

Shop Manual

HYDRAULIC
EXCAVATOR

PC210i -10
PC210LCi-10

SERIAL NUMBERS 451080 and up

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How to read the shop manual (ALL-0320-010-A-01-A)

(Rev. 2012/10)

- Some attachments and optional parts described in this shop manual may not be arranged for certain areas. Contact your Komatsu distributor if one or some of them are required.
- Materials and specifications are subject to change without notice.
- The shop manuals are available for "Machine part" and "Engine part". For the engine, see the shop manual for the same model of the engine as the one which is mounted on the machine.

Composition of shop manual

- This shop manual describes the technical information required for the services performed in a workshop. The shop manual is divided into the following chapters for the convenience of use.

00. Index and foreword

- This section includes the index, foreword, safety and basic information.

01. Specification

- This section explains the specifications of the machine.

10. Structure and function

- This section explains the structure and function of the machine. The section of "Structure and function" serves not only to give an understanding for the structure of each component, but also serves as reference material for troubleshooting.

20. Standard value table

- The standard values for a new machine and trouble shooting are indicated. This standard value table is used for testing and adjusting, and determining a failure at troubleshooting.

30. Testing and adjusting

- This section describes the measuring tools and how to measure, and how to adjust various parts. As for the standard value and failure criterion, see the standard value table.

40. Troubleshooting

- This section describes the troubleshooting in a suspected area when a failure occurs and the remedy for the failure. Troubleshooting is described by each failure mode.

50. Disassembly and assembly

- This section explains the procedures for removing, installing, disassembling, and assembling each part or component and the special tools for the works as well as precautions for doing them safely. In addition, tightening torque, and quantity and weight of coating material, oil, grease, and coolant required for the works are also explained.

60. Maintenance standard

- This section describes the maintenance standard values for each component. This section gives the criterion values for each component and required remedy at disassembly or maintenance.

80. Appendix

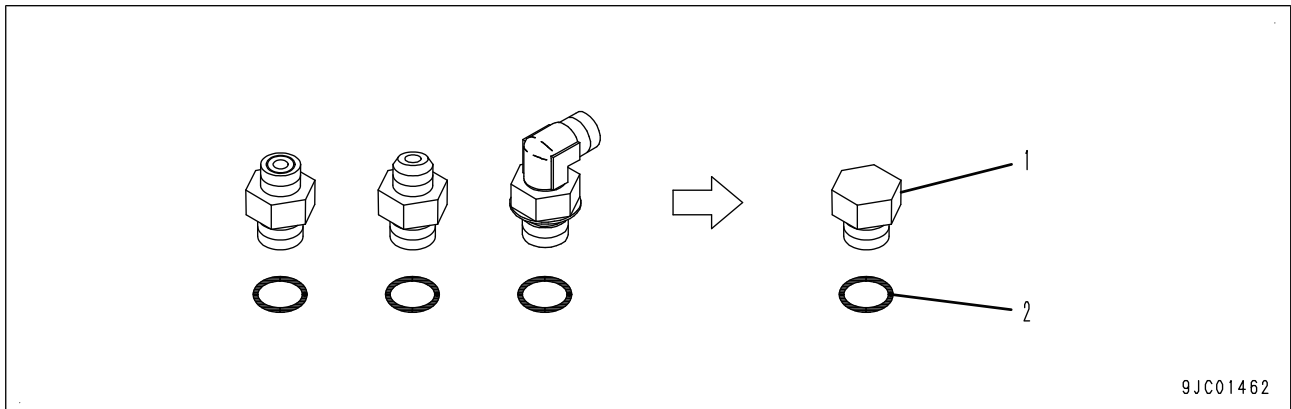
- The structure and function, testing and adjusting, and troubleshooting for all of the other components or equipment which can not be separately classified are explained together in the appendix.

90. Diagrams and drawings

- This section gives hydraulic circuit diagrams and electrical circuit diagrams.

Nominal No.	Bolt pitch (mm)		Hose side Flange (1)	Tube side		O-ring (4)	Bolt (5)	Washer (6)
	a	b		Split flange (2)	Sleeve head (3)			
	79.4	36.5	07379-01470	07371-51470	07378-11410	07000-13048	01010-81455	01643-31445
20	77.8	42.8	07379-02071	07371-32076	07378-12000	07000-12060	07372-51240	01643-51232
	96.8	44.5	07379-02080	07371-52080	07378-12010	07000-12060	01010-81865	01643-31845
24	88.9	50.8	07379-02484	07371-12484	07378-12400	07000-12070	07372-51240	01643-51232
30	106.4	62	07379-03010	07371-13010	07378-13000	07000-12085	07372-51650	01643-51645
34	120.6	69.8	07379-03411	07371-13411	07378-13400	07000-12100	07372-51650	01643-51645
40	130.2	77.8	07379-04012	07371-14012	07378-14000	07000-12110	07372-51650	01643-51645
50	152.4	92	07379-05011	07371-15011	07378-15000	07000-12135	07372-51655	01643-51645

Removal of pipe joints of O-ring boss type

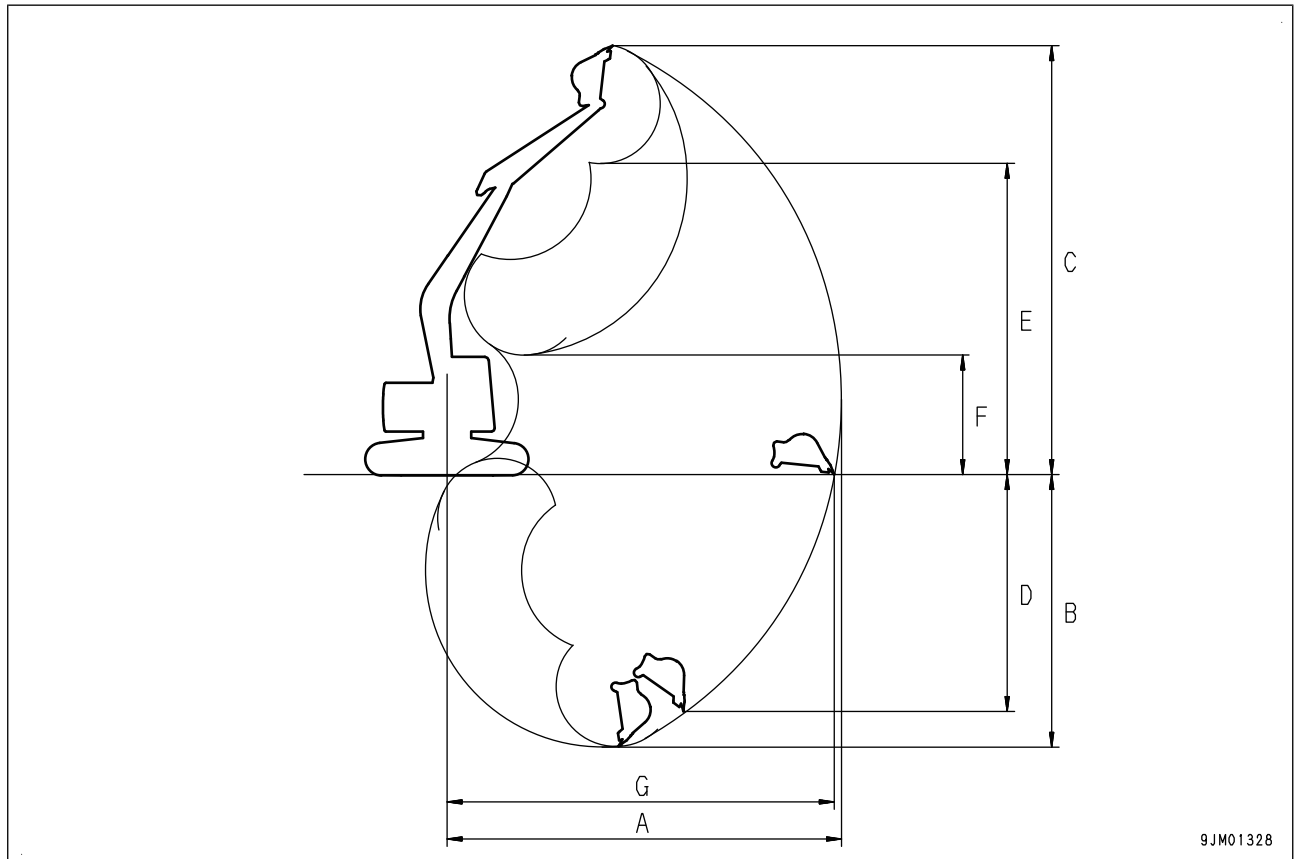


Nominal No.	Plug (1)	O-ring (2)
08	07040-10807	07002-10823
10	07040-11007	07002-11023
12	07040-11209	07002-11223
14	07040-11409	07002-11423
16	07040-11612	07002-11623
18	07040-11812	07002-11823
20	07040-12012	07002-12034
24	07040-12412	07002-12434
30	07041-13012	07002-13034
33	07040-13316	07002-13334
36	07041-13612	07002-13634
42	07040-14220	07002-14234
52	07040-15223	07002-15234

Removal of pipe joints of taper pipe thread type

Working range drawings (ALL-2110-001-A-02-A)

PC210I-10 (PC200 ICT-2110-931-A-03-A)

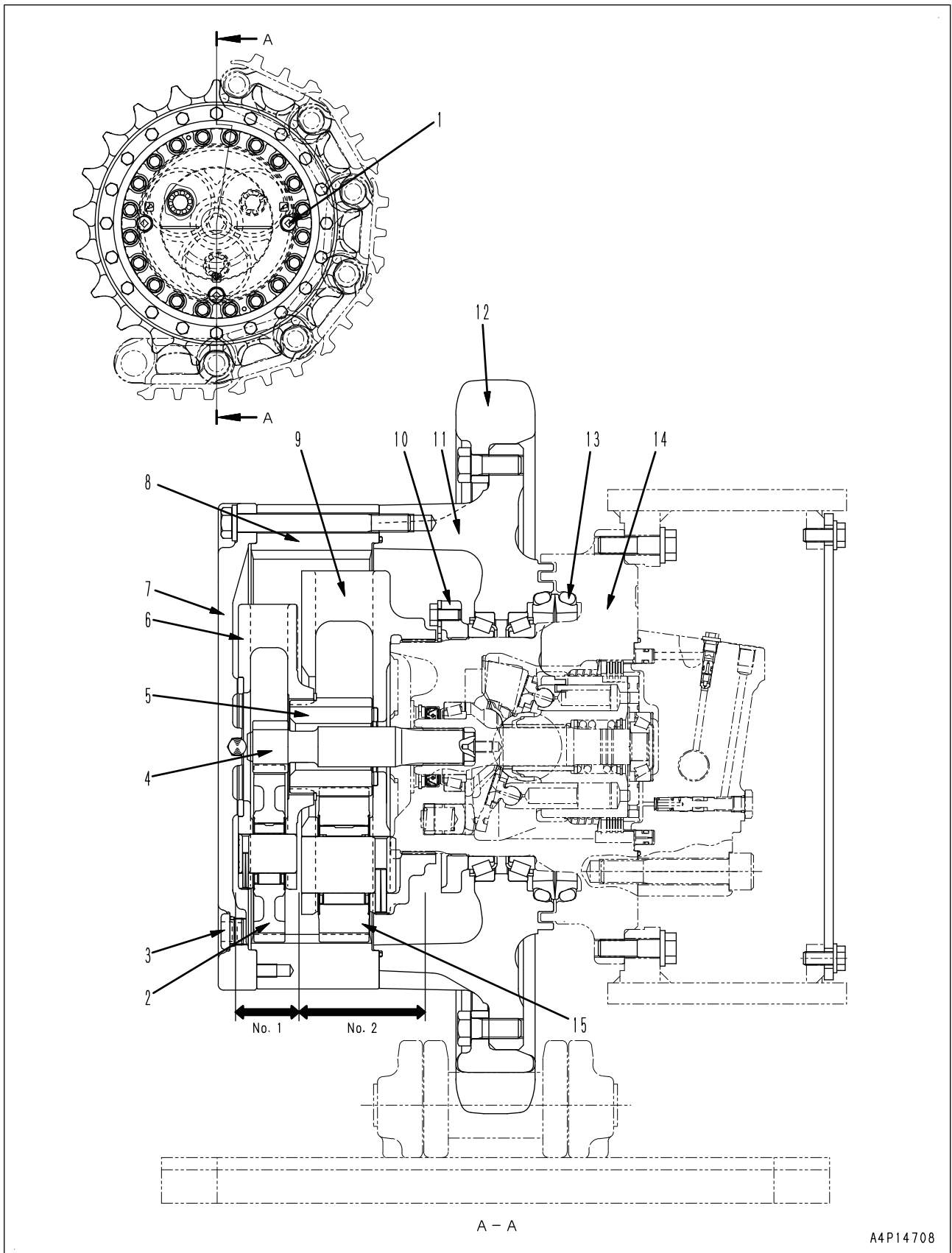


	Item	Unit	PC210I-10
A	Max. digging reach	mm	9,875
B	Max. digging depth	mm	6,620
C	Max. digging height	mm	9,970
D	Max. vertical wall digging depth	mm	5,980
E	Max. dumping height	mm	7,110
F	Min. dumping height	mm	2,645
G	Max. digging reach at ground level	mm	9,700

Cooling

- Coolant from the cylinder block enters the center housing to cool the KVG.
- Coolant return flows from the center housing and joins the flow at the EGR cooler outlet piping, then flows through the water inlet connector to the water pump.

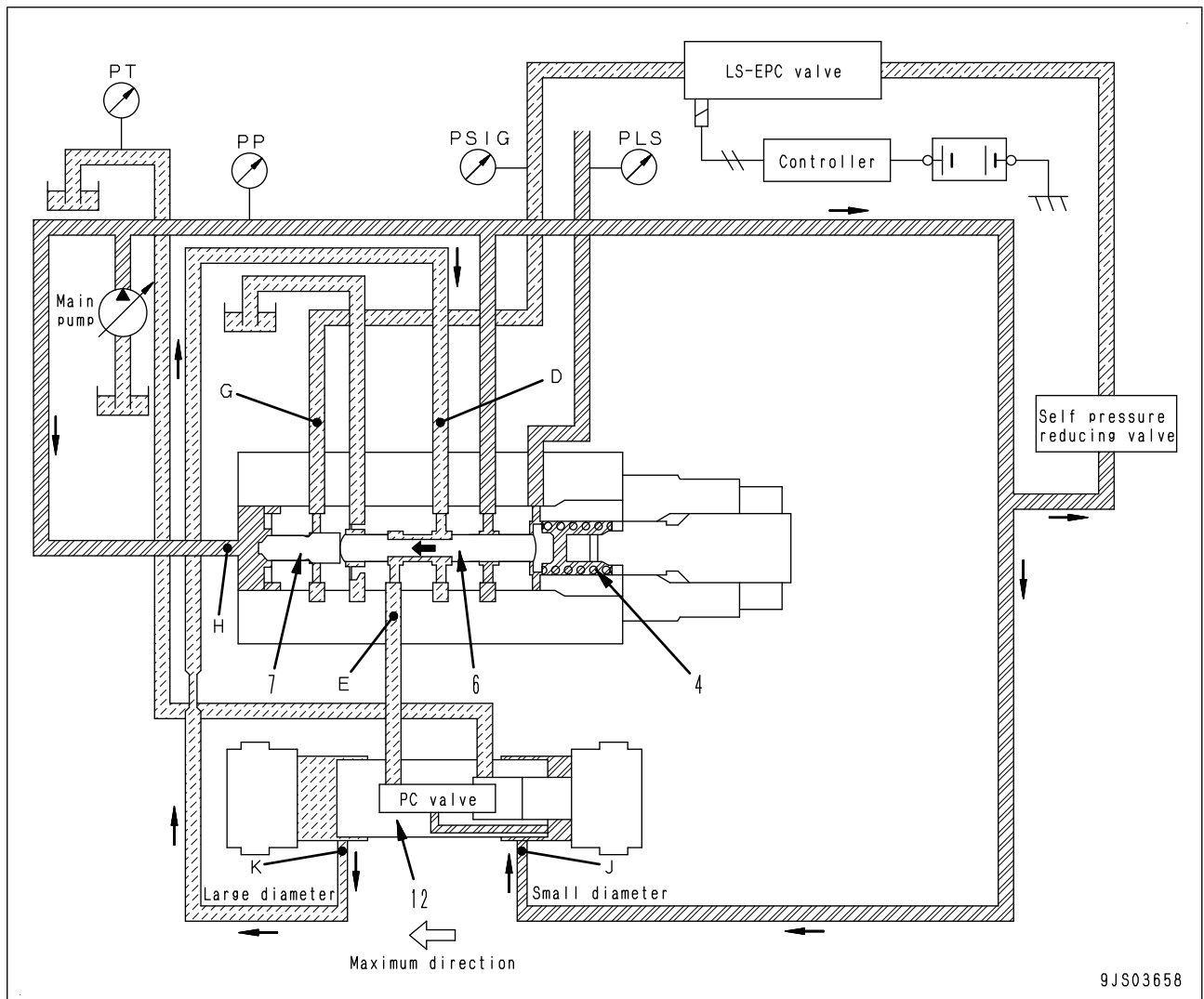
Final drive (PC220-DF10-041-K-00-A)



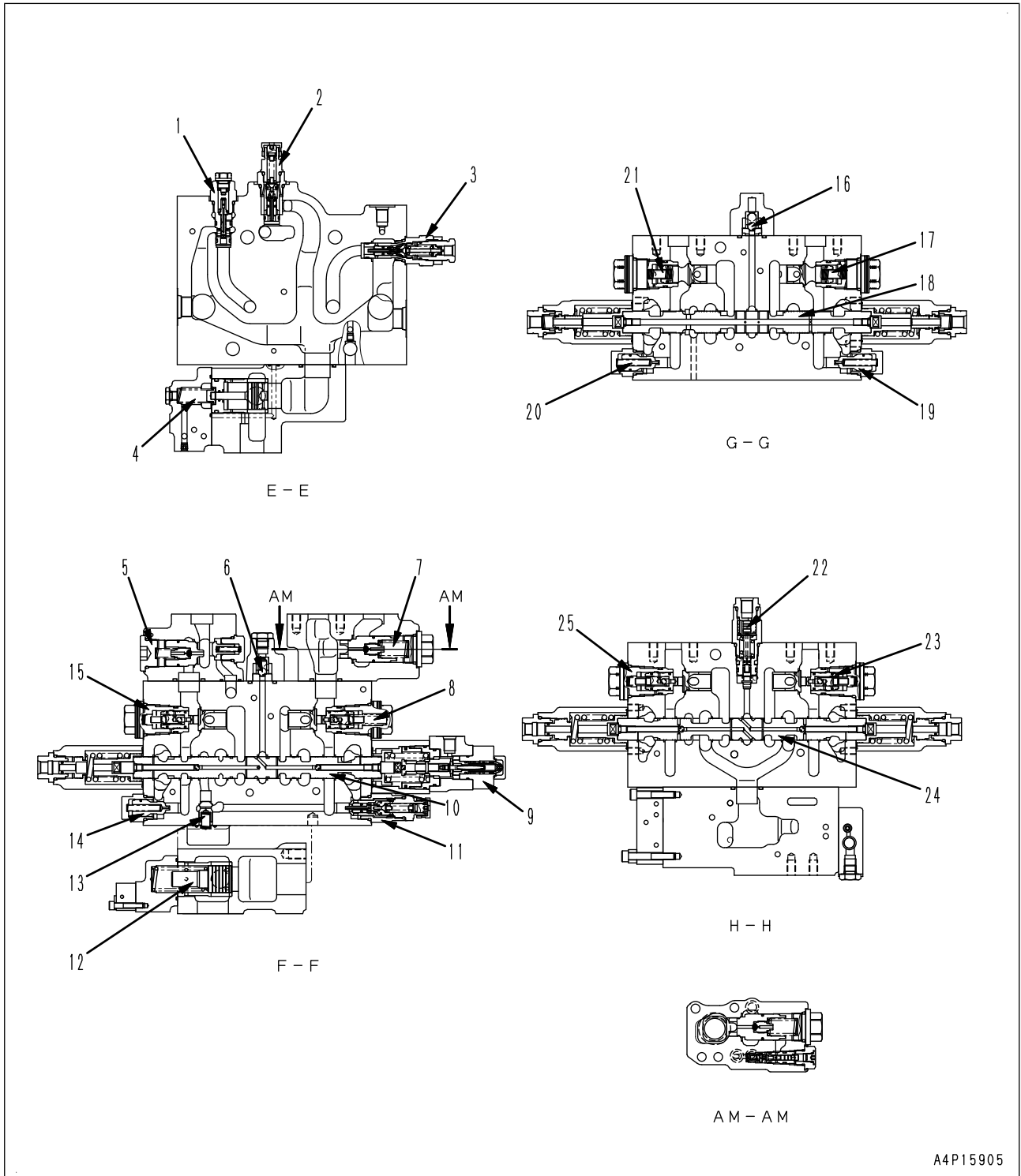
A4P14708

- 1. Level plug
- 2. No. 1 planetary gear (number of teeth: 42)
- 3. Drain plug

When pump delivery is increased



- When the difference between pump delivery pressure (PP) and LS pressure (PLS), in other words, LS differential pressure (ΔPLS) decreases (for example, when the control valve opening area increases and pump delivery pressure (PP) decreases), the combined force exerted by LS pressure (PLS) and spring (4) pushes spool (6) to the left.
- As spool (6) moves, ports (D) and (E) are interconnected and also connected to the PC valve.
- Since the PC valve and drain port are connected, the pressure between ports (D) and (K) becomes drain pressure (PT). (PC valve operation will be explained later.)
- The pressure on the large diameter piston side of servo piston (12) becomes drain pressure (PT), and pump pressure (PP) is constantly transmitted to port (J) on the small diameter end. Accordingly, servo piston (12) is pushed to the left and the swash plate is moved to increase the discharged volume.
- At this time, when the output pressure from the EPC valve for the LS valve is transmitted to port (G), a force is applied on piston (7) to move the piston to the right.
- If piston (7) is pushed to the right, setting force of spring (4) is weakened, changing the LS differential pressure (ΔPLS) [Difference between oil pressures (PLS) and (PP)] when ports (D) and (E) of spool (6) are connected.



1. Unload valve
- 2: Safety valve for hydraulic drift prevention valve (boom RAISE and arm DUMP)
3. Main relief valve
4. Variable back pressure valve

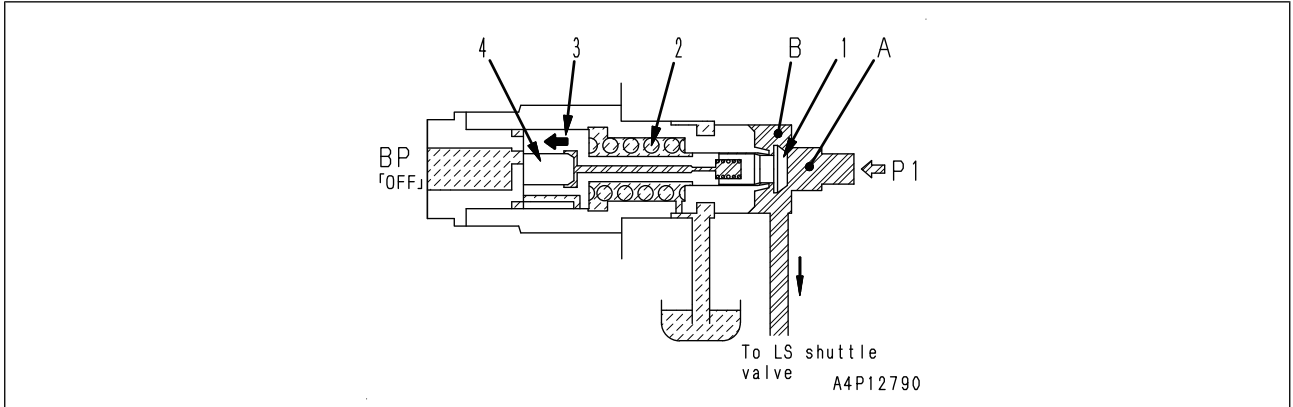
Arm valve

5. Arm hydraulic drift prevention valve (*1)
6. LS shuttle valve
7. Arm quick return valve
8. Pressure compensation valve (arm IN)

Operation (ALL-J6PA-044-K-00-A)

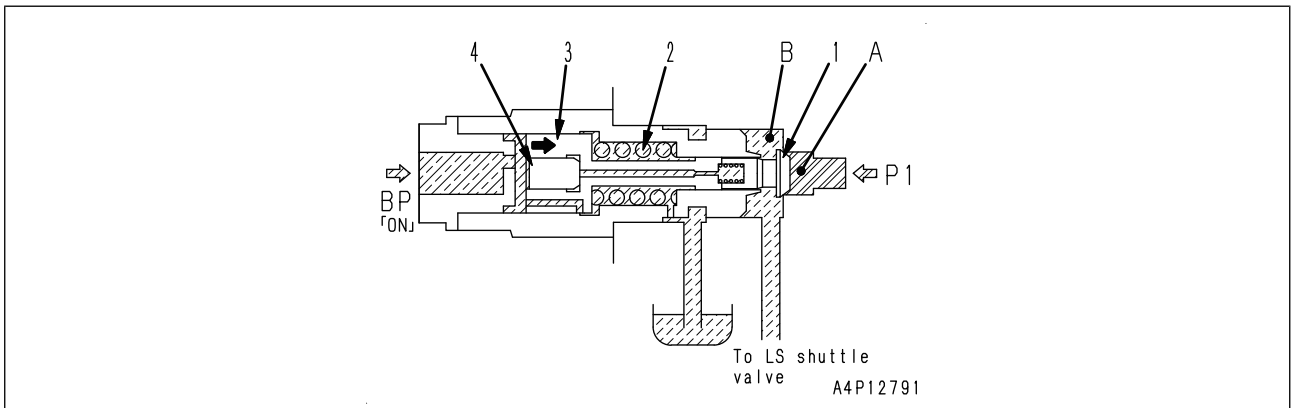
When pilot pressure (BP) is shut off

- Since pilot pressure (BP) is shut off, piston (3) is pressed to the left by force of spring (2).
- If the swing lever is moved, swing LS pressure (P1) passing through swing spool (5) enters port (A).
- Swing LS pressure (P1) presses valve (1) to the left, and port (A) and port (B) are interconnected.
- Swing LS pressure (P1) is transmitted from port (A) to LS shuttle valve (8) through port (B).



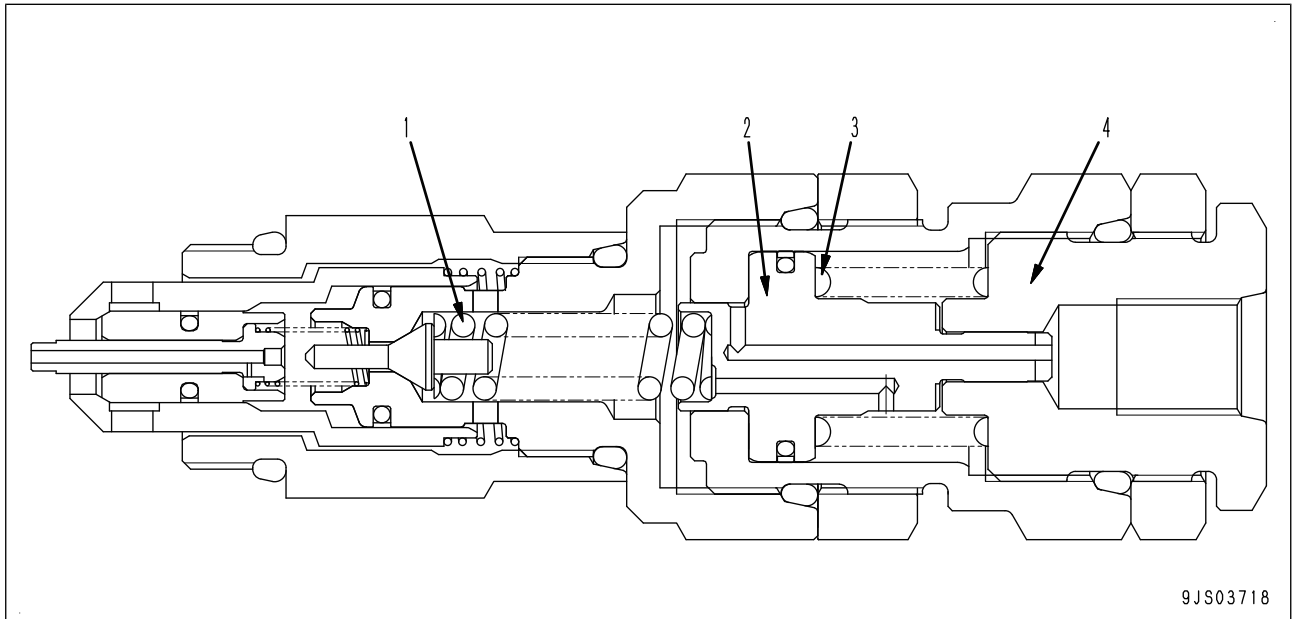
When pilot pressure (BP) is supplied

- When pilot pressure (BP) is supplied, pilot pressure (BP) moves piston (3) to the right against the force of spring (2).
- When piston (3) moves to the right, valve (1) disconnects ports (A) and (B).
- Since ports (A) and (B) are disconnected, swing LS pressure (P1) is not transmitted to LS shuttle valve (8).
- Swing LS pressure (P1) cannot affect other LS circuits, even if it rises.



2-stage suction-safety valve (PC220-PQJ2-041-K-00-A)

[Installed to port (B) of the service valve]



9JS03718

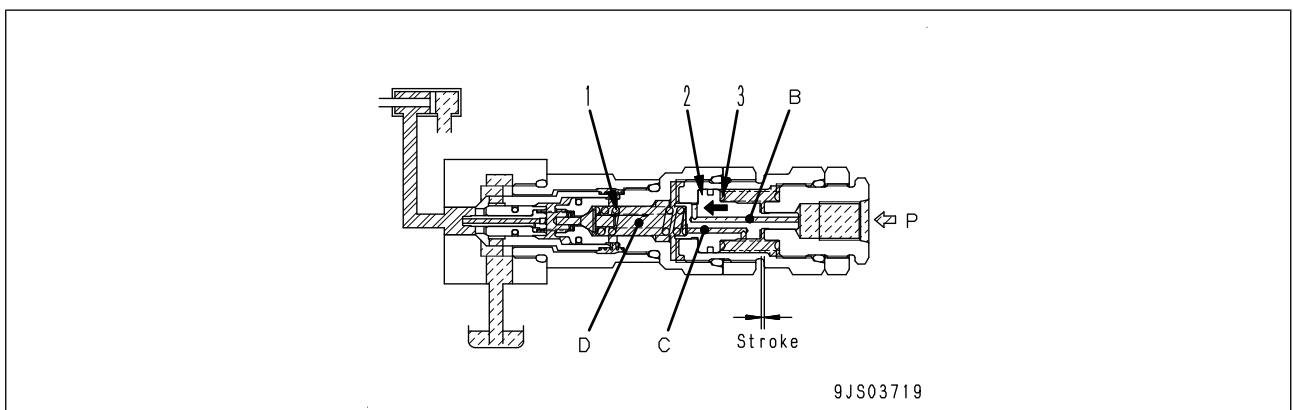
1. Spring
2. Piston
3. Spring
4. Holder

Function (PC220-PQJ2-042-K-00-A)

- This valve has two settings for its set pressure.
- This valve is set to the low-pressure setting when the pilot pressure is applied to it from the attachment circuit selector solenoid valve.
- ON/OFF of the pilot pressure changes the set pressure according to the type of the installed attachment (breaker, crusher, etc.).
- The set pressure of this valve is determined by the load at installed length of spring (1). (High-pressure side)
- The set pressure of the low-pressure setting is determined by the travel of the piston.

Operation (ALL-PQJ2-044-K-00-A)

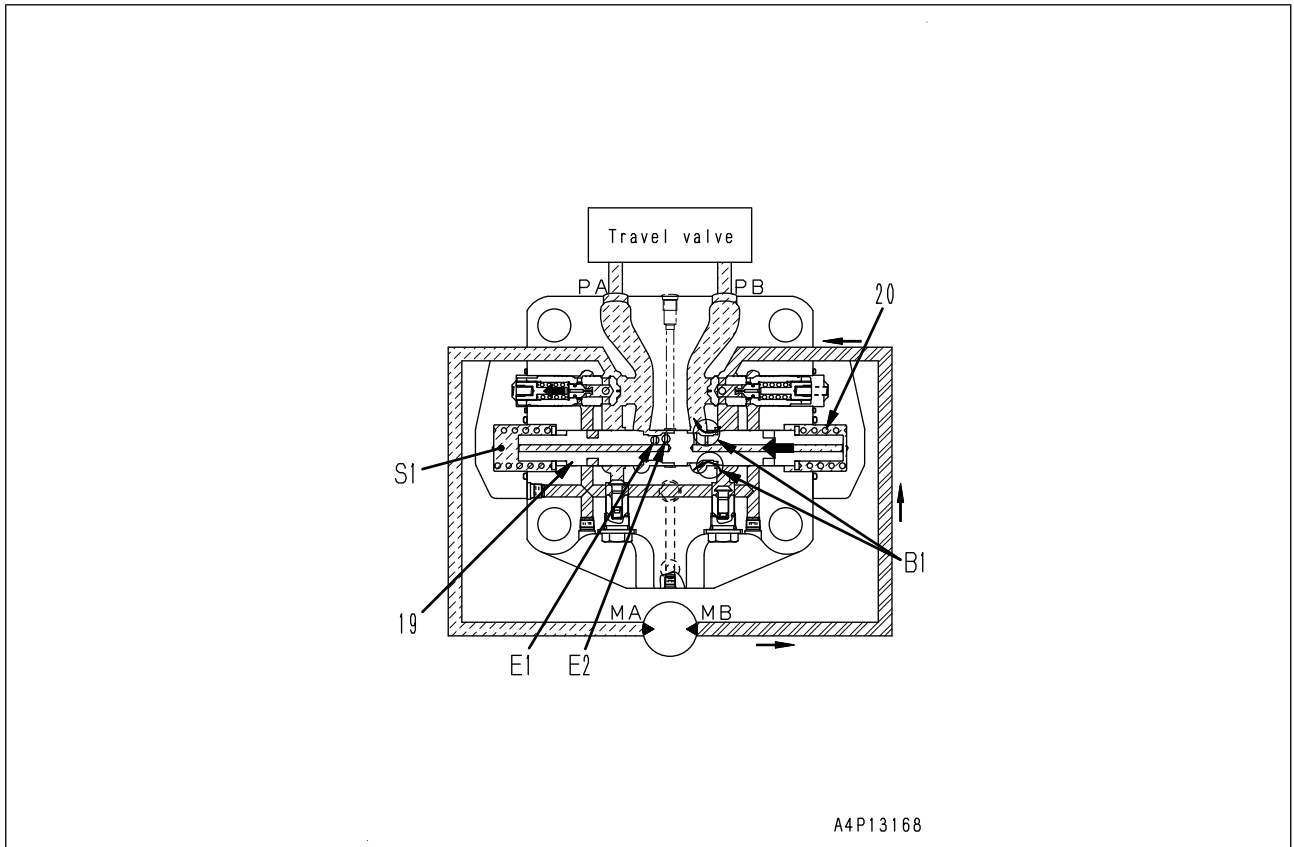
When pilot pressure (P) is shut off (high pressure setting)



9JS03719

- Since pilot pressure (P) is shut off, piston (2) is pressed to the left by force of spring (3). [Load at installed height of spring (1) < Load at installed height of spring (3).]

Braking while travelling downhill

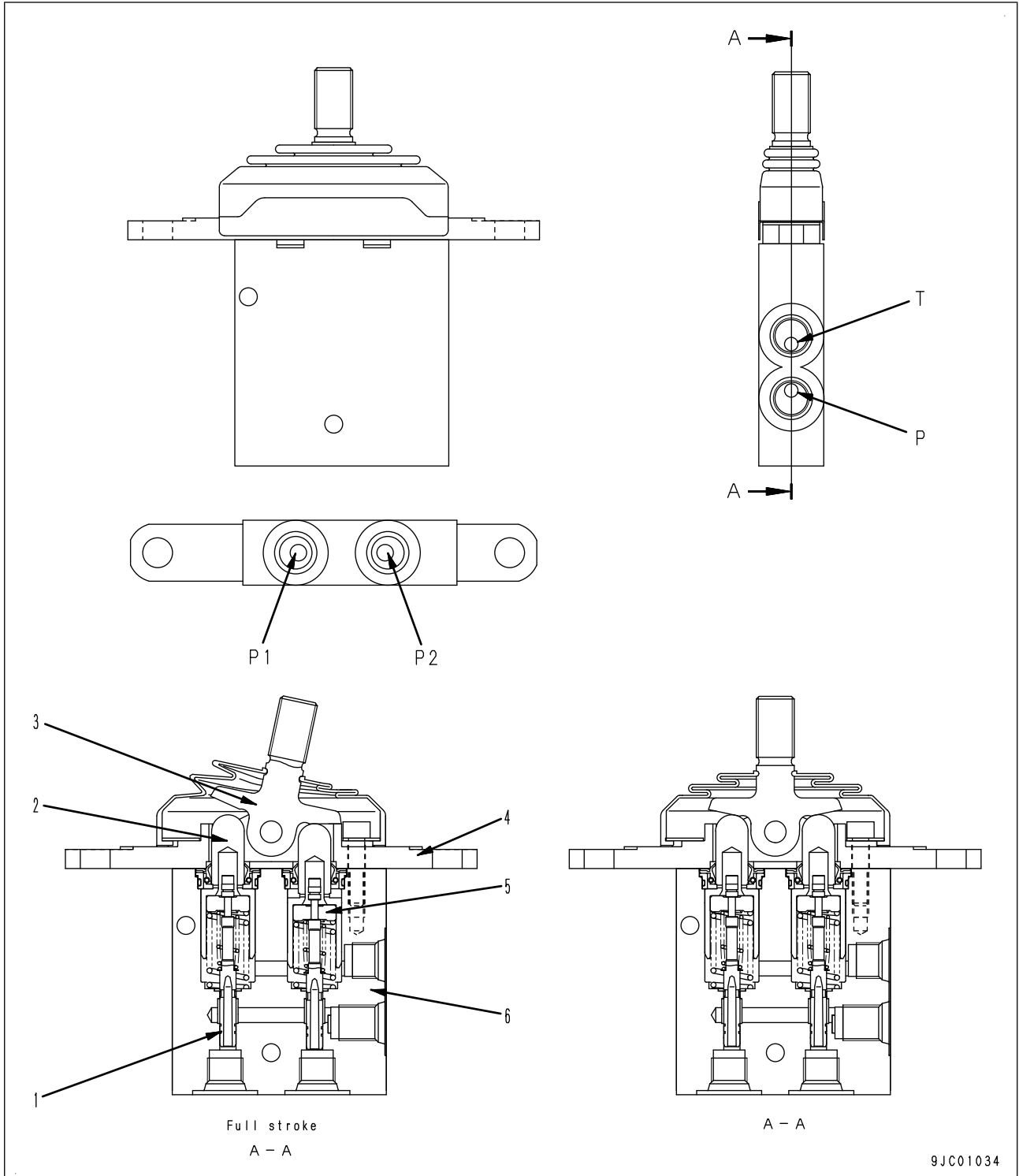


- When the machine almost run out of control during downhill travel, the motor runs idle and the pressure of the inlet side circuit decreases.
- The pressure in chamber (S1) decreases through orifices (E1) and (E2).
- When the pressure in chamber (S1) becomes lower than the spool selector pressure, spool (19) is returned to the left by the reaction force of spring (20) and outlet passage (B1) is throttled.
- The pressure of the motor outlet side circuit increases and rotational resistance is generated in the motor, preventing the machine from running out of control.
- Spool (19) moves to a position where the two forces acting on the spool balance with each other; one is the force exerted by the pressure in the motor outlet port and the other is the sum of the force due to machine's own weight and the force exerted by the pressure in the motor inlet port.
- Narrowing down the motor outlet side circuit in this way allows the machine to travel at a speed that matches the pump discharged volume.

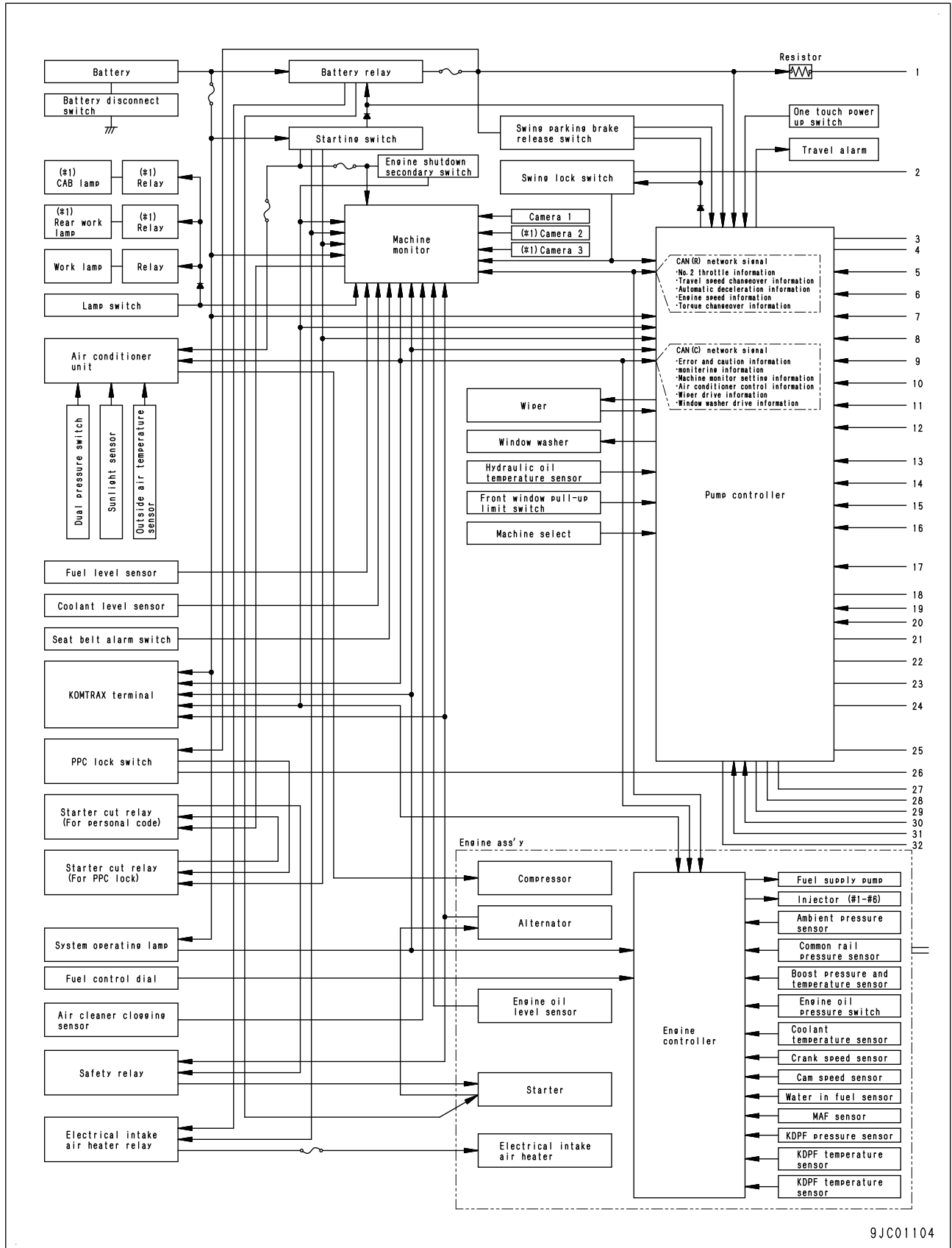
2nd-line attachment PPC valve (PC-PL2A-041-K-00-A)

(Machines ready for installation of attachment)

- ★ PPC: Abbreviation for Proportional Pressure Control
- ★ For details of operation, see "Work equipment and Swing PPC valve".

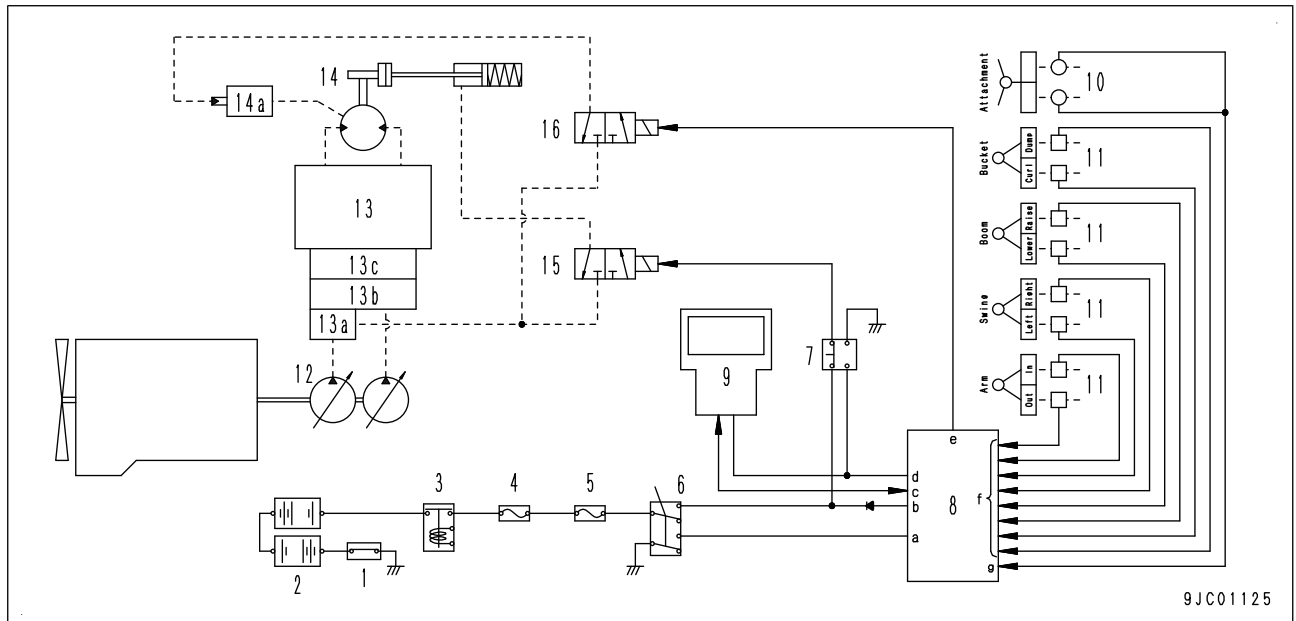


- P: From self-pressure reducing valve
- P1: To control valve (service valve 2 port)
- P2: To control valve (service valve 2 port)
- T: To hydraulic tank



9JC01104

Swing control function (PC-JA01-042-K-01-A)



1. Battery disconnect switch
2. Battery
3. Battery relay
4. Fusible link
5. Fuse box
6. Swing brake cancel switch
7. Swing lock switch
8. Pump controller
9. Machine monitor
10. Oil pressure switch
11. Oil pressure sensor
12. Main pump
13. Control valve
- 13a. Self-pressure reducing valve
- 13b. Merge-divider valve
- 13c. Travel junction valve
14. Swing motor
- 14a. 2-stage relief valve
15. Swing holding brake solenoid valve
16. 2-stage swing relief solenoid valve

Input and output signals

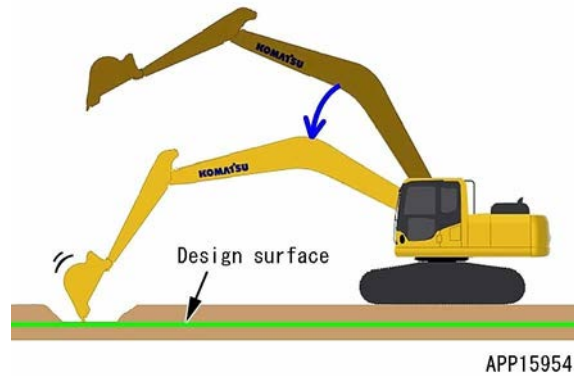
- a. Swing brake cancel switch signal
- b. Swing holding brake solenoid valve drive signal
- c. CAN signal
- d. Swing lock switch signal
- e. 2-stage swing relief solenoid valve drive signal
- f. Oil pressure sensor signal
- g. Oil pressure switch signal

1. Target speed of arm cylinder
2. EPC current

Automatic stop control function (PC200_ICT-LL80-270-K-10-A)

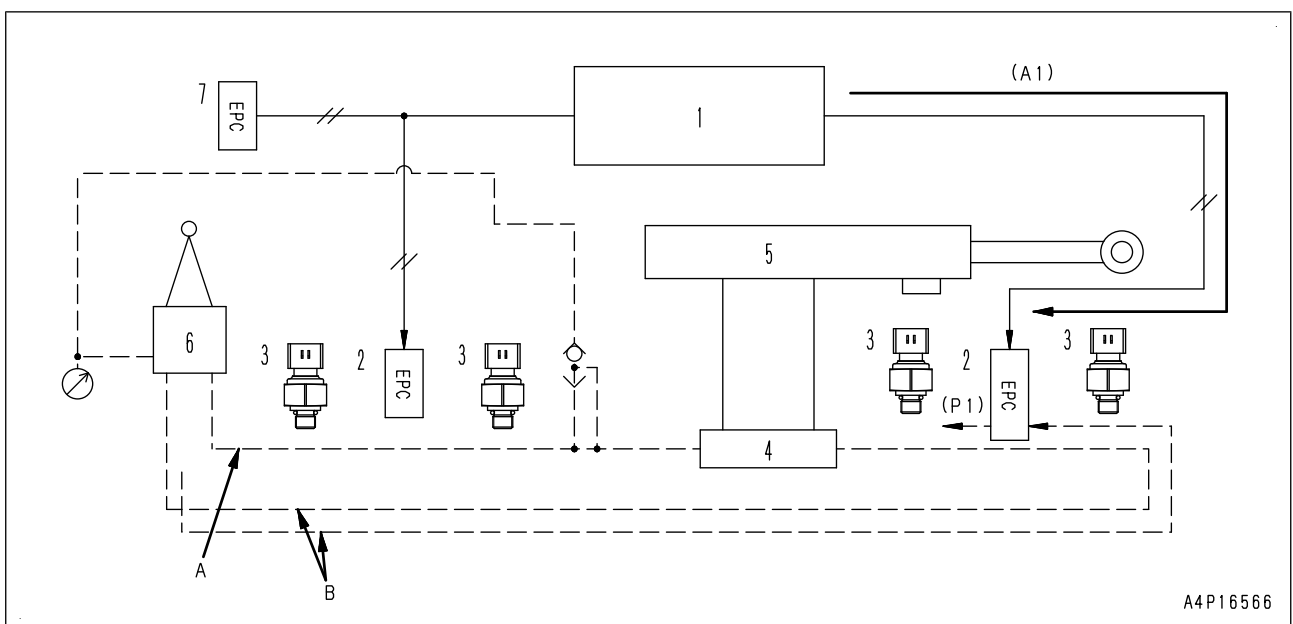
Function

- This function controls the work equipment to stop automatically in order not to damage the design pad.



Operation

When boom LOWER is operated



- A: Boom RAISE PPC circuit
 - B: Boom LOWER PPC circuit
1. Work equipment controller
 2. PPC pressure reducing EPC valve
 3. PPC pressure sensor
 4. Boom spool (control valve)
 5. Boom cylinder
 6. Work equipment control lever
 7. Boom RAISE EPC valve

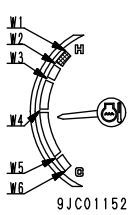
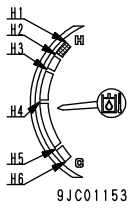
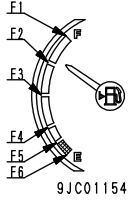

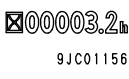
- When the boom LOWER is operated, the boom lowers and the bucket blade edge moves toward the design pad. (Bucket blade edge speed (S1))

DRC26-40P(B) [CN-CS03]

Pin No.	Signal name	Input/output signal
1	Continuous power supply (24 V)	Input
2	Solenoid power supply (24 V)	Input
3	(*1)	-
4	Battery relay signal	Output
5	(*1)	-
6	(*1)	-
7	(*1)	-
8	(*1)	-
9	Model selection 2	Input
10	Power supply (24 V)	Input
11	Continuous power supply (24 V)	Input
12	Solenoid power supply (24 V)	Input
13	(*1)	-
14	Starting switch ACC signal	Input
15	(*1)	-
16	(*1)	-
17	(*1)	-
18	(*1)	-
19	(*1)	-
20	Starting switch ACC signal	Input
21	Controller GND	Input
22	Solenoid power supply (24 V)	Input
23	(*1)	-
24	Starting switch ACC signal	Input
25	(*1)	-
26	(*1)	-
27	(*1)	-
28	(*1)	-
29	(*1)	-
30	Starting switch C signal	Input
31	Controller GND	Input
32	Controller GND	Input
33	Controller GND	Input
34	System operating lamp	Output
35	(*1)	-
36	(*1)	-
37	(*1)	-
38	(*1)	-
39	Model selection 5	Input
40	(*1)	-

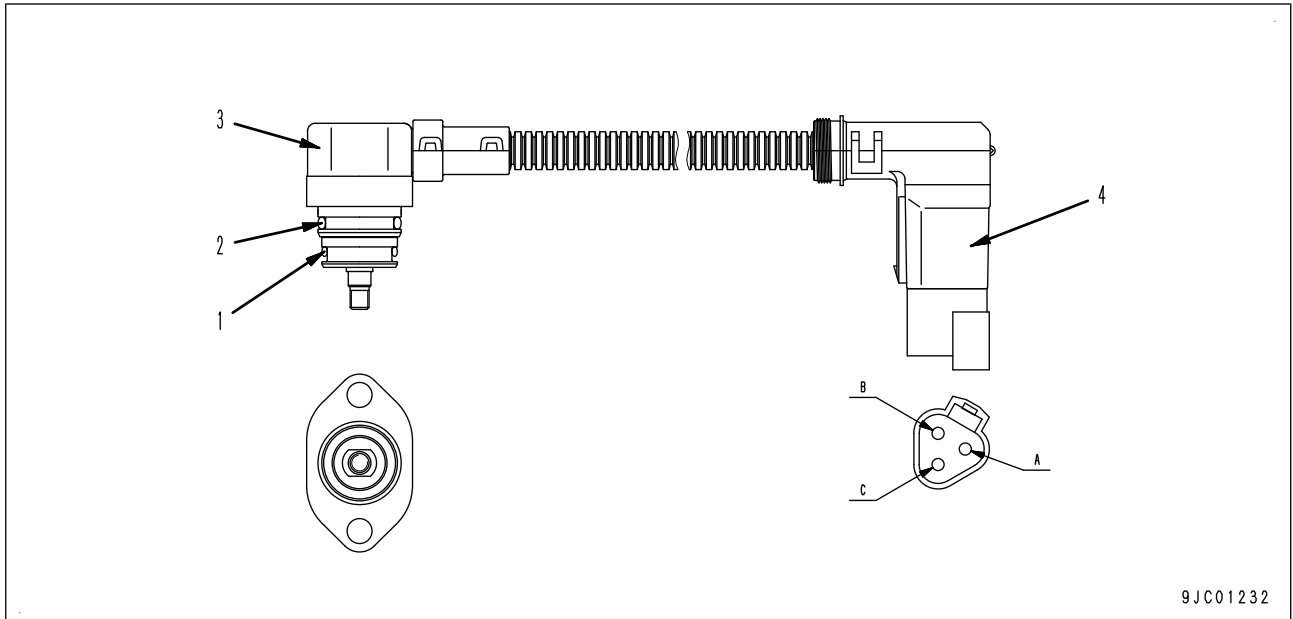
*1: Never connect these pins. Malfunctions or failures may occur.

Gauge

Gauge	Item displayed	Description			Remarks
		Range	Temperature (°C)	Monitor background	
 <p>9JC01152</p>	Engine coolant temperature gauge (*1)	Range	Temperature (°C)	Monitor background	<ul style="list-style-type: none"> Indicates corresponding temperature range. The alarm buzzer sounds at 105°C or higher. If background color is white, warm up engine.
		W1	105	Red	
		W2	102	Red	
		W3	100	Blue	
		W4	85	Blue	
		W5	60	Blue	
		W6	30	White	
 <p>9JC01153</p>	Hydraulic oil temperature gauge (*1)	Range	Temperature (°C)	Monitor background	<ul style="list-style-type: none"> Indicates corresponding temperature range. The alarm buzzer sounds at 105°C or higher. If background color is white, warm up hydraulic components.
		H1	105	Red	
		H2	102	Red	
		H3	100	Blue	
		H4	85	Blue	
		H5	40	Blue	
		H6	20	White	
 <p>9JC01154</p>	Fuel gauge (*1)	Range	Quantity (ℓ)	Monitor background	<ul style="list-style-type: none"> Indicates corresponding level range.
		F1	304	Blue	
		F2	245	Blue	
		F3	200	Blue	
		F4	100	Blue	
		F5	60	Blue	
		F6	41	Red	
 <p>9JC01155</p>	ECO gauge (*2)	Segment		Load level	<ul style="list-style-type: none"> Indicates instantaneous fuel consumption (average of fuel consumption by 3 seconds) in 10 steps. (Displays when "ECO Guidance" → "Configurations" → "ECO Gauge Display" in user menu is "ON".)
		Green	1 to 8	Light to medium	
		Orange	9, 10	Heavy	
 <p>9JC01156</p>	Service meter	00000.0 h to 99999.9 h			<ul style="list-style-type: none"> Indicates accumulated engine operating hours (alternator is generating). (Press F4 switch to change to clock display.)

EGR valve lift sensor (ENG-A9S2-041-K-00-A)

EGR: Abbreviation for Exhaust Gas Recirculation



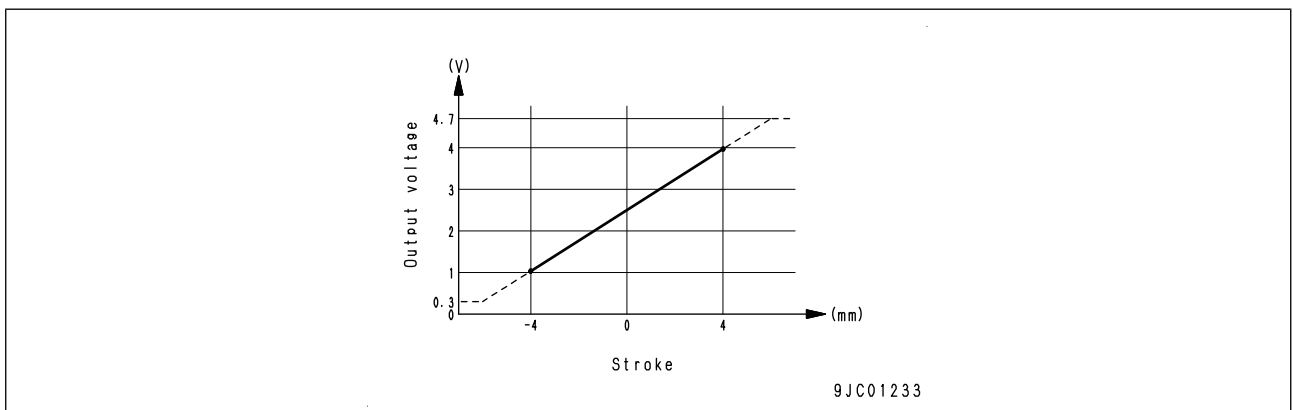
1. O-ring (small)
2. O-ring (large)
3. Sensor
4. Connector

Function (ENG-A9S2-042-K-00-A)

- This sensor, installed to EGR valve in the engine, detects the EGR valve opening to output the corresponding variable voltage.

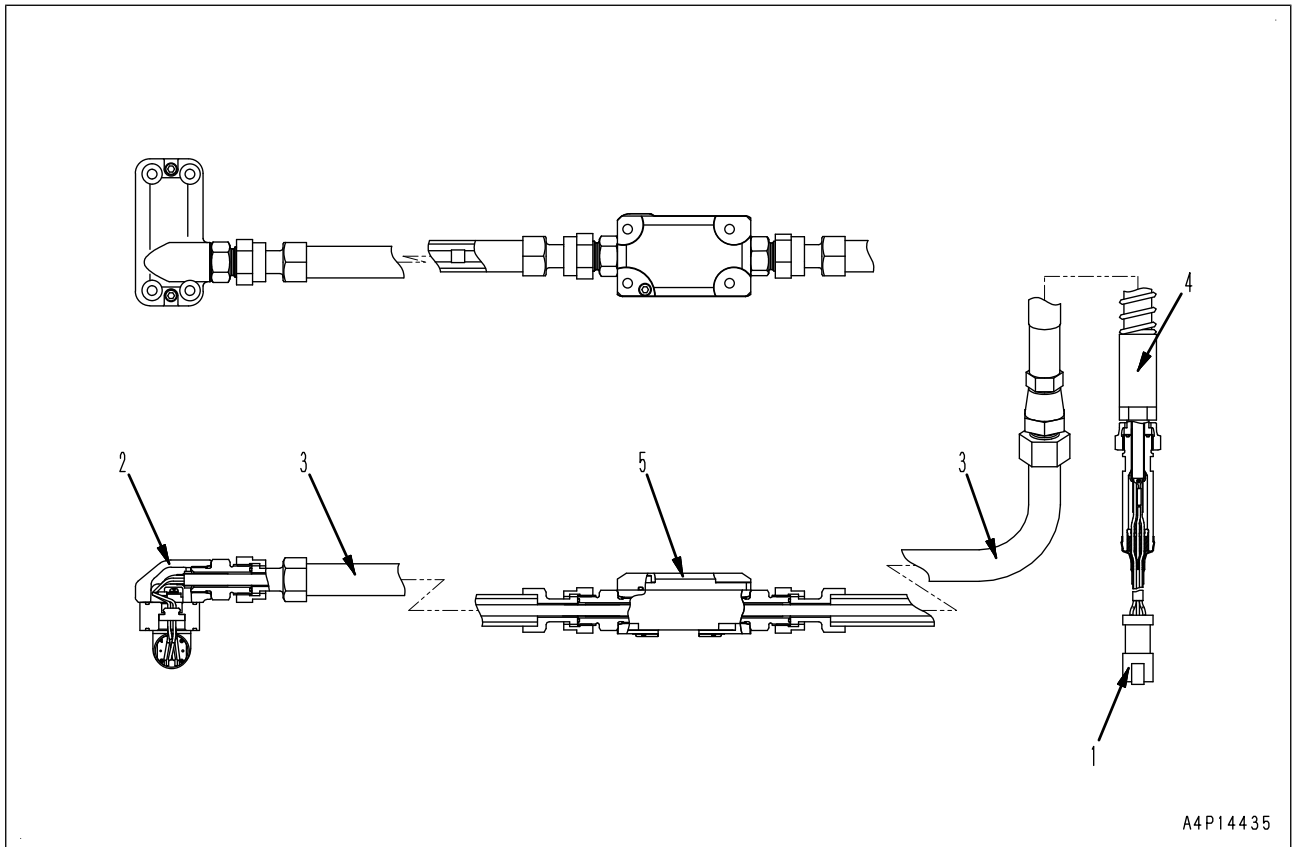
Output characteristics

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



Stroke and reset sensor for bucket cylinder (PC200 ICT-LCV8-041-K-00-A)

★ Do not disassemble this since it needs to be adjusted for maintaining the performance after reassembly.



A4P14435

1. Connector
2. Stroke sensor
3. Tube
4. Hose
5. Reset sensor

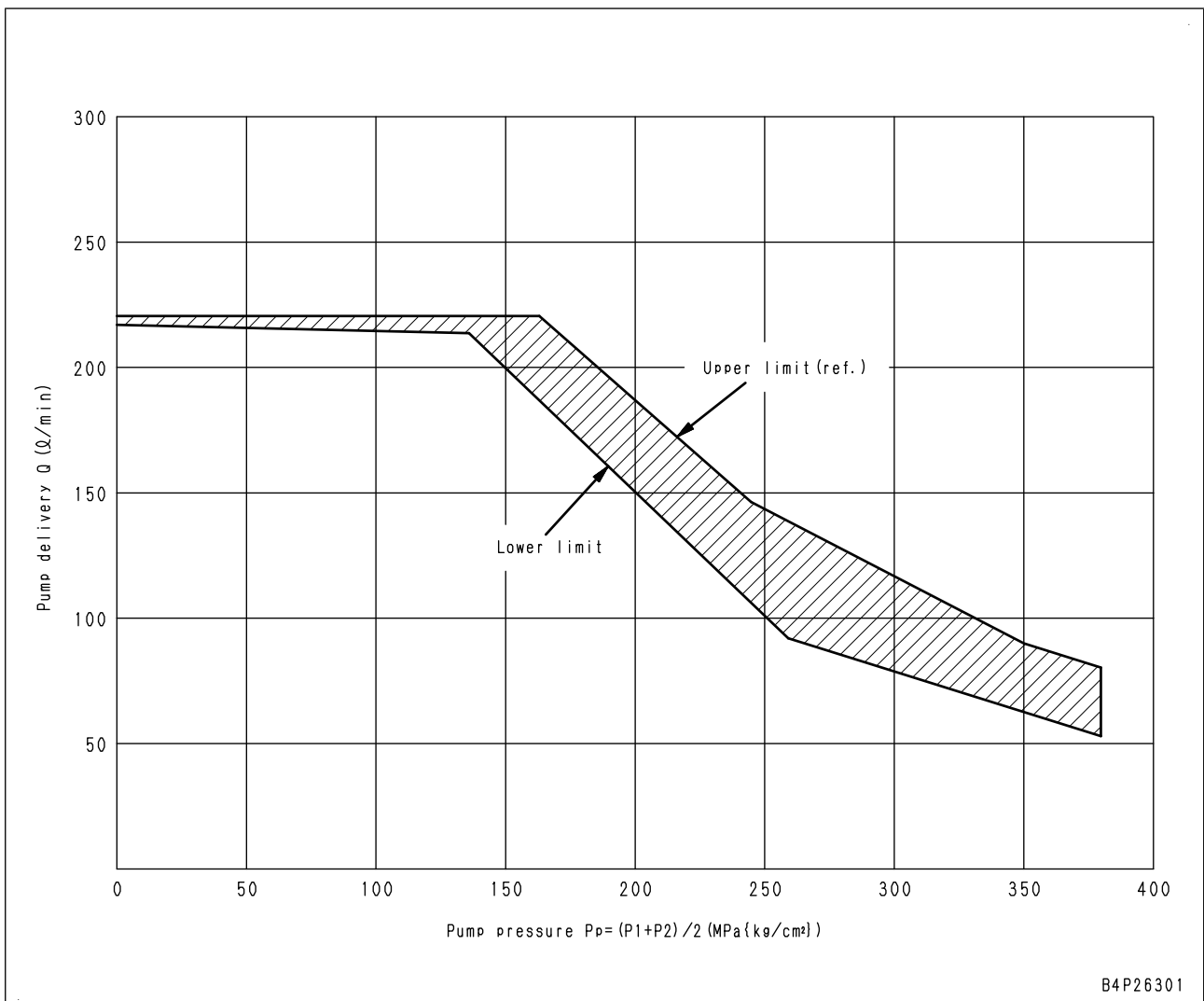
Hydraulic pump

Machine model			PC210i-10, PC210LCi-10	
Item	Measurement condition	Unit	Discharged volume Standard value	Discharged volume Repair limit
Performance of hydraulic pump	<ul style="list-style-type: none"> Pump rotation speed (rpm): 1,700 rpm PC-EPC current value (mA): 440mA Test pump discharged pressure (MPa {kg/cm²}) : P1 Other pump discharged pressure (MPa {kg/cm²}) : P2 Average discharged pressure (MPa {kg/cm²}) : $P_p = (P1 + P2) / 2$ 	ℓ/mln	Q (See graph)	Q (See graph)

★ Allow pump discharge pressures P1 and P2 as close as possible to the average pressure when measuring.

Avoid measuring in the proximity of turning point of the graph because the error increases there.

★ When measuring with the pump mounted on the machine, if it is impossible to set the engine speed to the specified speed by using the fuel control dial, take the pump discharged volume and the engine speed at the time of measurement, and use them as a base for calculating the pump discharged volume at the specified speed.



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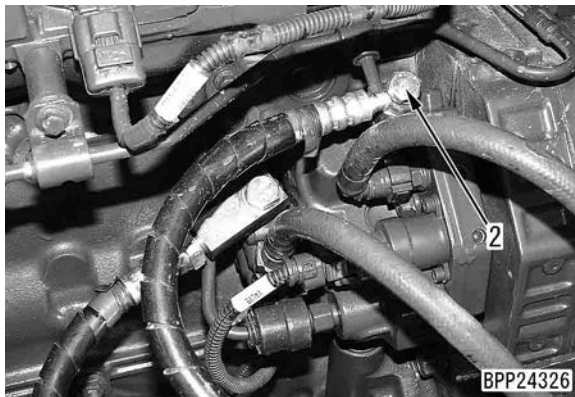
Testing/ Adjusting item	Sym- bol	Part No.	Part name	Qty	Remarks	
Calibration of boom dimensions and arm dimensions with total station (Arm Top Calibration)	W	1	Commercially available	Total station	1	
		2	2A5-98-21210	Measurement target	1	Measurement target W2 is a component of blade edge measuring jig W4.
		3	Commercially available	Marker	1	
		4	2A5-98-05011	Special jig for measuring blade edge	1	
			2A5-98-21111	• Bracket	1	
			2A5-98-21121	• Bracket	1	
			2A5-98-21130	• Bracket	1	
			2A5-98-21140	• Bracket	1	
			2A5-98-21151	• Pin	2	
			2A5-98-21161	• Block	1	
			2A5-98-21220	• Magnet	6	
			2A5-98-21230	• Reflector plate	1	
			2A5-98-21240	• Adapter	1	
			2A5-98-21250	• Bolt	2	
			2A5-98-21260	• Bolt	2	
			2A5-98-21270	• Bolt	3	
			2A5-98-21310	• Washer	2	
			17A-711-7850	• Washer	2	
			2A5-98-21330	• Pole	1	
			2A5-98-21340	• Collar	1	
			22J-973-3520	• Bolt	1	
01252-90616	• Washer	3				
01640-20610	• Washer	1				

Testing return circuit

1. Remove cover (1).



2. Remove joint bolt (2) of the fuel return hose between the supply pump and fuel cooler.



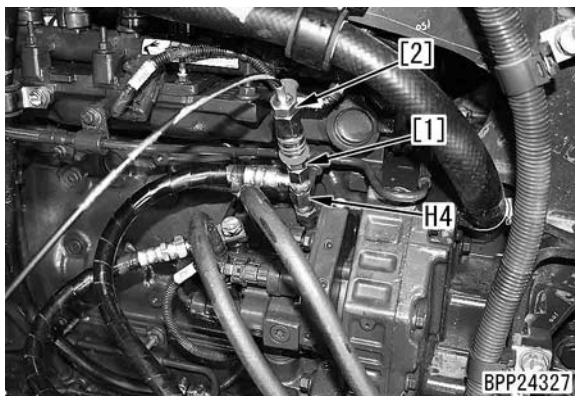
3. Install screw H4, and nipple [1] and hose [2] of hydraulic tester H1 instead of joint bolt (2), and connect them to gauge H5.

- ★ When installing screw H4, be sure to install the seal washer.

 **Screw H4:**

19.6 to 29.4 Nm {2 to 3 kgm}

- ★ The nipples and hoses in digital hydraulic tester H2 may be used.

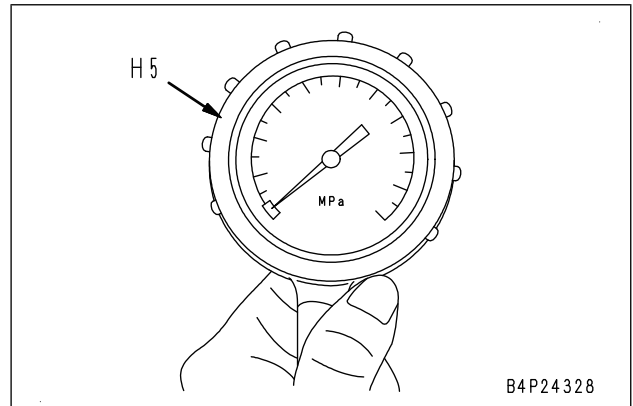


4. Start and measure the pressure in the return circuit while the engine is run at full speed.

- ★ If the engine cannot be started, you can measure the fuel pressure while rotating the engine using the starting motor. However, to protect the starting motor, do not rotate the engine for more than 20 seconds continuously.

- ★ If the pressure in the return circuit is in the following range, it is proper.

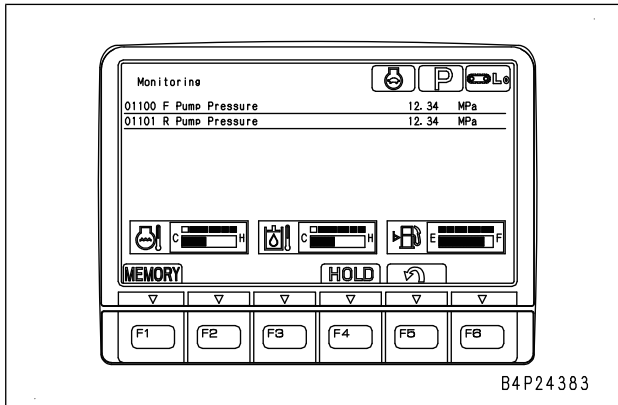
At high idle	Max. 18.6 kPa
Cranking	{Max. 0.19 kg/cm ² }



5. After completing measurement, remove the measuring tools and return the machine to the original condition.

 **Joint bolt (2):**

19.6 to 29.4 Nm {2 to 3 kgm}



- Increase the hydraulic oil temperature to 45 to 55 °C and measure the pump discharge pressure.

★ See "Measuring method by using oil pressure gauge" for checking procedure.

Adjusting (PC200_10-C000-270-K-00-A)

★ Adjustment of the unload valve is not available.

- Adjusting work equipment and travel relief pressure

★ If the relief pressure of the work equipment circuit and travel circuit is abnormal, adjust main relief valves (3) and (4) of the main relief valve according to the following procedure.

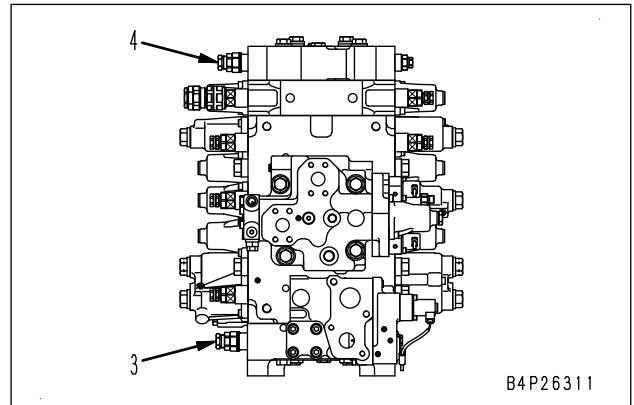
- (3): Front main relief valve
- (4): Rear main relief valve

★ When adjusting the main relief valve on the front pump, remove the cover under the control valve.

★ When adjusting the main relief valve for the rear pump circuit, remove the fuel tank cover.

★ Adjust only the low relief pressure of the main relief valve. If the low relief pressure is adjusted, the high relief pressure is set automatically.

★ The low relief pressure is the pressure under the following condition: the 2-stage relief solenoid valve is not energized and the pilot pressure is not applied to the selector port.



- Disconnect the pilot hose.
- While fixing holder (5), loosen lock nut (6).
- Turn holder (5) to adjust the pressure.

★ If the holder is

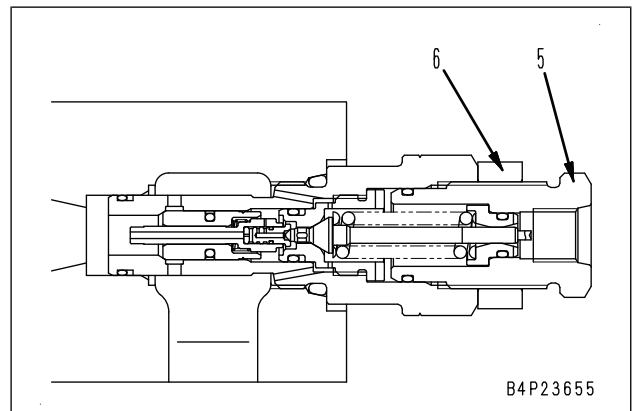
- turned clockwise, the pressure is increased.
- turned counterclockwise, the pressure is decreased.

★ Amount of adjustment per turn of holder:

Approx. 20.5 MPa {Approx. 209 kg/cm²}

- While fixing holder (5), tighten lock nut (6).

 **Lock nut: 49 to 58.8 Nm {5 to 6 kgm}**



- Connect the pilot hose.

6) After finishing adjustment, check the oil pressure again according to the above measurement procedure.

- Adjusting swing relief pressure

1) If the swing relief pressure is improper, adjust swing 2-stage relief valve (7) according to the following procedure.

- ★ Use the following part to block on the hose end.
07379-00640 (Flange #06)



- 3) Run the engine at full speed and relieve the bucket circuit by curling the bucket.

⚠ Take care not to perform "bucket DUMP operation".

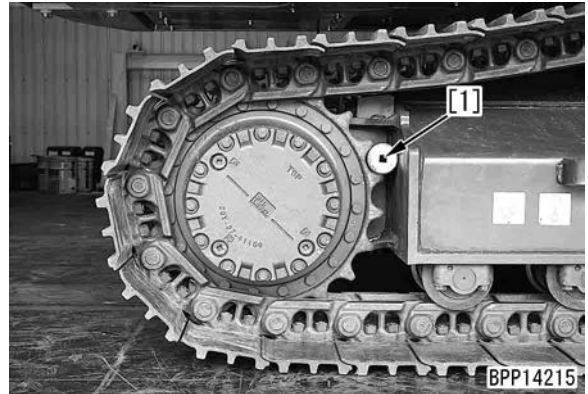
- 4) Start measuring the oil leakage 30 seconds after relieving is started, and measure the leak for 1 minute.
 - 5) After finishing testing, return the machine status as it was.
4. Measurement of oil leakage from swing motor
- 1) Disconnect two drain hoses (4) and block the hose side end by plugs.
- ★ Use the following part to block on the hose end.
07376-70522 (Plug #05)



- 2) Set the swing lock switch to the ON position.
 - 3) Run the engine at full speed and relieve the swing circuit by swinging.
 - ★ Start measuring the oil leakage 30 seconds after relieving is started, and measure the leak for 1 minute.
 - ★ After measuring one time, swing 180 deg., and then measure the leak again.
 - 4) After finishing testing, return the machine status as it was.
5. Measurement of oil leakage from travel motor

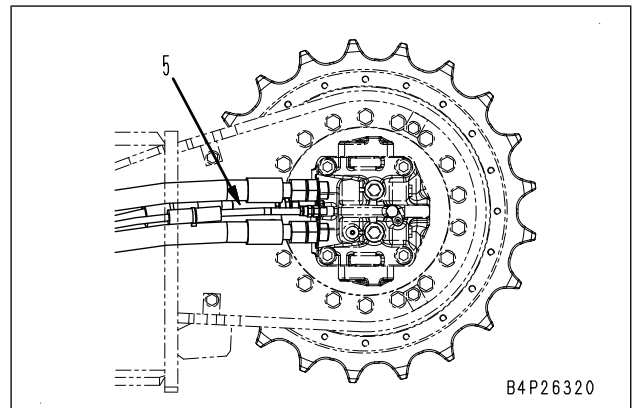
- 1) Remove the travel motor cover.
- 2) Run the engine, lock the travel mechanism, and stop the engine.

⚠ Put pin [1] between the sprocket and track frame to lock the travel mechanism securely.



- 3) Disconnect drain hose (5) of the travel motor and block the hose end by a plug.

- ★ Use the following part to block on the hose end.
07376-70422 (plug #04)

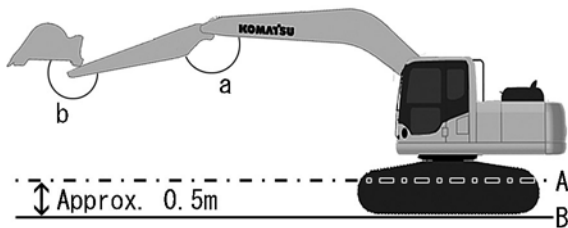


- 4) Run the engine at full speed, relieve the travel circuit, and measure the oil leakage.

⚠ Before operating the travel lever, check the pin position and locked direction of the travel again.

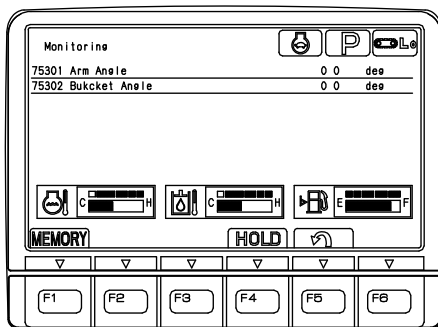
⚠ Wrong operation of the lever can cause the personal injury. Make the signals and checks securely.

- ★ Start measuring the oil leakage 30 seconds after relieving is started, and measure the leak for 1 minute.
- ★ Take measurement several times, moving the motor a little each time (i.e. change the position of the valve plate and cylinder, and that of the cylinder and piston each time).



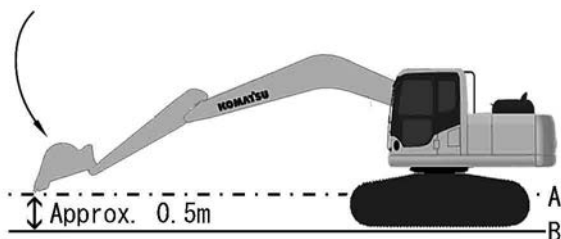
BPP31349

- ★ Arm angle and bucket angle can be checked on the "Monitoring / Custom" screen of the machine monitor. (For details of how to check, see "SPECIAL FUNCTIONS OF MACHINE MONITOR".)
Monitoring code: 75301 "Arm Angle"
Monitoring code: 75302 "Bucket Angle"



B4P34570

- 6) Select the semi-auto mode, lower the boom gradually by operating the work equipment control lever, and stop the blade edge at design surface (A).



BPP31350

- ★ The semi-auto mode is enabled by Auto/Manual switch at the upper right of the control box.
At this time, operate the work equipment control lever in the boom LOWER direction continuously until the distance (C) between the blade tip and design surface (A) on the control box screen becomes static (for

approximately. 10 seconds). Return the boom lever to NEUTRAL position when the distance value becomes static.



BPP31351

- 7) Operate the work equipment control lever in the arm IN direction to the stroke end. When this operation is performed, the auto grade assist control works and the blade edge moves along design surface (A) above the ground surface. At this time, record the distance (C) between the blade edge and design surface (A) on the control box screen with a video device, and read the variation.

- ★ Read the fall of the arm at the beginning of movement, the fall of the arm after passing the vertical position, and the variation during the stable period in which the arm does not move up.



BPP31352

GNSS receiving condition	Best	Bad
Bucket weight	Approximately 600 kg	Approximately 1600 kg
Guide of blade tip variation	Max. 10 mm	Max. 40 mm

- 8) Restore the adjustment values of "Arm Initial Speed" and "Arm Steady Speed" to the values before testing after the test is completed.

- ★ The adjustment values of "Arm Initial Speed" and "Arm Steady Speed" are set to "0" at shipment from factory.

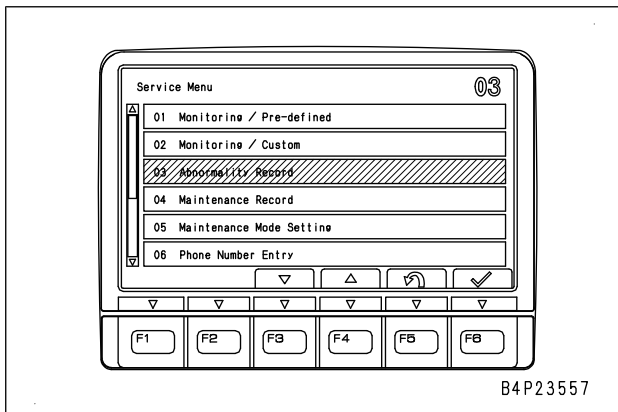
Abnormality record (electrical systems) (PC220-Q1S3-100-K-00-A)

The machine monitor records the past and currently occurring failures classifying them into the mechanical system abnormality and electrical system abnormality.

To check the electrical system abnormality record, perform the following procedures.

★ For the failure code list, see "40 Failure code list for troubleshooting".

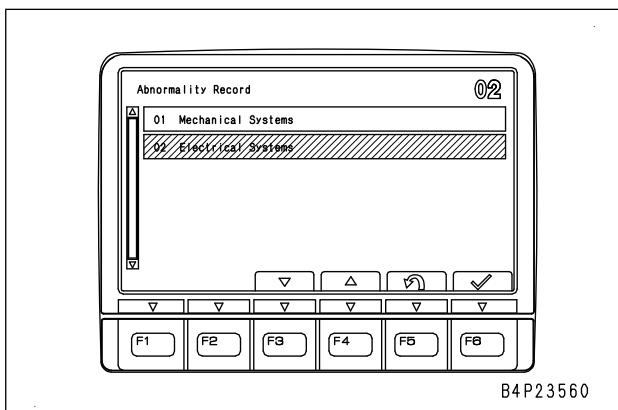
1. Selecting a menu
Select "Abnormality Record" on "Service Menu" screen.



2. Selecting a sub menu
Select "Electrical Systems" by using the function switch or numeral input switches on "Abnormality Record" screen displayed.

- [F3]: Moves selection downward
- [F4]: Moves selection upward
- [F5]: Returns the screen to "Service Menu" screen
- [F6]: Enters selection

★ When you input a 2-digit code by using the numeral input switches, the corresponding item is directly selected. Accordingly, you may enter the selection by using [F6].



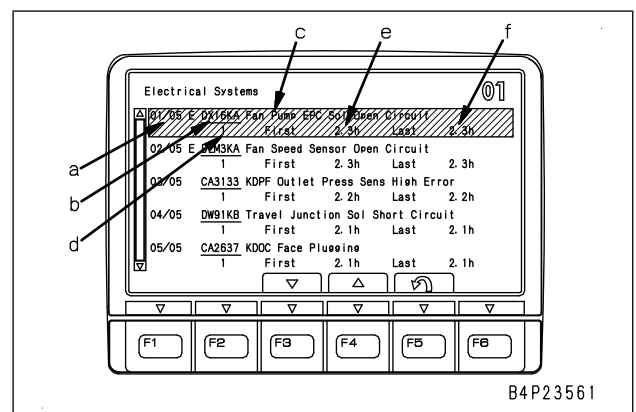
3. Information displayed on "Abnormality Record" screen
After "Electrical Systems" screen is displayed, the following information is displayed.

- (a) Occurrence order of abnormalities from latest one/ Total number of records
 - (b): Failure code
 - (c): Detail of failure
 - (d): Number of occurrences (displayable range: 0 to 65,535 times)
 - (e): Service meter reading at the first occurrence
 - (f): Service meter reading at the last occurrence
- [F1]: Moves to next page (screen) (when displayed)
 - [F2] Moves to previous page (screen) (when displayed)
 - [F3]: Moves selection downward
 - [F4]: Moves selection upward
 - [F5]: Returns screen to "Abnormality Record" screen

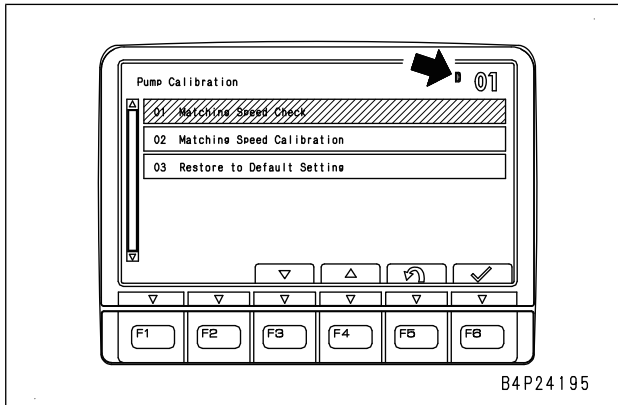
- ★ If no abnormality is recorded, "No Error" is displayed.
- ★ On the electrical systems abnormality record screen, up to 20 cases currently stored are displayed.

If the number of abnormality records increases to 21 or beyond, the latest occurrence code is displayed and the oldest one is deleted.

- ★ If the number of occurrence is 1 (first occurrence), the service meter reading at the first occurrence and that at the last occurrence are the same.
- ★ If [E] is displayed on the left of a failure code, the abnormality is still occurring or correction of it is not confirmed.
- ★ For all of the failure codes that the machine monitor can record, see the failure code list.



4. Clearing abnormality record
 - 1) While the "Electrical Systems" screen is displayed, perform the following operation by using the numeral input switches.
 - Switch operation (Press the switches in order while pressing [4])
[4] + [1] → [2] → [3]



B4P24195

[Reference]

- The alphabet letter at the right top of the screen indicates the following condition.

D: Default

F: Adjustment value at shipment from factory (Factory shipment state (Normal))

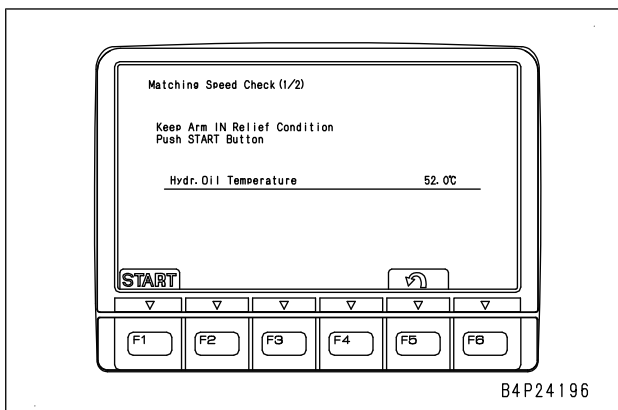
U: User calibration value

5. Matching speed check (arm IN relief)

- 1) When the "Matching Speed Check" screen is displayed, relieve the arm IN circuit and check the matching speed by using the function switch.

[F1]: START

[F5]: Returns to pump calibration screen



B4P24196

- 2) Operate the arm control lever or bucket control lever under the following condition to check the relief matching.

(Operation)

Operate according to the arm IN relief and bucket curl relief screen.

- ★ Set bucket CURL relief matching after completing arm IN relief matching.

Arm lever: Full stroke digging (Operate during arm IN relief matching)

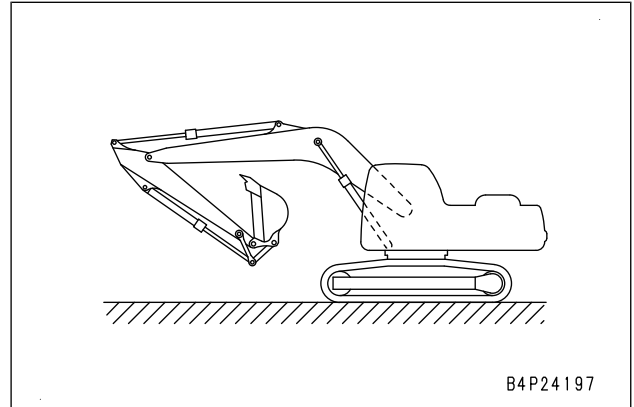
Bucket lever: Full digging (Operate during bucket digging relief matching)

(Condition)

- Hydraulic oil temperature: 45 to 55°C
- Working mode: P mode
- Fuel control dial: MAX
- Air conditioner: OFF

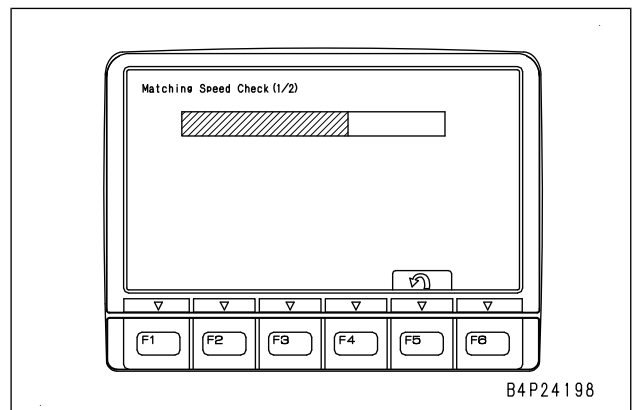
⚠ Secure sufficient area for operation of the work equipment during testing.

⚠ When operating the work equipment, secure full safety around the machine.



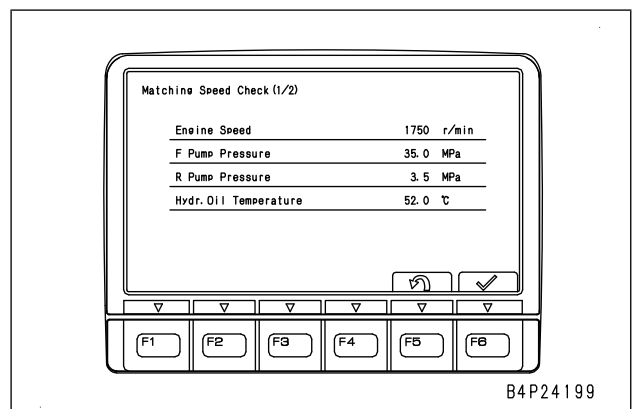
B4P24197

- 3) Perform arm IN relief operation. When the engine speed is stabilized, hold down [F1] on the machine monitor to start checking. During matching speed check, the bar on the screen is displayed. Keep relief operation until the check is finished.



B4P24198

- 4) If the check is normally completed, the result is displayed. Press [F6] to go to the bucket CURL relief.



B4P24199

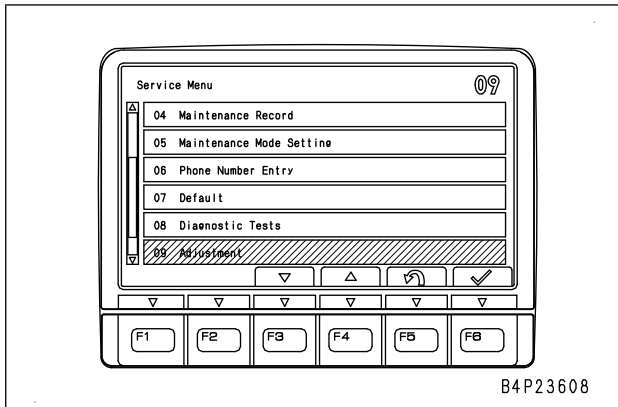
If check is finished unsuccessfully, "NG" is displayed for the State of check and the failure cause code is displayed. Referring to the failure cause codes in Table 2, find out

Adjustment (PPC Pressure Sensor Calibration: Boom LOWER PPC Pressure Sensor Calibration Check) (PC200_ICT-L6W3-270-K-00-A)

- ★ Use this function to check the data as needed if the automatic control is not correctly operated due to aged change, etc.
- ★ The machine condition is not restricted only for checking.

1. Selecting menu

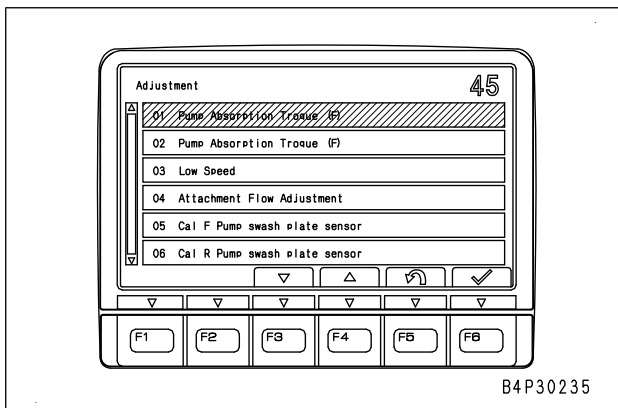
Select "Adjustment" on "Service Menu" screen.



2. Selecting sub menu

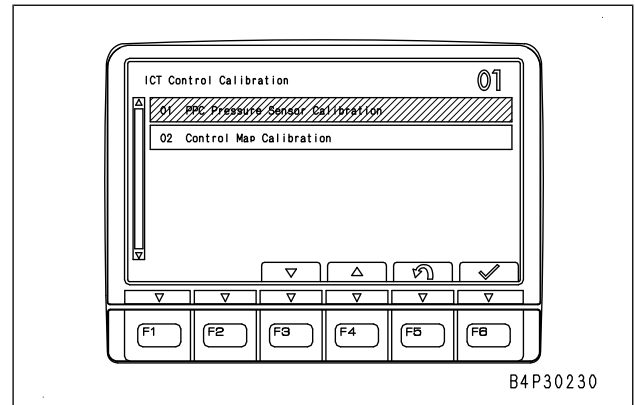
After "Adjustment" screen is displayed, input "45" by using the numeral input switches and press [F6].

- ★ This function is not displayed in the menu list since it is required only when replacing PPC pressure sensor, relay block assembly, and work equipment controller.



3. Selecting PPC pressure sensor calibration menu

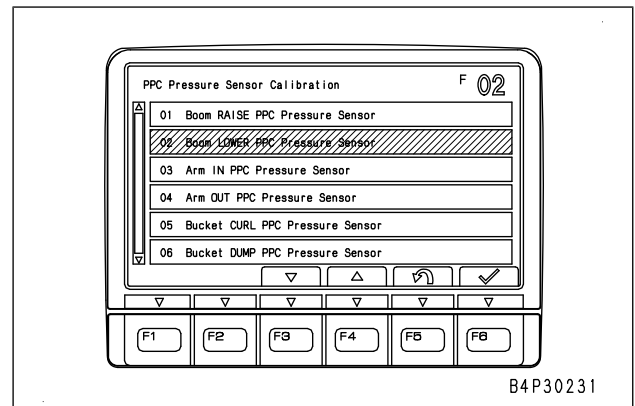
After the "ICT Control Calibration" screen is displayed, select "PPC Pressure Sensor Calibration" by using the function switch or numeral input switches.



4. Selecting boom LOWER PPC pressure sensor menu

After the "PPC Pressure Sensor Calibration" screen is displayed, select "Boom LOWER PPC Pressure Sensor" by using the function switch or numeral input switches.

- ★ An example of boom LOWER PPC pressure sensor calibration is described below. For other shafts, see the section describing the related shaft.



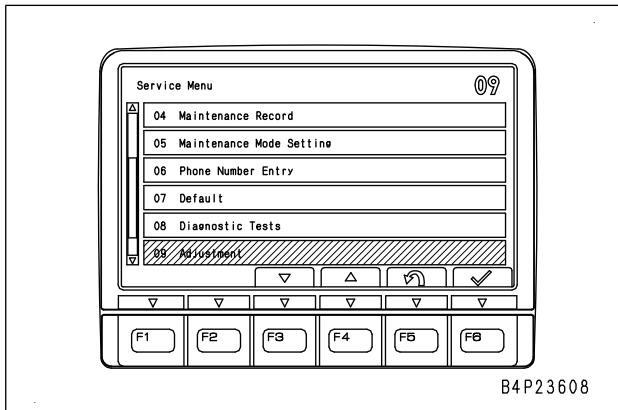
5. Selecting PPC pressure sensor calibration check menu

After the "Boom LOWER PPC Pressure Sensor" screen is displayed, select "PPC Pressure Sensor Calibration Check" by using the function switch or numeral input switches.

- ★ Selecting method is the same as on "Service Menu" screen.

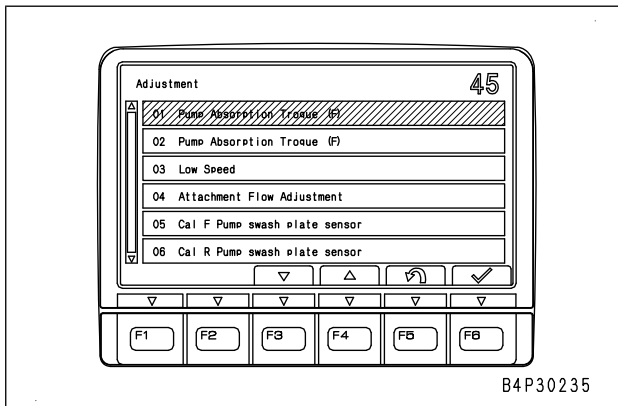
Adjustment (Arm IN PPC Pressure Sensor Calibration:Restore to Factory Setting) (PC200 ICT-L9U1-270-K-03-A)

1. Selecting menu
Select "Adjustment" on "Service Menu" screen.

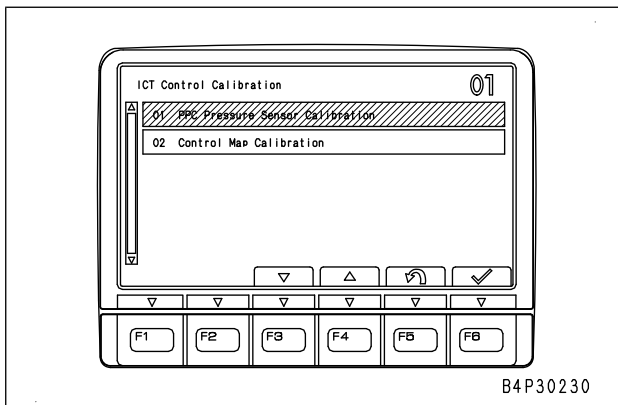


2. Selecting sub menu
After "Adjustment" screen is displayed, input "45" by using the numeral input switches and press [F6].

- ★ This function is not displayed in the menu list since it is required only when replacing PPC pressure sensor, relay block assembly, and work equipment controller.

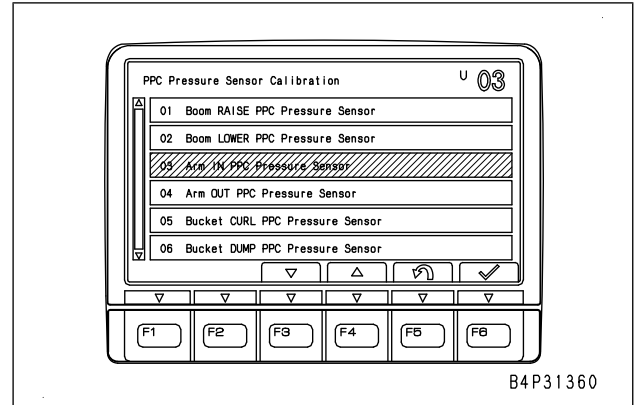


3. Selecting PPC pressure sensor calibration menu
After the "ICT Control Calibration" screen is displayed, select "PPC Pressure Sensor Calibration" by using the function switch or numeral input switches.



4. Selecting arm IN PPC pressure sensor menu

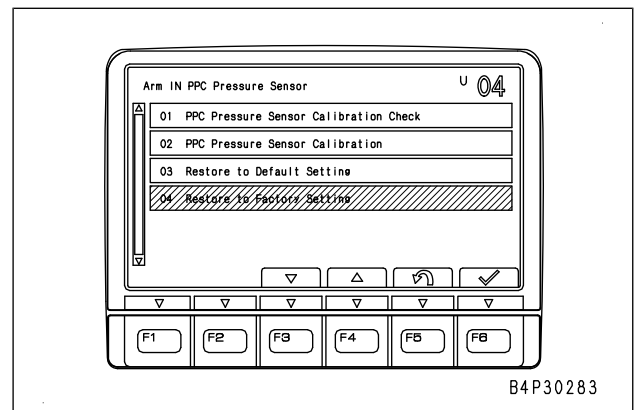
After the "PPC Pressure Sensor Calibration" screen is displayed, select "Arm IN PPC Pressure Sensor" by using the function switch or numeral input switches.



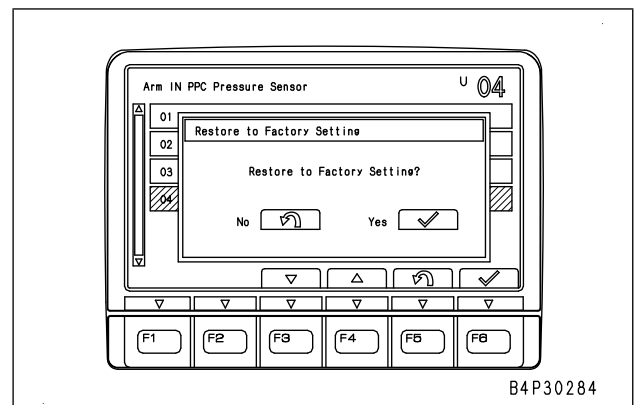
5. After the "Arm IN PPC Pressure Sensor" screen is displayed, select "Restore to Factory Setting" by using the function switch or numeral input switches.

- ★ "Restore to Factory Setting" is the function to return the parameter to the calibration value at shipment from factory.

- ★ Check this function if the automatic leveling assist function is defective or if the automatic stop control function is defective.

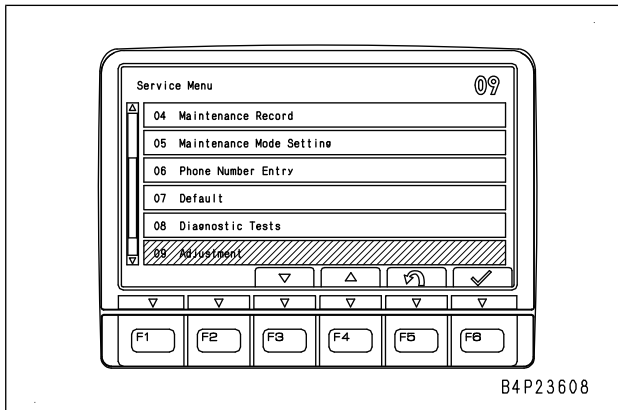


6. [F6]: Returns to the values at shipment from factory.



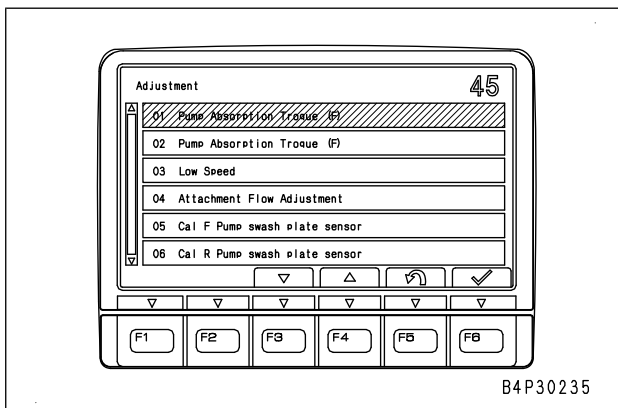
Adjustment (Bucket CURL PPC Pressure Sensor Calibration:Restore to Default Setting) (PC200_ICT-LEN2-270-K-02-A)

1. Selecting menu
Select "Adjustment" on "Service Menu" screen.

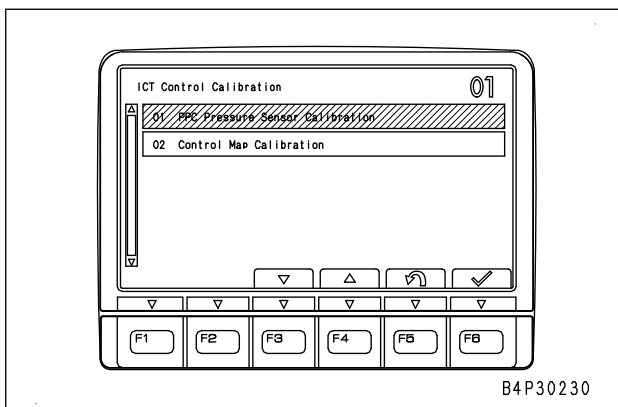


2. Selecting sub menu
After "Adjustment" screen is displayed, input "45" by using the numeral input switches and press [F6].

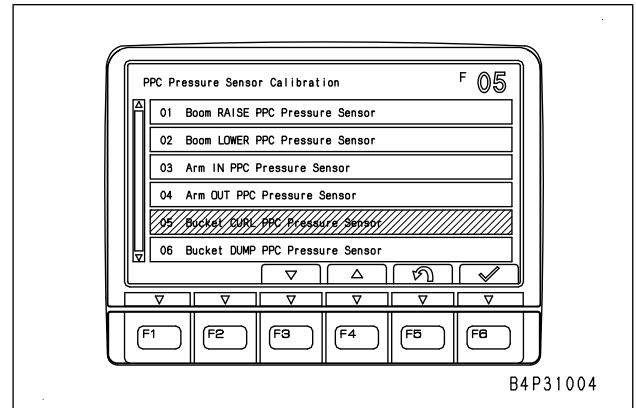
- ★ This function is not displayed in the menu list since it is required only when replacing PPC pressure sensor, relay block assembly, and work equipment controller.



3. Selecting PPC pressure sensor calibration menu
After the "ICT Control Calibration" screen is displayed, select "PPC Pressure Sensor Calibration" by using the function switch or numeral input switches.

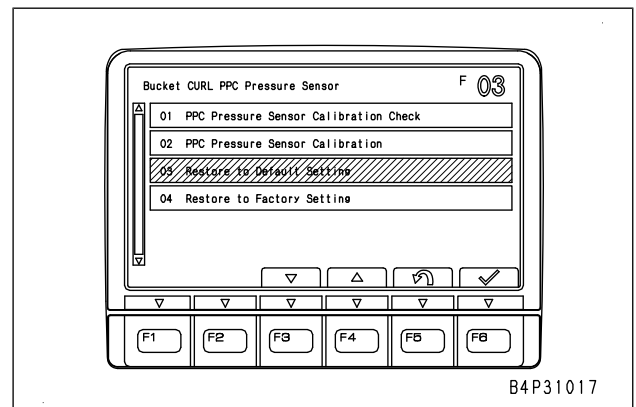


4. Selecting bucket CURL PPC pressure sensor menu
After the "PPC Pressure Sensor Calibration" screen is displayed, select "Bucket CURL PPC Pressure Sensor" by using the function switch or numeral input switches.

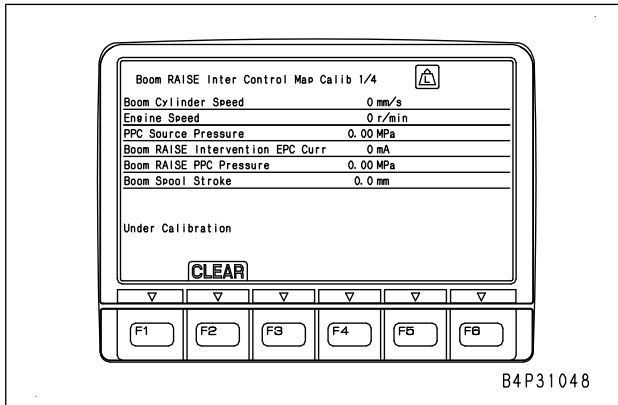


5. After the "Bucket CURL PPC Pressure Sensor" screen is displayed, select "Restore to Default Setting" by using the function switch or numeral input switches.

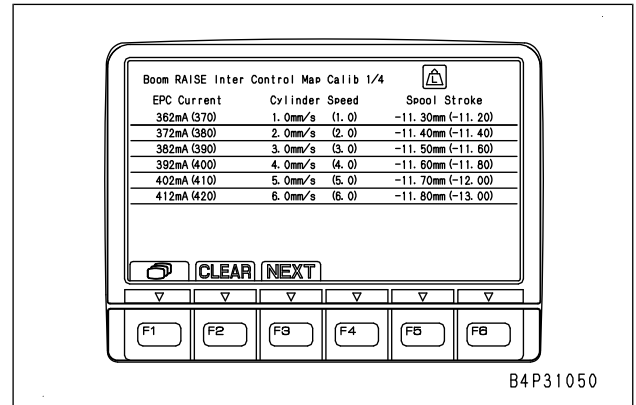
- ★ "Restore to Default Setting" is the function to return the parameter to the default value .
- ★ Do not use the default values. Be sure to perform the calibration.
- ★ Perform troubleshooting referring to "Troubleshooting", "E-83 Blade edge position on design surface is not accurate when automatic leveling assist function is on" and "E-84 Blade edge stop position is not accurate for design surface when automatic stop control function is on" before performing this adjustment in case of malfunction of automatic leveling assist function or automatic stop control function.



6. [F6]: Performs initialization.



B4P31048



B4P31050

4) Check the result of the calibration at start of movement performed when the lever is in NEUTRAL, press [F3] to proceed to the next calibration screen.

Current values from boom RAISE PPC intervention EPC current at start of movement to boom RAISE PPC intervention EPC at +10mA, +20mA, +30mA, +40mA and +50mA, PPC pressure, spool stroke, and cylinder speed are displayed as calibration results.

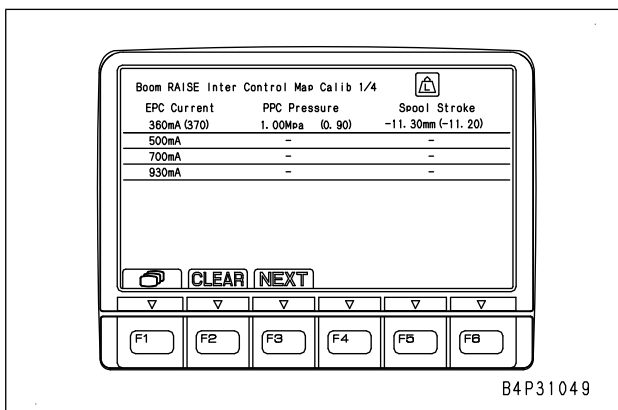
[F1]: Switches the calibration value confirmation screen

[F2]: Retries calibration

[F3]: Moves to the next calibration

★ A value in parentheses is the value memorized in the work equipment controller before calibration.

	EPC Current	Cylinder Speed	Spool stroke
	[mA]	[MPa]	[mm]
A	300 ~ 490	A < B < C < D < E < F	A < B < C < D < E < F
B	A + 10		
C	A + 20		
D	A + 30		
E	A + 40		
F	A + 50		



B4P31049

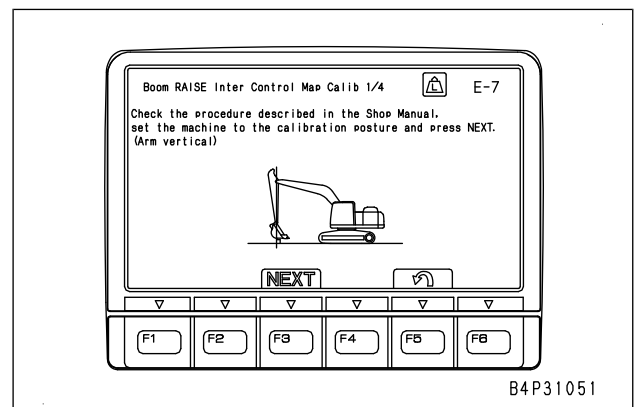
[F1]: Switches the calibration value confirmation screen

[F2]: Retries calibration

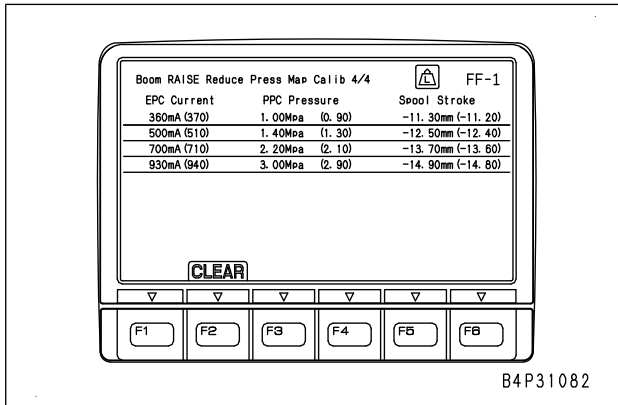
[F3]: Moves to the next calibration

★ As the EPC current increases, the cylinder speed and spool stroke are increased.

★ If the calibration is finished unsuccessfully, the calibration status is NG and a failure cause code is displayed. Check the cause referring to the failure cause code table (Table 4), and perform "Control Map Calibration" again.

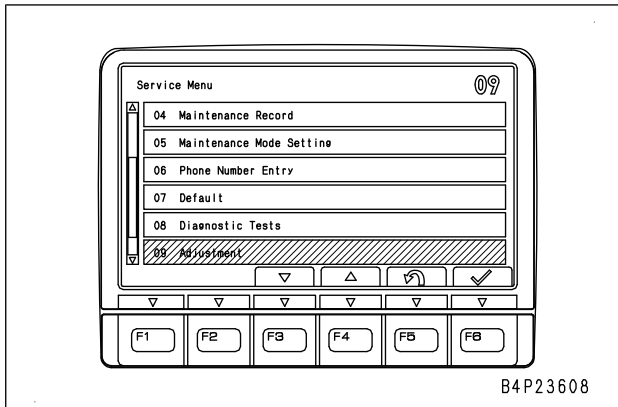


B4P31051

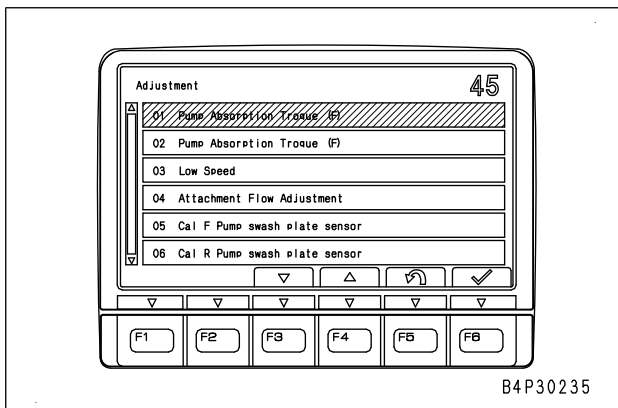


Adjustment (Control Map Calibration: Arm IN Reduce Pressure Control Map Calibration Check) (PC200 ICT-L9U1-270-K-04-A)

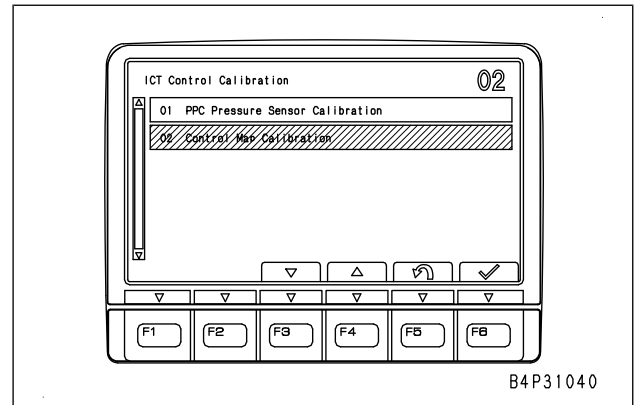
- ★ Use this function to check the data as needed if the automatic control is not correctly operated due to aged change, etc.
 - ★ The machine condition is not restricted only for checking.
1. Selecting menu
Select "Adjustment" on "Service Menu" screen.



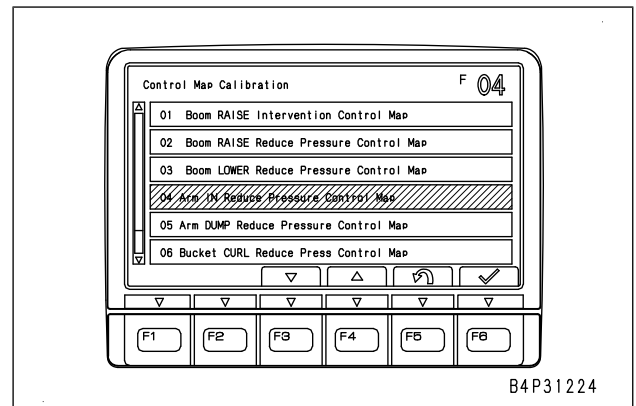
2. Selecting sub menu
After "Adjustment" screen is displayed, input "45" by using the numeral input switches and press [F6].
- ★ This function is not displayed in the menu list since it is required only when replacing PPC pressure sensor, relay block assembly, and work equipment controller.



3. Selection of control map calibration menu
After the "ICT Control Calibration" screen is displayed, select "Control Map Calibration" by using the function switch or numeral input switches.

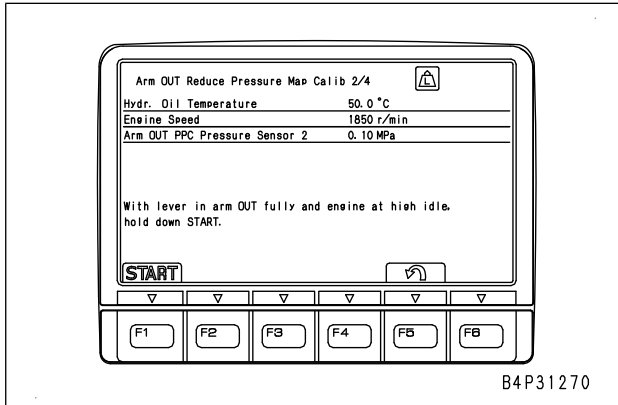


4. Selection of arm IN reduce pressure control map menu
After the "Control Map Calibration" screen is displayed, select "Arm IN Reduce Pressure Control Map" by using the function switch or numeral input switches.
- ★ An example of arm IN reduce pressure control map calibration is described below. For other shafts, see the section describing the related shaft.



5. Selection of control map calibration check menu
After the "Arm IN Reduce Pressure Control Map" screen is displayed, select "Control Map Calibration Check" by using the function switch or numeral input switches.
- ★ Selecting method is the same as on "Service Menu" screen.

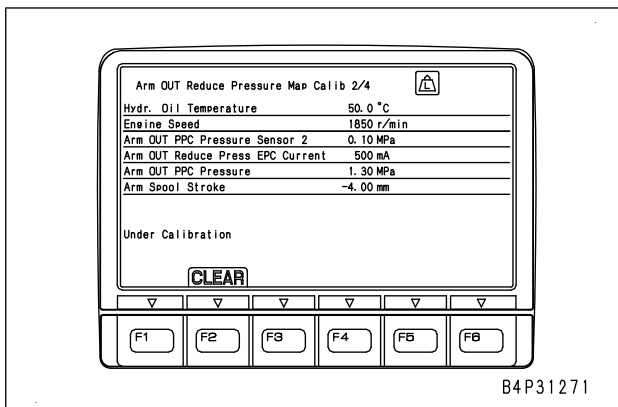
- ★ Perform warm-up operation to raise the hydraulic oil temperature on the previous screen.



- 7) Check the calibration conditions and hold down [F1] in the machine monitor to start the calibration at 500mA.

- ★ You cannot operate the work equipment by using this screen.
- ★ Calibration takes approximately 5.5 seconds.
- ★ Hydraulic oil temperature, engine speed, arm OUT PPC lever pressure, arm OUT reduce pressure EPC current, arm OUT PPC pressure and arm spool stroke during calibration are displayed in real time.
- ★ When calibration is finished, warning buzzer sounds and the display automatically shifts to the calibration result screen.

[F2]: Cancels calibration, and returns the display to the calibration start screen.

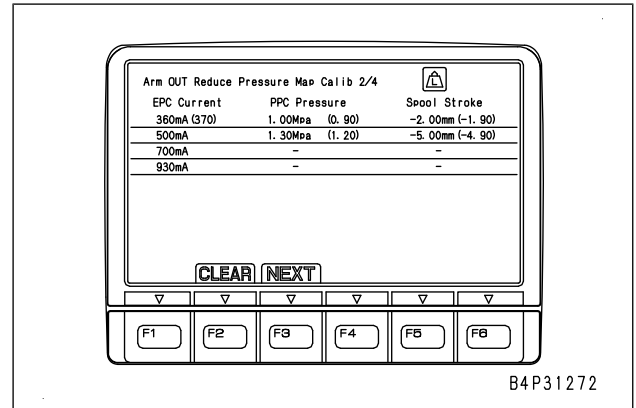


- 8) When the calibration is finished successfully, the calibration result at 500mA is displayed. PPC pressure at 500mA of arm OUT reduce pressure EPC and spool stroke are displayed.

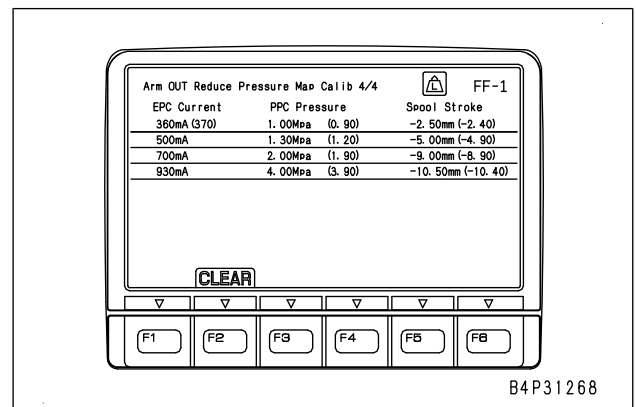
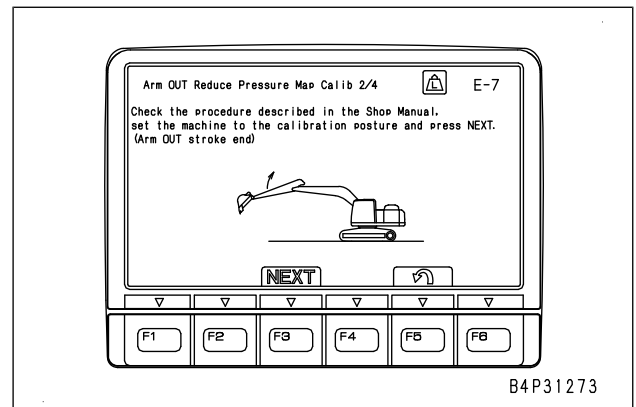
- ★ For standard values, see "Standard value table for machine".

- ★ A value in parentheses is the value memorized in the work equipment controller before calibration.

[F2]: Retries calibration.
[F3]: Moves to the next.



- ★ If the calibration is finished unsuccessfully, the calibration status is NG and a failure cause code is displayed. Check the cause referring to the failure cause code table (Table 4), and perform "Control Map Calibration" again.



- 9) Set the calibration posture at 700mA of EPC current value

Calibration posture

- Arm cylinder: Fully retracted position

[F3]: Moves the display to the next screen.

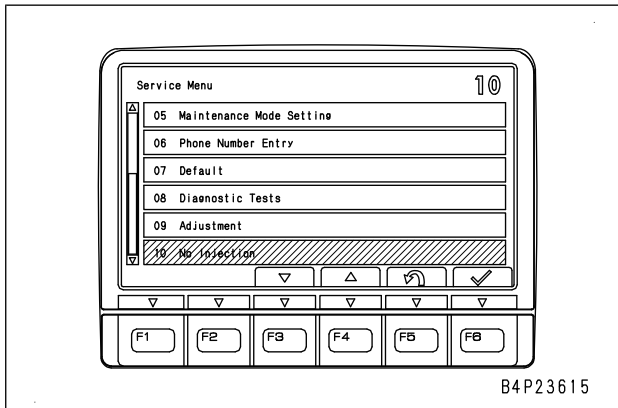
Cause code	Object							Content	Required action
	PPC pressure sensor calibration								
	Boom			Arm		Bucket			
	RAISE intervention	RAISE reduce pressure	LOWER reduce pressure	IN reduce pressure	OUT reduce pressure	CURL reduce pressure	DUMP reduce pressure		
WD-4	—	—	—	●	●	—	—	Arm IN pressure reducing EPC is defective.	Perform troubleshooting for arm IN pressure reducing EPC.
WD-5	—	—	—	●	●	—	—	Arm OUT pressure reducing EPC is defective.	Perform troubleshooting for arm OUT pressure reducing EPC.
WD-6	—	—	—	—	—	●	●	Bucket CURL pressure reducing EPC is defective.	Perform troubleshooting for bucket CURL pressure reducing EPC.
WD-7	—	—	—	—	—	●	●	Bucket DUMP pressure reducing EPC is defective.	Perform troubleshooting for bucket DUMP pressure reducing EPC.
WE-1	●	—	—	—	—	—	—	Boom RAISE intervention relay signal is OFF.	Perform troubleshooting for boom RAISE intervention relay signal.
WF-1	—	●	—	—	—	—	—	Boom RAISE lever full stroke is not operated.	Perform boom RAISE lever full stroke operation.
WF-2	—	—	●	—	—	—	—	Boom LOWER lever full stroke is not operated.	Perform boom LOWER lever full stroke operation.
WF-3	—	—	—	●	—	—	—	Arm IN lever full stroke is not operated.	Perform arm IN lever full stroke operation.
WF-4	—	—	—	—	●	—	—	Arm OUT lever full stroke is not operated.	Perform arm OUT lever full stroke operation.
WF-5	—	—	—	—	—	●	—	Bucket CURL lever full stroke is not operated.	Perform bucket CURL lever full stroke operation.
WF-6	—	—	—	—	—	—	●	Bucket DUMP lever full stroke is not operated.	Perform bucket DUMP lever full stroke operation.
WH-7	●	●	●	●	●	●	●	The engine speed is not Hi.	Set fuel control dial to the MAX position.
WH-8	●	●	●	●	●	●	●	PPC source pressure is low.	Perform troubleshooting for PPC source pressure.

No-Injection (PC200 ICT-AD00-25L-K-00-A)

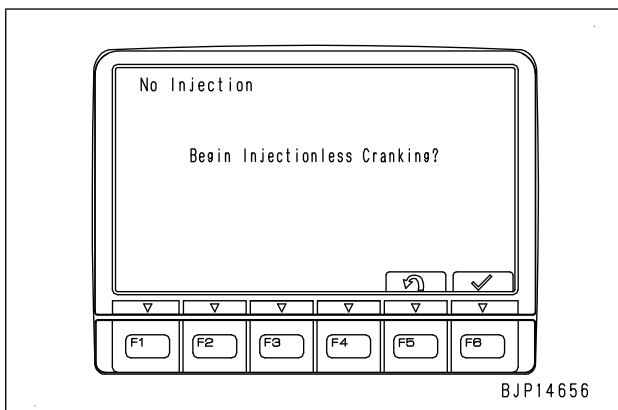
If the engine is operated after long storage of the machine, it may be worn or damaged because of insufficient lubrication with oil. To prevent this, the machine monitor has a function to crank the engine without injecting fuel to lubricate the engine before starting it.

Set no-injection cranking while the engine is stopped.

1. Selecting a menu
Select "No Injection" on "Service Menu" screen.

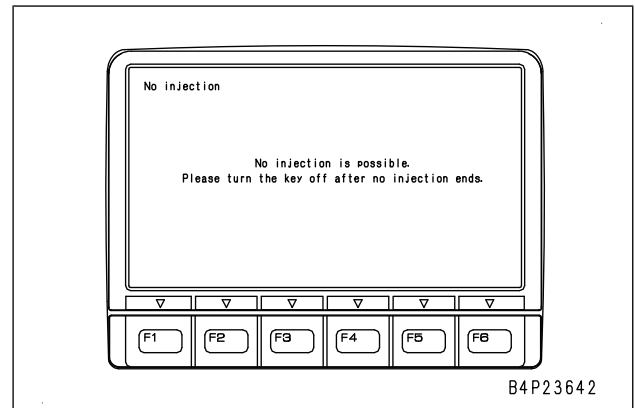


2. Displaying check screen
When the "No Injection" screen is displayed, the message to ask if "Begin Injectionless Cranking?" appears. Select the answer by using the function switch.
 - [F5]: Does not implement (returns the screen to "Service Menu")
 - [F6]: Executes

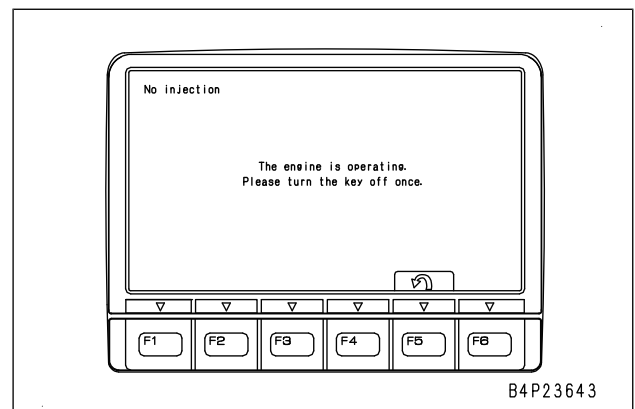


3. Starting no-injection cranking
If no-injection cranking (no fuel injection to every cylinder) is enabled, a message "No-injection is possible" is displayed on the screen. Under this condition, crank the engine with the starting motor.
 - ★ While the screen is changing to the following screen, the screen of "Getting Ready" is displayed.

- ★ Do not crank the engine for 20 seconds or longer to protect the starting motor.

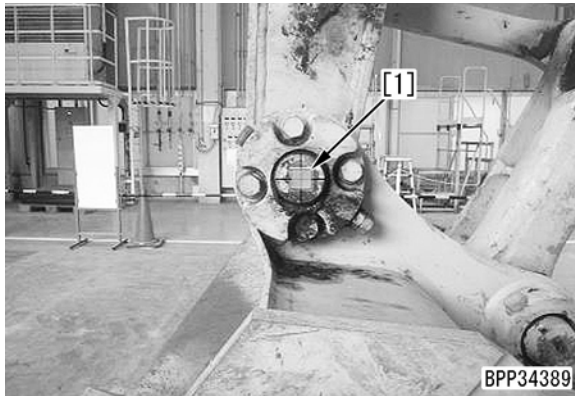


4. Finishing no-injection cranking
After the cranking is over, turn the starting switch to OFF position.
 - ★ You cannot change the screen described above to another screen.
5. Prohibiting no-injection cranking
Even if the operator tries to perform the no-injection cranking while the engine is running, the message "The engine is operating" is displayed and the no-injection cranking does not become effective.
 - ★ This function can be selected even when the engine is running. However, if you execute no-injection cranking, a message "The engine is operating. Please turn the key off once." is displayed on the screen.



Also, if no-injection cranking is operated when "Check" screen is displayed, the function does not become effective in the following case.

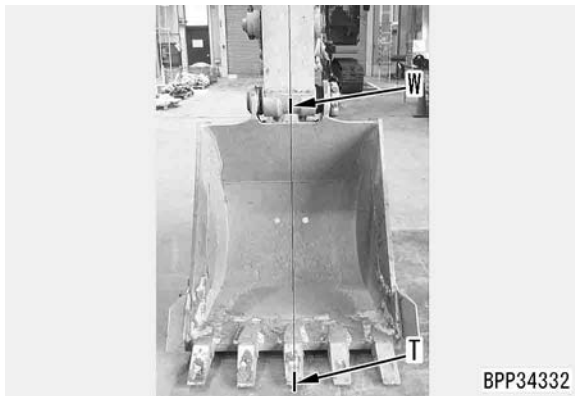
- The communication between the monitor and engine controller is not normal.
- Perform an engine start operation before the message "No injection is possible" is displayed.



BPP34389

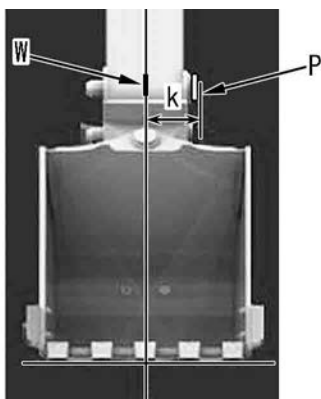
42. Draw a mark (W) at the center of the arm pin by using marker V3.

- Draw a mark (W) so that the virtual straight line between mark (W) and mark (T) is in parallel with the arm.



BPP34332

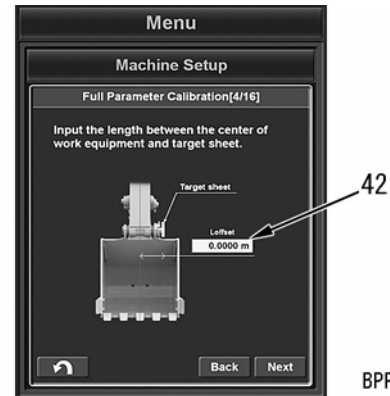
43. Measure the distance (k) from mark (W) at the center of the arm end to reflecting face (P) of reflector plate [1] stuck to center (f) of mounting pin of arm and bucket by using square V4.



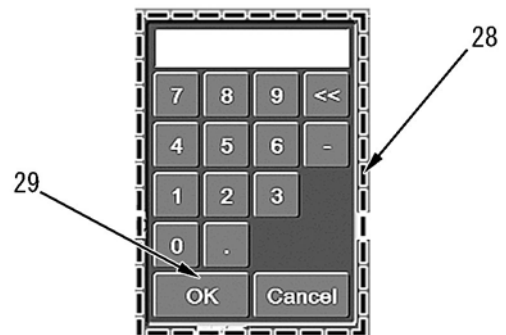
BPP34333

44. Press input column (42), and numeral keypad (28) appears. Input the correct value, and then press "OK" (29).

- ★ For input range, see "input range table for each measured value".



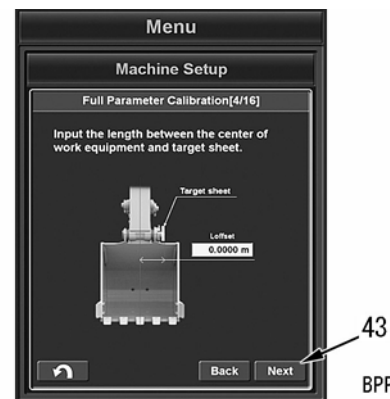
BPP34704



BPP34396

45. Press "Next" (43).

- The screen changes to "Full Parameter Calibration [5/16]" screen.

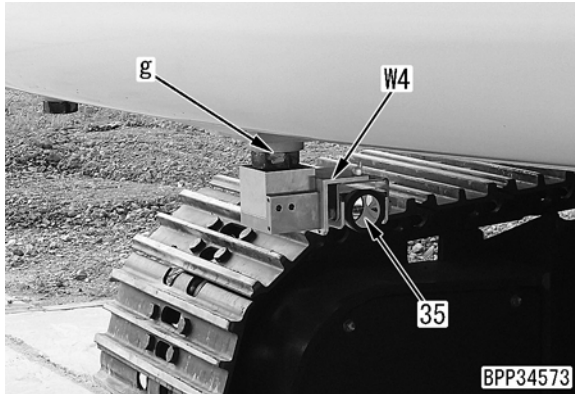


BPP34334

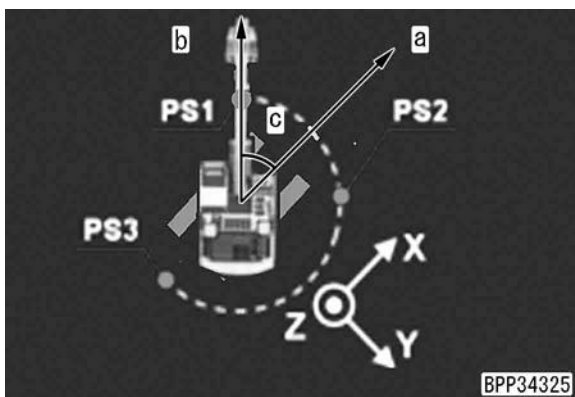
46. Slowly operate each part of the work equipment back and forth.

- ★ Leave the swing lock switch ON.
- ★ When moving each cylinder of the work equipment to the stroke end, operate it slowly so that the position or direction of the machine is not changed by shocks.

⚠ Be careful not to get your fingers in the special blade edge measuring jig W4 while installing it. Jig W4 is installed by using the attracting force of a powerful magnet.

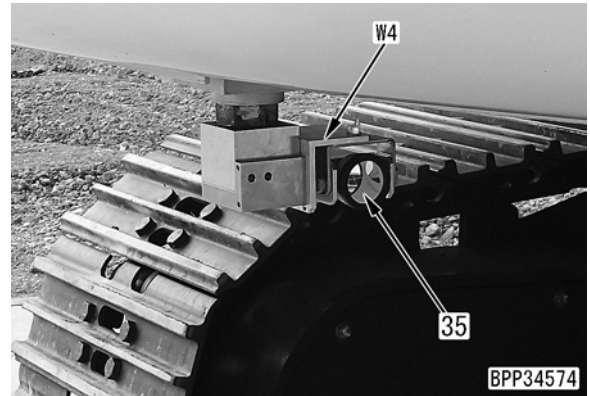


23. Swing the upper structure and direct the work equipment toward "PS1" on "Arm Top Calibration [1/7]" screen.
- When swinging, do not move the work equipment or track.
 - Standard of position "PS1"
Angle (c) between track direction (a) and work equipment direction (b): Approx. $60^\circ \pm 15^\circ$

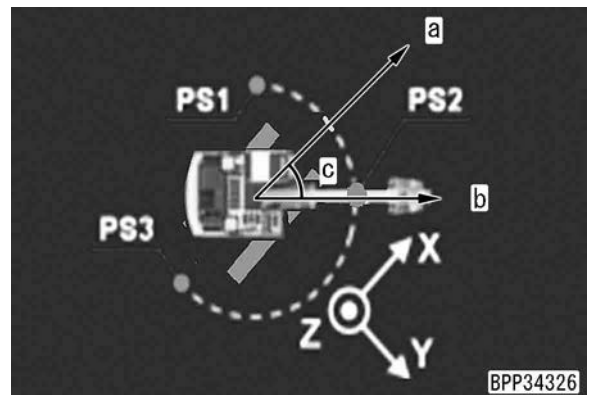


24. Rotate the prism (35) so that it faces forward to total station W1 as much as possible.

★ When special blade edge measuring jig W4 is adjusted by the rotation of prism (35), the measuring jig should not be moved if possible. A few millimeters of displacement should not be a problem.



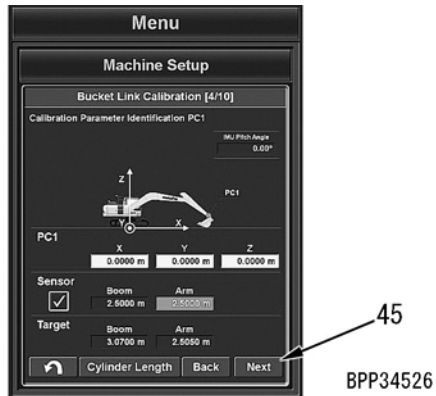
25. The operator of total station W1 measures the coordinates of special blade edge measuring jig W4, and records it.
- For the measuring method of the coordinates, see the Operation and Maintenance Manual for total station W1.
26. Swing the upper structure and direct the work equipment toward "PS2" on "Arm Top Calibration [2/7]" screen.
- When swinging, do not move the work equipment or track.
 - Standard of position "PS2"
Angle (c) between track direction (a) and work equipment direction (b): Approx. $60^\circ \pm 15^\circ$



27. Rotate the prism (35) so that it faces forward to total station W1 as much as possible.

★ When special blade edge measuring jig W4 is adjusted by the rotation of prism (35), the measuring jig should not be moved if possible. A few millimeters of displacement should not be a problem.

- The screen changes to "Bucket Link Calibration [5/10]" screen.



47. Adjust the bucket blade edge position by moving the work equipment so that "sensor value" (46) of boom/arm cylinder length on "Bucket Link Calibration [5/10]" screen matches with "target value" (47).

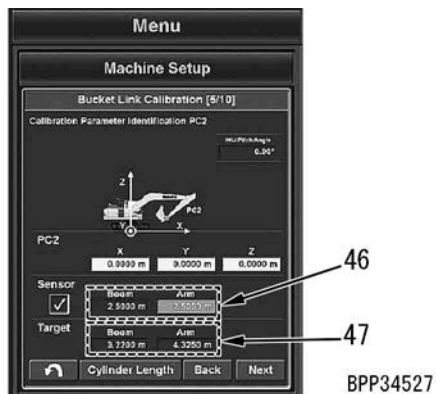
★ Leave the swing lock switch ON.

★ Reduce the difference between "sensor value" (46) and "target value" (47) to ± 0.010 (m) or less.

- The bucket cylinder may be set to any length.
- If the bucket touches the ground and you cannot adjust the difference to ± 0.010 (m) or less, leave the bucket at the position where it touches the ground.

★ When moving each cylinder of the work equipment to the stroke end, operate it slowly so that the position or direction of the machine is not changed by shocks.

★ Touch the bucket to the ground so lightly that the tracks do not float.



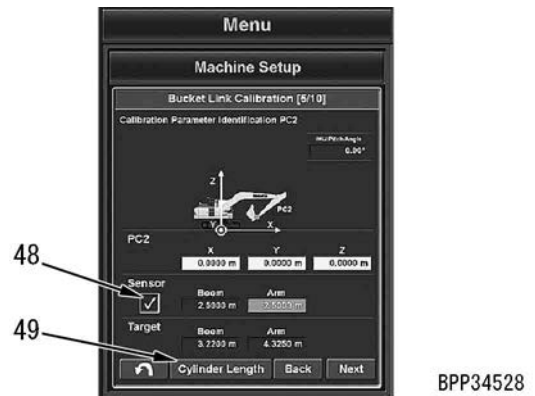
48. The operator of total station X1 measures and records the coordinates of the center of reflector plate [1] installed to the center of the pin at the arm end. After recording, the total station operator makes a sign of measurement completion of coordinates to the machine operator.

- For the measuring method of the coordinates, see the Operation and Maintenance Manual for total station X1.

49. Upon receiving the sign from the operator of total station X1, press "Cylinder Length" (48).

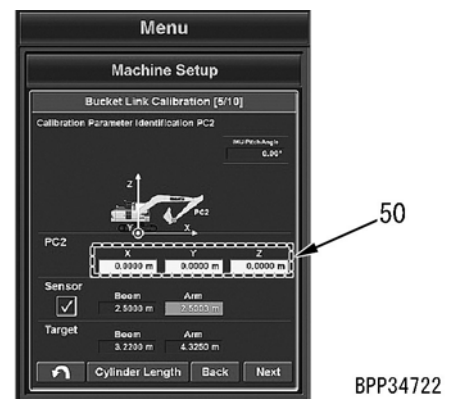
★ After receiving the sign, press "Cylinder Length" (48) immediately.

- When the length of the cylinder is saved in the control box, the check box (49) will be checked.
- If you press "Cylinder Length" (48) again, the check box is unchecked and you can save the cylinder length again.

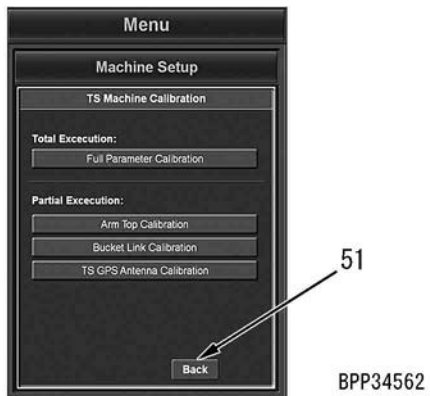


50. Input the coordinates of the center of the arm pin recorded in the procedure 48.

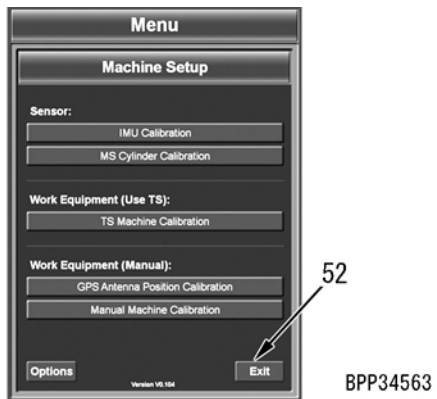
- Press input column (50), and numeral keypad (28) appears. Input the coordinates, and then press "OK" (29).
- For input range, see "input range table for each measured value".



76. "TS Machine Calibration" menu is displayed, and calibration is completed. Press Exit (51) to return to the standard screen. "Back" (43) and return the screen to "Machine Setup".

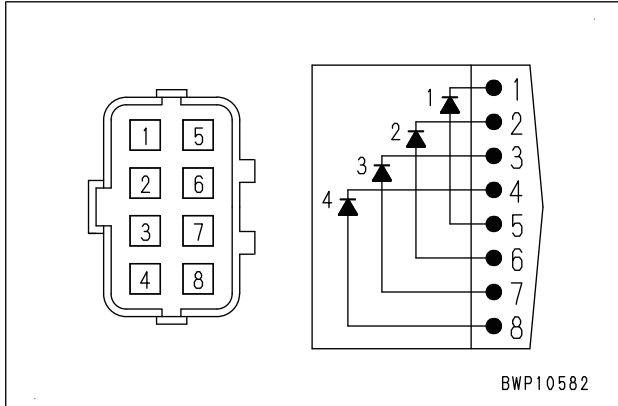


77. Press "Exit" (52) to return the screen to the standard screen.



Testing diodes (ALL-E300-001-P-00-A)

- ★ Test the diode array (8-pin) and the single diode (2-pin) according to the following procedure.
- ★ The continuity directions of the diode array are as follows.



- ★ The continuity direction of the single diode is indicated on the surface of the diode.

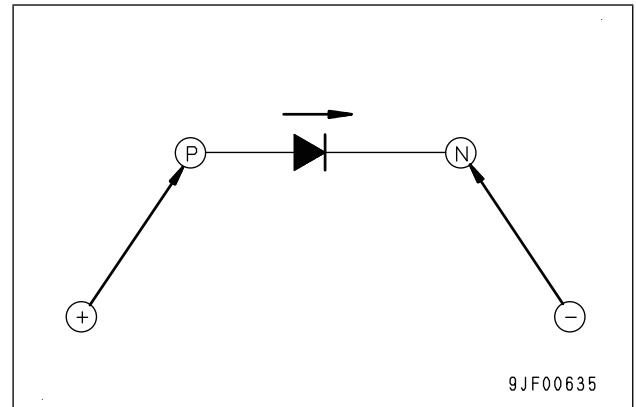
Testing (PC220-E300-36J-P-00-A)

1. When using a digital tester

- 1) Select the diode range screen to check the displayed values.
 - ★ When an ordinary circuit tester is used, the voltage of the internal battery is indicated.
- 2) Apply the red (+) lead of the multimeter to the anode (P) side of the diode and apply the black (-) lead to the cathode (N) side and check the indicated value.
- 3) Evaluate the condition of the diode by the indicated value.
 - Indicated value does not change: No continuity (defective)
 - Indicated value changes: Continuity (normal) (note)

Note: In the case of a silicon diode, a value in the range from 460 to 600 mV is indicated.

- The indicated value is 0 or approximate 0:
The diode has internal short circuit (defective).

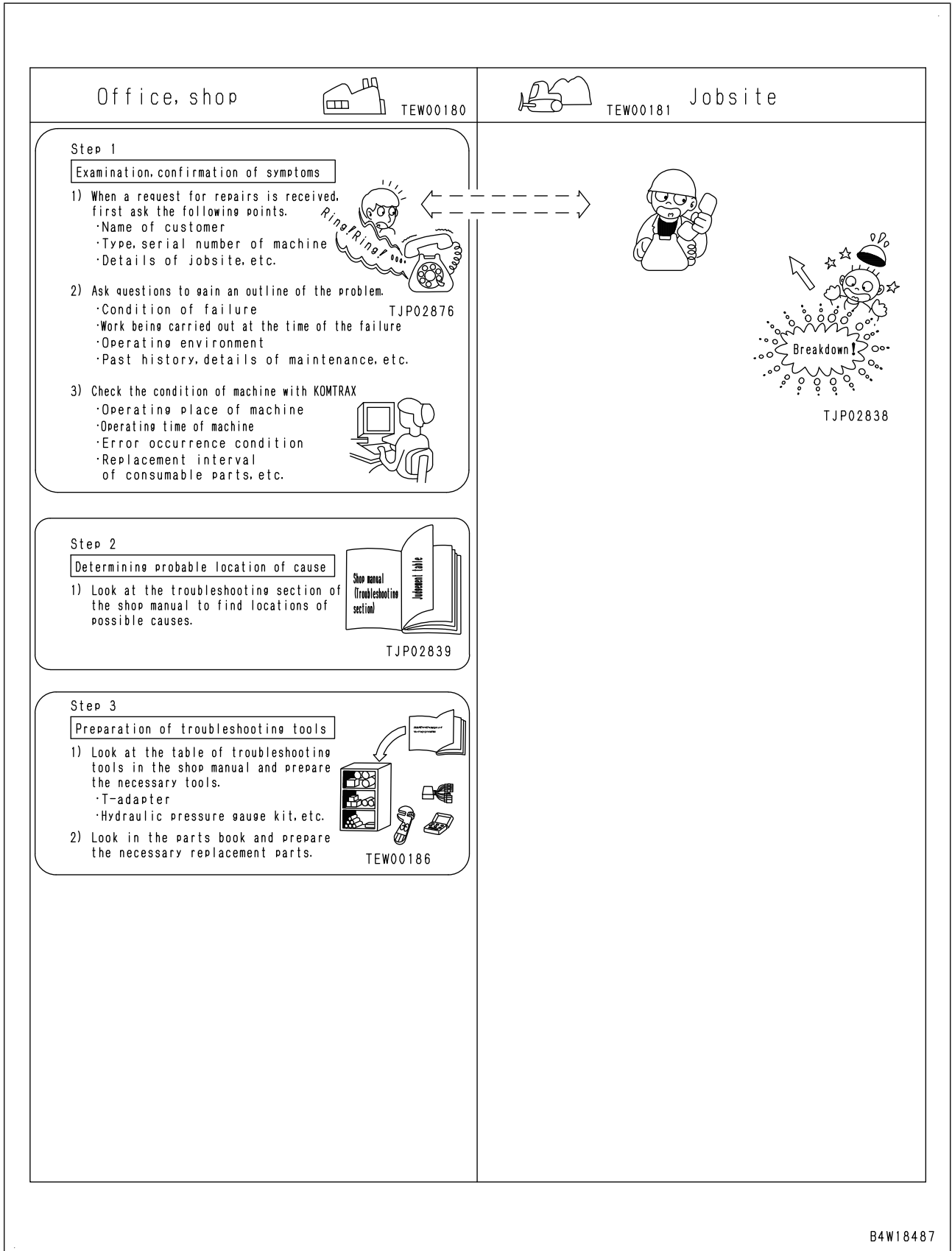


2. When using analog tester

- 1) Selects the resistance range screen.
- 2) Check the movement of the pointer when performing the following connection.
 - 1] Apply the red (+) lead of the multimeter to the anode (P) side of the diode and apply the black (-) lead to the cathode (N) side.
 - 2] Apply the red (+) lead of the multimeter to the cathode (N) side of the diode and apply the black (-) lead to the anode (P) side.
- 3) Evaluate the condition of the diode by the movement of the pointer.
 - The pointer does not move by the above 1] connection, but it does by the 2] connection: Normal (however, the movement of the pointer (resistance) varies by type of tester, or selection of measuring range).
 - The pointer moves by either connection of the above 1], and 2]: Defective (internal short circuit)
 - The pointer moves by neither connection the above 1], nor 2]: Defective (internal open circuit)

Sequence of events in troubleshooting (ALL-5140-42A-A-00-A)

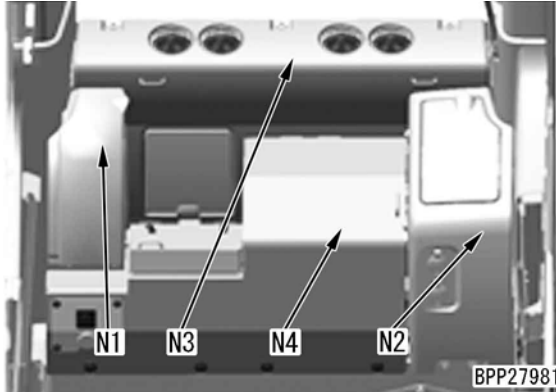
(Rev. 2011.7)



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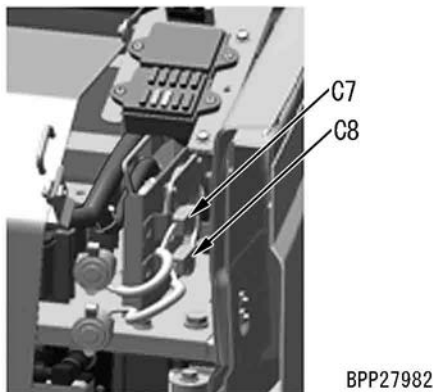
3. Pump controller

- 1) Slide the operator's seat and seat stand to the forward end.
- 2) Remove box (N1) (5 bolts).
- ★ Disconnect the hose at the bottom of box (N1).



- 3) Remove box (N2) (4 bolts and 1 clip).

- ★ Be careful about connector (C7) and (C8) behind box (N2).
- Connector (C7): 12V power socket intermediate harness (M12)
- Connector (C8): 12V power socket intermediate harness (M13)

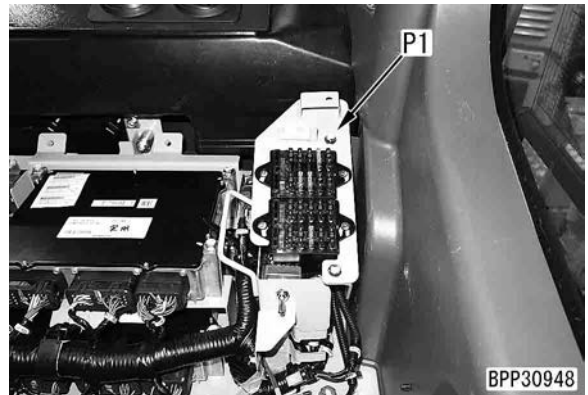


- 4) Remove cover (N3) (3 bolts).
- 5) Remove cover (N4) (9 bolts).
- 6) Disconnect connector (C0) behind cover (N4).
- Connector (C0): Cigarette lighter

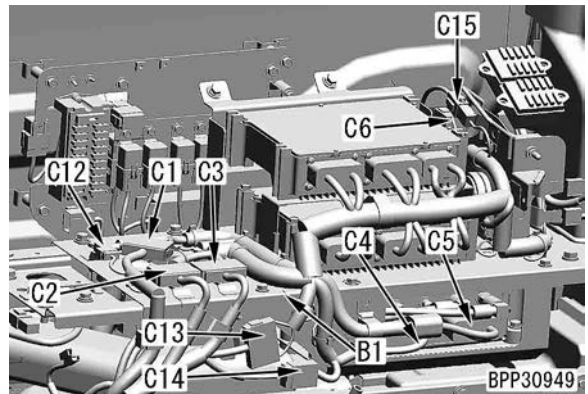


- 7) Remove bolts (2 pieces) of fuse box plate (P1).

- ★ Cut the cable ties that are fixing the harness.



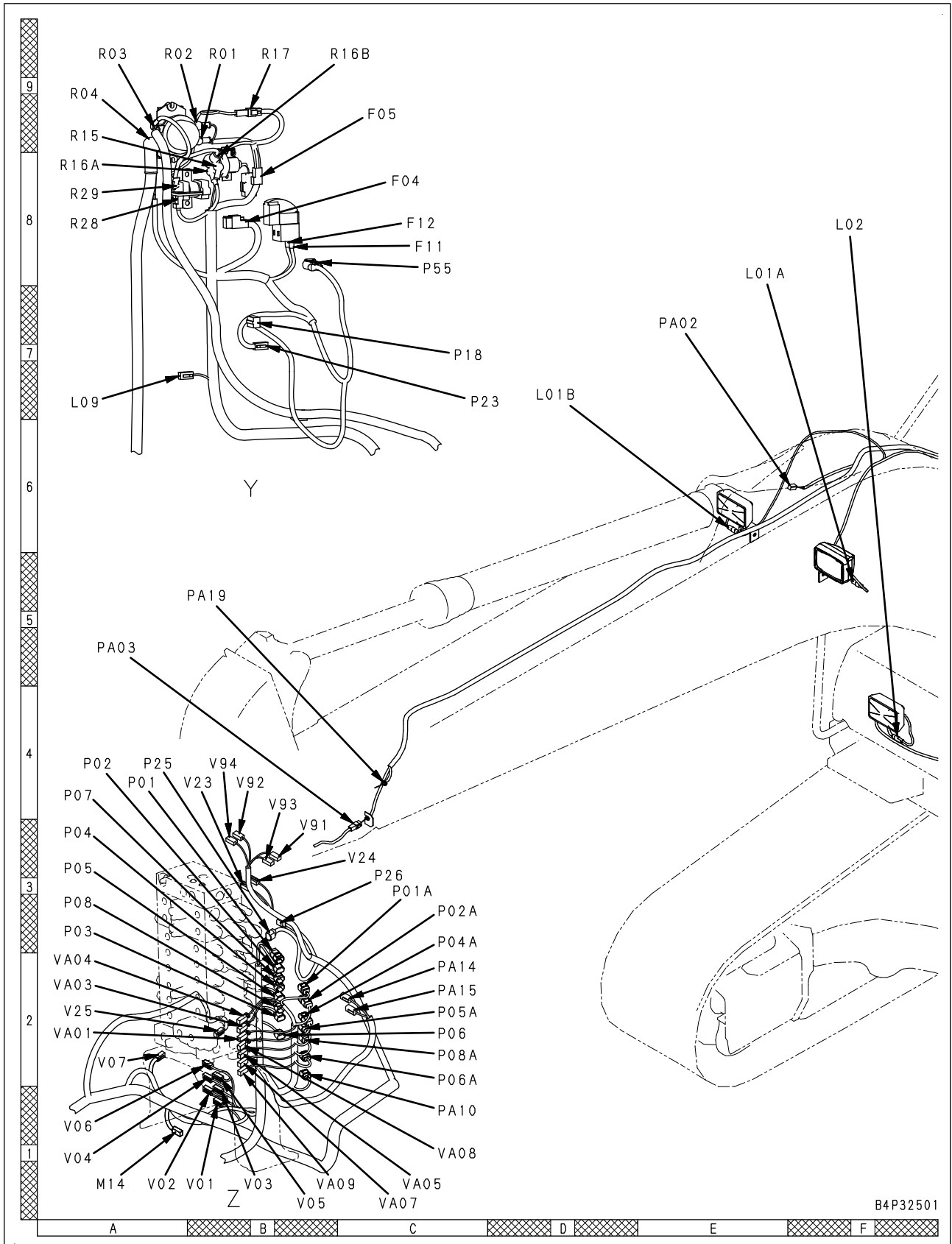
- 8) Remove bracket (B1) (4 bolts).
- 9) Disconnect connectors (C1), (C2), (C3), (C4), (C5) and (C6).



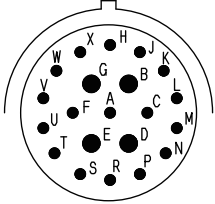
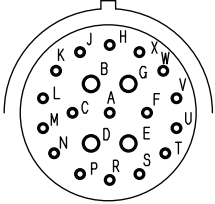
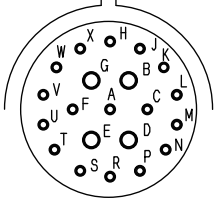
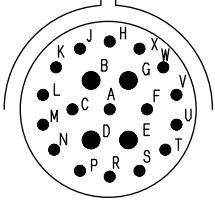
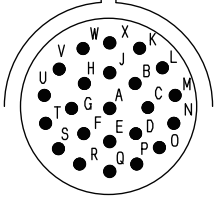
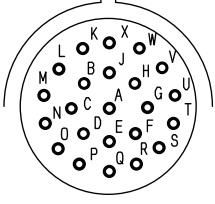
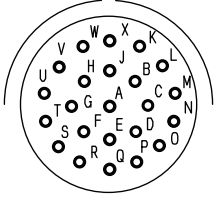
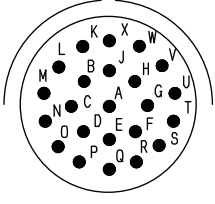
- Connector (C1): ICT harness (AA27)
- Connector (C2): ICT harness (AA16)
- Connector (C3): ICT harness (AA22)
- Connector (C4): ICT harness (CG02)
- Connector (C5): ICT harness (CG01)
- Connector (C6): ICT harness (AA15)
- Connector (C12): ICT harness (AA12)
- Connector (C13): ICT harness (AA17)
- Connector (C14): ICT harness (AA19)
- Connector (C15): ICT harness (AA18)

- 10) Cut the cable tie that are fixing the harness.
- 11) Connect test adapters to connectors CP01 and CP02 of pump controller (15).

Layout of connectors (1/6)



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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
24-21 (7)	Pin (male terminal)	Socket (female terminal)	799-601-9270 (T-adapter)
			
	Part No. :08191-71201, 08191-71202, 08191-71205, 08191-71206	Part No. :08191-74101, 08191-74102, 08191-74105, 08191-74106	
	Socket (female terminal)	Pin (male terminal)	
24-23 (8)	Socket (female terminal)	Pin (male terminal)	799-601-9280 (T-adapter)
			
	Part No. :08191-72201, 08191-72202, 08191-72205, 08191-72206	Part No. :08191-73101, 08191-73102, 08191-73105, 08191-73106	
	Pin (male terminal)	Socket (female terminal)	
24-23 (8)	Pin (male terminal)	Socket (female terminal)	799-601-9280 (T-adapter)
			
	Part No. :08191-81201, 08191-81202, 08191-81203, 08191-81204, 08191-81205, 08191-80206	Part No. :08191-84101, 08191-84102, 08191-84103, 08191-84104, 08191-84105, 08191-84106	
	Socket (female terminal)	Pin (male terminal)	
24-23 (8)	Socket (female terminal)	Pin (male terminal)	799-601-9280 (T-adapter)
			
	Part No. :08191-82201, 08191-82202, 08191-82203, 08191-82204, 08191-82205, 08191-82206	Part No. :08191-83101, 08191-83102, 08191-83103, 08191-83104, 08191-83105, 08191-83106	

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Part No.	Part name	Number of pins	Identifi- cation Symbol	T-adapter kit												Not included in kit	
				799-601-2500	799-601-2700	799-601-2800	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300		799-601-4101
	Oil pressure switch																
799-601-4180	Adapter PEVA for engine (CRI-T3)	3	4180													●	●
799-601-4190*	Socket for engine (CRI-T3) Common rail pressure	3	1, 2, 3 L													●	●
799-601-4230*	Socket for engine (CRI-T3) Intake pressure/ temperature	4	1, 2, 3, 4 C													●	●
799-601-4240*	Socket PAMB for engine (CRI-T3)	3	1, 2, 3A													●	●
799-601-4250*	Socket PIM for engine (CRI-T3)	3	1, 2, 3B													●	●
799-601-4330*	Socket G for engine (CRI-T3)	3	1, 2, 3, G													●	●
799-601-4340*	Socket for engine (CRI-T3) Pump actuator	2	2, PA													●	●
799-601-4380*	Socket for engine (CRI-T3) (95) Intake pressure/ temperature	4	1, 2, 3, 4T														●
799-601-4260	Adapter for controller (ENG)	4	DTP4													●	●
799-601-4211	Adapter for controller (ENG)	50	DRC50													●	
799-601-4220	Adapter for controller (ENG)	60	DRC60													●	
799-601-4390*	Socket for controller (95ENG)	60															●
799-601-4280*	Box for controller (PUMP)	12- 1															●
799-601-9720	Adapter for controller (HST)	16	HST16A														●
799-601-9710	Adapter for controller (HST)	16	HST16B														●
799-601-9730	Adapter for controller (HST)	26	HST26A														●
799-601-9890	Multi-adapter for DT 2 to 4, DTM 2 pins	2, 3, 4															●
799-902-9600	T-adapter for ICT control box	26															●
799-902-9700	T-box	26															●

*: These are not T-adapters but sockets.

Failure code [879BKA] A/C Outer Sensor Open Circuit (PC220-879BKA-441-A-00-A)

See "Failure code [879BKA] A/C Outer Sensor Open Circuit" of Section 80 Appendix.

Failure code [B@HANS] Hyd Oil Overheat (PC220_10-BaHANS-400-A-01-A)

Action level	Failure code	Failure	Hydraulic oil overheat (Pump controller system)
L02	B@HANS		
Details of failure	<ul style="list-style-type: none"> While engine is running, pump controller determines that hydraulic oil overheats (above approx. 105°C) from signal voltage of hydraulic oil temperature sensor. 		
Action of controller	<ul style="list-style-type: none"> Displays hydraulic oil temperature monitor red on machine monitor. If cause of failure disappears, machine becomes normal by itself. 		
Problem on machine	<ul style="list-style-type: none"> If machine is operated as it is, hydraulic components may be damaged. 		
Related information	<ul style="list-style-type: none"> Signal of hydraulic oil temperature sensor is input to pump controller and then data is transmitted to machine monitor through CAN communication system. Hydraulic oil temperature can be checked with monitoring function. (Code: 04401 Hydraulic oil temperature) Refer to following troubleshooting described in E mode troubleshooting section. <ul style="list-style-type: none"> E-21 Hydraulic oil temperature gauge indicates either Min. or Max. and does not move E-22 Hydraulic oil temperature gauge indicates incorrect temperature (indicates neither Min nor Max) Method of reproducing failure code: Starting engine. 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Overheating of hydraulic oil (when system works properly)	Hydraulic oil may overheat. Check it and remove cause if it overheats.	
2	Defective hydraulic oil temperature gauge system	If no failure is found by above checks, hydraulic oil temperature gauge system may be defective. Perform troubleshooting for failure code [DGH2KB].	

Failure code [CA227] Sensor 2 Supply Volt High Error (PC200 ICT-CA227-400-A-Z0-A)

Action level	Failure code	Failure	Sensor 2 Supply Voltage High Error (Engine controller system)
L03	CA227		
Detail of failure	<ul style="list-style-type: none"> High voltage is generated in sensor power supply 2 circuit. 		
Action of controller	<ul style="list-style-type: none"> Ignores signals from Bkup speed sensor and controls engine by using Ne speed sensor signals. Ignores signals from ambient pressure sensor, sets ambient pressure to fixed value (52.44 kPa {0.53 kg/cm²}), and runs engine. Ignores signals from charge (boost) pressure sensor and runs engine by setting boost pressure to calculated value. Ignores signals from crankcase pressure sensor, sets crankcase pressure to fixed value (0 kPa), and runs engine. Closes EGR valve. Limits engine output and runs engine. Stops KDPF regeneration control. 		
Problem on machine	<ul style="list-style-type: none"> Engine output lowers. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria, and remarks	
1	Sensor 2 Supply Voltage High Error	Perform troubleshooting for failure code [CA187].	

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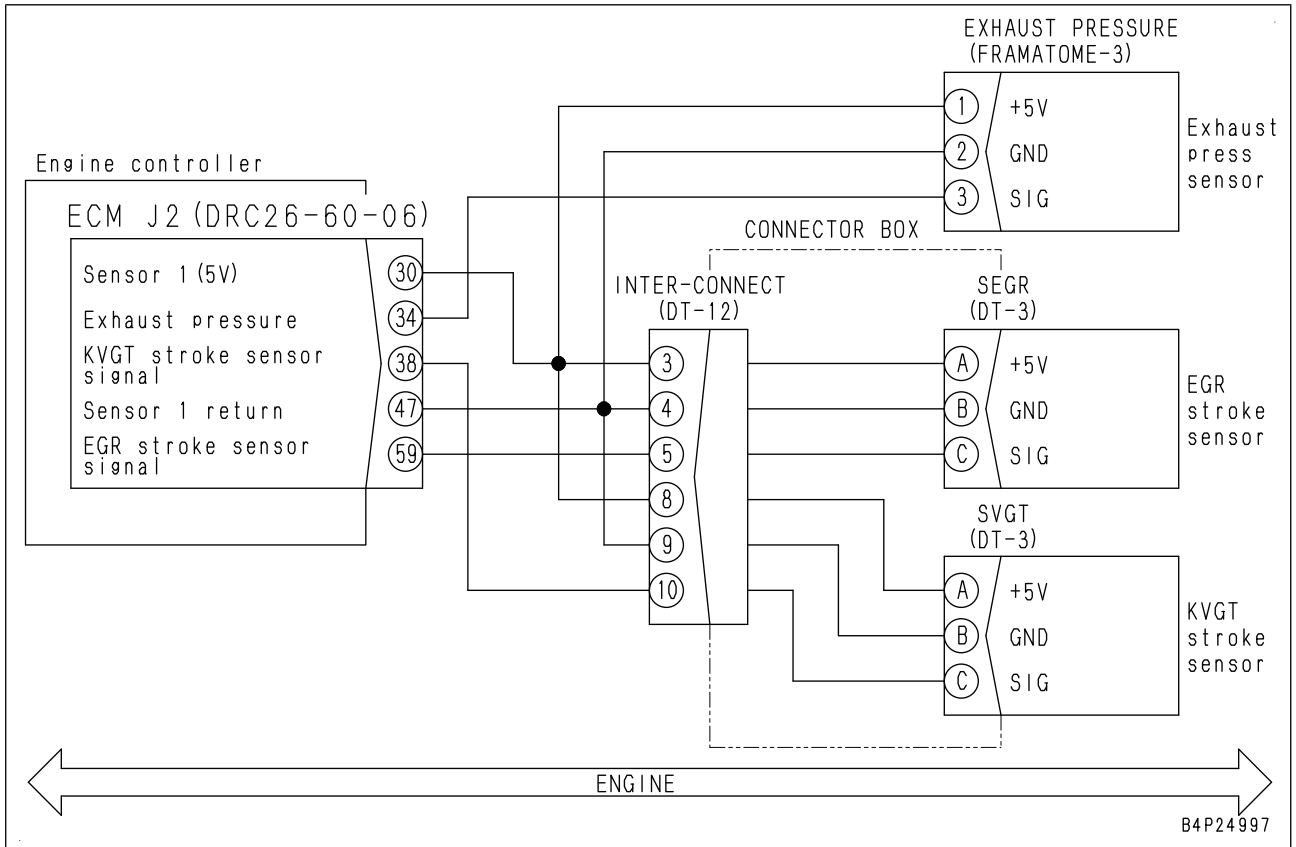
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Circuit diagram related to sensor power supply 1 circuit



Failure code [CA553] Rail Press High Error (D65-CA553-400-A-Z0-A)

Action level	Failure code	Failure	Rail Pressure High Error (Engine controller system)
L01	CA553		
Detail of failure	<ul style="list-style-type: none"> Excessively high pressure trouble (1) has occurred in the common rail circuit. 		
Action of controller	<ul style="list-style-type: none"> None in particular 		
Problem on machine	<ul style="list-style-type: none"> Engine noise becomes louder at no or light load. Engine output lowers. 		
Related information	<ul style="list-style-type: none"> Common rail pressure can be checked with monitoring function. (Code: 36400) Method of reproducing failure code: Start engine. 		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defect in related system	If another failure code is displayed, perform troubleshooting for it.
2	Defective connection of ground terminal	Connection of ground terminals may be defective. Check the following terminals. <ul style="list-style-type: none"> Ground terminal of machine ((-) terminal of battery) Ground terminal of engine Ground terminal of engine controller Ground terminal of starting motor
3	Defective common rail pressure sensor system	Perform troubleshooting for failure code [CA451], [CA452]

Failure code [CA1664] KDOC Malfunction (PC200LC_10-CA1664-400-A-Z0-A)

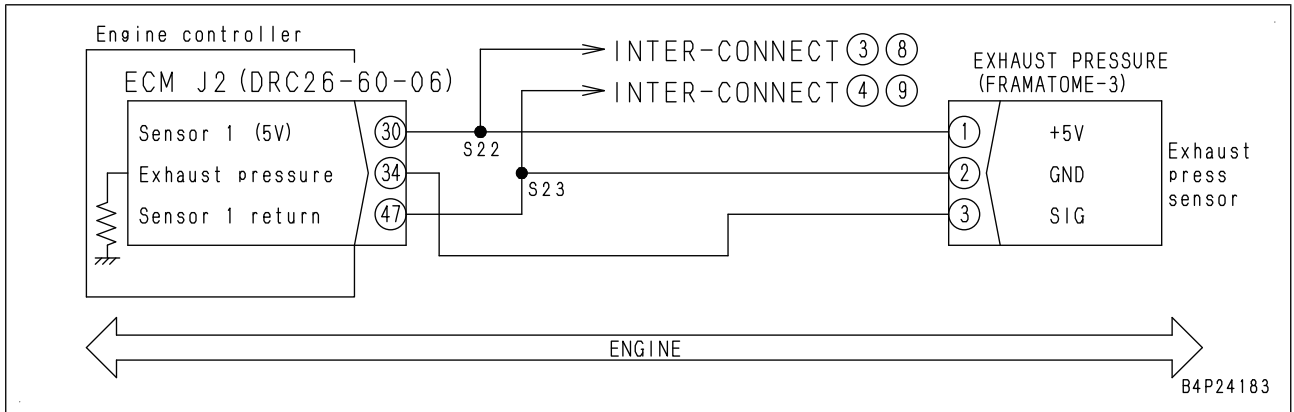
Action level	Failure code	Failure	KDOC Malfunction (Engine controller system)
L03	CA1664		
Detail of failure	<ul style="list-style-type: none"> During KDPF regeneration, KDOC inlet temperature sensor and KDOC outlet temperature sensor indicate similar values (temperature difference is approximately within 10°C). 		
Action of controller	<ul style="list-style-type: none"> Closes EGR valve Limits engine output and allows engine to run. Stops KDPF regeneration control. <p>★ You can cancel above measures by "turning starting switch to OFF position once, then turning starting switch to ON position" after failure code is generated.</p>		
Problem on machine	<ul style="list-style-type: none"> Engine output decreases. 		
Related information	<p>⚠ Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.</p> <ul style="list-style-type: none"> Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when engine is at idle (KDPF regeneration is not executed) are approx. 100 to 250°C, and difference between these temperatures is approx. 10°C. (KDOC inlet temperature > KDOC outlet temperature > KDPF outlet temperature) When active regeneration (manual stationary regeneration) is in progress, KDOC inlet temperature is approx. 250 to 400°C, and KDOC outlet temperature and KDPF outlet temperature are approx. 450 to 550°C. KDOC inlet temperature sensor connector label "TEMP1" expressed in black embossed letters is seen on KDPF temperature sensor consolidating box (KDOC outlet temperature sensor connector label "TEMP2" and KDPF outlet sensor connector label "TEMP3" are shown similarly to "TEMP1"). As to procedure for accessing KDPF temperature sensor, see 50 Disassembly and assembly, "Removal and installation of KDPF assembly" and "Disassembly and assembly of KDPF". Engine controller stops approximately 30 seconds after starting switch is turned to the OFF position. So when you restart engine, wait one minute minimum before turning starting switch to the ON position again. 		
Machine operation for clearing failure code	<ul style="list-style-type: none"> When this failure code appears, perform troubleshooting according to following work flow. <p>A. Identification of cause and repair ↓ B. Machine operation for clearing failure code</p> <p>★ This failure code does not disappear by simply turning starting switch to ON position from OFF position after repair. You must perform machine operation for clearing failure code after repair trouble.</p>		

A. Identification of cause and repair

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC inlet temperature sensor	If failure code [CA3313], [CA3314], or [CA3315] is also displayed, perform troubleshooting for [CA3313], [CA3314], or [CA3315].
2	Defective KDOC outlet temperature sensor	If failure code [CA3316], [CA3317], or [CA3318] is also displayed, perform troubleshooting for [CA3316], [CA3317], or [CA3318].

No.	Cause	Procedure, measuring location, criteria and remarks			
3	Defective KDPF (KCSF) (abnormal condition of soot accumulation)	<ul style="list-style-type: none"> ★ When the actual soot accumulation is less than the displayed value on the machine monitor 1. Proceed to checks on cause 4 to 7. 2. Turn the starting switch to the ON position, and perform the reset after KDPF cleaning (see "Related information"). <ul style="list-style-type: none"> ★ Check that failure code [CA1922] is changed to [CA1921]. ★ If the failure code [CA1922] continues, check the resetting procedure after KDPF cleaning, and perform the reset after KDPF cleaning again. 3. Start the engine. 4. Make sure that machine is in safe condition. 5. Perform manual stationary regeneration from user mode. <ul style="list-style-type: none"> ★ When the manual stationary regeneration is finished correctly, the repair is completed. ★ If failure code [CA1922] is displayed again within 1 hour after starting the manual stationary regeneration, perform Step 2 and 3 again. ★ If the regeneration does not complete within 3 hours, perform the troubleshooting of [CA2639]. ★ Check that failure code is not displayed after manual stationary regeneration is completed. ★ If failure code [CA1922], [CA1921] or [CA2639] is displayed after manual stationary regeneration is completed, perform checks on cause 8. 			
4	Defective KDOC inlet temperature sensor	If failure code [CA3313], [CA3314], or [CA3315] is displayed, perform troubleshooting for [CA3313], [CA3314], or [CA3315].			
5	Defective KDOC outlet temperature sensor	If failure code [CA3316], [CA3317], or [CA3318] is displayed, perform troubleshooting for [CA3316], [CA3317], or [CA3318].			
6	Defective KDPF outlet temperature sensor	If failure code [CA3319], [CA3321] or [CA3322] is displayed, perform troubleshooting for [CA3316], [CA3321] or [CA3322].			
7	Defective KDPF differential pressure sensor (including sensor tubes)	1. Turn starting switch to the ON position. 2. Monitor differential pressure sensed by KDPF differential pressure sensor on monitoring screen of machine monitor.			
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; text-align: center;">Code</td> <td style="width: 40%; text-align: center;">47,100 (kPa)</td> <td style="width: 30%; text-align: center;">0 ± 3 (kPa)</td> </tr> </table>	Code	47,100 (kPa)	0 ± 3 (kPa)
		Code	47,100 (kPa)	0 ± 3 (kPa)	
<ul style="list-style-type: none"> ★ If the differential pressure is outside of the above range, perform the following. 1. Remove KDPF differential pressure sensor tube. 2. Clean KDPF differential pressure sensor tube to clear clogging. <ul style="list-style-type: none"> ★ If the KDPF differential pressure sensor tube is not clogged, perform the following. 3. Perform for "Short circuit in wiring harness" of failure code [CA1881] or [CA1883]. (If no short circuit occurs, replace the KDPF differential pressure sensor.) 					

Circuit diagram related to exhaust manifold pressure sensor



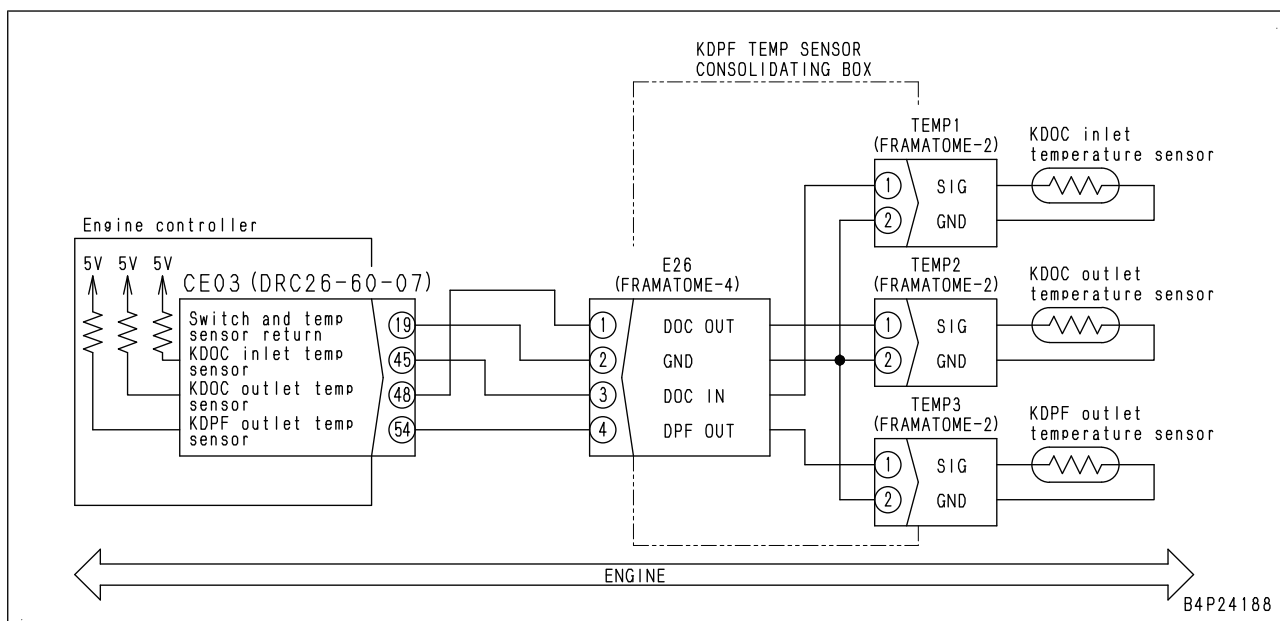
Failure code [CA2639] Manual Stationary Regeneration Request (PC200LC_10-

CA2639-400-A-Z0-A)

Action level	Failure code	Failure	Manual Stationary Regeneration Request (Engine controller system)
L01	CA2639		
Detail of failure	<p>The "Manual Stationary Regeneration Request" prompts operator to forcibly perform the "Manual Stationary Regeneration", which is more effective to remove soot, because soot accumulation in the KCSF of KDPF has exceeded level for the automatic regeneration.</p> <ul style="list-style-type: none"> Soot accumulation reaches level 4 or 5. 		
Action of controller	<ul style="list-style-type: none"> Normal control 		
Problem on machine	<ul style="list-style-type: none"> None in particular 		
Related information	<p>⚠ Since KDOC and KDPF are heated to 500°C or above, take care not to get burn injury.</p> <ul style="list-style-type: none"> Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) KVGT solenoid current can be checked with monitoring function. (Code: 48800 (mA)) Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when engine is at idle (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 the active regeneration (the 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. KDOC inlet temperature sensor connector label "TEMP1" expressed in black embossed letters is seen on KDPF temperature sensor consolidating box (KDOC outlet temperature sensor connector label "TEMP2" and KDPF outlet sensor connector label "TEMP3" are shown similarly to "TEMP1"). How to perform the manual stationary regeneration <ol style="list-style-type: none"> Start the engine. Make sure that machine is in safe condition. From the service menu of the machine monitor, display the "Diagnostic Tests" screen, open "Regeneration for Service", and perform the "Manual Stationary Regeneration". ★ While the regeneration for service is in progress, the "monitoring" screen is displayed by performing the switch operation: keep pressing numeral input switch [4] and sequentially press [1], [2], and [3] in order. (For detail, see Testing and adjusting "Regeneration for service" .) 		

No.	Cause	Procedure, measuring location, criteria and remarks
B. Machine operation for clearing failure code		
<p>1. Turn starting switch from OFF position to ON position and leave it there for 1 minute.</p> <ul style="list-style-type: none"> • If failure code disappears, repair is complete. <p>If failure code is not cleared, perform following steps.</p> <p>2. Start engine and run it at low idle (with no load) for approximately 15 minute.</p> <ul style="list-style-type: none"> • If failure code disappears, repair is complete. <p>If failure code is not cleared, perform following steps.</p> <p>★ If failure code remains uncleared after above steps 1 and 2 are implemented, following temperature requirements are included in clearing condition. Steps 3 and 4 are required to satisfy temperature requirements.</p> <ul style="list-style-type: none"> • KDOC outlet temperature ≥ 200 °C • KDPF outlet temperature ≥ 200 °C <p>3. Use monitoring function to display KDOC inlet and KDPF outlet temperatures.</p> <p>4. Use work equipment to raise either track off ground.</p> <p>5. Set swing lock switch to ON position and working mode to P-mode.</p> <p>6. Run that track idle off ground for continuous 3 minutes with fuel control dial at MAX position and travel speed at Hi setting.</p> <ul style="list-style-type: none"> • If failure code disappears, repair is complete. • After above steps are implemented, if failure code is not cleared because of low ambient temperature (at -20°C level), perform following steps. <p>7. Turn starting switch to OFF position.</p> <p>8. Disconnect connector E26 (in KDPF temperature sensor consolidating box) and install dummy temperature sensor to wiring harness side.</p> <p>9. Turn starting switch from OFF position to ON position.</p> <p>10. Monitor KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature, and check that each temperature ranges from approximately 560 to 590°C. For details, see Related information.</p> <p>11. Start engine and run it at low idle (with no load) for approximately 15 minute.</p> <p>If failure code disappears after implementing steps 7 to 11, repair work is complete.</p> <p>12. Turn engine starting switch to OFF position</p> <p>13. Remove dummy temperature sensor to restore connector connection.</p> <p>★ When service tool "INSITE" is available, you can clear every failure code by executing "Reset All Faults" command.</p> <p>For how to use "INSITE", see "INSITE" operation manual.</p>		
9	Defective engine controller	If this failure code appears again after above procedures are implemented, engine controller is defective.

Circuit diagram related to KDOC and KDPF temperature sensors



Failure code [CA3317] KDOC Outlet Temp Sens High Error (PC200LC_10-CA3317-400-

A-Z0-A)

Action level	Failure code	Failure	KDOC Outlet Temperature Sensor High Error (Engine controller system)
L03	CA3317		
Detail of failure	<ul style="list-style-type: none"> High voltage appears in KDOC outlet temperature sensor circuit. 		
Action of controller	<ul style="list-style-type: none"> Uses KDOC inlet temperature for KDOC outlet temperature to run engine. (If failure is detected in KDOC inlet temperature sensor, too, controller takes it that KDOC outlet temperature is at default value (250°C) and allows engine to run.) Closes EGR valve. Limits engine output and allows engine to run. Stops KDPF regeneration control. 		
Problem on machine	<ul style="list-style-type: none"> Engine output decreases. 		
Related information	<p>⚠ Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.</p> <ul style="list-style-type: none"> Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) This failure code appears if sensor connector is disconnected. If failure codes [CA3314] and [CA3319] are also displayed, connector in KDPF temperature sensor consolidating box may be disconnected or probably has open circuit (defective contact of connector) in ground line. KDOC inlet temperature sensor connector label "TEMP1" expressed in black embossed letters is seen on KDPF temperature sensor consolidating box (KDOC outlet temperature sensor connector label "TEMP2" and KDPF outlet sensor connector label "TEMP3" are shown similarly to "TEMP1"). Method of reproducing failure code: Turn starting switch to ON position. <p><How to clear failure code></p> <p>To avoid error due to improper operation, start and run engine at idle for 1 minute. If this failure code is cleared, repair is complete.</p>		

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 "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.
		If this failure code disappears, wiring harness connector is defective. ★ If this failure code appears, perform following checks.

Failure code [D110KB] Battery Relay Output Voltage (PC220_10-D110KB-400-A-01-A)

Action level	Failure code	Failure	Short circuit in battery relay output circuit (Pump controller system)
L01	D110KB		
Details of failure	<ul style="list-style-type: none"> Abnormal current flows when outputting 24 V to battery relay primary circuit (coil side). 		
Action of controller	<ul style="list-style-type: none"> Stops 24 V output to battery relay primary circuit (coil side). Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Problem on machine	<ul style="list-style-type: none"> Writing data into ROM (non-volatile memory) of each controller may fail. 		
Related information	<ul style="list-style-type: none"> As T-adaptor for pump controller connector is "socket-type box", operating voltage cannot be measured at pump controller connector. Output state (ON/OFF) to battery relay can be checked with monitoring function. (Code: 03700 Controller output 1) Method of reproducing failure code: For 0.5 seconds after turning starting switch from ON to OFF position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective battery relay (internal open circuit)	1. Turn starting switch to OFF position.		
		Continuity	Between terminal RE and terminal BR	Continuity
2	Ground fault in wiring harness (contact with GND circuit)	1. Turn starting switch to OFF position. 2. Disconnect negative battery cable (in order to prevent short circuit). 3. Disconnect terminals R01 and R02, and connectors D01, H15 and CP02.		
		Resistance	Between terminal R02 (BR) and ground	Min. 1 MΩ
			Between ground and terminal R02 (harness side), D01 (female) (1), or D01 (female) (2)	Min. 1 MΩ
			Between ground and CP02 (female) (108) or between D01 (female) (5)	Min. 1 MΩ
3	Pump controller defective.	If no failure is found by above checks, pump controller is defective. <ul style="list-style-type: none"> Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connector D01. 3. Turn starting switch to ON position. 4. Measure voltage during 4 to 7 seconds after turning starting switch from ON to OFF position. 		
		Voltage	Between D01 (5) and ground	20 to 30 V

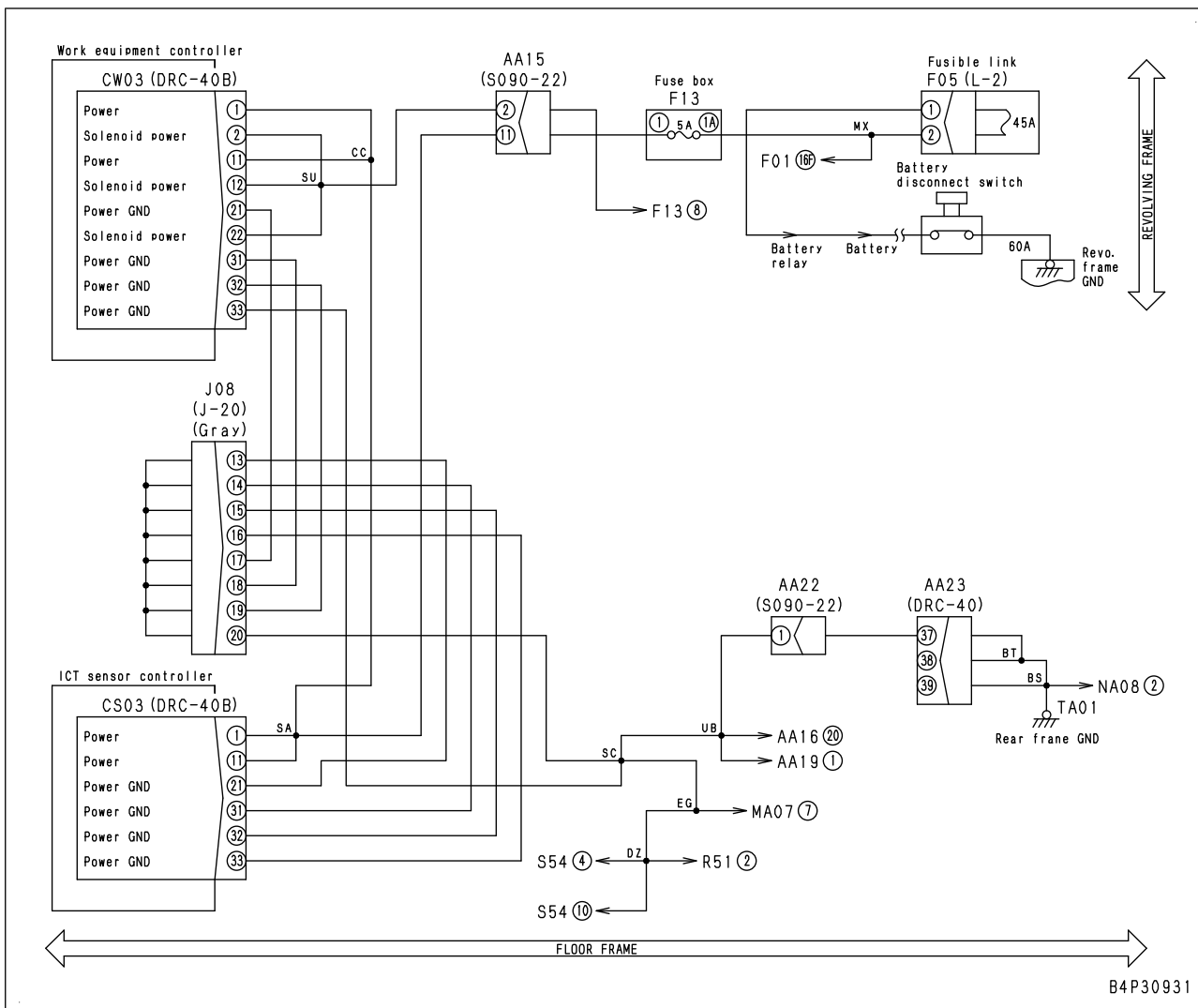
Failure code [DAF0MB] Monitor ROM Abnormality (PC220_10-DAF0MB-400-A-00-A)

Action level	Failure code	Failure	Monitor internal memory (ROM) error (Machine monitor system)
—	DAF0MB		
Details of failure	<ul style="list-style-type: none"> Program of machine monitor is rewritten (program error). 		
Action of controller			
Problem on machine	<ul style="list-style-type: none"> Indication of machine monitor is unreliable. Machine monitor is incapable of normally exchanging data with controllers. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective machine monitor	Machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

No.	Cause	Procedure, measuring location, criteria, and remarks		
4	Open circuit in wiring harness (Wire breakage or defective contact of connector)	<ul style="list-style-type: none"> • ACC signal of starting switch (start of CAN communication is not recognized) 1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect connectors CM01, CP01, CE03, CS03 and CW03, and insert T-adapters. 4. Turn the battery disconnect switch to ON position. 5. Turn starting switch to ON position. 		
		Voltage	Between CM01 (10) and (3)	20 to 30 V
			Between CE03 (3) and (21)	20 to 30 V
			Between CP01 (2) and each of (24), (43), and (80)	20 to 30 V
			Between CS03 (31) and each of (14), (20), and (24)	20 to 30 V
			Between CW03 (31) and each of (14), (20), and (24)	20 to 30 V
		<ul style="list-style-type: none"> ★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect related connectors and connect T-adapters to each female side. 		
		Resistance	Between CM02 (female) (11) and CP01 (female) (7)	Max. 1 Ω
			Between CM02 (female) (12) and CP01 (female) (26)	Max. 1 Ω
			Between CM02 (female) (11) and CS02 (female) (33)	Max. 1 Ω
			Between CM02 (female) (12) and CS02 (female) (23)	Max. 1 Ω
Between CM02 (female) (11) and CW02 (female) (33)	Max. 1 Ω			
Between CM02 (female) (12) and CW02 (female) (23)	Max. 1 Ω			
Between CM02 (female) (11) and ECM J1 (female) (8)	Max. 1 Ω			
Between CM02 (female) (12) and ECM J1 (female) (18)	Max. 1 Ω			
Between ECM J2 (female) (24) and Terminal port (female) (A)	Max. 1 Ω			
Between ECM J2 (female) (25) and Terminal port (female) (B)	Max. 1 Ω			
5	Ground fault in wiring harness (contact with ground circuit)	<ul style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 3. Disconnect related connectors, and connect T-adaptor to either female side. 		
		Resistance	Between ground and any of CP01 (female) (7), CM02 (female) (10), (11), CS02 (female) (33), CW02 (female) (33) and ECM J1 (female) (8)	Min. 1 MΩ
			Between ground and ECM J2 (female) (24) or Terminal port (female) (A)	Min. 1 MΩ
			Between ground and any of CP01 (female) (26), CM02 (female) (12), CS02 (female) (23), CW02 (female) (23), and ECM J1 (female) (18)	Min. 1 MΩ
Between ground and either of ECM J2 (female) (25) and Terminal port (female) (B)	Min. 1 MΩ			
6	Open circuit or hot short circuit in wiring harness	<ul style="list-style-type: none"> ★ If no failure (no open circuit) is found by check on cause 3, measure resistance at any one place in each case. 1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF. 		

No.	Cause	Procedure, measuring location, criteria, and remarks
7	Defective CAN communication 2 system	Perform checks on causes 4 to 9 in troubleshooting for failure code [DB2QKR].
8	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).
9	Defective machine monitor	If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to work equipment controller power supply



Failure code [DBRSKB] ICT/S Con Battery Relay Drive Short Cir. (PC200 ICT-

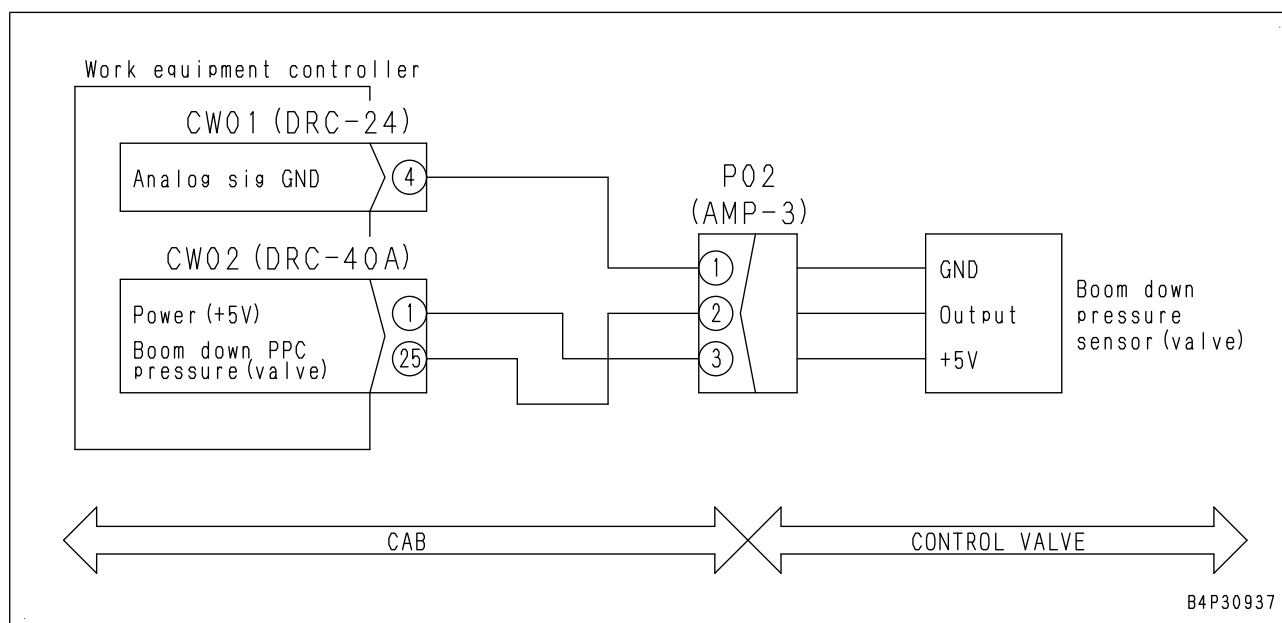
DBRSKB-400-A-Z1-A)

Action level	Failure code	Failure	Battery Relay Short Circuit (ICT Sensor) (ICT controller system)
L01	DBRSKB		
Details of failure	<ul style="list-style-type: none"> Abnormal current flows when outputting 17 V to battery relay primary circuit (coil side). 		
Action of controller	<ul style="list-style-type: none"> Stops 17 V to battery relay primary circuit (coil side). Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Problem on machine	<ul style="list-style-type: none"> Each controller may fail in writing of data into its ROM (non-volatile memory). Behaves as key switch is turned OFF because fusible link blows. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON→OFF position. Wait for 0.5 seconds. 		

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective battery relay (Internal short circuit)	1. Turn starting switch to OFF position.		
		Continuity	Between terminals R01 (E) and R02 (BR)	Continuity
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch OFF (to prevent short circuit during work). 3. Disconnect terminals R01 and R02, and disconnect connectors D01, H15, and CS03.		
		Resistance	Between terminal R02 (BR) and ground	Min. 1 MΩ
			Between ground and terminal R02 (harness side), D01 (female) (1) or (2)	Min. 1 MΩ
			Between ground and CS03 (female) (4) or D01 (female) (5)	Min. 1 MΩ
3	ICT sensor controller error	If no failure is found by preceding checks, ICT sensor controller is defective. <ul style="list-style-type: none"> Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connector D01. 3. Turn starting switch to ON position. 4. 4 to 7 seconds after turning starting switch from ON position to OFF position		
		Voltage	Between D01 (1) and ground	20 to 30 V

No.	Cause	Procedure, measuring location, criteria, and remarks		
	(contact with ground circuit)	Resistance	Between ground and CW02 (female) (25) or P02 (female) (2)	Min. 1 MΩ
5	Hot short circuit in wiring harness (Contact with 5 V circuit and 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector P02. 3. Connect T-adaptor to female side of connector P02. 4. Turn starting switch to ON position.		
		Voltage	Between P02 (female) (2) and ground	Max. 1 V
6	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to boom LOWER PPC pressure sensor



*: For details of power supply and ground circuit, refer to circuit diagram in [DB96KP].

Failure code [DKG1KM] Bucket Cylinder Calibration Not Complete

(PC200 ICT-DKG1KM-400-A-Z0-A)

Action level	Failure code	Failure	Bucket cylinder calibration not complete (ICT sensor controller system)
L01	DKG1KM		
Detail of failure	<ul style="list-style-type: none"> Cylinder calibration has been completed at least once, but it failed to complete when recalibrated. 		
Action of controller	<ul style="list-style-type: none"> None. 		
Problem on machine	<ul style="list-style-type: none"> Sensor may recognize the machine posture wrongly. 		
Related information	<ul style="list-style-type: none"> Control box displays the message [Sensors are invalid]. Method of reproducing failure code: Turn starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria, and remarks	
1	Cylinder calibration is not completed.	Recalibrate cylinder according to the manual.	

Failure code [DKT8KA] Bucket Cyl Stroke Sensor A Open Circuit (PC200 ICT-

DKT8KA-400-A-Z1-A)

Action level	Failure code	Failure	Bucket Cylinder Stroke Sensor A Open Circuit (ICT sensor controller system)
L01	DKT8KA		
Detail of failure	<ul style="list-style-type: none"> Input voltage from stroke sensor phase A for bucket cylinder is below 0.3 V. 		
Action of controller	<ul style="list-style-type: none"> None. 		
Problem on machine	<ul style="list-style-type: none"> Bucket in image of excavator on control box screen stops. 		
Related information	<ul style="list-style-type: none"> Control box displays the message "Sensors are invalid". Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective 5 V sensor power supply system	If failure code [DBR5KP] is also displayed, perform troubleshooting for it first. 1. Turn starting switch to OFF position. 2. Disconnect connector PA03 and connect T-adaptor to female side. 3. Turn starting switch to ON position. ★ If power supply voltage is abnormal, proceed to check on cause 3.			
		Voltage	Between PA03 (female) (3) and (4)	Power supply	2.5 to 6.0 V
2	Defective bucket cylinder stroke sensor phase A (internal open circuit or ground fault)	1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector PA03. 3. Turn starting switch to ON position. ★ If power supply voltage is normal and sensor output voltage is abnormal (0.3 V or lower), it cannot be determined whether ground fault or defective sensor is the cause. In this case, go to check on cause 4. If no failure is found by check on cause 4, bucket cylinder stroke sensor phase A is defective.			
		Voltage	Between PA03 (1) and (4)	Power supply	0.3 to 4.7 V
3	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors CS01 and PA03 and connect T-adaptors to each female side.			
		Resistance	★ If power supply voltage in check on cause 1 is normal, this check is not required.		Max. 1 Ω
			Between CS01 (female) (22) and PA03 (female) (3)		
			★ If power supply voltage in check on cause 1 is normal, this check is not required.		Max. 1 Ω
Between CS01 (female) (21) and PA03 (female) (4)					
Between CS01 (female) (13) and PA03 (female) (1)		Max. 1 Ω			
4	Ground fault in wiring harness (contact with ground circuit)	★ If power supply voltage in check on cause 2 is normal, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors CS01 and PA03, and connect T-adaptor to either female side.			
		Resistance	Between CS01 (female) (13) and (21), or between PA03 (female) (1) and (4)		Min. 1 MΩ
			Between ground and CS01 (female) (13), or between ground and PA03 (female) (1)		Min. 1 MΩ
5	ICT sensor controller error	If no failure is found by preceding checks, ICT sensor controller is defective. <ul style="list-style-type: none"> Reference 1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector CS01. 3. Turn starting switch to ON position. 			
		Voltage	Between CS01 (13) and (21)	0.3 to 4.7 V	

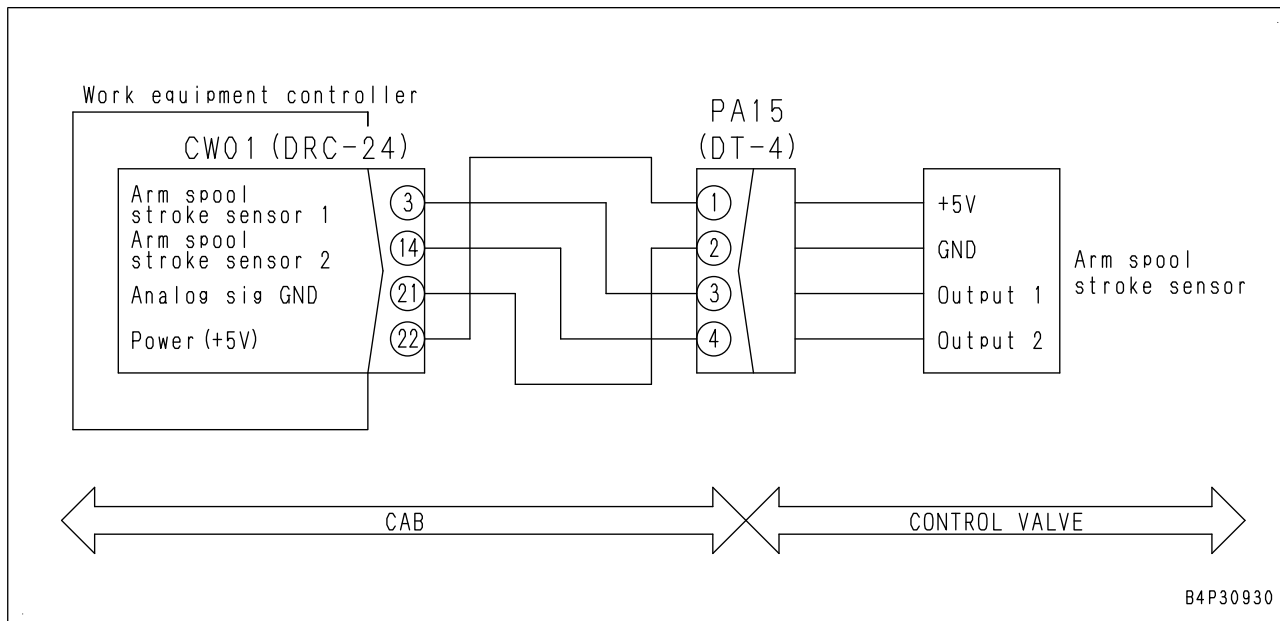
Failure code [DKU2MA] Arm Spool Stroke Sensor In Range Error (PC200 ICT-

DKU2MA-400-A-Z0-A)

Action level	Failure code	Failure	Arm Spool Stroke Sensor In Range Error (work equipment controller system)
L01	DKU2MA		
Detail of failure	<ul style="list-style-type: none"> Arm spool stroke cannot be recognized correctly. 		
Action of controller	<ul style="list-style-type: none"> None. 		
Problem on machine	<ul style="list-style-type: none"> Accuracy of the work equipment control is degraded. 		
Related information	<ul style="list-style-type: none"> Spool stroke sensor value can be checked with monitoring function. (Code: 75901 "Arm Spool Stroke") Method of reproducing failure code: Turn starting switch to ON position. 		
No.	Cause	Procedure, measuring location, criteria, and remarks	
1	Defective arm spool stroke sensor	If the problem is not solved after disconnecting and reconnecting each connector in the circuit 10 times, arm spool stroke sensor is defective.	

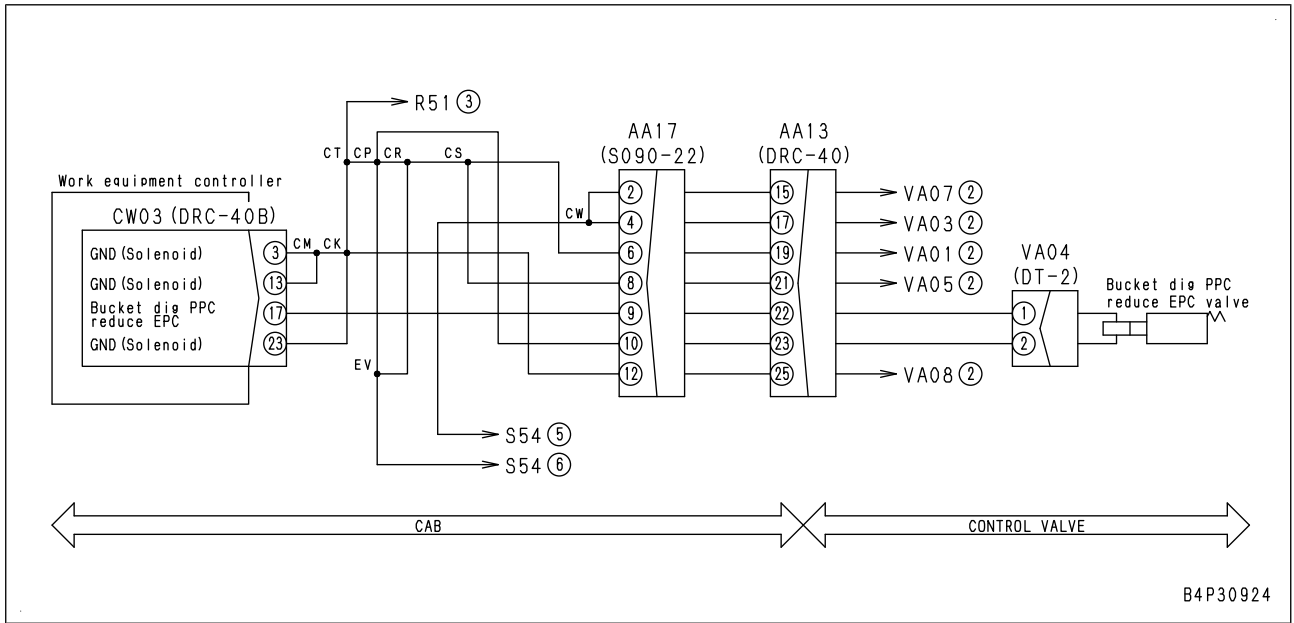
No.	Cause	Procedure, measuring location, criteria, and remarks		
5	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective.		
		<ul style="list-style-type: none"> • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector CW01. 3. Turn starting switch to ON position. 		
		Voltage	Between CW01 (14) and (21)	0.2 to 4.8 V

Circuit diagram related to arm spool stroke sensor 2



*: For details of power supply and ground circuit, refer to circuit diagram in [DB95KP].

Circuit diagram related to bucket CURL PPC pressure reducing EPC solenoid

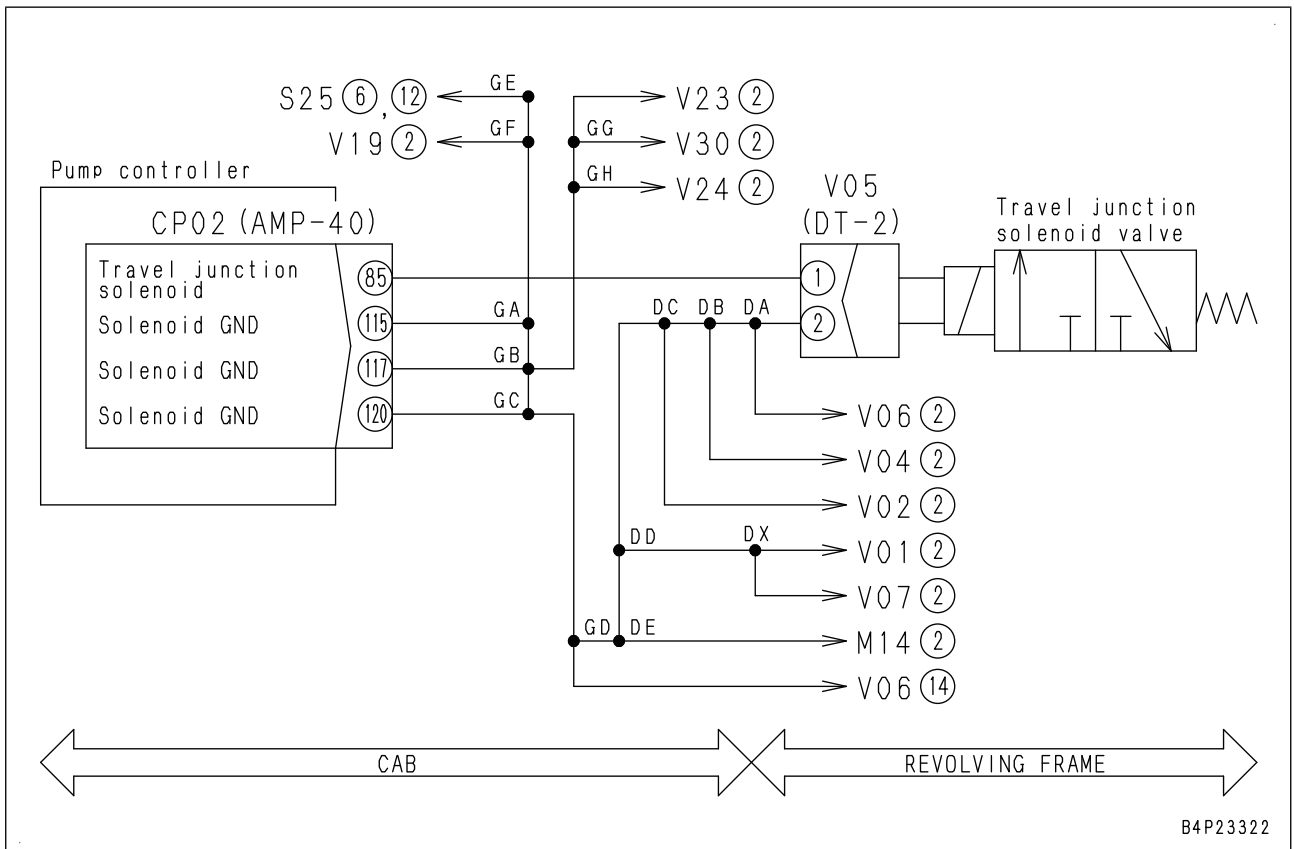


40 Troubleshooting

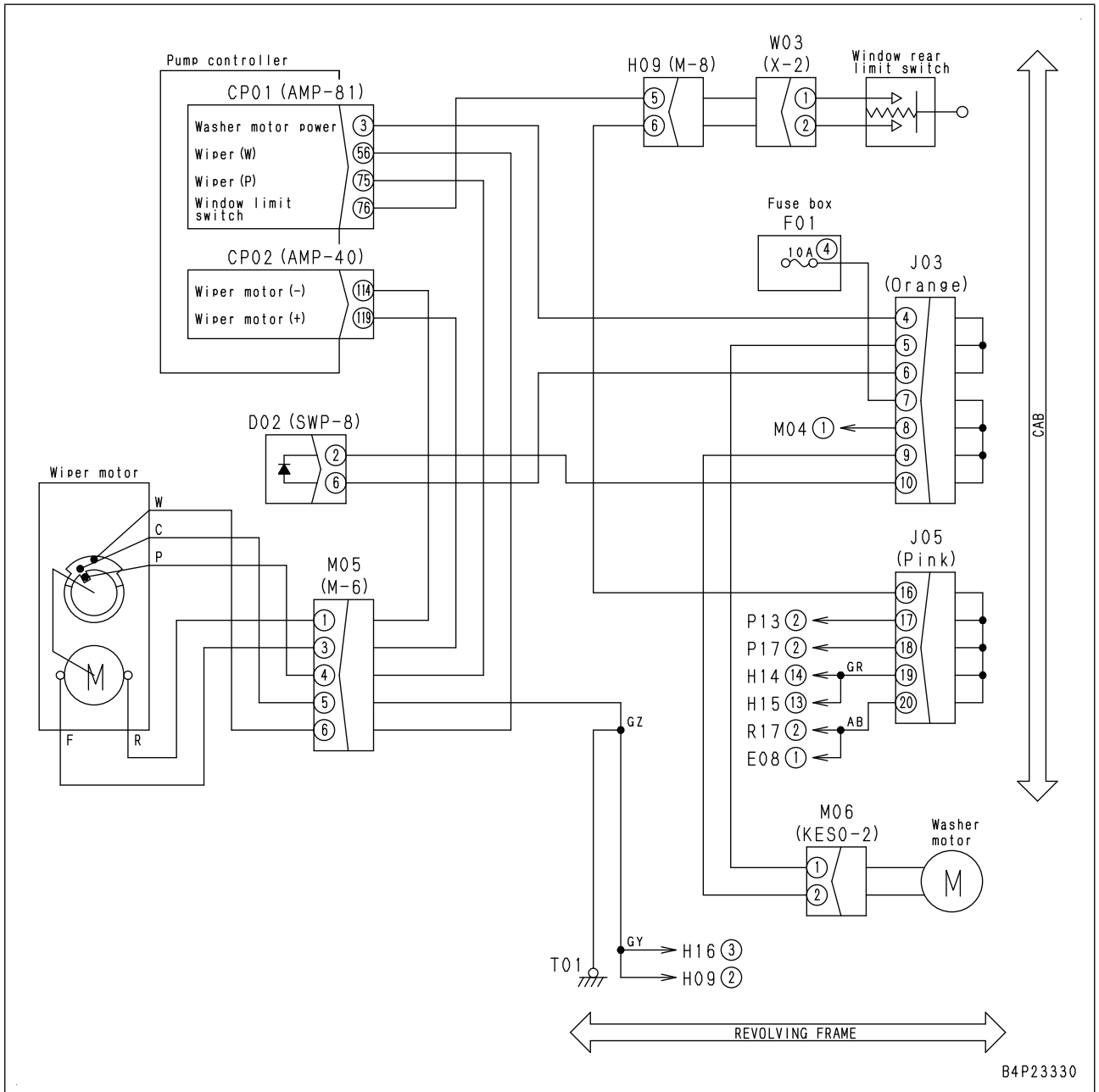
Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks		
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by above checks, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors D01, CP02, and V03, and connect T-adapters to each female side.		
		Resistance	Between D01 (female) (3) and V03 (female) (1)	Max. 1 Ω
			Between each of CP02 (female) (115), (117), (120), and V03 (female) (2)	Max. 1 Ω
5	Defective pump controller	If no failure is found by above checks, pump controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to travel junction valve solenoid



Circuit diagram related to wiper



B4P23330

E-9 Hydraulic oil temperature monitor lights up in white while engine is running (PC220_10-FEU-400-A-00-A)

Failure	<ul style="list-style-type: none"> Hydraulic oil temperature monitor lights up white while engine is running.
Related information	<ul style="list-style-type: none"> Signal of hydraulic oil temperature sensor is input to pump controller and then data is transmitted to machine monitor through CAN communication system. Hydraulic oil temperature can be checked with monitoring function. (Code: 04401 Hydraulic oil temperature)

No.	Cause	Procedure, measuring location, criteria and remarks
1	Insufficient warm-up of machine (when system works properly)	If coolant temperature monitor lights up in white, engine coolant temperature may be low (below approx. 30°C). Perform warm-up operation. <ul style="list-style-type: none"> Lighting up in white: Engine coolant temperature is low. Lighting up in blue: Engine coolant temperature is proper.
2	Defective hydraulic oil temperature gauge system	If no failure is found by above check, hydraulic oil temperature gauge system may be defective. Perform the following troubleshooting. <ul style="list-style-type: none"> E-21 Hydraulic oil temperature gauge indicates either Min. or Max. and does not move(PAGE 40-767) E-22 Hydraulic oil temperature gauge indicates incorrect temperature (indicates neither Min. nor Max.)(PAGE 40-769)

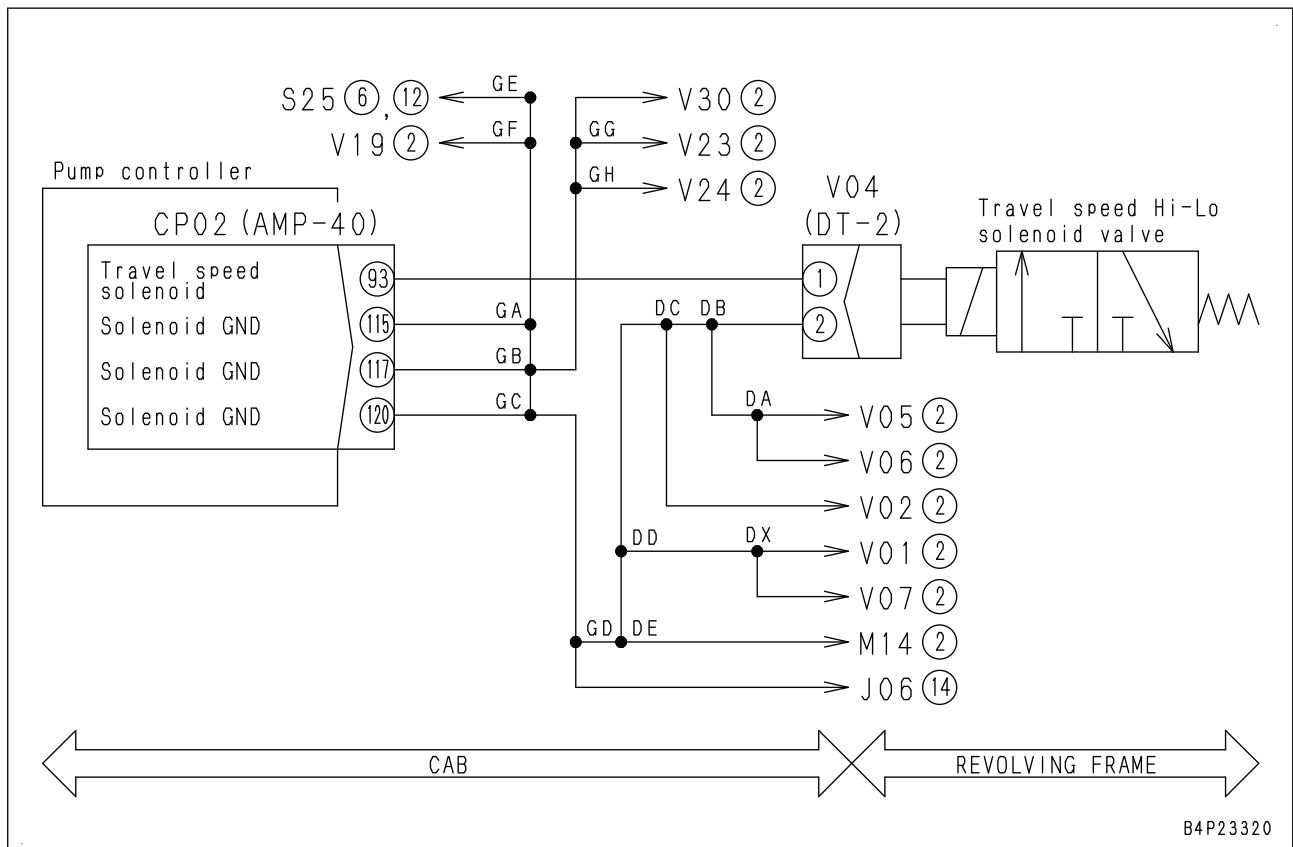
E-32 Travel speed does not change while travel speed selection is changed

(PC200LC_10-BQ3-400-A-Z0-A)

Failure	When selection of travel speed is changed, actual travel speed does not change.
Related information	<ul style="list-style-type: none"> When failure due to cause 1 occurs, actual travel speed does not decrease when travel speed setting is changed to "Lo". As T-adapter for pump controller connector is "socket-type box", operating voltage cannot be measured at pump controller connector.

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Hot short circuit in wiring harness circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector V04 and connect T-adapters to female side. 3. Turn starting switch to ON position.	
		<table border="1" style="width: 100%;"> <tr> <td style="width: 20%;">Voltage</td> <td style="width: 60%;">Between V04 (female) (1) and ground</td> <td style="width: 20%;">Max. 4.5 V</td> </tr> </table>	Voltage
Voltage	Between V04 (female) (1) and ground	Max. 4.5 V	
2	Defective machine monitor	If no failure is found by check on cause 1, machine monitor may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)	
3	Defective pump controller	If no failure is found by checks for causes 1 and 2, pump controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

Circuit diagram related to travel speed solenoid



B4P23320

E-50 ARM DUMP indication is not displayed properly with monitoring function (PC220_10-FFS-400-A-00-A)

Failure	• "Arm OUT (Arm Dump)" is not displayed properly with monitoring function.	
Related information	• Monitoring code: 01900 Pressure switch 1	
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective arm OUT PPC oil pressure sensor system (internal open or short circuit)	Carry out troubleshooting for failure code [DHSCMA] .

E-65 Control box displays the message [Komatsu controller not connected!] (PC200 ICT-K1J-400-A-Z1-A)

Failure	<ul style="list-style-type: none"> Control box displays the message [Komatsu controller not connected!]. Control box cannot perform CAN communication with ICT sensor controller and work equipment controller.
Related information	<ul style="list-style-type: none"> Perform troubleshooting outdoors or in the open air to acquire a sufficient number of satellites. Before performing troubleshooting, check that "MACHINE SETUP SETTING" is performed correctly as specified in the Operation and Maintenance Manual. Before performing troubleshooting, check that no related failure code is displayed. (If failure code [DBRQKR] or [DB9QKR] is displayed on the machine monitor, perform troubleshooting for it first.)

No.	Cause	Procedure, measuring location, criteria, and remarks	
1	CAN2 Disconnection (ICT sensor controller)	Perform troubleshooting for failure code [DBRQKR].	
2	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Turn control box power OFF. 3. Turn battery disconnect switch to OFF position. 4. Disconnect connectors CS02 and CX01, and connect T-adaptor to female sides.	
Resistance		Between CS02 (female) (22) and CX01 (female) (9)	Max. 1 Ω
Resistance		Between CS02 (female) (32) and CX01 (female) (8)	Max. 1 Ω
3	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Turn control box power OFF. 3. Turn battery disconnect switch to OFF position. 4. Disconnect connectors CS02, CX01, and AA15, and connect T-adaptor to female side.	
Resistance		Between CS02 (female) (22) and ground	Min. 1 MΩ
Resistance		Between CS02 (female) (32) and ground	Min. 1 MΩ
4	Defective ICT sensor controller	If no failure is found by check on causes 1 to 3, ICT sensor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).	
5	CAN2 Disconnection (Work equipment controller)	Perform troubleshooting for failure code [DB9QKR].	
6	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Turn control box power OFF. 3. Turn battery disconnect switch to OFF position. 4. Disconnect connectors CW02 and CX01, and connect T-adaptor to female sides.	
Resistance		Between CW02 (female) (22) and CX01 (female) (9)	Max. 1 Ω
Resistance		Between CW02 (female) (32) and CX01 (female) (8)	Max. 1 Ω
7	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Turn control box power OFF. 3. Turn battery disconnect switch to OFF position. 4. Disconnect connectors CW02, CX01 and AA18, and connect T-adaptor to female side.	
Resistance		Between CW02 (female) (22) and ground	Min. 1 MΩ
Resistance		Between CW02 (female) (32) and ground	Min. 1 MΩ
8	Defective work equipment controller	If no failure is found by check on causes 5 to 7, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).	
9	Defective control box	If no failure is found by above checks, control box is defective. (Since this is an internal defect, troubleshooting cannot be performed).	

E-84 Blade edge stop position is not accurate for design surface when automatic stop control function is on (PC200 ICT-K2J-400-A-Z0-A)

Failure	<ul style="list-style-type: none"> Blade edge stop position is not accurate for design surface when automatic stop control function is on. (Blade edge stops far above the design surface.) (Blade edge stops after digging deeper than design surface, or does not stop.)
Related information	<ul style="list-style-type: none"> Perform troubleshooting outdoors or at a place open to the sky to acquire a sufficient number of satellites. (If failure code is displayed, perform troubleshooting for it first.) Before performing troubleshooting, check that "PROJECT FILE SETTING" is performed correctly as specified in the Operation and Maintenance Manual. Before performing troubleshooting, check that any related-message is not displayed in control box. (If any of the following messages is displayed in control box, perform troubleshooting for it first.) Select manual mode before performing troubleshooting, and check that any failure described below does not occur. If failure occurs, perform troubleshooting for it first. H-1 All work equipments operate slowly or lack power H-2 Engine speed drops significantly or engine stalls H-5 Fine control performance or response is poor H-6 Boom speed or power is low H-7 Arm speed or power is low H-8 Bucket speed or power is low H-13 Time lag of work equipment is large Before performing troubleshooting, see E-79 "When checking and adjusting the bucket edge position, the value is different from the value of actual machine". If any failure occurs, perform troubleshooting for it first. Before performing troubleshooting, check movement range of the blade edge when automatic grading assist operates referring to Testing and adjusting.

No.	Cause	Procedure, measuring location, criteria, and remarks	
1	Defective design surface data	Check the design surface data for holes, protrusion, or defect.	
2	Improper bucket weight setting	Select proper bucket settings according to weight of mounted bucket.	
3	Defective Semi-Auto adjustment (stop control adjustment) settings	Perform stop control adjustment according to Operation and Maintenance Manual.	
4	Defective GPS receiving condition	Check that initializing display does not appear in the control box when a failure occurs. If initializing occurs, check for a failure at a place and time in favorable condition. (See E-68.)	
5	MC calibration not performed, and defective initialization and calibration	In the following cases, perform calibration again to check if it finishes correctly.	
	PPC pressure sensor calibration	Not performed	PPC pressure sensor and work equipment controller were replaced.
		Initializa-tion	Settings were cleared by mistake.
	Control map calibration	Not imple-mented	Main valve (including spool and stroke sensor), EPC valve, and work equipment controller were replaced.
		Initializa-tion	Settings were cleared by mistake.
Defec-tive calibra-tion		Calibration was performed under improper conditions (bucket weight, etc.).	
6	Defective PPC pressure sensor	Perform calibration of PPC pressure sensor to check if it finishes correctly.	

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

No.	Cause	Procedure, measuring location, criteria and remarks
16	Malfunction of LS valve (front)	If normal oil pressure is not obtained after adjustment, check LS valve for malfunction (setting of spring) and internal failure (locked or trapped LS spool).
17	Malfunction of LS valve (rear)	If normal oil pressure is not obtained after adjustment, check LS valve for malfunction (setting of spring) and internal failure (locked or trapped LS spool).
18	Malfunction of servo piston or PC valve (*)	If sensor output voltage is normal in checks on causes (1) and (2), determine that servo piston is normal. Check orifices and filters in pump servo devices for clogging.
19	Malfunction of piston pump	If no failure is found by above checks, piston pump may malfunction, or have internal failure. Check hydraulic tank strainer and return filter element for metal particles.

(*) Since PC valve is built in servo piston, servo piston assembly must be replaced if PC valve is defective.

H-15 One-touch power maximizing function does not operate (PC200LC_10-FGL-

400-A-Z0-A)

Failure	<ul style="list-style-type: none"> One-touch power maximizing function does not work..
Related information	<ul style="list-style-type: none"> Perform all troubleshooting with working mode set in P mode. If failure codes are displayed, perform troubleshooting for them first. (DWK0KA, DWK0KB)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Malfunction of 2-stage relief solenoid valve	★ Be ready with engine stopped, then perform troubleshooting with engine running at high idle.			
		2-stage relief solenoid output pressure	Swing lock switch	OFF	0 MPa {0 kg/cm ² }
			Swing lock switch	ON	2.9 MPa {30 kg/cm ² }
2	Defective adjustment or malfunction of main relief valve (front)	★ Be ready with engine stopped, then perform troubleshooting with engine running at high idle.			
		Front pump main relief pressure	Normal hydraulic relief	Hydraulic relief of bucket only	33.1 to 37.2 MPa {338 to 380 kg/cm ² }
			Hydraulic relief during one-touch power maximizing	Hydraulic relief of bucket only	36.1 to 39.7 MPa {368 to 405 kg/cm ² }
		If normal relief pressure is not obtained after adjustment, check main relief valve for malfunction (setting of spring) and internal failure (defective valve seat).			
3	Defective adjustment or malfunction of main relief valve (rear)	★ Be ready with engine stopped, then perform troubleshooting with engine running at high idle.			
		Rear pump main relief pressure	Normal hydraulic relief	Hydraulic relief of arm only	33.1 to 37.2 MPa {338 to 380 kg/cm ² }
			Hydraulic relief during one-touch power maximizing	Hydraulic relief of arm only	36.1 to 39.7 MPa {368 to 405 kg/cm ² }
		If normal relief pressure is not obtained after adjustment, check main relief valve for malfunction (setting of spring) and internal failure (defective valve seat).			

H-33 Swing drift on a slope is large while swing holding brake is released (PC200LC_10-MS7-400-A-Z0-A)

Failure	<ul style="list-style-type: none"> Hydraulic drift of swing is large (when swing parking brake is released).
Related information	<ul style="list-style-type: none"> Perform all troubleshooting with working mode set in P mode. Pump pressure can be checked with monitoring function. (Code: F pump pressure 01100, R pump pressure 01101)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Malfunction of swing control valve (spool)	Spool of swing control valve may malfunction. Check for locked spool.			
2	Malfunction of swing control valve (pressure compensation valve on right swing side)	Pressure compensation valve on right swing side of swing control valve may malfunction. Interchange pressure compensation valves on left and right swing sides and check whether failure symptom changes to make judgment.			
3	Malfunction of swing control valve (pressure compensation valve on left swing side)	Pressure compensation valve on left swing side of swing control valve may malfunction. Interchange pressure compensation valves on left and right swing sides and check whether failure symptom changes to make judgment.			
4	Defective swing motor (safety valve)	★ Be ready with engine stopped, then perform troubleshooting with engine running at high idle.			
		Swing relief pressure	Swing lock switch: ON.	Swing hydraulic relief	27.4 to 31.3 MPa {280 to 320 kg/cm ² }
		If normal pressure is not obtained after adjustment, sealing of safety valve may be defective. Safety valve has 2-stage relief function, however, set pressures for Hi and Lo settings are same (relief flow rate differs).			
5	Defective sealing of swing motor (suction valve)	Interchange suction valves on left and right swing sides of swing motor, and check whether failure symptom changes to make judgment. When removing valve, check it for lock valve and defects.			
6	Defective seating of swing motor (check valve)	Interchange check valves on left and right swing sides of swing motor, and check whether failure symptom changes to make judgment. When removing valve, check it for lock and defects.			
7	Malfunction of swing motor (reverse prevention valve)	Reverse prevention valve of swing motor may malfunction. Check for locked or almost trapped spool and setting of spring.			

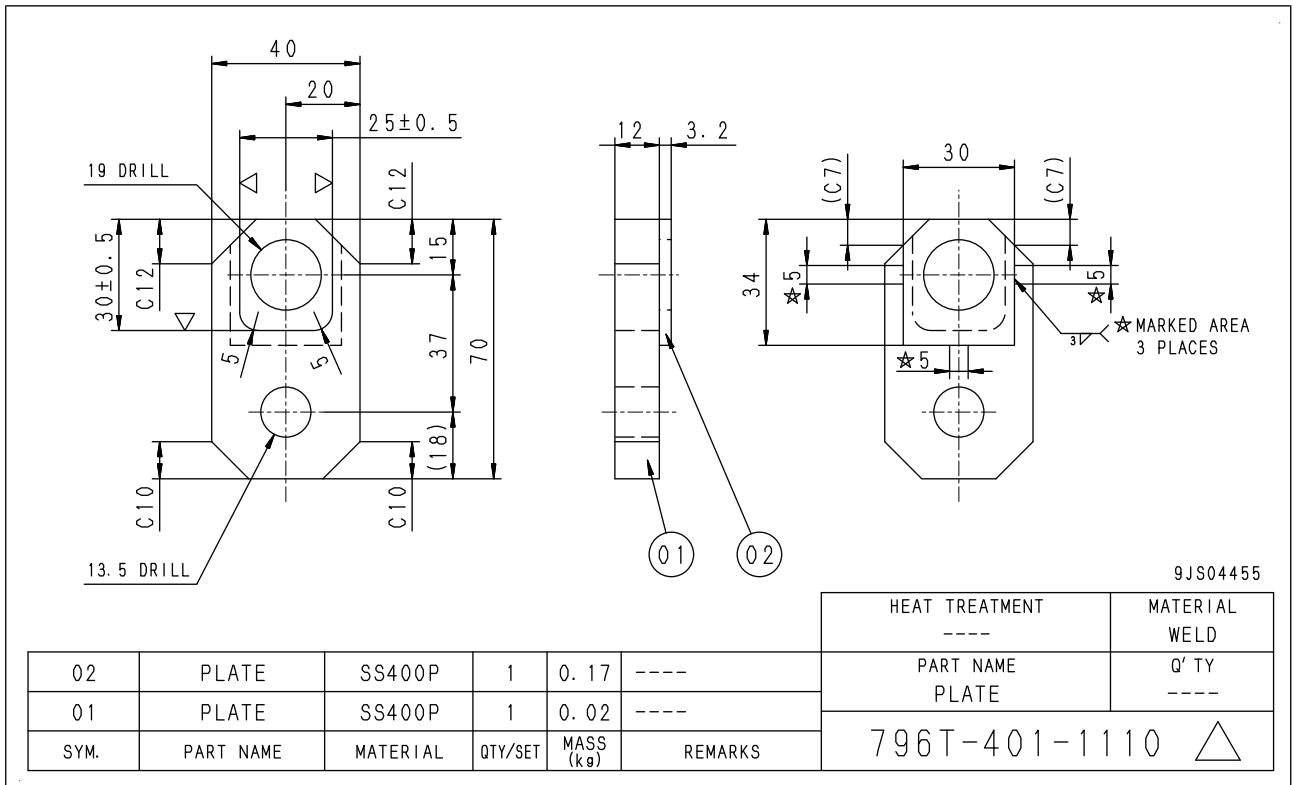
S-15 Fuel is contaminated in engine oil (PC220_10-B31-400-A-00-A)

Failure	Fuel mixes with engine oil (engine oil smells of diluted diesel fuel).		
Related information	<ul style="list-style-type: none"> • If a failure code is displayed, perform troubleshooting for it first. 		
No.	Cause	Check item and remarks	Remedy
1	Defective injector	<ul style="list-style-type: none"> • If exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low. • Even if a cylinder is cut out, engine speed does not change. (Reference: See "Handling cylinder cutout mode operation" in Testing and adjusting.) 	Replace injector.
2	Fuel leakage from injector and O-ring (spill circuit)	<ul style="list-style-type: none"> • Check injector and O-ring. 	Replace injector and O-ring.
3	Defective sealing between injector and injection pipe, and cracked injection pipe	<ul style="list-style-type: none"> • Check sealing between injector and injection pipe, and injection pipe. 	Repair or replace.
4	Defective supply pump	<ul style="list-style-type: none"> • Replace supply pump and see if fuel stops entering. 	Replace supply pump.

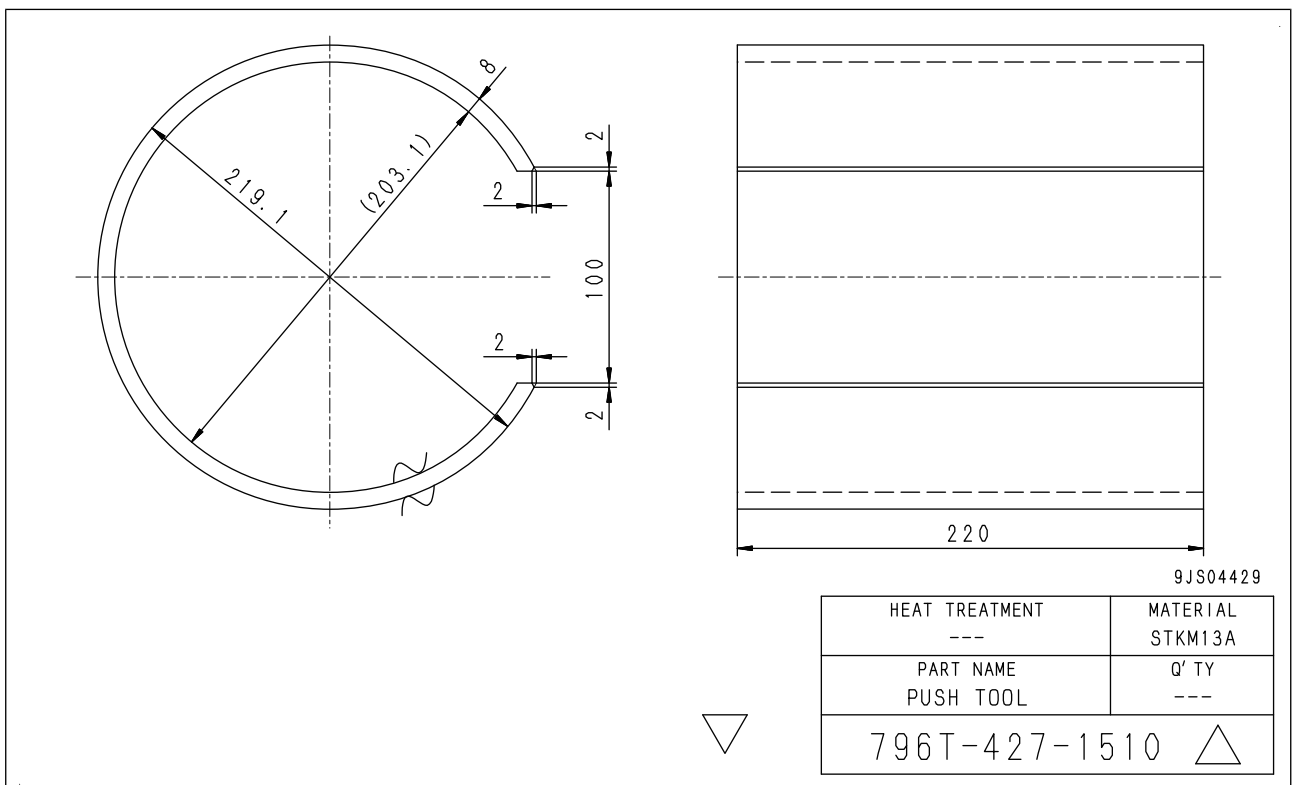
Sketches of special tools (PC200 ICT-3531-066-A-00-A)

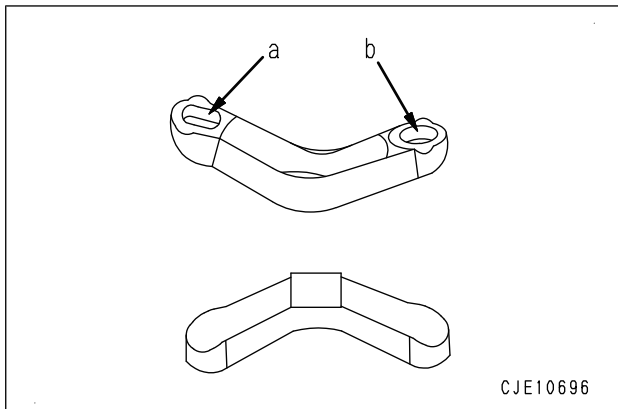
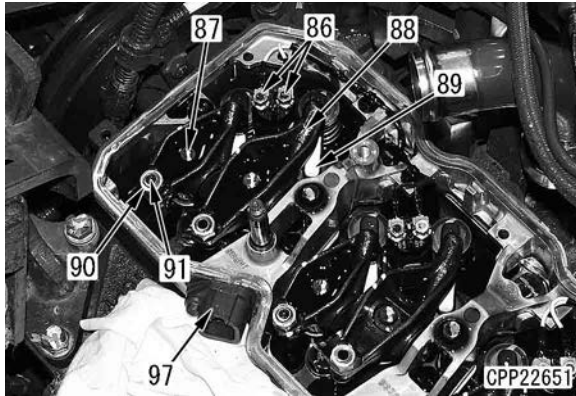
Note: Komatsu does not take any responsibility for special tools manufactured according to these sketches.

A9: Plate



F3: Push tool



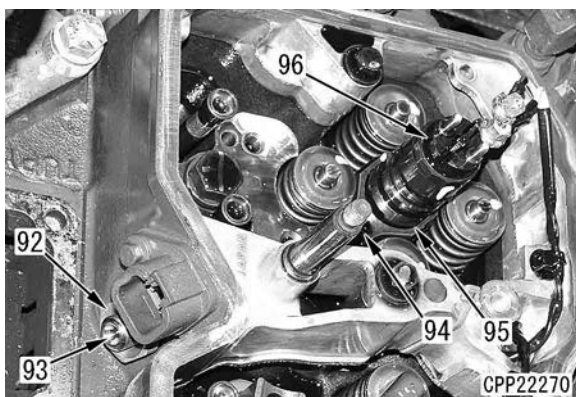


66. Remove retainers (92) and then remove six inlet connectors (93).

- ★ Clean the surrounding area to remove mud and other contamination in advance to prevent them from entering the connector hole.

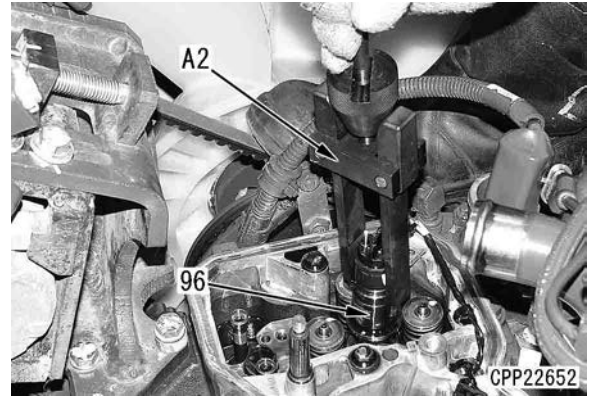
- ★ Use tool A4 to remove inlet connector (93).

67. Remove mounting bolts (94) of injector assembly (96), then remove holder (95).



68. By using tool A2, remove fuel injector assembly (96).

- ★ Take care that dirt and foreign matter do not enter the mounting portion of the injector assembly.



69. Remove push rod (98).

70. Remove mounting bolt (99) and remove rocker housing assembly (100).



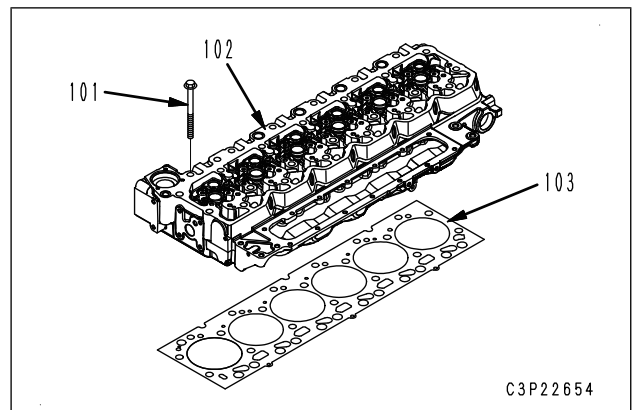
71. Remove 26 mounting bolts (101), then remove cylinder head assembly (102).



Cylinder head assembly:

75 kg

72. Remove cylinder head gasket (103).



Installation (PC200_10-A100-720-K-00-A)

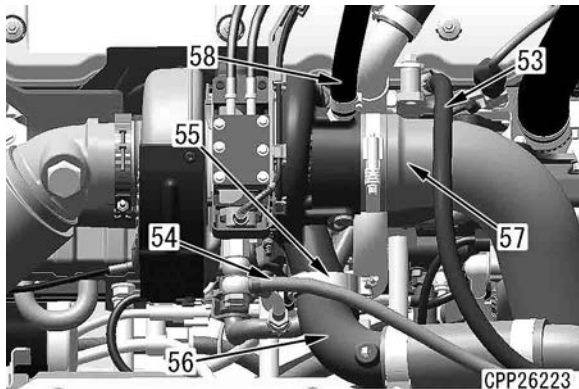
1. Cylinder head assembly

1) Measure nominal length (a) of all the cylinder head mounting bolts to check that each falls within the using limit.

- Using limit length of bolt: less than 132.1 mm

29. Disconnect hoses and tubes of KVGT. [*3]

- 1) Disconnect hose (53).
- 2) Disconnect hose (54).
- 3) Disconnect clamp (55).
- 4) Disconnect tube (56).
- 5) Disconnect hose (57).
- 6) Disconnect hose (58).

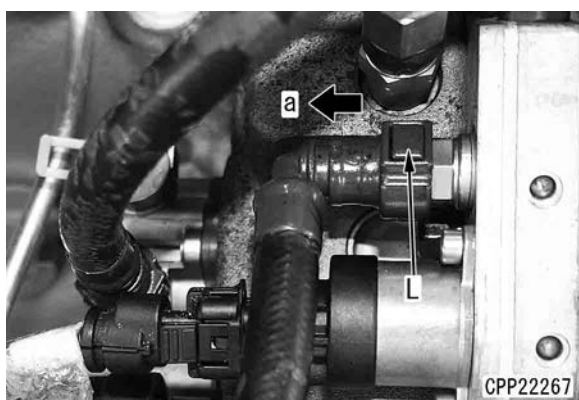
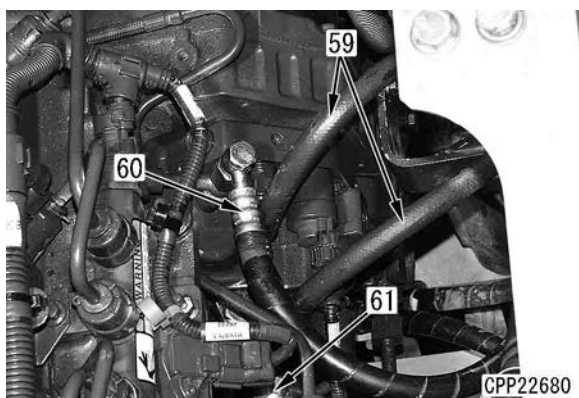


30. Disconnect fuel filter hoses (59) from supply pump. [*4]

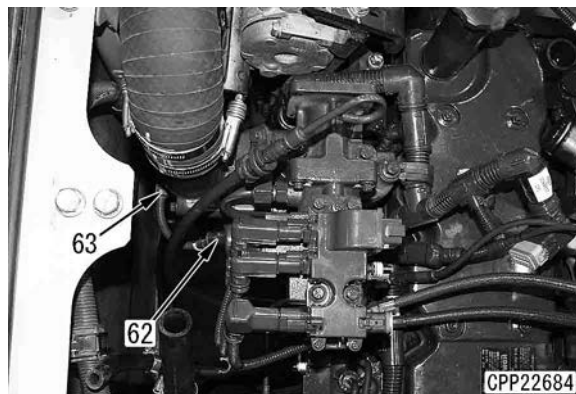
- ★ Pull out hose to the direction of (a) while pressing lock (L) on both sides.

31. Disconnect fuel return hose (60). [*5]

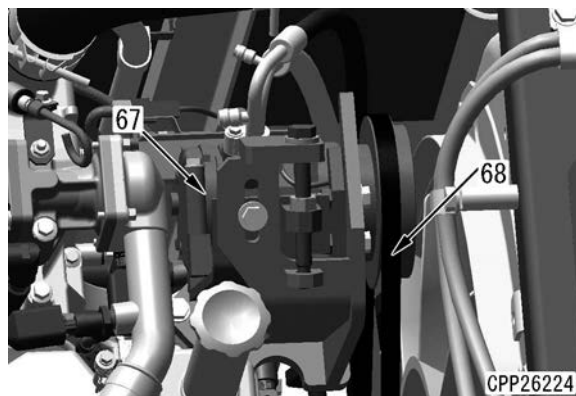
32. Disconnect fuel supply hose (61). [*6]



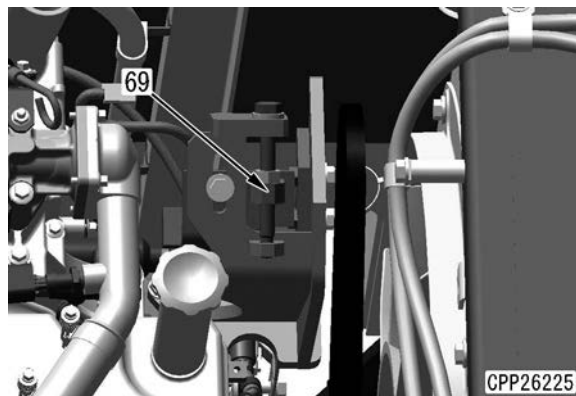
33. Disconnect intake air heater E01 (62) and wiring harness clamp (63). [*7]



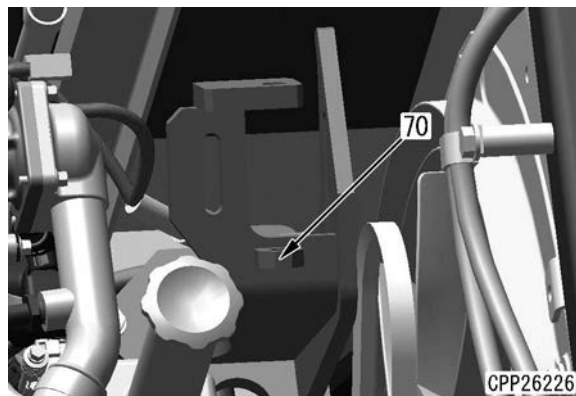
34. Remove air conditioner compressor (67) and air conditioner compressor belt (68). For details, see "Removal and installation of air conditioner compressor assembly".

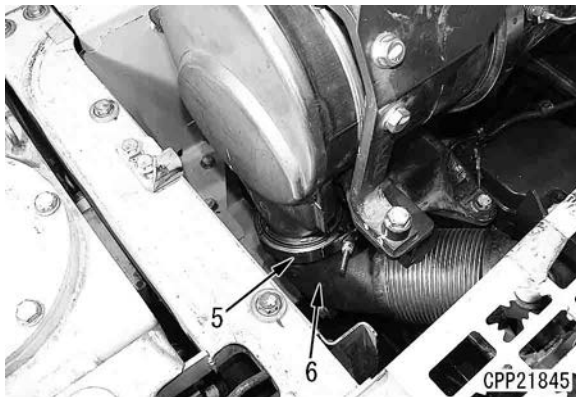


35. Remove bracket (69).



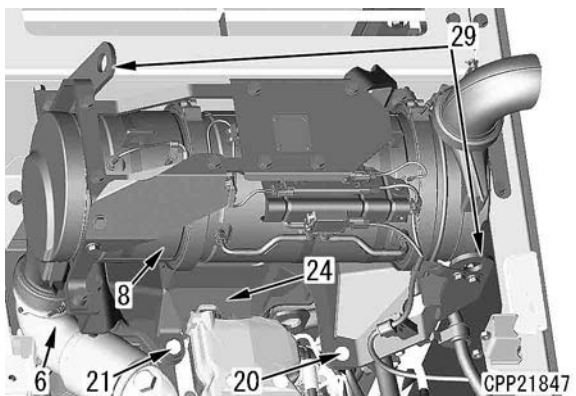
36. Remove bracket (70) for the air conditioner compressor.



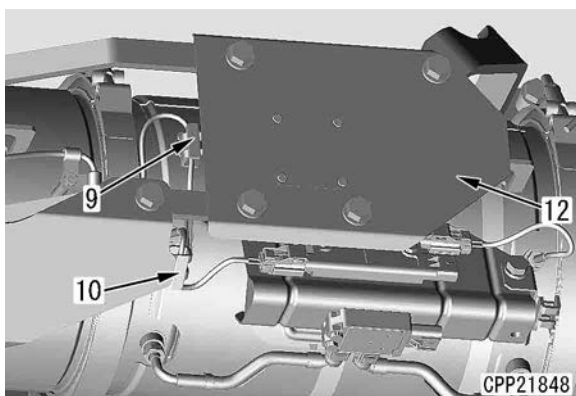


6. Remove three mounting bolts (20) and one mounting bolt (21).
7. Sling and remove KDPF bracket assembly (8).
 - ★ When slinging, hook it to sling plate (29).
 - ★ Pay attention to the gasket at the tube connection that may fall away during the removal.

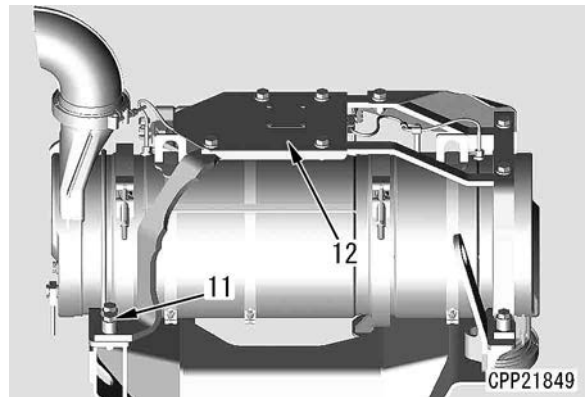
 **KDPF bracket assembly:**
75 kg



8. Disconnect sensor harness clamps (9) and (10) on the thermal guard side.

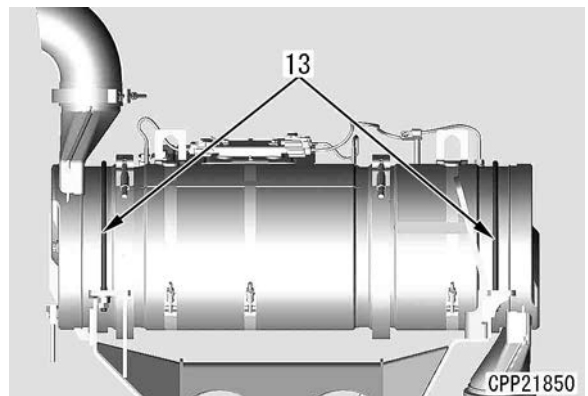


9. Remove four mounting bolts (11) and remove thermal guard (12).



10. Remove the double nuts and washers, then remove U-bolts (13).

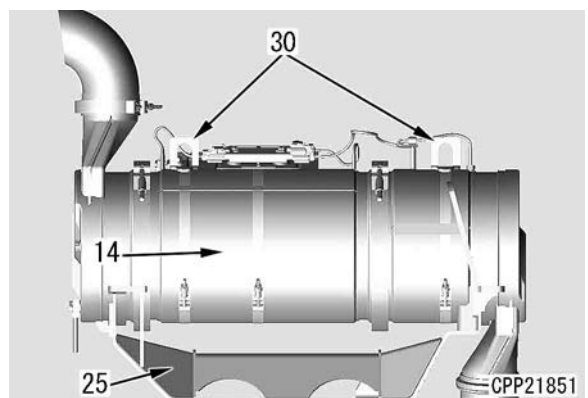
- ★ Loosen nuts alternately to prevent U-bolt thread galling.



11. Sling and remove KDPF assembly (14) from bracket (25).

- ★ When slinging, hook it to hanger (30).
- ★ Be careful not to deform eye-joint (15) when lowering the removed KDPF assembly.

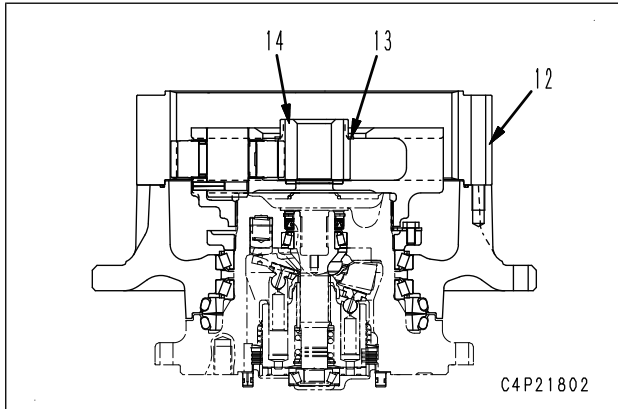
 **KDPF assembly:**
45 kg



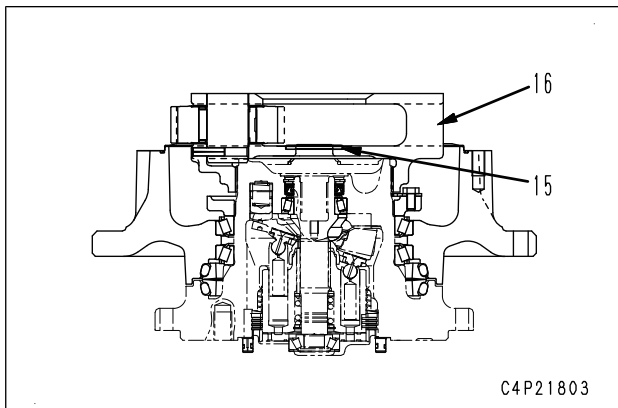
 **Ring gear:**

45 kg

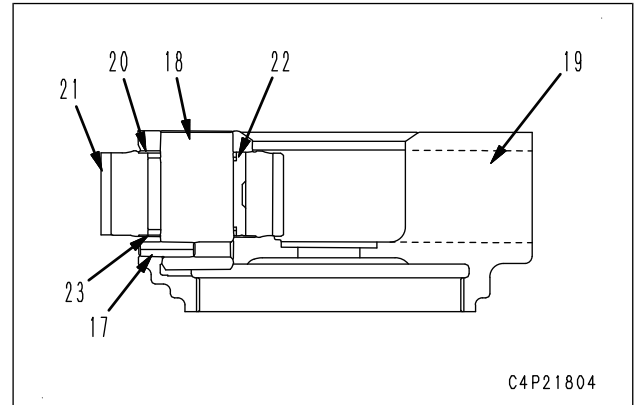
7. Thrust washer
Remove thrust washer (13).
8. No. 2 sun gear
Remove No. 2 sun gear (14).



9. Thrust washer
Remove thrust washer (15).
10. No. 2 planetary carrier assembly
 - 1) Remove No. 2 planetary carrier assembly (16).

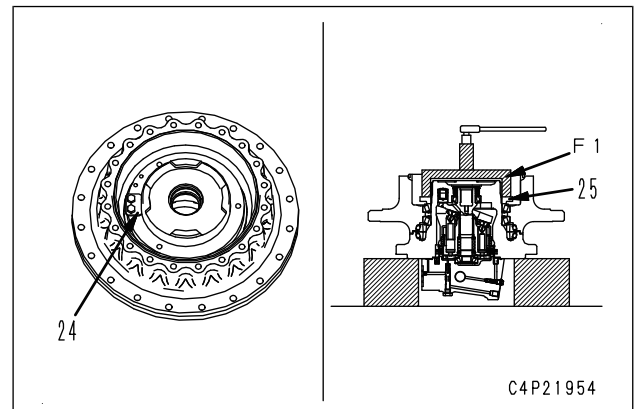


- 2) Disassemble the No. 2 planetary carrier assembly according to the following procedure.
 - 1] Drive pin (17) into shaft (18) to remove shaft (18) from No. 2 planetary carrier (19).
 - ★ After removing shaft (18), remove pin (17) from shaft (18).
 - 2] Remove thrust washer (20), No. 2 planetary gear (21), needle bearing (22), and thrust washer (23).




11. Ring nut

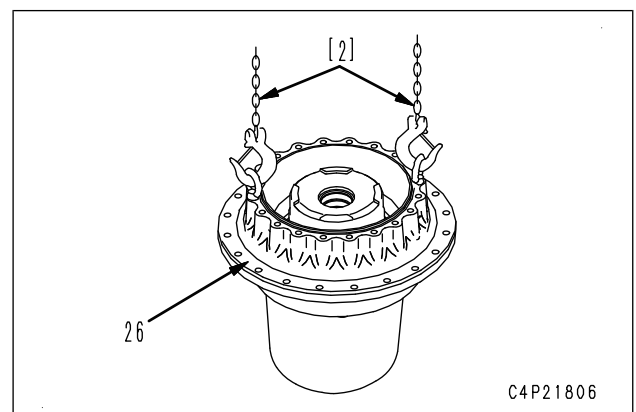
- 1) Remove lock plate (24).
- 2) By using tool F1, remove ring nut (25).



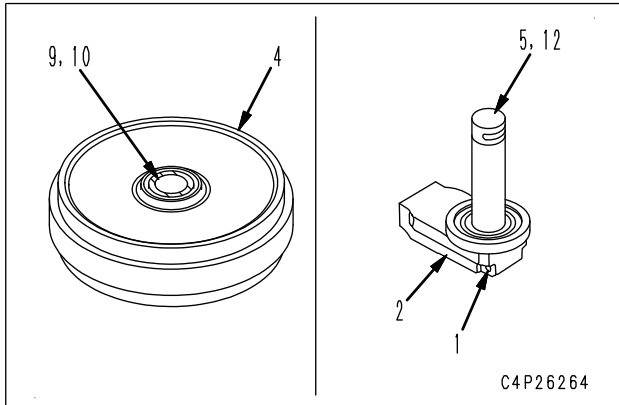
12. Hub assembly

- 1) Using eyebolts [2], sling and remove hub assembly (26) from the travel motor.

 **Hub assembly:**
80 kg

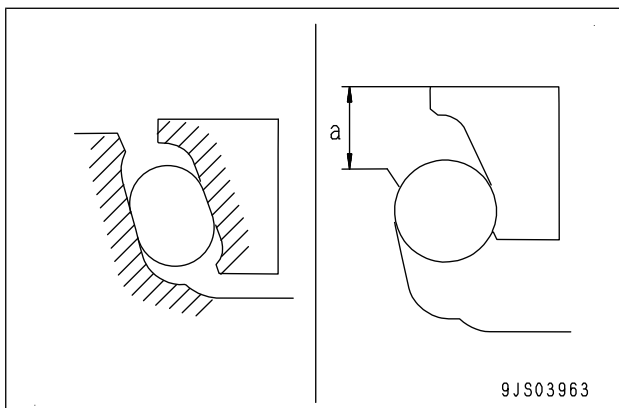
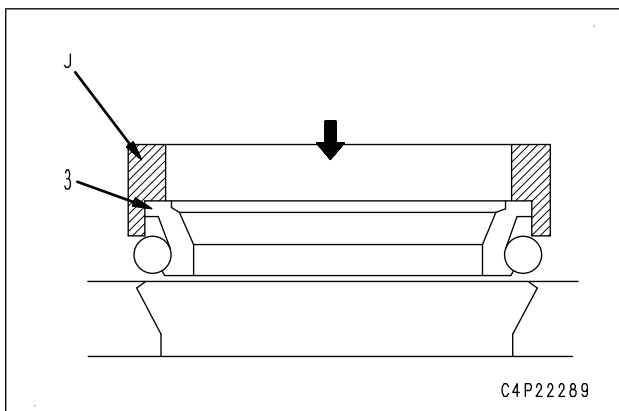


- 2) Remove bearing (27).

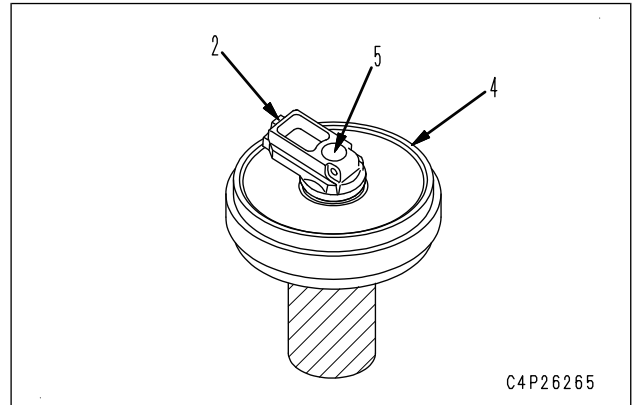


3. By using tool J, install floating seals (3) to idler (4) and the assembly of shaft (5) and support (2).

- ★ Completely clean, degrease, and dry the contact surfaces (hatched area shown in the figure) of the floating seal and the O-ring.
- ★ Apply oil to the sliding surface of the floating seal, and take care not to have any dirt stuck on it.
- ★ After inserting the floating seals, check that the inclination is less than 1 mm and the protrusion (a) is within the range of 7 to 11 mm.



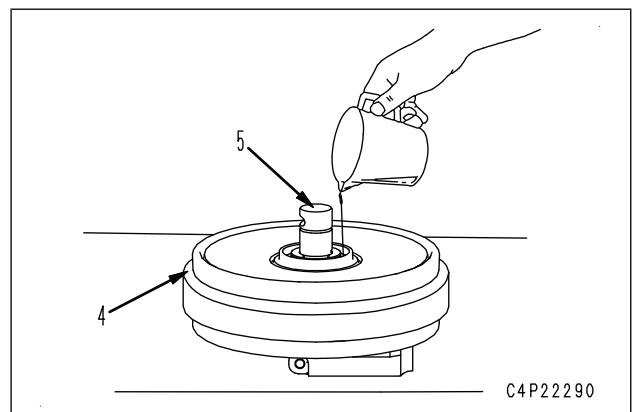
4. Install the assembly of shaft (5) and support (2) to idler (4).



5. Turn it over, and supply oil between shaft (5) and idler (4).

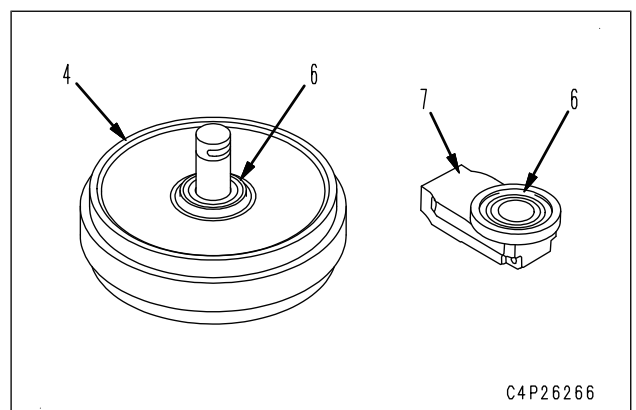


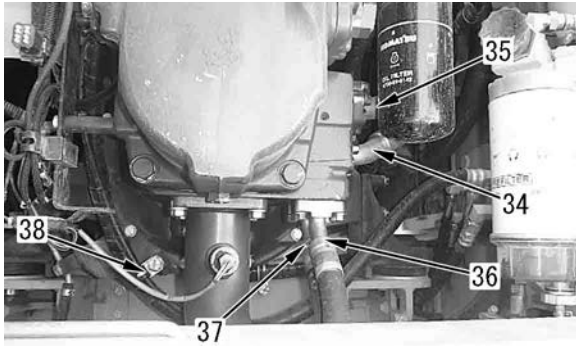
**Amount of oil to be sealed (EO-30DH):
245 to 255 cc**



6. By using tool J, install floating seal (6) to idler (4) and support (7).

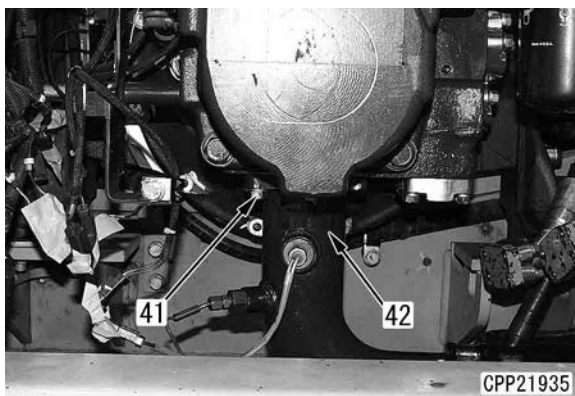
- ★ Completely clean, degrease, and dry the contact surfaces (hatched area shown in the figure) of the floating seal and the O-ring.
- ★ Apply oil to the sliding surface of the floating seal, and take care not to have any dirt stuck on it.
- ★ After inserting the floating seals, check that the inclination is less than 1 mm and the protrusion (a) is within the range of 7 to 11 mm.





CPP26281

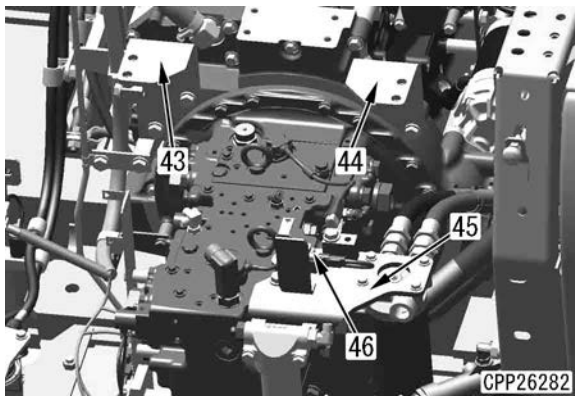
19. Remove four mounting bolts (41) and disconnect pump suction port tube (42).



CPP21935


20. Remove brackets (43) and (44).
21. Remove engine oil filter bracket (45) and reposition it downward..

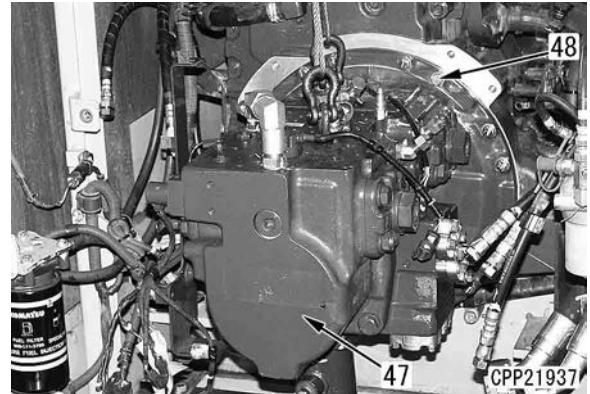
- ★ Harness clamp (46) is tightened together.



CPP26282

22. Sling main pump assembly (47) and remove mounting bolts (48).
23. Sling and remove main pump assembly (47).
[*2]

 **Main pump assembly:**
190 kg



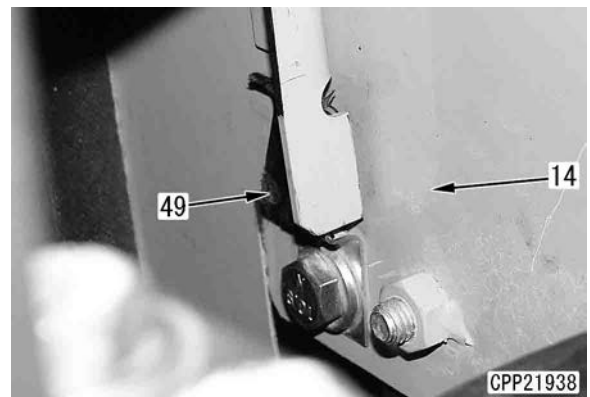
CPP21937

Installation (PC220-C200-720-K-00-A)

Perform installation in the reverse order to removal.


[*1]


- ★ When installing cover (14), engage the cover with clip (49) shown in the figure, and then tighten the mounting bolts.



CPP21938


[*2]

 **Main pump involute splines:**
Molybdenum disulfide grease (LM-G)

 **Mating face on main pump case:**
Liquid gasket (LG-6)

- ★ Take care not to torque the bolts excessively since the flywheel housing is made of aluminum.
★ Impact wrench is not allowed to use.
- Filling of oil (damper case)
Supply oil through the oil filler port to the specified level.

 **Damper case:**
0.65 ℓ

 **Damper case drain plug:**
45 ± 5 Nm {4.6 ± 0.5 kgm}

- Refilling of oil (hydraulic tank)
Supply oil through the oil filler port to the specified level. Run the engine to circulate the

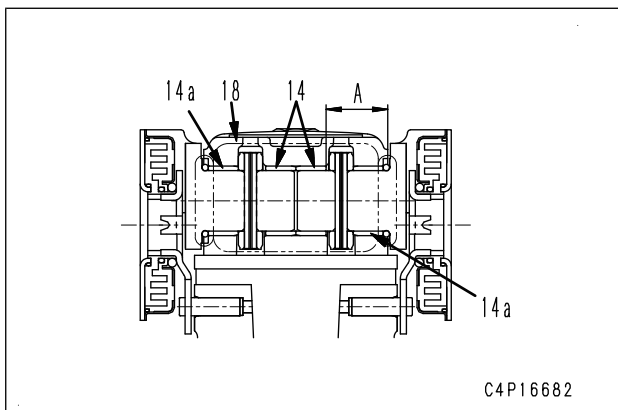
Assembly (PC220-C6V0-710-K-00-A)

- ★ Only precautions for assembly are described.
- ★ Before assembly, thoroughly clean the parts and check them for dirt, rust, or damage to prevent failure. Assemble the parts with utmost care.
- ★ When installing piston (7), apply grease (G2-LI) to its periphery and the inside of the valve body hole.
- ★ Install spring (4) with its small diameter end facing shim (3).
 - Diameter of spring (inside diameter)
 - Small diameter end: ϕ 4.9 mm
 - Large diameter end: ϕ 5.55 mm

- ★ Install shaft (16) according to the following procedure.

1. Using tool **Q1**, install bushing (14) to the case.

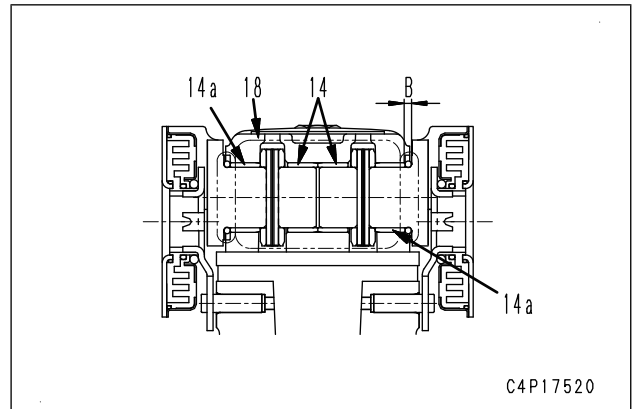
- ★ Install the bushing with its 10 deg. chamfered side ahead.
- ★ Install the bushing so that dimension (A) is as follows.
 - Dimension (A): 20.4 ± 0.3 mm
- ★ Do not drive the pin directly with a hammer, etc.



2. Using tool **Q2**, install bushing (14a) to the case.

- ★ Insert bushing (14a) with its 10-deg. chamfered side ahead.
- ★ Install bushing (14a) so that dimension (B) is as follows (bushing end face is flush with the case end face).
 - Dimension(B): 0 mm

- ★ Do not drive the pin directly with a hammer, etc.

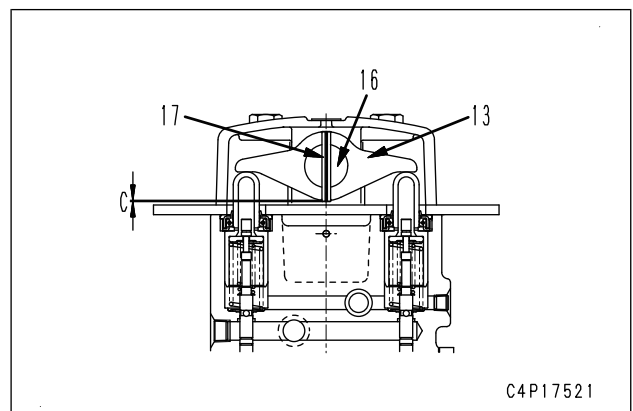


3. Install lever (13).

4. Install shaft (16).

5. Using tool **Q3**, install pin (17).

- ★ Installed dimension (C) of pin (17) should be as follows.
 - Dimension (C): 0 to 0.5 mm
- ★ Do not drive the pin directly with a hammer, etc.



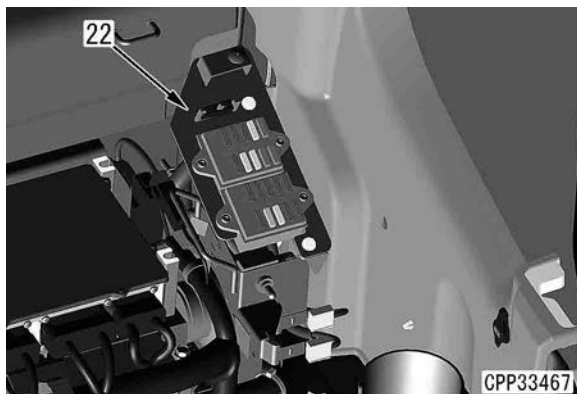
- ★ Apply grease (G2-LI) to the rocking parts of shaft (16), contact surfaces on lever (13) and piston (7), and contact surfaces on damper (21) and pin (20).

 **Grease (G2-LI)**

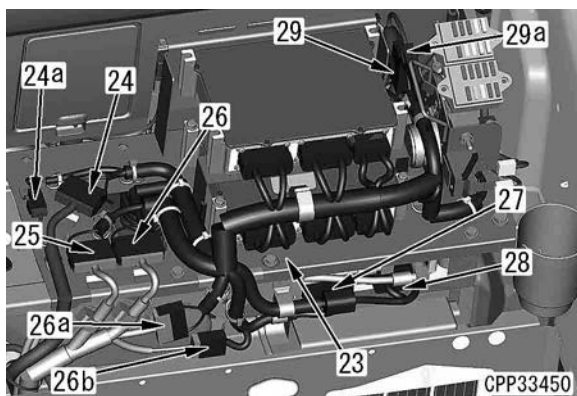
Rocking parts of shaft (16): 4 to 8 cc/entire periphery

Contact surfaces on lever (13) and piston (7): 0.3 to 0.8 cc/part

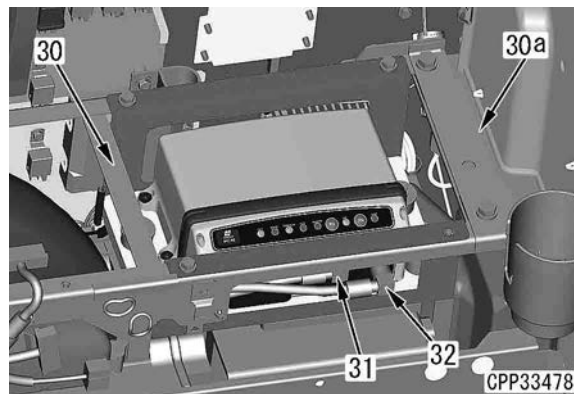
Contact surfaces on damper (21) and pin (20): 0.3 to 0.8 cc/part



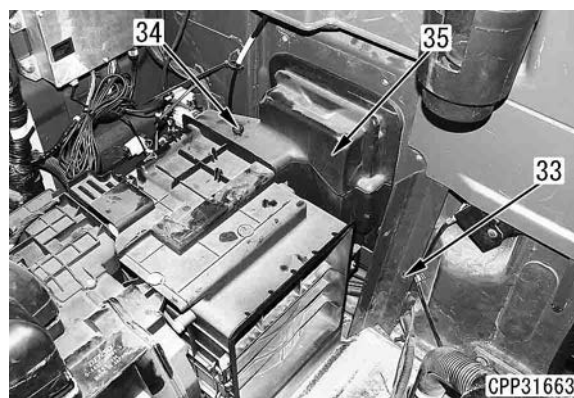
18. Remove bracket (23) (4 bolts).
19. Remove connectors (24), (24a), (25), (26), (26a), (26b), (27), (28), (29), and (29a).
- Connector (24): Intermediate harness (AA27)
 - Connector (24a): Intermediate harness (AA12)
 - Connector (25): Intermediate harness (AA22)
 - Connector (26): Intermediate harness (AA16)
 - Connector (26a): Intermediate harness (AA17)
 - Connector (26b): Intermediate harness (AA19)
 - Connector (27): Intermediate harness (CG02) [*1]
 - Connector (28): Intermediate harness (CG01) [*1]
 - Connector (29): Intermediate harness (AA15)
 - Connector (29a): Intermediate harness (AA18)



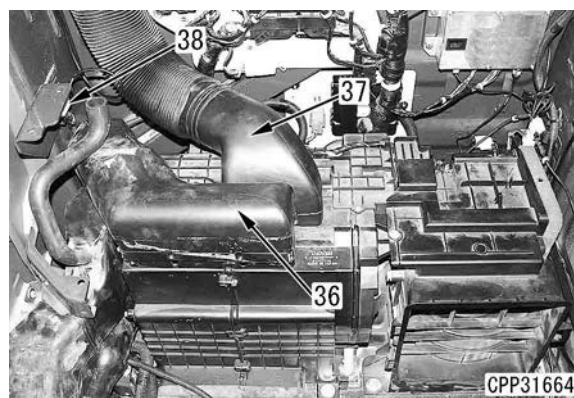
20. Remove bracket (30) (2 bolts).
21. Remove connectors (31) and (32).
- Connector (31): Intermediate harness (NA12)
 - Connector (32): Intermediate harness (NA11)



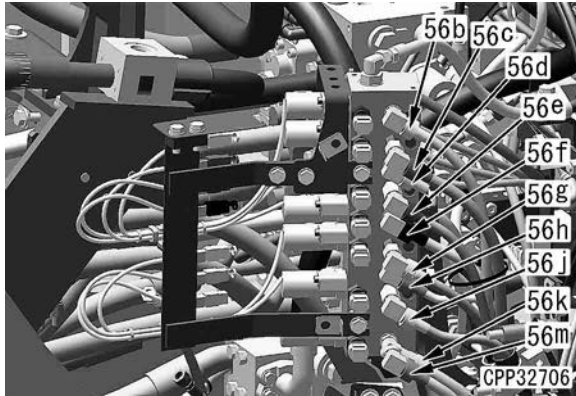
22. Remove bracket (30a).
23. Remove plate (33).
24. Pull up lock pin (34), unlock the lock, and remove duct (35).



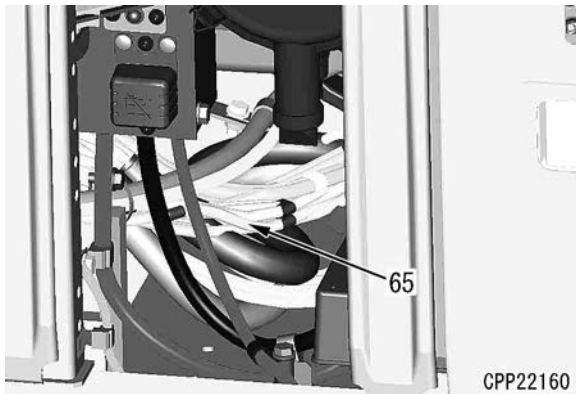
25. Remove ducts (36) and (37).
26. Disconnect connector (38).
- Connector (38): Room lamp (L03)
- ★ Cut the cable ties that are fixing the ducts and connectors.



27. Disconnect connectors (39) to (42) from KOMTRAX terminal (C).
- Connector (39): Communication antenna (GPS)
 - Connector (40): Machine main wiring harness (CK01)
 - Connector (41): Machine main wiring harness (CK02)
 - Connector (42): Communication antenna



- ★ Be sure to place a container to receive hydraulic oil before disconnecting the hoses.
34. Open the side cover on the left side of machine and pull out hose assembly (65).



35. Sling floor frame assembly (66), and remove it.

- ★ Check that all the hoses, connectors, and clamps are disconnected, and sling it gradually.

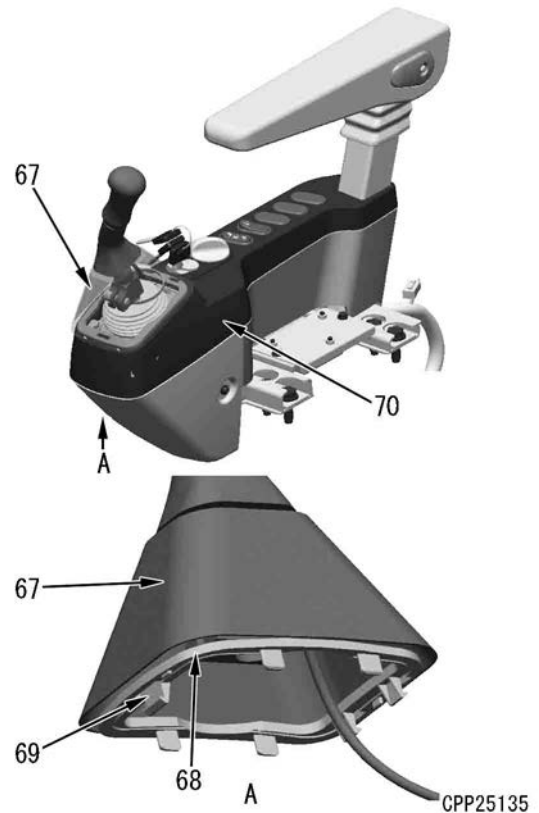
 **Floor frame assembly (66):**
250 kg



Reference: Precautions for removing work equipment control lever

Push lock (69) of plastic frame (68) in boot (67) with a flat-head screwdriver, etc., and remove boot (67) from console plastic cover (70).

- ★ If you pull a portion other than lock (69) of plastic frame (68) forcibly, you may break plastic frame (68).



Installation (PC200 ICT-H1H0-720-K-00-A)

Perform installation in the reverse order to removal.

[*1]

- Filling air conditioner circuit with refrigerant (R134a)
Fill the air conditioner circuit with refrigerant (R134a).

- ★ Filling quantity:
930 ± 50 g


- **Refilling of air compressor oil**
For details, see Others, "Filling compressor oil".
- **Refilling of coolant (radiator)**
Supply the coolant through the coolant filler port to the specified level. Run the engine to circulate the coolant through the system. Then, check the coolant level again.



Coolant (engine coolant):

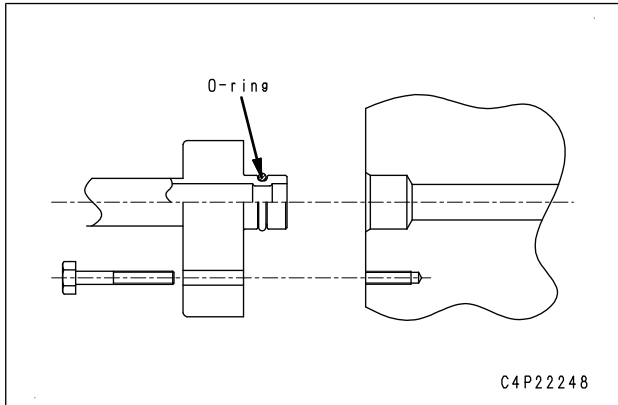
30.7 l (For details, see "Table of fuel, coolant and lubricants" .)

[*2]

 **Intermediate connector mounting bolt (X1) and (X2):**


2.55 to 3.11 Nm {0.26 to 0.32 kgm}


[*3]

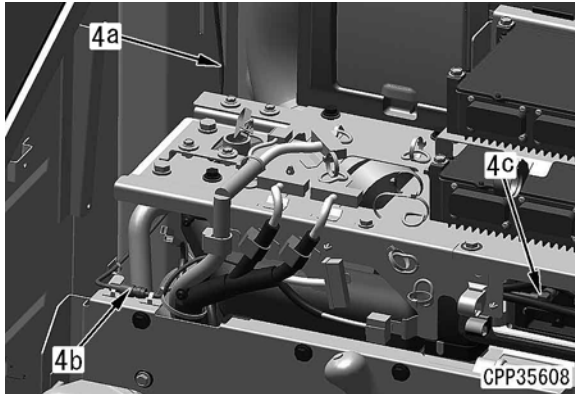


[*3]

★ Mount the air conditioner condenser assembly by inserting cushions in place.

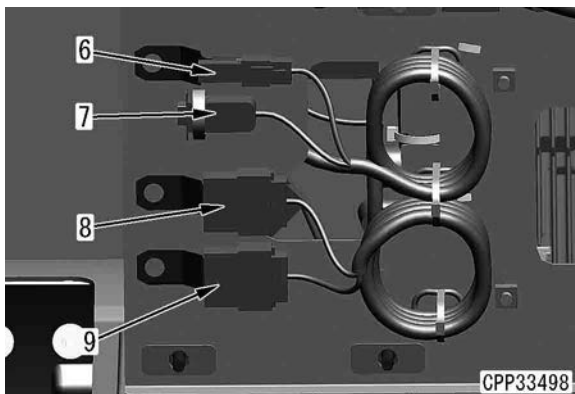
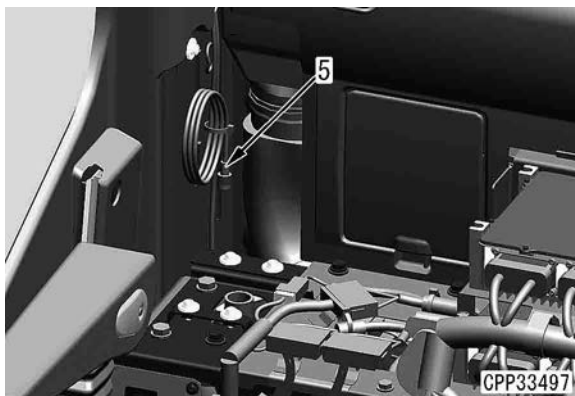
 **Air conditioner condenser assembly mounting bolt threads:**
Adhesive (LT-2)

 **Air conditioner condenser assembly mounting bolt:**
10 to 15 Nm {1.2 to 1.5 kgm}

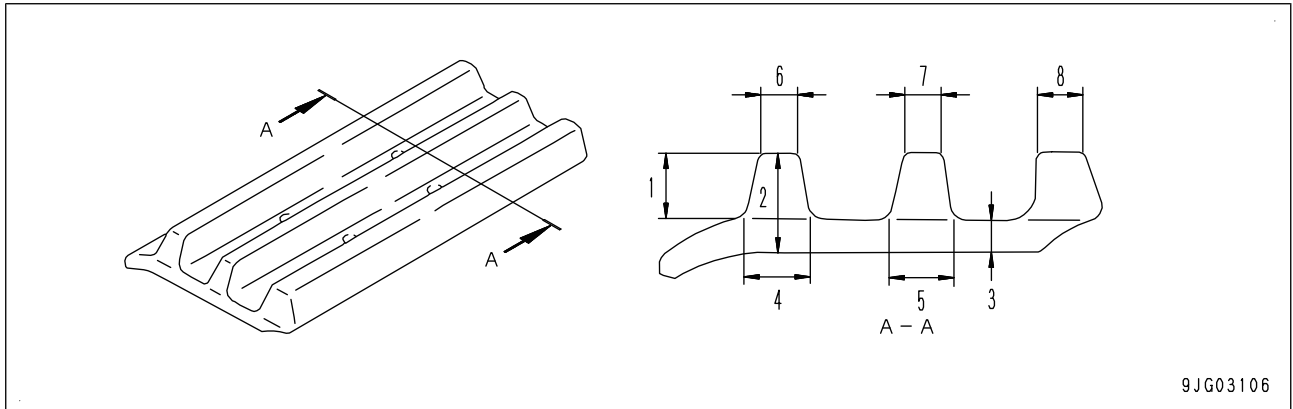


4. If radio device or sight link terminal is not installed, the harness may be bundled and fixed inside the cover.

- Radio device antenna cable (5)
- Connector (6): Radio device power supply (MA12)
- Connector (7): Radio device signal (MA09)
- Connector (8): Sight link (MA10)
- Connector (9): Sight link (MA11)



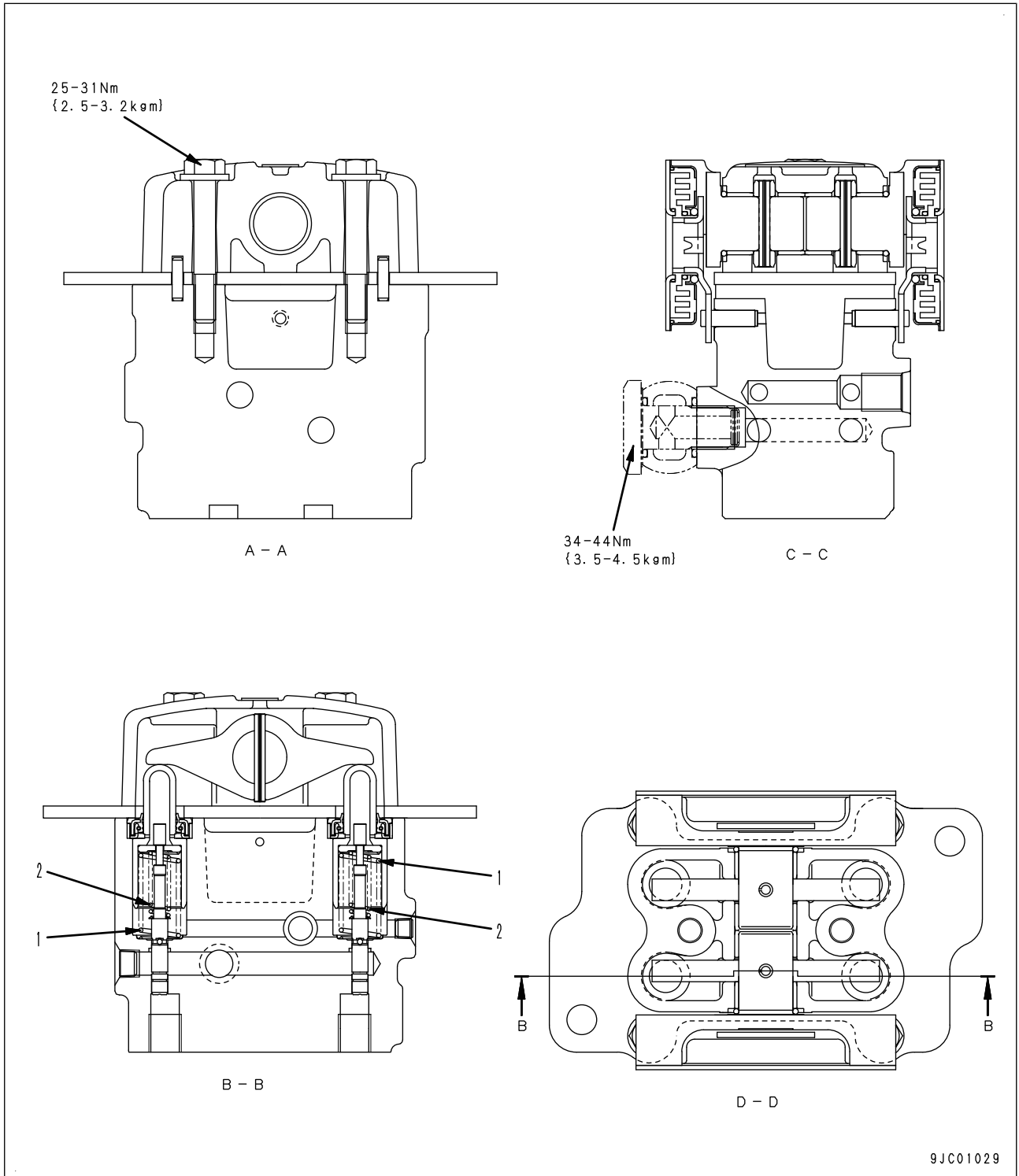
Triple grouser shoe (PC200_10-DTL8-034-K-00-A)



9JG03106

				Unit:mm
No.	Item	Criteria		Remedy
		Standard dimension	Repair limit	
1	Grouser overall height	26	16	Build-up welding for rebuilding or replace
		36	26	
2	Shoe overall height (*)	34.5	26	
3	Plate thickness (*)	10		
		8.5		
4	Grouser base length	26		
5		19		
6		20		
7	Grouser tip length	14		
8		19		

*: 600 mm width shoe.

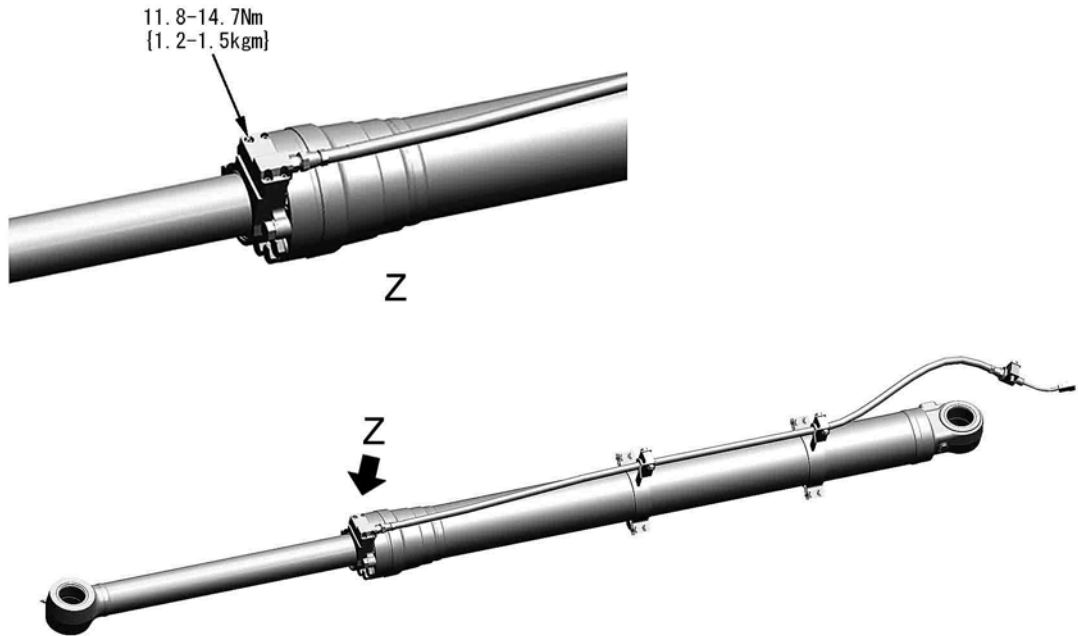


Unit:mm

No.	Item	Criteria					Remedy
		Standard dimension			Repair limit		
1	Centering spring	Free height x Outside diameter	Installed height	Load at installed length	Free height	Load at installed length	If damaged or deformed, replace spring
		48.57 x 15.5	32.5	108 N {11 kg}	-	86.3 N {8.8 kg}	
2	Metering spring	26.53 x 8.15	24.9	16.7 N {1.7 kg}	-	13.3 N {1.36 kg}	

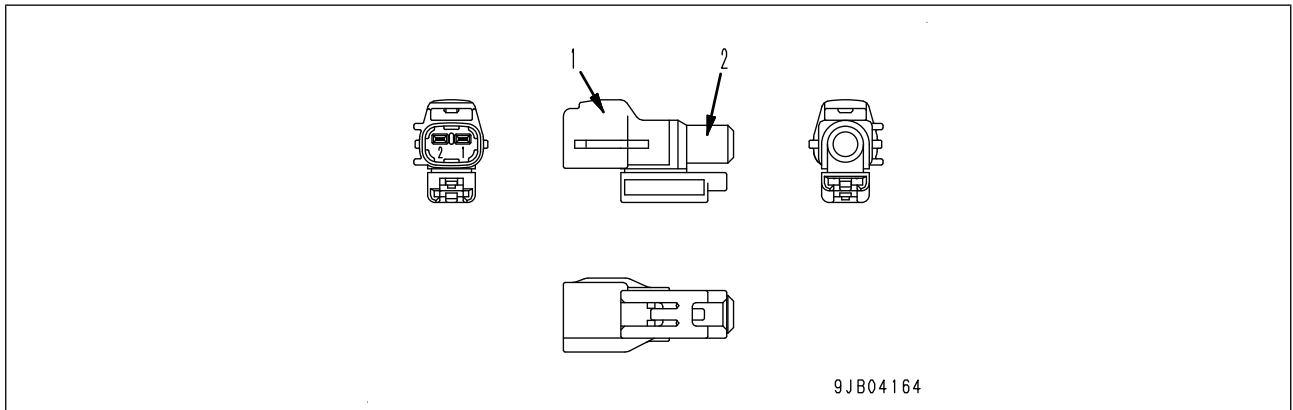
Stroke sensor for arm cylinder (PC200 ICT-L9UH-034-K-00-A)

★ Do not disassemble this since it needs to be adjusted for maintaining the performance after reassembly.



APP14422

Outer temperature sensor (outside air temperature sensor) (ALL-K55C-041-K-00-A)



1. Connector
2. Sensor

Function (ALL-K55C-042-K-00-A)

- The outside (air) temperature sensor is installed in the cooling unit.
- The outside air temperature sensor has feature of change in resistance by temperature change, therefore, can detect the ambient temperature.
- The air conditioner controller detects the ambient temperature by converting the changes in the resistance of the outside air temperature sensor into voltage changes.
- When performing automatic air conditioning, the air conditioner controller controls the blower motor and the air mix servomotor with the data of the outside (air) temperature sensor in order to adjust the temperature and air flow.

Testing (dual) pressure switch for refrigerant (PC220-K5FG-001-K-00-A)

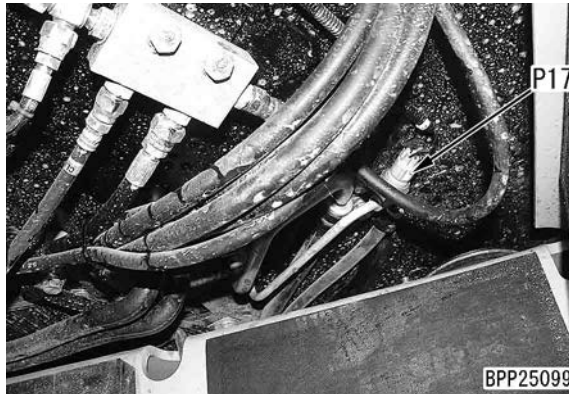
⚠ Place the machine on a level ground, lower the work equipment to the ground and stop the engine.

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

★ Note the connector numbers and installed positions before disconnecting wiring harnesses and hoses.

Testing (PC220-K5FG-360-K-01-A)

1. Swing by 90 ° .
2. Remove the cab undercover.
3. Disconnect the dual pressure switch connector P17.

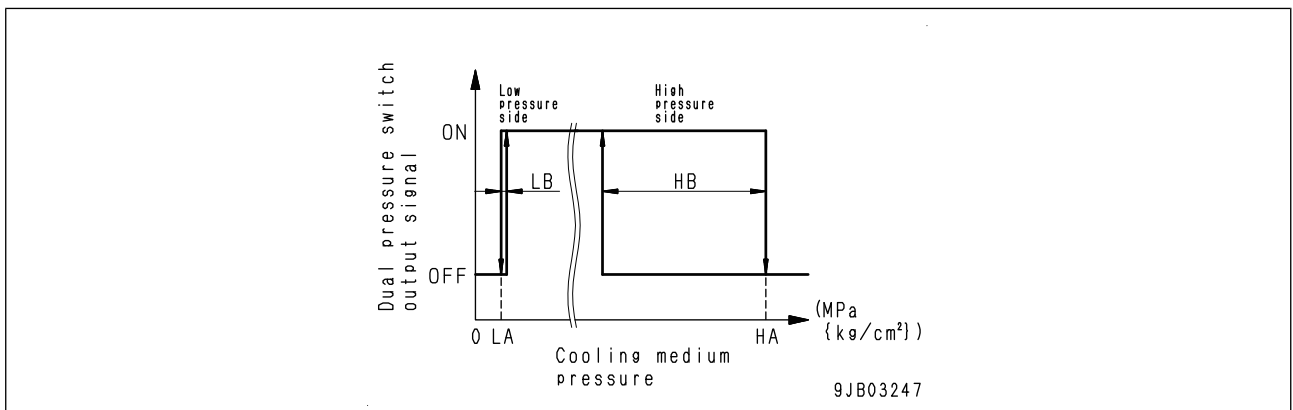


4. Ensure that the resistance between the switch-side terminals from connector P17 is shorted (ON). (If not shorted (OFF), the dual pressure switch will detect a refrigerant pressure abnormality.)

★ When the dual pressure switch is OFF, connect a pressure gauge to the high-pressure side of the air conditioner compressor and check the refrigerant pressure. See "Connection of service tool" and "Troubleshooting with gauge pressure."

★ If the refrigerant pressure is normal, the dual pressure switch is defective.

- (Dual) pressure switch



LA: 0.20 MPa {2 kg/cm²}

LB: 0.02 MPa {0.2 kg/cm²}

HA: 3.14 MPa {32 kg/cm²}

HB: 0.59 MPa {6 kg/cm²}

⚠ When replacing the dual pressure switch, refrigerant must be collected in advance.

★ If resistance between the switch-side terminals from connector P17 is shorted (ON), perform "Troubleshooting for compressor and refrigerant system".

No.	Cause	Procedure, measuring location, criteria and remarks		
		Resistance	Between R21 (male) (1) and (2) (i.e., coil resistance)	C Approx. 300 to 500 Ω
4	Breaking of harness	1. Turn starting switch to OFF position. 2. Disconnect connector R21 and carryout troubleshooting without turning starting switch ON. ★ Ensure that test result for cause 2 (air conditioner compressor is normal) is normal.		
		Resistance	Between connector R21 (female) (5) and F01-10 (Pressure switch is turned ON)	Max. 1 Ω
			Between connector R21 (female) (3) and the chassis ground (Air conditioner compressor coil resistance)	Approx. 15 Ω
			Between F01-14 and AC01 (female) (4) ★ Relay coil resistance	300 to 500 Ω
5	Ground fault in harness (Contact with GND circuit)	★ If the fuse is not blown, skip troubleshooting. 1. Turn starting switch to OFF position. 2. Disconnect connectors AC03 and R21, and connect a T-adaptor to the female side of AC03.		
		Resistance	Between AC03 (female) (1) and chassis ground	Min. 1 M Ω
6	Short-circuiting of harness	1. Turn starting switch to OFF position. 2. Disconnect connectors AC01, AC02, and R21. ★ Ensure that test result for cause 2 is normal.		
		Resistance	Between wiring harness side (2) of connector R21 and AC02 (female) (2), (3), and (4)	Min. 1 M Ω
7	Defective air conditioner controller	1. Turn starting switch to OFF position. 2. Disconnect connector R21. 3. Turn starting switch to ON position. 4. Display the air conditioner operation screen on the machine monitor and press the A/C switch.		
		Voltage	Between connector R21 (female) (2) and ground	Max. 1 V
8	Defective machine monitor	1. Turn starting switch to ON position. 2. Display the air conditioner operation screen on the machine monitor.		
		Press A/C switch.	"A/C ON" is displayed.	
9	Defective air conditioner unit	If no failures are found by the above checks, the air conditioner unit may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

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