SEN05842-01

Shop Manual

HYDRAULIC
EXCAVATOR

PC210LC-10

SERIAL NUMBERS 450001 and up

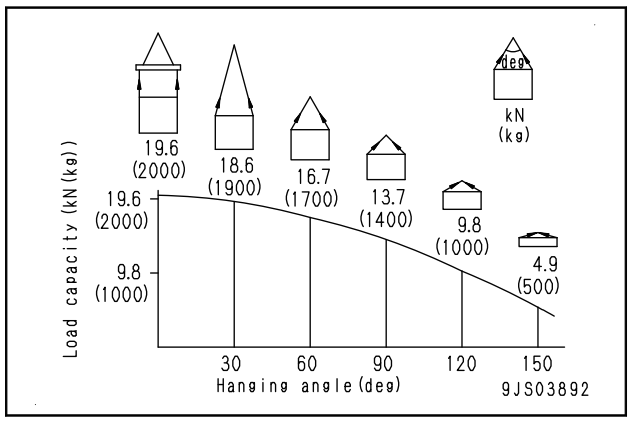
KOMATSU

- Keep putting on the gloves during sling work. (Put on the leather gloves, if available.)
- Measure the weight of the load by the eye and check its center of gravity.
- Use the proper sling according to the weight of the load and method of slinging. If too thick wire ropes are used to sling a light load, the load may slip and fall.
- Do not sling a load with one wire rope only. If do so, the load may rotate or the sling gets loose and the sling may slip off. Install two or more wire ropes symmetrically.

⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original slinging position on the load, which can result in a dangerous accident.

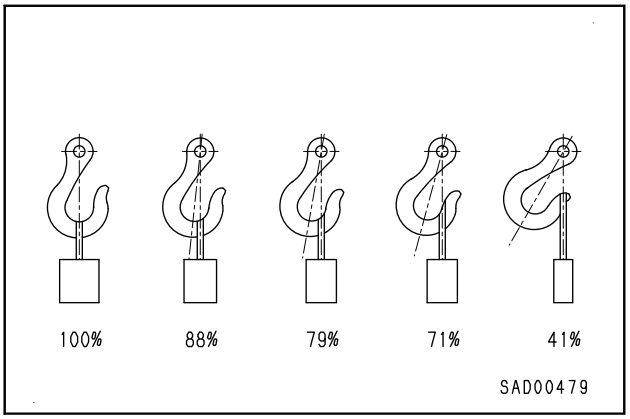
- Hanging angle must be 60 degrees or smaller as a rule.
- When hanging a heavy load (25kg or heavier), the hanging angle of the rope must be narrower than that of the hook.

★ When slinging a load with two ropes or more, the larger the hanging angle is, the larger the tension of each rope. The figure bellow shows the variation of allowable load in kN {kg} when hoisting is made with two ropes, each of which is allowed to sling up to 9.8 kN {1000kg} a load vertically, at various hanging angles. When the two ropes sling a load vertically, up to19.6 kN {2000 kg} of total weight can be suspended. This weight is reduced to 9.8 kN {1000 kg} when the two ropes make a hanging angle of 120 degrees. If the two ropes sling a 19.6 kN {2000 kg} load at a hanging angle of 150 degrees, each rope is subjected to a force as large as 39.2 kN {4000 kg}.



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

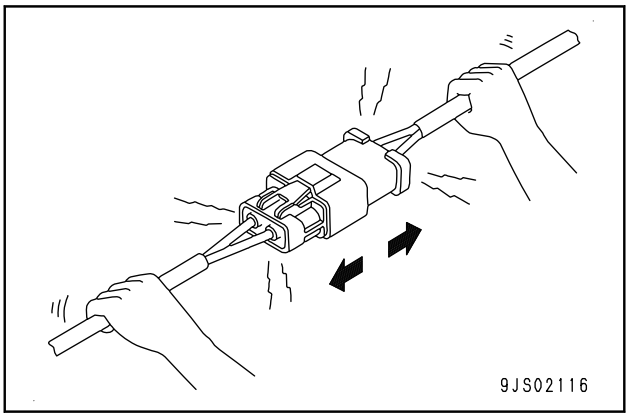
★ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The hook has the maximum strength at the middle part.



- Do not use twisted or kinked wire ropes.
- When slinging up a load, observe the following.
  1. Wind up the rope slowly until the wire rope tensions. When putting your hands on the wire ropes, do not grasp them but press them down from above. If you grasp them, your fingers may be caught.
  2. After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
  3. If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
  4. Do not lift up the load at an angle.
- When lowering a load, pay attention to the following.
  1. When lifting down a load, stop it temporarily at 30 cm above the floor, and then lower it slowly.
  2. Check that the load is stable, and then remove the sling.
  3. Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

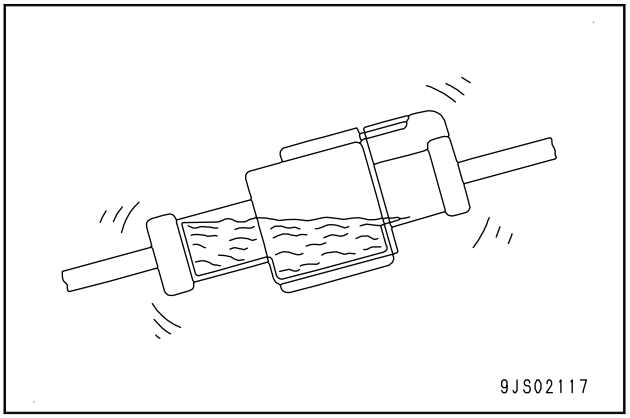
Precautions for using mobile crane

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



High-pressure water entering connector

- The connector is designed to make it difficult for water to enter (drip-proof structure), but if high-pressure water is sprayed directly on the connector, water may enter the connector, depending on the direction of the water jet. Accordingly, take care not to spray water over the connector.
  The connector is designed to prevent water from entering, but once water does enter, it is difficult to drain it. If water should get into the connector, the pins will be short-circuited by the water. So if any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.



Entry of water, mud or dirt when disconnecting a connector

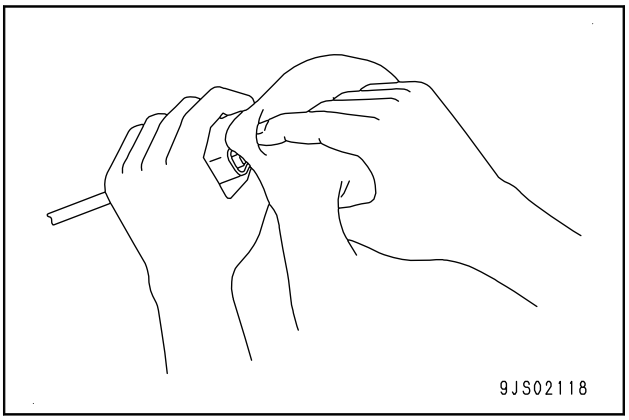
- If any water, mud or dirt is stuck to the outside surface of a connector, it can enter inside the connector when the connector is disconnected. Before disconnecting the connector, wipe off any stuck water or dirt by using a piece of dry cloth or blow it with compressed air.

Oil, mud or dirt stuck to connector

- If any oil or grease is stuck to the connector and an oil film is formed on the mating surface of the male and female pins, the oil prevents electricity from passing through, resulting in defective contact. If any oil or grease, mud or dirt is stuck to the connector, wipe it off with a dry cloth or blow it with compressed air and spray it with electrical contact restorer.

  ★ When wiping the joint portion of the connector, be careful not to apply excessive force or deform the pins.

  ★ If there is oil or water in the compressed air, it causes the contacts to become dirtier. So, remove the oil and water from the compressed air completely before cleaning the connector with the compressed air.

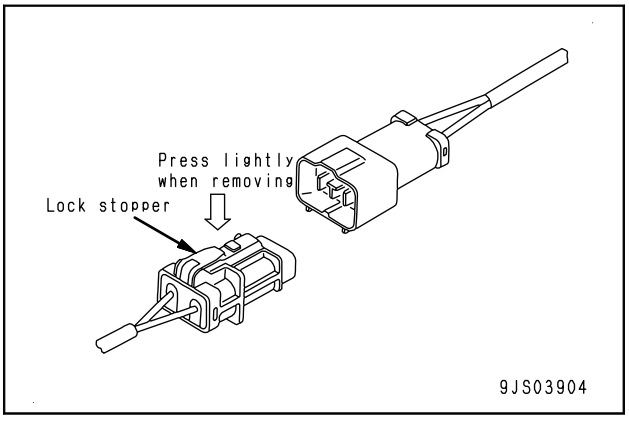


Removing, installing, and drying connectors and wiring harnesses

Disconnecting connectors

1. Hold the connectors when disconnecting.
   - Disconnect connectors by holding the connector bodies. For the connectors held by a screw, loosen the screw fully, then hold the male and female connectors with each hand respectively and pull them apart horizontally. For the connectors with lock stopper, press down the stopper with your thumb and pull the connectors apart.

     ★ Never pull the connector with one hand.



2. When removing from clips
   - Both of the connector and clip have stoppers, which are engaged with each other when the connector is connected.

Table of tightening torque for hose (taper seal type and face seal type)

★ Unless otherwise specified, tighten the hose fittings (taper seal type and face seal type) to the torque shown in the following table.

★ The table is applied to the threads coated with engine oil (wet threads)

Nominal No. of hose	Width across flats (mm)	Tightening torque (Nm {kgm})		Taper seal	Face seal	
		Range	Target	Thread size (mm)	Nominal No. - threads per inch, type of thread	Thread root diameter (reference)
02	19	34 to 54 {3.5 to 5.5}	44 {4.5}	—	9/16 -18UN	14.3
		34 to 63 {3.5 to 6.5}	44 {4.5}	14	—	—
03	22	54 to 93 {5.5 to 9.5}	74 {7.5}	—	11/16 -16UN	17.5
	24	59 to 98 {6.0 to 10.0}	78 {8.0}	18	—	—
04	27	84 to 132 {8.5 to 13.5}	103 {10.5}	22	13/16 -16UN	20.6
05	32	128 to 186 {13.0 to 19.0}	157 {16.0}	24	1 -14UNS	25.4
06	36	177 to 245 {18.0 to 25.0}	216 {22.0}	30	1-3/16 -12UN	30.2
(10)	41	177 to 245 {18.0 to 25.0}	216 {22.0}	33	—	—
(12)	46	197 to 294 {20.0 to 30.0}	245 {25.0}	36	—	—
(14)	55	246 to 343 {25.0 to 35.0}	294 {30.0}	42	—	—

Table of tightening torque for face seal joints

★ The tightening torque table below applies to the seal joint (sleeve nut type)

★ The table is applied to the threads coated with engine oil (wet threads).

Outer diameter of pipe (mm)	Width across flats (mm)	Tightening torque (Nm {kgm})		Face seal	
		Range	Target	Nominal No. - threads per inch, type of thread	Thread root diameter (Reference)
8	19	14 to 16 {1.4 to 1.6}	15 {1.5}	9/16 -18UN	14.3
10	22	24 to 27 {2.4 to 2.7}	25.5 {2.6}	11/16 -16UN	17.5
12	24 {27}	43 to 47 {4.4 to 4.8}	45 {4.6}	13/16 -16UN	20.6
15 {16}	30 {32}	60 to 68 {6.1 to 6.8}	64 {6.5}	1 -14UNS	25.4
22 {20}	36	90 to 95 {9.2 to 9.7}	92.5 {9.4}	1-3/16 -12UN	30.2

Reference: The face seal joint of the dimension in ( ) is also used, depending on the specification.

Specifications *(ALL-2111-001-A-00-A)*

PC210LC-10 *(PC200_10-2111-931-A-00-A)*

Machine model		PC210LC-10
Serial number		450001 and up
Bucket capacity	m^3	0.8
Machine weight	kg	21,600

Performance

Machine model			PC210LC-10
Serial number			450001 and up
Working ranges	Max. digging depth	mm	6,620
	Max. vertical wall digging depth	mm	5,980
	Max. digging reach	mm	9,875
	Max. digging reach at ground level	mm	9,700
	Max. digging height	mm	10,000
	Max. dumping height	mm	7,110
Max. digging force (with power maximizing function)		kN {kg}	138.3 {14,100} (149.1 {15,200})
Swing speed		min^{-1} {rpm}	12.4 {12.4}
Swing operation max. slope angle		deg.	25
Travel speed (Lo/Mi/Hi)		km/h	3.0/4.1/5.5
Gradeability		deg.	35
Ground pressure (standard shoe)		kPa {kg/cm^2}	38.2 {0.39}

Dimensions

Machine model		PC210LC-10
Serial number		450001 and up
Overall length	mm	9,625
Overall width	mm	3,080
Overall height (for transport) (*1)	mm	3,135
Cab height (*1)	mm	3,045
Ground clearance of upper structure (*2)	mm	1,085
Min. ground clearance	mm	440
Tail swing radius	mm	2,940
Min. swing radius of work equipment	mm	3,040
Top height at min. swing radius of work equipment	mm	8,005
Overall width of track	mm	2,980
Overall length of track	mm	4,450
Track gauge	mm	2,380
Distance between tumbler centers	mm	3,655
Cab height (*3)	mm	2,250
Standard shoe width	mm	700

*1: Excluding grouser height (26 mm) included.

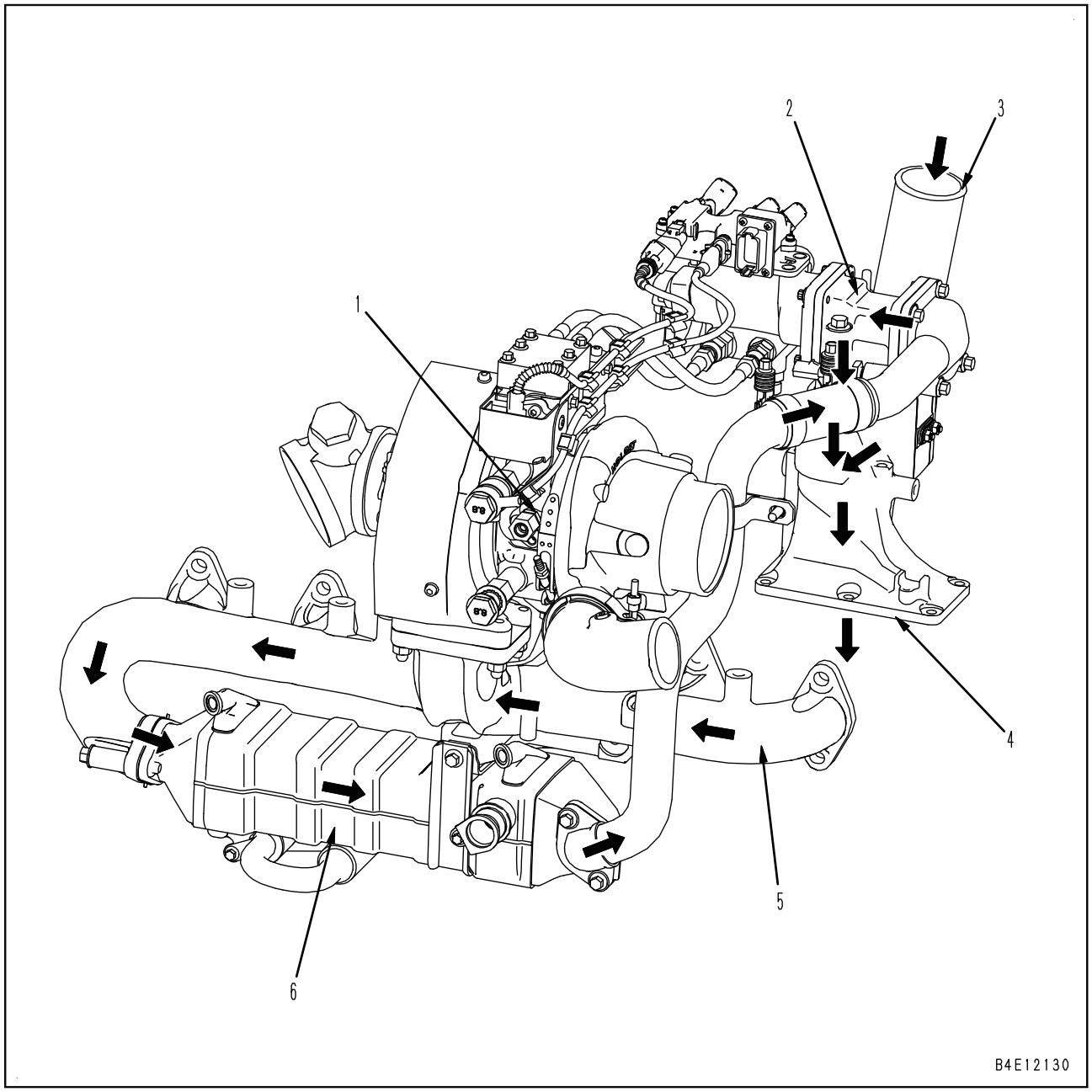
*2: Not excluding grouser height (26 mm) not included.

*3: Excluding engine hood.

EGR system piping drawing *(WA380-A9J0-04D-K-00-A)*

EGR: Abbreviation for Exhaust Gas Recirculation.

★ The shape is subject to machine models.



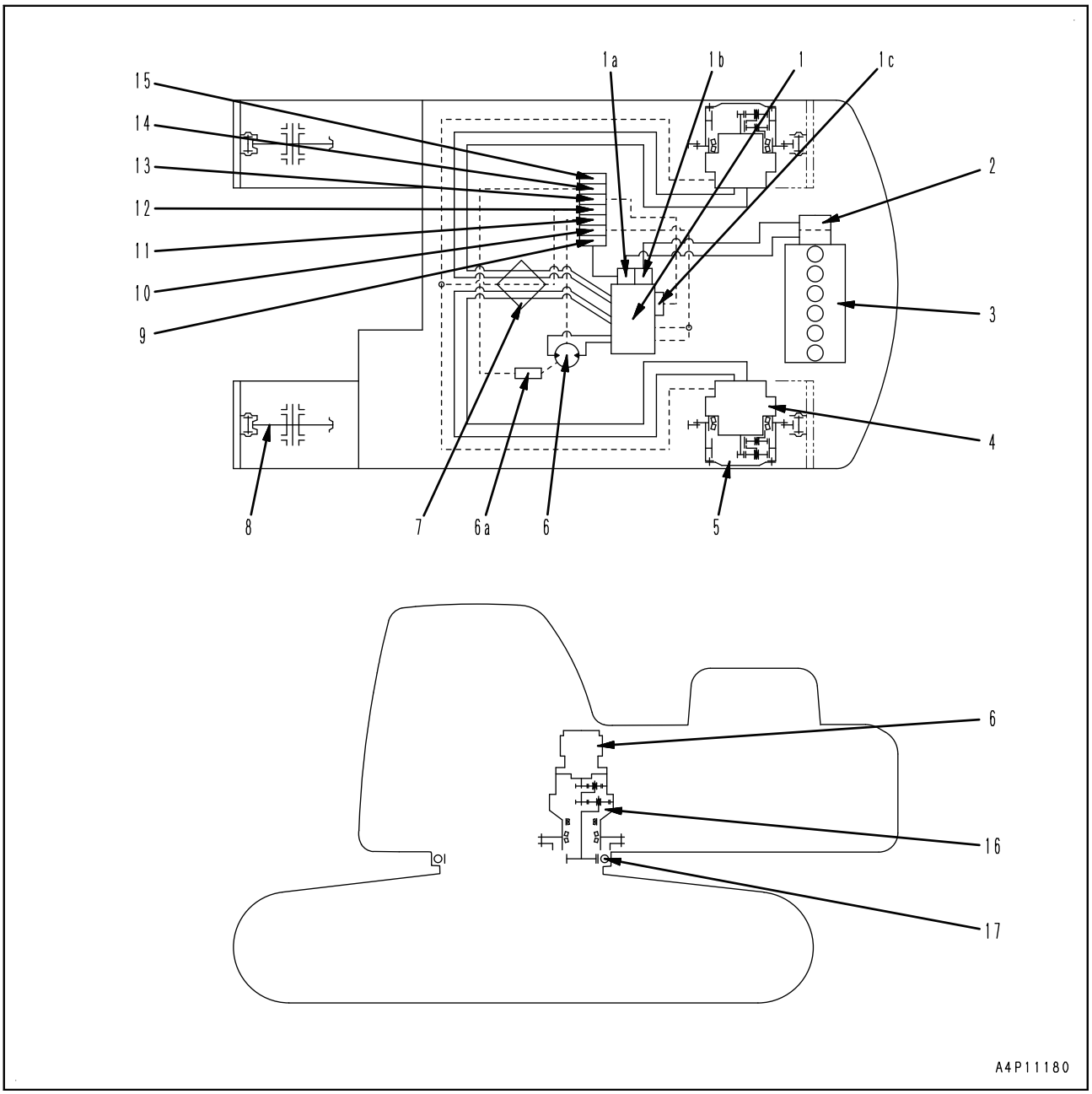
1. KVGT
2. EGR valve
3. Air intake pipe
4. Air intake connector
5. Exhaust manifold
6. EGR cooler

Function *(ENG107-A9J0-042-K-00-A)*

- EGR valve (driven hydraulically)
  Controls the gas flow from the exhaust system to the air intake system. Since the exhaust pressure is higher than the boost pressure, the exhaust gas flows to the air intake side.
- EGR cooler

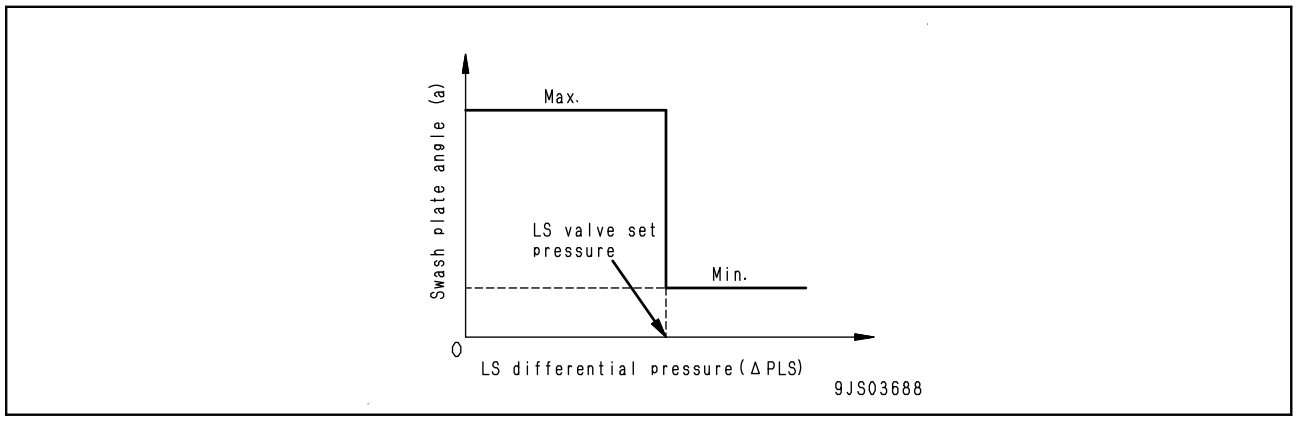
Power train *(ALL-C100-001-K-00-A)*

Power train system *(PC220-C100-041-K-00-A)*



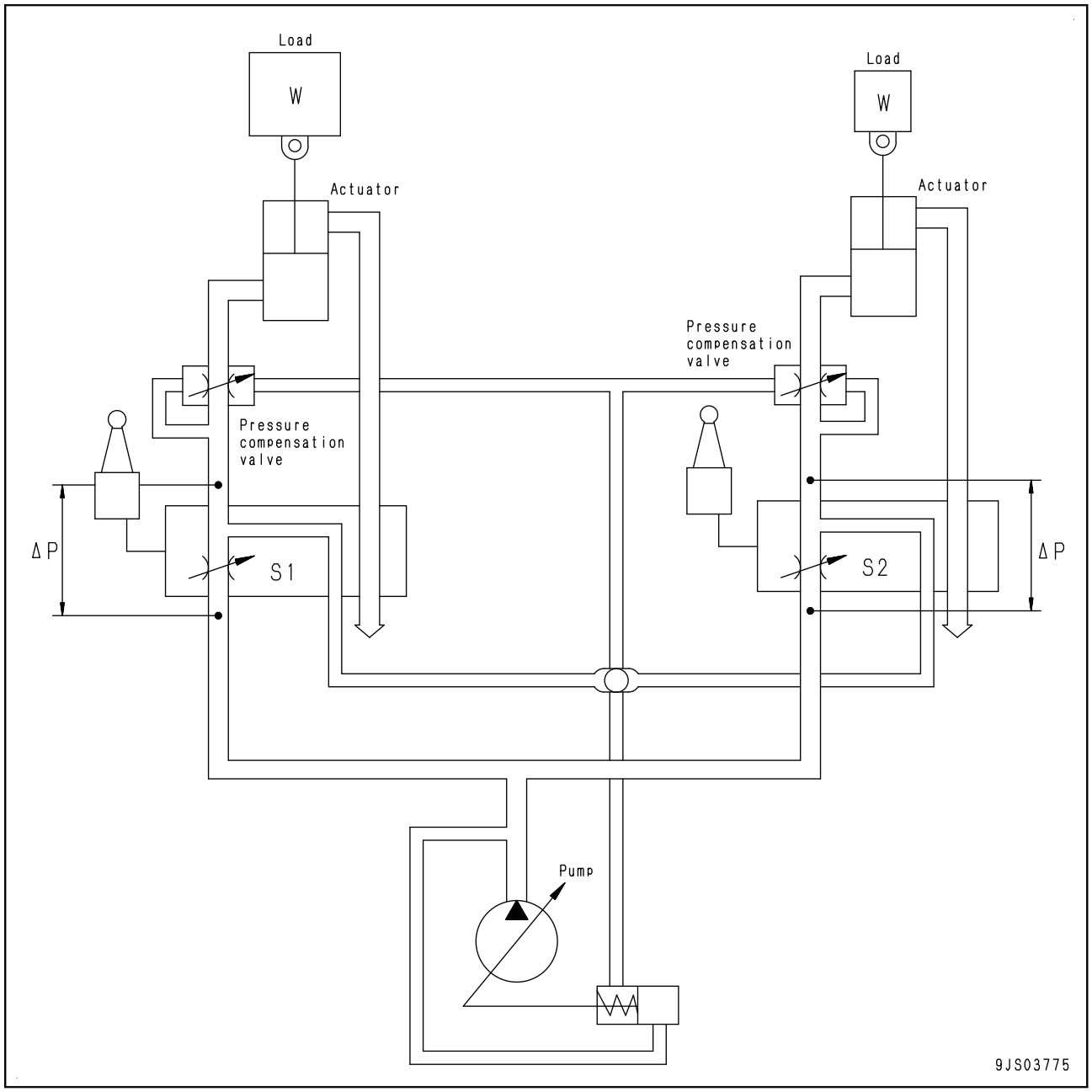
1. Control valve
1a. Self-pressure reducing valve
1b. Merge-divider valve
1c. Travel junction valve
2. Main pump
3. Engine
4. Travel motor
5. Final drive
6. Swing motor
6a. Swing 2-stage relief valve
7. Center swivel joint
8. Idler

LS differential pressure (ΔPLS) and pump swash plate angle



★ See “Main pump“ for the explanation of the operation.

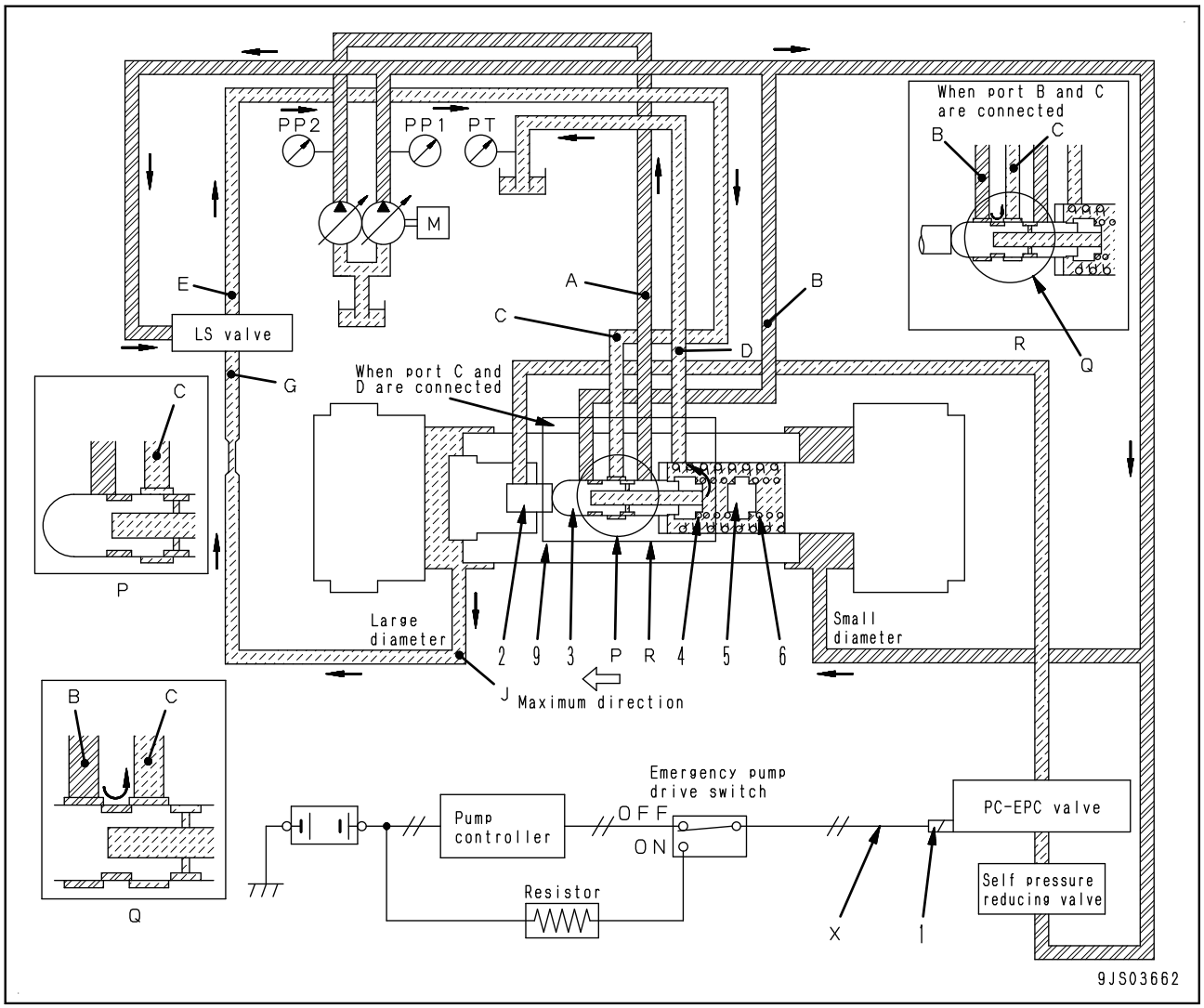
Pressure compensation control



- Spool (3) stops at a position where the combined force exerted by springs (4) and (6) is equalized to the combined force exerted by pump pressure (PP1) (self pressure) and pump pressure (PP2) (other pump's pressure) acting on spool (3).
- Depending on this position, the pressure output from the PC valve [port (C) pressure] varies.
- The amperage of the command current (X) depends on the type of work (lever operation), work mode selection, engine speed setting, and the actual engine speed.

★ Other pump's pressure denotes the pressure of the pump situated on the opposite side.

For the front pump pressure, the other pump's pressure is that of the rear pump. And for the rear pump pressure, the other pump's pressure is that of the front pump.

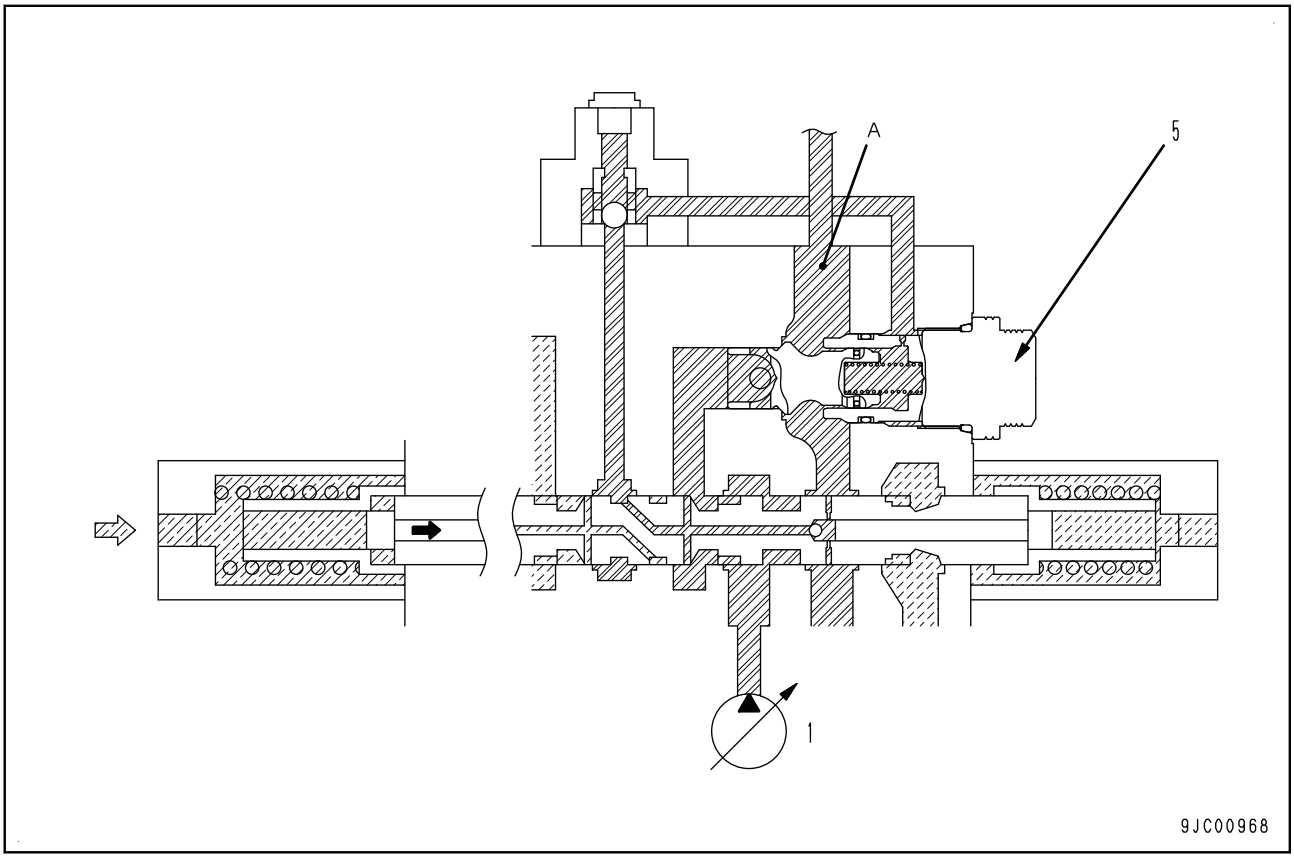


Action of spring

- The spring force of springs (4) and (6) in the PC valve depends on the position of the swash plate.
- When servo piston (9) moves to the right, spring (6) is compressed.
- When the piston moves further to the right, the piston comes in contact with seat (5) and spring (6) is fixed.
- Then, only spring (4) operates.
- When servo piston (9) compresses or decompresses springs (4) and (6), the spring force varies.
- When the command current (X) input to PC-EPC valve solenoid (1) varies, the thrust pushing piston (2) varies.
- The spring forces of springs (4) and (6) are also varied by the PC-EPC valve solenoid command current (X).
- Port (C) on the PC valve is connected to port (E) on the LS valve.
- Self pressure (PP1) is transmitted to the small diameter end of servo piston (9) and port (B), and other pump's pressure (PP2) is transmitted to port (A).
- When pressures (PP1) and (PP2) are low, spool (3) is on the left.

10. Suction safety valve (boom LOWER)
11. Suction valve (R.H. travel FORWARD)
12. Suction safety valve (arm IN)
13. LS shuttle valve (arm)
14. LS shuttle valve (R.H. travel)
15. LS selector valve
16. LS shuttle valve (boom)
17. LS shuttle valve (L.H. travel)
18. LS shuttle valve (bucket)
19. LS shuttle valve (service)
20. LS check valve

When traveling



Structure

- Since no holding pressure is generated at port (A) of the travel circuit, a pressure compensation valve without shuttle valve (5) is adopted.

Travel PPC shuttle valve *(PC220-C6V1-042-K-00-A)*

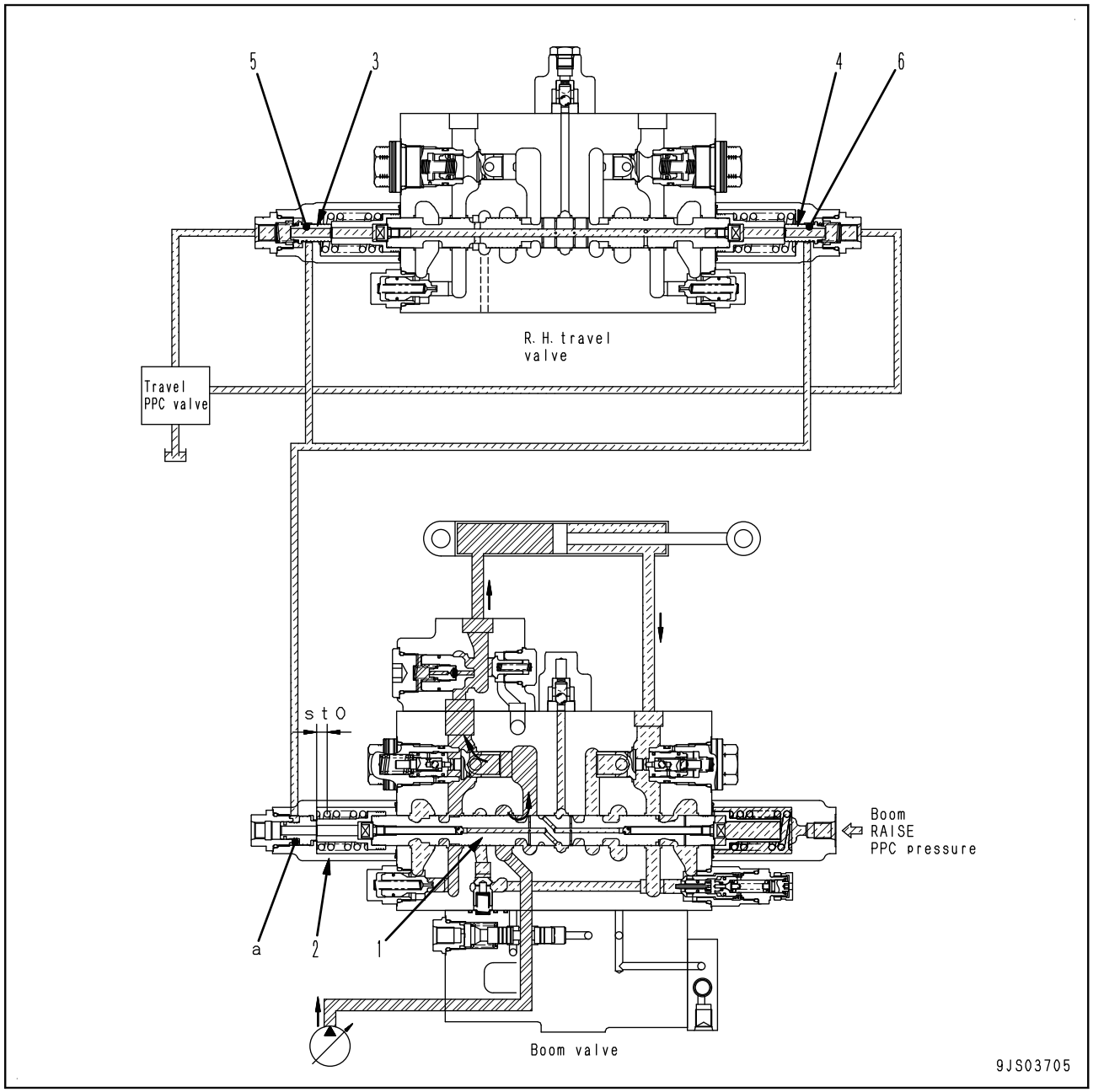
PPC: Abbreviation for Proportional Pressure Control

Function

- If boom RAISE, arm IN or OUT, bucket CURL or DUMP operation is performed when the machine is traveling up a steep, the pilot pressure from the travel PPC valve serves to restrict the travel of respective spools of boom, arm and bucket valves so that the oil flow rates to respective cylinders are restricted.
- To limit the travel of the boom, arm or bucket spool, the pilot pressure from the travel PPC valve passes through the internal circuit of respective control valves and acts on the spool.

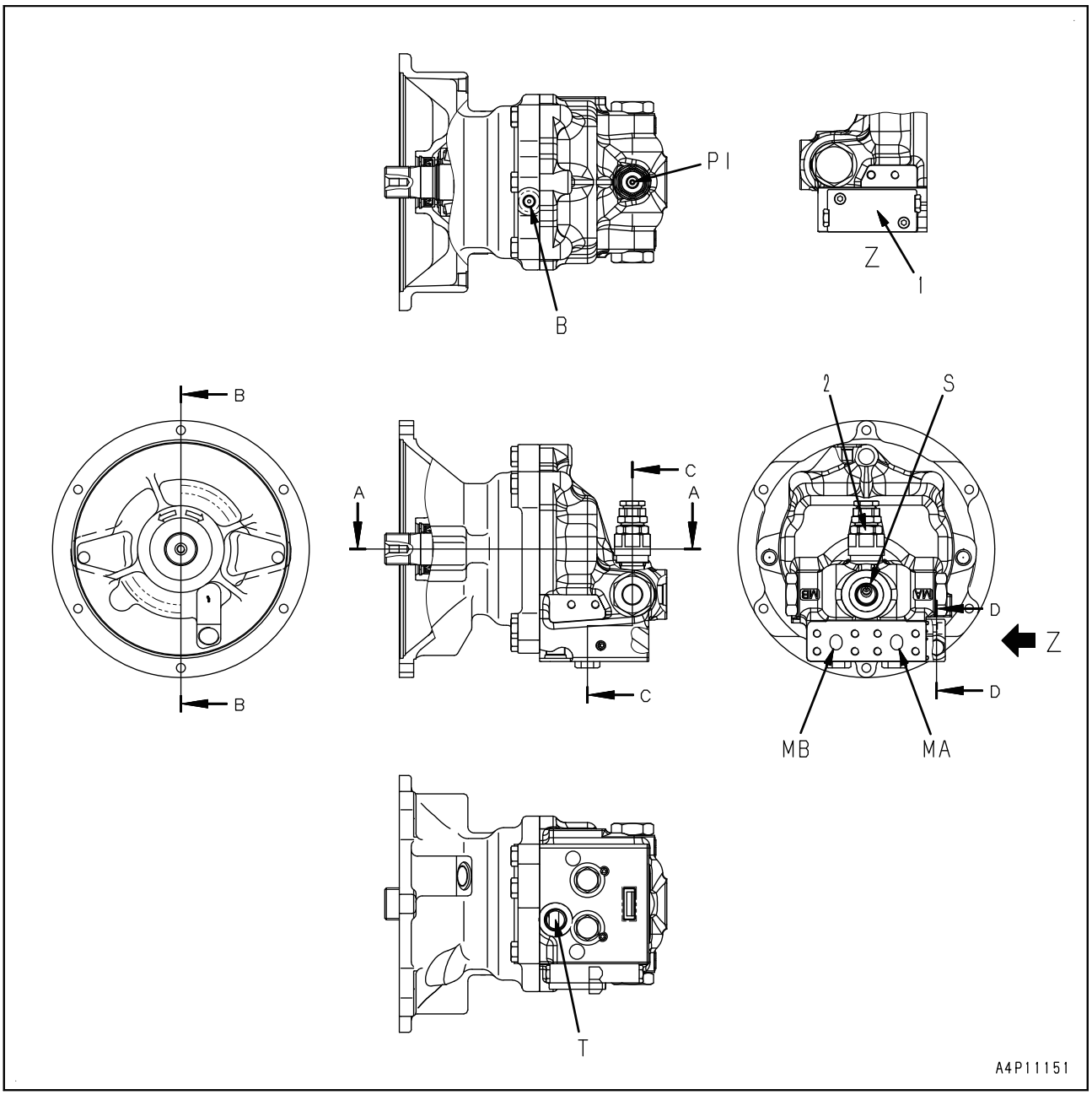
Operation *(ALL-C6V1-044-K-00-A)*

When travel levers are in NEUTRAL



- The oil in the stroke limiting signal chamber (a) passes through orifices (5) and (6) of respective pistons (3) and (4) build in the travel spring case, and then is drained through the travel PPC valve.
- When boom RAISE (or arm IN or OUT, bucket CURL or DUMP) operation is performed, spool (1) moves to the left until it contacts the end face of spring case (2) (st0).

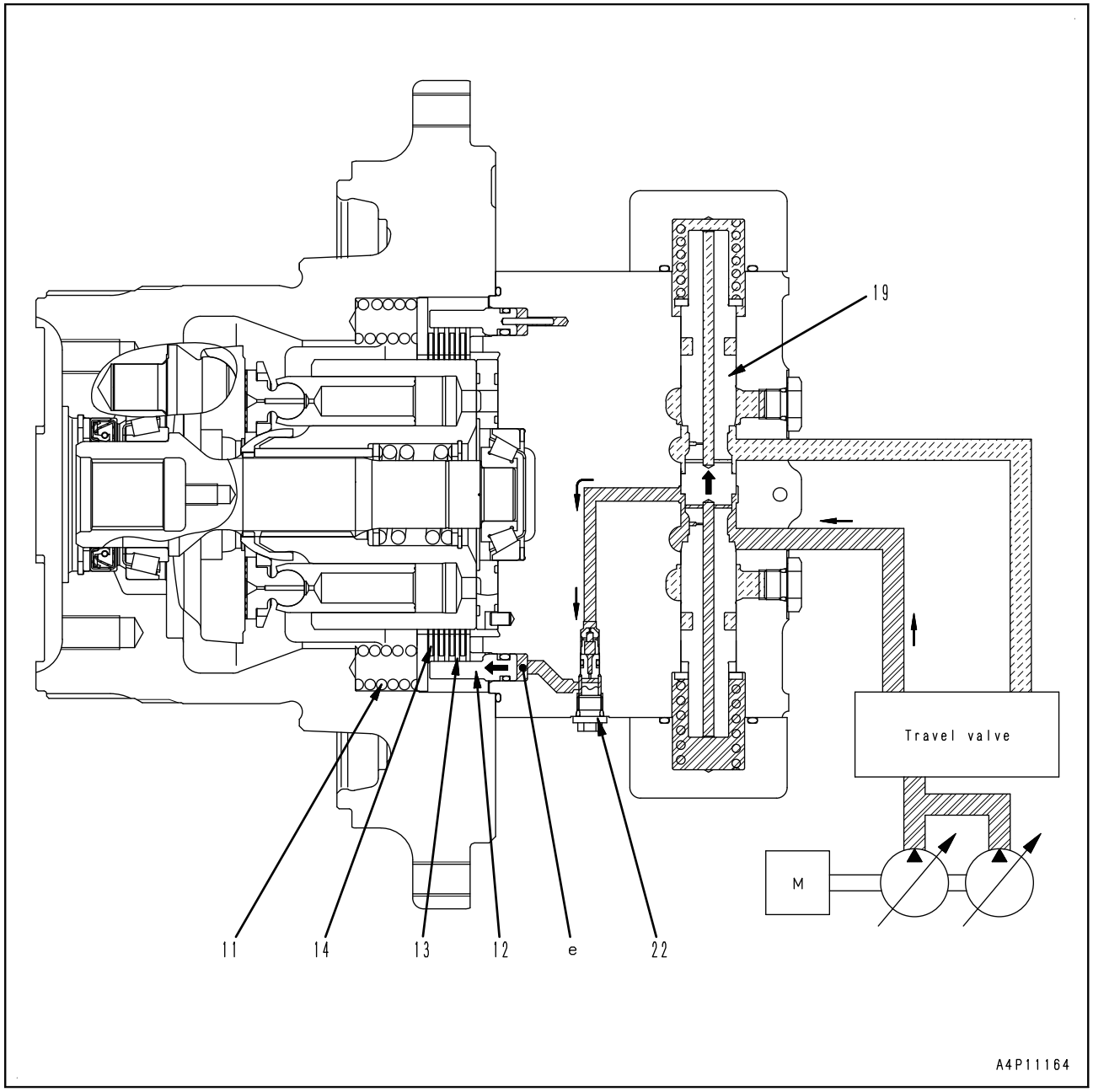
Swing motor *(PC-J610-041-K-00-A)*



MA: From control valve (left swing port)
MB: From control valve (right swing port)
B: From swing holding brake solenoid
S: From control valve (variable back pressure valve)
T: To hydraulic tank
PI: From 2-stage relief solenoid valve
1. Reverse prevention valve
2. 2-stage swing relief valve

Operation of parking brake *(PC-C4A0-044-K-00-A)*

When starting travel

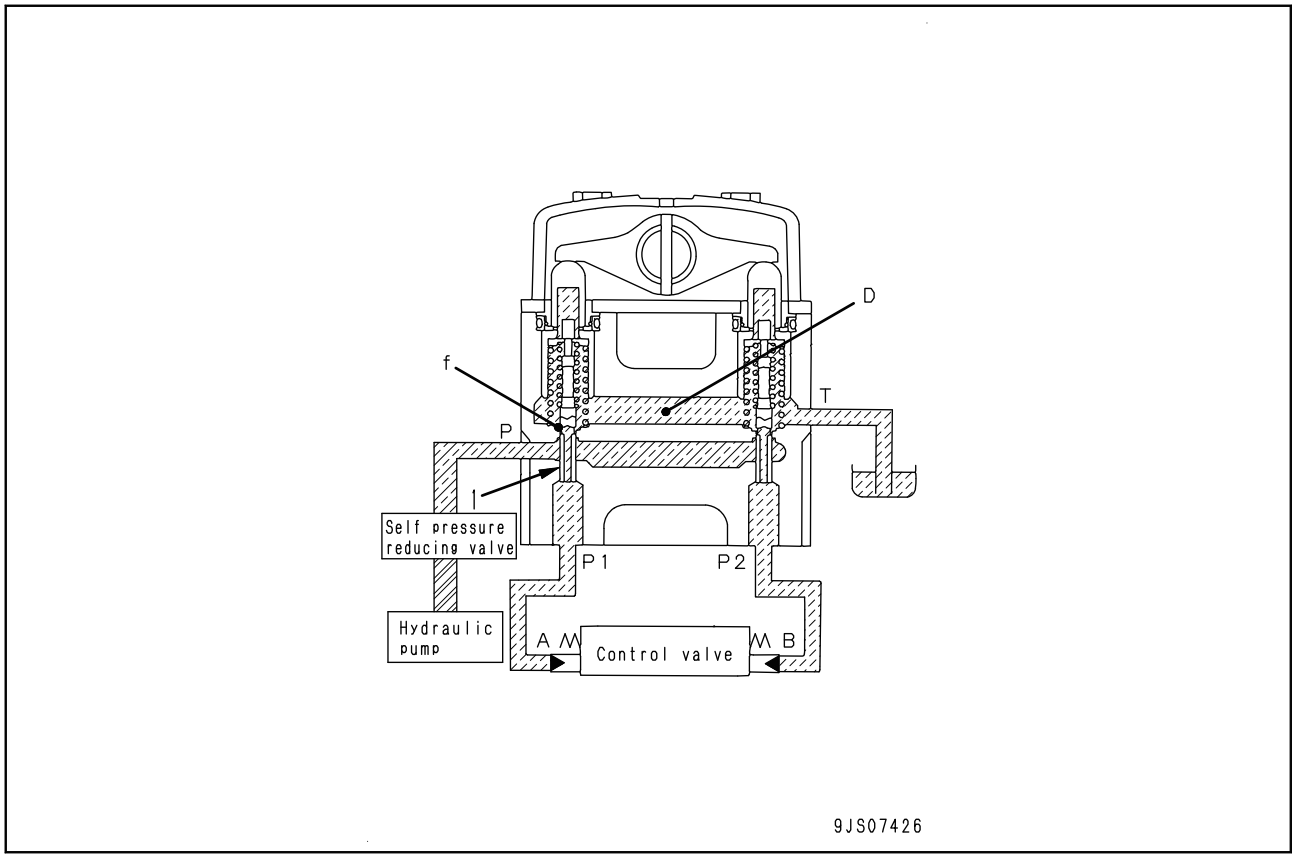


- When the travel lever is operated, the pressurized oil from the pump acts on counterbalance valve spool (19) to make the parking brake circuit.
- The oil flows into chamber (e) of brake piston (12), compresses spring (11), and pushes piston (12) to the left.
- Since the force pressing plate (13) and disc (14) against each other is eliminated, they are separated and the brake is released.

Operation *(PC-C6V0-044-K-00-A)*

When control lever is in NEUTRAL position

- Ports (A) and (B) of the control valve and ports (P1) and (P2) of the PPC valve are connected to drain chamber (D) through fine control hole (f) in spool (1).



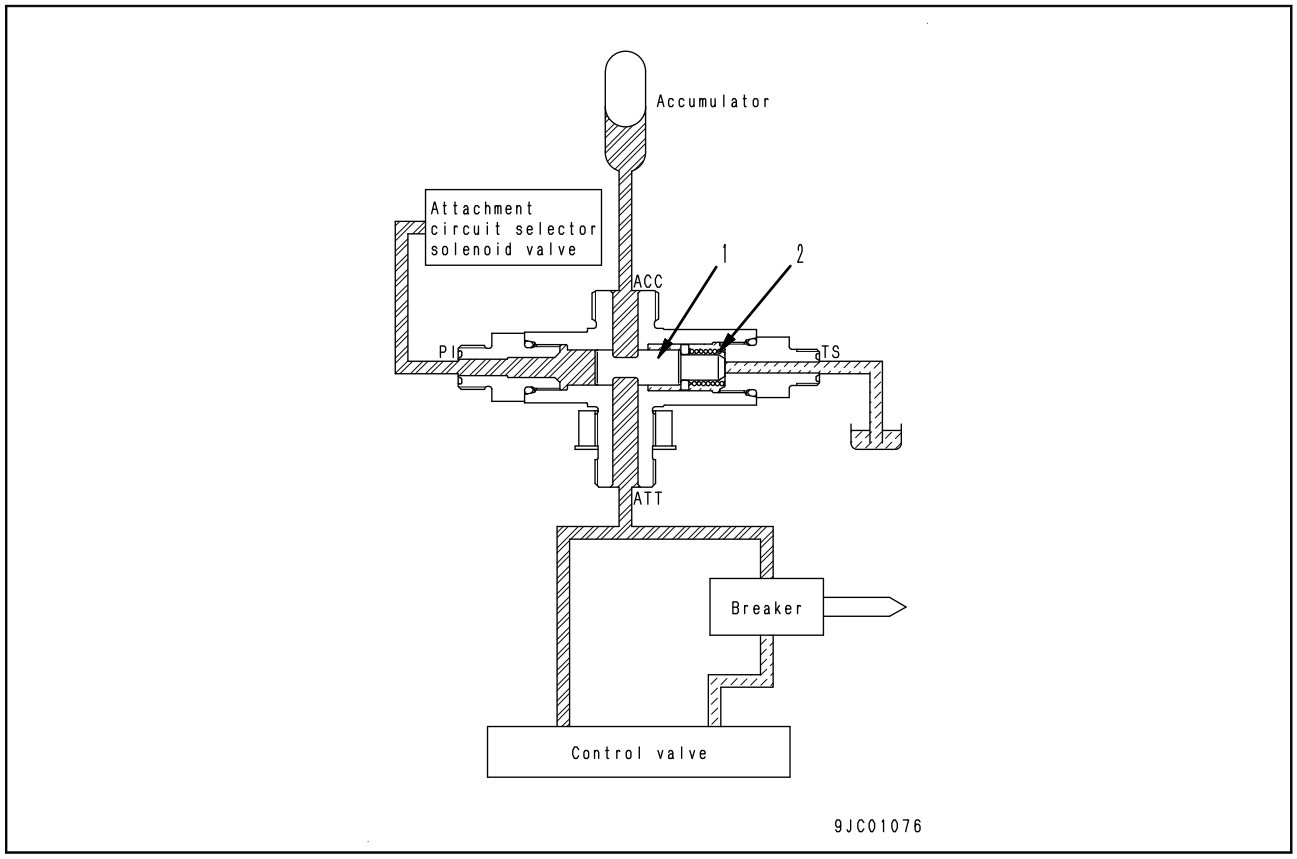
When control lever is in fine control range

(When moved from NEUTRAL to fine control range)

- When piston (4) is pushed by lever (5), retainer (9) is pushed and spool (1) is also pushed by metering spring (2) and moves downwards.
- When fine control hole (f) is disconnected from drain chamber (D), it is connected to pump pressure chamber (PP) at almost the same time.
- The pilot pressure from the control pump is transmitted from port (P1) to port (A) through the fine control hole (f).
- When the pressure in port (P1) becomes higher, spool (1) is pushed back and fine control hole (f) is disconnected from pump pressure chamber (PP). At almost the same time, it is connected to drain chamber (D) to release the pressure in port (P1).
- Accordingly, spool (1) moves up and down until the force of metering spring (2) is balanced with the force exerted by the pressure in port (P1).
- The positional relationship between spool (1) and valve body (10) [fine control hole (f) is located between drain chamber (D) and pump pressure chamber (PP)] does not change until retainer (9) comes in contact with spool (1).
- Metering spring (2) is compressed in proportion to the control lever travel.
- In addition, the pressure in port (P1) increases in proportion to the control lever travel.
- Accordingly, the control valve spool moves to a position at which the pressure in port (A) [equal to the pressure in port (P1)] is balanced with the reaction force of the control valve spool return spring.

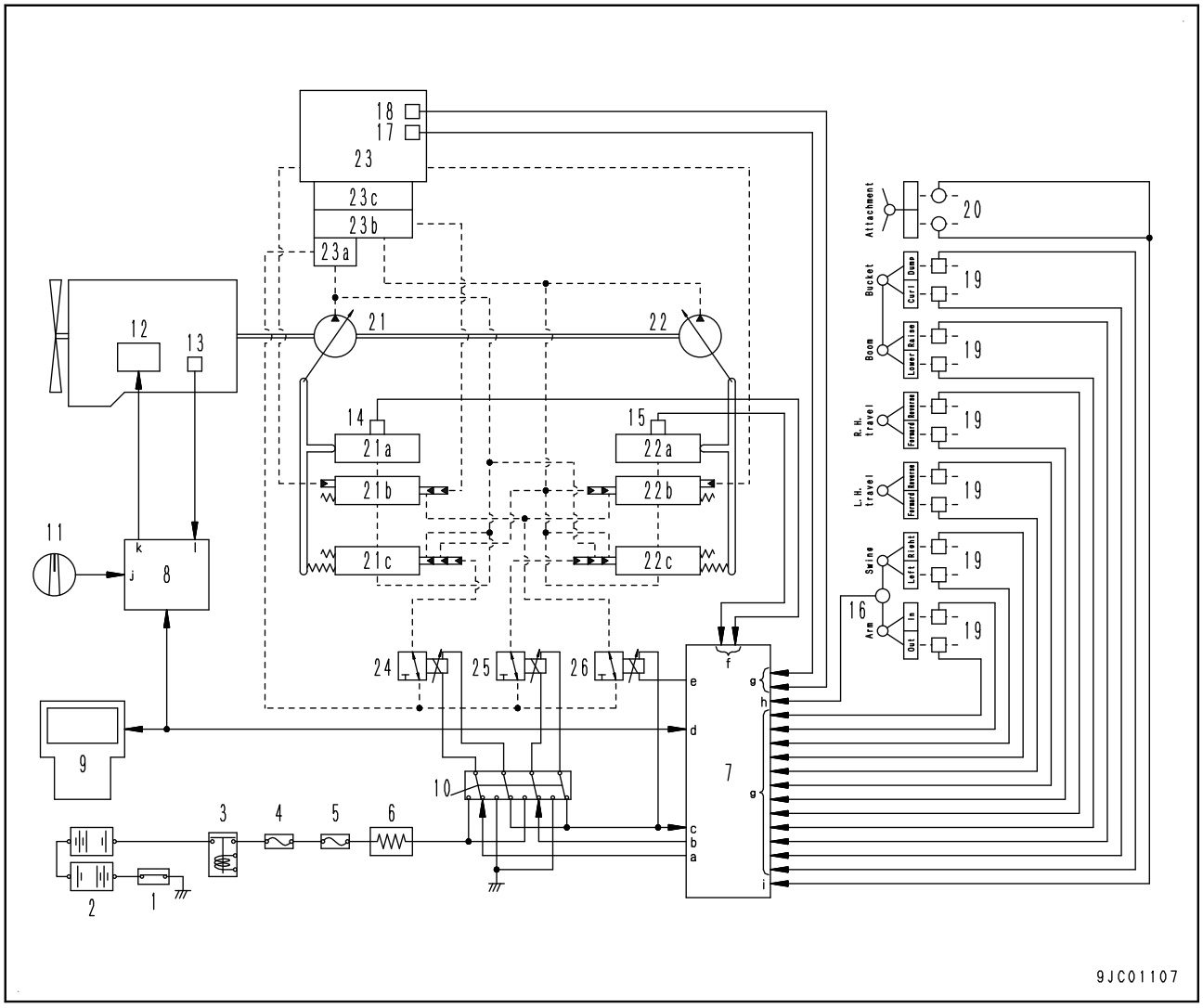
- Spool (1) is pressed to the left by the force of spring (2).
- Since port (ATT) is disconnected from port (ACC), no oil flows to the accumulator.

When breaker is installed



- Pilot pressure (PI) from the attachment circuit selector solenoid valve compresses spring (2), and spool (1) moves to the right to its stroke end.
- Port (ATT) is interconnected to port (ACC) and oil flows to the accumulator, so oil pulsation is absorbed by the accumulator.

Engine and pump combined control function *(PC200_10-C3W0-042-K-00-A)*



1. Battery disconnect switch
2. Battery
3. Battery relay
4. Fusible link
5. Fuse box
6. Resistor for PC-EPC valve
7. Pump controller
8. Engine controller
9. Machine monitor
10. Emergency pump drive switch
11. Fuel control dial
12. Fuel supply pump
13. Sensors
14. Front pump swash plate sensor
15. Rear pump swash plate sensor
16. One-touch power max. switch
17. Front pump oil pressure sensor
18. Rear pump oil pressure sensor

Overheat prevention function *(PC-B717-042-K-00-A)*

★ See "Engine automatic warm-up function" for the system circuit diagram.

- Prevents overheating to protect the engine and hydraulic components by reducing load on the pump and lowering the engine speed if the coolant or hydraulic oil temperature becomes too high.

Operating condition	→	Operation/Remedy	→	Resetting condition
Hydraulic oil temperature: Min. 95°C	→	Working mode: Travel Engine speed: Keep as is Travel speed: Lower	→	Hydraulic oil temperature: Below 95°C • Under above condition, controller is returned to the condition before operation of function (automatic reset).

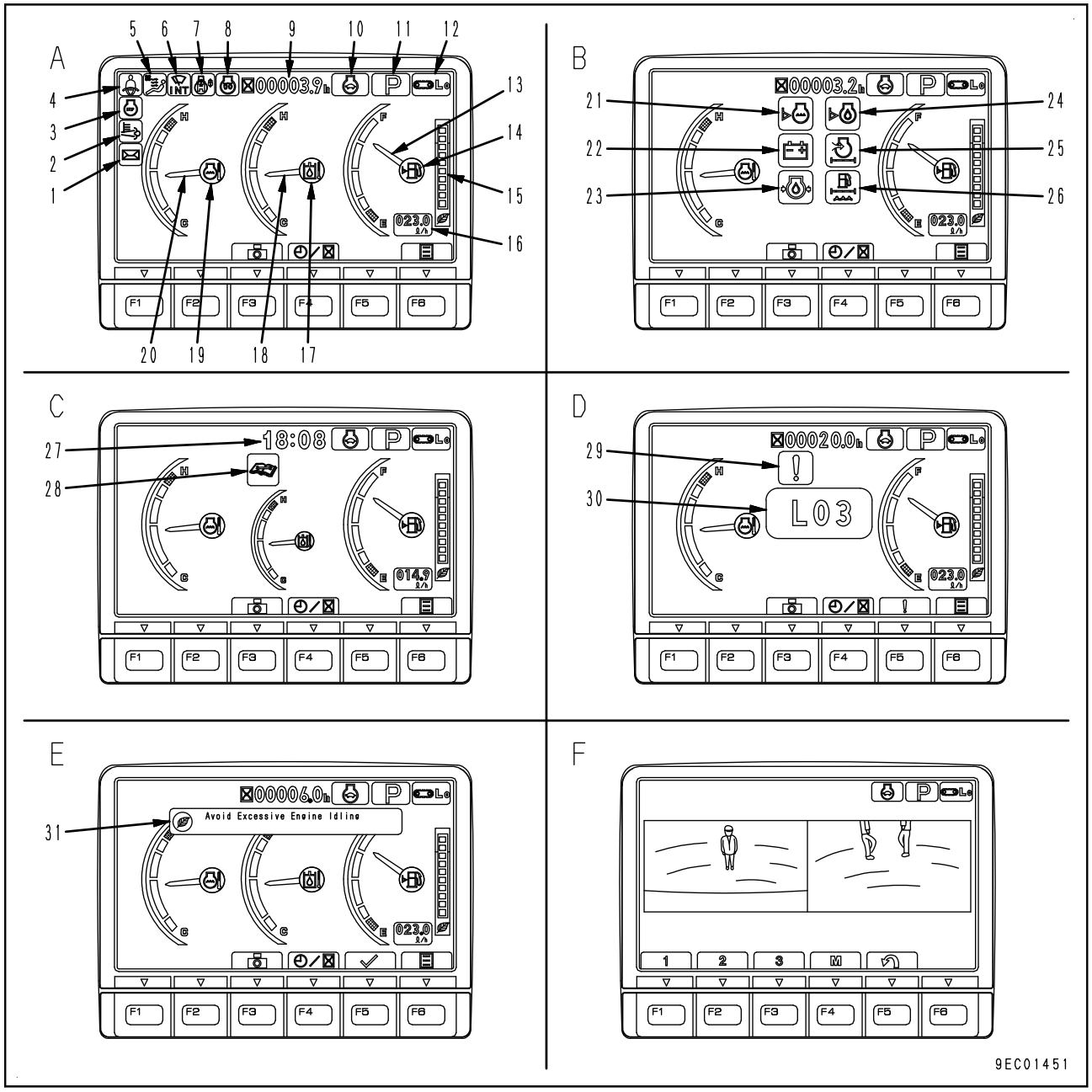
Operating condition	→	Operation/Remedy	→	Resetting condition
Coolant temperature: Min. 100°C or Hydraulic oil temperature: Min. 100°C	→	Working mode: P, E, ATT-P and ATT-E modes Engine speed: Keep as is • Torque control signal decreases the pump absorption torque to reduce the load on the engine.	→	Coolant temperature: Below 95°C Hydraulic oil temperature: Below 95°C • Under above condition, controller is returned to the condition before operation of function (automatic reset).

Operating condition	→	Operation/Remedy	→	Resetting condition
Coolant temperature: Min. 102°C or Hydraulic oil temperature: Min. 102°C	→	Working mode: P, E, ATT-P and ATT-E modes Engine speed: Keep as is • Torque control signal decreases the pump absorption torque to reduce the load on the engine.	→	Coolant temperature: Below 102°C Hydraulic oil temperature: Below 102°C • Under above condition, controller is returned to the condition before operation of function (automatic reset).

Operating condition	→	Operation/Remedy	→	Resetting condition
Coolant temperature: Min. 102°C or Hydraulic oil temperature: Min. 102°C	→	Working mode: B mode Engine speed: Keep as is Alarm monitor: Lights up • Torque control signal decreases the pump absorption torque to reduce the load on the engine.	→	Coolant temperature: Below 102°C Hydraulic oil temperature: Below 102°C • Under above condition, controller is returned to the condition before operation of function (automatic reset).

Pin No.	Signal name	Signal category
5	(*1)	—
6	EGR actuator (+)	D
7	(*1)	—
8	(*1)	—
9	(*1)	—
10	KVGT actuator (+)	D
11	(*1)	—
12	(*1)	—
13	(*1)	—
14	(*1)	—
15	(*1)	—
16	EGR actuator (-)	C
17	(*1)	—
18	GND	C
19	(*1)	—
20	KVGT actuator (-)	C
21	GND	C
22	(*1)	—
23	(*1)	—
24	CAN_B (+)	E
25	CAN_B (-)	E
26	(*1)	—
27	(*1)	—
28	(*1)	—
29	(*1)	—
30	Sensor power supply (5 V)	A
31	Sensor power supply (5 V)	A
32	KVGT speed sensor (+)	B
33	KVGT speed sensor (-)	C
34	Exhaust manifold pressure sensor	B
35	(*1)	—
36	(*1)	—
37	(*1)	—
38	KVGT position sensor	B
39	(*1)	—
40	(*1)	—
41	(*1)	—
42	(*1)	—
43	(*1)	—
44	Common rail pressure sensor	B
45	(*1)	—
46	GND	C
47	GND	C
48	EGR orifice temperature sensor	B
49	(*1)	—
50	(*1)	—
51	(*1)	—
52	(*1)	—
53	(*1)	—
54	(*1)	—
55	(*1)	—
56	(*1)	—

Display *(PC-Q1LA-042-K-00-A)*



A: Standard screen

B: Check before starting screen

C: Maintenance interval warning screen

D: Warning screen

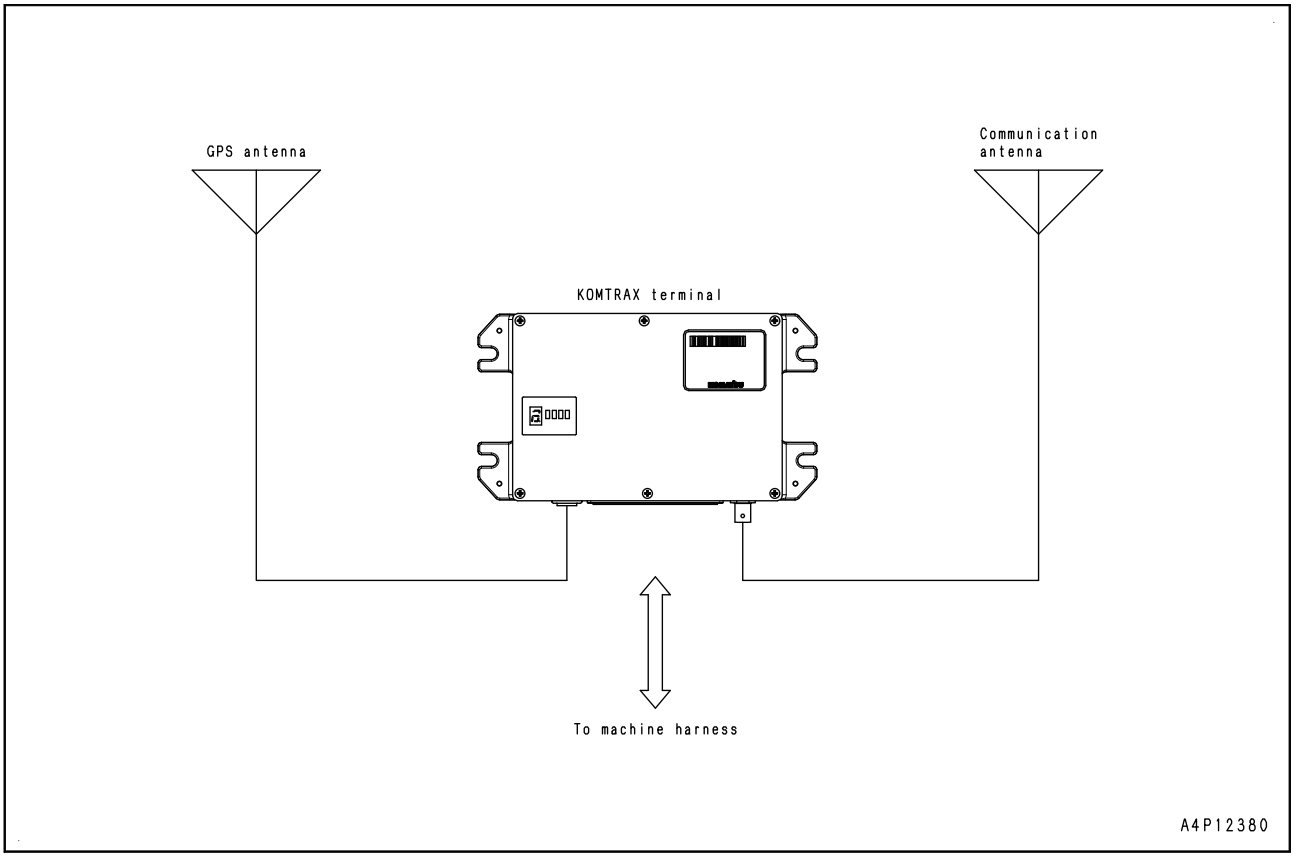
E: Guidance screen

F: Camera image screen

★ Camera image screen (F) shown in the figure is when two or more cameras are installed

1. Message monitor
2. KDPF regeneration monitor
3. Engine stop monitor
4. Seatbelt monitor
5. Air conditioner monitor
6. Wiper monitor

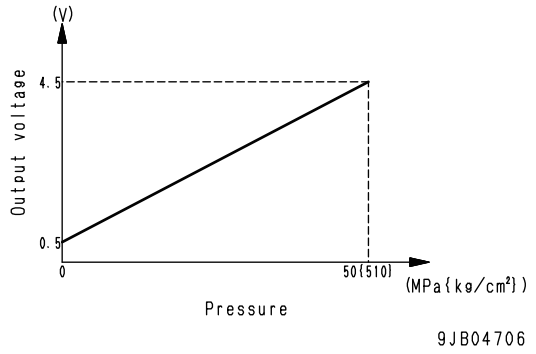
KOMTRAX system *(PC-Q210-042-K-00-A)*



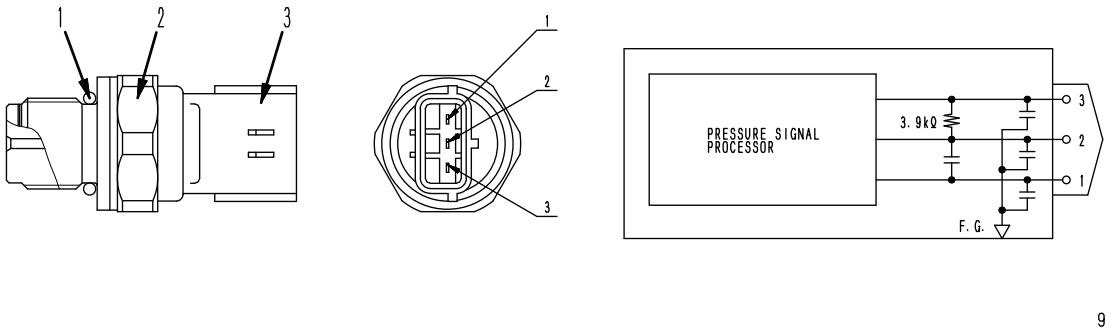
- The KOMTRAX system consists of the KOMTRAX terminal, communication antenna and GPS antenna.
- This system transmits various machine information by use of the radio communication. This system allows the KOMTRAX operator to refer the information and provide various services to the customers.
- Information transmittable from the KOMTRAX system are as follows.
  1. Operation map
  2. Service meter reading
  3. Location information
  4. Abnormality record

★ To provide the services, you need to make an arrangement for starting the KOMTRAX service separately.

Output characteristics



Rear pump oil pressure sensor *(PC-C3W5-041-K-00-A)*

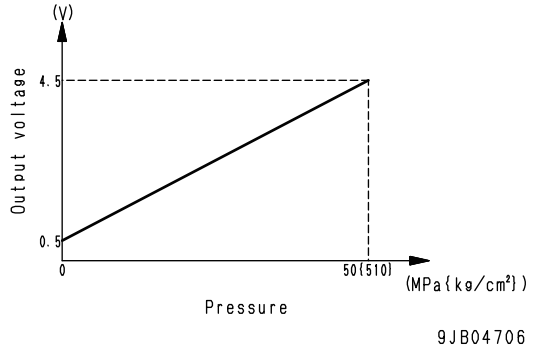


1. O-ring
2. Sensor
3. Connector

Function *(PC-C3W5-042-K-00-A)*

- The sensor is installed in the control valve. It detects the delivery pressure of the rear pump and outputs variable voltage signal.

Output characteristics



- Time lag

Machine model			PC210LC-10	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Boom time lag	• Hydraulic oil temperature: Within operating range • Engine at low idle • Power mode (P) • Set boom at full RAISE position. Move boom control lever to LOWER position. Measure length of time before front of machine starts lifting off the ground after work equipment touches the ground. • For measuring posture, see "Work equipment 5"	sec.	Max. 1.0	Max. 1.2
Arm time lag	• Hydraulic oil temperature: Within operating range • Engine at low idle • Power mode (P) • Set arm to the max. DUMP position. Move arm control lever to IN position. The time required from when the arm is stopped once at an approximately vertical orientation until it starts moving to the IN side again. • For measuring posture, see "Work equipment 6"	sec.	Max. 2.0	Max. 2.8
Bucket time lag	• Hydraulic oil temperature: Within operating range • Engine at low idle • Power mode (P) • Set bucket at full DUMP position. Move bucket control lever to CURL position. The time required from when the bucket is stopped once at an approximately vertical orientation until it starts moving to the CURL side again. • For measuring posture, see "Work equipment 7"	sec.	Max. 1.0	Max. 3.6

- Oil leakage

Machine model			PC210LC-10	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Cylinder internal oil leakage	• Hydraulic oil temperature: Within operating range • Engine: High idle • Leakage amount for 1 minute during relief of cylinder to be measured or travel motor	cc/min	4.5	20
Center swivel joint		cc/min	10	50

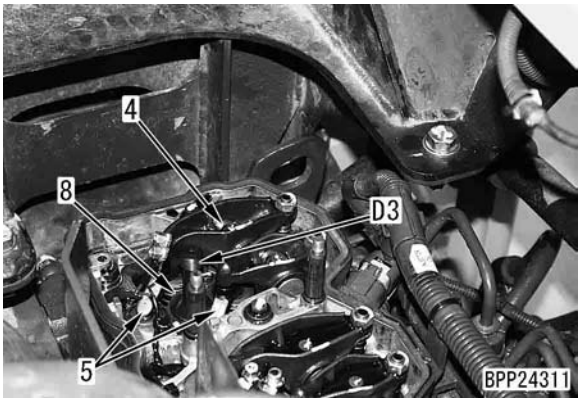
11.Install crosshead assembly (5) and rocker arm assembly (4).

Rocker arm assembly (4) mounting bolt:

36 ± 5 Nm {3.67 ± 0.51 kgm}

12.Adjust the valve clearance.

★ See "Testing and adjusting valve clearance".



13.Connect connectors (11) to (15).

- Connector (11): KVGT position sensor (SVGT)
- Connector (12): KVGT speed sensor (VGT_REV)
- Connector (13): Connector box (INTER CONNECT)
- Connector (14): EGR gas temperature sensor (EXHAUST GAS TEMPERATURE)
- Connector (15): Intermediate connector (INJ CYL 1&2)

14.Connect hoses (16) and (17) and tube (18).

- Hose (16): KVGT control pressure circuit

Hose (16):

25 ± 1.5 Nm {2.55 ± 0.15 kgm}

- Hose (16): KVGT drive pressure circuit

Hose (17):

15 ± 1 Nm {1.53 ± 0.1 kgm}

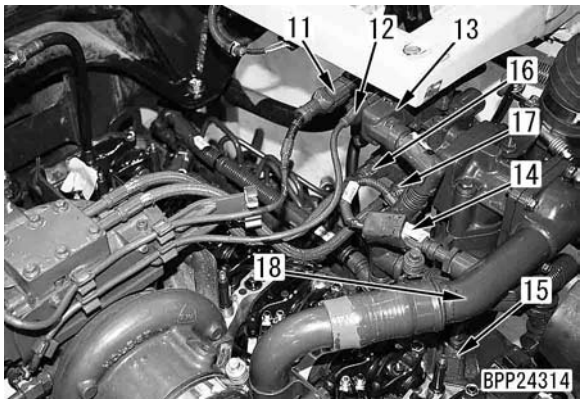
- Tube (18): EGR circuit

EGR circuit tube (18) (flange side):

24 ± 4 Nm {2.45 ± 0.41 kgm}

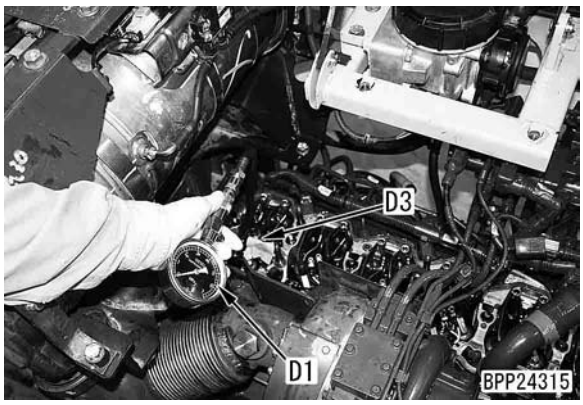
EGR circuit tube (18) (tube side):

10.5 ± 0.5 Nm {1.07 ± 0.05 kgm}



15.Connect gauge assembly D1 to adapter D3.

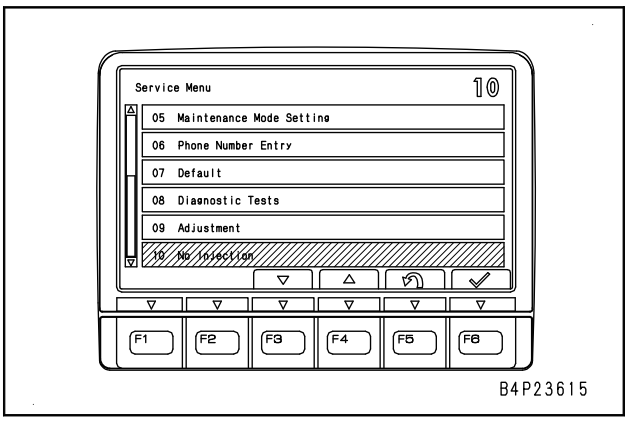
★ If a small amount of oil is applied to the connecting portions of gauge assembly D1 and adapter D3, air will not leak easily.



16.Operate the machine monitor to set to “No Injection“.

★ Turn the battery disconnect switch to the ON position, then turn the starting switch to the ON position.

★ For the method to set to “No Injection“, see "Special functions of machine monitor".



17.Rotate the crankshaft by the starting motor and measure the compression pressure.

★ Read the compression pressure when the gauge pointer stands still.

★ The compression pressure is normal when it is within the following standard value range.

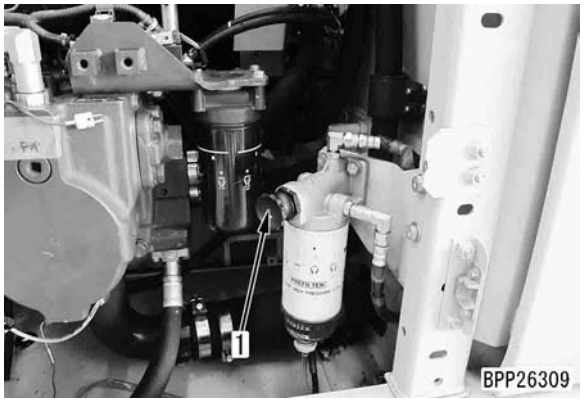
Bleeding air from fuel system *(ALL-AD00-001-K-00-A)*

★ If fuel is used up or if a fuel circuit part is removed and installed, bleed air from the fuel circuit according to the following procedure.

⚠ **Park the machine on a level ground and lower the work equipment to the ground.**

Bleeding air *(PC200_10-AD00-231-K-00-A)*

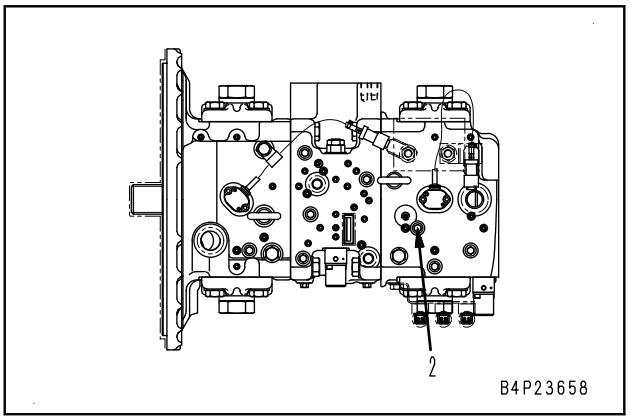
1. Fill the fuel tank up with fuel.
   ★ Add fuel until the fuel level gauge reaches blue range. (Turn the starting switch to ON position and check the fuel level from the gauge.)
2. Open the side cover on the right side of the machine.
3. Loosen hand primer (1) and pull it out, and then operate it forward and backward.
   ★ Operate the hand primer (1) until it becomes heavy.
   ★ The plug at the top of the fuel main filter head does not need to be removed.



4. After bleeding air, push in and tighten hand primer (1).

★ Do not adjust the relief valve for the oil pressure in control circuit.

★ The oil pressure in control circuit may be tested at oil pressure pickup port plug (2) on the hydraulic pump.

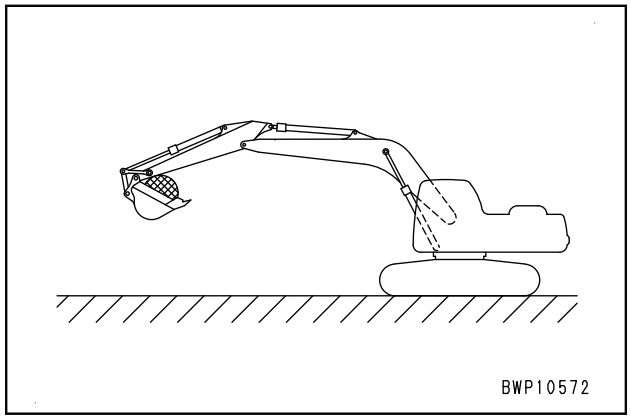


Isolating the parts causing hydraulic drift in work equipment *(ALL-L410-001-K-00-A)*

★ If the work equipment (cylinder) drifts hydraulically, perform check to see if the problem is in the cylinder seal or control valve according to the following procedure.

Checking *(PC-L410-360-K-00-A)*

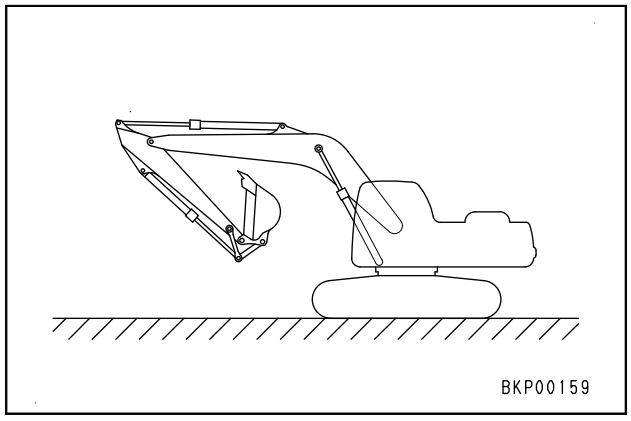
1. **Checking boom cylinder and bucket cylinder**
   1) Set the work equipment in the same posture as when measuring hydraulic drift, and stop the engine.
      ★ Put a weight equivalent to the rated load or fill the bucket with the earth and sand.



   2) When testing the boom cylinder, set the boom control lever to the RAISE position. When testing the bucket cylinder, set the bucket control lever to the CURL position.
      - If the lowering speed is increased at this time, the cylinder seal is defective.
      - If the lowering speed does not change at this time, the control valve is defective.

      ★ Operate the control lever with the engine starting switch in the ON position.

      ★ If there is no more pressure in the accumulator, run the engine for approximately 10 seconds to charge the accumulator.
2. **Checking arm cylinder**
   1) Move the arm cylinder to about 100 mm before the IN stroke end and stop the engine.



   2) Operate the arm control lever to the arm IN position.
      - If the lowering speed is increased at this time, the cylinder seal is defective.
      - If the lowering speed does not change at this time, the control valve is defective.

      ★ Operate the control lever with the engine starting switch in the ON position.

      ★ If there is no more pressure in the accumulator, run the engine for approximately 10 seconds to charge the accumulator.

[Reference] In case of the hydraulic drift is caused by defective cylinder packing, the reason why the drift speed becomes faster by above mentioned operation is as follows:

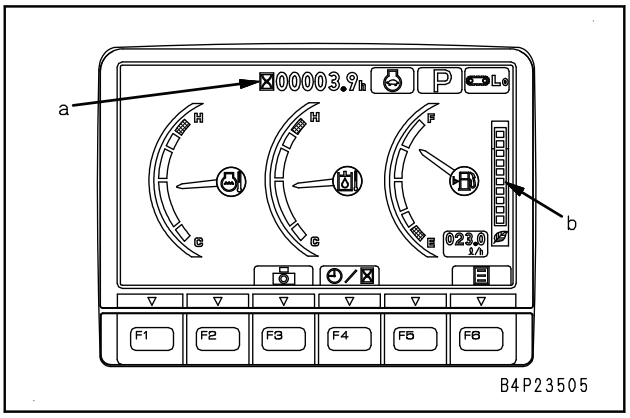
1) If the work equipment is set to the above posture (where the work equipment holding pressure is applied to the bottom side), the oil leaks from the bottom side to the head side. The volume on the head side is less than that on the bottom side by the volume of the rod, so the pressure in the head side is increased by the oil flowing in from the bottom side.
2) As the inner pressure in the head side is increased, it is balanced with the pressure in the bottom side at a certain level (which depends on the leak quantity), and the lowering speed is reduced.
3) If the circuit on the head side is opened to the drain circuit by the above operation of the lever (the bottom side is closed by the check valve at this time), the oil in the head side flows in the drain circuit. As a result, the pressure is in balanced and the lowering speed is increased.

3. **Testing PPC valve**
   Measure the hydraulic drift of the work equipment when the work equipment lock lever is in the LOCK and FREE positions with the accumulator charged fully.

   ★ Operate the control lever with the engine starting switch in the ON position.

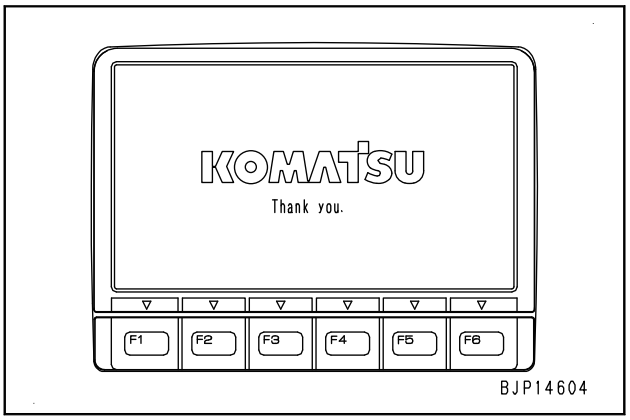
   ★ If there is no more pressure in the accumulator, run the engine for approximately 10 seconds to charge the accumulator.

   ★ If there is any difference in the hydraulic drift between LOCK and FREE positions, the PPC valve is defective (some internal defect).



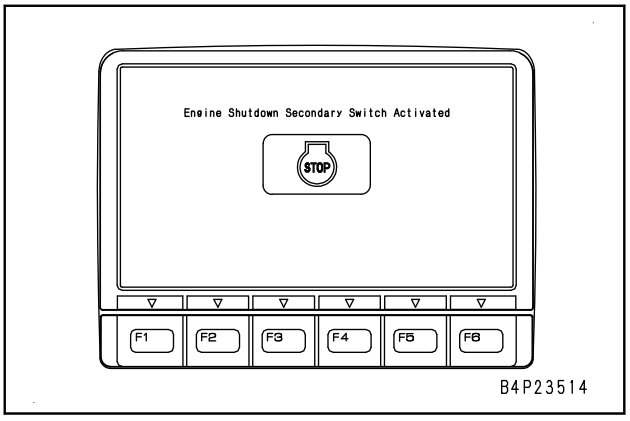
Display of end screen *(PC220-Q180-044-K-09-A)*
When starting switch is turned to OFF position, the end screen is displayed for 5 seconds.

★ Another message may be displayed on the end screen due to the message display function of KOMTRAX.



Display of operation screen for engine shutdown secondary switch *(PC220-AKHL-100-K-00-A)*
When you turn the engine shutdown secondary switch to the ON position, the “Engine Shutdown Secondary Switch Activated“ screen is displayed on every screen except the end screen.

★ The engine shutdown secondary switch is provided in the lower L.H. side corner of the operator's seat. This switch is used to stop the engine when it does not stop after the starting switch is turned to the OFF position.



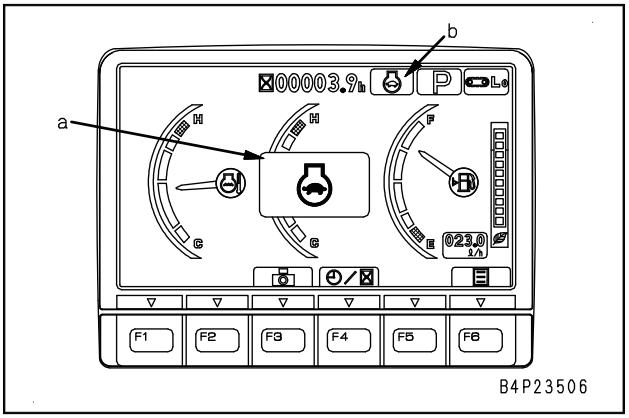
When you turn the engine shutdown secondary switch to the OFF position, the KOMATSU logo appears once and then the display is switched to the standard screen.

Selection of auto-deceleration *(PC220-AF6C-100-K-00-A)*
While the ordinary screen is displayed, if the auto-deceleration switch is pressed, large auto-deceleration monitor (a) is displayed for 2 seconds and the setting of the auto-deceleration is changed.

★ Each time the auto-deceleration switch is pressed, the auto-deceleration is changed in the order of [ON] → [OFF] → [ON].

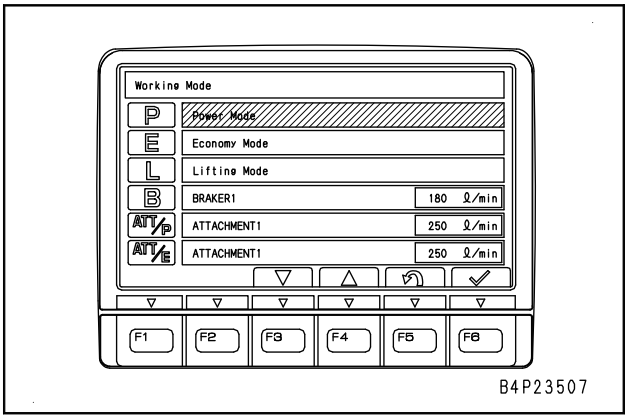
★ If the auto-deceleration is set to ON, large monitor (a) and auto-deceleration monitor (b) are displayed simultaneously.

★ If the auto-deceleration is set to OFF, auto-deceleration monitor (b) goes off.



Selection of working mode *(PC220-PT5W-100-K-01-A)*
Select desired working mode according to the following procedure.

1. While the standard screen is displayed, press the working mode selector switch, and the working mode selection screen is displayed.
   ★ Following figure shows the working mode selection screen when "with attachment" is set. (If "with attachment" is not set in service mode, attachment mode "ATT/P", "ATT/E" are not displayed.)



List of monitoring / pre-defined items (SI unit indicates the default values)

Support screen (1/14) Machine basic items

No.	ID	Item name	Unit (SI)	Applicable equipment
1	01002	Engine speed	r/min	ENG
2	04107	Coolant temperature	°C	ENG
3	37212	Engine oil switch		ENG
4	18400	Intake temperature	°C	ENG
5	04401	Hydr. oil temperature	°C	PUMP
6	03203	Battery power supply	V	ENG

Support screen (2/14) Fuel injection

No.	ID	Item name	Unit (SI)	Applicable equipment
1	01002	Engine speed	r/min	ENG
2	47300	KDOC 1 inlet temperature	°C	ENG
3	36400	Rail pressure	MPa	ENG
4	36200	Rail pressure command	MPa	ENG
5	48000	IMV current	A	ENG
6	48001	IMV current command	A	ENG

Support screen (3/14) EGR,KVGT actuator

No.	ID	Item name	Unit (SI)	Applicable equipment
1	01002	Engine speed	r/min	ENG
2	48100	Turbo speed	r/min	ENG
3	18100	EGR Valve Position	mm	ENG
4	48600	EGR solenoid current	mA	ENG
5	48700	KVGT position	mm	ENG
6	48800	KVGT solenoid current	mA	ENG

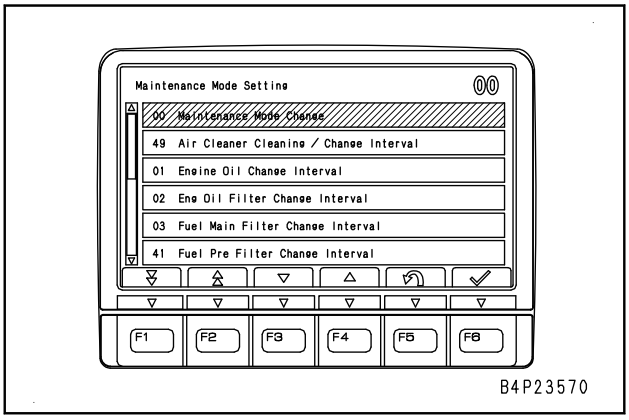
Support screen (4/14) Engine temperature-related items

No.	ID	Item name	Unit (SI)	Applicable equipment
1	01002	Engine speed	r/min	ENG
2	48100	Turbo speed	r/min	ENG
3	04107	Coolant temperature	°C	ENG
4	18400	Intake temperature	°C	ENG
5	18500	Charge temperature	°C	ENG
6	48500	EGR orifice temperature	°C	ENG

Support screen (5/14) Air intake/exhaust pressure, etc.

No.	ID	Item name	Unit (SI)	Applicable equipment
1	01002	Engine speed	r/min	ENG
2	37400	Ambient pressure	kPa	ENG
3	36500	Charge pressure-A	kPa	ENG
4	48300	Exhaust manifold pressure	kPa	ENG

★ 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].

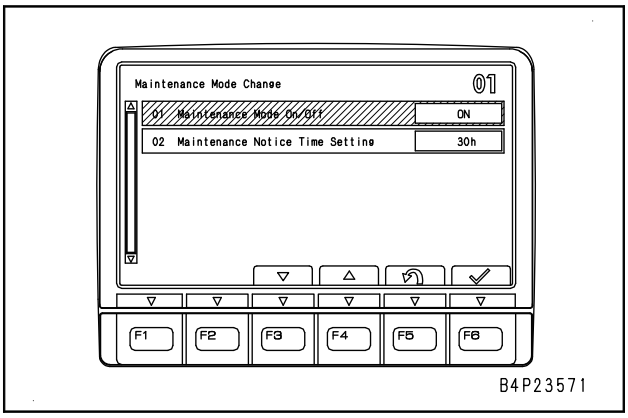


★ The following items can be selected on the Maintenance Mode Setting screen.

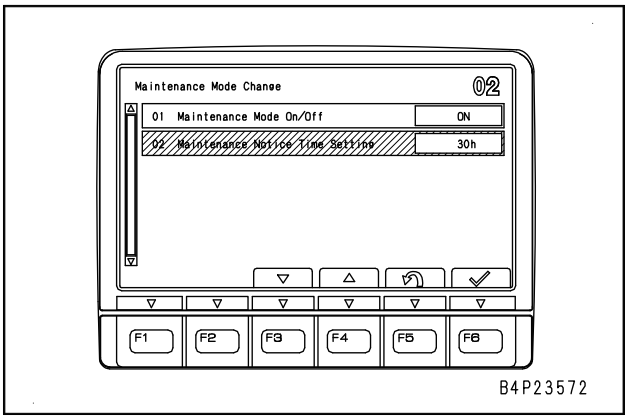
00 Maintenance mode change
49 Air cleaner cleaning/ change Interval
01 Engine oil change interval
02 Engine oil filter change interval
03 Fuel main filter change interval
41 Fuel pre-filter change interval
04 Hydraulic oil filter change interval
05 Hydraulic tank breather change interval
07 Damper case oil check and refill interval
08 Final drive oil change Interval
09 Swing machinery oil change interval
10 Hydraulic oil change interval
99 Returns all to Default Values

3. Setting of maintenance mode change
   After selecting “Maintenance Mode Change“ and the screen is displayed, select the desired setting by using the function switches.
   - ON: Functions of all maintenance items become effective in operator mode.
   - OFF: Functions of all maintenance items becomes ineffective in operator mode
   - [F3]: Moves selection to the below item
   - [F4]: Moves selection to the above item
   - [F5] Cancels selection and returns to the "Maintenance Mode Change" screen
   - [F6]: Enters selection and returns to "Maintenance Mode Change" screen

   ★ Even if ON/OFF of each item has been set, if the above setting is changed, it overrides the individual setting.



4. Setting of Maintenance Notice Time Setting
   After selecting "Maintenance Notice Time Setting", if the screen is displayed, set with the function switches.



   - Default value: Maintenance notice time set on the machine monitor (Recommended by the manufacturer and not changeable).
   - Set value: Maintenance interval that can be freely set. Maintenance reminder function works according to this set time in operator mode (the time increases or decreases in multiples of 10 hours).
   - [F3]: Decreases set value
   - [F4]: Increases set value
   - [F5] Cancels contents of setting before entry and returns to the "Maintenance Mode Change" screen
   - [F6]: Enters setting and returns to Maintenance mode setting screen

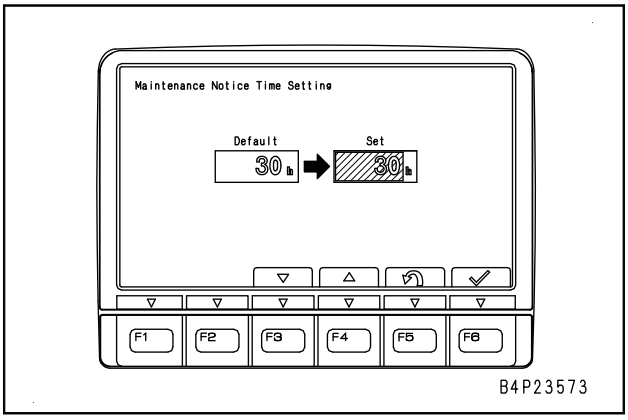


Table 1. Failure cause codes

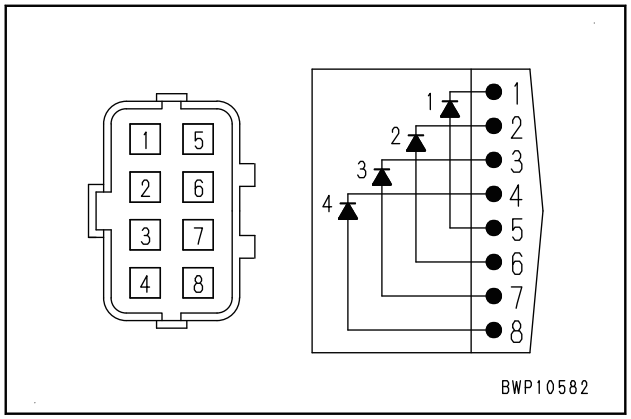
Calibration failure cause codes (Displayed in descending order of priority)

Cause code	Object			Content	Remedies
	MIN Calibration of swash plate	MAX Calibration of swash plate	Pump Calibration of IT		
A-1	●	●	●	Engine speed signal is 0 rpm	Check that engine is started
A-2	●	●	●	Hydraulic oil temperature is low	Check hydraulic oil temperature (Min. 45°C)
A-3	●	●	●	Hydraulic oil temperature is high	Check hydraulic oil temperature (Calibration of swash plate: Max. 85°C, Calibration of pump IT: Max. 55°C)
A-4	●	●	●	Overheating	Check for overheating
A-6	●	●	●	Pump pressure sensor (F, R) is defective	Perform troubleshooting for pump pressure sensor
A-7	●	●	—	Pump swash plate (F, R) sensor is defective	Perform troubleshooting for pump swash plate sensor
A-8	—	—	●	Arm IN PPC pressure sensor is defective	Perform troubleshooting for arm IN PPC pressure sensor
A-9	—	—	●	PC-EPC abnormality	Perform troubleshooting for PC-EPC
A-A	—	—	●	CAN communication is defective (engine, monitor, pump)	Perform troubleshooting for CAN
A-B	—	—	●	Bucket CURL PPC pressure sensor is defective	Perform troubleshooting for bucket CURL PPC pressure sensor
B-1	●	—	—	Pump pressure of calibrated pump is above standard value	Perform troubleshooting for relief valve and pump
B-3	●	●	—	Lever is not in NEUTRAL	Set lever in NEUTRAL
C-1	—	●	—	Pump pressure of calibrated pump is below standard value	Perform troubleshooting for relief valve and pump
C-2	—	●	—	Travel speed setting is not Hi	Set travel speed to Hi on monitor
C-3	—	●	●	Fuel control dial is not set to MAX position	Set fuel control dial to Max. position.
C-4	—	●	—	Both tracks are running	Set travel lever to full stroke and work equipment lever to neutral.
C-5	—	●	—	Oil flow from two pumps are not divided	Check adjustment of service (Oil flow is normally divided during travel single operation)
C-6	—	●	—	Travel PPC pressure sensor abnormality	Perform troubleshooting for travel PPC
C-7	—	●	—	Travel PPC pressure is below standard value	Set travel lever to full stroke.
E-1	—	—	●	Arm IN when the arm IN circuit relieved PPC pressure is below the specified level or arm IN PPC pressure sensor out of the normal range (*1)	Set arm IN lever to full stroke.
E-2	—	—	●	Pump pressure (F, R) is out of standard range	Perform troubleshooting for relief valve and pump

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.

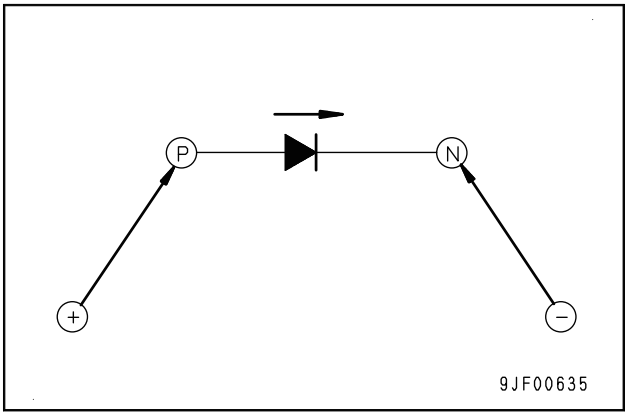


★ The continuity direction of the single diode is indicated on the surface of the diode.

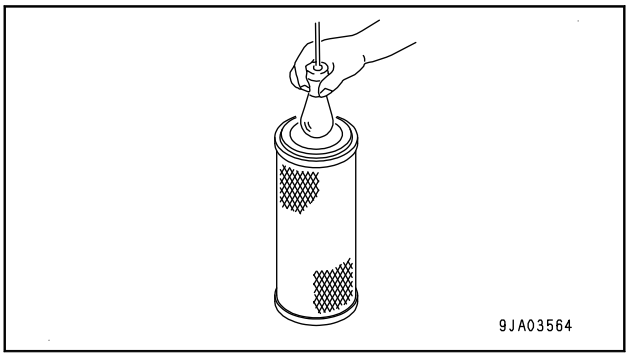
Testing *(PC220-E300-36J-P-00-A)*

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)



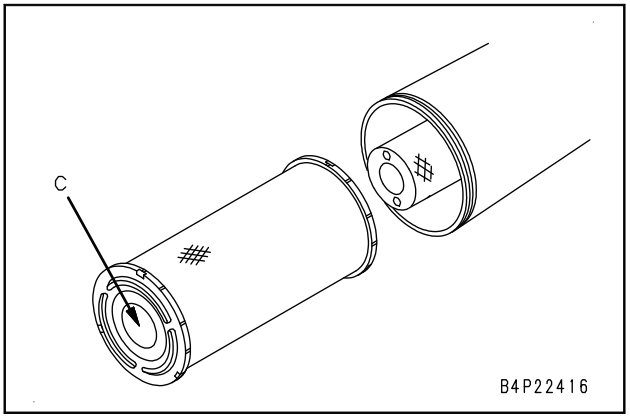
8. Remove the cloth or tape covering inner element (6).
9. Check that there is no dirt or oil stuck to the sealing portion of the new element or cleaned element. Wipe off if any is attached.

   ★ If the element and O-ring are used again after usage for more than one year, it may cause problems even if they are cleaned. Do not use them.

   ★ Do not use the element if its folds or gasket or seal are damaged.
10. Push the outer element straight into air cleaner body as moving it the lightly up and down, and right and left by hand.

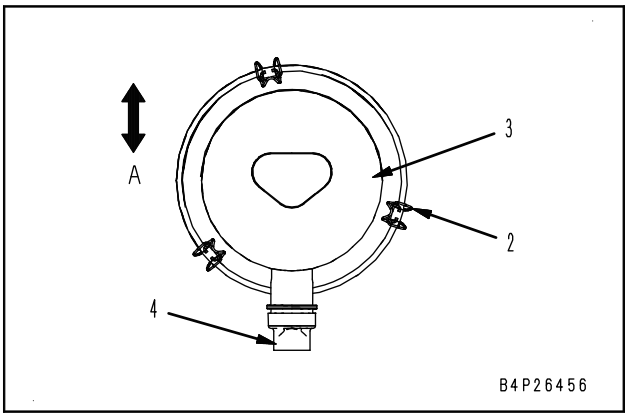
    ★ Install it so that the bottom of the air cleaner element (face where no hole is drilled) (C) comes to cover (3) end.

    If it is installed in wrong direction, it may cause breakage of the air cleaner element or serious damage to the engine.



11. Install cover (3) according to the following procedure.
    1) Place cover (3) to the element.

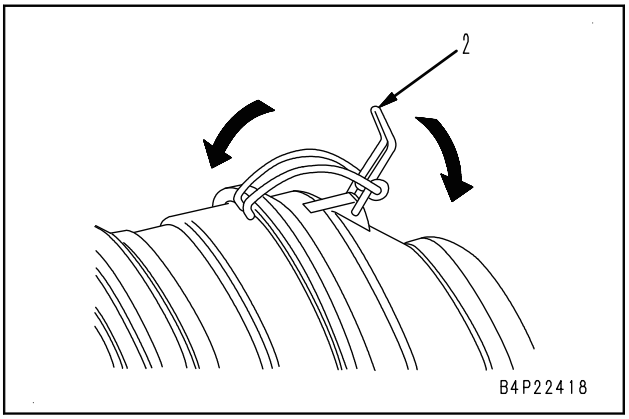
       ★ Always install cover (3) so that vacuator (4) sits to the direction below (A).



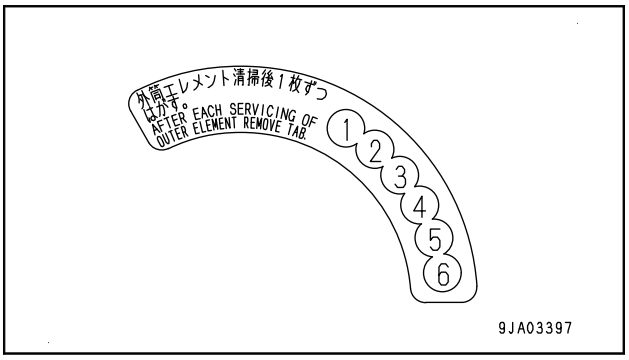
    2) Hook the tip of hook (2) to the fitting part of the air cleaner body and lock it.

       ★ When locking the hook (2), do it in diagonal order (top and bottom, right and left).

       ★ When cover (3) is installed, check that the clearance between the air cleaner body and cover (3) is not too large. If it is too large, install it again.

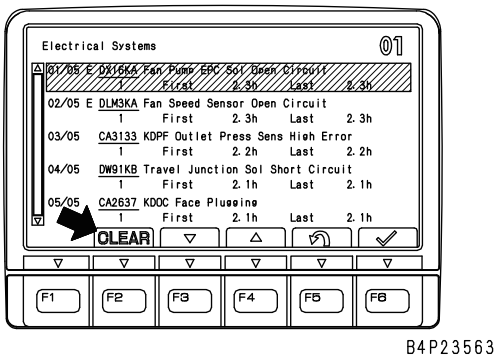


12. Remove one seal from the element whenever the element is cleaned.



Replacement

1. Remove outer element (5) according to "Cleaning of outer element".
2. Remove inner element (6), then immediately install the new inner element (6) to air cleaner body (7).



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14.Take record of information of all columns.

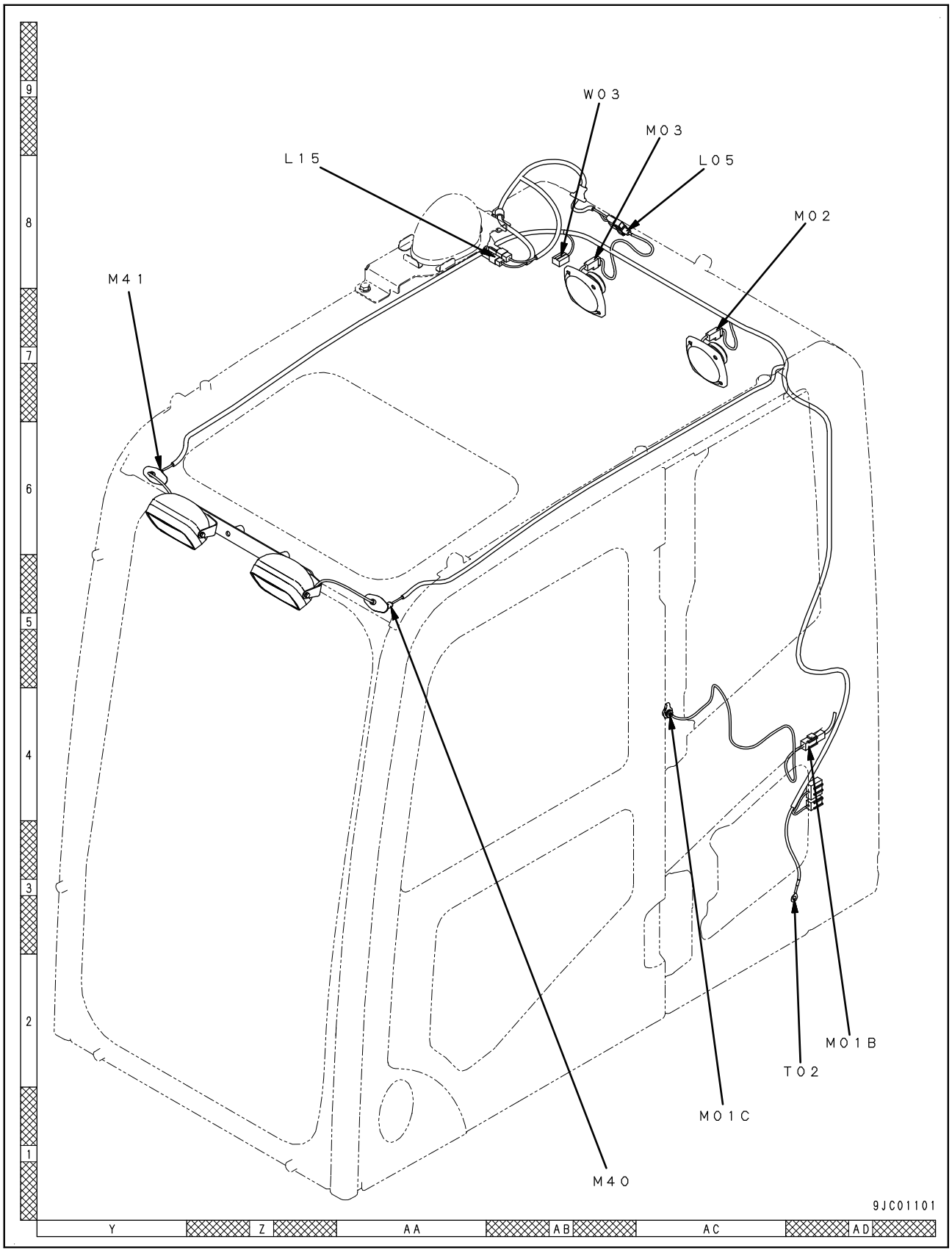
★ Similarly to the electrical system abnormality record, if "E" is displayed on the left of a failure code, that failure code is "active"

(the failure is still occurring or normal resetting is not confirmed yet).

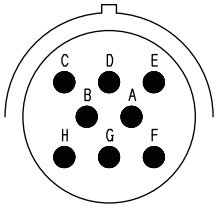
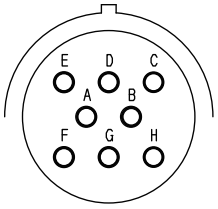
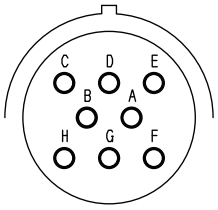
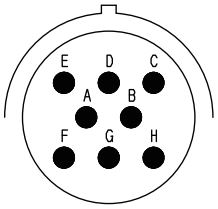
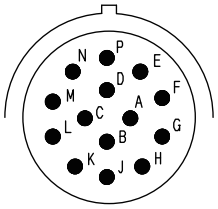
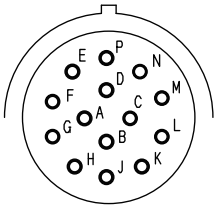
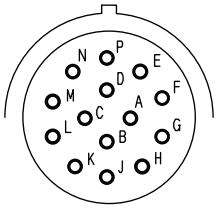
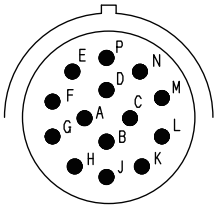
15.Press switch [F2] (CLEAR) in the panel switch section to clear all codes temporarily. Check if "Abnormal" is still displayed and take record. (Same as 10 in [*1] and [*2])

16.Press switch [F5] (return) in the panel switch section to return to the "Abnormality record" screen.

Layout of connectors (5/6)



[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.
18-8 (1)	Pin (male terminal)	Socket (female terminal)	799-601-9210 (T-adapter)
	 BWP05001	 BWP05002	
	Part No. :08191-11201, 08191-11202, 08191-11205, 08191-11206	Part No. :08191-14101, 08191-14102, 08191-14105, 08191-14106	
	Socket (female terminal)	Pin (male termial)	799-601-9210 (T-adapter)
	 BWP05003	 BWP05004	
	Part No. :08191-12201, 08191-12202, 08191-12205, 08191-12206	Part No. :08191-13101, 08191-13102, 08191-13105, 08191-13106	
18-14 (2)	Pin (male terminal)	Socket (female terminal)	799-601-9220 (T-adapter)
	 BWP05005	 BWP05006	
	Part No. :08191-21201, 08191-12202, 08191-21205, 08191-12206	Part No. :08191-24101, 08191-24102, 08191-24105, 08191-24106	
	Socket (female terminal)	Pin (male termial)	799-601-9220 (T-adapter)
	 BWP05007	 BWP05008	
	Part No. :08191-22201, 08191-22202, 08191-22205, 08191-22206	Part No. :08191-23101, 08191-23102, 08191-23105, 08191-23106	

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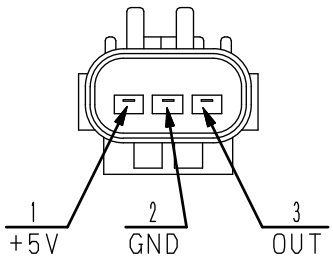
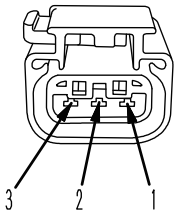
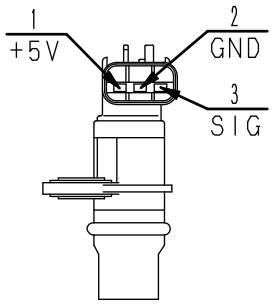
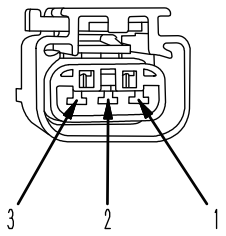
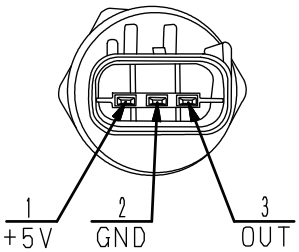
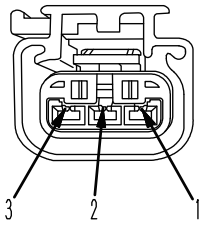
FRAMATOME connector for engine

No. of pins	Ambient pressure sensor (107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-4140 (T-adapter) (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

No. of pins	NE speed sensor (95, 107, 114, 125, 140, 170, 12V140 engine) and CAM sensor (95, 107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	
3			799-601-4130 (T-adapter) (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

No. of pins	EGR gas pressure sensor (125, 140 engine)		
	Sensor side (plug)	Harness side (receptacle)	
3			799-601-4180 (T-adapter) (Kit : 799-601-4101) (Kit : 799-601-4201)
	—	—	

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Failure codes table *(PC200LC_10-5520-441-A-00-A)*

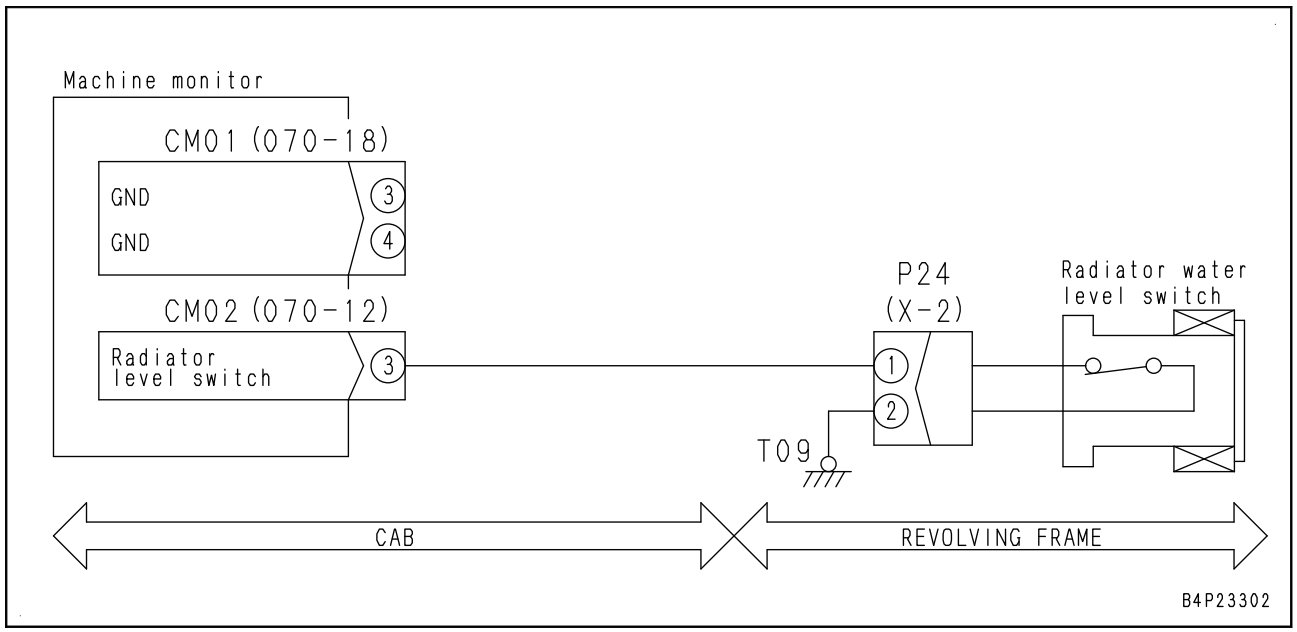
Failure code	Failure (Displayed on screen)	Applicable component	Action level	History category	Remarks
879AKA	Failure code [879AKA] A/C Inner Sensor Open Circuit(PAGE 40-117)	MON	—	Electrical system	See Chapter 80, Other items
879AKB	Failure code [879AKB] A/C Inner Sensor Short Circuit(PAGE 40-118)	MON	—	Electrical system	See Chapter 80, Other items
879BKA	Failure code [879BKA] A/C Outer Sensor Open Circuit(PAGE 40-119)	MON	—	Electrical system	See Chapter 80, Other items
879BKB	Failure code [879BKB] A/C Outer Sensor Short Circuit(PAGE 40-120)	MON	—	Electrical system	See Chapter 80, Other items
879CKA	Failure code [879CKA] Ventilating Sensor Open Circuit(PAGE 40-121)	MON	—	Electrical system	See Chapter 80, Other items
879CKB	Failure code [879CKB] Ventilating Sensor Short Circuit(PAGE 40-122)	MON	—	Electrical system	See Chapter 80, Other items
879DKZ	Failure code [879DKZ] Sunlight Sensor Open or Short Circuit(PAGE 40-123)	MON	—	Electrical system	See Chapter 80, Other items
879EMC	Failure code [879EMC] Ventilation Damper Abnormality(PAGE 40-124)	MON	L01	Electrical system	See Chapter 80, Other items
879FMC	Failure code [879FMC] Air Mix Damper Abnormality(PAGE 40-125)	MON	L01	Electrical system	See Chapter 80, Other items
879GKX	Failure code [879GKX] Refrigerant Abnormality(PAGE 40-126)	MON	L01	Electrical system	See Chapter 80, Other items
989L00	Failure code [989L00] Engine Controller Lock Caution1(PAGE 40-127)	MON	—	Electrical system	
989M00	Failure code [989M00] Engine Controller Lock Caution2(PAGE 40-128)	MON	—	Electrical system	
989N00	Failure code [989N00] Engine Controller Lock Caution3(PAGE 40-129)	MON	—	Electrical system	
A1U0N3	Failure code [A1U0N3]: KDPF Dry Request (HC Release)(PAGE 40-130)	ENG	L01	Electrical system	
A1U0N4	Failure code [A1U0N4] KDPF Dry Request (HC Release)(PAGE 40-132)	ENG	L03	Electrical system	
AA10NX	Failure code [AA10NX] Air Cleaner Clogging (PAGE 40-134)	MON	L01	Electrical system	
AB00KE	Failure code [AB00KE] Charge Voltage Low (PAGE 40-136)	MON	L03	Electrical system	
B@BAZG	Failure code [B@BAZG] Engine Oil Pressure Low(PAGE 40-138)	ENG	L03	Electrical system	
B@BAZK	Failure code [B@BAZK] Eng Oil Level Low (PAGE 40-139)	MON	L01	Electrical system	
B@BCNS	Failure code [B@BCNS] Engine Coolant Overheat(PAGE 40-140)	ENG	—	Electrical system	
B@BCZK	Failure code [B@BCZK] Radiator Coolant Level Low(PAGE 40-141)	MON	L01	Electrical system	
B@HANS	Failure code [B@HANS] Hyd Oil Overheat (PAGE 40-143)	PUMP	L02	Electrical system	
CA115	Failure code [CA115] Eng Ne and Bkup Speed Sens Error(PAGE 40-144)	ENG	L04	Electrical system	

Failure code [879FMC] Air Mix Damper Abnormality *(PC220-879FMC-441-A-00-A)*

See "Failure code [879FMC] Air Mix Damper Abnormality" of Section 80 Appendix.

★ Since the connector of air mix servo motor can not be disconnected as long as it is installed on the machine, change air conditioner controller or air conditioner unit.

Circuit diagram related to radiator coolant level switch



Failure code [CA154] Chg Air Temp Sensor Low Error *(D65-CA154-400-A-Z0-A)*

Action level	Failure code	Failure	Charge (boost) temperature sensor signal voltage is too low. (Engine controller system)
L03	**CA154**		
Detail of failure	• Low voltage is detected in charge (boost) temperature sensor signal circuit.		
Action of controller	• Takes it that charge temperature (boost temperature) is at calculated value and allows engine to run. • Closes EGR valve. • Restricts engine output and allows engine to run. • Stops KDPF regeneration control.		
Problem on machine	• Engine does not start easily at low temperature. • Engine output lowers.		
Related information	• Signal voltage from charge temperature sensor (boost temperature sensor) can be checked with monitoring function (Code: 18501 (V)). • Temperature sensed by charge temperature sensor (boost temperature sensor) can be checked with monitoring function. (Code: 18500 (°C)) • Method of reproducing failure code: Turn starting switch to ON position. • If temperature sensor connector is disconnected, this failure code is not displayed but failure code [**CA153**] for "High Error" is displayed.		

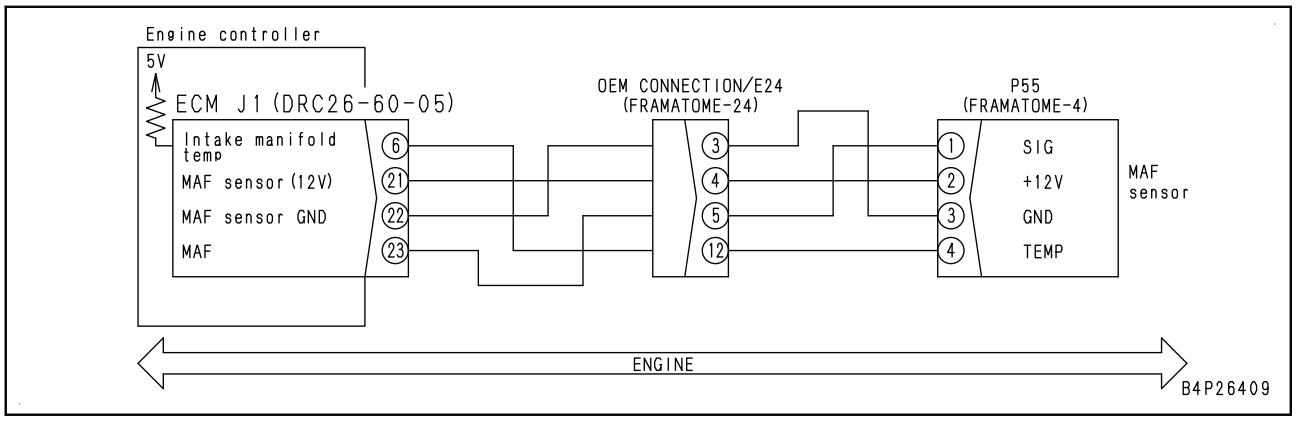
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.			
		If this failure code does not appear, wiring harness connector is defective. ★ If this failure code appears, perform following.			
2	Defective charge temperature sensor	1. Turn starting switch to OFF position. 2. Disconnect connector BOOST PRESS & IMT, and connect socket to male side of connector. ★ If charge temperature sensor has resistance of 80 Ω to 48 kΩ , regard charge temperature sensor as normal.			
		Resis-tance	Between BOOST PRESS & IMT (male) (3) and (4) ★ Charge temperature -Resistance characteristics	-40 °C	41 to 48 kΩ
				-20 °C	14 to 16 kΩ
				0 °C	5.4 to 6.1 kΩ
				30 °C	1.6 to 1.8 kΩ
				60 °C	560 to 600 kΩ
				90 °C	230 to 250 Ω
				130 °C	80 to 90 Ω
			Between BOOST PRESS & IMT (male) (3) and ground	Whole range	Min. 100 kΩ
3	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1 and connect T-adapter to female side of connector.			
		Resis-tance	Between ECM J1 (female) (5) and (59) ★ Use Temperature-Resistance characteristics table for troubleshooting on cause 2.		80 Ω to 48 kΩ
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and BOOST PRESS & IMT, and connect T-adapter to female side of ECM J1.			
		Resis-tance	Between ECM J1 (female) (5) and ground		Min. 100 kΩ
5	Defective engine controller	If no failure is found in above checks, engine controller is defective. (Since this is internal defect, troubleshooting cannot be performed.)			

Failure code [CA322] Inj #1(L#1) Open/Short Error *(D65-CA322-400-A-Z0-A)*

Action level	Failure code	Failure	Injector #1(L#1) Open/Short Error (Engine controller system)
L03	CA322		
Detail of failure	• Open or short circuit is detected in drive circuit of No. 1 injector.		
Action of controller	• None in particular.		
Problem on machine	• Engine runs with poor combustion or hunts. • Engine output decreases.		
Related information	• Method of reproducing failure code: Start engine. • While engine is running normally, approx. 65 V of pulse voltage is supplied to injector (+) side. Because it is pulse voltage, it cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 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, harness connector is defective. ★ If this failure code appears, perform following checks.		
2	Defective No. 1 injector	1. Turn starting switch to OFF position. 2. Disconnect connector INJECTOR CYL 1 & 2 and connect T-adapters to male side.		
		Resistance	Between INJECTOR CYL 1 & 2 (male) (3) and (4)	Max. 2 Ω
			Between INJECTOR CYL 1 & 2 (male) (3) and ground	Min. 100 kΩ
3	Open circuit or ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1 and connect T-adapters to female side.		
		Resistance	Between ECM J1 (female) (48) and (58)	Max. 2 Ω
			Between ECM J1 (female) (48) and ground	Min. 100 kΩ
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and INJECTOR CYL 1 & 2, and connect T-adapters to each female side.		
		Resistance	Between ECM J1 (female) (48) and INJECTOR CYL 1 & 2 (female) (3)	Max. 2 Ω
			Between ECM J1 (female) (58) and INJECTOR CYL 1 & 2 (female) (4)	Max. 2 Ω
5	Ground fault in wiring harness (contact with ground circuit)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and INJECTOR CYL 1 & 2, and connect T-adapters to either female side.		
		Resistance	Between ground and ECM J1 (female) (48) or INJECTOR CYL 1 & 2 (female) (3)	Min. 100 kΩ

Circuit diagram related to mass air flow sensor



Failure code [CA488] Chg Air Temp High Torque Derate *(D65-CA488-400-A-Z0-A)*

Action level	Failure code	Failure	Chg Air Temp High Torque Derate (Engine controller system)
L03	CA488		
Detail of failure	• Temperature signal from boost pressure & temperature sensor exceeds upper limit of control temperature.		
Action of controller	• Restricts engine output and allows engine to run.		
Problem on machine	• Engine output lowers.		
Related information	• Boost temperature can be checked with monitoring function. (Code: 18500 Boost temperature) • Method of reproducing failure code: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Drop of cooling performance of aftercooler	Aftercooler cooling performance may be degraded. Check for following points: • Defective fan rotation • Insufficient cooling air • Clogged aftercooler fins
2	Unusual rise of turbocharger outlet temperature	Outlet temperature of turbocharger may be unusually high. Check related parts.
3	Defective boost temperature sensor system	Perform troubleshooting for failure codes [CA153] and [CA154].

Failure code [CA692] Intake Air Temp Sens Low Error *(PC200LC_10-CA692-400-A-Z0-A)*

Action level	Failure code	Failure	Intake Air Temperature Sensor Low Error (Engine controller system)
L01	CA692		
Detail of failure	• Low voltage error is detected in signal circuit of intake air temperature sensor.		
Action of controller	• Takes it that intake temperature is at fixed value (25 °C) and allows engine to run.		
Problem on machine			
Related information	• Signal voltage from intake air temperature sensor can be checked with monitoring function. (Code: 18401 (V)) • Temperature sensed by intake air temperature sensor can be checked with monitoring function. (Code: 18400 (°C)) • Mass air flow sensor and intake temperature sensor are integrated. • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "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 does not appear, wiring harness connector is defective. ★ If this failure code appears, perform following.			
2	Defective intake temperature sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector P55. 3. Turn starting switch to ON position.			
		If this failure code changes to failure code [CA691], intake air temperature sensor is defective.			
		• • Reference 1. Turn starting switch to OFF position. 2. Disconnect connector P55 and connect T-adapters to male side.			
		Resistance	Between P55 (male) (4) and (3) ★ Intake temperature - resistance characteristics	-30 °C	25 to 28 kΩ
				0 °C	5.5 to 6.1 kΩ
				25 °C	1.9 to 2.1 kΩ
				40 °C	1.1 to 1.2 kΩ
				100 °C	180 to 185 Ω
			Between P55 (male) (4) and ground (sensor body)	Whole range	Min. 100 kΩ
3	Open or short circuit in wiring harness (short circuit, wire breakage and defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J1 and connect T-adapter to female side of connector.			
		Resistance	Between ECM J1 (female) (6) and (22)		180 Ω to 28 kΩ
		★ Use Intake temperature - Resistance characteristics table for troubleshooting on cause 2.			
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and P55, and connect T-adapters to either female side.			
		Resistance	Between ground and ECM J1 (female) (6) or P55 (female) (4)		Min. 100 kΩ
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J1 and P55, and connect T-adapters to female side of ECM J1. ★ Check with multimeter in continuity mode.			

Failure code [CA1695] Sensor 5 Supply Volt High Error *(PC220_10-CA1695-400-A-00-A)*

Action level	Failure code	Failure	Sensor power supply 5 high error
L03	CA1695		
Details of failure	• High voltage appears in 5 V power supply for KDPF differential pressure sensor and KDPF outlet pressure sensor.		
Action of controller	• Takes it that KDPF outlet pressure sensor is at fixed value (0 kPa {0 kg/cm^2}) and allows engine to run. • Takes it that KDPF delta pressure sensor value is at recommended value (or at 0 kPa {0 kg/cm^2}). • Closes EGR valve. • Limits engine output and allows engine run. • Stops KDPF regeneration control.		
Problem on machine	• Engine output decreases.		
Related information	• KDPF delta pressure sensor and KDPF outlet pressure sensor are integrated. • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. Perform checkup referencing the descriptions of wiring harness and connectors in "c: Electrical equipment"of "Checks before troubleshooting" in "General information on troubleshooting". 2. Turn starting switch to ON position.		
		If this failure code does not appear, wiring harness connector is defective. ★ If this failure code is displayed, implement the following.		
2	Defective KDPF delta pressure (outlet pressure) sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector E25. 3. Turn starting switch to ON position. ★ Ignore displayed failure codes other than this one.		
		If this failure code does not appear, KDPF delta pressure (outlet pressure) sensor is defective.		
3	Ground fault in wiring harness (contact with GND circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors CE03 and E25, and connect T-adapters to either female side.		
		Resistance	Between CE03 ground and (female) (52) or E25 (female) (4)	Min. 100 kΩ
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors CE03 and E25, and connect T-adapters to female side of connector CE03.		
		Resistance	Between CE03 (female) (52) and each pin other than (52)	Min. 100 kΩ
5	Defective engine controller	1. Turn starting switch to OFF position. 2. Disconnect connector E25. 3. Insert T-adapters into connector CE03 or connect T-adapters to female side of connector E25. 4. Turn starting switch to ON position.		
		Voltage	Between CE03 (52) and (43), or between E25 (female) (4) and (1)	4.75 to 5.25 V

No.	Cause	Procedure, measuring location, criteria and remarks
		★ When you finish the check of the exhaust gas color, release "Regeneration Disable".

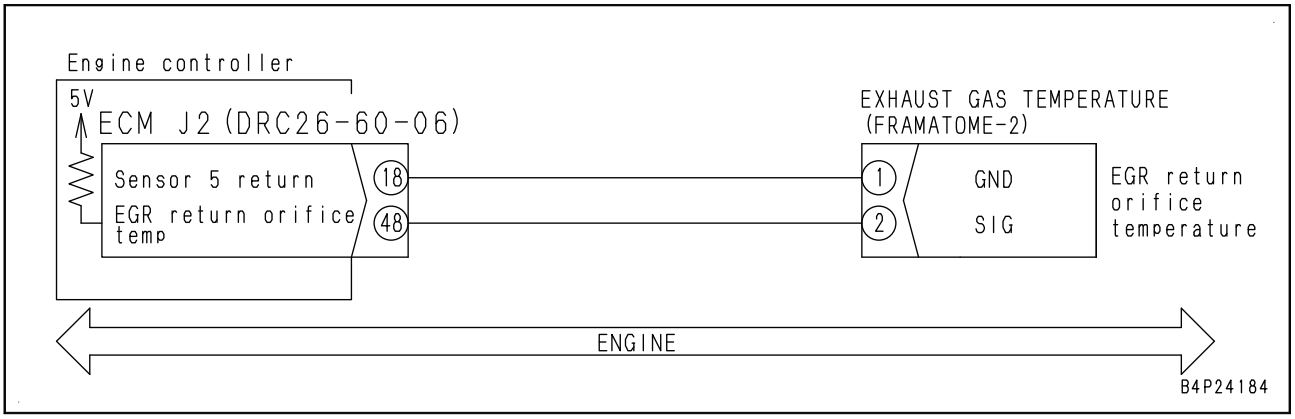
Failure code [CA2272] EGR Valve Pos Sens Low Error *(D65-CA2272-400-A-Z0-A)*

Action level	Failure code	Failure	EGR Valve Position Sensor Low Error
L03	CA2272		(Engine controller system)
Detail of failure	• Low voltage appears in signal circuit of EGR valve lift sensor.		
Action of controller	• Closes EGR valve. • Limits engine output and allows engine to run. • Stops KDPF regeneration control.		
Problem on machine	• Engine output decreases.		
Related information	• Signal voltage from EGR valve lift sensor can be checked with monitoring function. (Code: 18101 (V)) • Position sensed by EGR valve lift sensor can be checked with monitoring function. (Code: 18100 (mm)) • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 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, harness connector is defective. ★ If this failure code appears, perform following checks.			
2	Defective sensor power supply circuit	If failure code [CA352] or [CA386] is displayed, perform troubleshooting for [CA352] or [CA386] first. 1. Turn starting switch to OFF position. 2. Disconnect connector SEGR and connect T-adapters to female side. 3. Turn starting switch to ON position.			
		Voltage	Between SEGR (female) (A) and (B)	Power supply	4.75 to 5.25 V
3	Open circuit in connector box (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adapters to INTER-CONNECT male side and SEGR female side.			
		Resistance	★ If no failure is found by check on cause 2, this check is not required. Between INTER-CONNECT (male) (3) and SEGR (female) (A).		Max. 10 Ω
			★ If no failure is found by check on cause 2, this check is not required. Between INTER-CONNECT (male) (4) and SEGR (female) (B).		Max. 10 Ω
			Between INTER-CONNECT (male) (5) and SEGR (female) (C)		Max. 10 Ω
4	Ground fault in connector box (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors INTER-CONNECT and SEGR, and connect T-adapters to INTER-CONNECT male side and SEGR female side.			
		Resistance	Between ground and INTER-CONNECT (male) (5) or SEGR (female) (C)		Min. 100 kΩ
			Between ground and INTER-CONNECT (male) (3) or SEGR (female) (A)		Min. 100 kΩ

No.	Cause	Procedure, measuring location, criteria and remarks		
		Resistance	Between ECM J2 (female) (48) and ground, or between EXHAUST GAS TEMPERATURE (female) (2) and ground	Min. 100 kΩ
6	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to EGR orifice temperature sensor



No.	Cause	Procedure, measuring location, criteria and remarks
6	Defective KDOC	1. Remove KDPF. 2. Remove KDOC. • Check KDOC for cracks (replace KDOC if cracks are found). • Check whether more than 50% of KDOC inlet surface is plugged with soot or not. (KDOC cleaning) ★ When KDOC is replaced, perform check on cause 7. And when cleaning of KDOC is done, perform checks on causes 7 and 8.
7	Reset after KDOC change	1. Install KDOC and KDPF. 2. Turn starting switch to ON position. 3. From service menu of machine monitor, display the "Diagnostic Tests" screen, open "03 KDPF Memory Reset", and then perform "03 KDOC Change" (reset after KDOC change). ★ Check that reset after KDOC change is completed successfully (by reset count). If not, perform troubleshooting again. ★ When KDOC is replaced, finish troubleshooting without performing manual stationary regeneration.
8	Performing manual stationery regeneration	1. Perform manual stationary regeneration from Regeneration for Service. 2. Turn starting switch to OFF position. 3. Repeat the "Regeneration for service" (to check the repair completion). ★ If failure code [CA2637] is displayed after you have completed the "Regeneration for Service", the KDOC efficiency has dropped. Replace the KDOC and perform reset after KDOC change (see Cause 7).

★ Operate the machine approximately 3 hours and check that this failure code is not displayed.

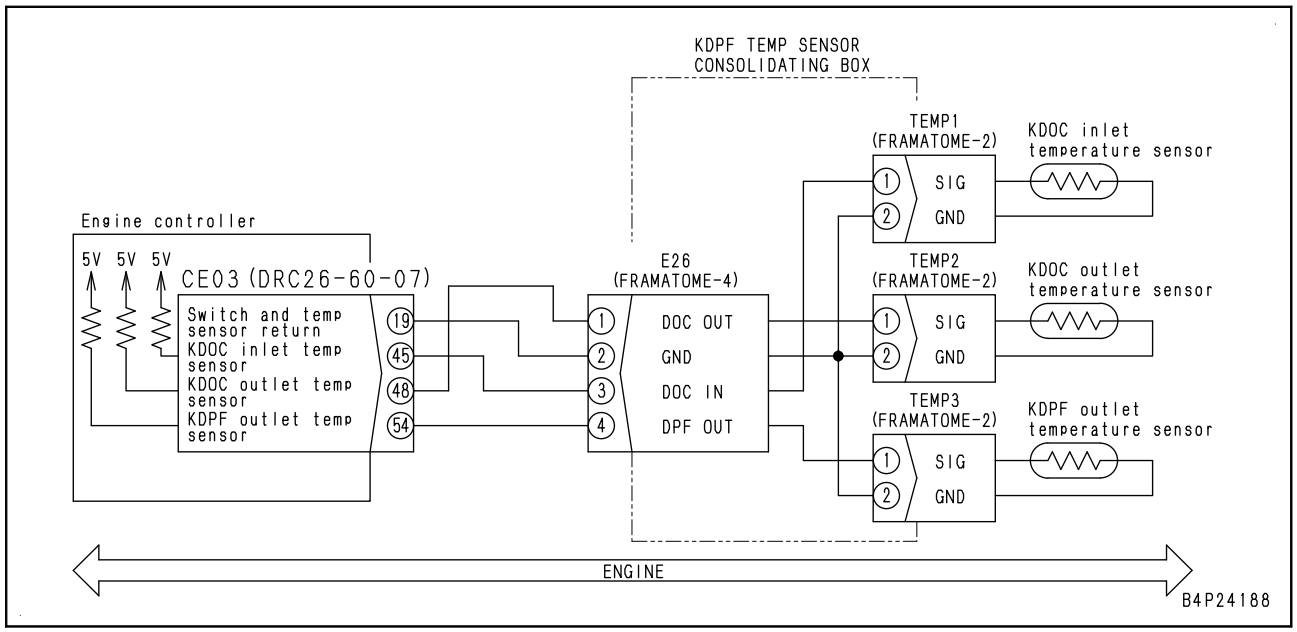
Failure code [CA3253] KDOC Temp Error - Non Regeneration *(PC200LC_10-CA3253-400-A-Z0-A)*

Action level	Failure code	Failure	KDOC Temperature Error - Non Regeneration
L03	CA3253		(Engine controller system)
Detail of failure	• KDOC outlet temperature remains at high level when active regeneration is not performed.		
Action of controller	• Closes EGR valve • Limits engine output and allows engine to run. • Stops KDPF regeneration control. ★ 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.		
Problem on machine	• Engine output decreases.		
Related information	⚠ **Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.** • 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)) • Misfire of cylinder can induce following phenomena. 1. Combustion is impaired causing high exhaust temperature. 2. Since cylinders other than disabled cylinder increase their fuel injection to compensate for torque drop, exhaust temperature may rise and KDOC inlet temperature high error may be generated. • 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 OFF position. So when you restart engine, wait 1 minute minimum before turning starting switch to ON position again.		
Machine operation for clearing failure code	• When this failure code appears, perform troubleshooting according to following work flow. A. Identification of cause and repair ↓ B. Machine operation for clearing failure code ★ 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. ★ In machine operation for clearing failure code, "dummy temperature sensor: 799T-601-4680" is used.		

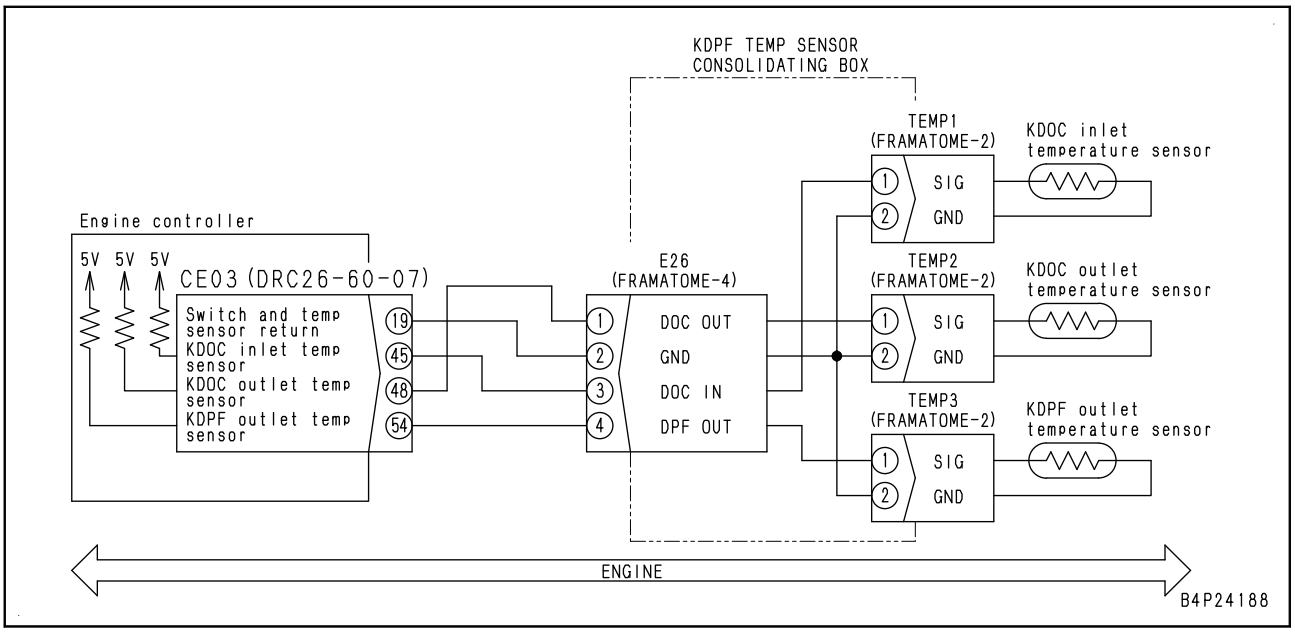
A. Identification of cause and repair

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC inlet temperature sensor	Perform checks on causes 1 and 3 to 5 of troubleshooting for failure code [CA3251] (causes related to sensor and wiring harness).
2	Defective KDOC outlet temperature sensor	Perform checks on causes 1 and 3 to 5 of troubleshooting for failure code [CA3254] (causes related to sensor and wiring harness).
3	Defective KDOC	1. Remove KDPF. 2. Remove KDOC.

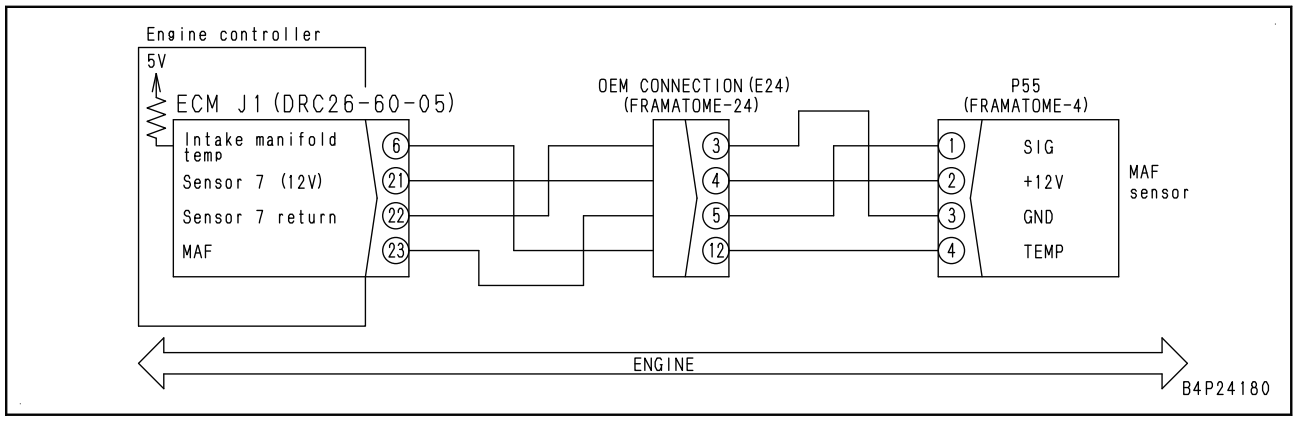
Circuit diagram related to KDOC and KDPF temperature sensors



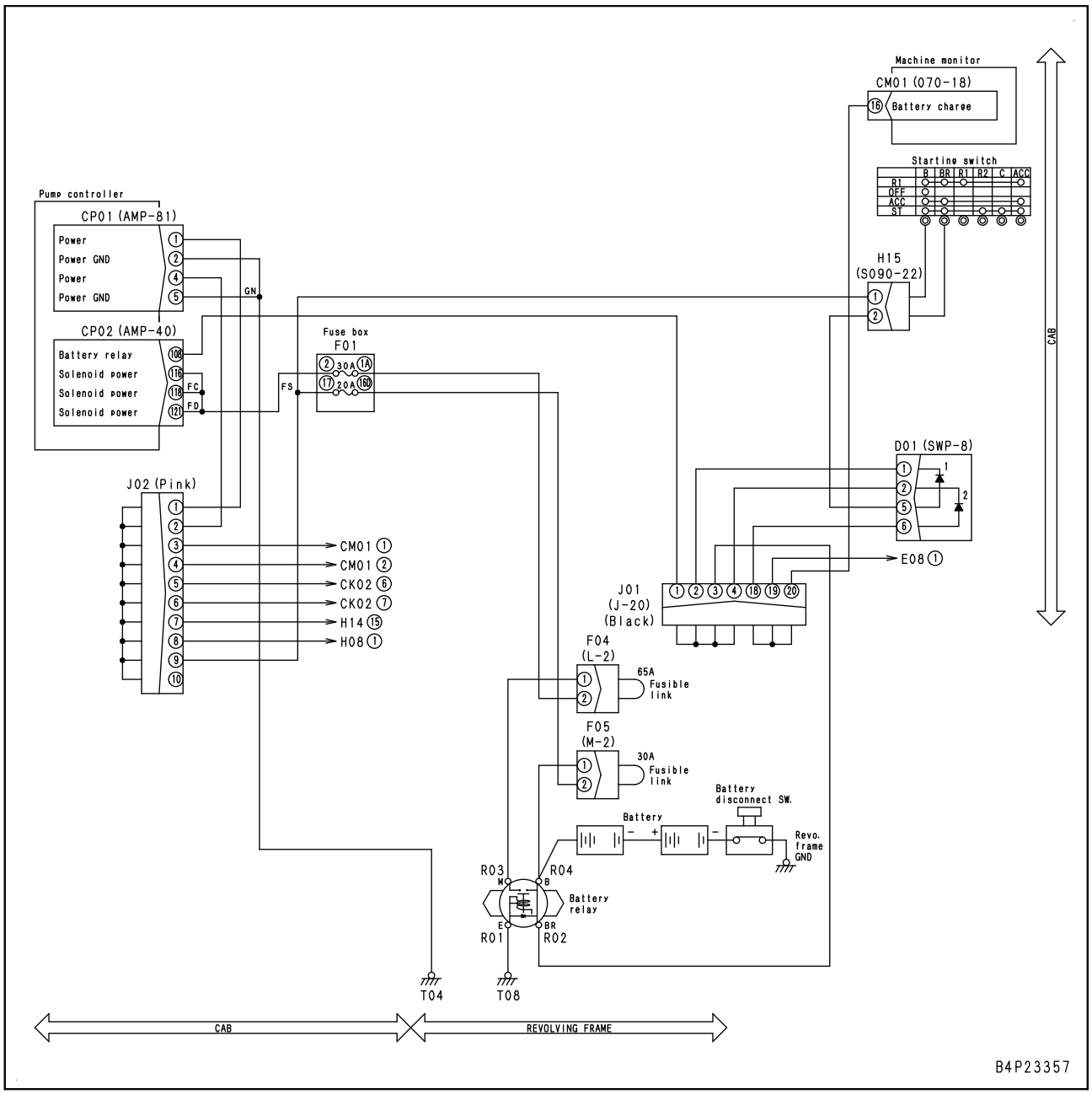
Circuit diagram related to KDOC and KDPF temperature sensors



Circuit diagram related to mass air flow sensor



Circuit diagram related to solenoid power supply



Failure code [DAF9KQ] Model Selection Abnormality *(PC200LC_10-DAF9KQ-400-A-Z0-A)*

Action level	Failure code	Failure	Model selection abnormality
L03	DAF9KQ		(Machine monitor system)
Detail of failure	• Model registered in the machine monitor and pump controller differs. (Machine monitor or pump controller has been replaced with a wrong part.)		
Action of controller			
Problem on machine	• Machine does not operate normally.		
Related information	• Condition of model selection signal can be checked by using monitoring function (Code: 02201 Switch Input 2) ★ PC210LC–10 Model select 1 = OFF Model select 2 = ON Model select 3 = ON Model select 4 = OFF Model select 5 = ON • Method of reproducing failure code: Turn starting switch to ON position. No. Cause Procedure, measuring location, criteria and remarks • Assembly part No. of pump controller program can be checked by using monitoring function (Code: 20229) • Assembly part No. of machine monitor program can be checked by using monitoring function (Code: 20227) • Method of reproducing failure code: Turn starting switch to ON position.		

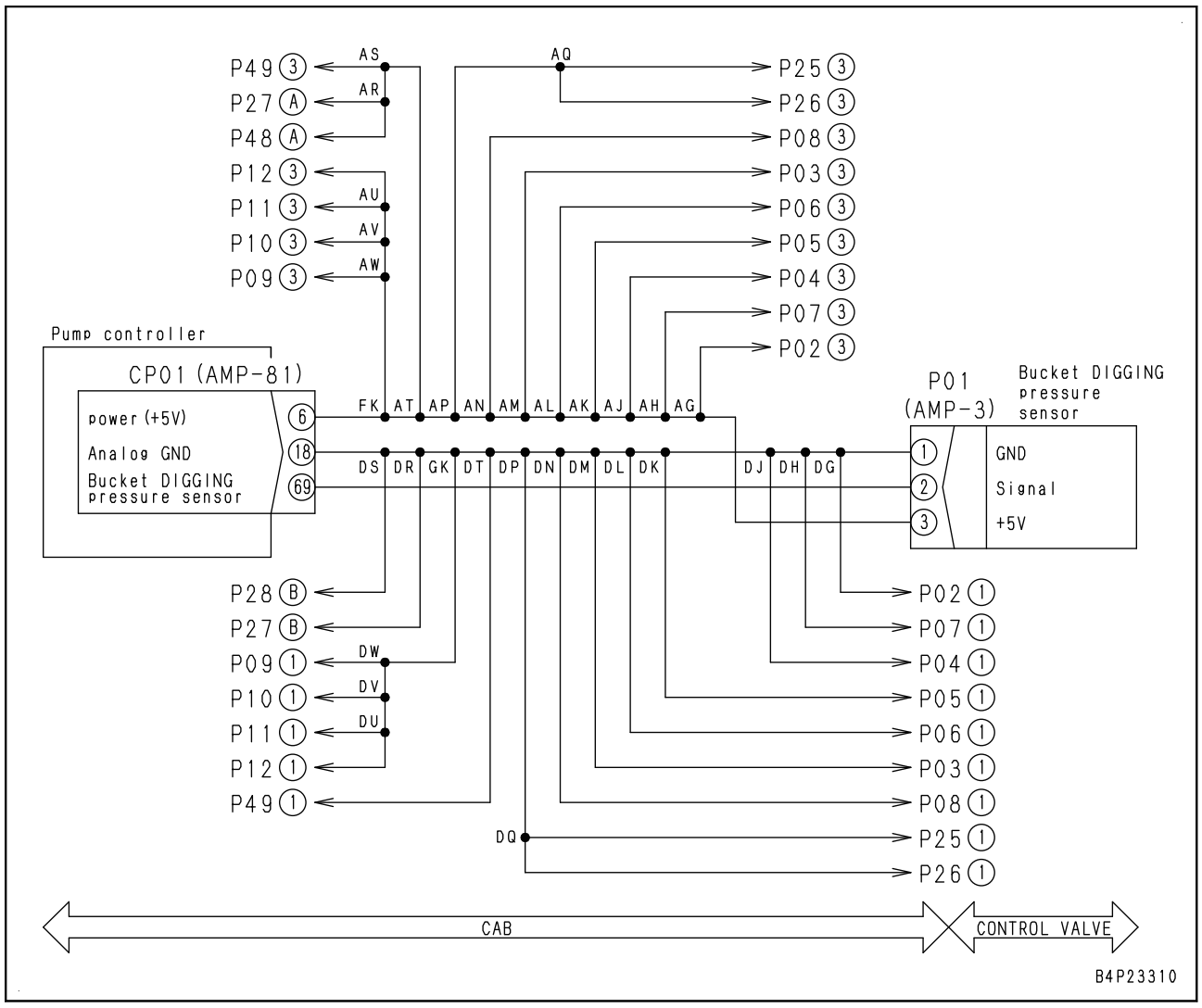
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective machine monitor	1. Use monitoring function to display assembly part number and check whether it is identical to that listed in Parts book. Defective machine monitor (a different model is registered)
2	Defective pump controller	1. Use monitoring function to display assembly part number and check whether it is identical to that listed in Parts book. Defective pump controller (a different model is registered)

Failure code [DB2RKR] CAN1 Discon (Engine Con) *(PC220_10-DB2RKR-400-A-00-A)*

Action level	Failure code	Failure	CAN communication-1 line of engine controller is disabled (Detected by machine monitor) (Machine monitor system)
L04	DB2RKR		
Details of failure	• Machine monitor does not recognize engine controller through CAN communication-1 line (KOMNET/r).		
Action of controller	• Holds current working mode. • Holds current selection of auto-deceleration. • Holds information at failure occurrence.		
Problem on machine	• Information obtained from engine controller is not displayed or special function that uses information from engine controller does not work. Or update of received data is stopped. • Engine is uncontrollable. • Engine speed and coolant temperature are undetectable. • Gauge pointers for engine coolant temperature and hydraulic oil temperature disappear from machine monitor.		
Related information	• Method of reproducing failure code: Turn starting switch to ON position. • Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. • If failure code [DB2QKR] is also displayed, engine controller system may be defective due to cause 1. • Machine monitor uses failure code [DA2RKR] to indicate CAN communication failure through CAN 1 line. When failure code [DA2RKR] is also displayed, ground fault, short circuit or hot short circuit in wiring harness (CAN communication line) may occur. • Terminating resistor of CAN1 on cab side is inside machine monitor, and that on engine side is connector terminal port. (Connector Terminal port is not on CAN communication 1 line but connected to it via connector "ECMJ2"). • Since power to each controller and machine monitor is supplied directly from battery, they receive power even while starting switch is at OFF position. • Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective engine controller system	Perform checks on causes 1 to 3 of troubleshooting for [DB2QKR].		
2	Defective CAN terminating resistor (open circuit or short circuit in internal wiring)	1. Turn starting switch to OFF position. 2. Disconnect connector CM02 and terminal port, and connect T-adapters to each male sides of them.		
		Resistance	Between terminal port (male) (A) and (B)	120 ± 12 Ω
			Between CM02 (male) (10) and (12)	120 ± 12 Ω
3	Open circuit or short circuit in wiring harness	• CAN communication line ★ CAN communication terminating resistor of 120 Ω is provided in machine monitor, too. Since 120 Ω resistors are connected in parallel, if combined resistance measured at connector of controller other than machine monitor is 60 Ω, there is no open circuit in wiring harness. 1. Turn starting switch to OFF position and disconnect ground cable. 2. Disconnect connectors CM02, CP01, ECM J1, ECM J2 and Terminal port one by one, and connect T-adapters to each female side. ★ When short circuit occurs (1 Ω or less between terminals), disconnect every CAN communication connector of controllers. Then, check where short circuit occurs, namely between wiring harnesses or within the controller.		
		Resistance	Between CM02 (female) (11) and (12)	Approx. 120 Ω
			Between CP01 (female) (7) and (26)	Approx. 120 Ω
			Between Terminal port (female) (A) and (B)	Approx. 120 Ω
			Between ECM J1 (female) (8) and (18)	Approx. 120 Ω
			Between ECM J2 (female) (24) and (25)	Approx. 120 Ω

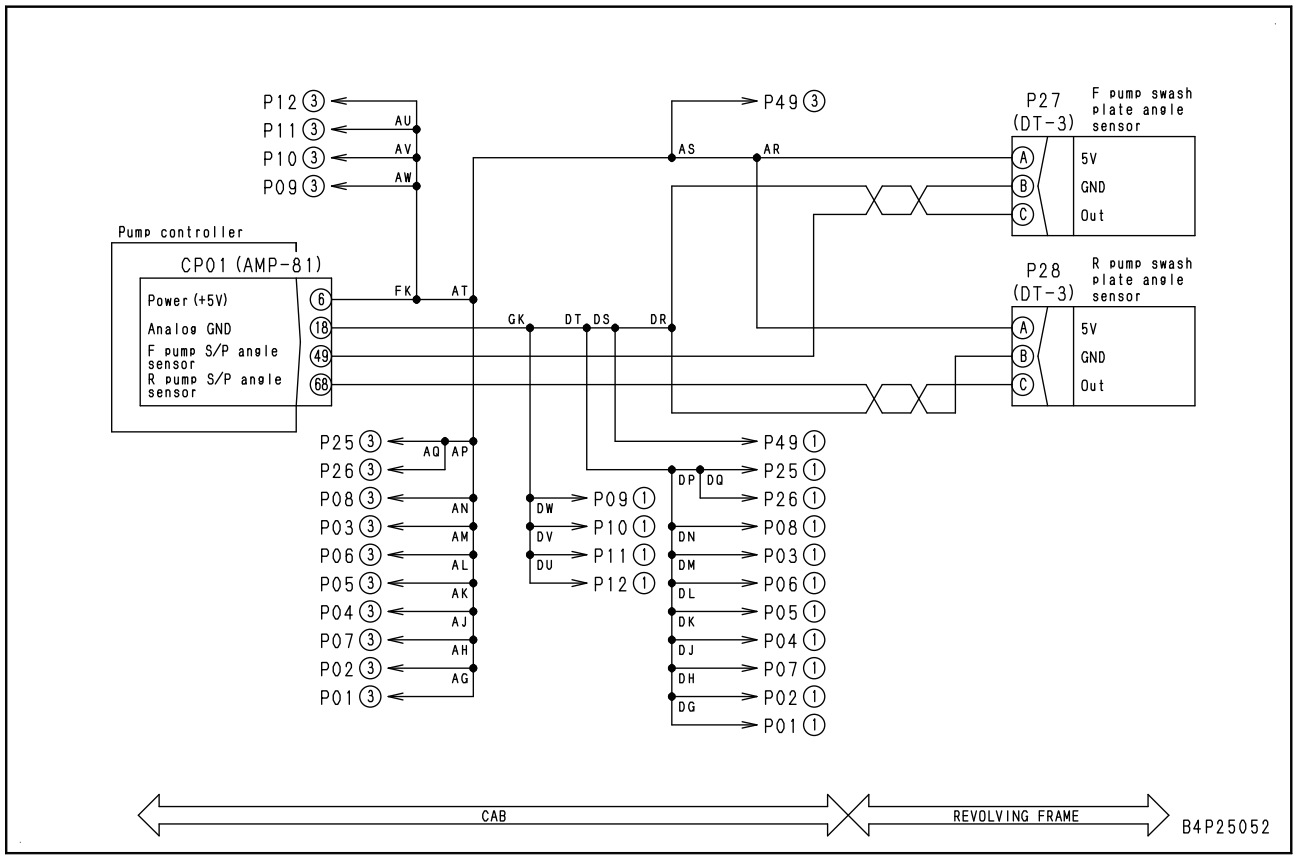
Circuit diagram related to bucket CURL PPC pressure sensor



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Open circuit in wiring harness
(wire breakage or defective contact of connector)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P05, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="3">Resis-tance</td><td>★ If power supply voltage measured in check on cause 1 is normal, this check is not required.
Between CP01 (female) (18) and P05 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between CP01 (female) (50) and P05 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td>★ If power supply voltage measured in check on cause 1 is normal, this check is not required.
Between CP01 (female) (6) and P05 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">4</td><td rowspan="2">Ground fault in wiring harness
(contact with ground circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P05, and connect T-adapters to either female side.</td></tr>
<tr><td>Resis-tance</td><td>Between ground and CP01 (female) (50) or P05 (female) (2)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Hot short circuit in wiring harness
(contact with 24 V circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector P05.
3. Connect T-adapters to female side of connector P05.
4. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between P05 (female) (2) and ground</td><td>Max. 1 V</td></tr>
<tr><td>6</td><td>Defective pump controller</td><td colspan="3">If no failure is found by above checks, pump controller is defective.
(Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks		
		Resis-tance	★ If power supply voltage measured in check on cause 1 is normal, this check is not required. Between CP01 (female) (6) and P28 (female) (A)	Max. 1 Ω
			★ If power supply voltage measured in check on cause 1 is normal, this check is not required. Between CP01 (female) (18) and P28 (female) (B)	Max. 1 Ω
			Between CP01 (female) (68) and P28 (female) (C)	Max. 1 Ω
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors CP01 and P28, and connect T-adapters to either female side.		
		Resis-tance	Between ground and CP01 (female) (68) or P28 (female) (C)	Min. 1 MΩ
5	Hot short circuit in wiring harness (contact with 24 v circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector P28. 3. Connect T-adapters to female side of connector P28. 4. Turn starting switch to ON position.		
		Voltage	Between P28 (female) (C) and ground	Max. 1 V
6	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 F and R pump swash plate sensors

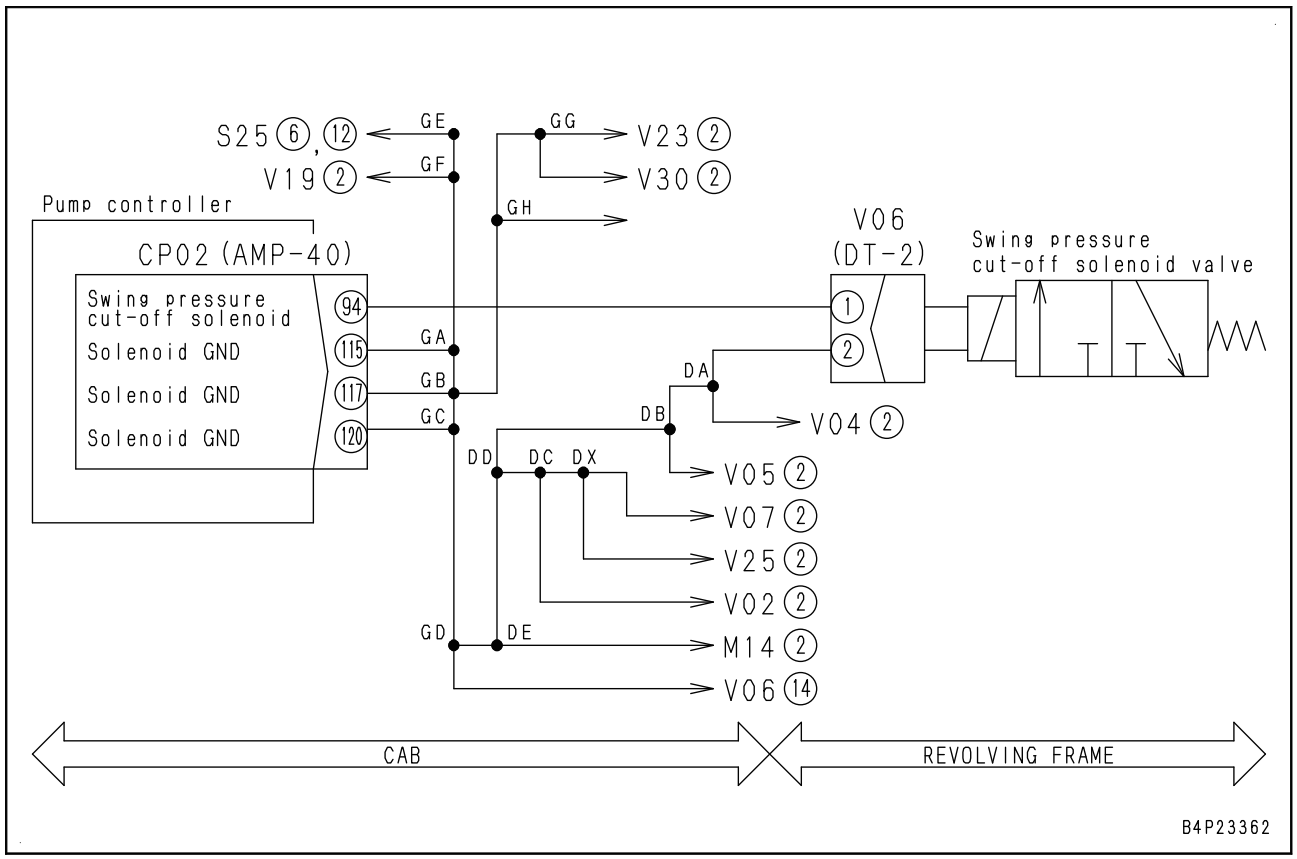


Failure code [DW91KA] Travel Junction Sol Open Circuit *(PC200-DW91KA-400-A-00-A)*

Action level	Failure code	Failure	Open circuit in travel junction solenoid circuit (Pump controller system)
L01	DW91KA		
Details of failure	• Controller output voltage to travel junction solenoid exceeds standard value when it stops outputting drive current to travel junction solenoid.		
Action of controller	• None in particular (Since no current flows, solenoid does not operate.) • If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Machine cannot turn easily during traveling.		
Related information	• Controller's command (ON/OFF) to travel junction valve solenoid can be checked with monitoring function. (If controller sends solenoid ON command, monitoring display is ON even if solenoid is not switched to ON due to open circuit.) (Code: 02300 Solenoid 1) • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective travel junction solenoid (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector V05 and connect T-adapters to male side.		
		Resistance	Between V05 (male) (1) and (2)	20 to 60 Ω
2	Open circuit or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector CP02 and connect T-adapters to female side.		
		Resistance	Between CP02 (female) (85) and each of CP02 (female) (115), (117) and (120)	20 to 60 Ω
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors CP02 and V05, and connect T-adapters to each female side.		
		Resistance	Between CP02 (female) (85) and V05 (female) (1)	Max. 1 Ω
			Between V05 (female) (2) and each of CP02 (female) (115), (117) and (120)	Max. 1 Ω
4	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 swing cut-off solenoid

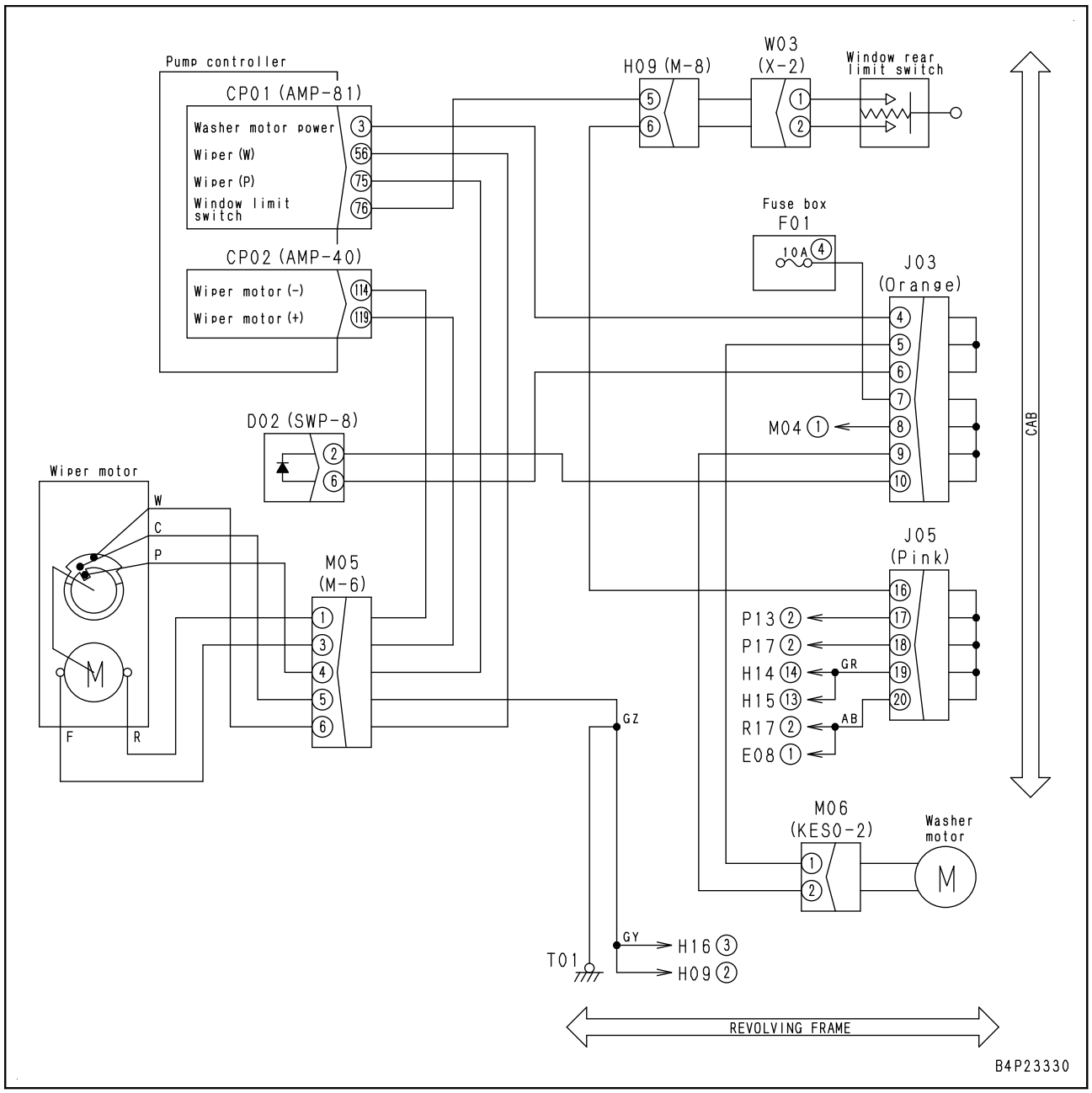


Failure code [DXE4KB] Attachment Flow EPC Short Circuit *(PC200-DXE4KB-400-A-00-A)*

Action level	Failure code	Failure	Short circuit in attachment flow throttle EPC solenoid circuit (Pump controller system)
-	DXE4KB		
Details of failure	• When attachment flow throttle EPC solenoid is driven, abnormal current flows.		
Action of controller	• Stops outputting current to attachment flow throttle EPC solenoid. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	• Attachment does not move.		
Related information	• Drive current of attachment flow throttle EPC solenoid can be checked with monitoring function. (Code: 01700 Service solenoid current) • Method of reproducing failure code: Turn starting switch ON and set machine in breaker mode (B).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective attachment flow throttle EPC solenoid (internal short circuit or ground fault)	1. Turn starting switch to OFF position. 2. Disconnect connector V30, and connect T-adapters to male side.		
		Resistance	Between V30 (male) (1) and (2)	3 to 14 Ω
			Between V30 (male) (1) and ground	Min. 1 MΩ
2	Short circuit or ground fault in harness	1. Turn starting switch to OFF position. 2. Disconnect connector CP02 and connect T-adapters to female side.		
		Resistance	Between CP02 (female) (97) and each of CP02 (female) (115), (117) and (120)	3 to 14 Ω
			Between CP02 (female) (97) and ground	Min. 1 MΩ
3	Ground fault in wiring harness (contact with GND circuit)	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors CP02 and V30, and connect T-adapters to either female side.		
		Resistance	Between ground and CP02 (female) (97), or V30 (female) (1)	Min. 1 MΩ
4	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 wiper



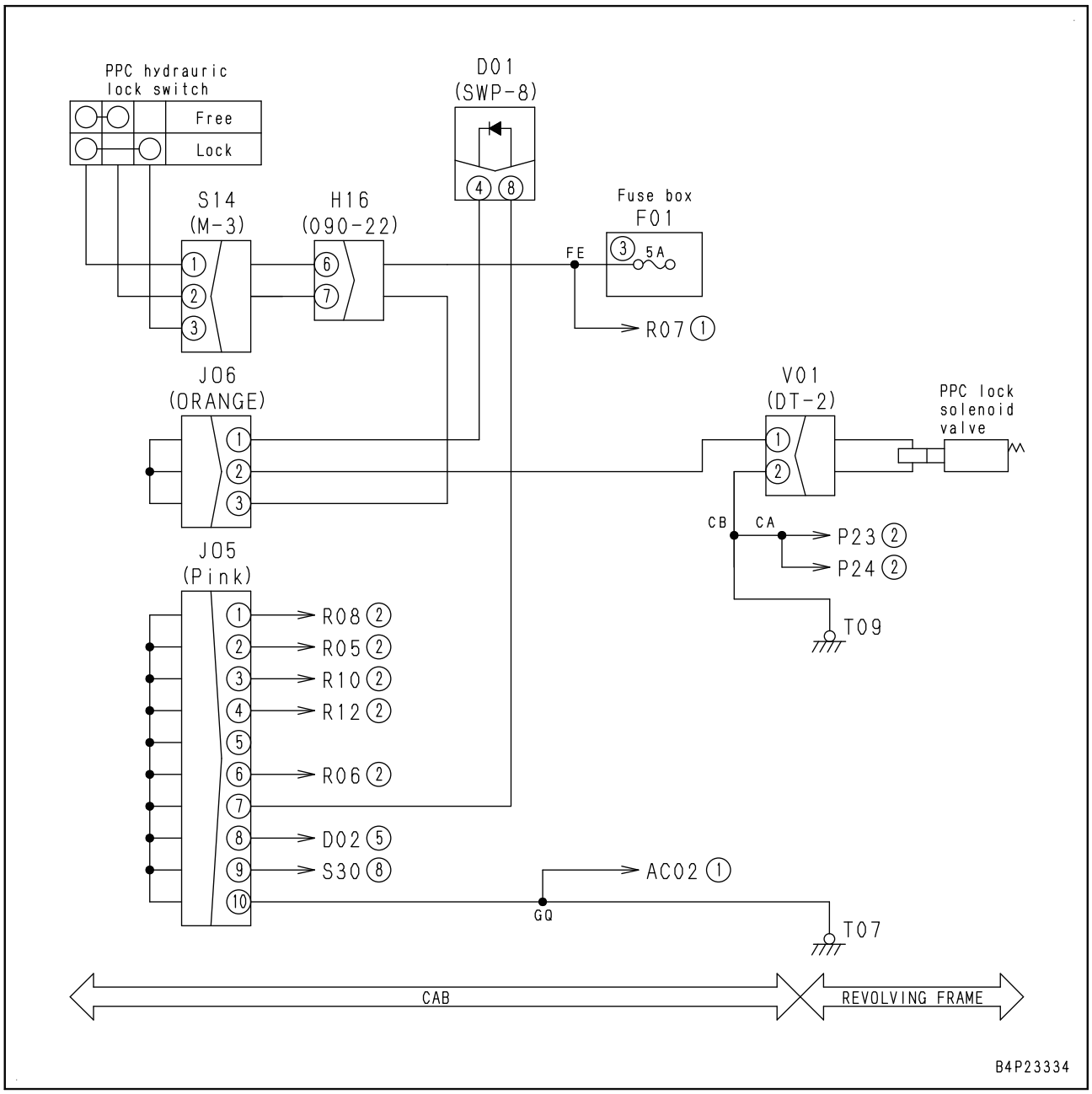
Cause		Procedure, measuring location, criteria and remarks		
9	Open circuit in wiring harness	If no failure is found by check on cause 7, this check is not required. 1. Turn starting switch to OFF position, and turn battery disconnect switch to OFF position. 2. Disconnect fusible link F05, No. 15 and 17 fuses of F01, and connectors H15 and CM01. 3. Connect T-adapters to male side of connector F05 and female side of H15 and CM01.		
		Resistance	Between battery (-) and ground	Max. 1 Ω
			Between battery (+) and F05 (male) (1)	Max. 1 Ω
			Between F05 (male) (2) and F01-16F	Max. 1 Ω
			Between F01-17 and each of CM01 (female) (1) and (2)	Max. 1 Ω
			Between ground (T04) and CM01 (female) (3), (4)	Max. 1 Ω
			Between F01-17 and H15 (female) (1)	Max. 1 Ω
			Between H15 (female) (5) and F01-15E	Max. 1 Ω
			Between F0-15 and CM01 (female) (10)	Max. 1 Ω
10	Ground fault in wiring harness (contact with ground circuit)	If no failure is found by checks on causes 3 to 5 and 7, this check is not required. 1. Turn starting switch to OFF position, and turn battery disconnect switch to OFF position. 2. Disconnect fusible link F05, No. 17 of fuse F01, terminal 14D, and connectors H15, CM01, and CP01. 3. Connect T-adapters to male side of connector F05 and female side of H15 and CM01.		
		Resistance	Between battery (+) or F05 (male) (1) and ground	Min. 1 MΩ
			Between ground and F05 (male) (2) or F01-16F	Min. 1 MΩ
			Between F01-17 and ground, or between CM01 (female) (1), (2) and ground, or between H15 (female) (1) and ground	Min. 1 MΩ
			Between ground and H15 (female) (5) or CM01 (female) (10)	Min. 1 MΩ
11	Defective machine monitor	If no failure is found by above diagnoses, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

E-21 Hydraulic oil temperature gauge indicates either Min. or Max. and does not move *(PC220_10-FGJ-400-A-00-A)*

Failure	• While hydraulic oil temperature is rising normally, indication of temperature gauge does not rise from white range (C). • While hydraulic oil temperature is stabilized normally, indication of temperature gauge rises to red range (H).
Related information	• 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 by using monitoring function. (Code: 04401 Hydraulic oil temperature)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective hydraulic oil temperature sensor (internal open or short circuit)	1. Starting switch: OFF 2. Disconnect connector P22 and connect T-adapter to male side.			
		Resistance	Between P22 (male) (1) and (2)	10°C	Approx. 90 kΩ
				30°C	Approx. 35 kΩ
				80°C	Approx. 6.5 kΩ
				100°C	Approx. 3.5 kΩ
			Between P22 (male) (2) and ground	Whole range	Min. 1 MΩ
2	Open circuit or short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connector CP01 and connect T-adapter to female side.			
		Resistance	Between CP01 (female) (28) and (46) ★ Resistance accords with value on temperature characteristics table in cause 1.		3.5 to 90 kΩ
			Between CP01 (female) (28) and ground		Min. 1 MΩ
3	Open circuit in wiring harness (Open circuit or defective contact in connector)	★ If no failure is found by check on cause 2, this check is not required. 1. Starting switch: OFF 2. Disconnect connectors CP01 and P22, and connect T-adapter to either female side.			
		Resistance	Between CP01 (female) (28) and P22 (female) (2)		Max. 1 Ω
			Between CP01 (female) (46) and P22 (female) (1)		Max. 1 Ω
4	Ground fault in wiring harness (contact with ground circuit)	★ If no failure is found by check on cause 2, this check is not required. 1. Starting switch: OFF 2. Disconnect connectors CP01 and P22, and connect T-adapter to either female side.			
		Resistance	Between CP01 (female) (28) and ground, or between P22 (female) (2) and ground		Min. 1 MΩ
5	Hot short circuit in wiring harness (contact with 24 V circuit)	1. Starting switch: OFF 2. Disconnect connector P22. 3. Insert T-adapter to connector CP01 or connect T-adapter to female side of connector P22. 4. Starting switch: ON			
		Voltage	Between CP01 (28) or P22 (female) (2) and ground		Approx. 5 V
6	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.)			

Related circuit diagram

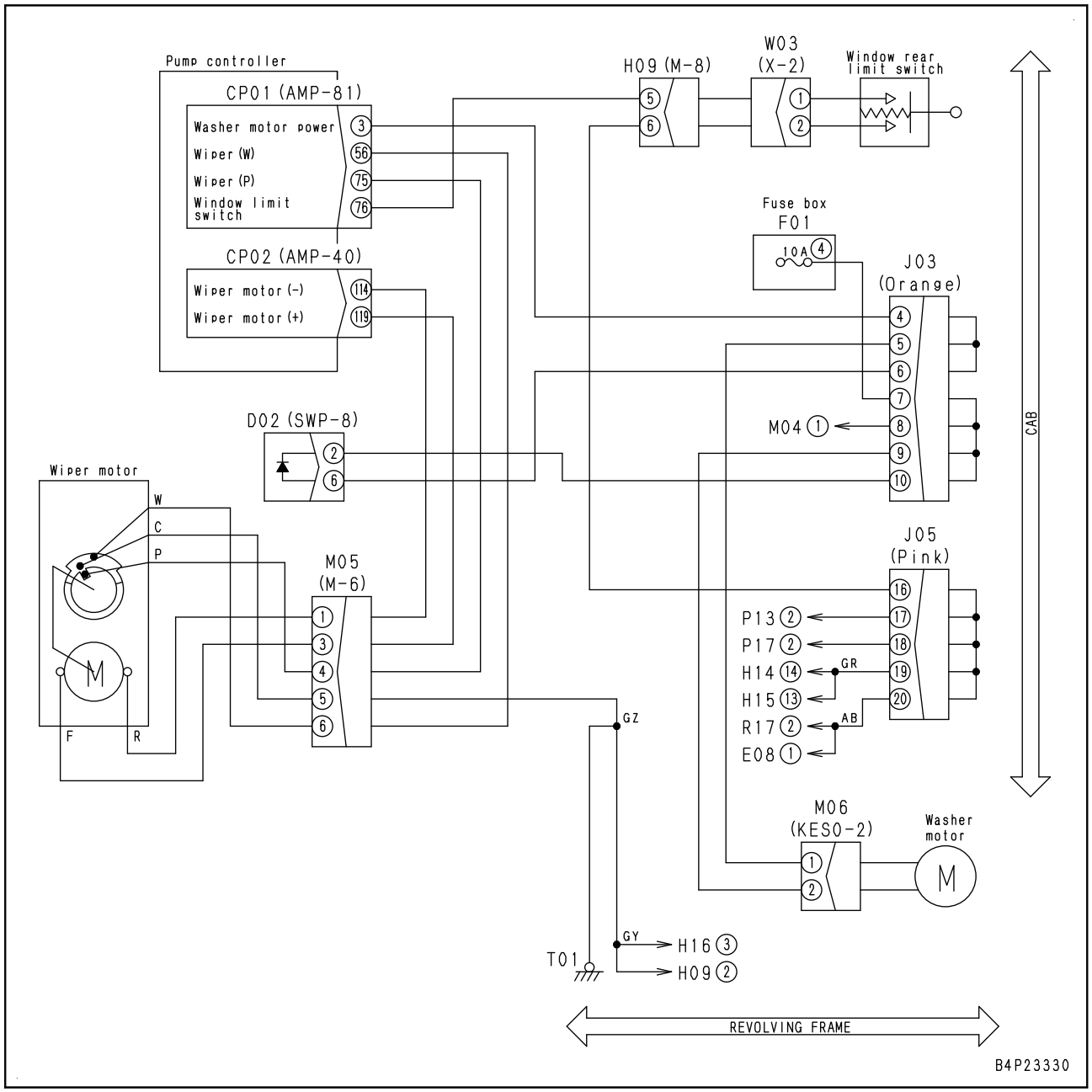


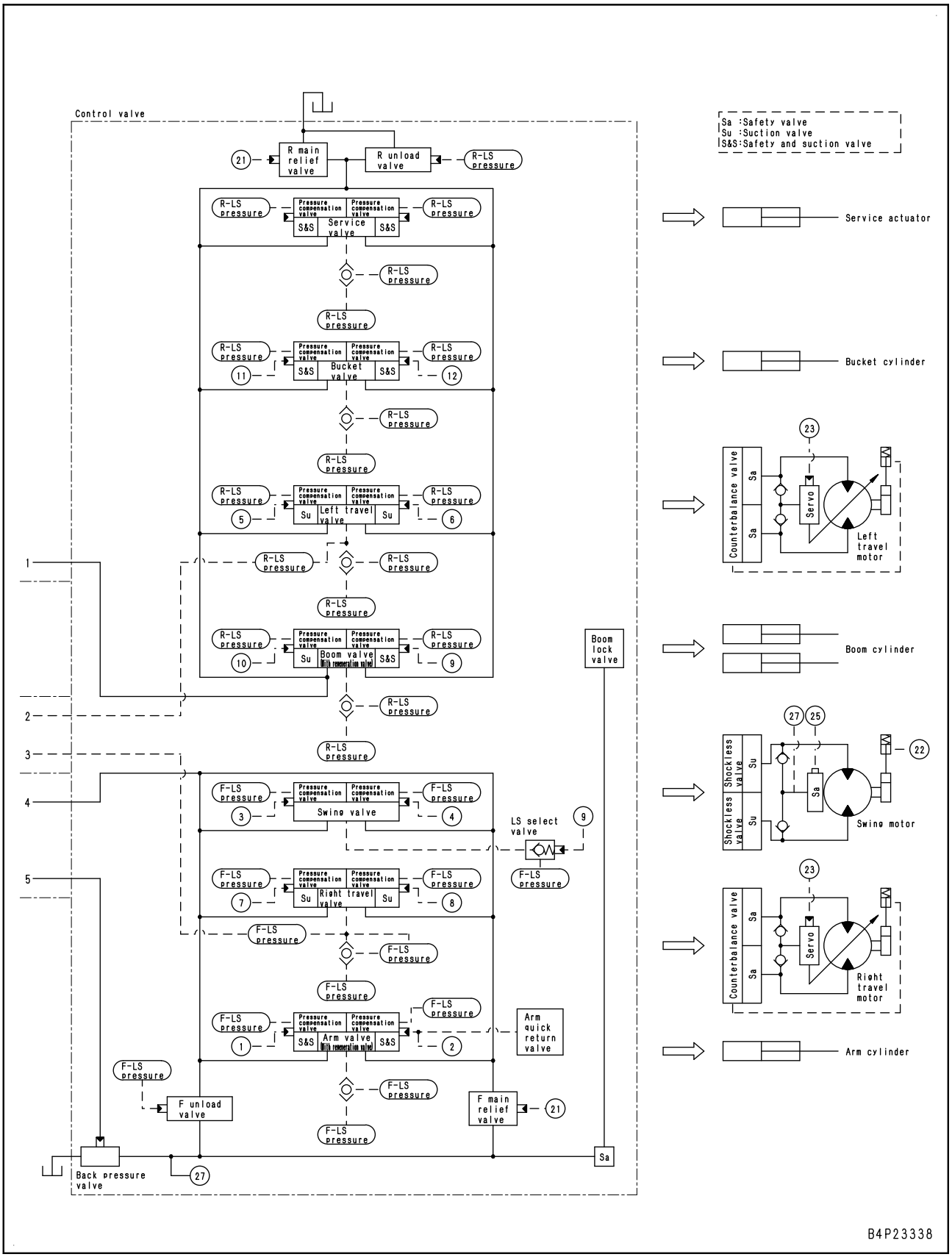
E-48 Window washer does not operate when window washer switch is operated *(PC220_10-FH0-400-A-00-A)*

Failure	• When window washer switch is operated, window washer does not operate.
Related information	• Condition of window washer switch signal can be checked with monitoring function. (Code: 04504 Monitor 1st, 2nd line switches) • As for window washer, perform troubleshooting for failure code [DY2CKB].

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective machine monitor	Machine monitor may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to wiper




Control valve
Sa :Safety valve
Su :Suction valve
S&S:Safety and suction valve
R main relief valve
R unload valve
R-LS pressure
Service valve
Bucket valve
Left travel valve
Boom valve
Swing valve
Right travel valve
Arm valve
Boom lock valve
LS select valve
F-LS pressure
F unload valve
F main relief valve
Arm quick return valve
Back pressure valve
Service actuator
Bucket cylinder
Counterbalance valve
Servo
Left travel motor
Boom cylinder
Shockless valve
Swing motor
Right travel motor
Arm cylinder
B4P23338

H-5 Fine control performance or response is poor *(PC200LC_10-FTB-400-A-Z0-A)*

Failure	• Fine control performance or response is poor.
Related information	• Perform all troubleshooting with working mode set in P mode. • If failure codes are displayed, perform troubleshooting for them first. (DKR0MA, DKR1MA, DXE0KA, DAXE0KB) • Signal voltage from swash plate sensor can be checked with monitoring function. (Code: F pump side 01138, R pump side 01140)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Malfunction of pump swash plate sensor (front)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Sensor output voltage	All levers in NEUTRAL		1.35 ± 0.63 V
			L.H. track only: Running idle off ground Swing lock switch: ON		3.35 ± 0.63 V
2	Malfunction of pump swash plate sensor (rear)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Sensor output voltage	All levers in NEUTRAL		1.35 ± 0.63 V
			R.H. track only: Running idle off ground Swing lock switch: ON		3.35 ± 0.63 V
3	Malfunction of LS-EPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		LS-EPC valve output pressure	Travel control lever: NEUTRAL	Travel speed: Lo	2.9 MPa {30 kg/cm^2}
			Travel control lever: Finely moved	Travel speed: Hi	0 MPa {0 kg/cm^2}
4	Clogged orifice in LS circuit	Orifice may be clogged. Check it.			
5	Defective adjustment of LS valve (front)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Oil pressure to be measured	Lever position and oil pressure ratio		
			All levers in NEUTRAL		L.H. track: Running idle off ground in Hi speed setting
					Lever moved halfway
		Pump delivery pressure	Almost same as LS valve output pressure		1
		LS valve output pressure	Almost same as pump delivery pressure		Approx. 0.6 (Approx. 3/5)
6	Defective adjustment of LS valve (rear)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Oil pressure to be measured	Lever position and oil pressure ratio		
			All levers in NEUTRAL		R.H. track: Running idle off ground in Hi speed setting
					Lever moved halfway
		Pump delivery pressure	Almost same as LS valve output pressure		1
		LS valve output pressure	Almost same as pump delivery pressure		Approx. 0.6 (Approx. 3/5)

H-12 Hydraulic drift of bucket is large *(PC200LC_10-MS2-400-A-Z0-A)*

Failure	• Hydraulic drift of bucket is large.
Related information	• Perform all troubleshooting with working mode set in P mode.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective bucket cylinder	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.		
		Leak from bucket cylinder	Bucket CURL hydraulic relief	Max. 20 cc/min
2	Malfunction of bucket control valve (suction-safety valve)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.		
		Bucket relief pressure	Bucket CURL or DUMP hydraulic relief	33.1 to 37.2 MPa {338 to 380 kg/cm^2}
		★ If relief pressure is below standard value, suction-safety valve may be defective.. ★ You can replace suction-safety valve with other one and check whether failure symptom changes for judgment.		
3	Malfunction of bucket control valve (spool)	★ Release remaining pressure from hydraulic tank and piping and then perform troubleshooting with engine stopped.		
		• Check for locked or trapped bucket spool in control valve body. (Spool must move smoothly.) • Remove bucket spool from valve body and check it for defects and dirt. • Take care not to let foreign matter enter control valve when re-installing bucket spool.		
4	Malfunction of bucket control valve (pressure compensation valve)	★ Check whether bucket cylinder moves slowly when performing hydraulic relief of other work equipment. (If bucket cylinder moves, control valve is defective.) ★ If any failure is found in above check item, interchange pressure compensation valves on bucket CURL and DUMP sides, and check whether failure symptom changes. (Pressure compensation valves have different area ratio, so be sure to return them to their original positions after test.)		

H-23 One of tracks does not run *(PC200LC_10-BG1-400-A-Z0-A)*

Failure	• One of tracks does not run..
Related information	• Perform all troubleshooting with working mode set in P mode. • Travel PPC pressure can be checked with monitoring function. (Code: 01882) • 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 R.H. travel PPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		PPC valve output pressure	R.H travel control lever	NEUTRAL	0 MPa {0 kg/cm^2}
			R.H travel control lever	FORWARD and REVERSE	2.84 to 3.43 MPa {29 to 35 kg/cm^2}
2	Malfunction of L.H. travel PPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		PPC valve output pressure	L.H. travel control lever	NEUTRAL	0 MPa {0 kg/cm^2}
			L.H. travel control lever	FORWARD and REVERSE	2.84 to 3.43 MPa {29 to 35 kg/cm^2}
3	Malfunction of R.H.travel control valve (spool)	If no failure is found by check on cause (1) and one track does not run when travel control lever is operated with pump pressure at approx. 4 MPa, check whether spool is locked near NEUTRAL position.			
4	Malfunction of L.H.travel control valve (spool)	If no failure is found by check on cause (2) and one track does not run when travel control lever is operated with pump pressure at approx. 4 MPa, check whether spool is locked near NEUTRAL position.			
5	Malfunction of R.H. travel control valve (suction valve)	When R.H. travel control lever is operated, if R.H. track does not run because of low pump pressure, check suction valve.			
6	Malfunction of L.H. travel control valve (suction valve)	When L.H. travel control lever is operated, if L.H. track does not run because of low pump pressure, check suction valve.			
7	Defective R.H. travel motor (safety valve)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Travel relief pressure	R.H. travel hydraulic relief	FORWARD and REVERSE	36.8 to 40.2 MPa {375 to 410 kg/cm^2}
		If relief pressures of travel FORWARD and REVERSE are unusual to the same degree, sealing of safety valve may be defective. Interchange safety valves of L.H. and R.H. travel motors, and check whether failure symptom changes.			
8	Defective L.H. travel motor (safety valve)	★ Be ready with engine stopped, then perform troubleshooting with engine running at full speed.			
		Travel relief pressure	L.H. travel hydraulic relief	FORWARD and REVERSE	36.8 to 40.2 MPa {375 to 410 kg/cm^2}
		If relief pressures of travel FORWARD and REVERSE are unusual to the same degree, sealing of safety valve may be defective. Interchange safety valves of L.H. and R.H. travel motors, and check whether failure symptom changes.			
9	Defective R.H. travel motor (check valve)	If safety valve is found to be normal in checks on cause (7), sealing of check valve may be defective. Interchange check valves on FORWARD and REVERSE sides of same travel motor, and check whether failure symptom changes.			

S-3 Fuel is being injected but engine does not start (misfiring: engine cranks but does not start) *(WA380_7-A28-400-A-Z0-A)*

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

No.	Cause	Point to check, remarks	Remedy
1	Defective battery	• Specific gravity of electrolyte and voltage of battery are low.	Add battery electrolyte and charge battery.
2	Insufficient fuel in tank	• Fuel tank is empty.	Add fuel.
3	Clogged air breather hole in fuel tank cap	• Air breather hole in fuel tank cap is clogged.	Flush air breather hole in fuel tank cap and clean surrounding area.
4	Clogged fuel filter element	• Check used hours of fuel filter. If used beyond specified hours, fuel filter element may be clogged.	Replace fuel filter element.
5	Foreign material in fuel	• Rust and water are found in fuel drained from fuel tank.	Replace fuel.
6	Air in fuel piping system	• Air is bled during air bleeding of fuel system. (Reference: See Testing and adjusting, "Bleeding air from fuel system".)	Perform air bleeding. Repair or replace fuel piping.
7	Leakage from fuel piping system	• Fuel leaks from fuel piping. (Reference: See Testing and adjusting, "Checking fuel circuit for leakage".)	Repair or replace fuel piping related parts.
8	Fuel leakage from injector and inlet connector	• Injector return rate is excessive. (Reference: See Testing and adjusting, "Measuring fuel delivery, return and leakage".)	Tighten or replace inlet connector.
9	Defective priming pump	• No resistance is felt or large effort is required when operating priming pump.	Replace priming pump.
10	Clogged air cleaner element	• Air cleaner dust indicator indicates that dust is at caution level.	Check and clean air cleaner element.
11	Defective intake air heater	• When preheating works, intake air heater mounting area does not become hot. • When preheating works or when temperature is low, preheating monitor does not indicate properly.	Replace intake air heater.
12	Worn valve or rocker arm, etc.	• Check valve clearance. (Reference: See Testing and adjusting, "Testing and adjusting valve clearance".) • When engine is cranked, unusual noise is heard from around cylinder head.	Replace valve or rocker arm.
13	Defective piston ring	• Measuring compression pressure (Reference: See Testing and adjusting, "Testing compression pressure".)	Replace piston ring or piston.
14	Defective injector (clogged injector or defective fuel spray)	• When engine is run in cylinder cutout mode with some cylinder cut out, engine speed does not change. (Reference: See Testing and adjusting, "Handling cylinder cutout mode operation".)	Replace injector.
15	Defective engine controller	Since this is an internal defect, troubleshooting cannot be performed.	Replace engine controller.

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	• If a failure code is displayed, perform troubleshooting for it first.

No.	Cause	Check item and remarks	Remedy
1	Defective injector	• 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)	• Check injector and O-ring.	Replace injector and O-ring.
3	Defective sealing between injector and injection pipe, and cracked injection pipe	• Check sealing between injector and injection pipe, and injection pipe.	Repair or replace.
4	Defective supply pump	• Replace supply pump and see if fuel stops entering.	Replace supply pump.

Primer

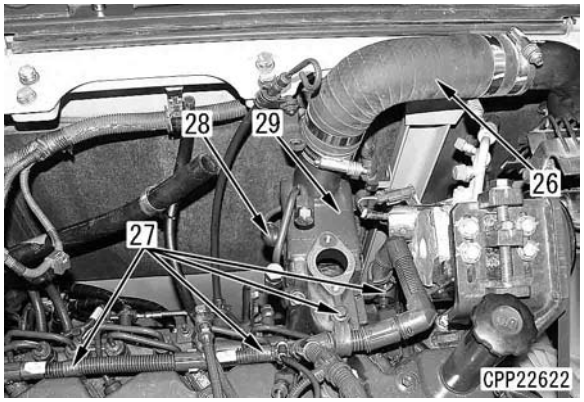
Komatsu code	Part No.	Capacity	Container	Main features and applications	
Loctite 712	428-99-80080	100 mℓ	Glass container	• Use to accelerate hardening of instantaneous adhesive.	
Sunstar Paint Primer 580 Super	417-926-3910	20 mℓ	Glass container	For adhering cab glass	• Use as primer for painted cab sheet metal surface. (Effective period: 4 months after manufacture)
Sunstar Glass Primer 580 Super		20 mℓ	Glass container		• Use as primer for cab glass surface. (Effective period: 4 months after manufacture)
Sunstar Paint Primer 435-95	22M-54-27230	20 mℓ	Glass container		• Use as primer for painted cab sheet metal surface. (Effective period: 4 months after manufacture)
Sunstar Glass Primer 435-41	22M-54-27240	150 mℓ	Steel can		• Use as primer for black ceramic-coated glass surface and for hard polycarbonate-coated surface. (Effective period: 4 months after manufacture)
Sunstar Sash Primer GP-402	22M-54-27250	20 mℓ	Glass container		• Use as primer for sash (Almite) (Effective period: 4 months after manufacture)

Adhesive

Komatsu code	Part No.	Capacity	Container	Main features and applications	
Sunstar Penguin Seal 580 Super "S" or "W"	417-926-3910	320 mℓ	Polyethylene container	For adhering cab glass	• Use "S" in high temperature season and "W" in low temperature season as adhesive for glass. (Effective period: 4 months after manufacture)
Sika Japan, Sikaflex 256HV	20Y-54-39850	310 mℓ	Polyethylene container		• Use as adhesive for glass. (Effective period: 6 months after manufacture)
Sunstar Penguin Super 560	22M-54-27210	320 mℓ	Ecocart (Special container)		• Use as adhesive for glass. (Effective period: 6 months after manufacture)

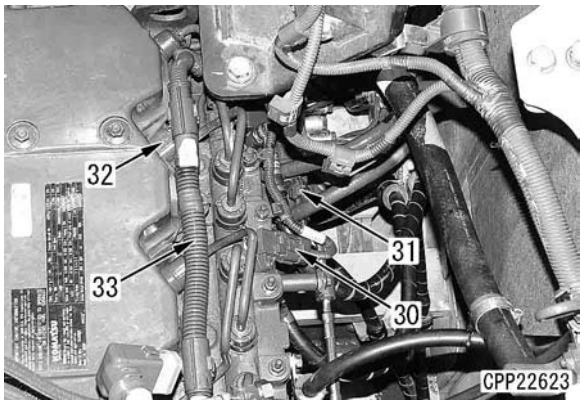
Caulking material

Komatsu code	Part No.	Capacity	Container	Main features and applications	
Sunstar Penguin Seal No.2505	417-926-3920	320 mℓ	Polyethylene container	For adhering cab glass	• Use to seal joints of glass parts. (Effective period: 4 months after manufacture)
Sekisui Silicone Sealant	20Y-54-55130	333 mℓ	Polyethylene container		• Use to seal front window. (Effective period: 6 months after manufacture)
GE Toshiba Silicones TOSSEAL 381	22M-54-27220	333 mℓ	Cartridge		• Use to seal glass-to-glass joint. Translucent white seal. (Effective period: 12 months after manufacture)

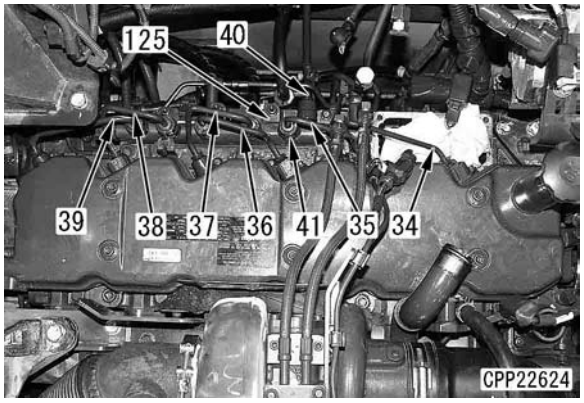


21. Disconnect wiring harness connectors (30), (31), and (32).

★ After the disconnection, move wiring harness (33) toward the counterweight.



22. Remove 14 fuel spray prevention caps (41) of high-pressure pipes (34) to (40).
23. Remove high-pressure pipes (34) to (39).
24. Remove the clamp, then remove high-pressure pipe (40).
25. Loosen the mounting bolts of common rail (125).

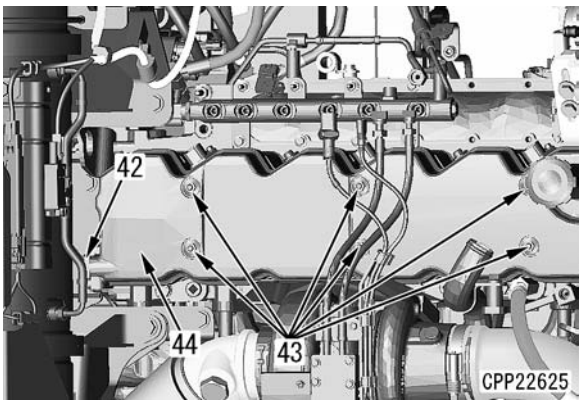


26. Remove blowby duct (42).

★ When removing blowby duct (42), take care that the O-ring will not fall from it.

★ Since the O-ring is fitted to the flywheel housing side of blowby duct (42), it may be removed together with cylinder head cover (44).

27. Remove six nuts (43), then remove head cover (44).



28. Remove nuts (45) for the wiring harnesses from the injector assembly.

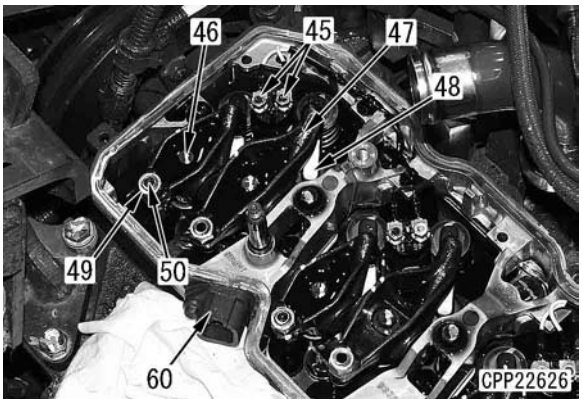
Wiring harness color	Cylinder No.
White	1, 3, 5
Black	2, 4, 6

★ Do not remove injector wiring harness connector (60) from the rocker housing unless needed.

29. Remove 12 bolts (46), then remove rocker arm assembly (47), crosshead (48), and the rocker arm support.

★ Loosen lock nuts (49) and then loosen adjustment screws (50) a few turns each to prevent excessive forces from working on the push rods when the rocker arms are installed.

★ Record the installed position and direction (shapes of holes (a) and (b)) of each crosshead. (This is necessary to reinstall them in the original directions.)



★ Installed positions of wiring harnesses

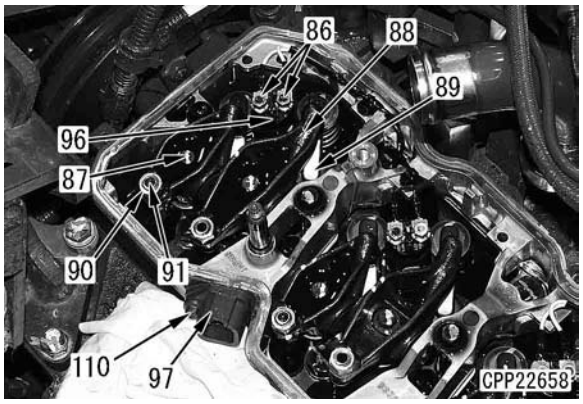
Wiring harness color	Cylinder No.
White	1, 3, 5
Black	2, 4, 6

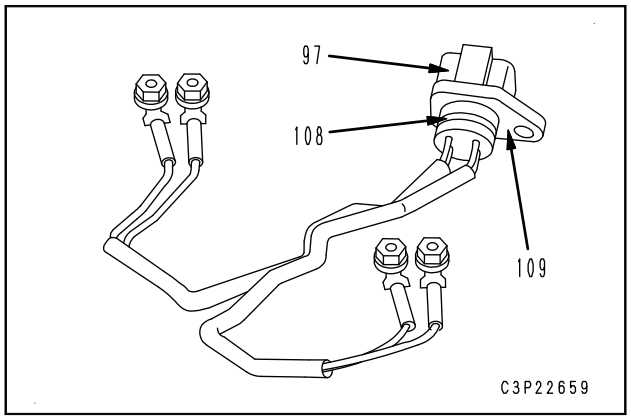
Mounting nut:
1.5 ± 0.25 Nm {0.15 ± 0.03 kgm}

★ If injector wiring harness connector (97) is removed, apply liquid gasket to O-ring (108) and flange (109) of the connector.
Apply a bead of liquid gasket, ϕ3 mm in diameter to the O-ring so that the ring groove is completely covered.
If the O-ring is damaged, replace it and the wiring harness assembly as a unit.

O-ring and flange face of connector:
Liquid gasket (LG-7)

Connector flange mounting bolt (110):
10 ± 2 Nm {1 ± 0.2 kgm}





6. Head cover
   1) Install the gasket and then install head cover (85) with mounting nuts (84).

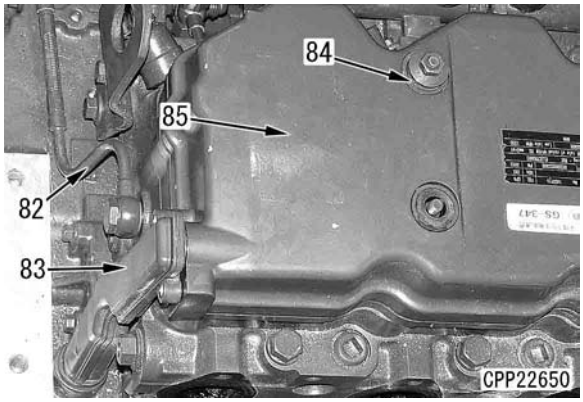
Mounting nut:
24 ± 4 Nm {2.45 ± 0.41 kgm}

2) Install blowby duct (83).

Mounting bolt:
7 ± 2 Nm {0.7 ± 0.2 kgm}

3) Install spill tube (82).

Joint bolt:
24 ± 4 Nm {2.45 ± 0.41 kgm}



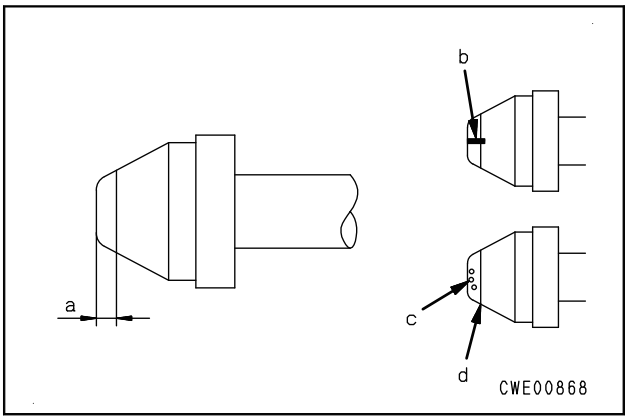
7. High-pressure pipe

⚠ Do not use high-pressure pipes with bending modification.

⚠ Be sure to use the genuine high-pressure pipe fixing clamp and observe the tightening torque.

⚠ Install each high-pressure pipe and wiring harness at least 10 mm apart from each other.

★ A high-pressure pipe may cause fuel leakage if visible lengthwise slits (**b**) or spots (**c**) are found at the joint's taper seal at part (**a**) (within 2 mm from the end), or the stepped wear at part (**d**) (2 mm from the end of taper seal) is as severe as it can be felt with a fingernail. If there is any of those defects, replace the high-pressure pipe.



1) Tighten common rail (125) and high pressure pipes (34) to (39) lightly.

Removal and installation of engine and main pump assembly *(PC220-R400-924-K-00-A)*

★ Special tools

Symbol		Part No.	Part Name	Necessity	Q'ty
A	9	796T-401-1110	Plate	●	1
	10	795-799-9300	Lifting tool	●	1
	12	Commercially available	Long socket (7/16 in)	●	1
R	1	796-460-1210	Oil stopper	●	1
	2	796-770-1320	Adapter	●	1

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

⚠ **Set the lock lever in the LOCK position.**

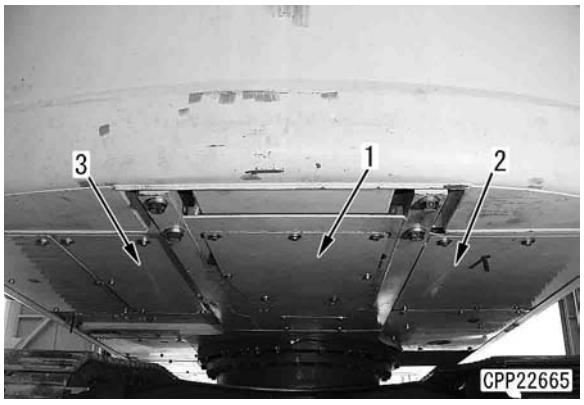
⚠ **Release the remaining pressure in the hydraulic circuit. For details, see Testing and adjusting, referring to "Releasing remaining pressure from hydraulic circuit".**

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

★ Attach tags to the hoses to indicate their installed positions to prevent any mistake when installing.

Removal *(PC200_10-R400-520-K-00-A)*

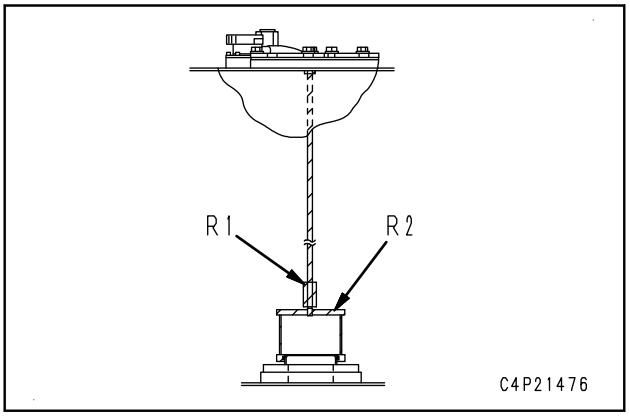
1. Remove undercovers (1), (2), and (3).



2. Remove the strainer of the hydraulic tank and stop oil from flowing by using tools R1 and R2.

★ If you do not use tools R1 and R2, remove the drain plug to drain oil from the hydraulic tank and piping.

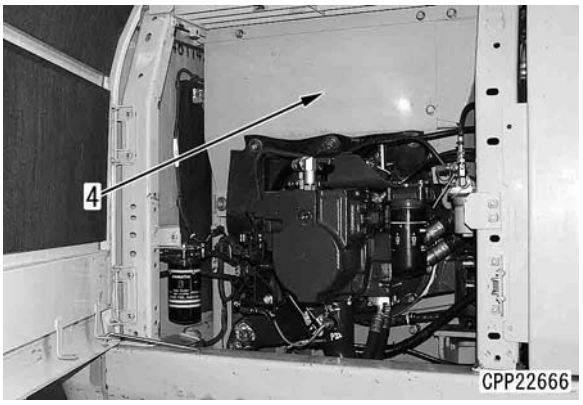
Hydraulic tank:
132 ℓ



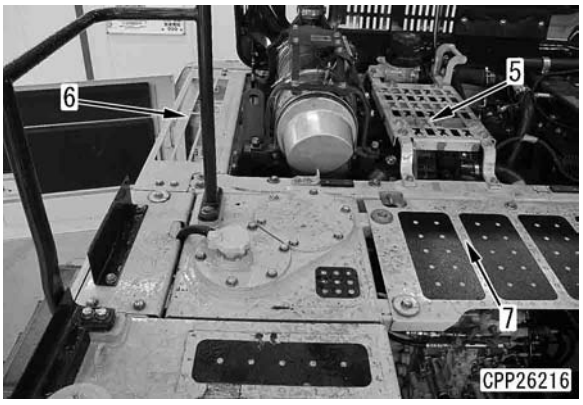
3. Drain the coolant through drain valve. (Drain hose: inside diameter ϕ7 mm)

Coolant:
30.7 ℓ

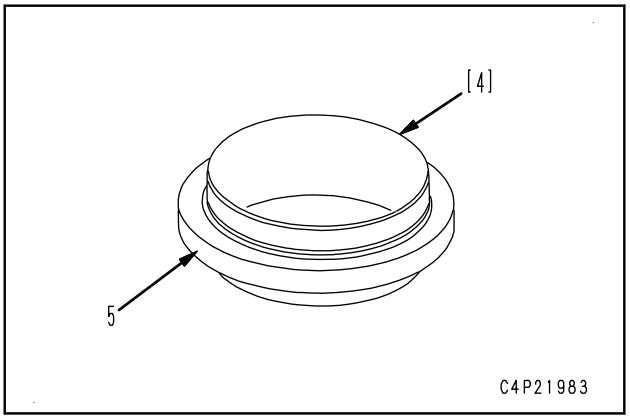
4. Open the R.H. side cover of the machine and remove rubber-lined cover (4).



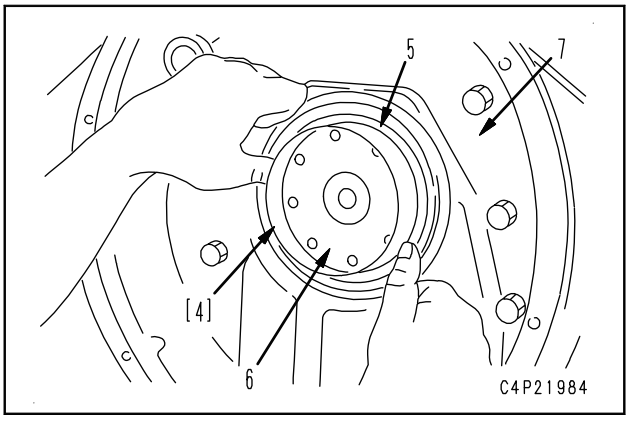
5. Remove engine hood assembly. For details, see "Removal and installation of engine hood assembly".
6. Remove step (5) and covers (6), (7) and (8).



★ Before installing the engine rear oil seal, degrease, clean and dry the crankshaft sealing face and the seal lip face to prevent oil leakage.



2. Install pilot [4] to crankshaft (6) and push engine rear oil seal (5) into flywheel housing (7).
3. Push in engine rear oil seal (5) further and then pull out pilot [4].

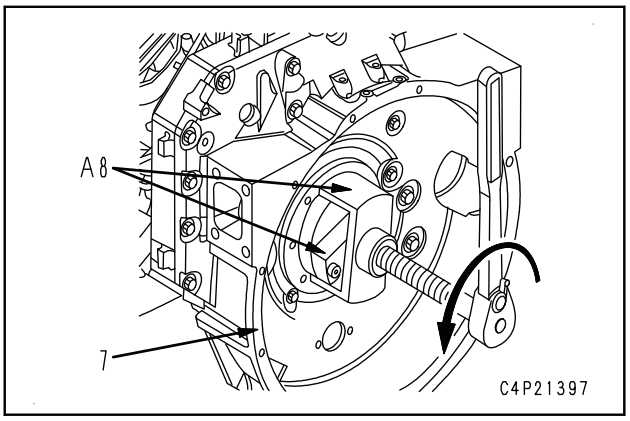


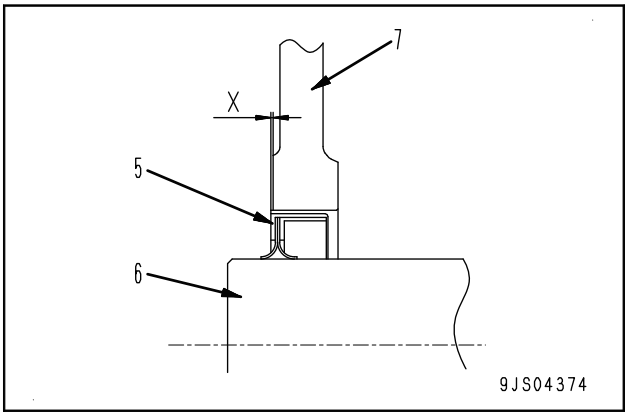
4. Use tool A8 to install engine rear oil seal (5) to the proper depth in flywheel housing (7).

★ Push in engine rear oil seal (5) with care not to bend it.

★ Extrusion of engine rear oil seal (5) from flywheel housing (7)

X: Max. 0.38 mm



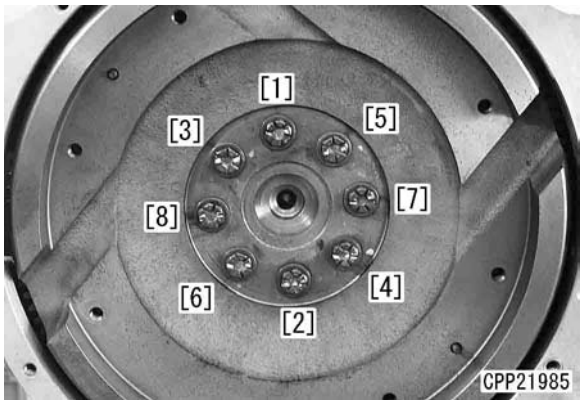


Perform the following installation in the reverse order to removal.

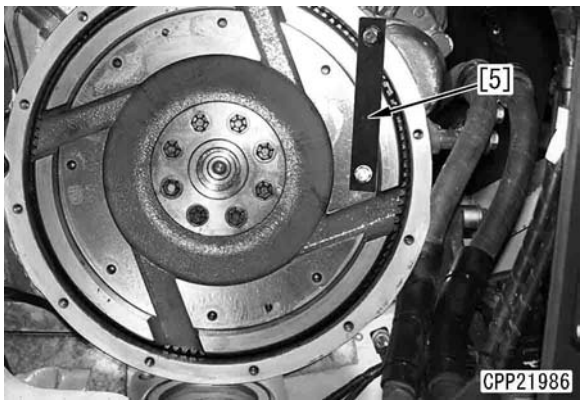
[*1]

★ Tighten the eight flywheel assembly mounting bolts in the order shown in the figure.

Flywheel assembly mounting bolt:
137 ± 7 Nm {13.97 ± 0.71 kgm}



★ Use plate [5] to prevent the flywheel assembly from rotating when tightening the bolts.



[*2]

- Measuring radial runout

★ Radial runout: Max. 0.13 mm

1. Install dial gauge [6] on the stand, and set the stand on flywheel housing (7).

Disassembly and assembly of KDPF *(PC220-A9H0-926-K-00-A)*

★ Special tools

Symbol		Part No.	Part Name	Necessity	Q'ty
A	1-1	Commercially available	Long socket (1/2 in)	●	1
	1-2	Commercially available	Long socket (7/16 in)	●	1

⚠ Since the temperature of KDPF or KDOC becomes 500 °C or higher, take care not to get burn injury.

⚠ Stop the engine and wait until the temperature of piping around engine drops, then remove KDPF.

⚠ When cleaning, replacing or disposing KDPF and KCSF, use dust mask during the work to prevent inhaling deposited soot, ash, mat material or metallic powder inside KDPF.

⚠ Install KCSF with care to the mounting direction.

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

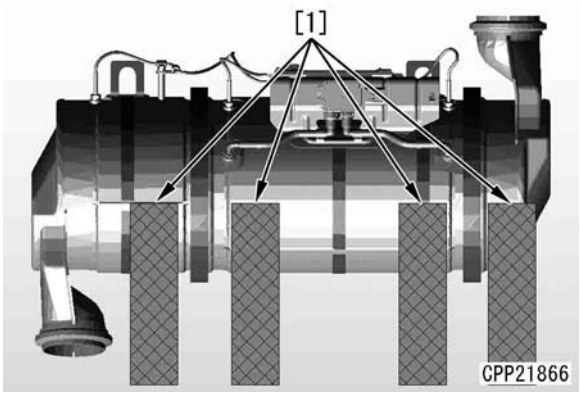
⚠ Keep the record for each KDPF unit to monitor the life, and never use the KDPF exceeded its life.

★ V-clamp and band used in KDPF is made of stainless steel, accordingly never use air tool for removal and installation of nut to avoid damage on the thread part.

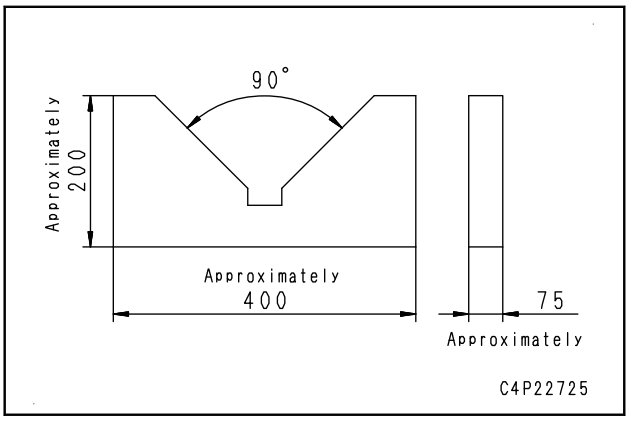
★ Prepare new gaskets or bands when removing them.

Disassembly *(PC220-A9H0-530-K-00-A)*

1. Secure the KDPF assembly at 4 places to support its inlet body and filter assembly by using block [1].



★ Prepare block [1] referring to the figure below, and use it with wooden plate to float the inlet side flange from the ground.

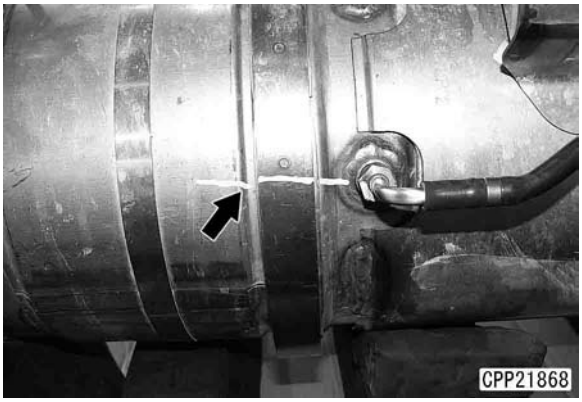


2. Put a match mark on the assembly for correct alignment of inlet and outlet angles at reassembly.

★ Put a marking on the V-clamp, inlet body and outlet body in alignment with the KDPF filter and mounting portion of the differential pressure sensor pipe.

★ The angle can be adjusted at the installation of the KDPF assembly, slight misalignment of marking is allowed.

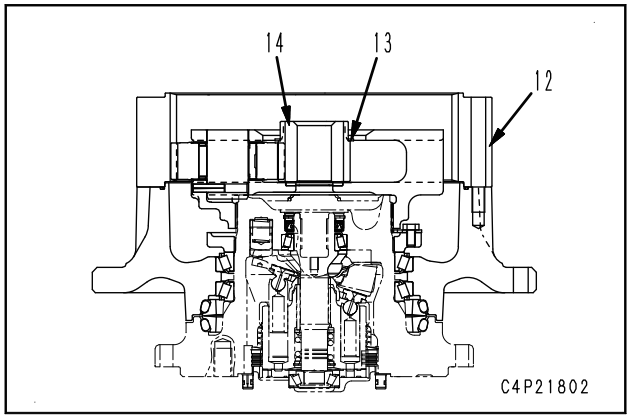
- Inlet side



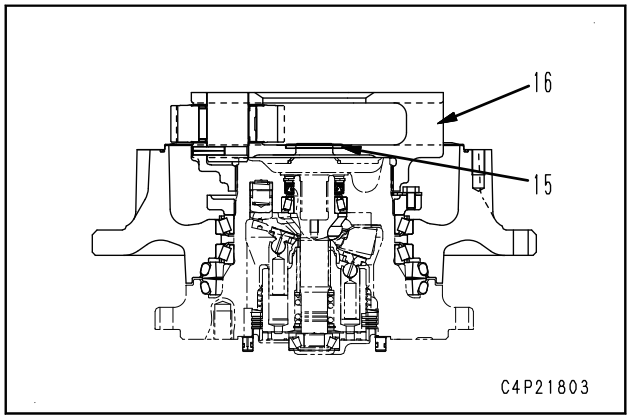
- Outlet side

Ring gear:
45 kg

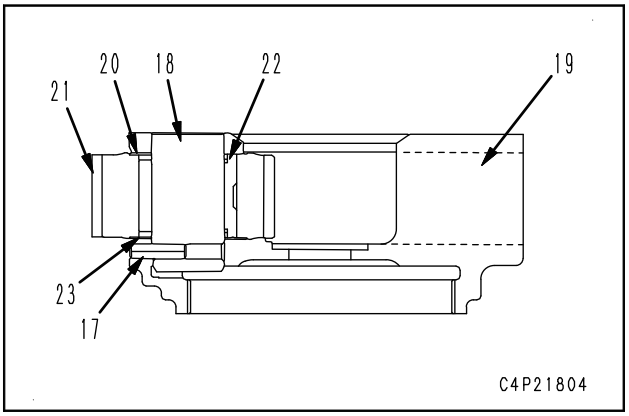
7. Thrust washer
   Remove thrust washer (13).
8. No. 2 sun gear
   Remove No. 2 sun gear (14).



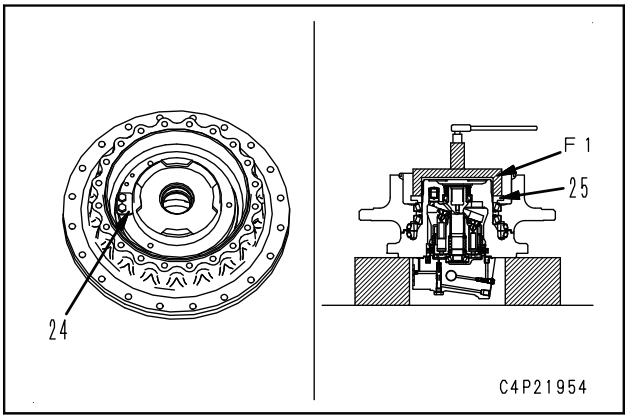
9. Thrust washer
   Remove thrust washer (15).
10. No. 2 planetary carrier assembly
    1) Remove No. 2 planetary carrier assembly (16).



    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).

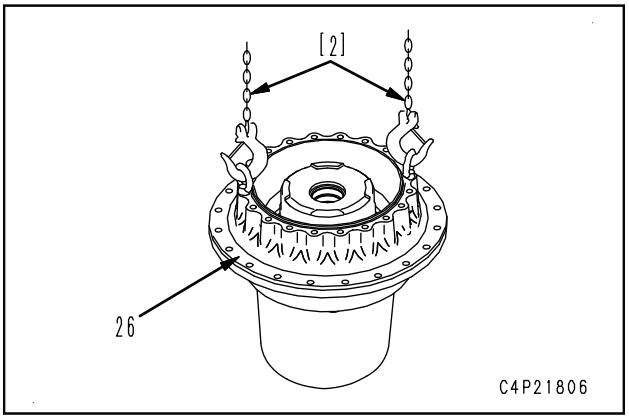


11. Ring nut
    1) Remove lock plate (24).
    2) By using tool F1, remove ring nut (25).



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

Hub assembly:
80 kg



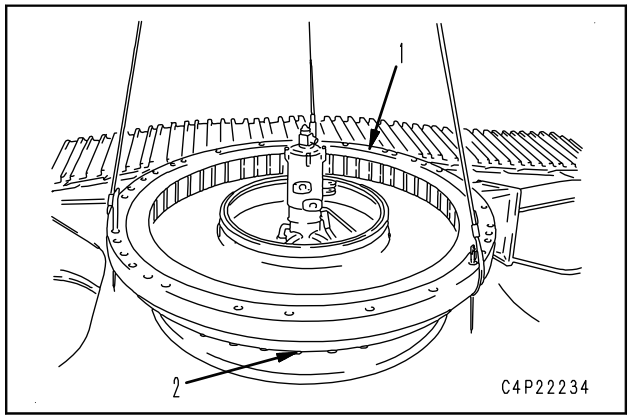
    2) Remove bearing (27).

Removal and installation of swing circle assembly *(PC220-J110-924-K-00-A)*

Removal *(PC220-J110-520-K-00-A)*

1. Remove the revolving frame assembly referring to the section “Removal and installation of revolving frame assembly“.
2. Remove swing circle assembly mounting bolts (2) and sling swing circle assembly (1). **[*1]**
   ★ Leaving one mounting bolt each in the front and rear, sling swing circle assembly (1) by 3-point lifting method.
3. Remove the remaining mounting bolts to remove swing circle assembly (1).

Swing circle assembly (1):
295 kg



Installation *(PC220-J110-720-K-00-A)*

Perform installation in the reverse order to removal.

[*1]

★ Position the soft zone position S mark of an inner race: (a) and the soft zone position S mark of an outer race: (b) in the R.H. side of the machine as shown below and install it on the track frame.

Amount of grease filled in grease bath:
Grease (G2-LI) 15.8 ℓ

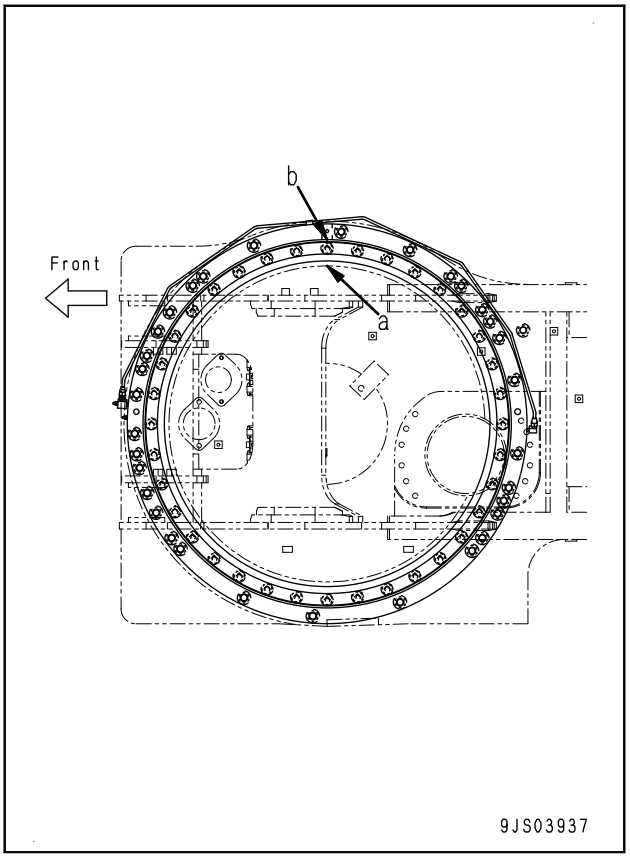
Swing circle mounting bolt threaded portion:
Adhesive (LT-2)

- In case of angle tightening:

  Swing circle mounting bolt:
  1. **Initial torque: 294.2 ± 29.4 Nm {30 ± 3 kgm}**
  2. **Then tighten the bolt by 60 ± 6 deg.**

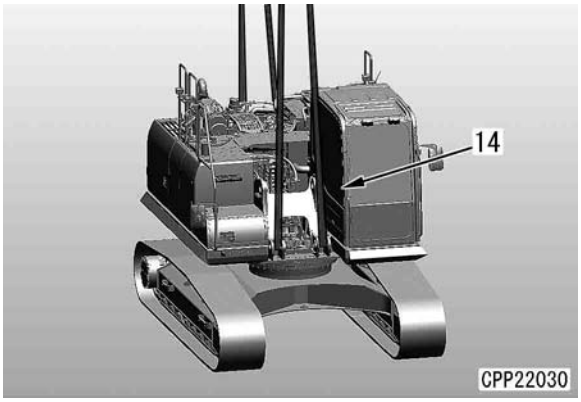
- In case of torque tightening:

  Swing circle mounting bolt:
  716 to 814 Nm {73 to 83 kgm}



★ Lift revolving frame assembly (14) slowly, taking care not to let it hit against center swivel joint assembly (5).

Revolving frame assembly (14):
6,500 kg



Installation *(PC220-H110-720-K-00-A)*

Perform installation in the reverse order to removal.

[*1]

Hoses are connected to the following places.

- Hose (6): Swing motor port (T)
- Hose (7): Travel speed increase solenoid valve
- Hose (8): Control valve port (B2)
- Hose (9): Control valve port (B5)
- Hose (10): Control valve port (A2)
- Hose (11): Control valve port (A5)

[*2]

Swivel circle mating surface:
Liquid gasket (LG-6)

Threads of revolving frame mounting bolt:
Adhesive (LT-2)

- In case of torque tightening

  Revolving frame assembly mounting bolt:
  716 to 814 Nm {73 to 83 kgm}

- In case of angle tightening

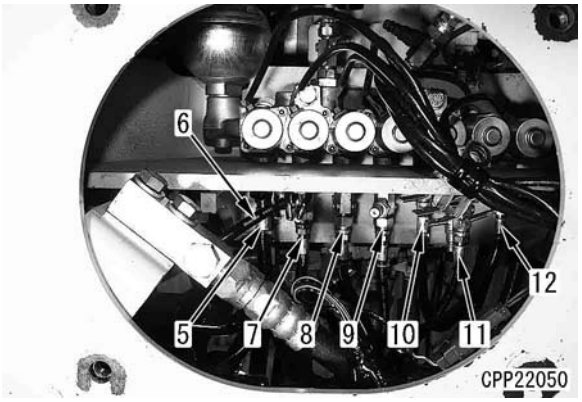
  1st time:
  294.2 ± 29.4 Nm {30 ± 3 kgm}

  2nd time:
  60 ± 6 deg.

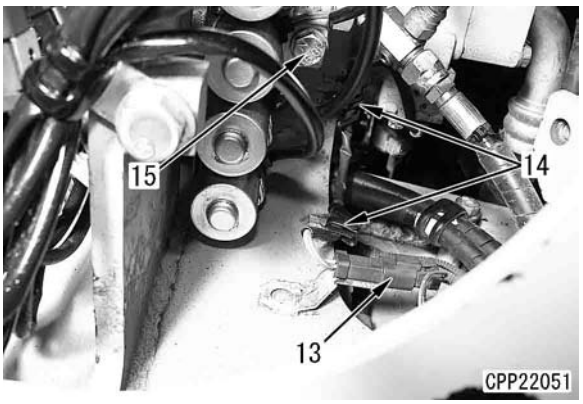
- Refilling of oil (hydraulic tank)
  Supply oil through the oil filler port to the specified level. Run the engine to circulate the oil through the system. Then, check the oil level again.
- Bleeding air
  Bleed air from the hydraulic pump circuit. For details, see Testing and adjusting, "Bleeding air from hydraulic circuit".

★ The hose bands are colored as follows:

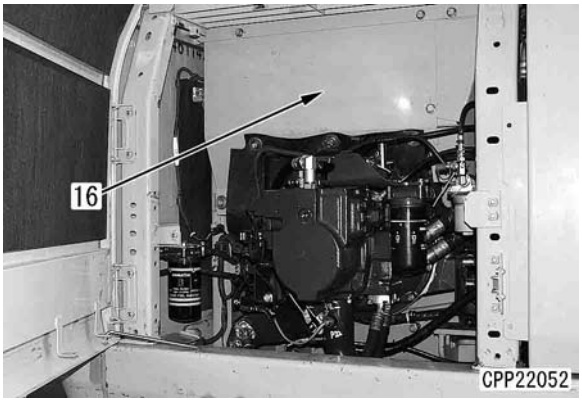
- Hose (5): Red (to PPC valve)
- Hose (6): Without band (to control valve)
- Hose (7): Without band (to control valve)
- Hose (8): Blue (to swing motor)
- Hose (9): Red and yellow (to travel motor)
- Hose (10): Brown (to control valve)
- Hose (11): White (to swing motor)
- Hose (12): Green (to attachment circuit selector solenoid valve) (for machines equipped with attachment)



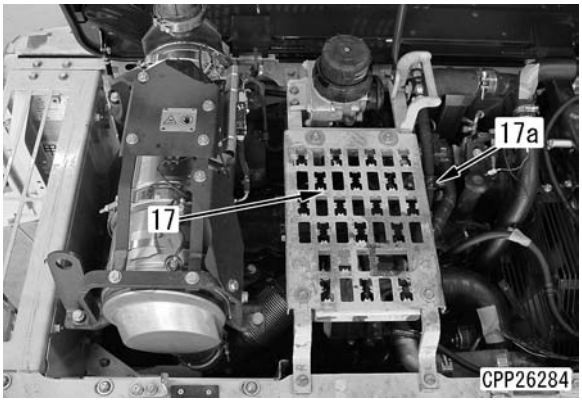
6. Disconnect connector (13) and detach the harness from two clamps (14).
   - Connector (13): Variable back pressure EPC valve (V25)
7. Remove two solenoid valve mounting bolts (15).
   ★ Move the solenoid valve aside to allow removing the mounting bolts of the control valve.

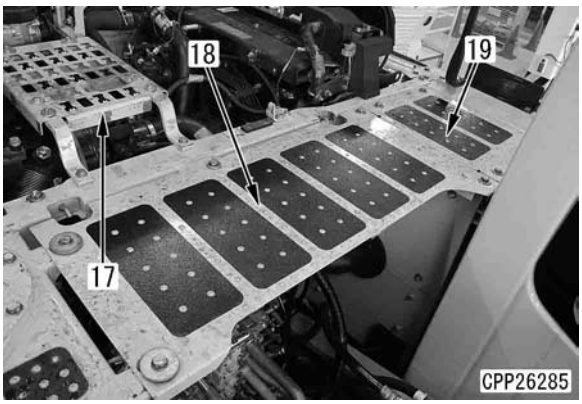


8. Open the right side cover and remove rubber-lined cover (16) (five bolts).

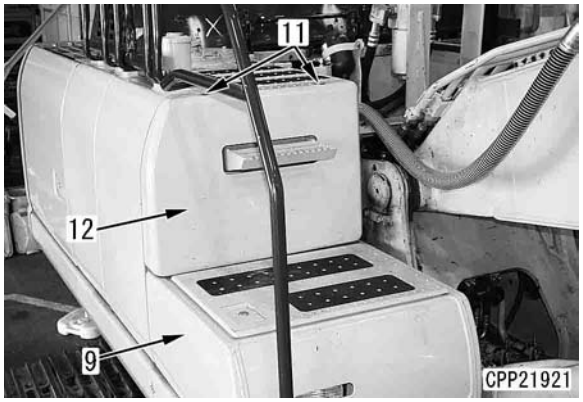


9. Open the engine hood, remove mounting bolt of KCCV hose clamp (17a), and remove step (17) (four bolts), covers (18) (five bolts), and (19) (four bolts).
   ★ If the machine is equipped with a return oil filter and accumulator, remove them referring to Step 4 of “Removal and installation of swing motor and swing machinery assembly“. (for machines equipped with attachment)

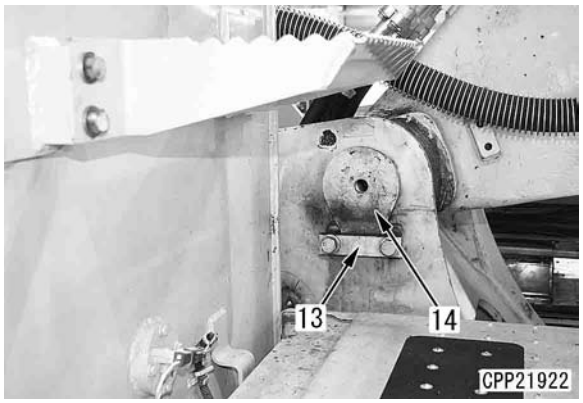




10. Remove three mounting bolts (21) of cover (20) and five mounting bolts (24) of cover (22).
    ★ Each of covers (20) and (22) can be removed as it is without separating it into the upper and lower halves.
    ★ Remove covers (20) and (22) after removing frame (25).
11. Remove eight mounting bolts (25a) of frame (25).



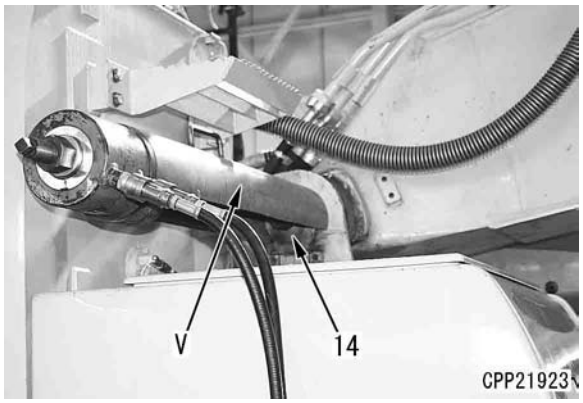
11.Sling the work equipment assembly, remove plate (13) and boom foot pin (14). **[*2]**



- Removal by using tool V
  Remove plate (13) and remove boom foot pin (14) by using tool V.

★ Shims are installed, so note their quantity and thickness.

Boom foot pin:
55 kg



12.Remove work equipment assembly (15).

Work equipment assembly:
4,500 kg

Installation *(PC220-L410-720-K-00-A)*

Perform installation in the reverse order to removal.

[*1]

Inner surface of bushing when installing pin:
Molybdenum disulphide lubricant (LM-P)

Pin after installed in position:
Grease (LM-G)

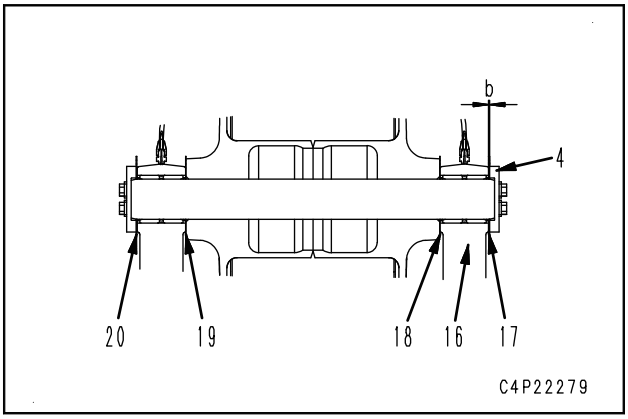
⚠ When aligning the pin holes, never insert your fingers in them.

★ Adjust clearance (b) between cylinder rod (16) and plate (4) to 1.5 mm or less by using shims.

★ Install one shim or more on each end face.

★ Shim thickness (resin shim)

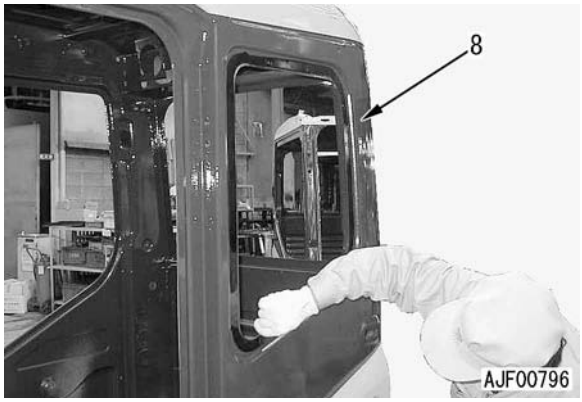
- Shim (17): adjust by combining 1.0 mm and 2.0 mm shims
- Shim (18): 1.0 mm
- Shim (19): 1.0 mm
- Shim (20): 1.0 mm



[*2]

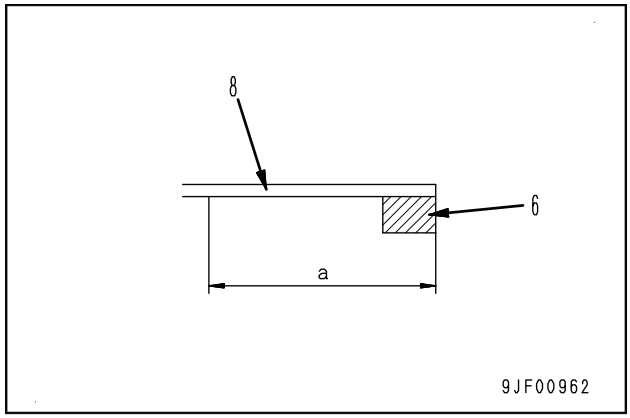
Inner surface of bushing when installing pin:
Molybdenum disulphide lubricant (LM-P)

Pin after installed in position:
Grease (LM-G)



★ Places to apply: Apply over the entire circumference with dimension (**a**).

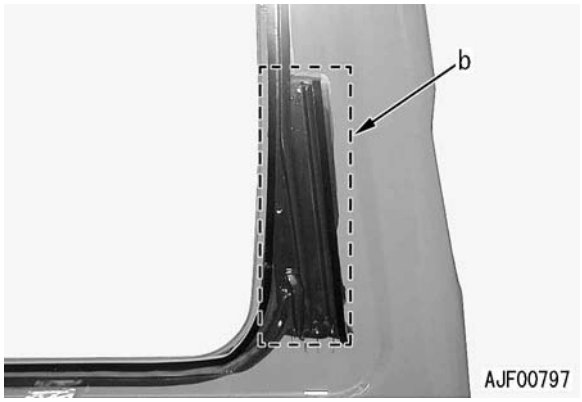
- Primer applying dimension (**a**): 30 mm

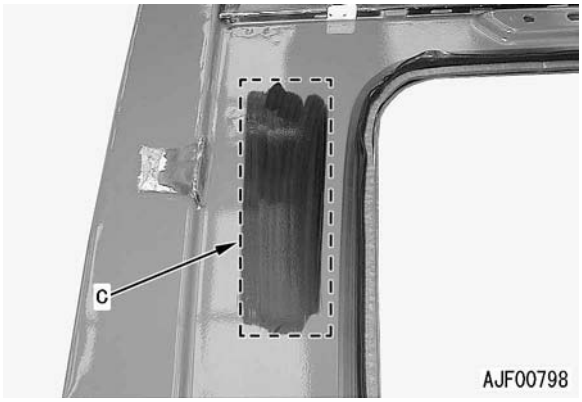


★ In addition to the above places, apply primer to right side window glass (1) and lower door glass (3).

- Area to apply additional primer for right side window glass (1): (**b**)
- Area to apply additional primer for lower door window glass (3): (**c**)

★ After applying the primer, leave it in air for at least five minutes (maximum eight hours) to dry.





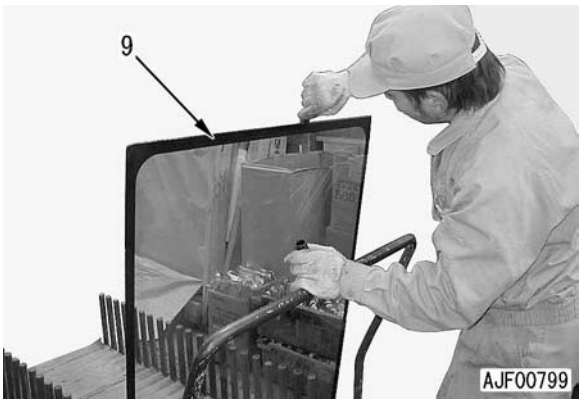
★ Never apply wrong primer. If the paint primer is applied by mistake, wipe it off with white gasoline. If glass primer, etc. is applied by mistake, wipe it off with white gasoline.

4) Evenly apply the glass primer to the adhesion surfaces of glass (9).

Primer for glass:

Sunstar Primer 453-41 for glass

★ Do not apply the primer more than two times. (Applying primer more than twice will degrade the performance.)



★ Places to apply: Apply the primer to adhesion surface (**d**) on window glass (9) along its circumference, which is determined by the installed position of dam rubber (6) and operator's cab (8).

- Primer applying dimension (**d**): 30 mm

★ Do not apply the primer to the boarder area of about 5 mm wide between the black portion and transparent portion of the glass.

★ After applying the primer, leave it in air for at least 5 minutes (maximum 8 hours) to dry.

★ Never apply wrong primer. If painted surface primer is applied by mistake, wipe it off with white gasoline.

★ 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]

★ When installing the air conditioner hoses and tubes, take care so that dust, dirt, or water does not enter them.

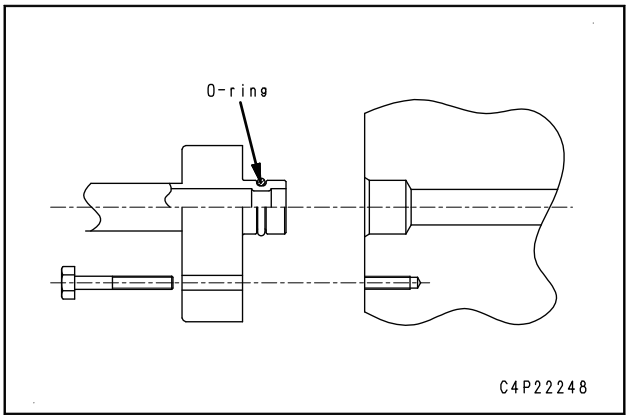
★ When connecting the air conditioner hoses and tubes, check that O-rings are fitted to their joints.

★ Do not reuse an O-ring since it is deformed and deteriorated once it is used.

★ When removing O-rings, use a soft tool to avoid damaging hoses and tubes.

★ Check that there is no defect or deterioration on the O-ring.

★ Apply compressor oil (Denso: ND-OIL8) for R134a refrigerant to O-rings.



Hose clamp (M6 bolt):
8 to 12 Nm {0.8 to 1.2 kgm}

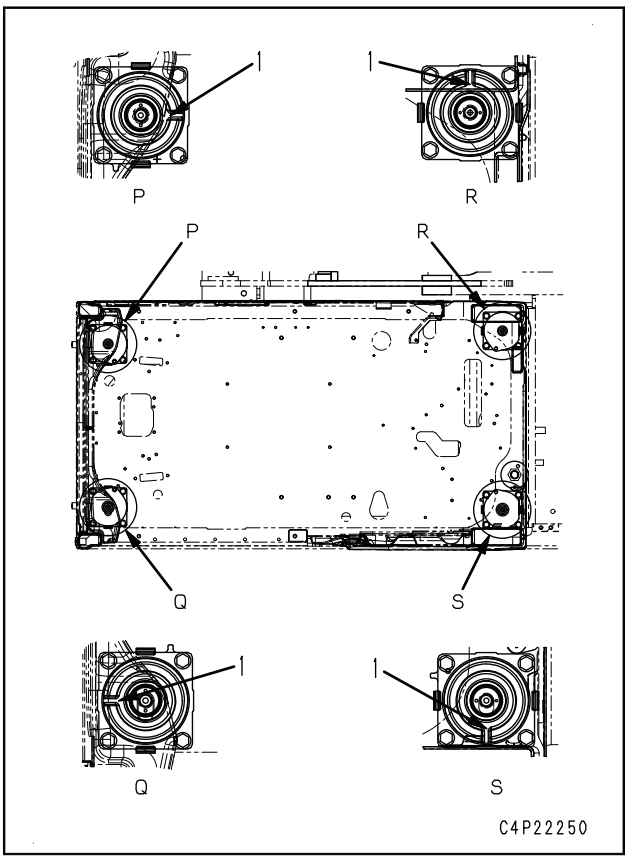
[*3]

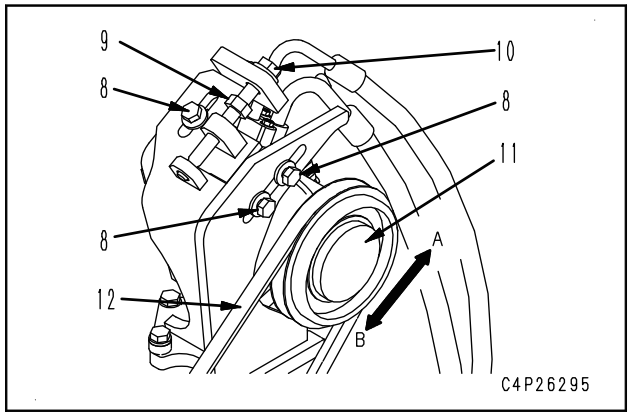
★ When installing the hoses of heater core, make white line (marking) of heater hoses straight to prevent kink of heater hoses.

Reference: Precautions for installing cab mount

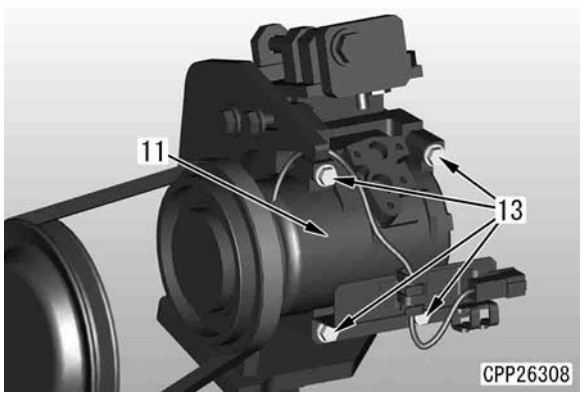
★ The type of damper differs by the installed position. Note the identification labels before removing them. (See Structure and Function,“Cab mount and cab tipping stopper“.)

★ Cab mounts must be installed with the mount rubber groove (1) oriented as shown in the figure. (Top view. Left side of figure is the front side of machine)





7. Remove four air conditioner compressor mounting bolts (13) and remove air conditioner compressor (11). **[*5]**



Installation *(PC200_10-K590-720-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".

[*2]

Reconnect the disconnected air tubes according to the following procedure.

★ Use new MIKALOR clamps.

1. Set the hose to the original (marked) position.
   ★ Reference
   Air hose fitting length:
   80 mm (both R.H. and L.H. sides)
2. With bridge (**BR**) set under the clamp bolt, tighten the bolt so that bridge (**BR**) laps over with the band by dimension (**b**) indicated below.
   Dimension (**b**): Min. 5 mm

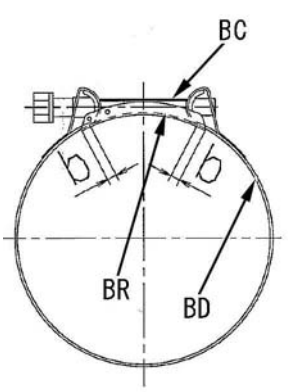
Clamp bolt thread portion (BC):
Lubricant (THREEBOND PANDO 18B)

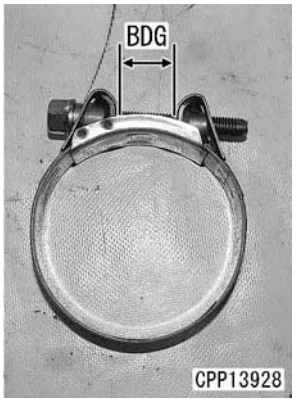
★ Impact wrench is not allowed to use.

- If hoses are to be reused
  Install the clamp to the clamp mark put on the hose.

Clamp bolt:
Min. 6 Nm {0.6 kgm}

- When using a new hose
  Tighten the clamp so that BDG dimension is as follows.
  BDG: 7 to 10 mm





[*3]

★ When installing air conditioner hoses and tubes, take care so that dust, dirt or water does not enter them.

★ When connecting the air conditioner hoses and tubes, check that O-rings are fitted to their joints.

★ Do not reuse an O-ring since it is deformed and deteriorated once it is used.

★ When removing O-rings, use a soft tool to avoid damaging hoses and tubes.

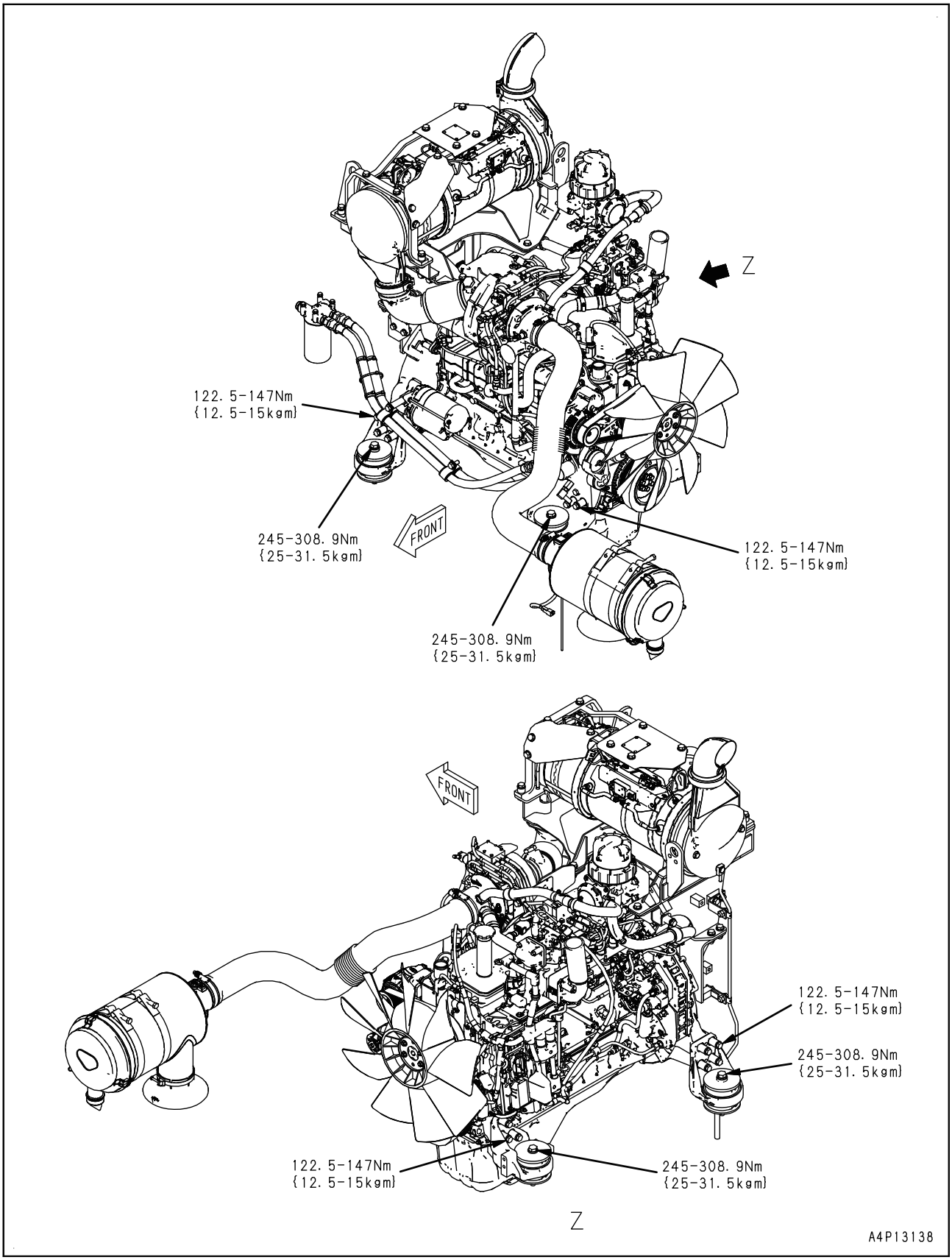
★ Check that there is no defect or deterioration on the O-ring.

★ Apply compressor oil (Denso: ND-OIL8) for R134a refrigerant to O-rings.

Hose clamp (M6 bolt):
8 to 12 Nm {0.8 to 1.2 kgm}

Engine and cooling system *(ALL-R401-001-K-00-A)*

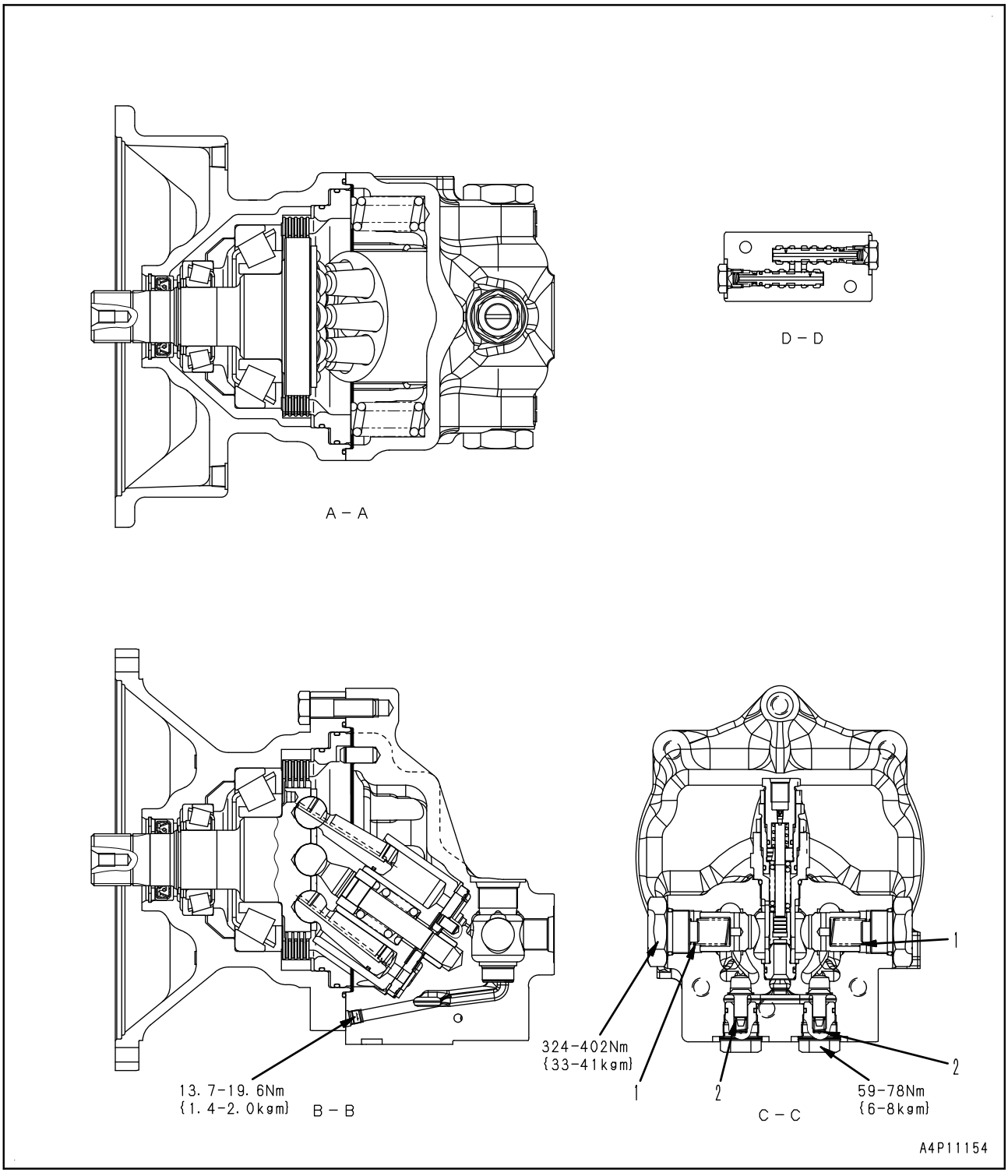
Engine mount *(PC200_10-H320-034-K-00-A)*



Unit:mm

No.	Item	Criteria				Remedy
21	Interference between bushing and link	Standard dimension	Tolerance		Standard interference	Adjust or replace
			Shaft	Hole		
		59	+0.434 +0.394	+0.074 0	0.320 to 0.434	
22	Interference between regular pin and link	38	+0.222 +0.162	–0.138 –0.200	0.300 to 0.422	
23	Clearance between regular pin and bushing	Standard dimension	Tolerance		Standard clearance	
			Shaft	Hole		
		38	+0.222 +0.162	+0.902 +0.402	0.180 to 0.740	
(*1) 24	Interference between master pin and link	Standard dimension	Tolerance		Standard interference	
			Shaft	Hole		
		37.8	+0.280 +0.250	+0.062 0	0.188 to 0.280	
(*1) 25	Clearance between master pin and bushing	Standard dimension	Tolerance		Standard clearance	
			Shaft	Hole		
		38	–0.150 –0.350	+0.902 +0.402	0.552 to 1.252	

*1: For the dry type track

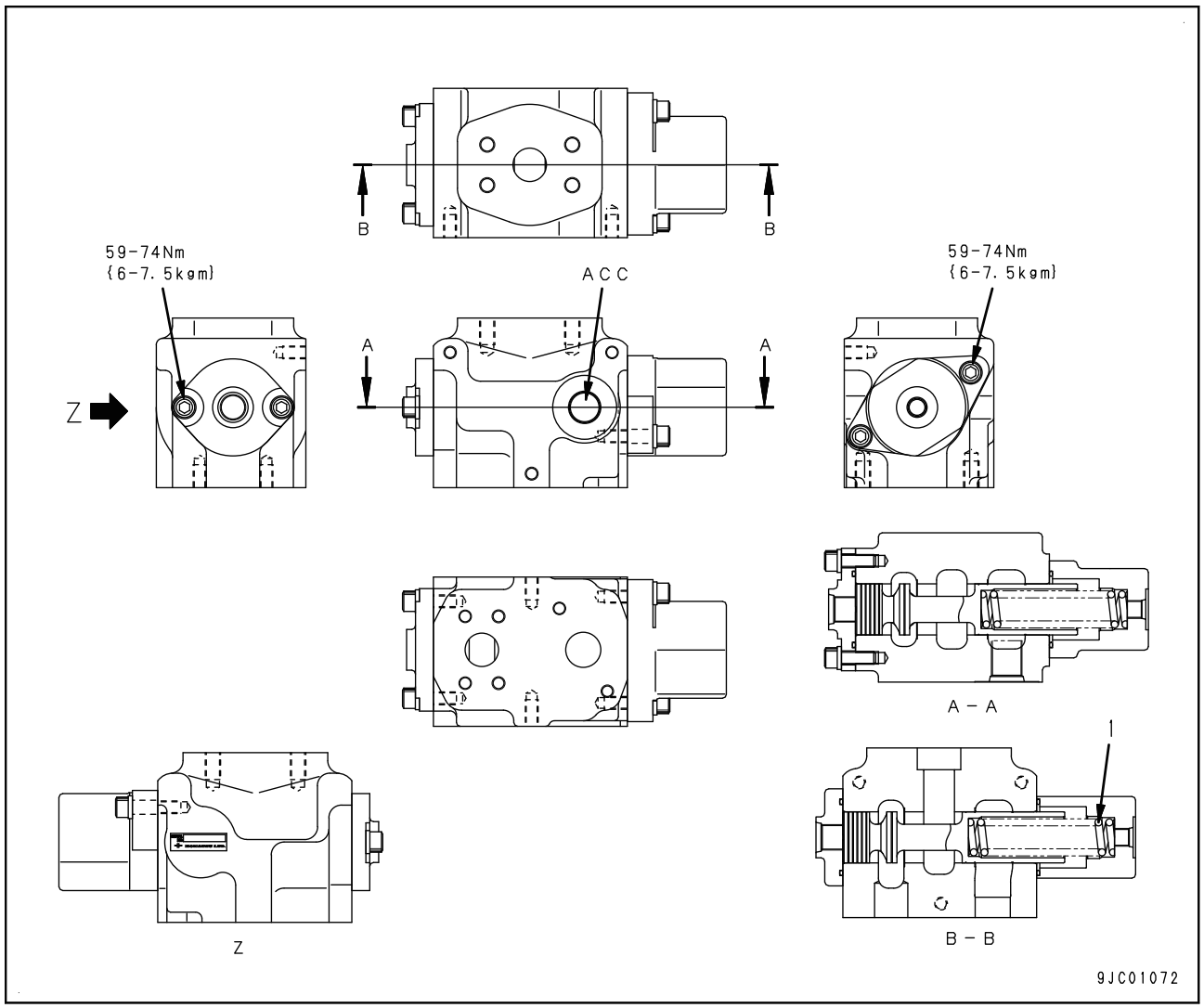


Unit: mm

No.	Item	Criteria					Remedy
		Standard dimension			Repair limit		
1	Check valve spring	Free length x Outside diameter	Installed length	Load at installed length	Free length	Load at installed length	If damaged or deformed, replace spring
		57.2 x 20	30.9	3.43 N {0.35 kg}	—	2.75 N {0.28 kg}	
2	Shuttle valve spring	16.4 x 8.9	11.5	13.7 N {1.4 kg}	—	11.0 N {1.12 kg}	

Attachment circuit selector valve (for low-pressure circuit) *(PC-PQJ3-034-K-00-A)*

(if equipped)



Unit mm

No.	Item	Criteria					Remedy
		Standard dimension			Repair limit		
1	Spool return spring	Free length x Outside diameter	Installed length	Load at installed length	Free length	Load at installed length	If damaged or deformed, replace spring
		132 x 29	114.5	834 N {85.0 kg}	—	667 N {68.0 kg}	

Air conditioner components *(ALL-K500-001-K-02-A)*

Precautions for refrigerant *(ALL-K512-012-K-00-A)*

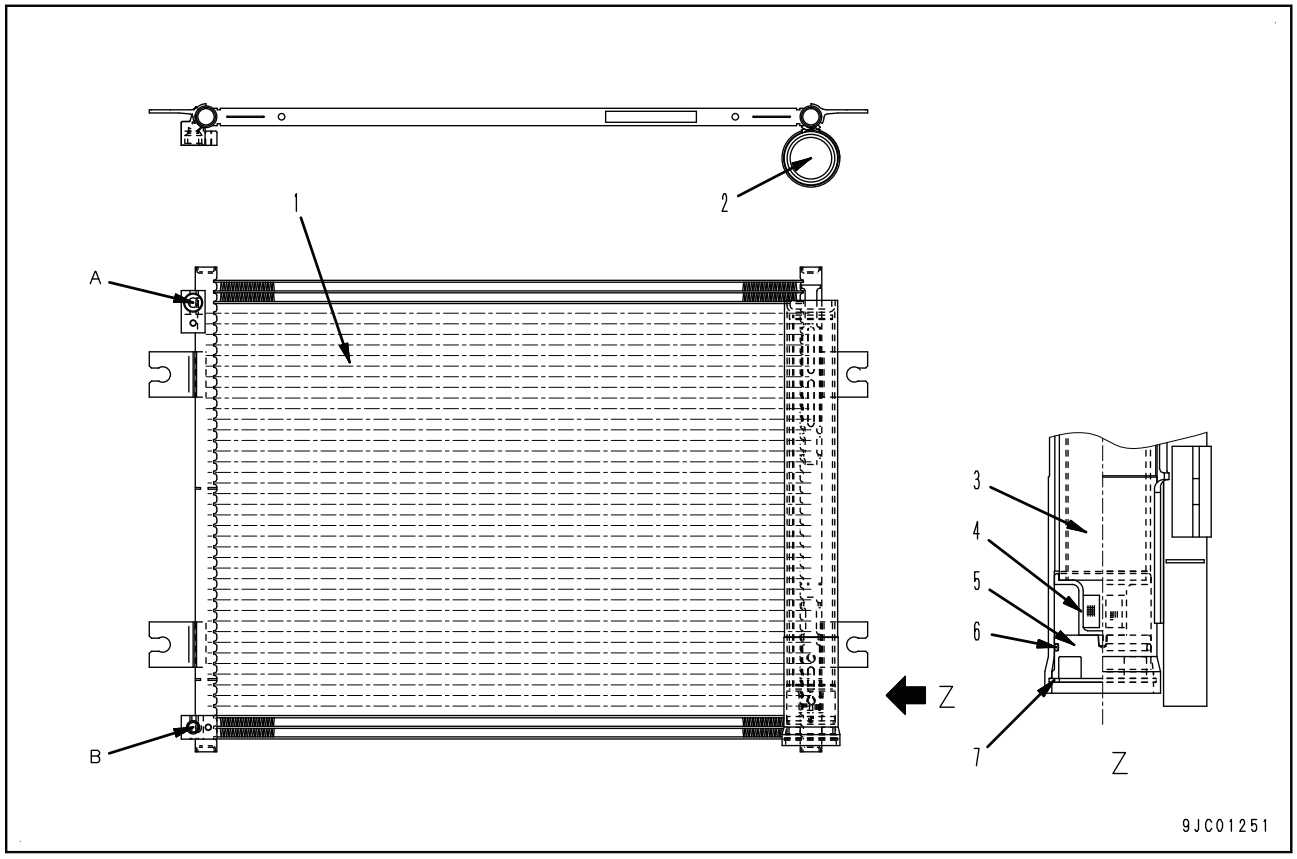
⚠ **Collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit before disconnecting the air conditioner hoses to replace the air conditioner unit or condenser, the air conditioner compressor, receiver drier, etc.**

★ Ask a qualified person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a). (Only registered person can work.)

★ Never release the refrigerant (R134a) to the atmosphere.

⚠ **If refrigerant gas (R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Put on protective eyeglasses, gloves and working clothes with long sleeves while collecting the refrigerant or filling the air conditioner circuit with the refrigerant.**

Air conditioner condenser *(ALL-K580-041-K-00-A)*



A: Refrigerant inlet (from compressor)

B: Refrigerant outlet (to air conditioner unit)

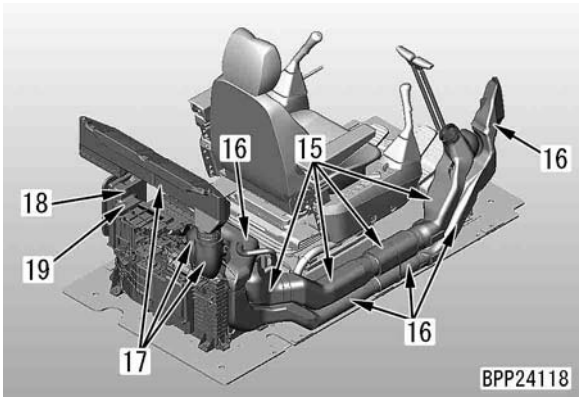
1. Condenser
2. Modulator
3. Desiccating agent
4. Filter
5. Seal cap
6. O-ring
7. Snap ring

Specification *(ALL-K580-044-K-00-A)*

Fin pitch (mm)	4.0
Total heat dissipation surface (m^2)	3.58
Max. working pressure (MPa{kg/cm^2})	3.53{36}
Weight of desiccating agent (g)	290

Function *(ALL-K580-042-K-00-A)*

- The condenser cools and liquefies the high pressure and high temperature misty refrigerant sent from the compressor.
- The sub-cool section of condenser (1) further cools liquefied refrigerator, which came to this section after passing through modulator (2), to increase the cooling efficiency.
- Modulator (2) stores the high-pressure and high-temperature liquefied refrigerant from the condenser. It is capable of completely liquefying the refrigerant even when bubbles are contained in the refrigerant due to the condenser condition in heat dissipation.
- Filter (4) and desiccating agent (3) contained in modulator (2) eliminate foreign substances in the circulation circuit and water in the refrigerant.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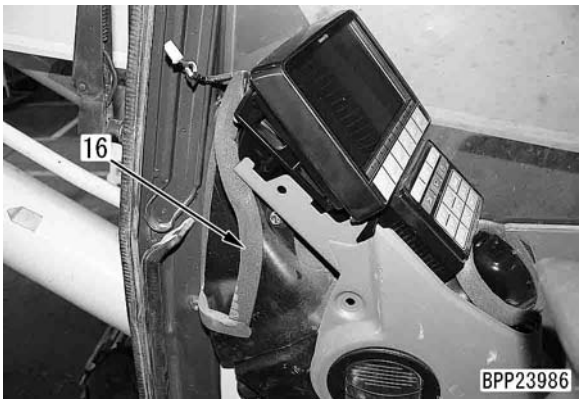
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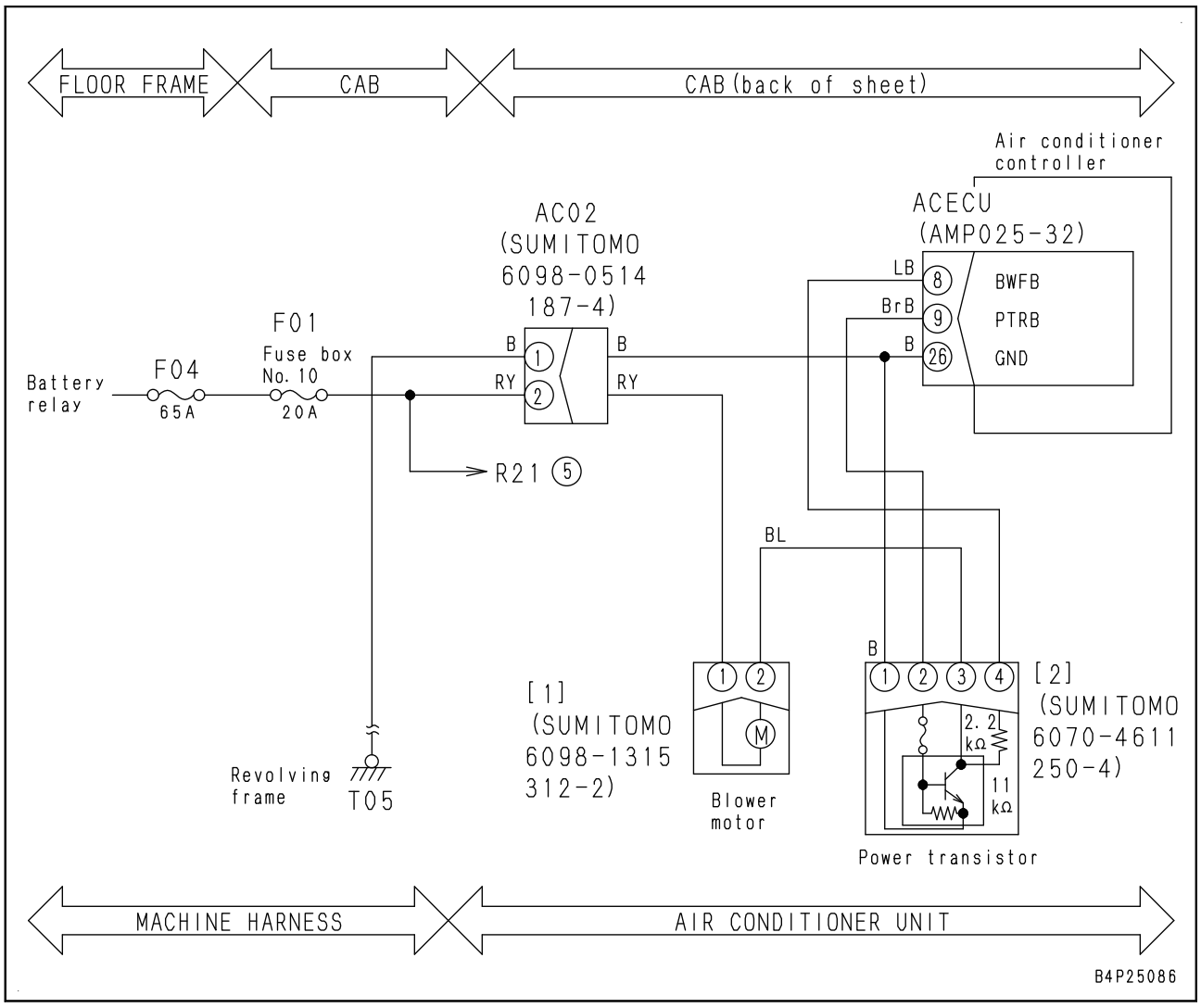
Failure code [879BKA] A/C Outer sensor Open Circuit *(PC220_10-879BKA-400-A-00-A)*

Action level	Failure code	Failure	Air conditioner outside air temperature sensor disconnection (Machine monitor system)
—	879BKA		
Details of failure	• Air conditioner controller detected disconnection in outside (air) temperature sensor.		
Action of controller	• The air conditioner controller sends information about the outside (air) temperature sensor disconnection to the machine monitor via CAN communication. • Continues control of air conditioner in automatic mode, ignoring data of outside (air) temperature sensor.		
Problem on machine	• Since the air conditioner outside temperature sensor has a disconnection, outside temperature is not counted in automatic mode. (The air conditioner is not affected in manual mode)		
Related information	• Method of reproducing failure code: Turn starting switch to ON position. • Check whether this failure code is displayed in the "Electrical Systems" screen of the electrical system in the service mode of the machine monitor. • For connectors and other parts, see “Parts and connectors layout“. • Since connector ACECU of the air conditioner controller has small pins and does not have a T-adapter, carry out troubleshooting by using the intermediate connector (Although the intermediate connector does not have a T-adapter either, it does have large pins). • If the air conditioner wiring harness between connector ACECU of the air conditioner controller and the intermediate connector needs to be replaced, the air conditioner unit must be replaced.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective outside air temperature sensor	1. Turn starting switch to “OFF“ position. 2. Disconnect connector P18.			
		Resistance	Between P18 (male) (1) and (2)	25°C	Approx 1.7 kΩ
2	Open circuit or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector AC01. ★ Same as above, if resistance is normal			
		Resistance	Between AC01 (female) (7) and (8)	25°C	Approx 1.7 kΩ
3	Breaking of harness (Wire breakage or defective contact of connectors)	★ If cause 2 is not the cause for the failure, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors P18 and AC01.			
		Resistance	Between AC01 (female) (7) and P18 (female) (1)		Max. 1 Ω
			Between AC01 (female) (8) and P18 (female) (2)		Max. 1 Ω
4	Defective air conditioner controller	If no failures are found by the above checks, the air conditioner controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)			
5	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.)			

Circuit diagram related to blower motor system



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