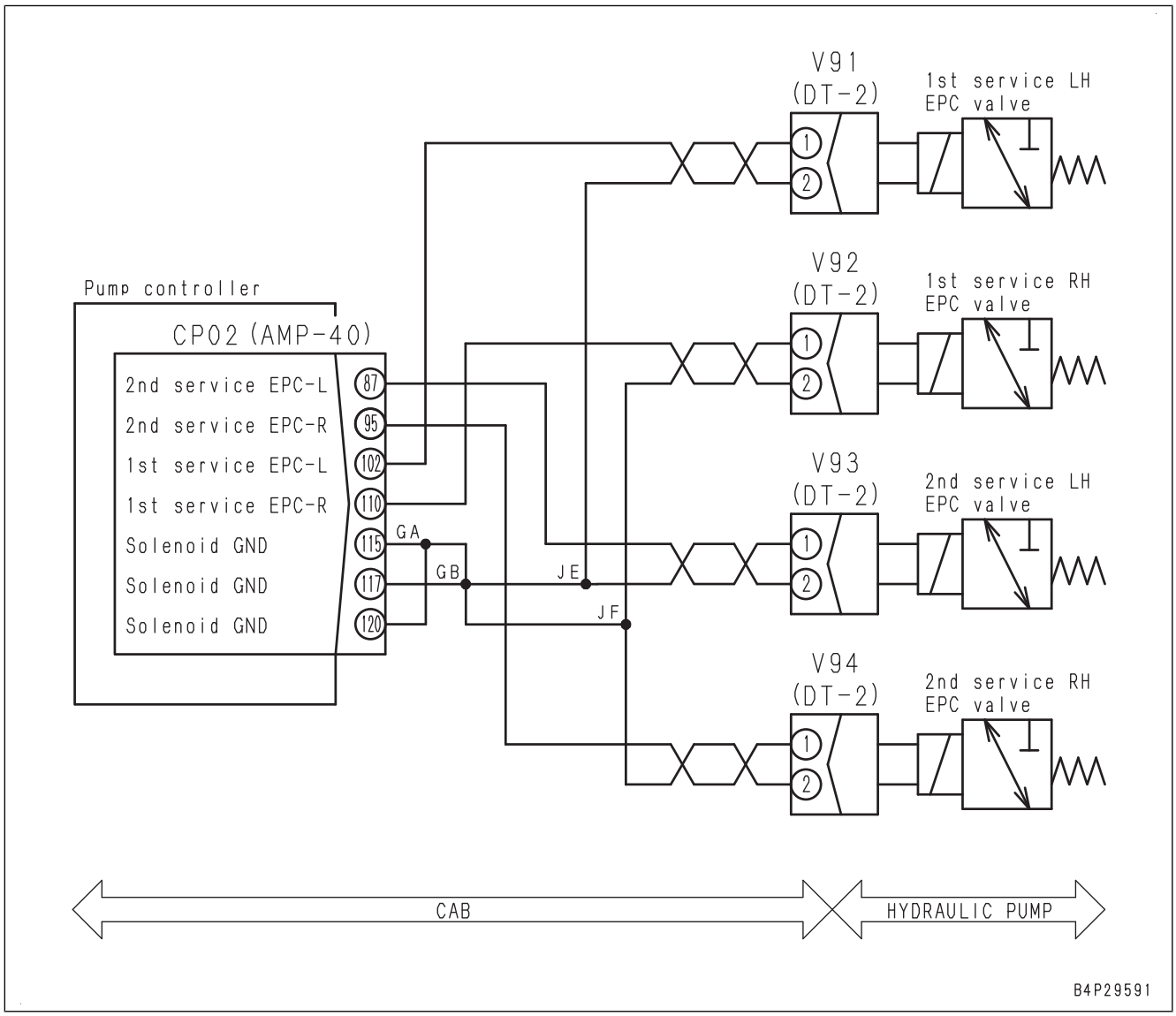
Action level	Failure code	Failure	Bucket DUMP PPC Reduce Pressure EPC Ground Fault (Work equipment controller system)
L03	DW4SKB		
Detail of failure	When controller drives bucket DUMP PPC reduce pressure EPC solenoid circuit, abnormal current flows through circuit.		
Action of controller	Stops driving bucket DUMP PPC reduce pressure EPC solenoid circuit.		
Phenomenon on machine	• Bucket DUMP operation cannot be done. • Semi-auto mode cannot be selected in manual mode. • Manual mode is automatically selected in semi-auto mode.		
Related information	• Output state to bucket DUMP PPC reduce pressure EPC solenoid can be checked with monitoring function. (Code: 75805) • “Sensors are invalid” is displayed in control box. • After completion of repair, check that the failure code is cleared by the following procedure. Procedure: Turn the starting switch to ON position, and operate the bucket control lever (DUMP).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective bucket DUMP PPC reduce pressure EPC solenoid (internal short circuit)	1. Turn the starting switch to OFF position. 2. Disconnect the connector VA08, and connect the T-adapter to male side.		
		Resistance	Between VA08 (male) (1) and (2)	5 to 15 Ω
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn the starting switch to OFF position. 2. Disconnect the connectors CW03 and VA08, and connect the T-adapter to either female side.		
		Resistance	Between ground and CW03 (female) (7) or VA08 (female) (1)	Min. 1 MΩ
3	Open circuit or short circuit in wiring harness	1. Turn the starting switch to OFF position. 2. Disconnect the connectors CW03 and VA08, and connect the T-adapter to either female side.		
		Resistance	Between CW03 (female) (7) and (3), or between VA08 (female) (1) and (2)	Min. 1 MΩ
4	Defective work equipment controller	If no failure is found by preceding checks, the work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

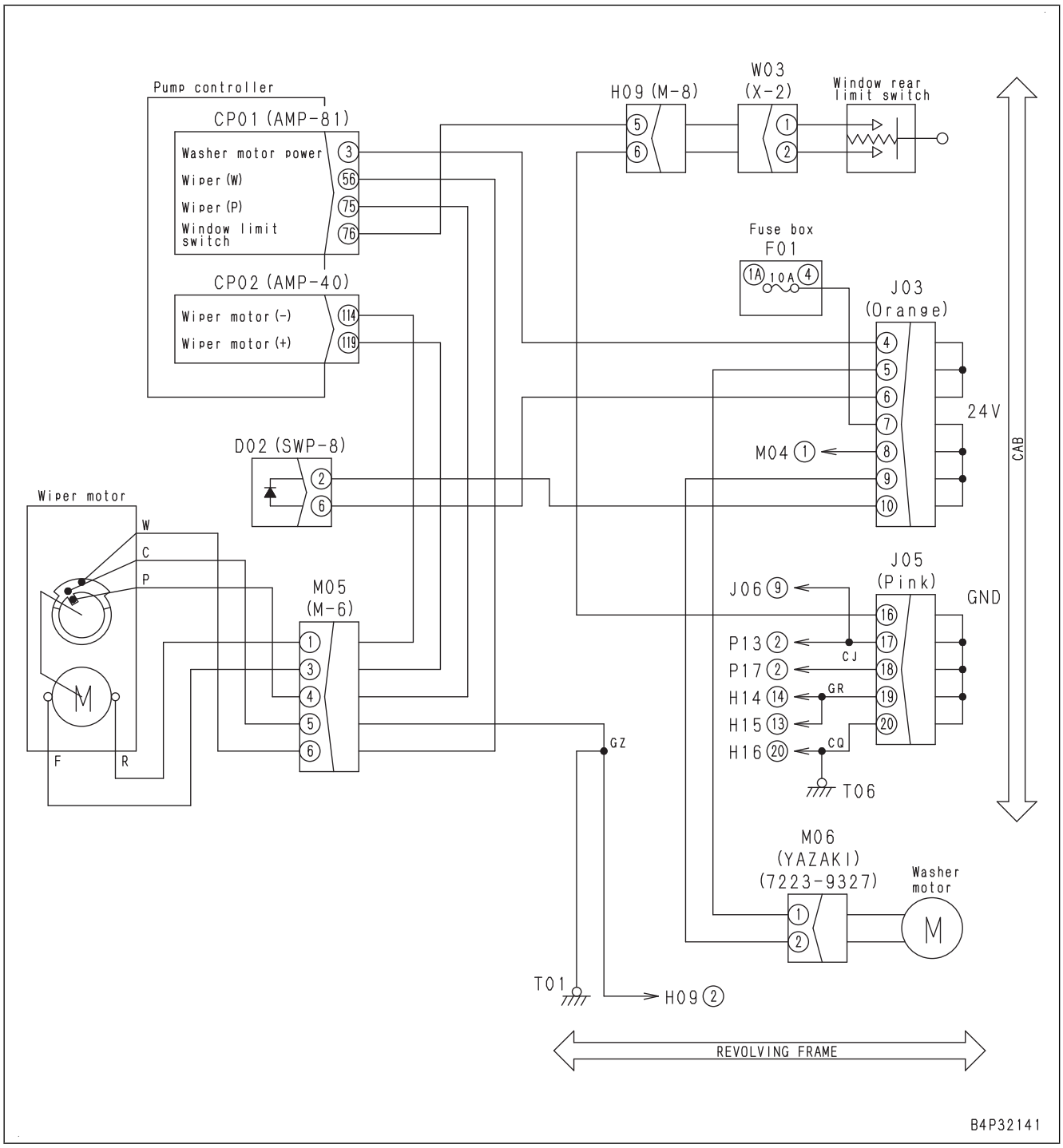
CIRCUIT DIAGRAM OF Attachment Press EPC1 Adjustment



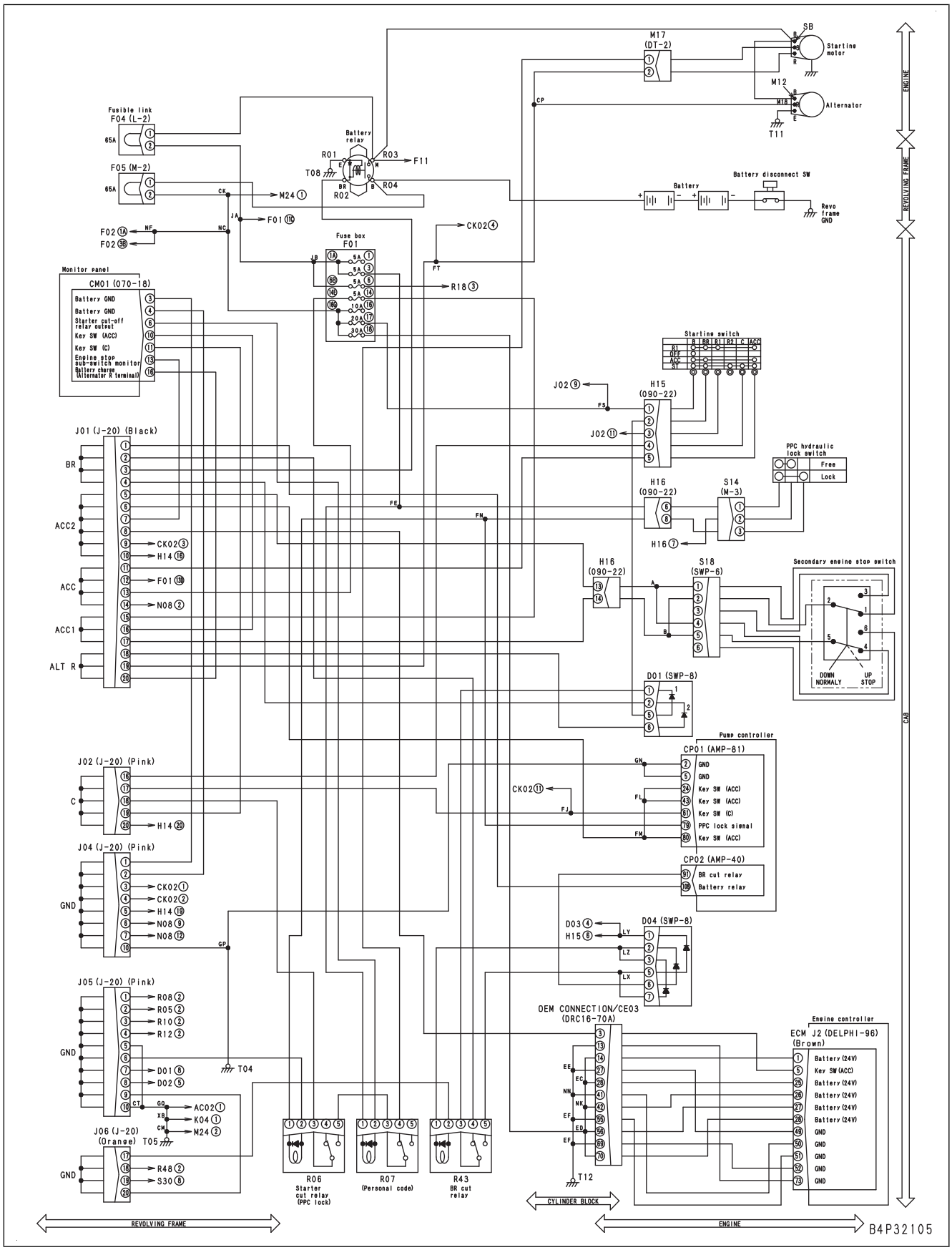
Circuit diagram related to ATT flow rate adjustment EPC



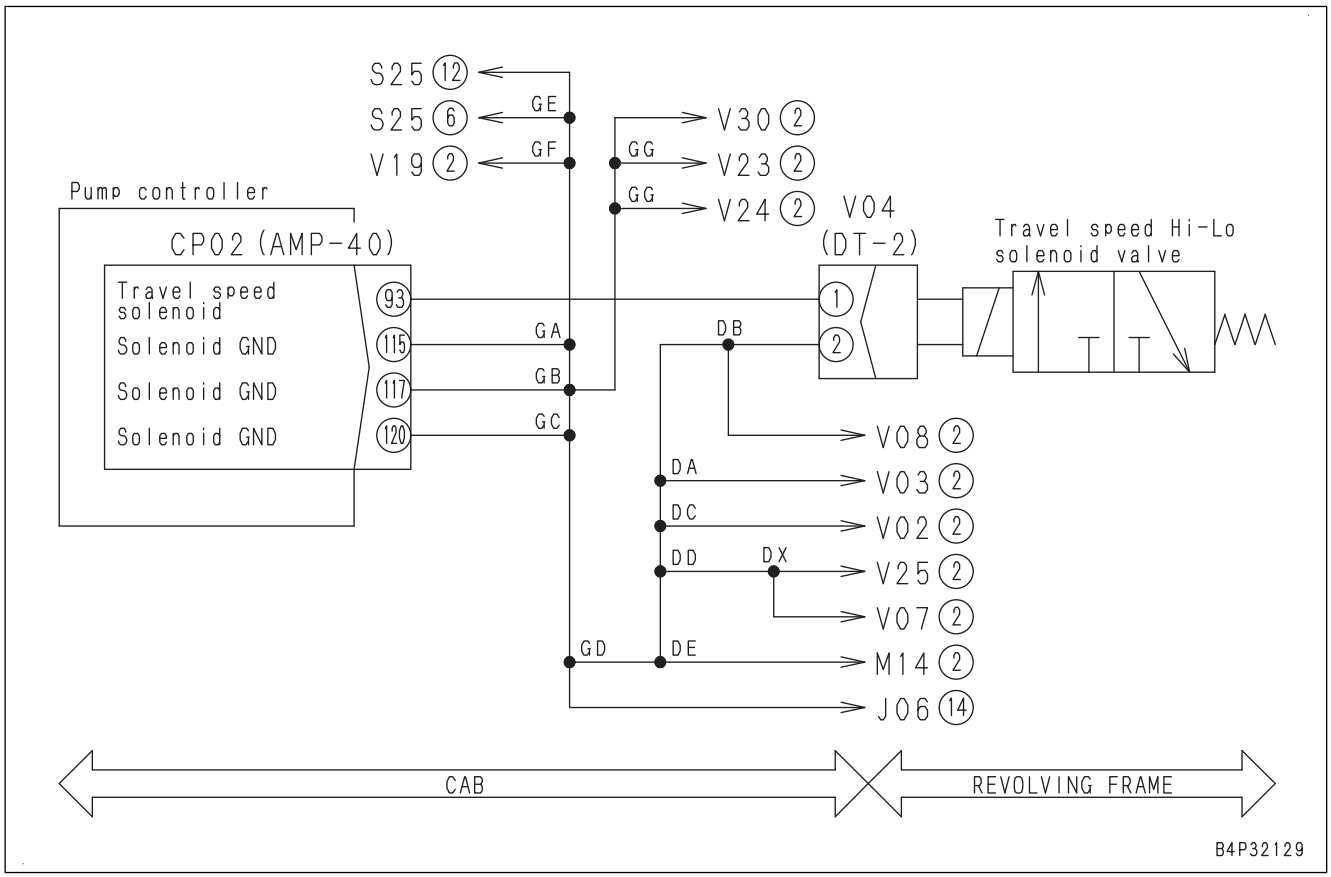
Circuit diagram related to wiper



Circuit diagram related to engine starting circuit

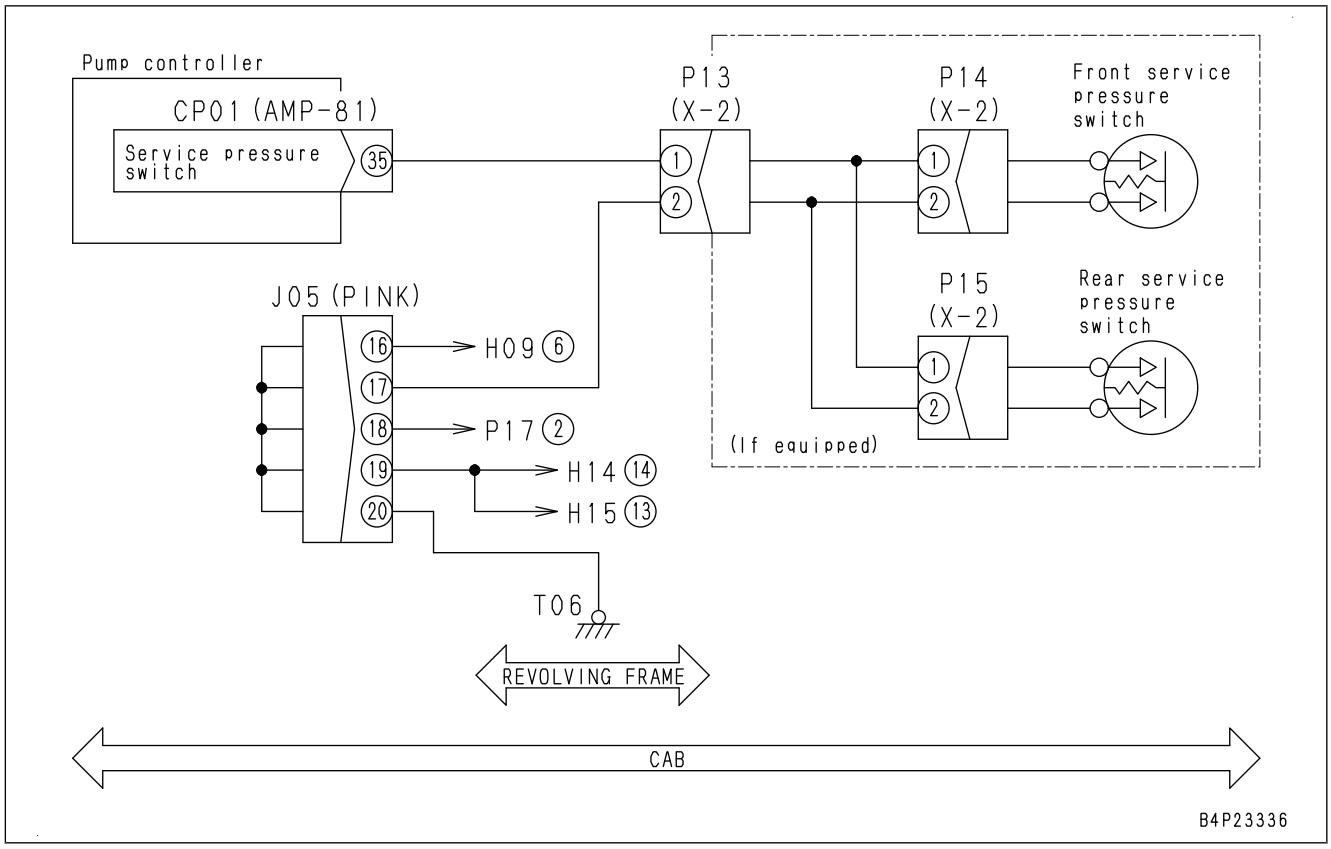


Circuit diagram related to travel speed solenoid



No.	Cause	Procedure, measurement location, criteria and remarks		
4	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Starting switch: OFF 2. Disconnect CP01, P14 and P15. Connect the T-adapter to each female side.		
		Resistance	Between CP01 (female) (35) and P14 (female) (1)	Max. 1 Ω
			Between CP01 (female) (35) and P15 (female) (1)	Max. 1 Ω
			Between P14 (female) (2) and ground (T06)	Max. 1 Ω
			Between P15 (female) (2) and ground (T06)	Max. 1 Ω
5	Ground fault in wiring harness (contact with GND circuit)	1. Starting switch: OFF 2. Disconnect CP01, P14 and P15. Connect a T-adapter to one of them on the female side.		
		Resistance	Between ground and one of CP01 (female) (35), P14 (female) (1), and P15 (female) (1)	Min. 1 MΩ
6	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect P14 and P15. Connect a T-adapter to one of them on the female side. 3. Starting switch: ON		
		Voltage	Between ground and P14 (female) (1) or P15 (female) (1)	Approx. 7 V
7	Defective pump controller	If no failure is found by the previous checks, the pump controller is defective. (Because this is an internal defect, troubleshooting cannot be done.)		

Circuit diagram of service PPC pressure switch



E-86 "SEMI-AUTO MODE" IS SHOWN BUT THE WORKING MODE ICON IS NOT SHOWN

Detail of failure	"Semi-auto mode" is shown but the working mode icon is not shown.
Related information	• Do the troubleshooting outdoors or in an area open to the sky to find a sufficient number of satellites. • Before you do this troubleshooting, do the troubleshooting for “SEMI-AUTO MODE IS SHOWN BUT AUTO GRADE ASSIST DOES NOT OPERATE” and “SEMI-AUTO MODE IS SHOWN BUT AUTO STOP CONTROL DOES NOT OPERATE” in E-mode.

No.	Cause	Procedure, measurement location, criteria and remarks
1	Machine specification and software version do not agree.	Check that the specification of the machine is specification in which the work equipment control in working mode is available. Update the software to the latest version. If the version of control box is old because it is used from a different model, update is required.
2	Working mode icon setting has not been set to be shown.	Set the setting for the icon to be shown. See Operation and Maintenance Manual, Control box settings, Display/not display of working mode selector icon. The function cannot be enabled unless this setting has been done.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">14</td><td rowspan="4">Defective boom cylinder</td><td colspan="3">Check hydraulic drift of boom cylinder with engine stopped.
• Hydraulic oil temperature: 45 to 55 °C
• Bucket with rated load, boom horizontal, arm cylinder fully retracted and arm cylinder fully extended, machine body lifted</td></tr>
<tr><td colspan="3">If visible hydraulic drift is observed, it is abnormal.</td></tr>
<tr><td colspan="3">• If any failure is found in above check items, check the leakage amount of boom cylinder when boom RAISE is relieved.
• Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Boom cylinder leakage amount</td><td>Boom RAISE relief</td><td>Max.
20 cc/min</td></tr>
</table>

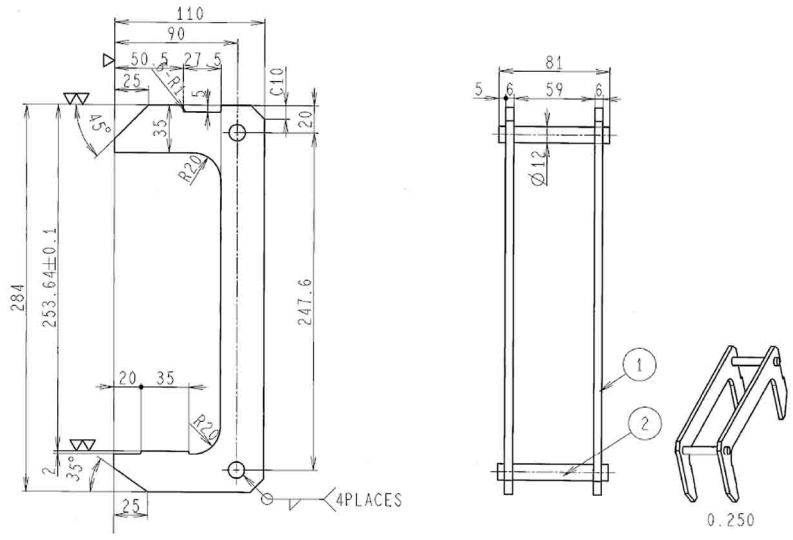
H-31 UPPER STRUCTURE OVERRUNS EXCESSIVELY WHEN IT STOPS SWINGING (BOTH RIGHT AND LEFT)

Failure	Upper structure overruns excessively when it stops swinging (both right and left).
Related information	• Perform all troubleshooting with working mode set in power mode (P). • F pump pressure can be checked with monitoring function. (Code: 01100) • R pump pressure can be checked with monitoring function. (Code: 01101) • If failure code [DWK0KA] or [DWK0KB] is also displayed, perform troubleshooting for it first.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective swing motor (safety valve)</td><td colspan="4">Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Swing relief pressure</td><td>Swing lock switch: ON</td><td>Swing control lever: L.H. swing relief and R.H. swing relief</td><td>28.4 to 32.9 MPa {285 to 335 kgf/cm^2}</td></tr>
<tr><td colspan="4">• If both right and left swings are lower than the standard value at the same pressure, sealing of safety valve may be defective.
• The safety valve is featured with a 2-stage relief function, however, its Hi and Lo pressure settings are the same (the relief flow differs).</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Defective swing motor</td><td colspan="4">Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td>Swing motor leakage amount</td><td>Swing lock switch: ON</td><td>Swing control lever: L.H. swing relief and R.H. swing relief</td><td>11 ℓ/min</td></tr>
</table>

No.	Cause	Point to check, remarks	Remedy
10	Defective mass air flow and temperature sensor	Change sensor and check that consumption of AdBlue/DEF is normal. (Failure code may not be displayed because of attachment of dust on the sensor.)	Replacement of mass air flow and temperature sensor
11	Gas leakage from EGR piping	Gas is leaking from EGR piping.	Replace EGR piping
12	The aftercooler outlet temperature is high (The intake manifold temperature is high).	Clogging of the aftercooler core (Aftercooler outlet temperature: Max. 50 °C)	Cleaning of the aftercooler core
13	Urea deposit (white deposit) is accumulated in the AdBlue/DEF mixing tube.	Check whether urea deposit is accumulated in the AdBlue/DEF mixing tube.	• Cleaning inside AdBlue/DEF mixing tube • Perform service regeneration.
14	Defective AdBlue/DEF mixing tube	Check that AdBlue/DEF mixing tube is not damaged, and that exhaust gas is not leaked. (Check that no urea deposit is accumulated on AdBlue/DEF mixing tube surface)	Replacement of AdBlue/DEF mixing tube
15	Defective SCR catalyst	• Check that SCR catalyst is not damaged and the performance is not deteriorated. • Perform troubleshooting for failure code [CA3151].	SCR catalytic exchange

Guide



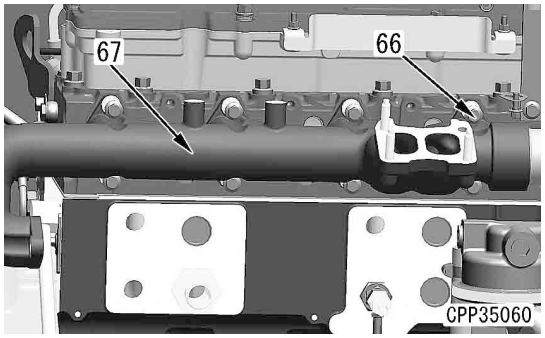
CPP39363

HEAT TREATMENT	MATERIAL
----------	WELD
PART NAME	Q'TY
GUIDE	1
796T-208-2010 △	

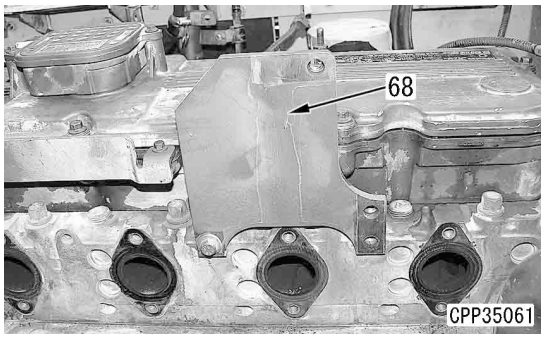
SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
02	BAR	SS400	2	0.07	
01	PLATE	SS400	2	0.62	

Exhaust manifold

57. Remove mounting bolts (66) (12 pieces), and remove exhaust manifold (67).

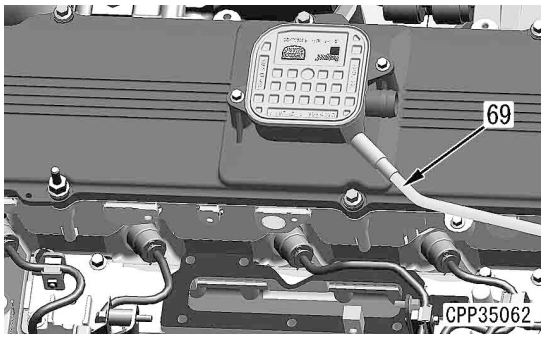


58. Remove plate (68).



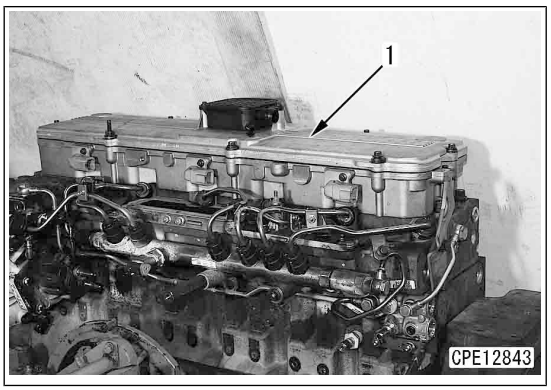
Blowby hose

59. Remove blowby hose (69).



Head cover and rocker housing

60. Remove head cover (1).



METHOD FOR INSTALLING RADIATOR ASSEMBLY

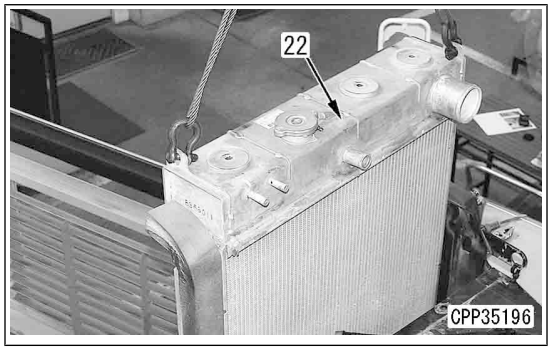
Radiator assembly

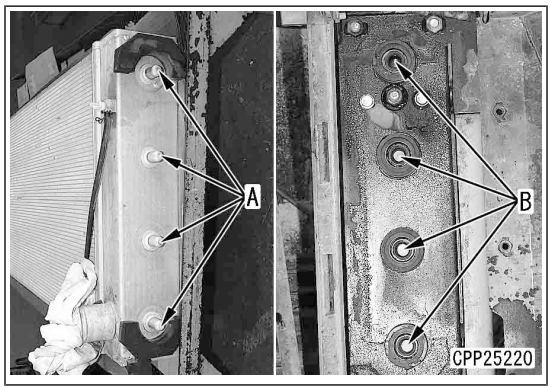
1. Sling radiator assembly (22), and insert it slowly into the shroud.

   NOTICE

   - **Check that the heat insulation material (sponge) on the periphery of radiator assembly (22) is not damaged.**
   - **If the heat insulation material (sponge) on the periphery of radiator assembly (22) is damaged, replace it with a new one.**
   - **When installing radiator assembly (22), be careful not to damage the heat insulation material (sponge) on the periphery.**
   - **Check from the bottom side that convex parts (A) at the bottom of radiator assembly (22) properly fits with concave parts (B) of the machine.**

   Radiator assembly (22):
   30 kg

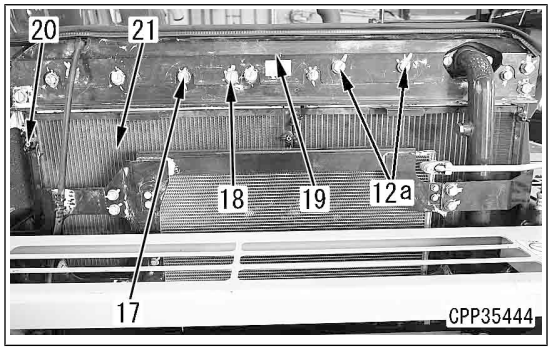


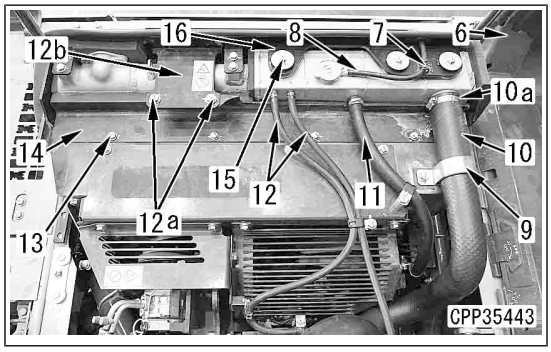


2. Install net (21) with wing screws (20) (2 pieces).
3. Install cover (19) with mounting bolts (18) (5 pieces).
4. Install bracket (16) with mounting bolts (15) (3 pieces) and (17) (4 pieces).
5. Install cover (14) with mounting bolts (13) (4 pieces).
6. Install cover (12b) with mounting bolts (12a).
7. Install hoses (11) and (12).

   Hose (11) clamp::
   4.4±0.49 Nm {0.45±0.05 kgfm}
8. Install hose (10) with clamp (10a), and install clamp (9).

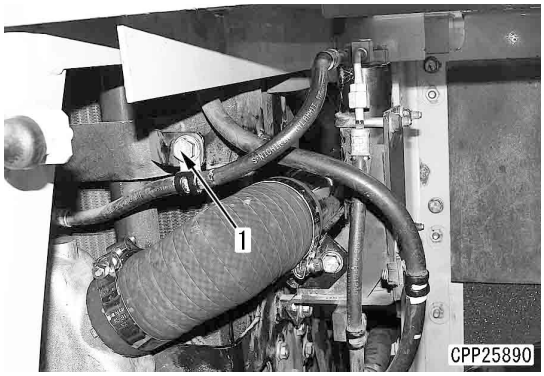
   Clamps (10a):
   10.8 to 11.8 Nm {1.1 to 1.2 kgfm}
9. Install hose (8), and install clamp (7).





Air conditioner condenser

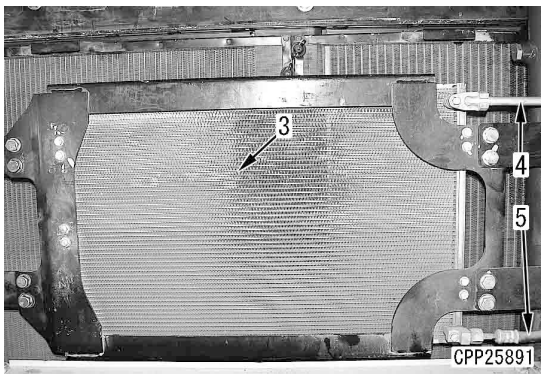
4. Disconnect air conditioner hose clamps (1) (2 places).



5. Remove bolts (8 pieces), disconnect air conditioner condenser (3) from the stay, and move it so that it does not hinder the work.

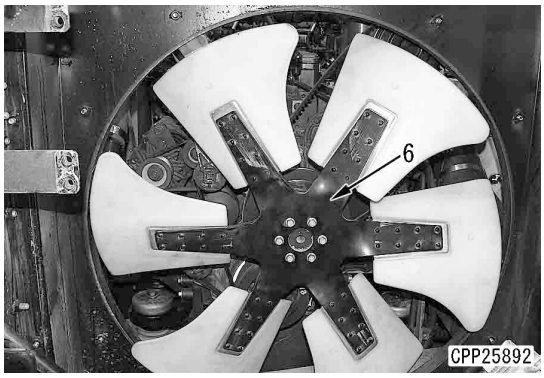
   REMARK

   When moving air conditioner condenser (3), be careful not to deform air conditioner hoses (4) and (5).



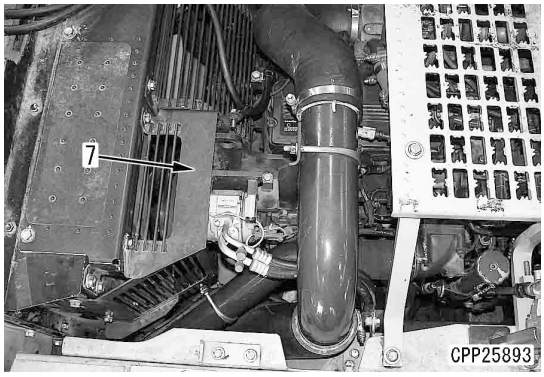
Fan

6. Remove fan (6).

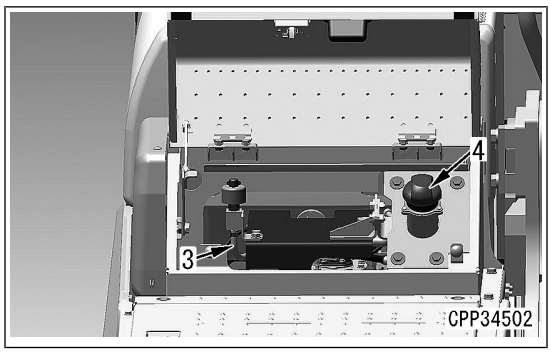


Air conditioner compressor

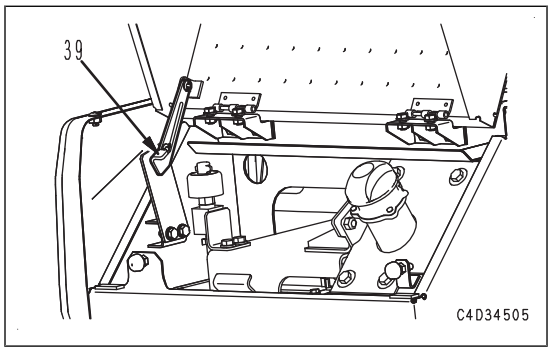
7. Remove fan guard (7).



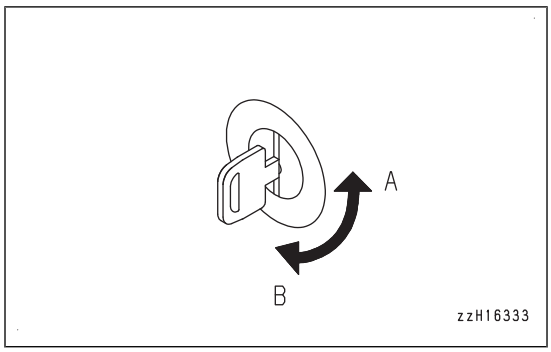
16. Install breather hose (3).



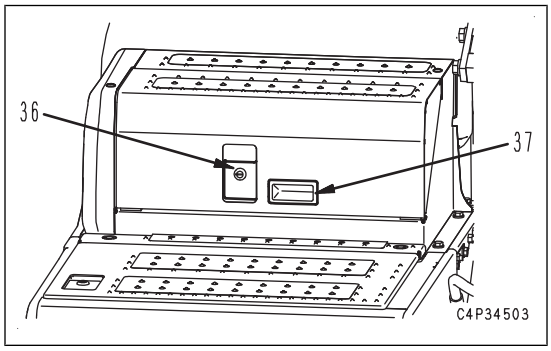
17. Unlock stay (39).
18. Hold rubber handle (37), and lower it.



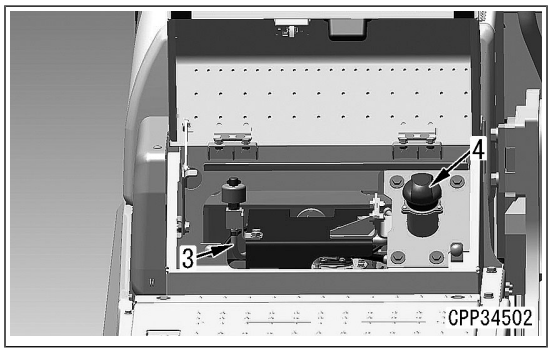
19. Insert the key and turn it clockwise.
    Position A: OPEN
    Position B: CLOSE (LOCK)



20. Remove the key from key slot (36).



21. Install breather hose (3).



REMOVE AND INSTALL SCR ASSEMBLY

Tools for removal and installation of SCR assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	-	Lifting tool	●	1			Removal and installation of SCR assembly
B	-	Digital angle gauge	●	1	N		For measurement of SCR inlet angle

⚠ Place the machine on a level ground, lower the work equipment to the ground so that it is stable, and set the lock lever to LOCK position, and then stop the engine.

⚠ Stop the engine, turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)

⚠ Since SCR is heated to 500 °C or above, be careful not to get burn injury.

⚠ Wait for the temperature of SCR to cool down before starting any work.

⚠ Check that no combustibles (dry leaves, twigs, etc.) are accumulated around SCR. Remove any dirt or combustible materials if they are found.

⚠ Since SCR is fragile against shock such as falling, handle it with care, and never use damaged part.

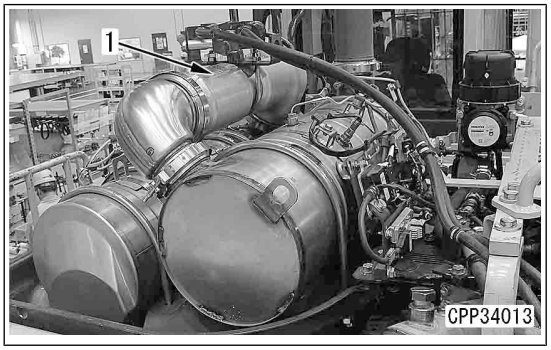
METHOD FOR REMOVING SCR ASSEMBLY

AdBlue/DEF mixing tube

1. Remove AdBlue/DEF mixing tube (1). For details, see "REMOVE AND INSTALL AdBlue/DEF MIXING TUBE".

   NOTICE

   Block the hole to avoid entry of foreign material or damage to the exhaust pipe.



REMOVE AND INSTALL AdBlue/DEF INJECTOR

Tools to be used when removing and installing AdBlue/DEF injector

Symbol		Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A		Commercially available	Vinyl gloves	●	1	N		Disconnection and connection of AdBlue/DEF hose
B		6540-71-1310	Cover for AdBlue/DEF injector electric connector	■	1	N		Removal and installation of AdBlue/DEF injector electric connector
C		600-919-5050	Plug (for 5/16 inch hose diameter)	■	1	N		Disconnection and connection of AdBlue/DEF hose
D	-	6540-71-1720	AdBlue/DEF injector cap kit	■	1	N		Removal and installation of AdBlue/DEF injector
	1	-	• AdBlue/DEF side cap	■	1	N		Disconnection and connection of AdBlue/DEF hose
	2	-	• Coolant side cap	■	2	N		Removal and installation of coolant hose
	3	-	• Injector side cap	■	1	N		Removal and installation of AdBlue/DEF injector

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

⚠ Stop the engine, turn the battery disconnect switch to OFF position, and remove the key. (For details, see TESTING AND ADJUSTING, "HANDLE BATTERY DISCONNECT SWITCH".)

METHOD FOR REMOVING AdBlue/DEF INJECTOR

GNSS antenna

1. Remove the L.H. GNSS antenna. See "REMOVE AND INSTALL GNSS ANTENNA".

Engine hood

2. Open the engine hood (1).

Sprocket

4. Install the sprocket. For details, see “REMOVE AND INSTALL SPROCKET”.

Bleeding air

5. Bleed air from the travel motor. For details, see TESTING AND ADJUSTING, “BLEED AIR FROM EACH PART”.

Refilling with hydraulic oil

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

   Hydraulic tank:

   248 ℓ

DISASSEMBLE AND ASSEMBLE IDLER ASSEMBLY

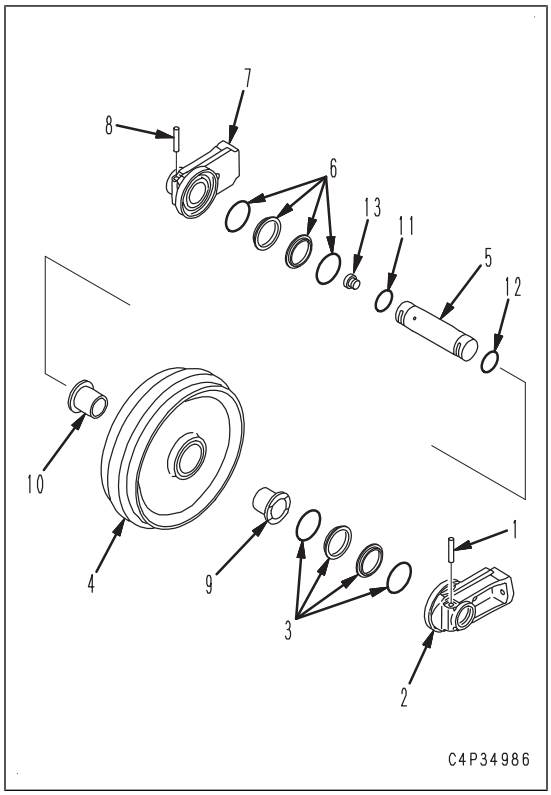
Tools for disassembling and assembling of idler assembly

Symbol	Part No.	Part name	Necessity	Q'ty	New/Redesign	Sketch	Remarks
A	791-530-1510	Installer	■	1			Installation of floating seal
B	791-101-5431	Plate	■	1			Press fit of bushing

METHOD FOR DISASSEMBLING IDLER ASSEMBLY

Support

1. Pull out dowel pin (1), and remove support (2).



Floating seal

2. Remove floating seal (3) from support (2) and idler (4).

Idler

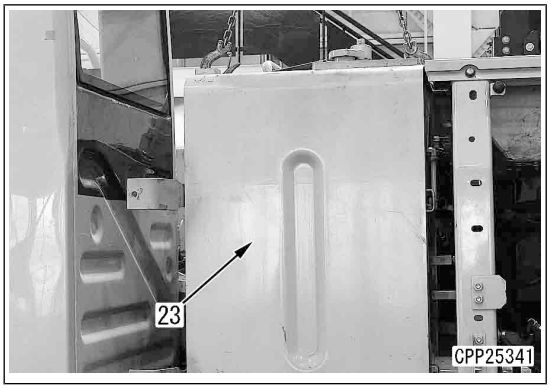
3. Pull out idler (4) from shaft (5) and support (7) assembly.

   REMARK

   Approximately 240±10 cc oil is filled and sealed. Drain it at this time or spread a cloth to keep the ground clean.

31. Sling the hydraulic tank assembly (23), and remove it.

Hydraulic tank assembly (23):
190 kg

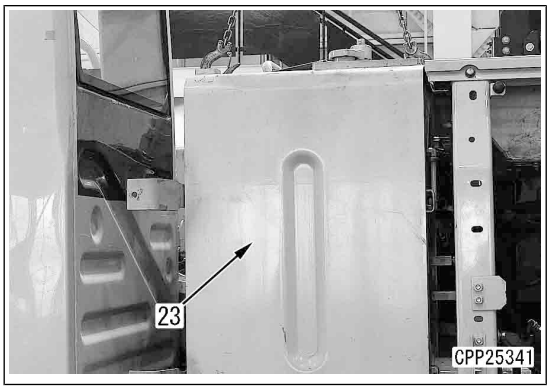


METHOD FOR INSTALLING HYDRAULIC TANK ASSEMBLY

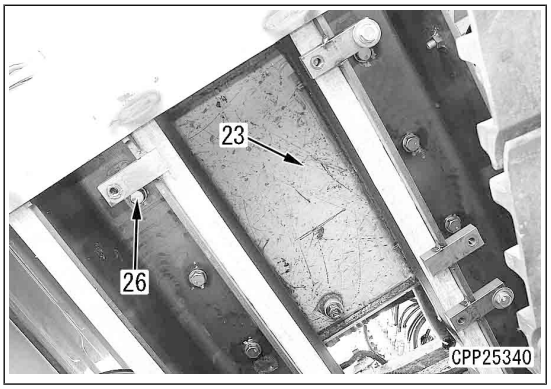
Hydraulic tank assembly

1. Sling and set hydraulic tank assembly (23) to the machine.

Hydraulic tank assembly (23):
190 kg

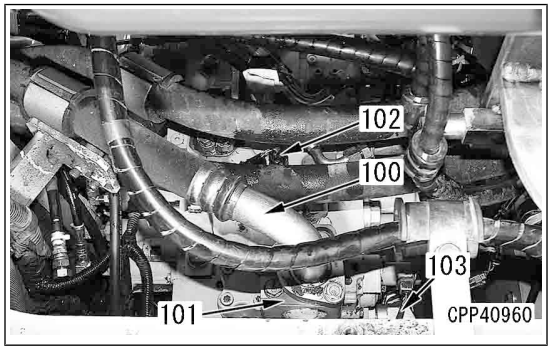


2. Sling hydraulic tank assembly (23), hold it, and install bolts (26) (6 pieces).

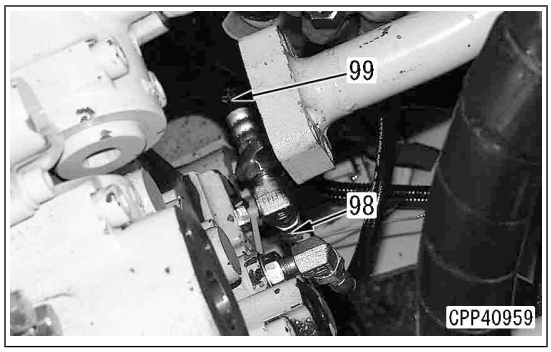


Solenoid valve hose

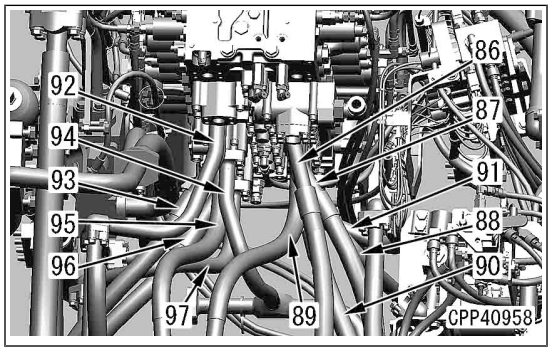
3. Connect the following connectors.
   - Connector (102): Rear pump pressure sensor (P26)
   - Connector (103): Variable back pressure EPC valve (V25)
4. Connect the hoses and tubes on the rear side of the control valve.
   - Hose (100): Port T
   - Tube (101): Port T (1ATT specification only)



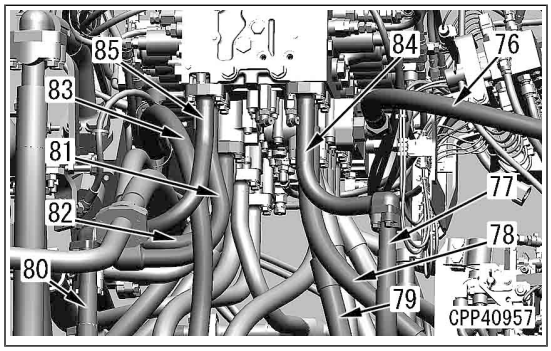
5. Connect the following hoses on the front side of the control valve.
   - Hose (98): Port TS(1ATT specification only)
   - Hose (99): Port TS



6. Connect the following hoses and tubes.
   - Hose (86): Port B1
   - Hose (87): Port B2
   - Tube (88): Port B3
   - Hose (89): Port B4
   - Hose (90): Port B5
   - Tube (91): Port B6
   - Tube (92): Port A1
   - Hose (93): Port A2
   - Tube (94): Port A3
   - Hose (95): Port A4
   - Hose (96): Port A5
   - Tube (97): Port A6



7. Connect the following hoses and tubes on the front side of the control valve.
   - Hose (76): Port T1
   - Hose (77): Port B-3
   - Hose (78): Port B-2
   - Hose (79): Port B-1
   - Hose (80): Port A-3
   - Hose (81): Port A-2
   - Hose (82): Port A-1
   - Hose (83): Port TSW
   - Tube (84): Port B-3
   - Tube (85): Port A-3

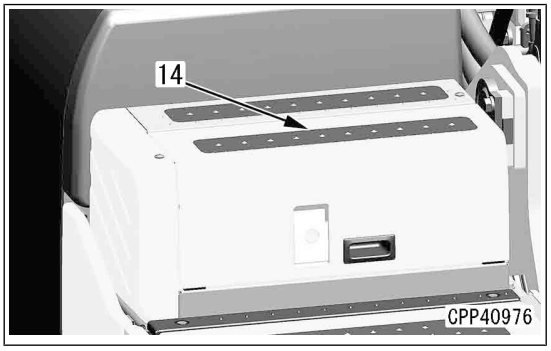


AdBlue/DEF case

20. Install AdBlue/DEF case (14). See “REMOVE AND INSTALL AdBlue/DEF TANK ASSEMBLY”.

    AdBlue/DEF case (14):

    35 kg



Refilling with oil

21. Refill with oil to the specified level through the oil filler port. Run the engine to circulate the oil through the piping. Then check the oil level again.

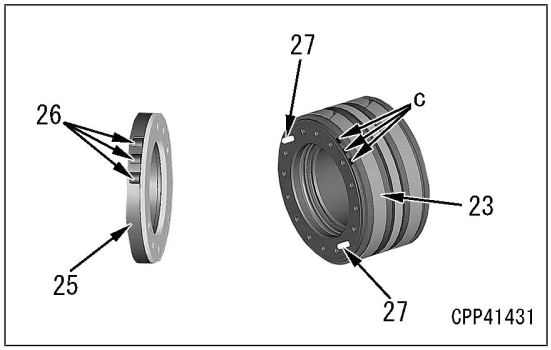
    Hydraulic tank:

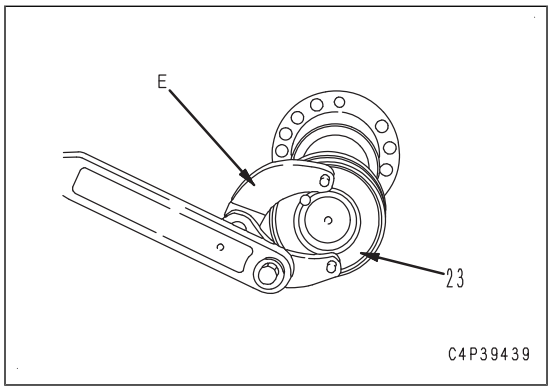
    188 ℓ (specified level365 ℓ, for the oil and grease, see “TABLE OF FUEL, COOLANT, AND LUBRICANTS”.)

Air bleeding

22. Bleed air from the hydraulic pump circuit. See TESTING AND ADJUSTING, “BLEED AIR FROM HYDRAULIC CIRCUIT”.

23. When reusing both of the piston rod (22) and piston assembly (23), install them according to the following procedure.
    1) Align the pin (27) with the hole of the magnet holder assembly (25) so that the magnet (26) is aligned with the mark position (c) to integrate the piston assembly (23) with the magnet holder assembly (25).
    2) Install the piston assembly (23) and magnet holder assembly (25) to the piston rod (22).
    3) By using the wrench assembly (E), tighten the piston assembly (23) until it stops.





    4) Loosen the piston assembly (23), and align the hole position in order to install the screw (24).

       REMARK

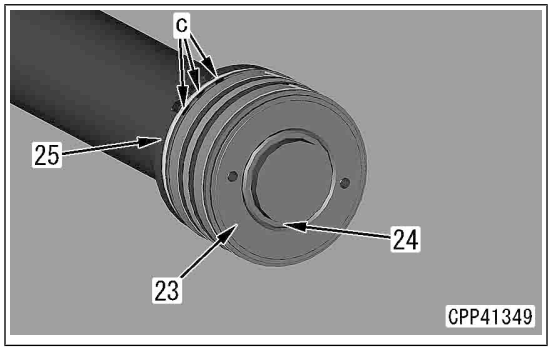
       • Do not loosen the piston assembly (23) too much.
    5) Install the screw (24), and fix the piston assembly (23).

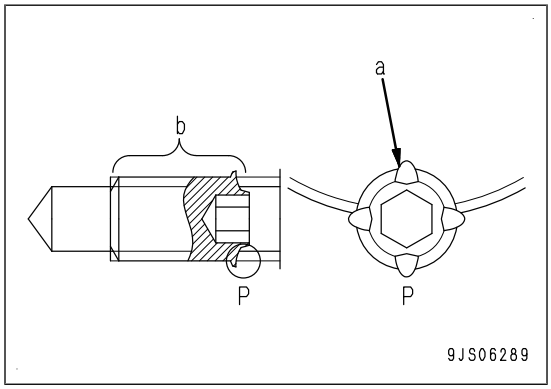
       Threaded portion of the screw (24):
       Liquid adhesive (Loctite No. 262 or equivalent)

       Screw (24):
       58.9 to 73.6 Nm {6 to 7.5 kgfm}

       NOTICE

       After installing the screw (24), punch the screw (24) at 4 peripheral places (a) to prevent it from removing.

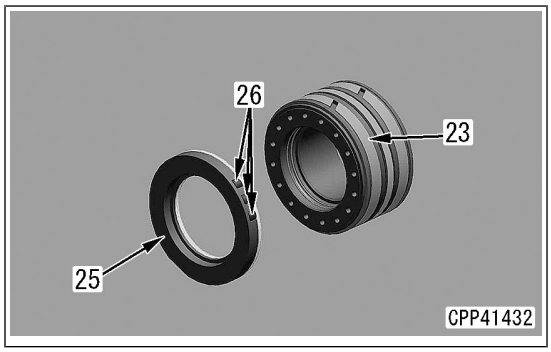




24. When replacing one or both of the piston rod (22) and piston assembly (23) with new ones, install the new ones according to the following procedure.
    1) Install the piston assembly (23) and magnet holder assembly (25) to the piston rod assembly (22).

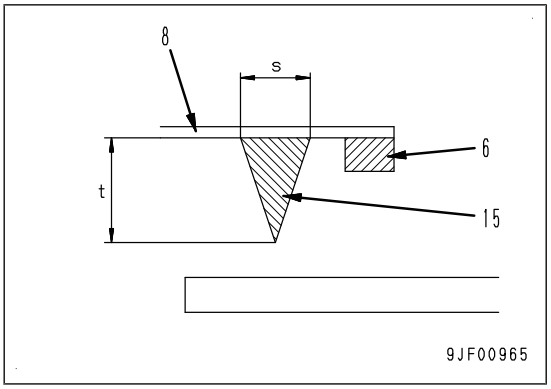
       REMARK

       Do not install the pin (27) yet.



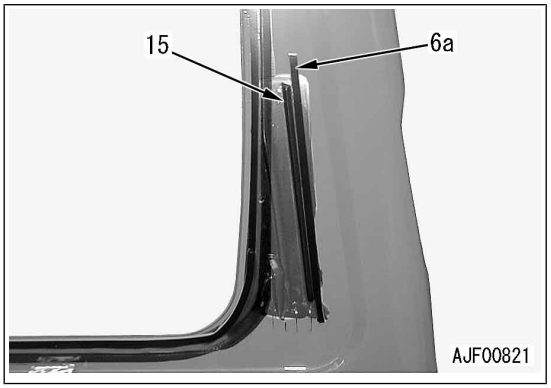
REMARK

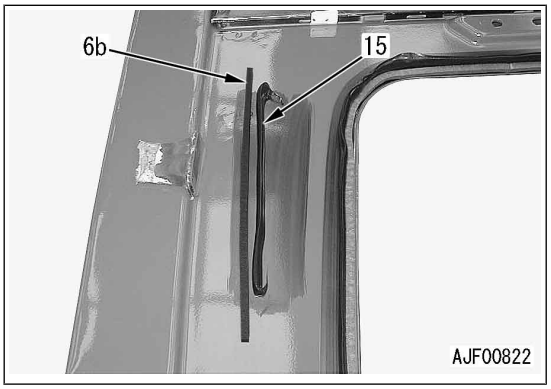
- Thickness of the applied adhesive (15) must be higher than that of the dam rubber (6).
- Height of the applied adhesive must be even.



REMARK

Also apply the adhesive (15) to the additional dam rubber (6a) of R.H. window glass and additional dam rubber (6b) of the door lower window glass.





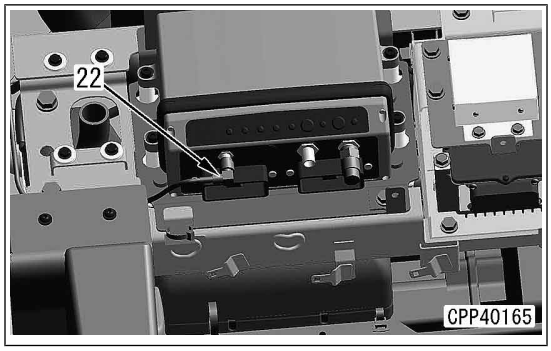
Glass

7. Install the glass.
   1) Install the glass (9) aligning it to the lines drawn on the tapes in the process of step 5.

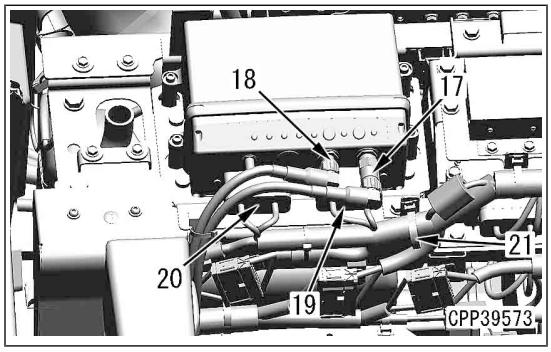
NOTICE

- **Since the glass cannot be removed and installed again, install it with utmost caution.**
- **Glass bonding work must be finished within 5 minutes from application of adhesive.**

37. Connect the connector (22) of GNSS receiver.
    Connector (22): GNSS built-in radio device antenna wiring harness AA39

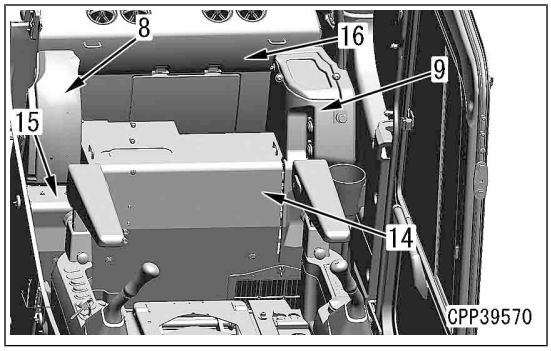


38. Bind it with the cable tie (21).
39. Connect the connectors (17), (18), (19), and (20) of GNSS receiver.
    Connector (17): GNSS antenna wiring harness NA11
    Connector (18): GNSS antenna wiring harness NA12
    Connector (19): Intermediate wiring harness CG01
    Connector (20): Intermediate wiring harness CG02
    Connectors (17) and (18):
    4.0 to 5.0 Nm {0.41 to 0.51 kgfm}
    Mounting bolt of connectors (19) and (20):
    2.83±0.28 Nm {0.29±0.03 kgfm}

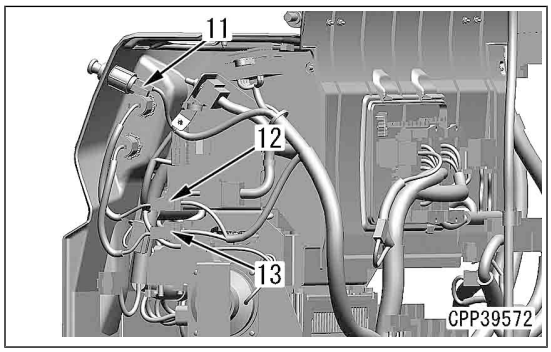


Cover, box

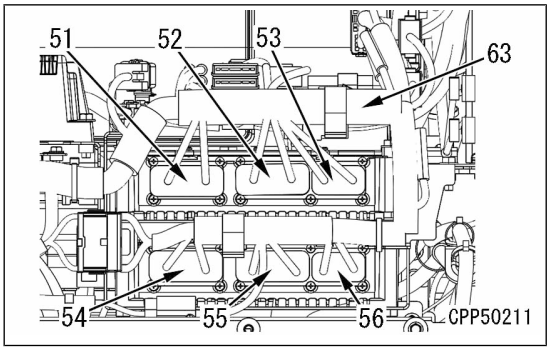
40. Install the cover (16) with the bolts (3 pieces).
41. Install the cover (15) with the bolts (3 pieces).
42. Install the cover (14) with the bolts (5 pieces).

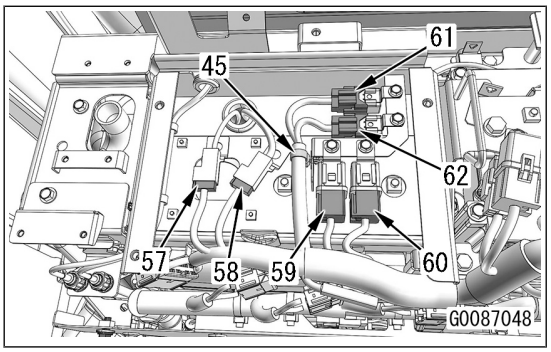


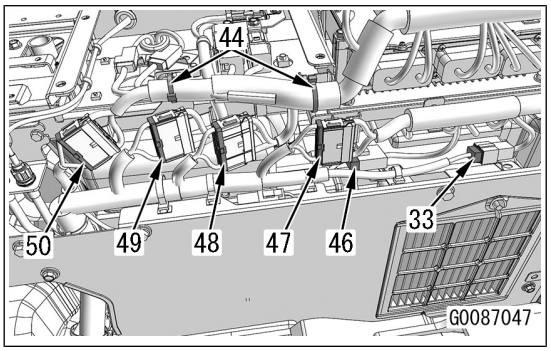
43. Install the box (8) with the bolts (5 pieces).
44. Connect the connectors (11), (12), and (13) on the back side of the cover (9).
    Connector (11): Cigarette lighter M04
    Connector (12): 12 V power socket intermediate wiring harness M13B
    Connector (13): 12 V power socket intermediate wiring harness M13A

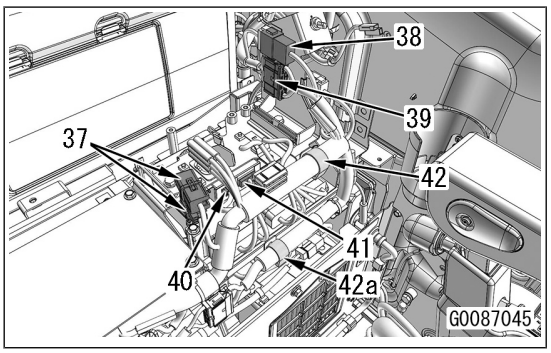


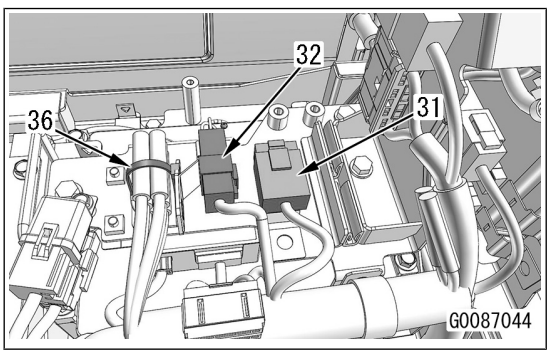
16. Install the wiring harness (63).
17. Connect the connectors (33), (46), (47), (48), (49), (50), (51), (52), (53), (54), (55), (56), (57), (58), (59), (60), (61), and (62).
    Connector (33): AA24
    Connector (46): AA19
    Connector (47): AA16
    Connector (48): AA22
    Connector (49): AA17
    Connector (50): AA27
    Connector (51): CW03
    Connector (52): CW02
    Connector (53): CW01
    Connector (54): CS03
    Connector (55): CS02
    Connector (56): CS01
    Connector (57): MA06
    Connector (58): KB01
    Connector (59): R62
    Connector (60): R59
    Connector (61): R35
    Connector (62): R60
    Connector (51), (52), (53), (54), (55), (56): 2.83±0.28 Nm {0.29±0.03 kgm}
18. Fasten the bands (44) (2 places) and (45).
19. Install the resin clips (42) and (42a).
20. Connect the connectors (38), (39), (40), and (41).
    Connector (38): AA18
    Connector (39): AA15
    Connector (40): MA08
    Connector (41): MA07
21. Install the relays (37) (2 pieces) with the bolt (M6).
22. Fasten the band (36).
23. Connect the connectors (31) and (32).
    Connector (31): S31
    Connector (32): AC88











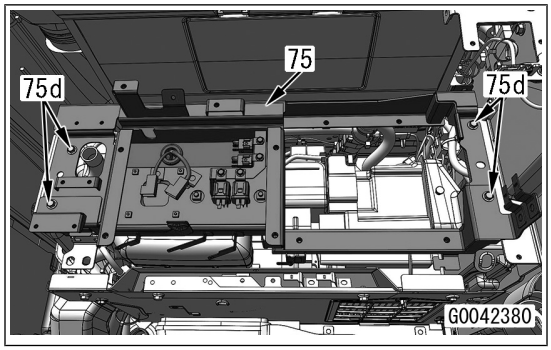
31. Remove the bolts (75d) (4 pieces), and remove the frame (75).

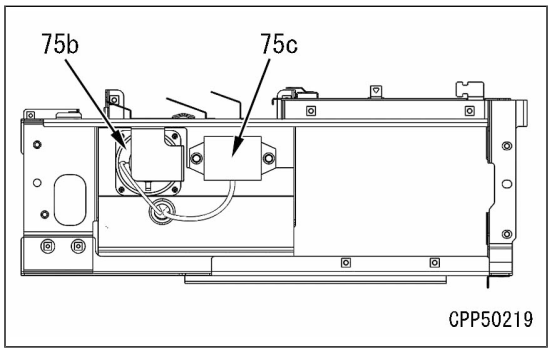
    NOTICE

    The speaker (75b) and resistor (75c) are installed at the back of the frame (75). When placing the frame (75), be careful not to damage them.

    Tool: Ratchet handle, socket

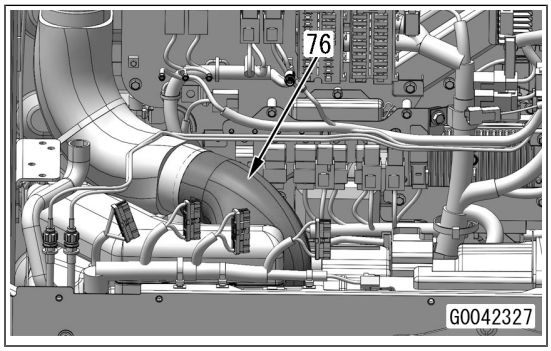
    Bolt (75d): Width across flats 12 mm, M8





Piping, connector

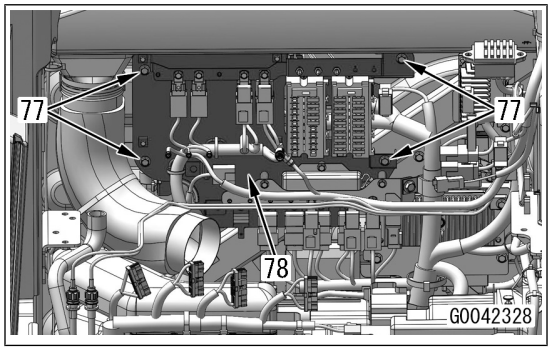
32. Remove the duct (76).



33. Remove the bolts (77) (4 pieces), and remove the plate (78).

    Tool: Ratchet handle, socket

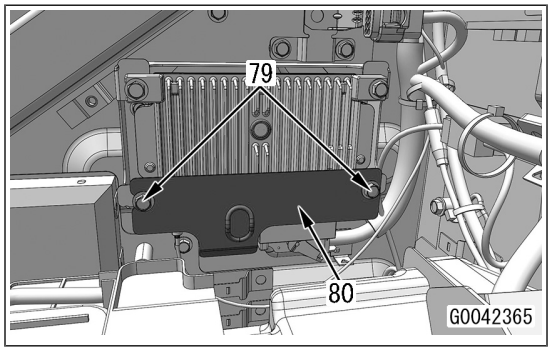
    Bolt (77): Width across flats 12 mm, M8



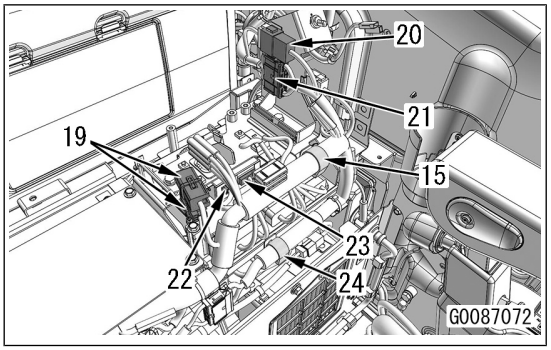
34. Remove the bolts (79) (2 pieces), and remove the plate (80).

    Tool: Ratchet handle, socket

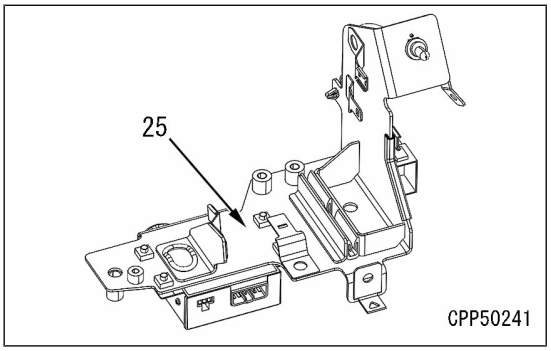
    Bolt (79): Width across flats 12 mm, M8



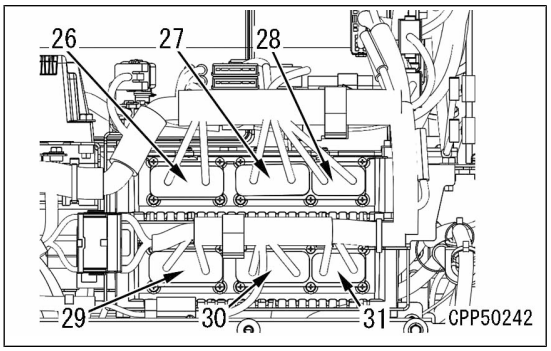
12. Remove the bolt (M6), and remove the relays (19) (2 pieces).
13. Disconnect the connectors (20), (21), (22), and (23).
    Connector (20): AA18
    Connector (21): AA15
    Connector (22): MA08
    Connector (23): MA07
14. Remove the resin clips (15) and (24).



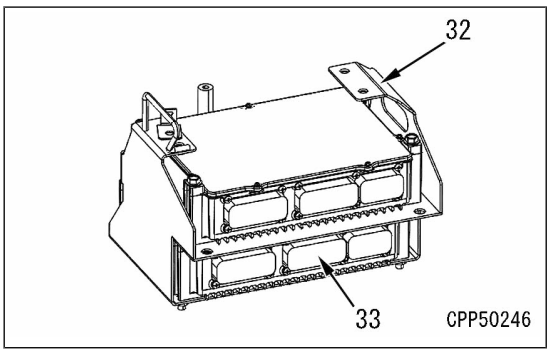
15. Remove the bolts (M8) (3 pieces), and remove the bracket (25).



16. Disconnect the connectors (26), (27), (28), (29), (30), and (31).
    Connector (26): CW03
    Connector (27): CW02
    Connector (28): CW01
    Connector (29): CS03
    Connector (30): CS02
    Connector (31): CS01



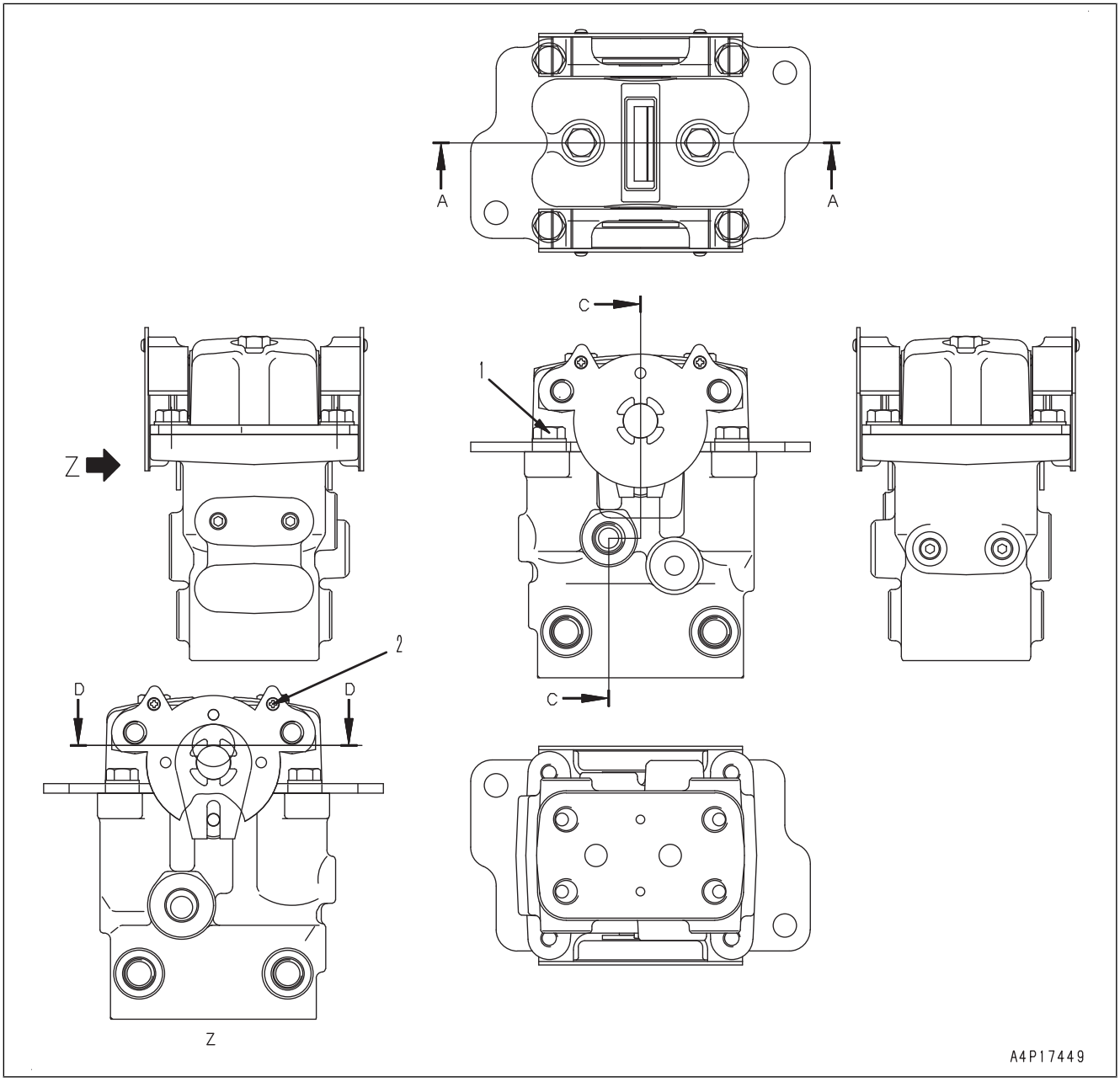
17. Remove the bolts (M8) (4 pieces), and remove the bracket (32).
18. Remove the bolts (M8) (4 pieces), and remove ICT sensor controller (33).



Unit: mm

No.	Item	Criteria		Remedy
1	Backlash between No. 1 planetary gear and No. 1 sun gear shaft	Standard clearance	Allowable clearance	Replace
		0.14 to 0.48	1.00	
2	Backlash between No. 1 planetary gear and ring gear	0.19 to 0.66	1.3	
3	Backlash between travel motor and No. 2 planetary carrier	0.06 to 0.25	-	
4	Backlash between No. 2 planetary gear and No. 2 sun gear	0.15 to 0.51	1.00	
5	Backlash between No. 2 planetary gear and ring gear	0.19 to 0.66	1.3	
6	Backlash between No. 1 planetary carrier and No. 2 sun gear	0.44 to 0.74	1.6	

MAINTENANCE STANDARD OF TRAVEL PPC VALVE



No.	Item	Criteria	Remedy
1	Tightening torque of bolt	27 to 34 Nm {2.8 to 3.5 kgfm}	Retighten
2	Tightening torque of bolt	0.441 to 0.588 Nm {0.045 to 0.06 kgfm}	

OUTLINE OF REFRIGERATION CYCLE

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

Compression (Compressor)

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

Condensation (Condenser)

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

Expansion (Expansion valve)

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

(*1) Throttle action

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

Evaporation (Evaporator)

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

INFORMATION DESCRIBED IN TROUBLESHOOTING TABLE

The following types of information are described in the troubleshooting table and related circuit diagram. Fully understand the description and perform troubleshooting.

Failure	Problem on machine
Related information	Information related to the occurred failure and its troubleshooting

No.	Cause	Procedure, measuring location, criteria, and remarks
1	Probable causes for trouble	[Details] • Procedure • Measuring point “Between A and B” denotes measuring values such as voltage and resistance, etc. between A and B. • Criteria to judge probable causes (standard value), remarks [Precautions for troubleshooting] (1) Connector number description sequence and tester lead handling For troubleshooting, connect the positive (+) and negative (-) leads of a multimeter as shown below unless otherwise specified. • Connect the positive (+) lead to pin or wiring harness indicated in the front. • Connect the negative (-) lead to a pin or wiring harness indicated in the rear. (2) Example of troubleshooting by check of multiple items • Normal in 1 but abnormal in 2 At that time, the description is made as “Defective ---” as shown on the left.
2		
3	Defective ---	

[Failures in wiring harness]

- Open circuit
  Connection of connector is defective or wiring harness is broken.
- Ground fault
  A wiring harness not to be connected to the GND (ground) circuit comes to contact with the GND (ground) circuit or chassis.
- Hot short circuit
  A wiring harness not to be connected to the power supply circuit comes to contact with the power supply circuit.
- Short circuit
  An independent wire in the wiring harness abnormally comes into contact with one of other wires. (Defective insulation in connector, etc.)