SEN05644-08

Shop Manual

HYDRAULIC
EXCAVATOR

PC290LC-10

SERIAL NUMBERS 15001 and up

KOMATSU

jump on or off the machine. When the scaffold is not provided, use steps or stepladder to secure your footing.

Precautions during work

- For the machine equipped with the battery disconnect switch, check that the system operating lamp is turned off before starting the work. Then, turn the battery disconnect switch to OFF (○) position and remove the switch key. For the machine not equipped with the battery disconnect switch, remove the cable from the battery before starting the work. Be sure to remove the negative end (-) of the battery cable first.
- Release the remaining pressure in the circuits completely before the work when the parts in the circuits of oil, fuel, coolant and air are disconnected or removed. When the cap of the oil filter, drain plug or oil pressure pickup plug is removed, loose them slowly to prevent the oil from spurting out.
- When removing or installing the checking plug or the piping in the fuel circuit, wait 30 seconds or longer after the engine is shut down and start the work after the remaining pressure is released from the fuel circuit.
- Immediately after the engine is shut down, the coolant and oil in the circuits are hot. Be careful not to get scalded by the hot coolant and oil. Start the work after checking that the coolant and oil are cooled down sufficiently.
- Start the work after the engine is shut down. Be sure to shut down the engine when working on or around the rotating parts in particular. When checking the machine without shutting down the engine (measuring oil pressure, rotational speed, oil or coolant temperature), take extreme care not to get caught in the rotating parts or the working equipment.
- The hoist or crane must be used to sling the components weighing 25 kg or heavier. Check the slings (wire rope, nylon sling, chain and hook) for damage before the work. Use the slings with ample capacity and install them to the proper places. Operate the hoist or crane slowly to prevent the component from hitting any other part. Do not work with any part still raised by the hoist or crane.
- When removing the part which is under internal pressure or reaction force of the spring, always leave 2 bolts in diagonal positions. Loosen those 2 bolts gradually and alternately and release the pressure, then, remove the part.
- When removing the part, be careful not to break or damage the electrical wiring. The damaged wiring may cause electrical fires.
- When removing piping, prevent the fuel or oil from spilling out. If any fuel or oil drips onto the floor, wipe it off immediately. Fuel or oil on the floor can cause you to slip and can even cause fires.
- As a general rule, do not use gasoline to wash parts. Do not use gasoline to clean the electrical parts, in particular.
- Reinstall the parts removed to their original places. Replace the damaged parts and the parts which must not be used with new ones. When installing the hoses and wiring harnesses, be careful that they are not damaged by contacting with other parts when the machine is operated.
- When connecting the high pressure hoses and tubes, make sure that they are not twisted. The damaged high pressure hoses and tubes are very dangerous when they are installed. So, be extremely careful when connecting the high pressure pipings. In addition, check that their connections are correct.
- When assembling or installing the parts, be sure to tighten the bolts to the specified torque. When installing the protective parts such as guards, or the parts which vibrate violently or rotate at high speeds, be sure to check that they are installed correctly.
- When aligning 2 holes, never insert your fingers or hand into the holes. Align the holes with care so that your fingers are not caught in the hole.
- When measuring hydraulic pressure, check that the measuring tools are correctly installed.
- Pay attention to safety when removing and installing the tracks of the track type machines. When removing the track, it separates suddenly. The workers should not stand at either end of the track.
- If the engine is operated for a long time in a closed place which is not ventilated well, you may suffer from gas poisoning. Accordingly, open the windows and doors to ventilate the place well.

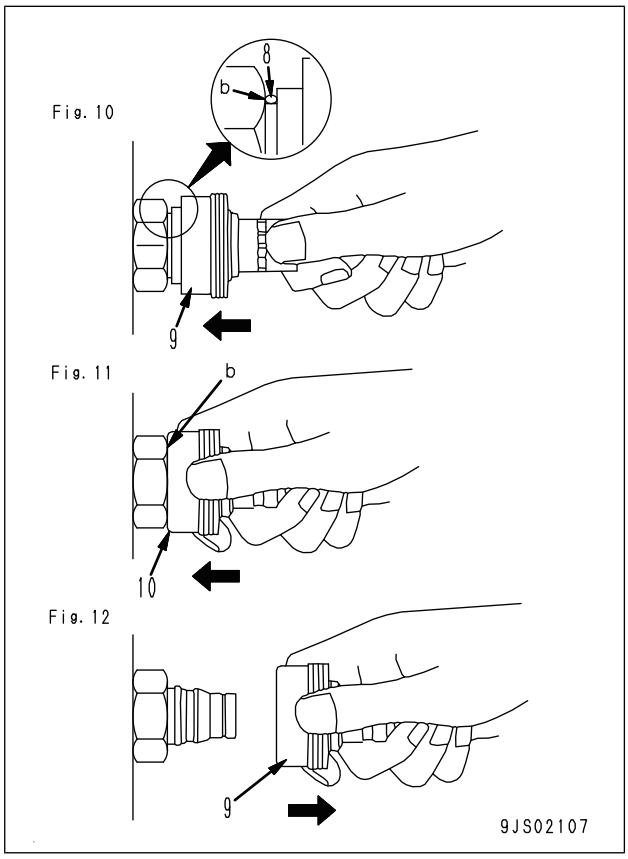
Precautions for slinging work and making signals

- Only one appointed worker must make signals and co-worker must communicate with each other frequently. The appointed signaler must make specified signals clearly at the place where the signaler is well seen from the operator's seat and where the signaler can see the working condition easily. The signaler must always stand in front of the load and guide the operator safely.
  1. Do not stand under the load.
  2. Do not step on the load.
- Check the slings before starting sling work.
- Keep putting on the gloves during sling work. (Put on the leather gloves, if available.)

Type 3 *(ALL-C930-925-P-03-A)*

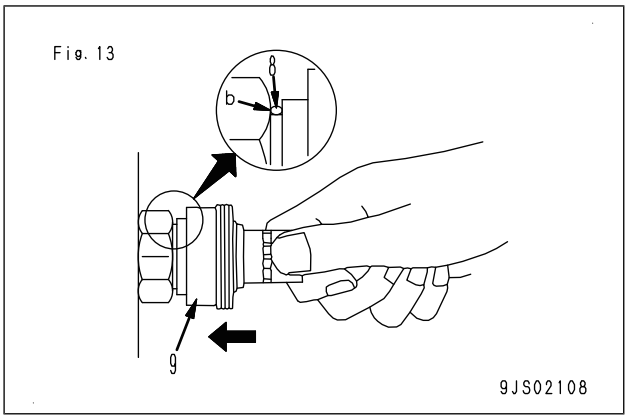
Disconnection

1. While holding the fitting, push body (9) in straight until sliding prevention ring (8) hits contact surface (b) at the hexagonal portion on the male side. (Fig. 10)
2. While keeping the condition of Step 1, push cover (10) straight until it hits contact surface (b) of the hexagonal portion on the male side. (Fig. 11)
3. While keeping the conditions of Steps 1 and 2, pull out whole body (9) to disconnect it. (Fig. 12)



Connection

1. While holding the fitting, push body (9) in straight until sliding prevention ring (8) hits contact surface (a) at the hexagonal portion on the male side to connect them. (Fig. 13)



★ When the hydraulic cylinder is used for the first time after reassembly of the hydraulic equipment such as the hydraulic cylinder, pump, etc. and piping after removing them for repair, be sure to perform air bleeding of the hydraulic circuit according to the following procedure.

1. Start the engine, and run it at low idle.
2. Repeat the operation to extend and retract each cylinder of the work equipment to approximately 100 mm before the stroke end 4 to 5 times.
3. Operate the hydraulic cylinder 3 to 4 times to the end of its stroke.

★ After the completion of repair and when operating the machine which is stored long term, perform the air bleeding with the same procedure as the one described above.

Precautions at the time of completing work
Refilling of coolant, oil and grease

- When the coolant is drained, tighten the drain valve securely, then refill the coolant reservoir with the coolant Komatsu recommends to the specified level. Start the engine to circulate the coolant in the piping, and add the coolant to the specified level again.
- When the hydraulic components are removed and installed, refill the oil reservoir with the oil Komatsu recommends to the specified level. Start the engine to circulate the oil in the piping, and add the oil to the specified level again.
- If the hydraulic piping or hydraulic equipment is removed, be sure to bleed air from the system after rebuilding the parts, by referring to "Testing and adjusting".
- Supply the specified amount of grease to the work equipment parts.

Testing installed condition of cylinder heads and manifolds

- Check the cylinder head and intake and exhaust manifold mountings for looseness.
- If any bolt is loose, retighten it.

★ For the tightening torques, see the "Disassembly and assembly".

Testing of engine piping for damage and looseness

Intake and exhaust system	Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for air suction and exhaust gas leakage. If any part is loosely installed or damaged, retighten the bolts or repair the parts.
Cooling system	Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for water leakage. If any part is loosely installed or damaged, retighten the bolts or repair the parts.
Fuel system	Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for fuel leakage. If any part is loosely installed or damaged, retighten the bolts or repair the parts.

Check of KDPF or muffler and exhaust pipe for damage and looseness

- Visually check the KDPF or muffler, exhaust pipe and their mounting parts for a crack and damage. If any part is damaged, replace it.
- Check the mounting bolts, nuts, and clamps of the KDPF or muffler, exhaust pipe and their mounting parts for looseness.
  If any part is loosely installed, retighten the bolts.

Check of KDPF or muffler function

- Check the KDPF or the muffler for unusual noise comparing to the noise when they are new.
  If any unusual noise is heard, repair KDPF or muffler, referring to "Troubleshooting" and "Disassembly and assembly".

kg/cm^2 to lb/in^{22}

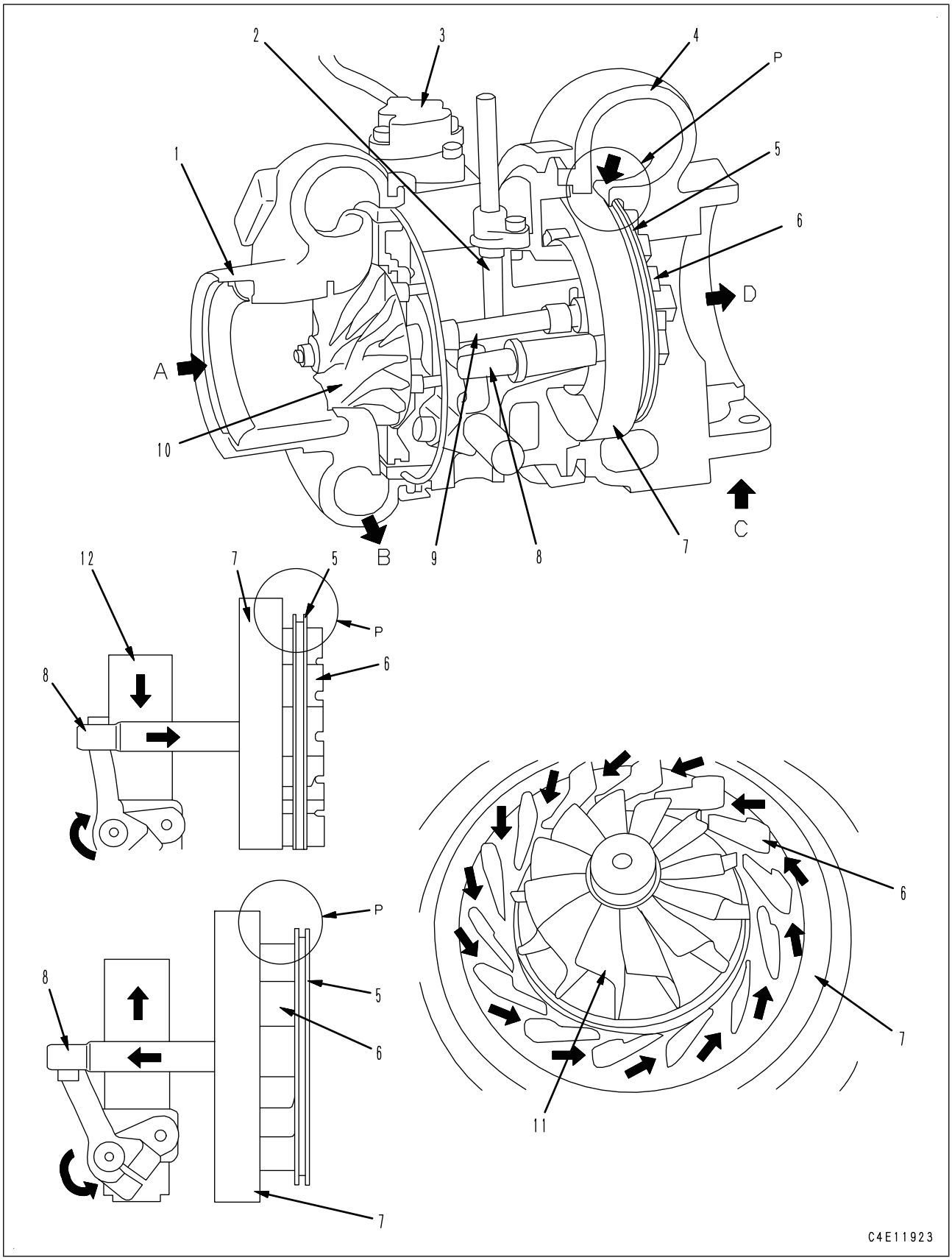
1 kg/cm^2 = 14.2233 lb/in^{22}

	0	1	2	3	4	5	6	7	8	9
0	0	14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1,010	1,024	1,038	1,053	1,067	1,081	1,095	1,109	1,124
80	1,138	1,152	1,166	1,181	1,195	1,209	1,223	1,237	1,252	1,266
90	1,280	1,294	1,309	1,323	1,337	1,351	1,365	1,380	1,394	1,408
100	1,422	1,437	1,451	1,465	1,479	1,493	1,508	1,522	1,536	1,550
110	1,565	1,579	1,593	1,607	1,621	1,636	1,650	1,664	1,678	1,693
120	1,707	1,721	1,735	1,749	1,764	1,778	1,792	1,806	1,821	1,835
130	1,849	1,863	1,877	1,892	1,906	1,920	1,934	1,949	1,963	1,977
140	1,991	2,005	2,020	2,034	2,048	2,062	2,077	2,091	2,105	2,119
150	2,134	2,148	2,162	2,176	2,190	2,205	2,219	2,233	2,247	2,262
160	2,276	2,290	2,304	2,318	2,333	2,347	2,361	2,375	2,389	2,404
170	2,418	2,432	2,446	2,460	2,475	2,489	2,503	2,518	2,532	2,546
180	2,560	2,574	2,589	2,603	2,617	2,631	2,646	2,660	2,674	2,688
190	2,702	2,717	2,731	2,745	2,759	2,773	2,788	2,802	2,816	2,830
200	2,845	2,859	2,873	2,887	2,901	2,916	2,930	2,944	2,958	2,973
210	2,987	3,001	3,015	3,030	3,044	3,058	3,072	3,086	3,101	3,115
220	3,129	3,143	3,158	3,172	3,186	3,200	3,214	3,229	3,243	3,257
230	3,271	3,286	3,300	3,314	3,328	3,343	3,357	3,371	3,385	3,399
240	3,414	3,428	3,442	3,456	3,470	3,485	3,499	3,513	3,527	3,542

KVGT *(WA380-AA10-041-K-00-A)*

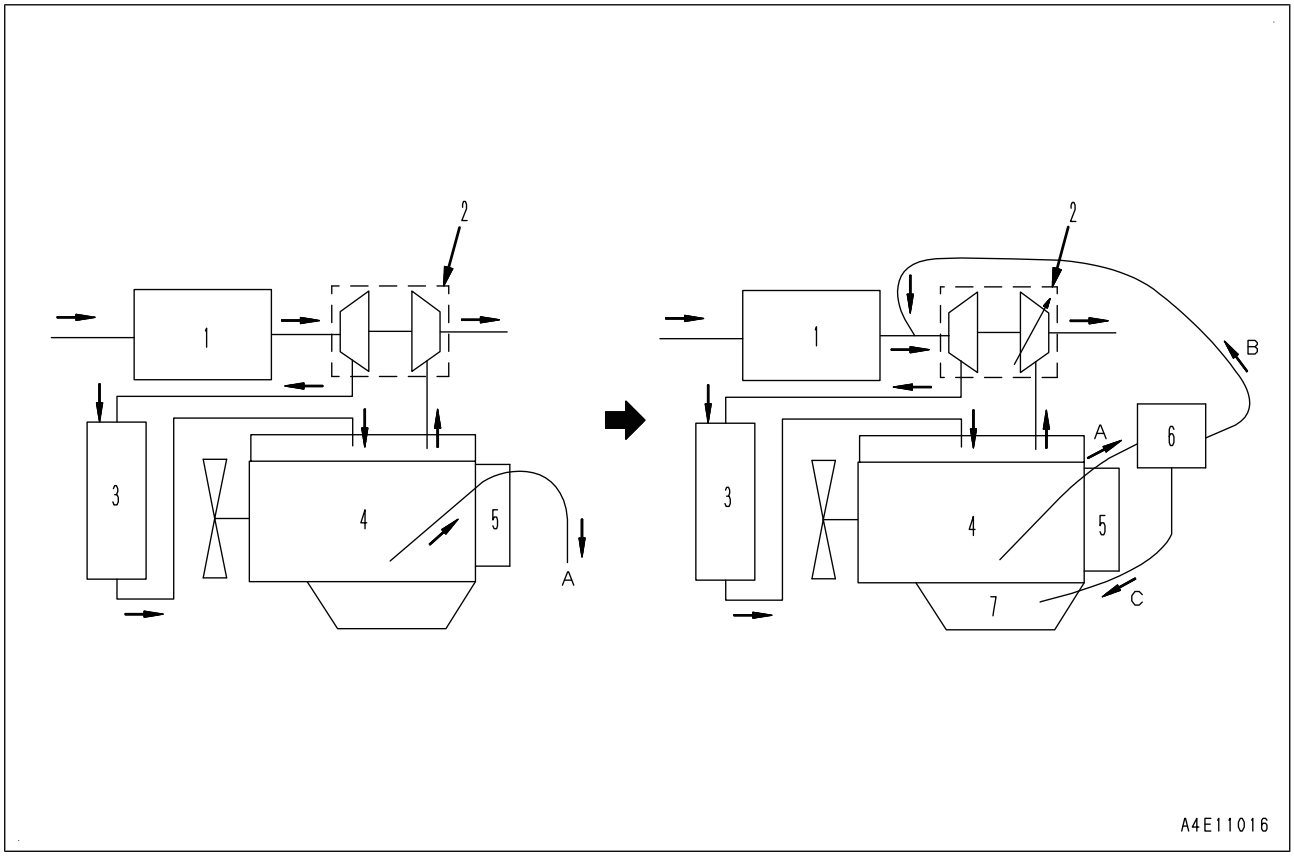
★ KVGT: Abbreviation for Komatsu Variable Geometry Turbocharger

★ The shape is subject to machine models.



Operation *(ENG107-A180-044-K-00-A)*

★ The figure on the left shows the flow of blowby gas released to the atmosphere from conventional engines. The figure on the right shows the flow of blowby gas recirculated to the intake system by the KCCV ventilator.

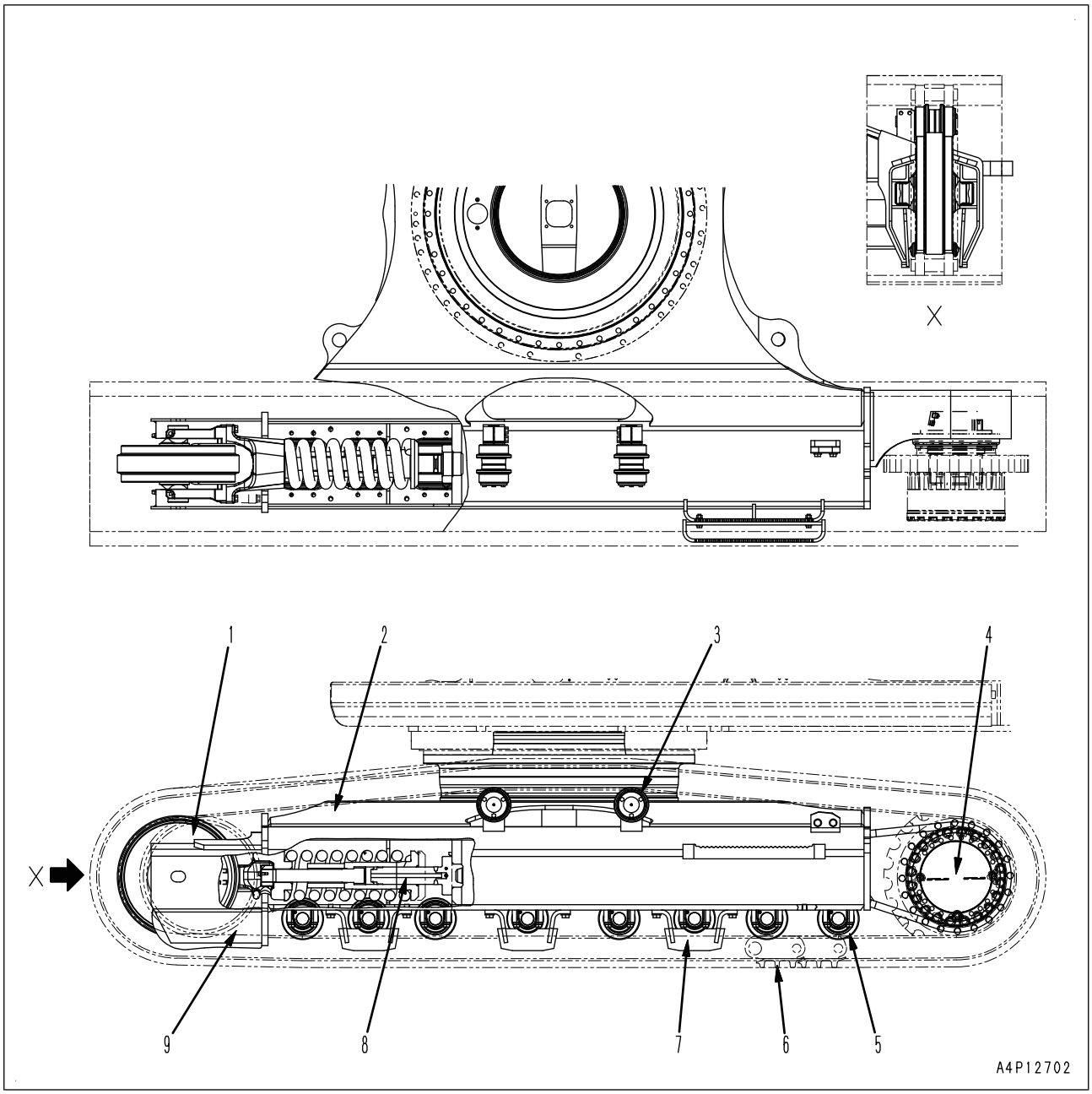


1. Air cleaner
2. KVGT
3. Aftercooler
4. Cylinder block (crankcase)
5. Breather
6. KCCV ventilator
7. Oil pan

- Engine oil mist is removed from blowby gas (A) in cylinder block (4) by the filter in KCCV ventilator (6), and then the cleaned gas (B) is recirculated to the intake side of the KVGT.
- Removed engine oil (C) flows through a check valve and falls to the oil pan.

Undercarriage and frame *(ALL-DT00-001-K-00-A)*

Track frame and idler cushion *(PC290-DT20-041-K-00-A)*



1. Idler
2. Track frame
3. Carrier roller
4. Final drive
5. Track roller
6. Track shoe
7. Center guard
8. Idler cushion
9. Front guard

Specifications *(PC290-DT20-030-K-00-A)*

- Number of track rollers

15. Spline
16. Bearing
17. LS valve

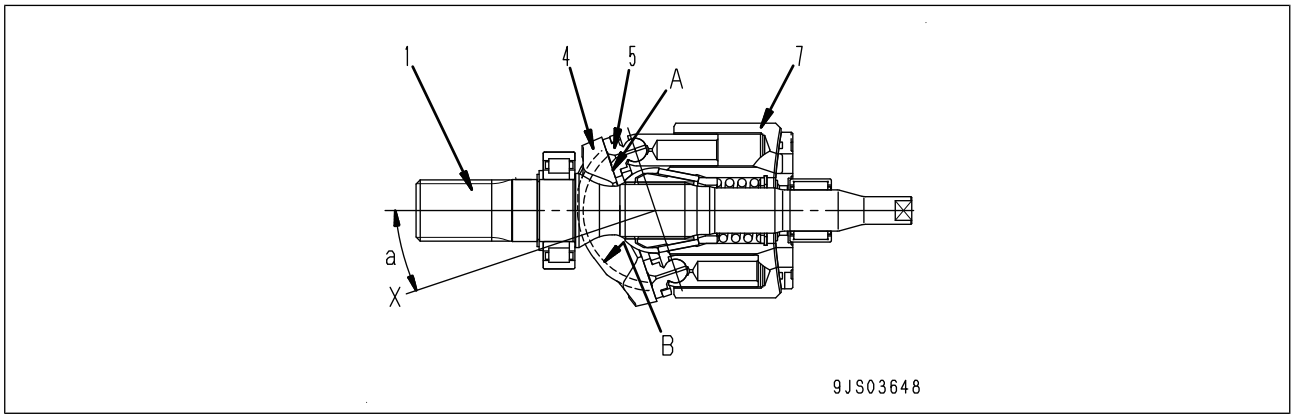
Outline
- This pump consists of two variable capacity swash plate piston pumps, PC valve, LS valve, EPC valve, and swash plate sensor.

Function
- The pump converts the engine speed and torque transmitted to its shaft (1) into oil pressure and delivers pressurized oil corresponding to the load.
- It is possible to change the discharged volume by changing the swash plate angle.

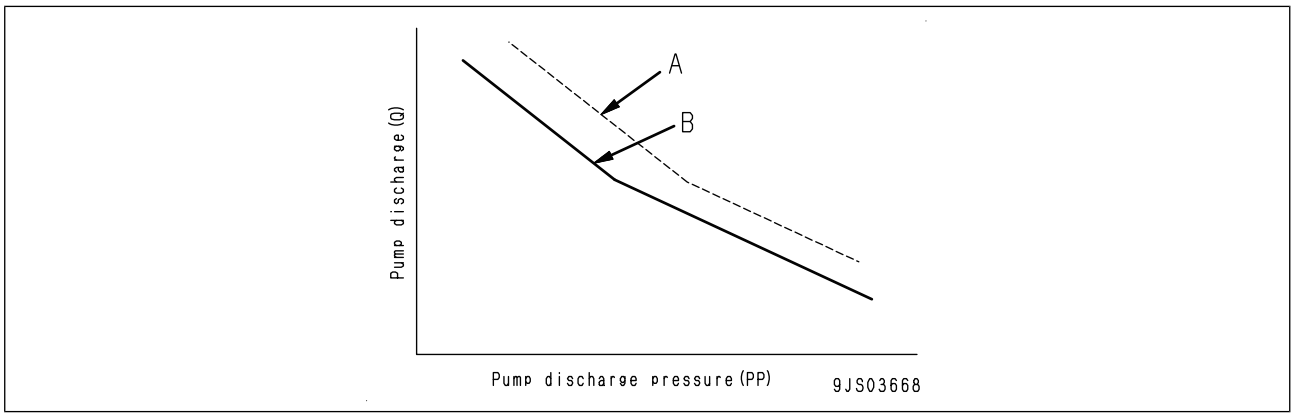
Structure
- Cylinder block (7) is supported to shaft (1) by spline (15).
- Shaft (1) is supported by each bearing (16) at the front and rear.
- The tip of piston (6) is shaped as a concave sphere and is crimped together with shoe (5).
- Piston (6) and shoe (5) constitute a spherical bearing.
- Rocker cam (4) has flat surface (A), and shoe (5) is always pressed against this surface while sliding in a circular pattern.
- Rocker cam (4) transmits high pressure oil to cylindrical surface (B) with cradle (2), which is secured to the case, and forms a static pressure bearing when it slides.
- Piston (6) performs reciprocal motion in the axial direction inside each cylinder chamber of cylinder block (7).
- Cylinder block (7) seals the pressurized oil to valve plate (8) and performs relative rotation.
- The oil pressure balance on the valve plate is maintained properly.
- The pressurized oil is sucked in and discharged from each cylinder chamber in cylinder block (7) through valve plate (8).

Operation *(PC220-C200-044-K-00-A)*

- Cylinder block (7) rotates together with shaft (1) and shoe (5) slides on plane (A).
- Rocker cam (4) moves along cylindrical surface (B). As a result, angle (a) between center line (X) of rocker cam (4) and the axis of cylinder block (7) changes.
- Angle (a) is called the swash plate angle.



- If swash plate angle (a) is made between center line (X) of rocker cam (4) and the axis of cylinder block (7), plane (A) functions as a cam against shoe (5).
- Piston (6) reciprocates inside cylinder block (7) and a difference is made between volumes (E) and (F) in cylinder block (7).
- Each piston (6) sucks and discharges oil by (F) - (E).
- Oil is discharged while cylinder block (7) rotates and the volume of chamber (E) decreases.
- The volume of chamber (F) grows larger and, in this process, the oil is sucked.

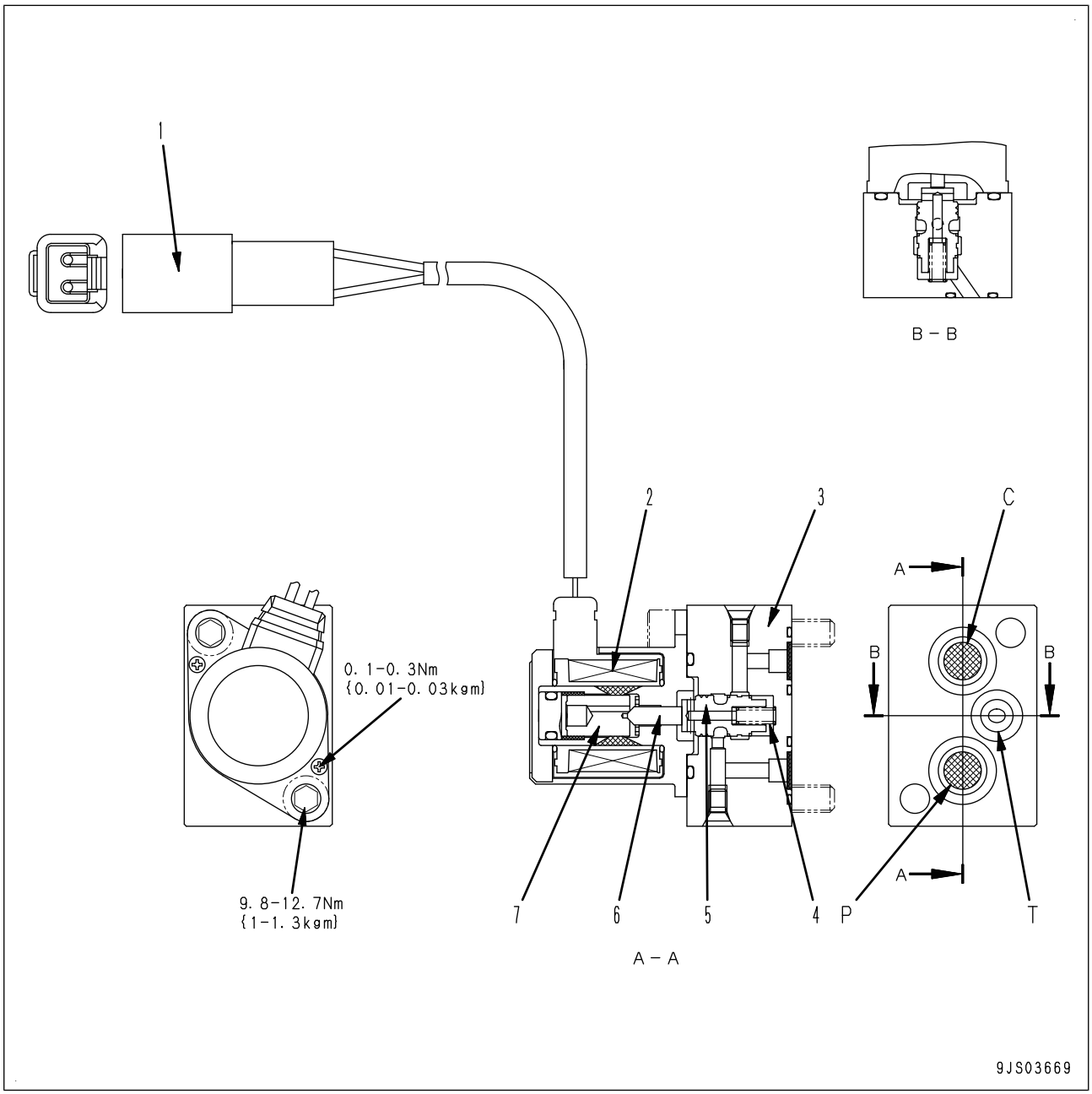


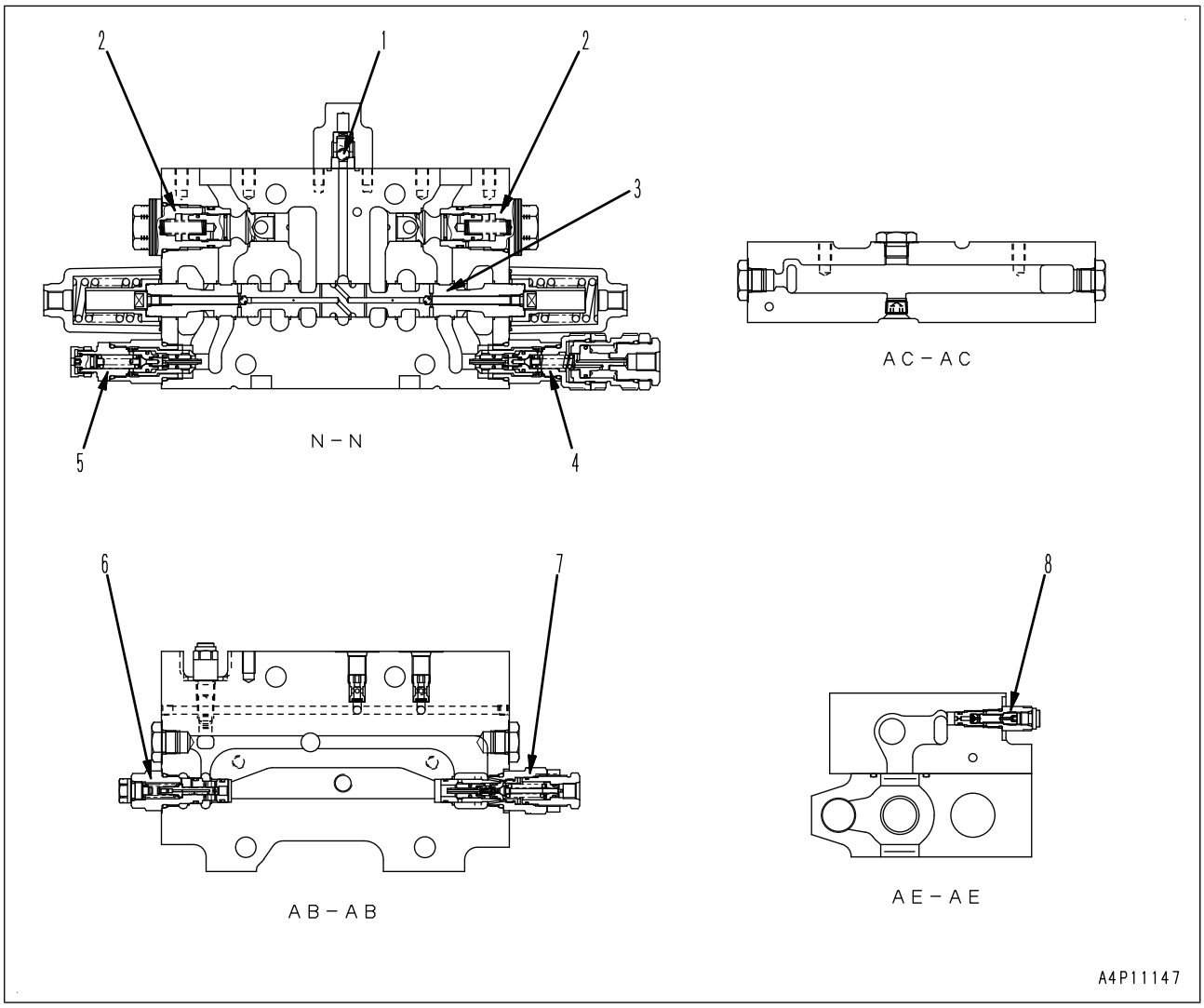
LS(PC)-EPC valve *(PC-C2M0-041-K-00-A)*

LS: Abbreviation for Load Sensing

PC: Abbreviation for Pressure Compensation

EPC: Abbreviation for Electromagnetic Proportional Control





Service valve

1. LS shuttle valve
2. Pressure compensation valve
3. Spool
4. 2-stage suction safety valve
5. Suction safety valve
6. Unload valve
7. Main relief valve
8. LS bypass plug

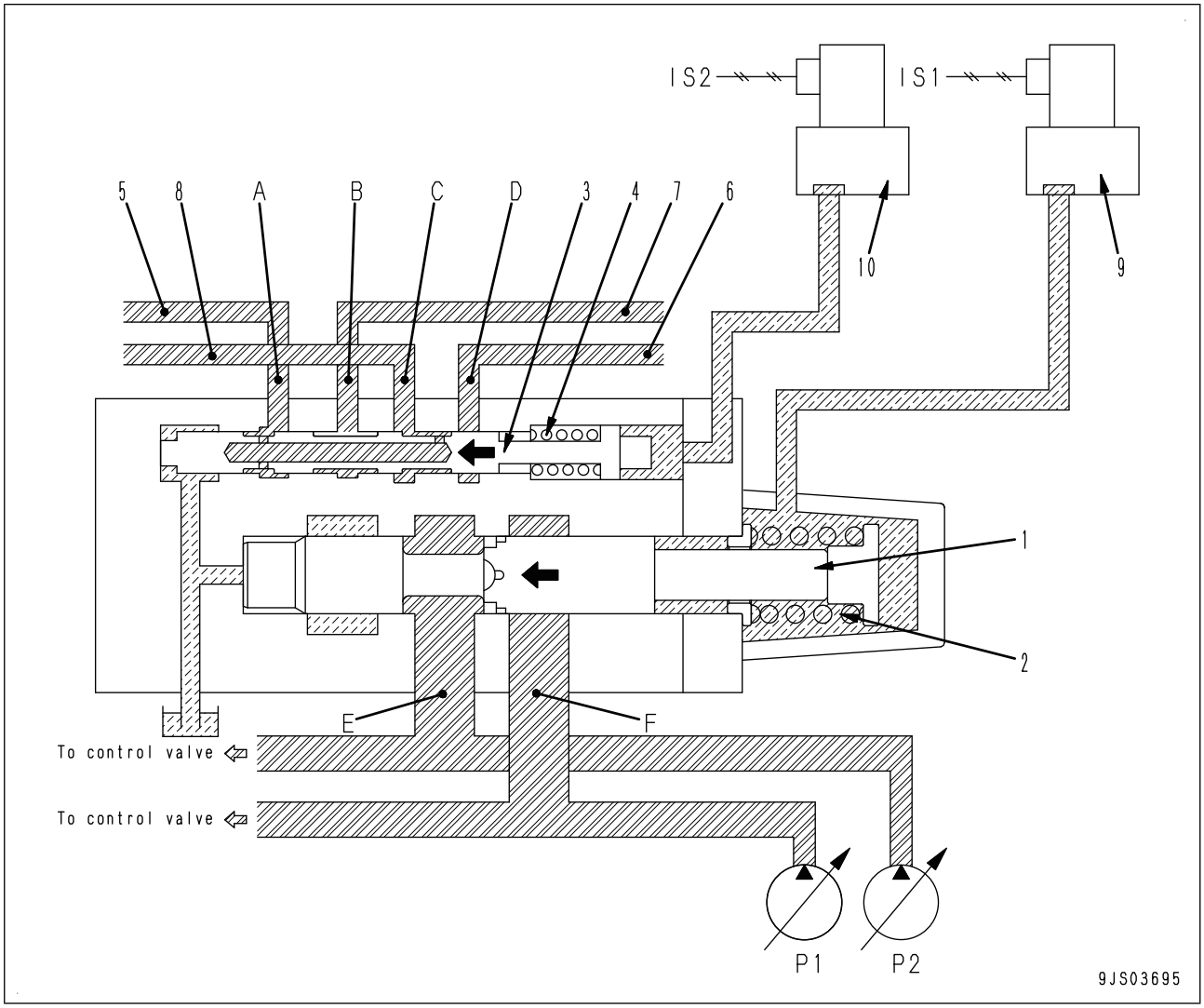
Structure

- The control valves of the following types are set.
  6-spool valve (without service valve)
  7-spool valve (6-spool valve with service valve)
- This control valve consists of a 6-spool valve (unit type) and a set of service valve. A merge-divider valve, a variable back pressure valve and a boom hydraulic drift prevention valve are installed to it.
- Since all the valves are assembled together with connecting bolts and their passes are connected to each other inside the assembly, the assembly is compact and easy to maintain.
- With one spool provided for one work equipment, this control valve is simple in structure.

Operation

- Since drive signal (IS1) of the EPC valve for the main spool is OFF, the output pressure of the pump merge-divider EPC valve is 0 MPa {0 kg/cm^2}.
- Main spool (1) is pressed to the right by spring (2). As a result, ports (E) and (F) are interconnected.
- Pressurized oil (P1) and (P2) discharged from the two pumps merge at ports (E) and (F), and flow to the control valve which requires the oil.
- Since drive signal (IS2) of the EPC valve for LS spool (3) is also OFF, LS spool (3) is pressed to the right by spring (4). As a result, ports (A) and (B) are interconnected and ports (B) and (C) are interconnected.
- The LS pressures transmitted from respective control valve spools through LS circuits (A), (B), (C), and (D) are transmitted to all the pressure compensation valves.

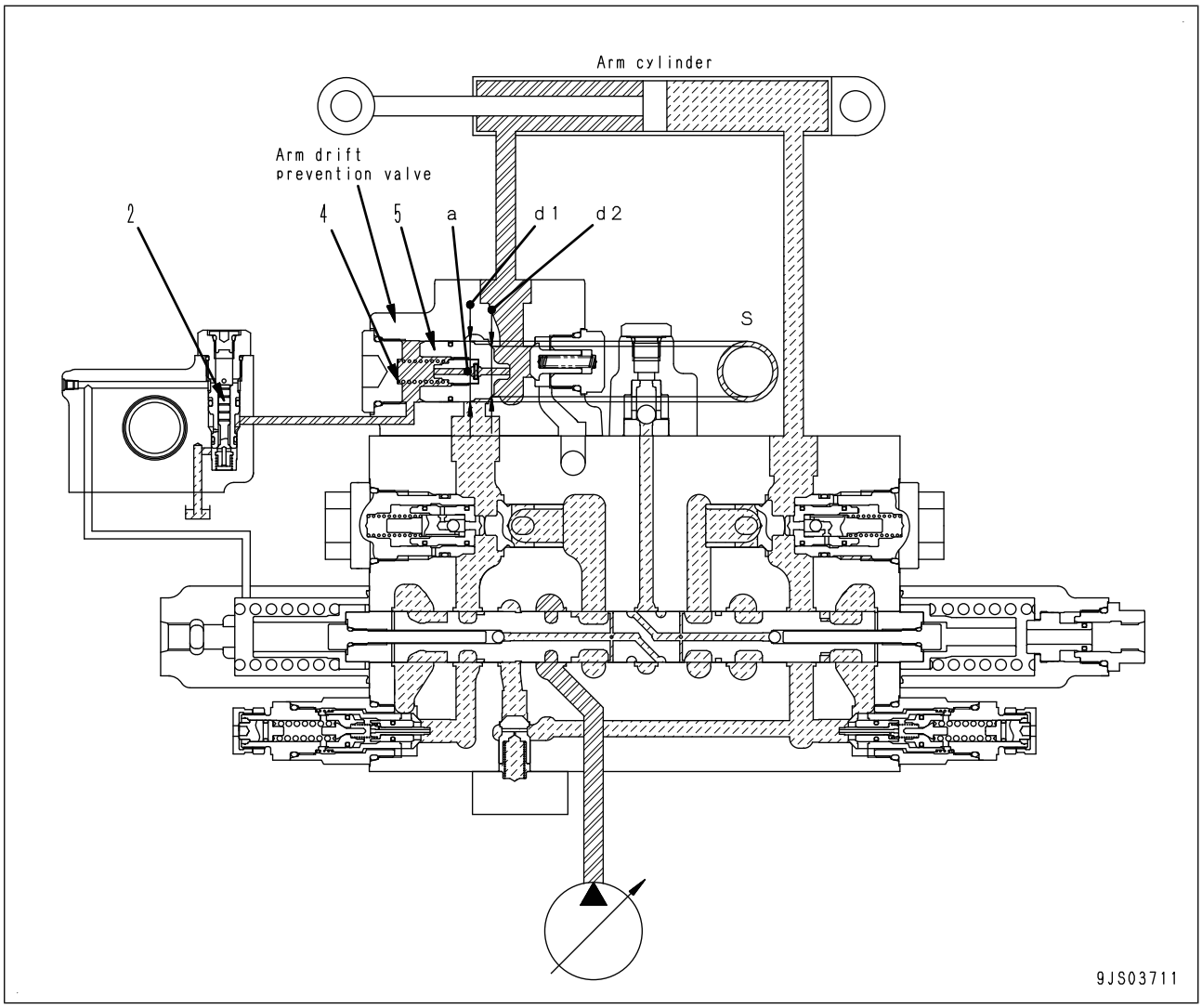
When oil flowing from two pumps are divided [pump merge-divider valve changeover signals (IS1) and (IS2) are ON]



Operation

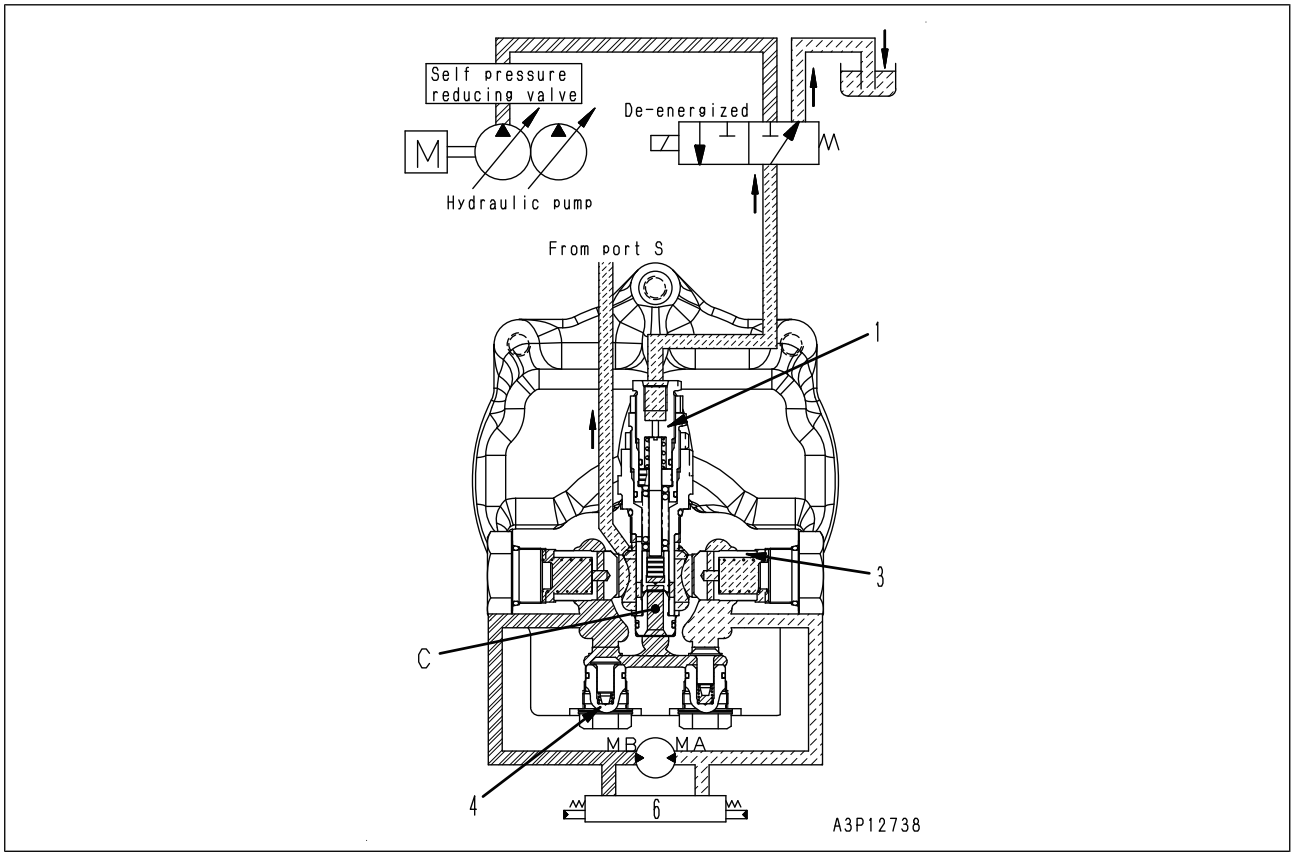
- Since drive signal (IS1) of the main spool is ON, main spool (1) is moved to the left by the output pressure from the pump merge-divider EPC valve. As a result, port (E) is disconnected from port (F).
- The pressurized oil from the two pumps are sent to respective control valve groups.
  Pressure P1: To bucket, left travel, boom
  Pressure P2: To swing, right travel, arm
- When drive signal (IS2) of the EPC valve for LS spool (3) becomes ON, LS spool (3) is also moved to the left by the output pressure from the pump merge-divider EPC valve. As a result, ports (A) and (C) are interconnected, and other ports remain disconnected from each other.
- The LS pressures transmitted from respective control valve spools through LS circuits (A), (B), (C), and (D) are transmitted to respective control valves.

In arm "NEUTRAL" operation



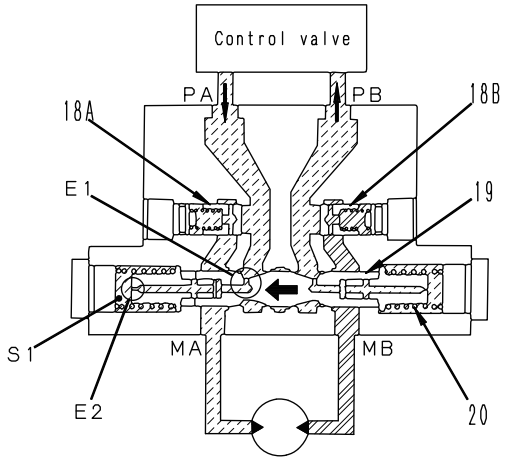
- When the arm is operated to "NEUTRAL" position, the pressurized oil flowing inside poppet (5) through orifice (a) of poppet (5) is stopped by pilot piston (2).
- The holding pressure of arm cylinder head exerts a right-hand force on the left side of ring-shaped area (S), of which outside diameter is equal to diameter (d1) of poppet (5) and of which inside diameter is equal to seat diameter (d2).
- The combined force of right-hand force on area (S) and the reaction force of spring (4) moves poppet (5) to the right.
- The circuit from control valve to arm cylinder head shuts off, then the oil pressure of the arm cylinder head side is kept.

When swing is stopped



- When the swing control lever is returned to "NEUTRAL" from "swing RIGHT" position, the supply of pressurized oil from the pump to port (MA) is stopped.
- The pressurized oil from the motor outlet cannot return to the tank since the return circuit to the tank is blocked by control valve (6). Thus, pressure in port (MB) increases.
- If the pressure in port (MB) becomes too high, the pressurized oil returns to the hydraulic tank through relief valve (1) and port (S).
- Rotation resistance is exerted on the motor and the brake starts working.
- If the pressure in port (MB) becomes higher than that in port (MA), it presses shuttle valve (4).
- The pressure in chamber (C) becomes the same as that in port (MB), and increases to the set pressure of relief valve (1).
- A high braking torque works on the motor, thereby stopping the motor.
- While relief valve (1) is actuated, the relieved pressurized oil and the pressurized oil from port (S) are routed to port (MA) through the check valve (3).
- Thus, cavitations in port (MA) is prevented.

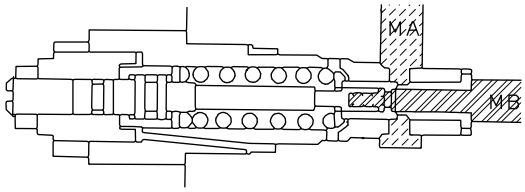
Braking while travelling downhill



- If the machine tries to run away when traveling downhill, the motor will turn under no load, so the pressure at the motor inlet port will drop, and the pressure in chamber (S1) through orifices (E1) and (E2) will also drop. When the pressure in chamber (S1) drops below the spool switching pressure, spool (19) is returned to the left, in the direction of the arrow by spring (20), and outlet port (MB) is throttled.
  As a result, the pressure at the outlet port side rises, resistance is generated to the rotation of the motor, and this prevents the machine from running away.
  In other words, the spool moves to a position where the pressure at the outlet port (MB) balances the pressure at the inlet port and the force generated by the weight of the machine. It throttles the outlet port circuit and controls the travel speed according to the amount of oil discharged from the pump.

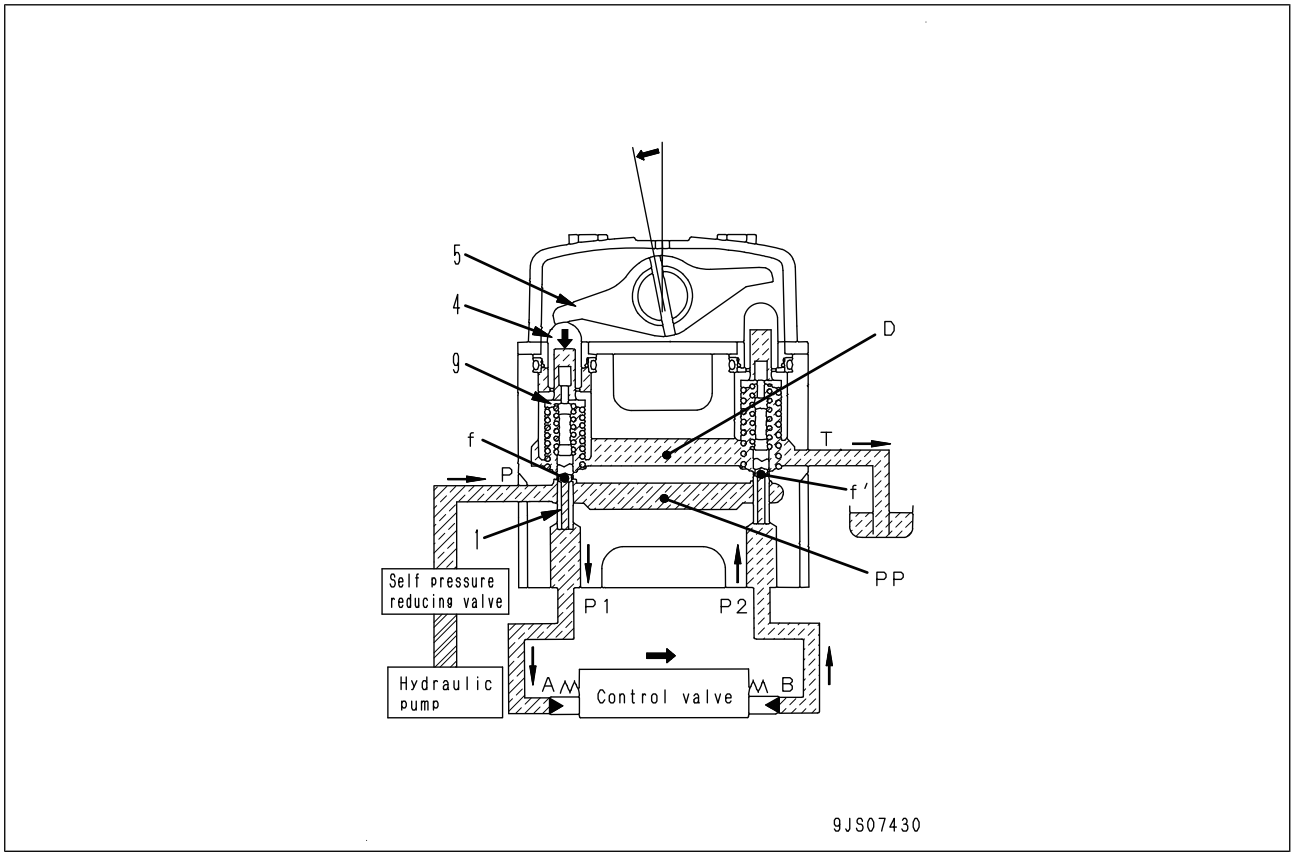
Suction safety valve *(PC290-C660-042-K-00-A)*

Function



- When travel is stopped (or when traveling downhill), the circuits at the inlet and outlet ports of the motor are closed by the counterbalance valve. However, the motor is rotated by inertia, so the pressure at the outlet port of the motor will become abnormally high and damage the motor or piping. The safety valve

When control lever is fully operated



- Lever (5) pushes down piston (4), and retainer (9) pushes down spool (1).
- Fine control hole (f) is disconnected from drain chamber (D) and connected to pump pressure chamber (PP).
- The pilot pressure oil from the self-pressure reducing valve passes through fine control hole (f) and flows from port (P1) to port (A) and pushes the control valve spool.
- The oil returning from port (B) flows from port (P2) through fine control hole (f') into drain chamber (D).

1st-line attachment PPC valve (with EPC valve) *(PC-PL29-041-K-00-A)*

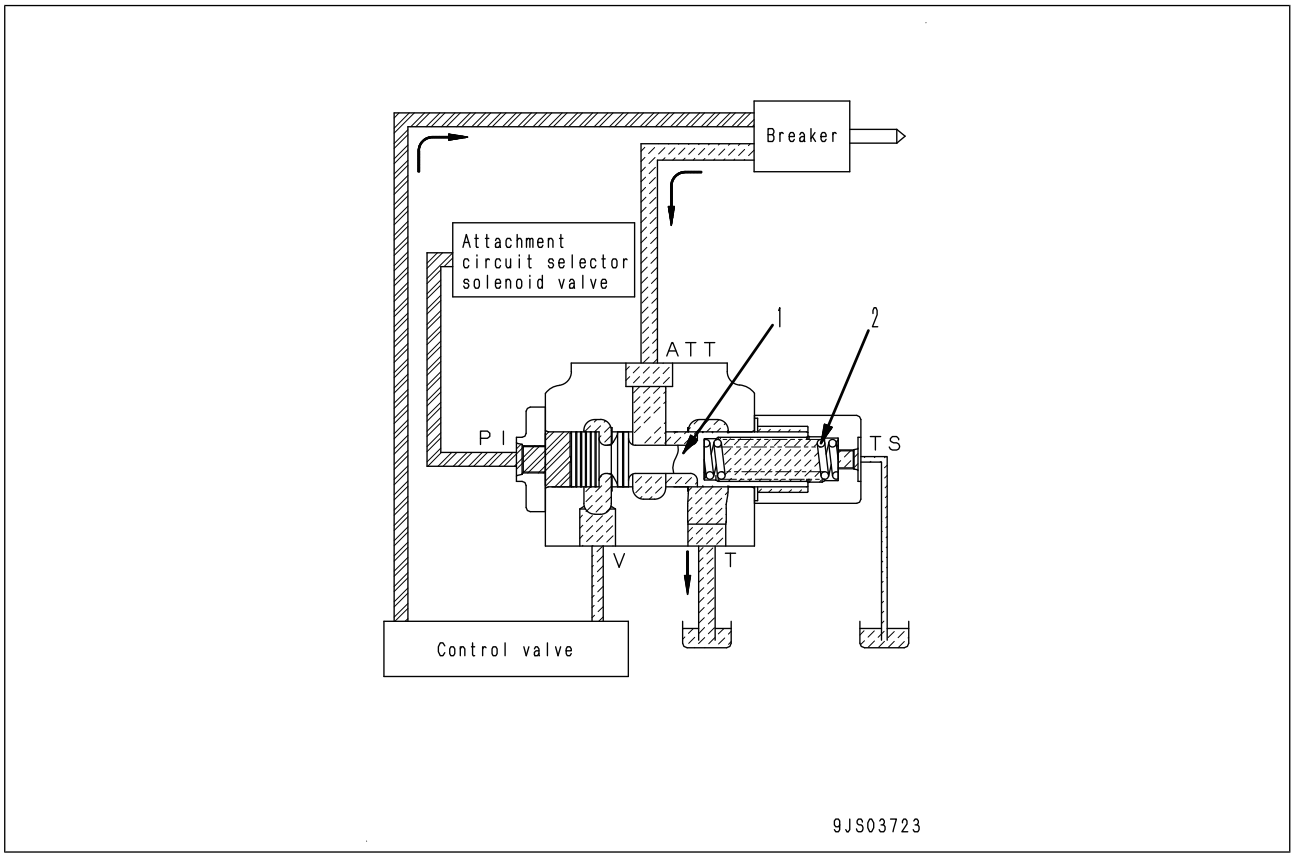
(if equipped)

PPC: Abbreviation for Proportional Pressure Control

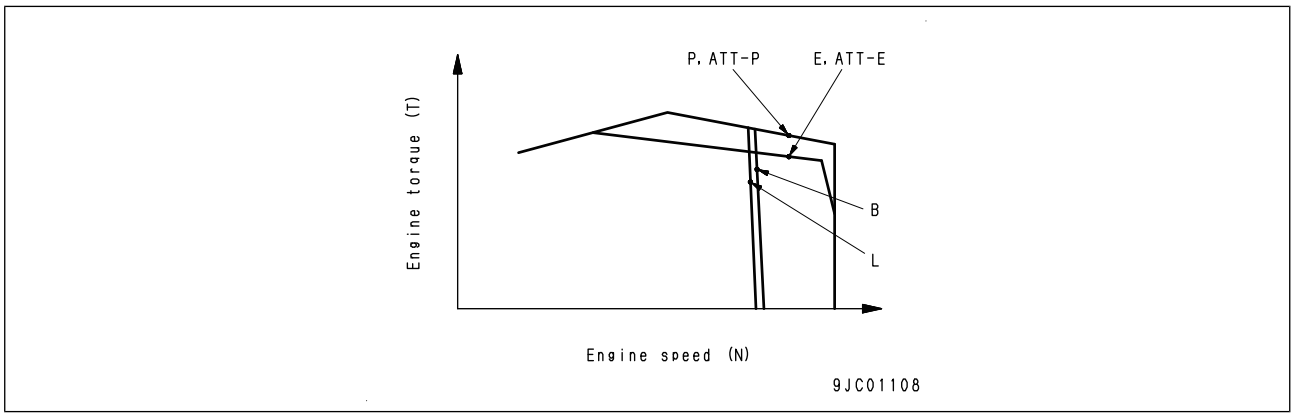
EPC: Abbreviation for Electromagnetic Proportional Control

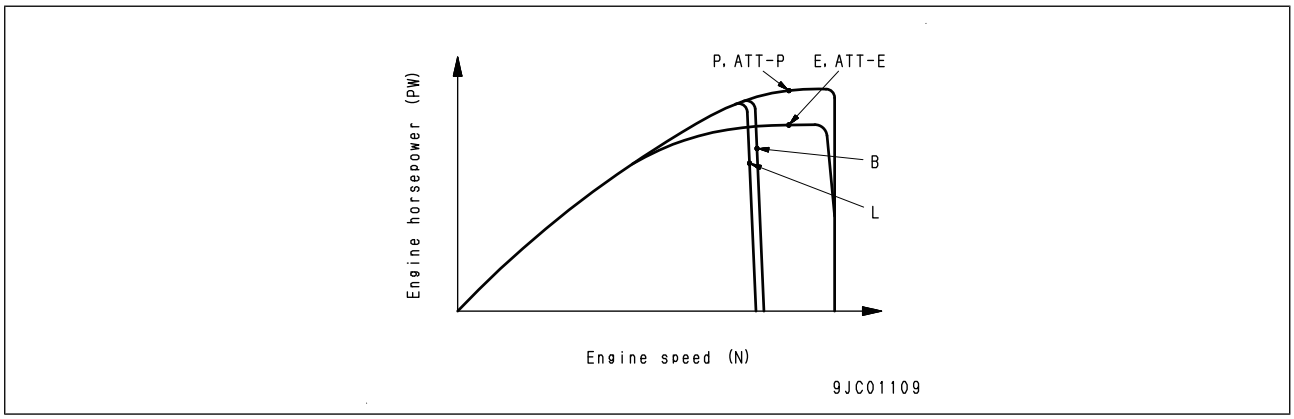
★ For details of operation, see "Work equipment and swing PPC valve".

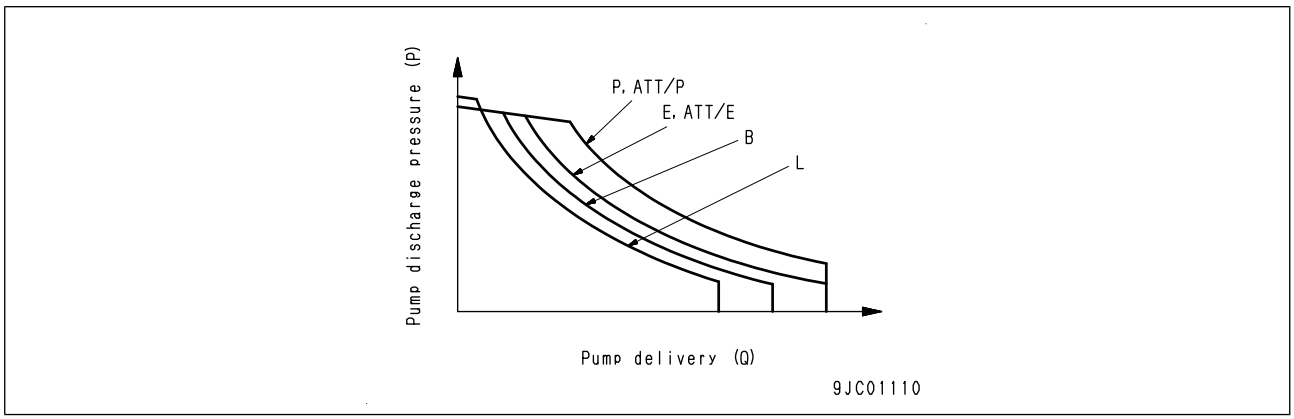
When breaker is installed



- 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 disconnected from port (V) and is interconnected to port (T).
- The pressurized oil returning from the breaker returns directly to the hydraulic tank via port (T) without passing through the control valve.







Control method in each mode

P, E, L, ATT-P and ATT-E modes

Matching point

Working mode	Matching point
P and ATT-P (During work)	127.1kW/1,750 rpm {170 HP/1,750 rpm}
E and ATT-E (During work)	108.2 kW/1,750 rpm {145 HP/1,750 rpm}

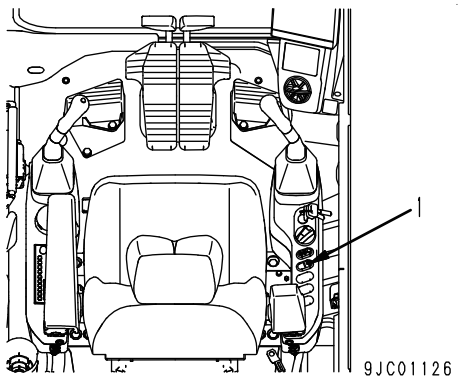
- In P, E, ATT-P and ATT-E modes, the engine speed is always controlled so that it is kept around the matching point specified for each mode.
- At light loads, the engine operates at high speeds. As the load increases, the engine speed decreases while the torque is increased, until the matching point with pump absorption torque upper limit (PT) is reached. [See (1) in graph]
- As the load increases further, the engine speed decreases further. [See (2) in graph]
- The controller lowers the pump absorption upper limit torque (PT) to reduce the load on the engine. [See (3) in graph]

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

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

Function

Swing lock and swing holding brake function
- On machines with swing lock (manual), swing can be locked at any position by turning swing lock switch (1) to "ON" position.
- Interlocked with the swing operation, the swing holding brake (automatic lock) prevents hydraulic drift from occurring after the swing stops.
- Interlocked with the L.H. and R.H. work equipment control levers and attachment control pedals operations, the swing holding brake is canceled to reduce the load on the swing equipment during excavation work.



Pin No.	Signal name	Input/Output signal
70	(*1)	—
71	(*1)	—
72	R.H. travel FORWARD PPC oil pressure sensor	Input
73	(*1)	—
74	(*1)	—
75	Wiper motor stop (P)	Input
76	Cab front window open limit switch	Input
77	Model selection 4	Input
78	(*1)	—
79	PPC lock switch	Input
80	Starting switch ACC signal	Input
81	(*1)	—

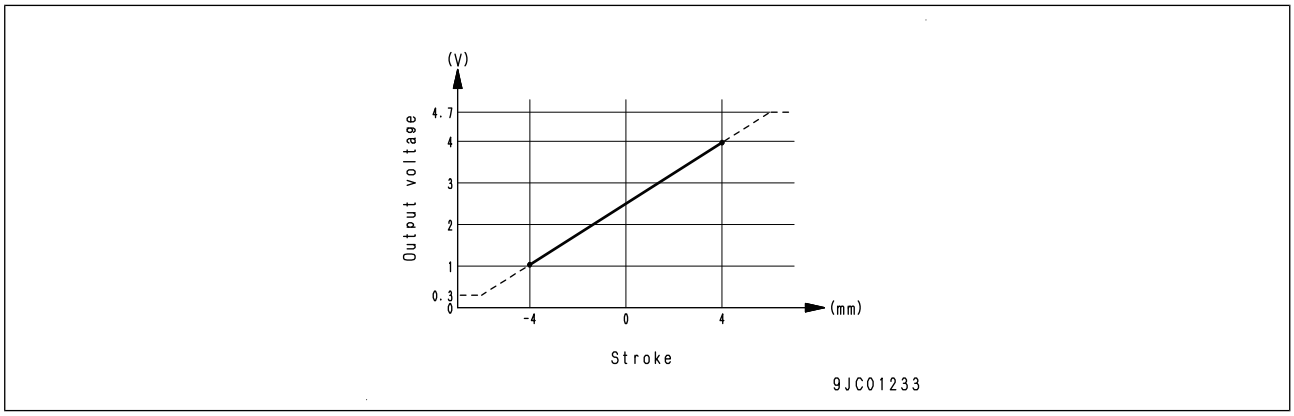
*1: Never connect these pins. Malfunctions or failures may occur.

AMP-40P [CN-CP02]

Pin No.	Signal name	Input/Output signal
82	(*1)	—
83	(*1)	—
84	(*1)	—
85	Travel junction solenoid valve	Output
86	Attachment selector solenoid valve	Output
87	(*1)	—
88	LS-EPC valve	Output
89	Pump merge-divider EPC valve (LS)	Output
90	(*1)	—
91	(*1)	—
92	(*1)	—
93	Travel speed increase solenoid valve	Output
94	Swing 2-stage relief solenoid valve	Output
95	(*1)	—
96	Front pump PC-EPC valve	Output
97	Attachment oil flow rate adjustment EPC valve	Output
98	(*1)	—
99	(*1)	—
100	System-in-use signal	Output
101	Swing holding brake solenoid valve	Output
102	(*1)	—
103	(*1)	—
104	Rear pump PC-EPC valve	Output
105	(*1)	—
106	(*1)	—
107	Travel alarm	Output
108	Battery relay drive	Output
109	2-stage relief solenoid valve	Output
110	(*1)	—
111	(*1)	—
112	Pump merge-divider EPC valve (main)	Output
113	Variable back pressure solenoid valve	Output
114	Wiper motor (-)	Output
115	GND (solenoid)	Input
116	Solenoid power supply	Input
117	GND (solenoid)	Input

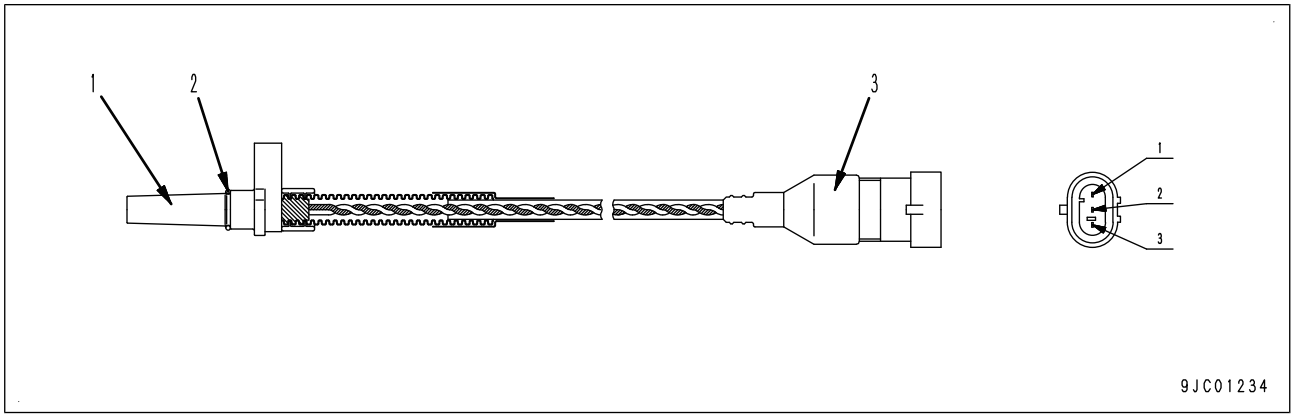
Pilot monitor

<table>
<tr><th>Symbol</th><th>Display item</th><th colspan="3">Description</th><th>Remarks</th></tr>
<tr><td rowspan="5"> 
9JC01177</td><td rowspan="5">Preheating</td><td>Automatic preheating</td><td colspan="2">• It operates automatically at a low temperature. (Symbol lights up as long as for approx. 30 seconds)
• It goes off after the engine is started.</td><td rowspan="5">• Indicates preheat operating status.</td></tr>
<tr><td rowspan="4">Manual preheating</td><td>Elapsed time after turning the starting switch to "HEAT (Preheating)"</td><td>Monitor display</td></tr>
<tr><td>0 to 30 sec.</td><td>Lights up</td></tr>
<tr><td>30 to 40 sec.</td><td>Flashes</td></tr>
<tr><td>After 40 sec. or longer</td><td>Lights out</td></tr>
<tr><td rowspan="3"> 
9JC01178</td><td rowspan="3">One-touch power max.</td><td>One-touch power max. switch</td><td colspan="2">Monitor display</td><td rowspan="3">• Indicates the operating status of one-touch power maximizing function.</td></tr>
<tr><td>ON</td><td colspan="2">Lights up
(Goes out if pressed for 8.5 seconds)</td></tr>
<tr><td>OFF</td><td colspan="2">Lights out</td></tr>
<tr><td rowspan="5"> 
9JC01179</td><td rowspan="5">Swing lock</td><td>Swing lock switch</td><td>Swing brake cancel switch</td><td>Monitor display</td><td rowspan="5">• Indicates swing lock operating status.</td></tr>
<tr><td>OFF</td><td>OFF</td><td>Lights out</td></tr>
<tr><td>ON</td><td>OFF</td><td>Lights up</td></tr>
<tr><td>OFF</td><td>ON</td><td>Flashes</td></tr>
<tr><td>ON</td><td>ON</td><td>Flashes</td></tr>
<tr><td> 
9JC01180</td><td>Wiper</td><td colspan="3">INT: Intermittent operation
ON: Continuous operation
Lights out: Holds in position</td><td>• Indicates front glass wiper operating condition.</td></tr>
<tr><td> 
9JC01175</td><td>Air conditioner</td><td colspan="3">Lights up: ON
Lights out: OFF</td><td>• Indicates air conditioner and air blower operating status.</td></tr>
<tr><td> 
9JC01181</td><td>Seatbelt</td><td colspan="3">Lights up: Not fastened
Lights out: Fastened</td><td>• Indicates whether seatbelt is fastened.</td></tr>
<tr><td> 
9JC01182</td><td>Engine stop</td><td colspan="3">Lights up: When engine is stopped
Lights out: While engine is running</td><td>• Indicates the engine operating status.</td></tr>
<tr><td> 
9JC01183</td><td>KDPF regeneration</td><td colspan="3">Lights up: KDPF is being regenerated
Lights out: KDPF regeneration is finished</td><td>• Indicates regenerating state of KDPF.</td></tr>
</table>



KVGT speed sensor *(ENG-AAQ4-041-K-00-A)*

KVGT: Abbreviation for KOMATSU Variable Geometry Turbocharger



1. Sensor
2. O-ring
3. Connector

Function *(ENG-AAQ4-042-K-00-A)*

- This sensor, installed to KVGT in the engine, outputs the pulse voltage due to the rotation of KVGT turbine.

★ The 3-pole connector is applied for this sensor, however, available pins are the pin No. 1 and No. 2 only, and it has no pin No. 3.

KVGT position sensor *(ENG-AAQ3-041-K-00-A)*

KVGT: Abbreviation for KOMATSU Variable Geometry Turbocharger

Standard service value table *(ALL-A000-001-K-00-A)*

Standard value table for engine related parts *(PC290_10-A000-033-K-00-A)*

Applicable model					PC290LC–10	
Engine					SAA6D107E–2	
Category	Item	Measuring conditions		Unit	Standard	Service limit
Engine	Speed	• Coolant temperature: within operating range • Swing lock switch: ON	Engine at full speed	rpm	1,955 ± 70	1,955 ± 70
			At low idle	rpm	1,050 ± 50	1,050 ± 50
			Rated speed	rpm	2,050	2,050
	Boost pressure	• Coolant temperature: within operating range • Hydraulic oil temperature: within operating range • Swing lock switch: ON • Arm IN relief + power max.		kPa {mm Hg}	Min. 133 {Min. 1,000}	Min. 107 {Min. 800}
	Exhaust gas color	• Coolant temperature: within operating range • At relief with arm IN • Swing lock switch: ON • After maintaining it at steady-state for five seconds	Engine outlet (Between turbocharger and KDPF inlet)	Bosch index	-	2.2
			KDPF outlet (Tail pipe outlet)	Bosch index	-	0.5
	Valve clearance	• Coolant temperature: normal temperature	Intake valve	mm	0.25	0.152 to 0.381
			Exhaust valve	mm	0.51	0.381 to 0.762
	Compression pressure	• Engine oil temperature: 40 to 60°C	Compression pressure	MPa {kg/cm^2}	Min. 2.41 {Min. 24.6}	Min. 1.69 {Min. 17.2}
			Engine speed	rpm	250 to 280	250 to 280
	Blowby pressure	• Coolant temperature: within operating range • Hydraulic oil temperature: within operating range • Arm IN relief + power max. • When KCCV circuit is disconnected		kPa {mmH_2O}	Max. 0.98 {Max. 100}	Max. 1.96 {Max. 200}
	Engine oil pressure	• Coolant temperature: within operating range • SAE15W-40 Oil	Engine at full speed	MPa {kg/cm^2}	Min. 0.29 {Min. 3.0}	Min. 0.25 {Min. 2.5}
			At low idle	MPa {kg/cm^2}	Min. 0.10 {Min. 1.0}	Min. 0.07 {Min. 0.7}
	EGR valve and KVGT drive pressure	• Coolant temperature: within operating range • Hydraulic oil temperature: within operating range	At low idle	MPa {kg/cm^2}	Min. 1.2 {Min. 12.0}	Min. 1.2 {Min. 12.0}
	Engine oil temperature	• All speed range (inside oil pan)		°C	80 to 110	120
	Fan belt tension	• Between fan pulley and alternator pulley • Deflection when pressed with thumb at 98 N {10 kg}		mm	Auto-tentioner	Auto-tentioner

SHOP MANUAL

HYDRAULIC EXCAVATOR

PC290LC - 10

Model	Serial Number
PC290LC - 10	15001 and up

30 Testing and adjusting

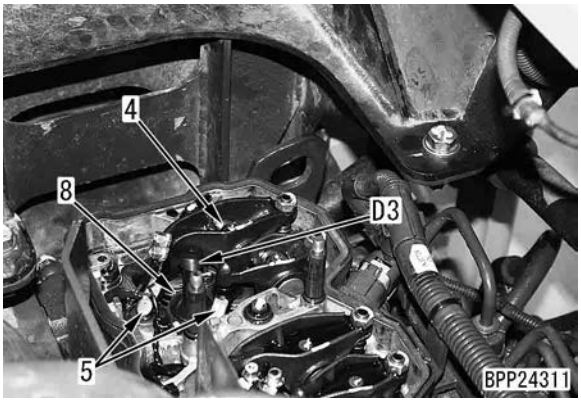
11.Install crosshead assembly (5) and rocker arm assembly (4).

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}

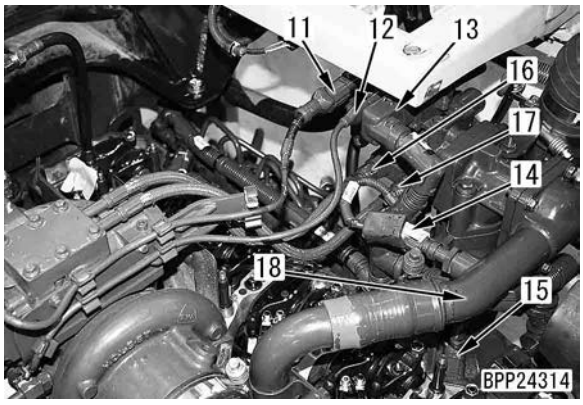
- Tube (18): EGR circuit

EGR circuit tube (18) (flange side):

24 ± 4 Nm {2.45 ± 0.41 kgm}

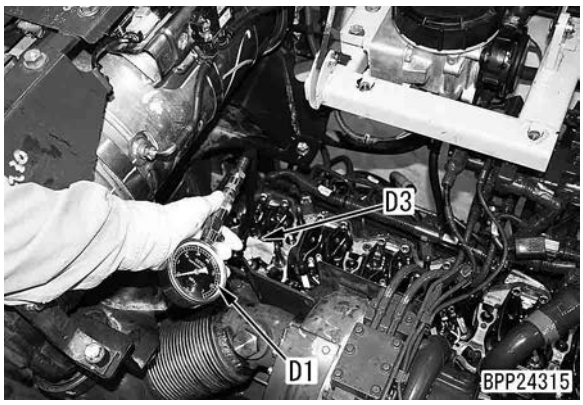
EGR circuit tube (18) (tube side):

10.5 ± 0.5 Nm {1.07 ± 0.05 kgm}



15.Connect gauge assembly D1 to adapter D3.

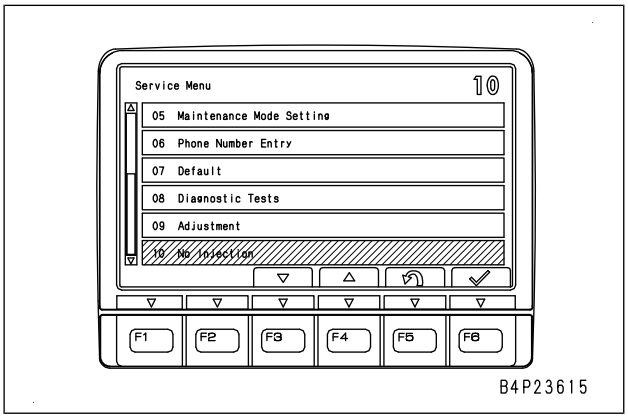
★ If a small amount of oil is applied to the connecting portions of gauge assembly D1 and adapter D3, air will not leak easily.



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".



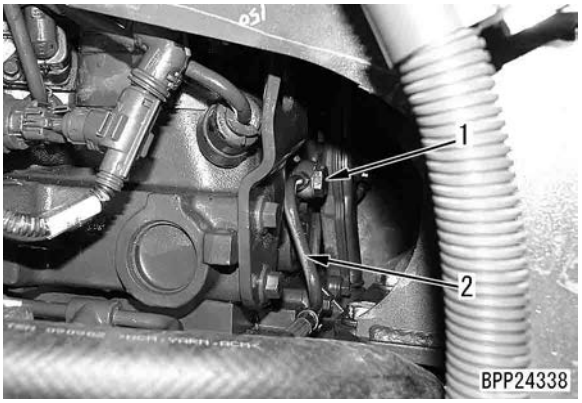
17.Rotate the crankshaft by the starting motor and measure the compression pressure.

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

Testing injector return rate from injector

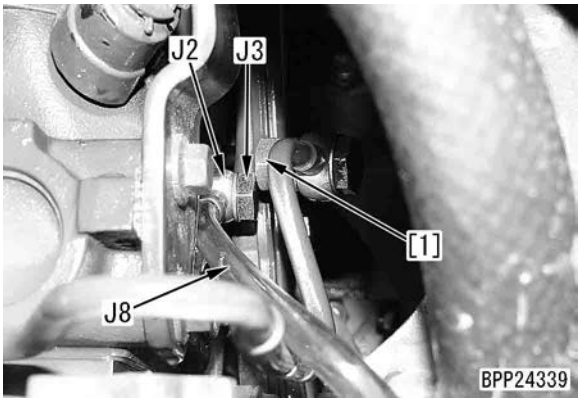
★ The fuel return rate from the injector is tested while spill tube (2) of the pressure limiter is connected. Accordingly, before testing the return rate from the injector, check that the leakage from the pressure limiter is normal.

1. Remove check valve (1) of the cylinder head and disconnect spill tube (2).

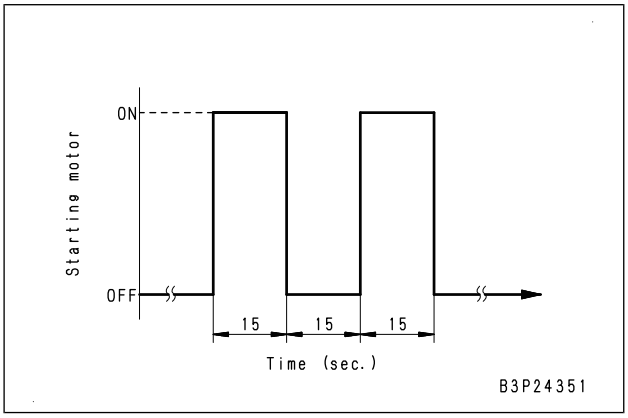


2. Install cap nut [1] of tester kit J1 to spill tube (2) side to prevent the fuel from flowing out.
   ★ When installing cap nut [1], be sure to install the seal washer.
3. Install joint J2 to the cylinder head side and secure it with joint bolt J3.
   ★ When installing joint J2, be sure to install the seal washer.

   Joint bolt J3:
   24 ± 4 Nm {2.45 ± 0.41 kgm}
4. Install hose J8 to joint J2.

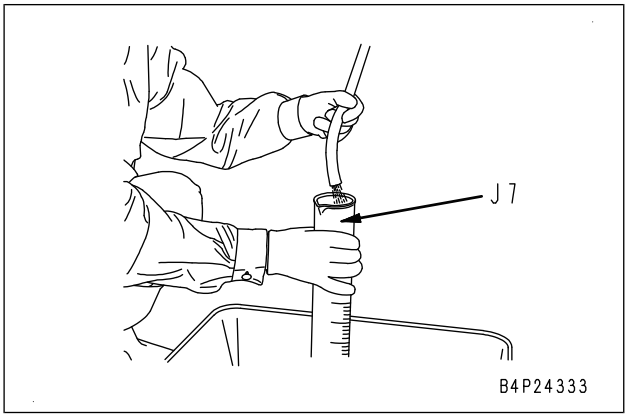


5. Run the engine at low idle and measure the fuel return rate in 30 seconds by using measuring cylinder J7.
   ★ If the engine cannot be started, you can measure the fuel pressure while rotating the engine using the starting motor. However, to protect the starting motor, do not rotate the engine for more than 20 seconds continuously. "Crank the engine for 15 seconds, then stop for 15 seconds and crank it again for 15 seconds." Do the measurement in this manner.



   ★ If the return rate from the fuel injector is in the following range, it is normal.

During low idle (For 30 sec)	Max. 125 mℓ
Cranking (min. 150 rpm, for 30 seconds)	Max. 45 mℓ



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

   Mounting check valve (1) of spill tube (2):
   24 ± 4 Nm {2.45 ± 0.41 kgm}

Testing and adjusting oil pressure in pump PC control circuit *(ALL-C2A3-001-K-00-A)*

★ Testing tools

Symbol		Part No.	Part Name
P	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5220	Nipple (10 x 1.25 mm)
		07002-11023	O-ring

⚠ **Lower the work equipment to the ground and stop the engine. After the engine stops, operate the control lever several times to release the remaining pressure in the piping. Then loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.**

★ Before testing the oil pressure in the pump PC control circuit, check that the oil pressure in the work equipment, swing, and travel circuits and the source pressure of the control circuit are proper.

Measure the PC valve output pressure (servo piston inlet pressure) under the following conditions.

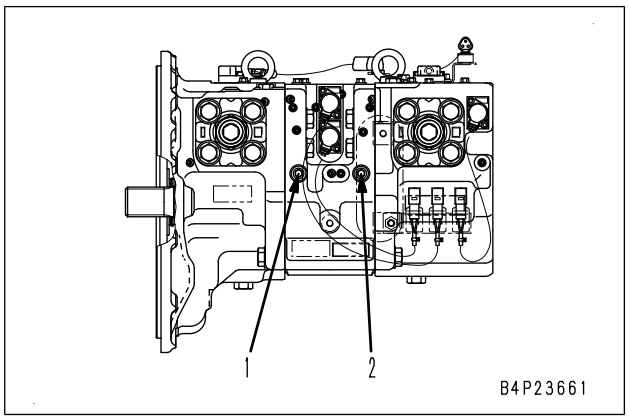
- Hydraulic oil temperature: 45 to 55°C

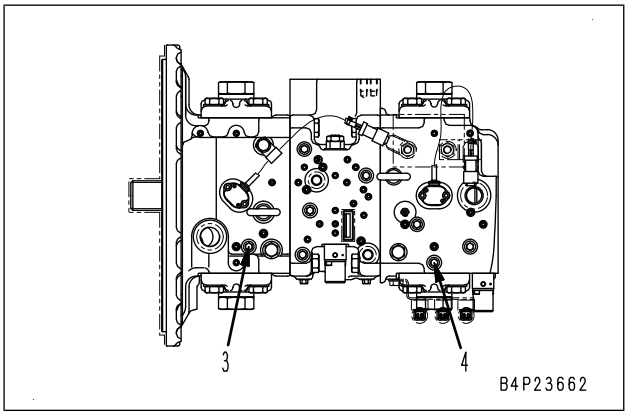
Testing *(PC220-C2A3-362-K-00-A)*

1. **Testing PC valve output pressure (servo piston inlet pressure)**

★ Measure the PC valve output pressure (servo piston inlet pressure) and pump delivery pressure simultaneously and compare them.

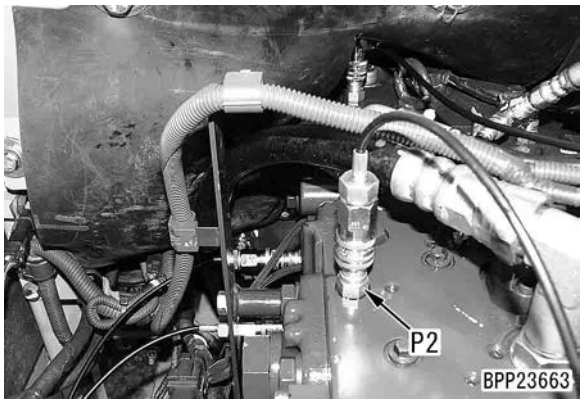
1) Remove pressure pickup port plug (4).
   - (1): Front pump delivery pressure pickup port
   - (2): Rear pump delivery pressure pickup port
   - (3): Front control pressure pickup port
   - (4): Rear control pressure pickup port



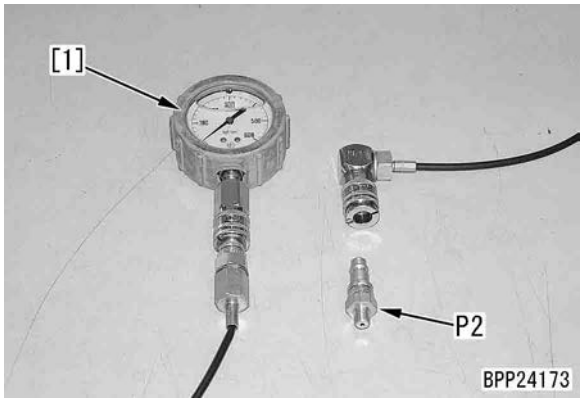


2) Install nipple **P2** to rear control pressure port (4) (the other ports are equipped with nipples) and connect them to oil pressure gauge [1] of hydraulic tester **P1**.

★ Use an oil pressure gauge for 60 MPa {600 kg/cm²}.



3) Start the engine and keep it running until the hydraulic oil temperature rises to the operating range.



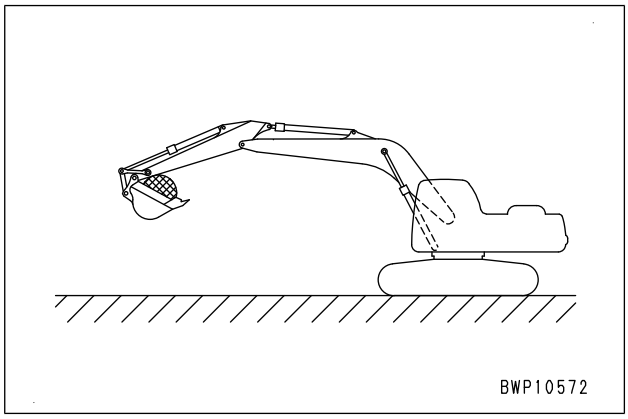
4) Measure the pump delivery pressure and PC valve output pressure (pressure at servo piston inlet) at the same time after setting the machine to the following conditions with the engine running at full speed.
   - Working mode: P mode
   - Swing lock switch ON

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.

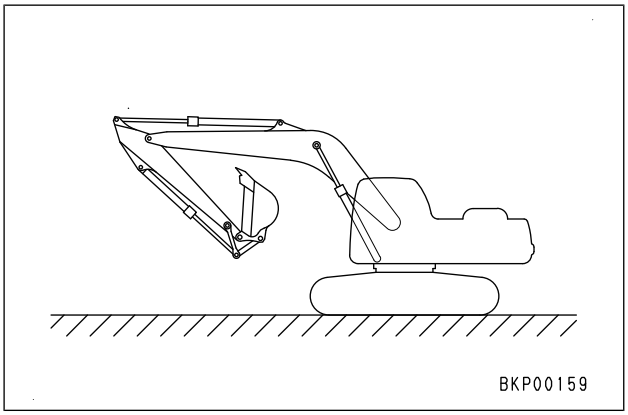
Testing *(PC-L410-360-K-00-A)*

1. Testing boom cylinder and bucket cylinder
   1) Stop the engine with the same posture as the hydraulic drift measurement.
      ★ Apply rated load to the bucket inside or fill the bucket with soil or sand.



   2) For boom, move the boom control lever to "RAISE" side. For bucket, move the bucket control lever to "CURL" side.
      - When the lowering speed is increased at this time, the cylinder packing is defective.
      - If the lowering speed does not change at this time, the control valve is defective.

      Determine the test results as described above.
      ★ The control lever can be operated when the starting switch is set to ON position.
      ★ If the accumulator pressure is reduced, run the engine for approximately 10 seconds to accumulate the pressure.
2. Testing arm cylinder
   1) Operate the arm control lever to IN, and stop the engine at the time when the arm cylinder extends to approximately 100 mm front of the stroke end.

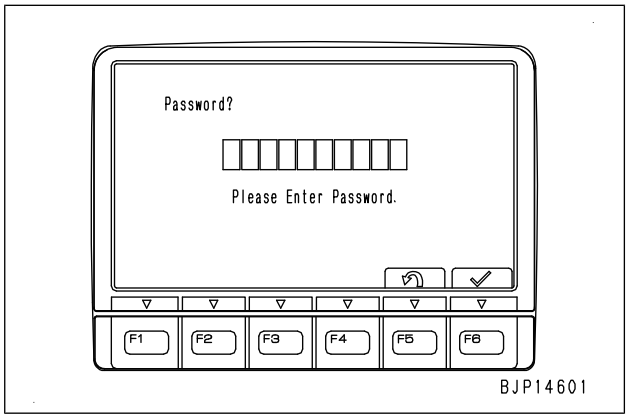


   2) Operate the arm control lever to IN again to determine the test results.
      - When the lowering speed is increased at this time, the cylinder packing is defective.
      - If the lowering speed does not change at this time, the control valve is defective.

      ★ The control lever can be operated when the starting switch is set to ON position.
      ★ If the accumulator pressure is reduced, run the engine for approximately 10 seconds to accumulate the pressure.

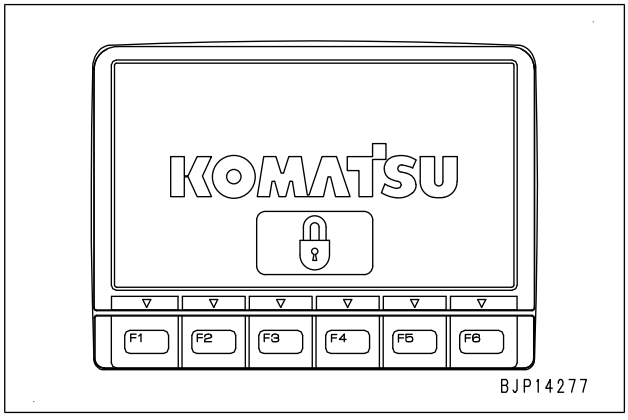
   [Reference] Reasons why the lowering speed is increased by the above operation when the cylinder packing causes the hydraulic drift:
   1) When the machine is set in the above posture (where the holding pressure is applied to the bottom side), the oil leaks from the bottom side to the head side. Since the volume on the head side is less than that on the bottom side by the volume of the rod, the pressure in the head side is increased by the oil flowing in from the bottom side.
   2) As the internal pressure on the head side increases, both pressures come to balance at a certain level of pressure (depending on leakage), and the lowering speed becomes slower.
   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 imbalanced and the lowering speed is increased.
3. Testing PPC valve
   Test the lowering volume of the work equipment when the work equipment lock lever is set to the LOCK position and FREE position with the pressure accumulated in the accumulator.
   ★ The control lever can be operated when the starting switch is set to ON position.

★ The machine monitor has some password functions other than the engine start lock. Those functions are independent from one another.



★ The following screen may sometimes be displayed instead of the above "Password input" screen.

★ If this screen is displayed, call the person responsible for the operation of KOMTRAX in your Komatsu distributor and ask for remedy.



Display of check of breaker mode *(PC220-Q180-044-K-03-A)*

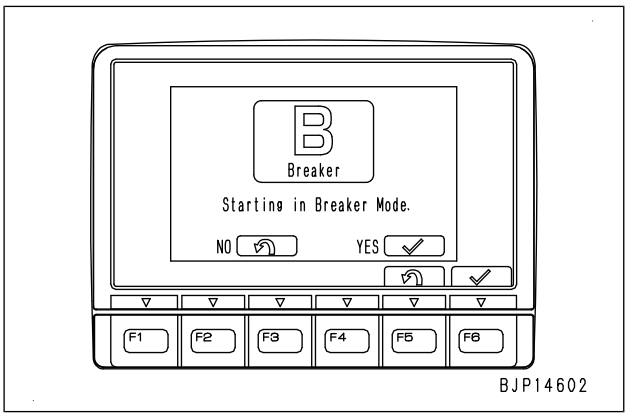
When the starting switch is turned ON, if the working mode is set to the breaker mode [B], a message to inform the operator of starting in the breaker mode is displayed on the screen.

⚠ **If an attachment other than the breaker is used while the working mode is set to the breaker mode [B], the machine may move unexpectedly or may not operate normally or the hydraulic components may be damaged.**

★ After operation to check of the breaker mode is finished, the screen changes to "Display of check before starting".

If [No] is selected: Working mode is set to economy mode [E]

If [Yes] is selected: Working mode is set to breaker mode [B]



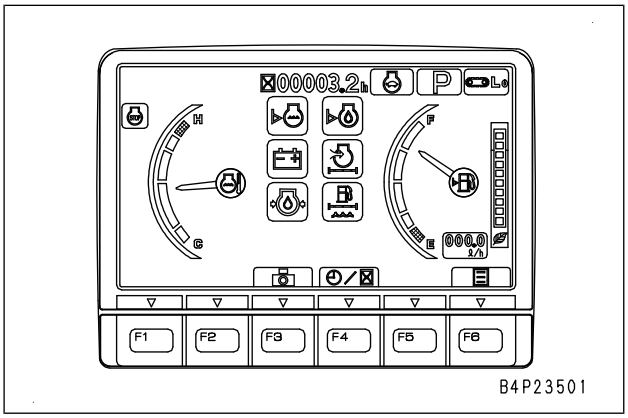
Display of check before starting *(PC220-Q180-044-K-04-A)*

When the screen changes to the check before starting screen, the check before starting is performed for 2 seconds.

★ If any abnormalities are detected in the check before starting, the screen changes to "Warning after the check before starting" screen or "Overdue Maintenance" screen.

★ If no abnormalities were detected in the check before starting, display changes to "Working Mode and Travel Speed Check" screen.

★ The monitors (6 monitors) on the screen shows the items currently subjected to the check before starting.



Display of warning after check before starting *(PC220-Q180-044-K-05-A)*

If any abnormalities are detected in the check before starting, the alarm monitor is displayed on the screen.

★ The figure shows how air cleaner clogging monitor (a) warns of clogging on air cleaner.

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

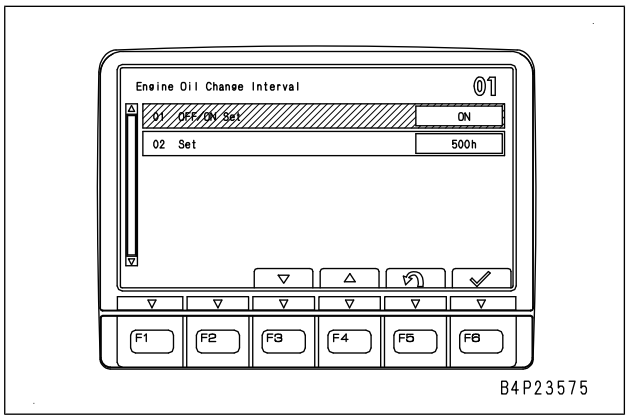
Support screen (4/14) Engine temperature-related items

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

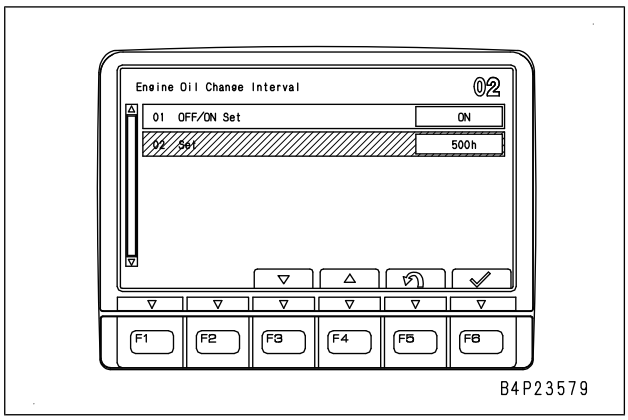
Support screen (5/14) Air intake/exhaust pressure, etc.

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

5. Setting of each maintenance item
   Select each maintenance item. After the screen is displayed, set the item by using the function switches.
   - "ON": Enables function of each maintenance item selected in the operator mode
   - "OFF": Disables function of each maintenance item selected in operator mode
   - [F3]: Moves selection downward
   - [F4]: Moves selection upward
   - [F5]: Cancels the selection and returns the screen to the "Maintenance Mode Change" screen
   - [F6]: Enters selection and returns the screen to the "Maintenance Mode Change" screen



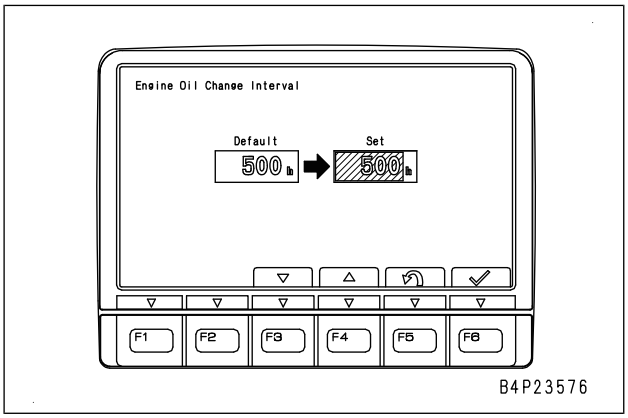
6. Setting of set value of each maintenance item
   Select the set value of each maintenance item. After the screen is displayed, set the value by using the function switches.



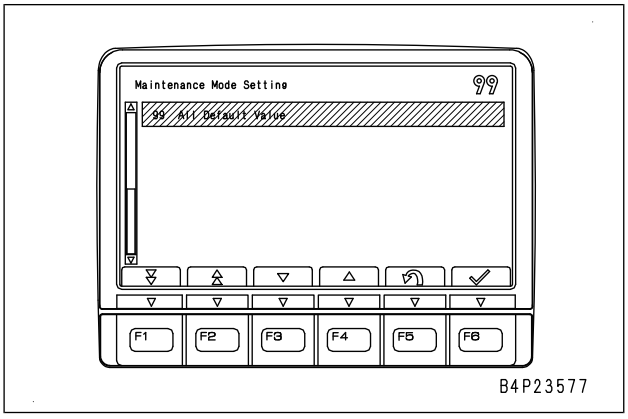
   - "Default": "Maintenance Notice Time" set in machine monitor (unchangeable value recommended by the manufacturer)
   - "Set": Maintenance due time that can be freely set. Maintenance function in operator mode works corresponding to this set time (the time increases or decreases in increments of 25 hours).
   - [F3]: Decreases set value
   - [F4]: Increases set value
   - [F5]: Cancels contents of setting not yet entered and returns the screen to "Maintenance Mode Change" screen
   - [F6]: Enters setting and returns the screen to "Maintenance Mode Change" screen

★ When you enter by using [F6] and return to the "Maintenance Mode Setting" screen by using [F5] , your setting is enabled.

★ If the set value of an item of which maintenance reminder function is set to "ON" is changed after one operating hour or more from the setup, the change is recognized as a reset of the remaining time.



7. Function to return all of the values to default values
   After selecting "All Default Value" and the screen is displayed, select the desired setting by using the function switches.



   - If the operation for this function is executed, the set values of all the maintenance items are returned to the default values.
   - [F5]: Returns the screen to the "Maintenance Mode Setting" screen
   - [F6]: Executes initialization

★ A while after [F6] is pressed, the initialization completion screen is displayed. Then, when the "Maintenance Mode Setting" screen is displayed, initialization is complete.

Table 1. Failure cause codes

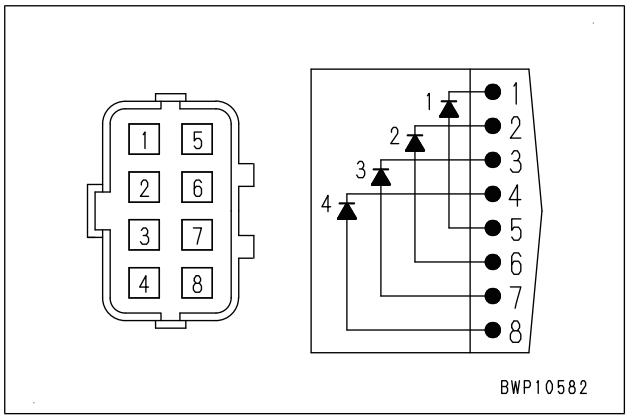
Calibration failure cause codes (Displayed in descending order of priority)

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.

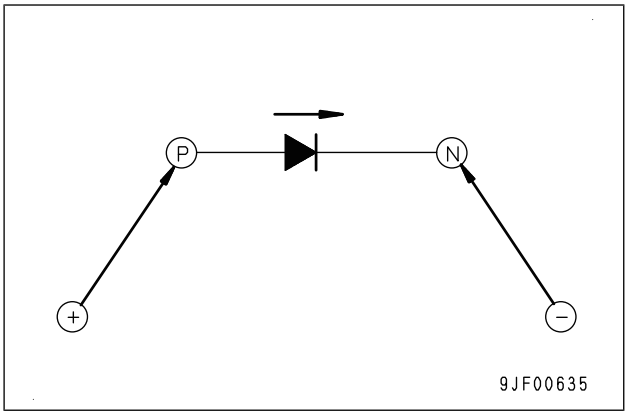


★ The continuity direction of the single diode is indicated on the surface of the diode.

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)

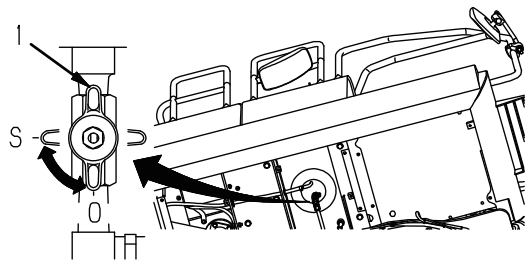
      Note: In the case of a silicon diode, a value in the range from 460 to 600 mV is indicated.
      - The indicated value is 0 or approximate 0:
        The diode has internal short circuit (defective).



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)

- Prepare the filter wrench.

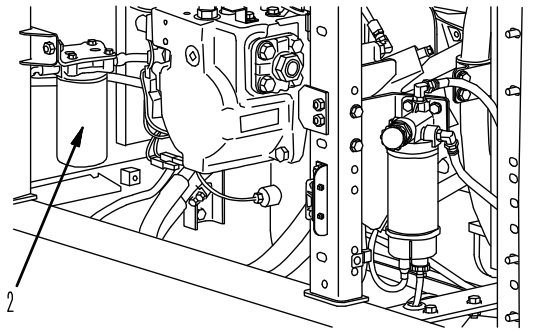
1. Turn valve (1) at the bottom of the fuel tank to the "CLOSE" (S) position.



B4P23368

2. Open the side cover on the rear right side of the machine.
3. Place a container under the filter cartridge to receive the fuel.
4. Using the filter wrench, rotate filter cartridge (2) to remove.

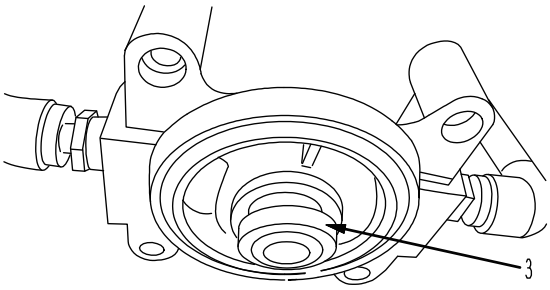
★ If the filter cartridge is removed, the fuel drips from the filter head.
Do not leave the machine with the filter cartridge removed to prevent the fuel from flowing out.



B4P23370

5. Clean the filter holder. Apply a thin film of oil to the packing of the new filter cartridge and install the cartridge to the filter holder.

★ Replace inside seal (3) with a new one.



B4P22411

★ Do not fill the new filter cartridge with fuel.

★ Remove cap (A) at the center before installing the filter cartridge.

c6. Check of wiring harness for discoloration, burn and cover peeling

- Check the wiring harness and cables for discoloration and burn.

★ Discoloration and burn indicate that short circuit or ground fault is in the circuit.

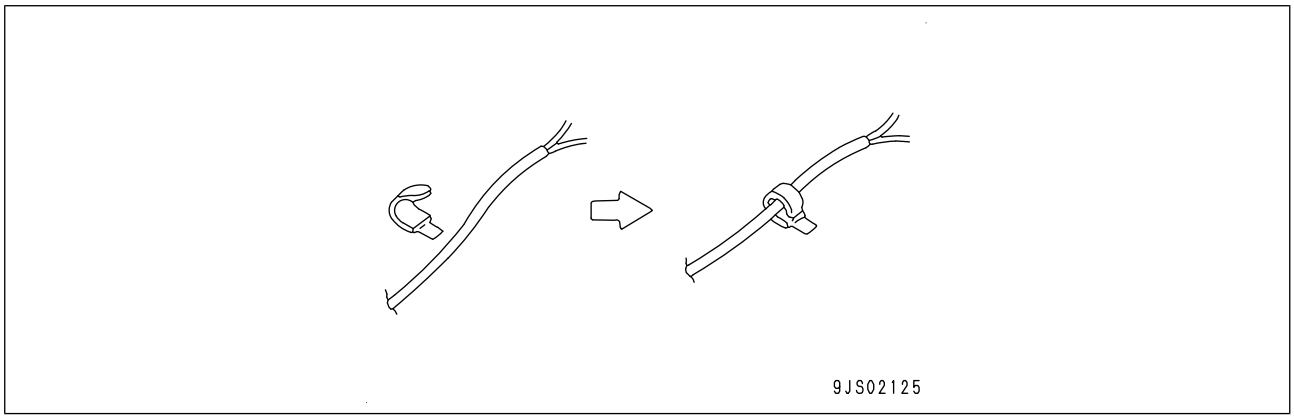
- Check the wiring harnesses and cables for damage and peeling of the covers.
- If any fault are found, repair or replace the wiring harness or cable.

c7. Check for coming off of wiring harness clamps and sagging of the wiring harness

- Check the wiring harnesses for sagging and play caused by coming off of the clamp.

★ In particular, carefully check the wiring harness around the hot and movable parts.

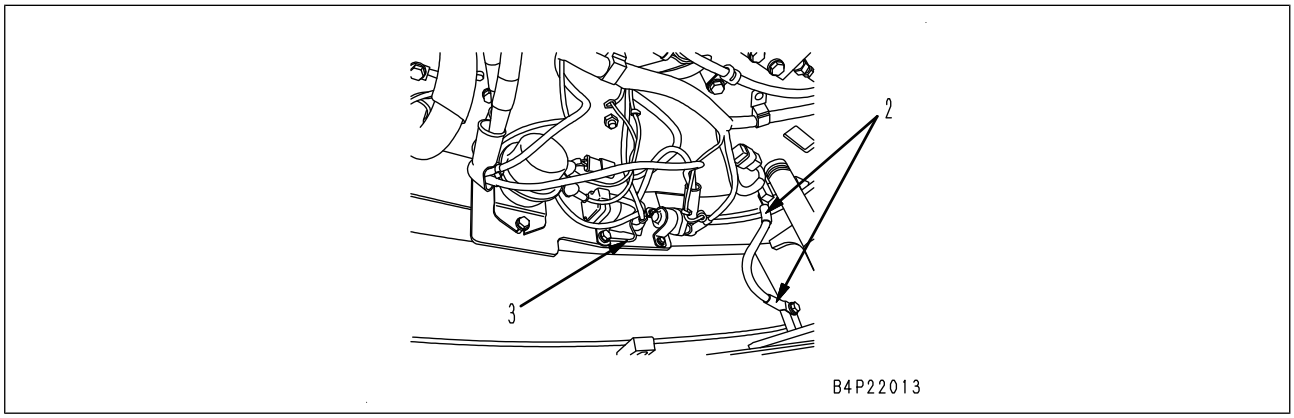
- If any part is off the clamp, secure it by clamp again.



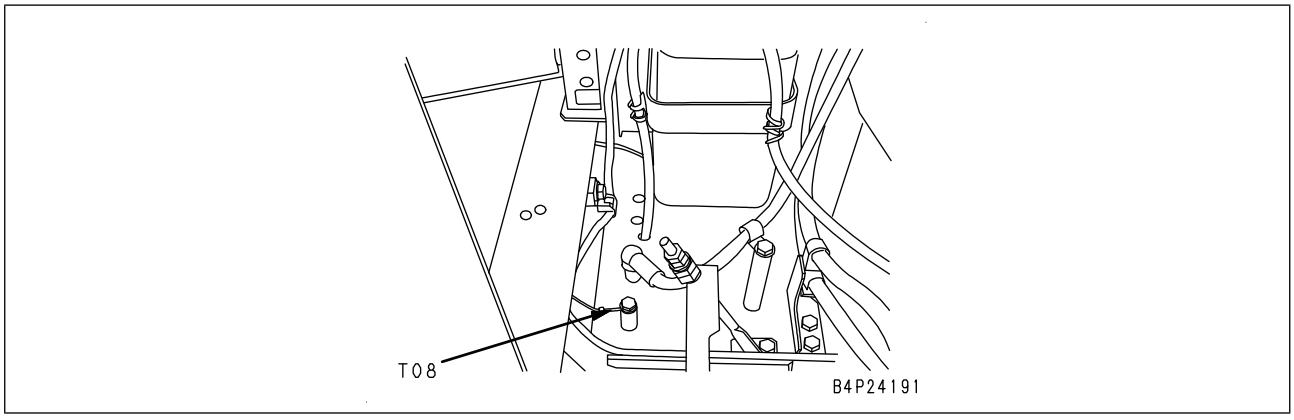
c8. Check of grounding

★ Check the ground terminal for looseness and rusting in particular.

- Check the connection of ground terminals (2) and (T01).



- Open the side cover at the rear left of the machine.
- Check the connection of ground terminal (T08).



- Check ground terminals (T04) to (T07), (T09), and (T10) for connection.

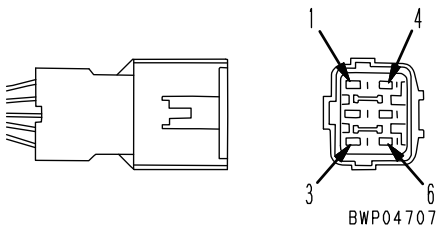
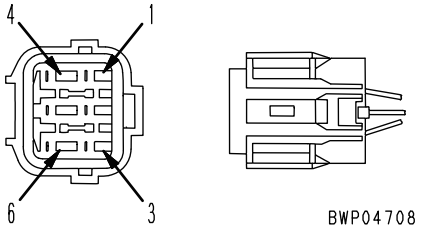
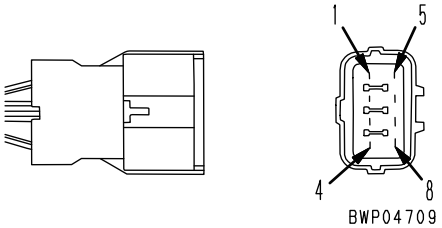
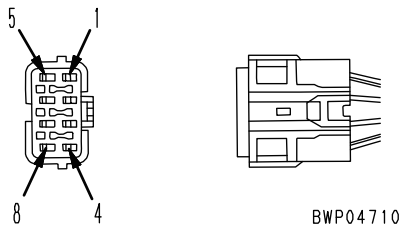
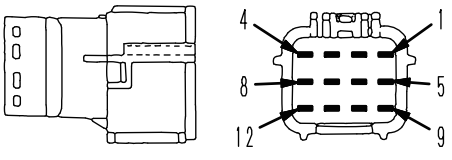
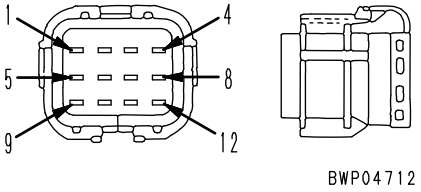
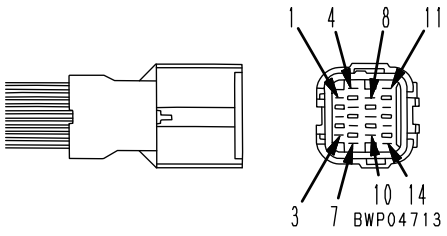
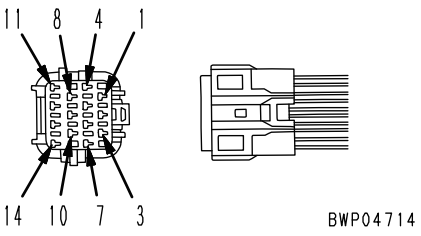
Information in troubleshooting table *(ALL-5170-421-A-01-A)*

(Rev. 2011/12)

★ The following information is summarized in the troubleshooting table. Before performing troubleshooting, understand that information fully.

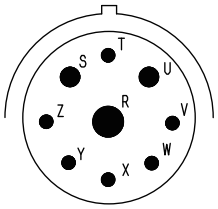
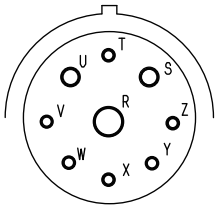
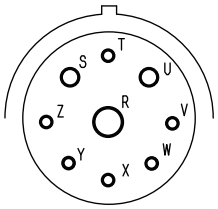
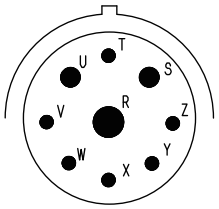
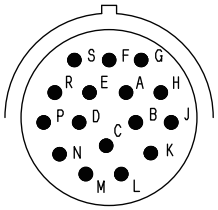
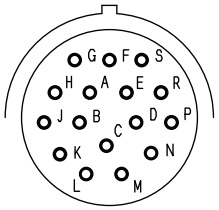
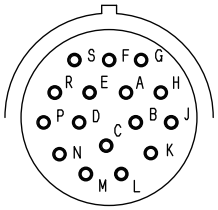
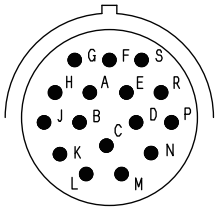
Action level	Failure code	Failure	Failure name displayed on the Abnormality Record screen of the machine monitor
Display on machine monitor	Display on machine monitor		
Detail of failure	Description of the failure detected by the machine monitor or controller		
Action of controller	An action that is performed to protect the system and devices when a failure is detected by the machine monitor or controller		
Problem on machine	A problem that appears as a failure on the machine as a result of an action (above) that is performed by the machine monitor or controller.		
Related information	Information on occurred failure or troubleshooting		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective —	<Contents of description> • Procedure • Measuring location ★ "Between A and B" denotes measuring values such as voltage and resistance between A and B. ★ "Between A and ground" means the measurement of voltage, resistance or others between terminal A and the place which has a continuity with chassis frame such as unpainted hexagonal head bolt or bolt hole which has no rust, etc. • Criteria to judge probable causes (standard value), remarks <How to use troubleshooting sheet> • Perform troubleshooting procedures in numerical order. • If the check result does not meet the criteria, the probable cause described on the left column is the actual cause of the failure. • If the check result meet the criteria and there is no specific instruction, proceed to the next step (cause). • If a defect is found and repaired, check that the defect has been corrected. <Failures in wiring harness> • Open circuit Connection of connector is defective or wiring harness is broken. • Ground fault A harness not to be connected to the ground (earth) circuit comes into contact with the ground (earth) circuit or chassis accidentally. • Hot short circuit A harness not to be connected to the power circuit comes into contact with the power circuit accidentally. • Short circuit An independent wire in the harness erroneously comes into contact with another independent wire. (poor insulation at connector and others)
2	Open or short circuit in wiring harness	
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	
4	Ground fault in wiring harness (contact with ground circuit)	
5	Hot short circuit	
6	Short circuit in wiring harness	

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

B4D18191

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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
24-9 (5)	Pin (male terminal)	Socket (female terminal)	
	 BWP05017	 BWP05018	799-601-9250 (T-adapter)
	Part No. :08191-51201, 08191-51202	Part No. :08191-54101, 08191-54102	
	Socket (female terminal)	Pin (male termial)	
	 BWP05019	 BWP05020	799-601-9250 (T-adapter)
	Part No. :08191-52201, 08191-52202	Part No. :08191-53101, 08191-53102	
24-16 (6)	Pin (male terminal)	Socket (female terminal)	
	 BWP05021	 BWP05022	799-601-9260 (T-adapter)
	Part No. :08191-61201, 08191-62202, 08191-61205, 08191-62206	Part No. :08191-64101, 08191-64102, 08191-64105, 08191-64106	
	Socket (female terminal)	Pin (male termial)	
	 BWP05023	 BWP05024	799-601-9260 (T-adapter)
	Part No. :08191-62201, 08191-62202, 08191-62205, 08191-62206	Part No. :08191-63101, 08191-63102, 08191-63105, 08191-63106	

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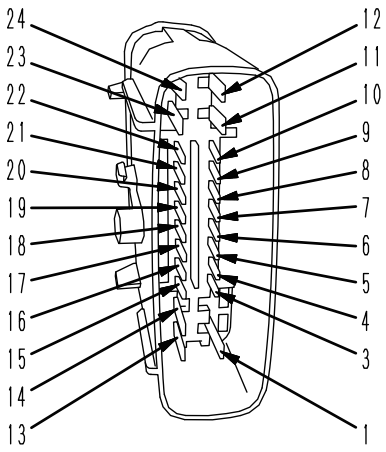
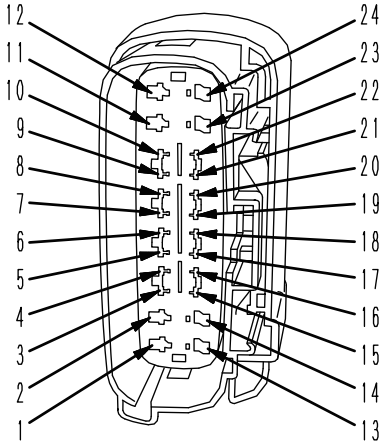
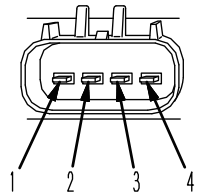
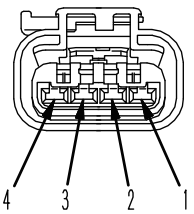
FRAMATOME connector for engine

No. of pins	Inter mediate connector (107, 114, 125, 140 engine)		
	Engine side (plug)	Machine side (receptacle)	Testing connection use special tool Part No.
24			799-601-4651 (T-adapter) (Kit : 799-A65-4600)
	—	—	

No. of pins	Mass air flow sensor (95, 107, 114, 125, 140 engine) KDPF temperature sensor consolidating box, KDPF delta (outlet) pressure sensor (107, 114, 125, 140 engine)		
	Sensor side (plug)	Harness side (receptacle)	
4			799-601-4620 (T-adapter) (Kit : 799-A65-4600)
	—	—	

B4W21626

Failure codes table *(PC220-5520-441-A-00-A)*

Failure code	Failure (Displayed on screen)	Controller	Action level	Category of history	Remarks
879AKA	Failure code [879AKA] A/C Inner Sensor Open Circuit(PAGE 40-126)	MON	—	Electrical system	See Chapter 80, Other items
879AKB	Failure code [879AKB] A/C Inner Sensor Short Circuit(PAGE 40-127)	MON	—	Electrical system	See Chapter 80, Other items
879BKA	Failure code [879BKA] A/C Outer Sensor Open Circuit(PAGE 40-128)	MON	—	Electrical system	See Chapter 80, Other items
879BKB	Failure code [879BKB] A/C Outer Sensor Short Circuit(PAGE 40-129)	MON	—	Electrical system	See Chapter 80, Other items
879CKA	Failure code [879CKA] Ventilating Sensor Open Circuit(PAGE 40-130)	MON	—	Electrical system	See Chapter 80, Other items
879CKB	Failure code [879CKB] Ventilating Sensor Short Circuit(PAGE 40-131)	MON	—	Electrical system	See Chapter 80, Other items
879DKZ	Failure code [879DKZ] Sunlight Sensor Open or Short Circuit(PAGE 40-132)	MON	—	Electrical system	See Chapter 80, Other items
879EMC	Failure code [879EMC] Ventilation Damper Abnormality(PAGE 40-133)	MON	L01	Electrical system	See Chapter 80, Other items
879FMC	Failure code [879FMC] Air Mix Damper Abnormality(PAGE 40-134)	MON	L01	Electrical system	See Chapter 80, Other items
879GKX	Failure code [879GKX] Refrigerant Abnormality(PAGE 40-135)	MON	L01	Electrical system	See Chapter 80, Other items
989L00	Failure code [989L00] Engine Controller Lock Caution1(PAGE 40-136)	MON	—	Electrical system	
989M00	Failure code [989M00] Engine Controller Lock Caution2(PAGE 40-137)	MON	—	Electrical system	
989N00	Failure code [989N00] Engine Controller Lock Caution3(PAGE 40-138)	MON	—	Electrical system	
A1U0N3	Failure code [A1U0N3] HC desorb request1 (PAGE 40-139)	PUMP/ ENG	L01	Electrical system	
A1U0N4	Failure code [A1U0N4] HC desorb request2 (PAGE 40-141)	PUMP/ ENG	L03	Electrical system	
AA10NX	Failure code [AA10NX] Air Cleaner Clogging (PAGE 40-143)	MON	L01	Mechanical system	
AB00KE	Failure code [AB00KE] Charge Voltage Low (PAGE 40-145)	MON	L03	Mechanical system	
B@BAZG	Failure code [B@BAZG] Engine Oil Pressure Low(PAGE 40-147)	ENG	L03	Mechanical system	
B@BAZK	Failure code [B@BAZK] Eng Oil Level Low (PAGE 40-148)	MON	L01	Mechanical system	
B@BCNS	Failure code [B@BCNS] Engine Coolant Overheat(PAGE 40-149)	ENG	L02	Mechanical system	
B@BCZK	Failure code [B@BCZK] Radiator Coolant Level Low(PAGE 40-150)	MON	L01	Mechanical system	
B@HANS	Failure code [B@HANS] Hyd Oil Overheat (PAGE 40-152)	PUMP	L02	Mechanical system	
CA115	Failure code [CA115] Eng Ne and Bkup Speed Sens Error(PAGE 40-153)	ENG	L04	Electrical system	

Failure code [879EMC] Ventilation Damper Abnormality *(PC220-879EMC-441-A-00-A)*

See "Failure code [879EMC] Ventilation Damper Abnormality" of Section 80 Appendix.

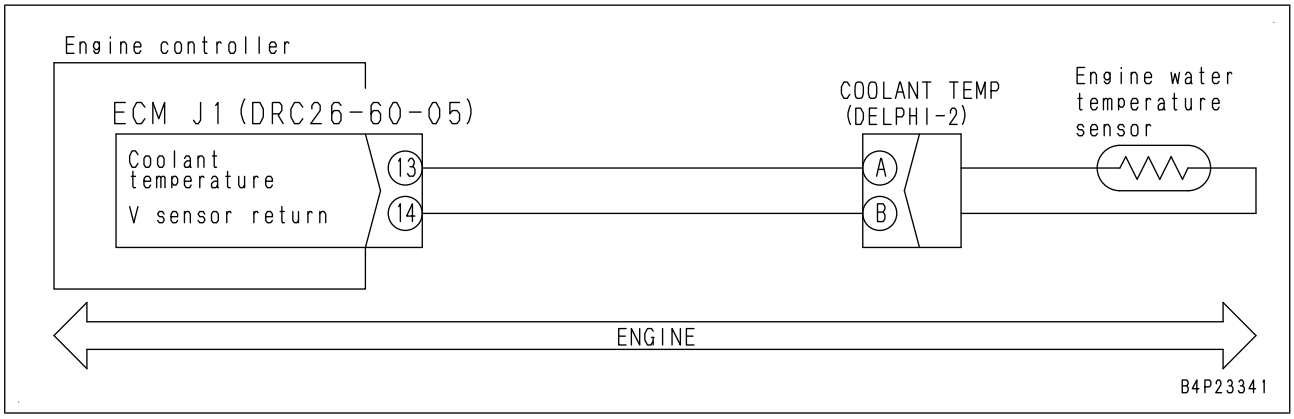
★ Since connector of vent changeover servomotor cannot be disconnected while air conditioner is mounted on machine, air conditioner controller or air conditioner unit must be replaced.

Failure code [B@BCNS] Engine Coolant Overheat *(PC220_10-BaBCNS-400-A-01-A)*

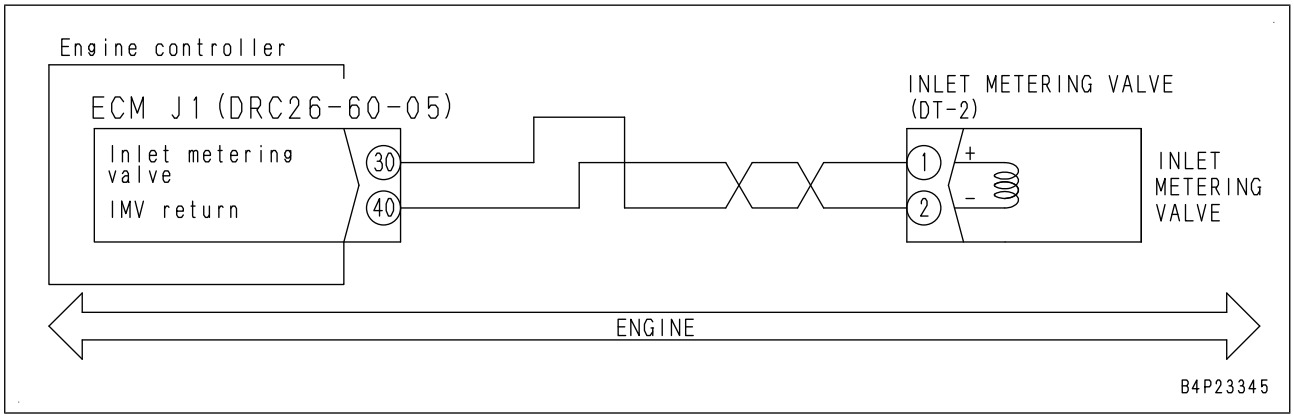
Action level	Failure code	Failure	Engine coolant overheats (Engine controller system)
L02	B@BCNS		
Details of failure	• While engine is running, engine controller detects overheating of engine coolant from signal voltage of engine coolant temperature sensor.		
Action of controller	• Displays engine coolant temperature monitor red on machine monitor. • If cause of failure disappears, machine becomes normal by itself. • Limits engine output and allows engine run. • Stops regeneration control. • Closes EGR valve (depending on coolant temperature).		
Problem on machine	• If machine is operated as it is, engine may seize up.		
Related information	• Signal of engine coolant temperature sensor is input to engine controller and then data is transmitted to machine monitor through CAN communication system. • Engine coolant temperature can be checked with monitoring function. (Code: 04107 Engine coolant temperature) • Method of reproducing failure code: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Overheating of engine coolant (when system is normal)	Engine coolant may overheat. Check it and remove cause if it overheats.
2	Defective engine coolant temperature gauge system	If no failure is found by above checks, engine coolant temperature gauge system may be defective. Perform the following troubleshooting described in E-mode troubleshooting section. • E-19 Coolant temperature gauge indicates either Min. or Max. and does not move(PAGE 40-571) • E-20 Coolant temperature gauge indicates incorrect temperature (indicates neither Min. nor Max.)(PAGE 40-572)

Circuit diagram related to coolant temperature sensor



Circuit diagram related to IMV / PCV1



Failure code [CA351] Injectors Drive Circuit Error *(PC200-CA351-400-A-00-A)*

Action level	Failure code	Failure	Injector drive circuit error (Engine controller system)
L03	CA351		
Details of failure	• There is error in drive power circuit of injector.		
Action of controller	• Limits engine output and allows engine to run.		
Problem on machine	• Exhaust gas becomes black. • Combustion becomes irregular. • Engine output decreases. • Stopped engine cannot be started.		
Related information	• Method of reproducing failure code: Starting engine. • Power supply voltage of engine controller can be checked by using monitoring function. (Code: 03203 (V))		

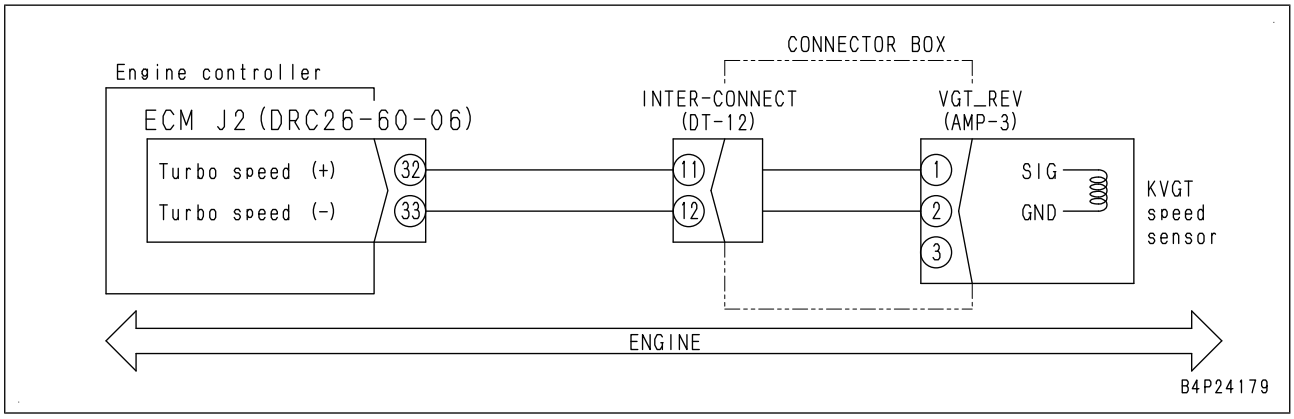
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective related system	If another failure code is displayed, perform troubleshooting for it, too.
2	Defective power supply voltage system	Perform troubleshooting for failure code [CA441].

Failure code [CA449] Rail Press Very High Error *(PC200-CA449-400-A-00-A)*

Action level	Failure code	Failure	Common rail pressure sensor very high error 2 (Engine controller system)
L03	CA449		
Details of failure	• High pressure error (2) appears in common rail circuit.		
Action of controller	• Runs engine with engine output limited.		
Problem on machine	• Engine sound becomes large without load or with light load. • Engine output decreases.		
Related information	• Common rail pressure can be checked with monitoring function. (Code: 36400 Common rail pressure) • Method of reproducing failure code: Start engine.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective related system	If another failure code is displayed, perform troubleshooting for it, too.		
2	Air in low-pressure fuel circuit	Air may be in low-pressure fuel circuit. Check it according to following procedure. 1. Remove fuel pressure pickup port plug (outlet side) of fuel main filter. 2. Operate feed pump of fuel pre-filter. 3. Check leakage level of fuel and air from pressure pickup plug hole.		
3	Defective fuel return circuit parts	★ For check of pressure in fuel return circuit, see Testing and adjusting, "Testing fuel pressure".		
		Fuel return circuit pressure	Engine at low idle or cranking	Max. 18.6 MPa {Max. 0.19 kg/cm^2}
4	Defective common rail pressure sensor system	Perform troubleshooting for failure codes **[CA451]** and **[CA452]**.		
5	Defective pressure limiter	★ For check of leakage from pressure limiter, see Testing and adjusting, "Checking fuel return rate and leakage".		
		Leakage from pressure limiter	Engine at low idle (for 30 seconds)	Max. 8 cc
6	Defective supply pump	If no failure is found by above checks, supply pump may be defective.		

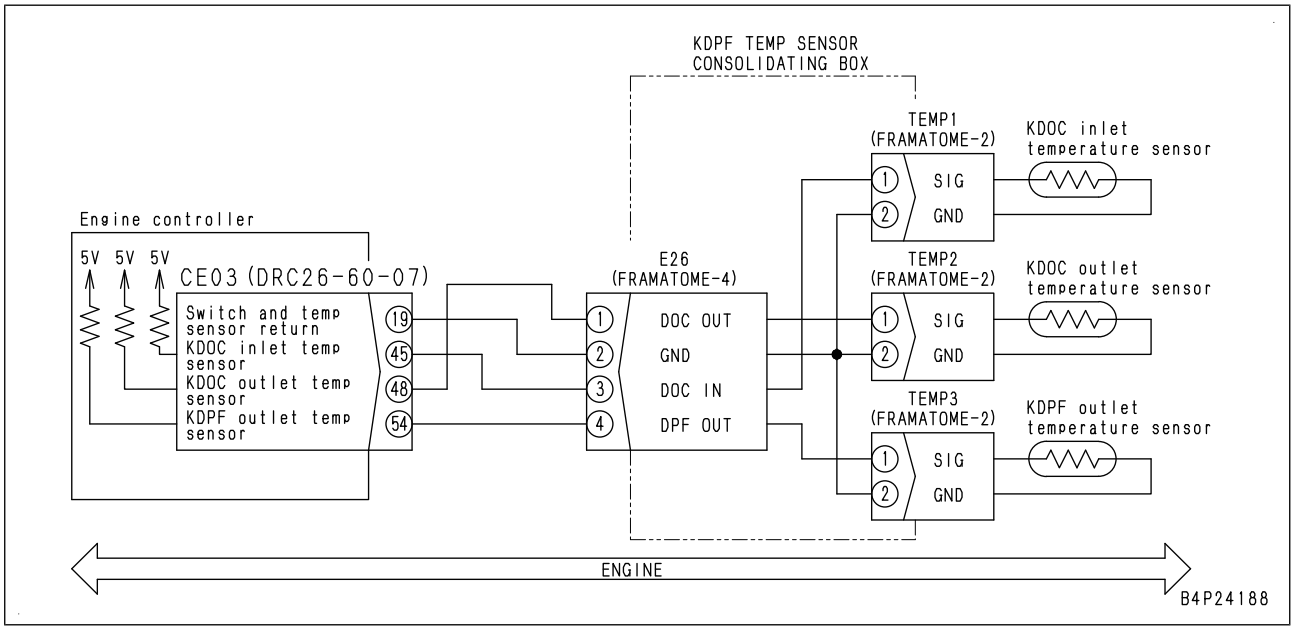
Circuit diagram related to turbo speed sensor



No.	Cause	Procedure, measuring location, criteria and remarks
5	Short circuit in wiring harness	1. Turn starting switch to ON position. 2. Monitor signal voltage from KDOC inlet temperature sensor and KDPF outlet temperature sensor, and record signal voltages from respective temperature sensors in the initial state (see Related information). 3. Turn starting switch to OFF position. 4. Disconnect either connector TEMP1 or TEMP2. 5. Turn starting switch to ON position. 6. Monitor signal voltage from KDOC inlet temperature sensor and KDPF outlet temperature sensor, and record 2nd signal voltages from respective temperature sensors (see Related information).
		If 2nd signal voltages from KDPF outlet temperature sensor are almost same as those in initial state respectively, wiring harness is short circuited (perform troubleshooting for failure codes [CA3315] and [CA3322]).

★ Start and run engine at high idle for 15 minutes, and then check that this failure code is not displayed.

Circuit diagram related to KDOC temperature sensor



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Defective wiring harness or engine controller</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector E25.
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If failure code [CA1881] is not displayed, wiring harness or engine controller is defective.
★ Perform check on cause 2 again.
★ Ignore other displayed failure codes.</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective wiring harness or engine controller</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connector E25 and connect short connector to female side.
★ Connect 5 V line to signal line (short pin (4) to (2) of connector E25).
3. Turn starting switch to ON position.</td></tr>
<tr><td colspan="3">If failure code [CA1879] is not displayed, wiring harness or engine controller is defective.
★ Perform check on cause 2 again.
★ Ignore other displayed failure codes.</td></tr>
<tr><td>7</td><td>Defective KDPF delta pressure sensor</td><td colspan="3">★ If no failure is found by check on cause 5, KDPF delta pressure sensor is defective.</td></tr>
<tr><td rowspan="4">8</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 CE03 and E25, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="3">Resistance</td><td>★ If no failure is found by check on cause 2, this check is not required.
Between CE03 (female) (43) and E25 (female) (1)</td><td>Max. 10 Ω</td></tr>
<tr><td>★ If no failure is found by check on cause 2, this check is not required.
Between CE03 (female) (52) and E25 (female) (4)</td><td>Max. 10 Ω</td></tr>
<tr><td>Between CE03 (female) (55) and E25 (female) (2)</td><td>Max. 10 Ω</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Ground fault in wiring harness (contact with GND circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CE03 and E25, and connect T-adapters to either female side.</td></tr>
<tr><td>Resistance</td><td>Between ground and CE03 (female) (55) or between E25 (female) (2)</td><td>Min. 100 kΩ</td></tr>
<tr><td rowspan="2">10</td><td rowspan="2">Short circuit in wiring harness</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CE03 and E25, and connect T-adapters to female side of connector CE03.
★ Check by using multimeter in continuity mode.</td></tr>
<tr><td>Continuity</td><td>Between CE03 (female) (55) and each pin other than (55)</td><td>No continuity
(No sound is heard)</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Defective engine controller</td><td colspan="3">1. Turn starting switch to ON position and wait for approximately one minute (recheck of error at key-ON).
2. If this failure code is displayed, perform [Clearing failure codes] in "Related information".</td></tr>
<tr><td colspan="3">When this failure code remains displayed and no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

★ If this failure code is still displayed and does not disappear even after performing "How to clear the failure code" in Related information, repeat the troubleshooting.

Failure code [CA2272] EGR Valve Pos Sens Low Error *(PC220_10-CA2272-400-A-00-A)*

Action level	Failure code	Failure	EGR valve lift sensor low error (Engine controller system)
L03	CA2272		
Details 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)) • Valve 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.		

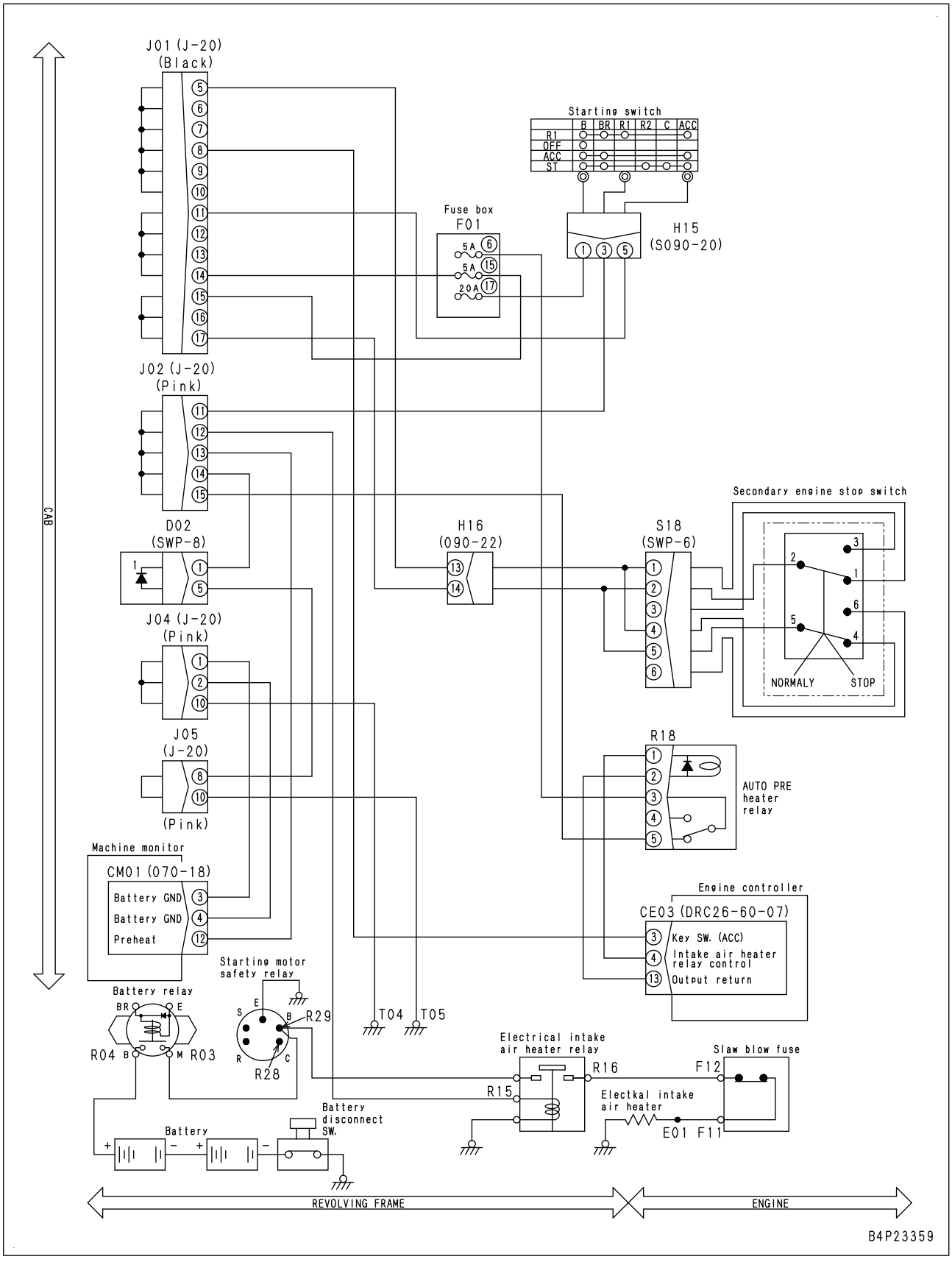
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	1. Perform checkup referencing descriptions of wiring harness and connectors in "c: Electrical equipment"of "Checks before troubleshooting" in "General information on troubleshooting". 2. Turn starting 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 sensor power supply system	If failure code **[CA352]** or **[CA386]** is also displayed, perform troubleshooting for it first.			
3	Defective sensor power supply system	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
4	Open circuit in connector box (wire breakage or defective contact of connectors)	1. Turn starting switch to OFF position. 2. Disconnect connector INTER-CONNECT and SEGR, and connect T-adapter.			
		Resistance	★ If no failure is found by check on causes 2 and 3, 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 causes 2 and 3, 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
5	Ground fault in connector box (contact with GND circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector INTER-CONNECT and SEGR, and connect T-adapters.			
		Resistance	Between ground and INTER-CONNECT (male) (5) and SEGR (female) (C)		Min. 100 kΩ
			Between ground and INTER-CONNECT (male) (3) and SEGR (female) (A)		Min. 100 kΩ

Failure code [CA2376] EGR Orifice Temp Sens Low Error *(PC220_10-CA2376-400-A-00-A)*

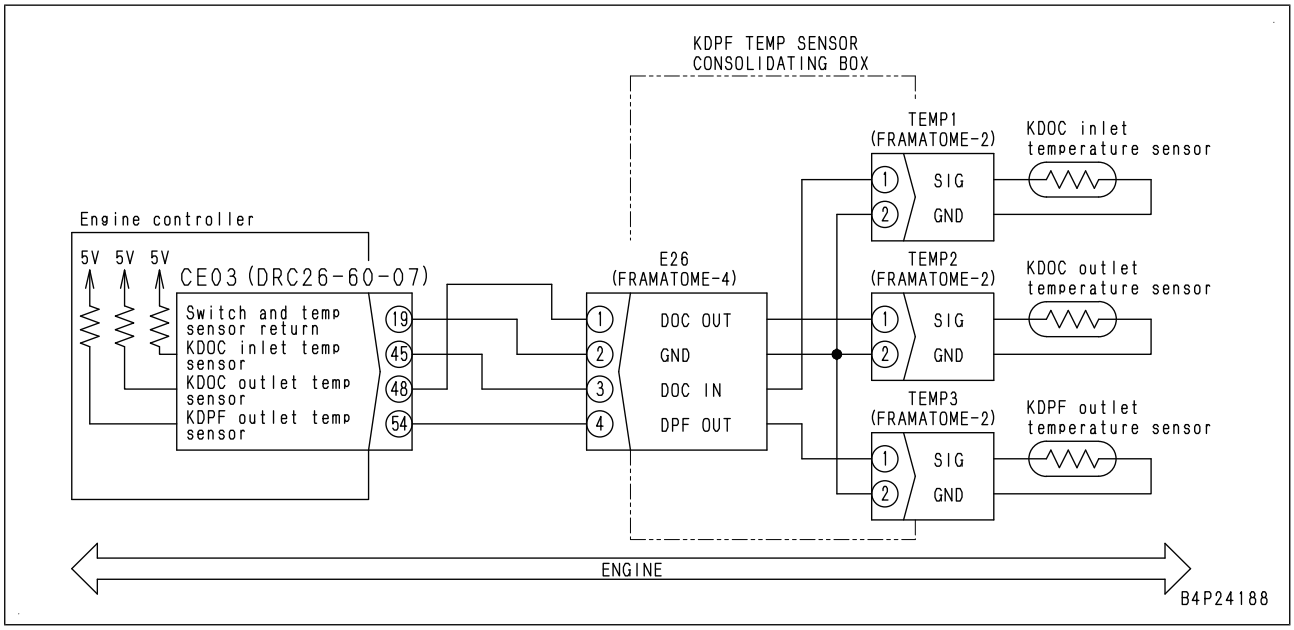
Action level	Failure code	Failure	EGR orifice temperature sensor low error (Engine controller system)
L03	CA2376		
Details of failure	• Low voltage error is detected in EGR orifice temperature sensor signal circuit.		
Action of controller	• Runs engine by setting EGR orifice temperature to the calculated value. • Closes EGR valve. • Limits engine output and allows engine to run. • Stops regeneration control by KDPF.		
Problem on machine	• Engine output decreases.		
Related information	• Voltage sensed by EGR orifice temperature sensor can be checked using monitoring function. (Code: 48501 (V)) • Temperature sensed by EGR orifice temperature sensor can be checked using monitoring function. (Code: 48500 (°C)) • 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 harness and connectors in "c: Electrical equipment" of "Checks before troubleshooting" in "General information on troubleshooting", and check them. 2. Turn starting switch to ON position.			
2	Defective EGR orifice temperature sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector EXHAUST GAS TEMPERATURE. 3. Turn starting switch to ON position. If this failure code changes to failure code **[CA2375]**, EGR orifice temperature sensor is defective.			
3	Defective EGR orifice temperature sensor (internal defect)	• Reference 1. Turn starting switch to OFF position. 2. Disconnect connector EXHAUST GAS TEMPERATURE and connect T-adapter to male side.			
		Resistance	Between EXHAUST GAS TEMPERATURE (male) (1) and (2)	-30°C	760 to 880 kΩ
				0°C	380 to 515 kΩ
				25°C	155 to 225 kΩ
				80°C	21 to 29 kΩ
				200°C	900 to 1050 Ω
				300°C	150 to 200 Ω
				400°C	40 to 56 Ω
				500°C	15 to 22 Ω
			Between EXHAUST GAS TEMPERATURE (male) (2) and ground (sensor body)	Whole range	Min. 100 kΩ
4	Open circuit or short circuit in wiring harness (short circuit, open circuit or defective connector contact)	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J2 and connect T-adapter to female side. ★ Resistance is the same as that given in temperature-resistance characteristics table of EGR orifice temperature sensor that has bee used to check cause 3.			
		Resistance	Between ECM J2 (female) (18) and (48)	15 Ω to 880 kΩ	
5	Ground fault in harness (Contact with GND circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and EXHAUST GAS TEMPERATURE, and connect T-adapters to either female side.			

Circuit diagram related to intake air heater relay



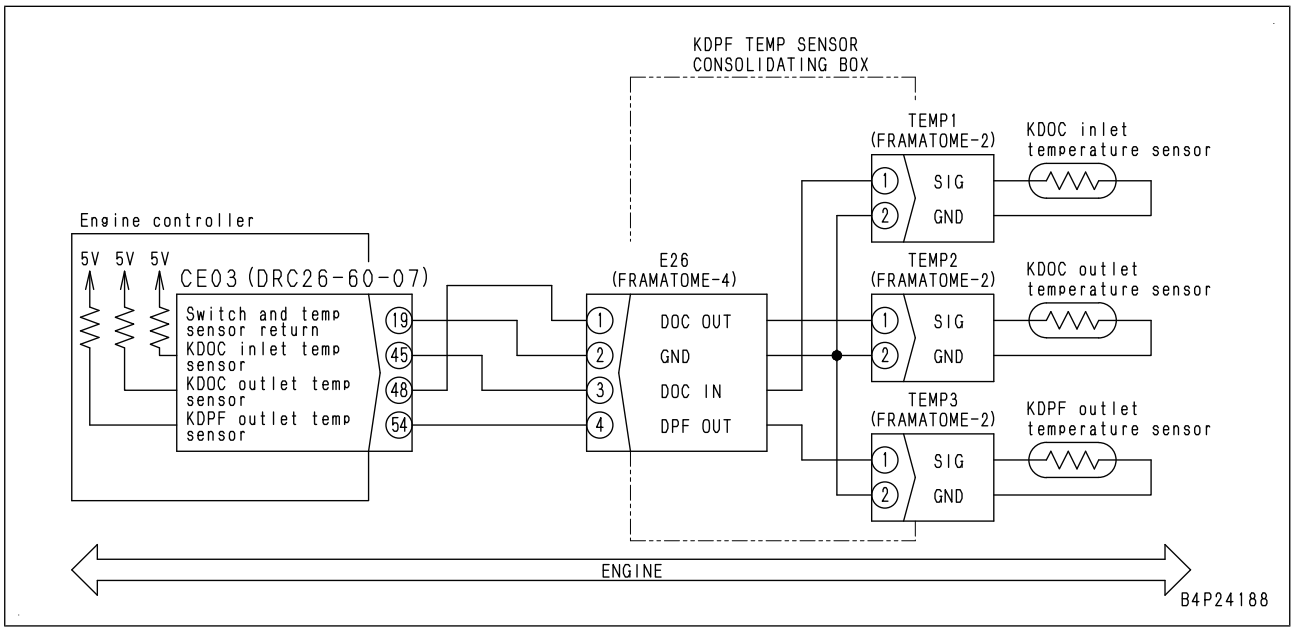
Circuit diagram related to KDOC and KDPF temperature sensor



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="5">6</td><td rowspan="5">KDPF temperature sensors integrated box abnormal</td><td colspan="3">★ If no abnormality is found in checks on causes 3 to 5, this check is not required.
1. Starting switch: OFF
2. Disconnect connector E26 and connect T-adapter to male side.
3. Disconnect connectors TEMP1, TEMP2, TEMP3, and connect T-adapter to male side of TEMP1.</td></tr>
<tr><td rowspan="3">Resistance</td><td>★ If no abnormality is found in checks on causes 3 or 4, this check is not required.
Between E26 (male) (2) and TEMP1 (male) (2)</td><td>Max. 10 Ω</td></tr>
<tr><td>★ If no abnormality is found in checks on causes 3 or 4, this check is not required.
Between E26 (male) (3) and TEMP1 (male) (1)</td><td>Max.10 Ω</td></tr>
<tr><td>★ If no failure is found by check cause 5, this check is not required.
Between E26 (male) (3) and each other pin</td><td>Min. 100 kΩ</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Open circuit in wiring harness
(wire breakage or defective contact of connector)</td><td colspan="3">★ If no abnormality is found in checks on causes 3 or 4, this check is not required.
1. Starting switch: OFF
2. Disconnect connectors CE03 and E26, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between CE03 (female) (45) and E26 (female) (3)</td><td>Max. 10 Ω</td></tr>
<tr><td>Between CE03 (female) (19) and E26 (female) (2)</td><td>Max. 10 Ω</td></tr>
<tr><td rowspan="2">8</td><td rowspan="2">Short circuit in wiring harness</td><td colspan="3">★ If no failure is found by checks on cause 5, this check is not required.
1. Starting switch: OFF
2. Disconnect connectors CE03 and E26, and connect T-adapter to female side of connector CE03.
★ Check by using multimeter in continuity mode.</td></tr>
<tr><td>Continuity</td><td>Between CE03 (female) (45) and each other pin</td><td>No continuity
(No sound is heard)</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Defective engine controller</td><td colspan="3">1. Starting switch: ON
2. If this failure code is displayed, carry out [Clearing failure codes] in "Related information".</td></tr>
<tr><td colspan="3">If this failure code is still displayed and no problem is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

No.	Cause	Procedure, measuring location, criteria and remarks
14	Malfunction of KDOC	1. Remove the KDPF. 2. Remove the KDOC. • Check for cracks in the KDOC (replace KDOC if cracks are found). • Check if more than 50% of the KDOC inlet face is plugged with soot or not (KDOC cleaning).
15	Defective engine controller	1. Starting switch: ON 2. If this failure code is displayed, perform [Clearing failure codes] in "Related information". If this failure code is displayed and no problem is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

Circuit diagram related to KDOC and KDPF temperature sensor

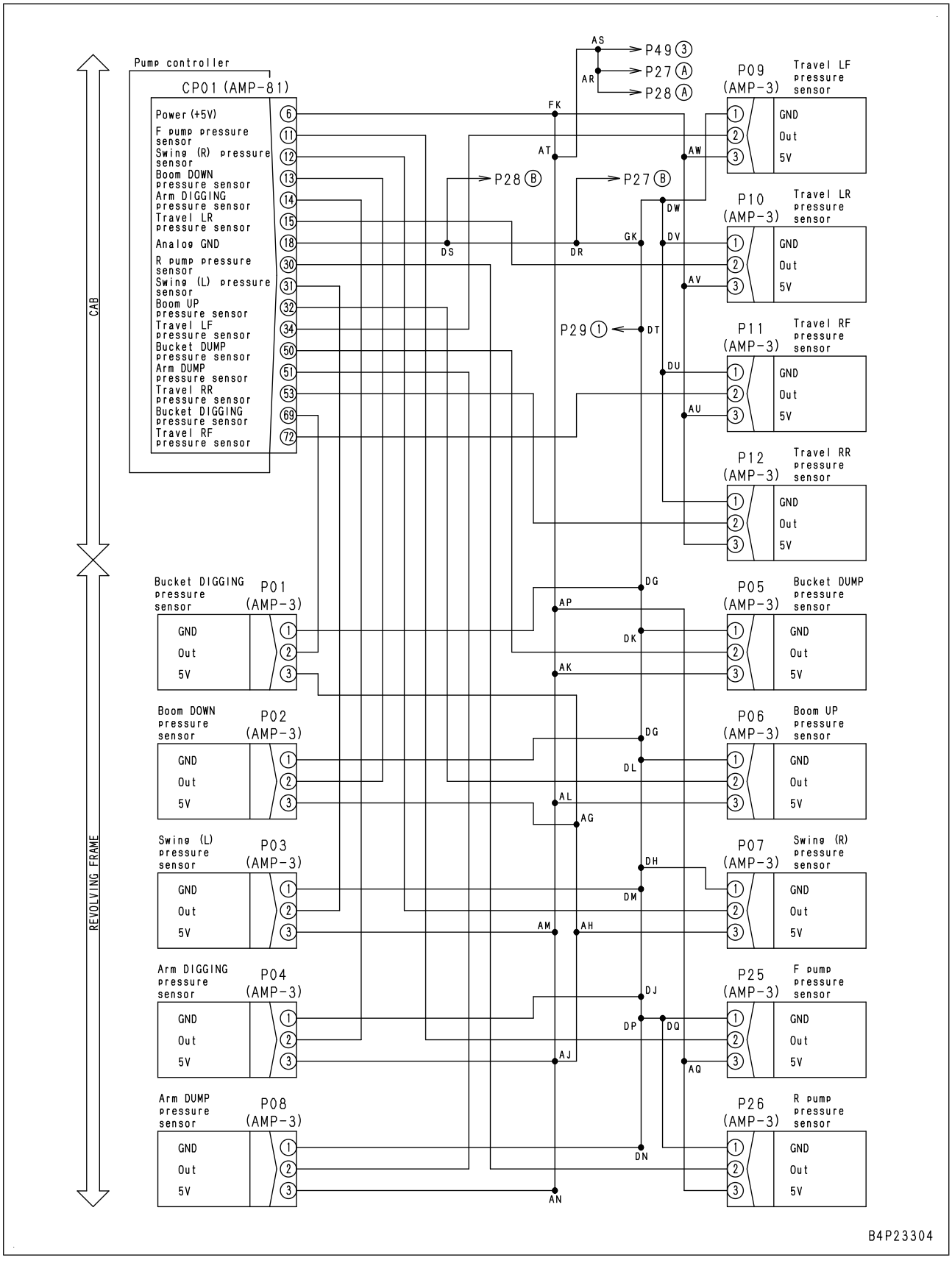


Failure code [D110KB] Battery Relay Output Voltage *(PC220_10-D110KB-400-A-01-A)*

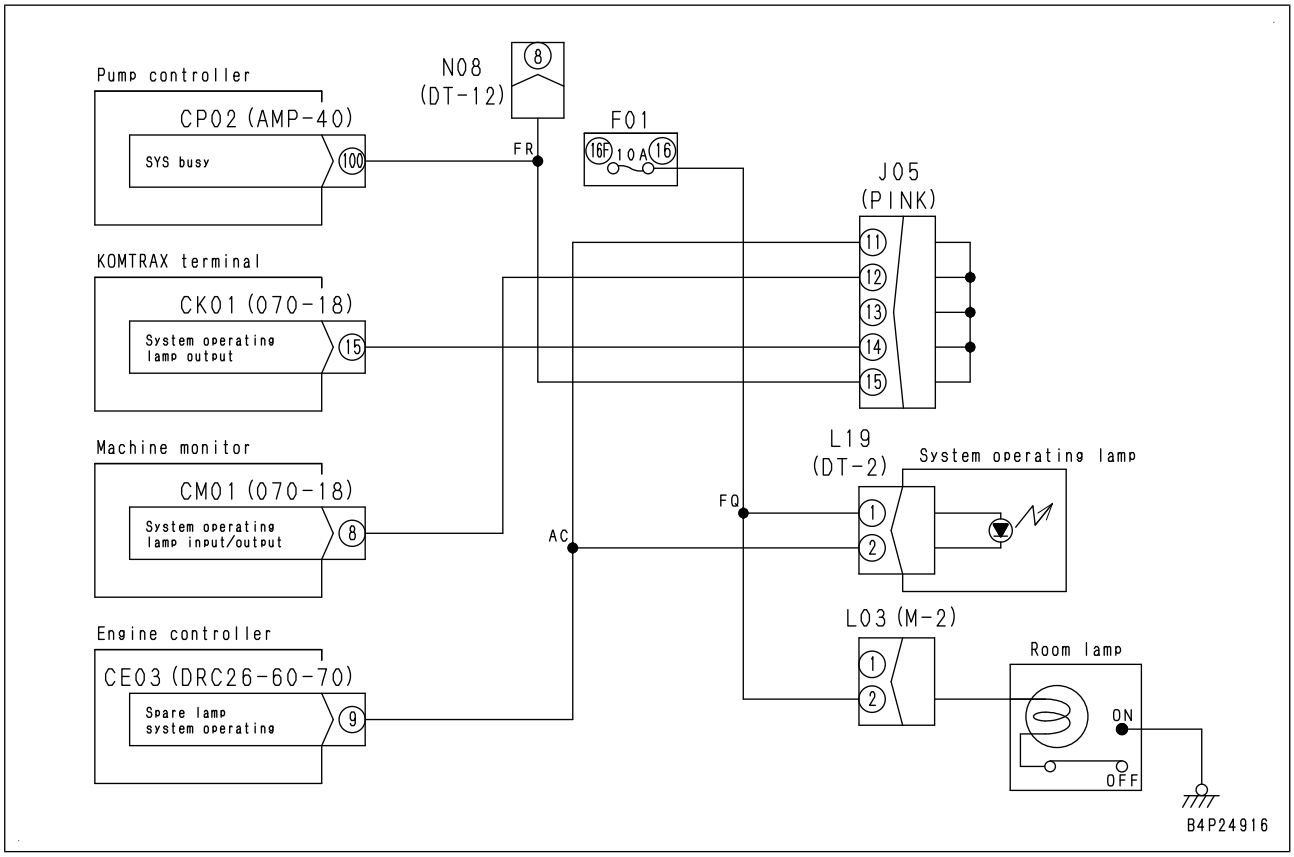
Action level	Failure code	Failure	Short circuit in battery relay output circuit (Pump controller system)
L01	D110KB		
Details of failure	• Abnormal current flows when outputting 24 V to battery relay primary circuit (coil side).		
Action of controller	• Stops 24 V output to battery relay primary circuit (coil side). • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	• Writing data into ROM (non-volatile memory) of each controller may fail.		
Related information	• As T-adapter for pump controller connector is "socket-type box", operating voltage cannot be measured at pump controller connector. • Output state (ON/OFF) to battery relay can be checked with monitoring function. (Code: 03700 Controller output 1) • Method of reproducing failure code: For 0.5 seconds after turning starting switch from ON to OFF position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective battery relay (internal open circuit)	1. Turn starting switch to OFF position.		
		Continuity	Between terminal RE and terminal BR	Continuity
2	Ground fault in wiring harness (contact with GND circuit)	1. Turn starting switch to OFF position. 2. Disconnect negative battery cable (in order to prevent short circuit). 3. Disconnect terminals R01 and R02, and connectors D01, H15 and CP02.		
		Resistance	Between terminal R02 (BR) and ground	Min. 1 MΩ
			Between ground and terminal R02 (harness side), D01 (female) (1), or D01 (female) (2)	Min. 1 MΩ
			Between ground and CP02 (female) (108) or between D01 (female) (5)	Min. 1 MΩ
3	Pump controller defective.	If no failure is found by above checks, pump controller is defective. • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connector D01. 3. Turn starting switch to ON position. 4. Measure voltage during 4 to 7 seconds after turning starting switch from ON to OFF position.		
		Voltage	Between D01 (5) and ground	20 to 30 V

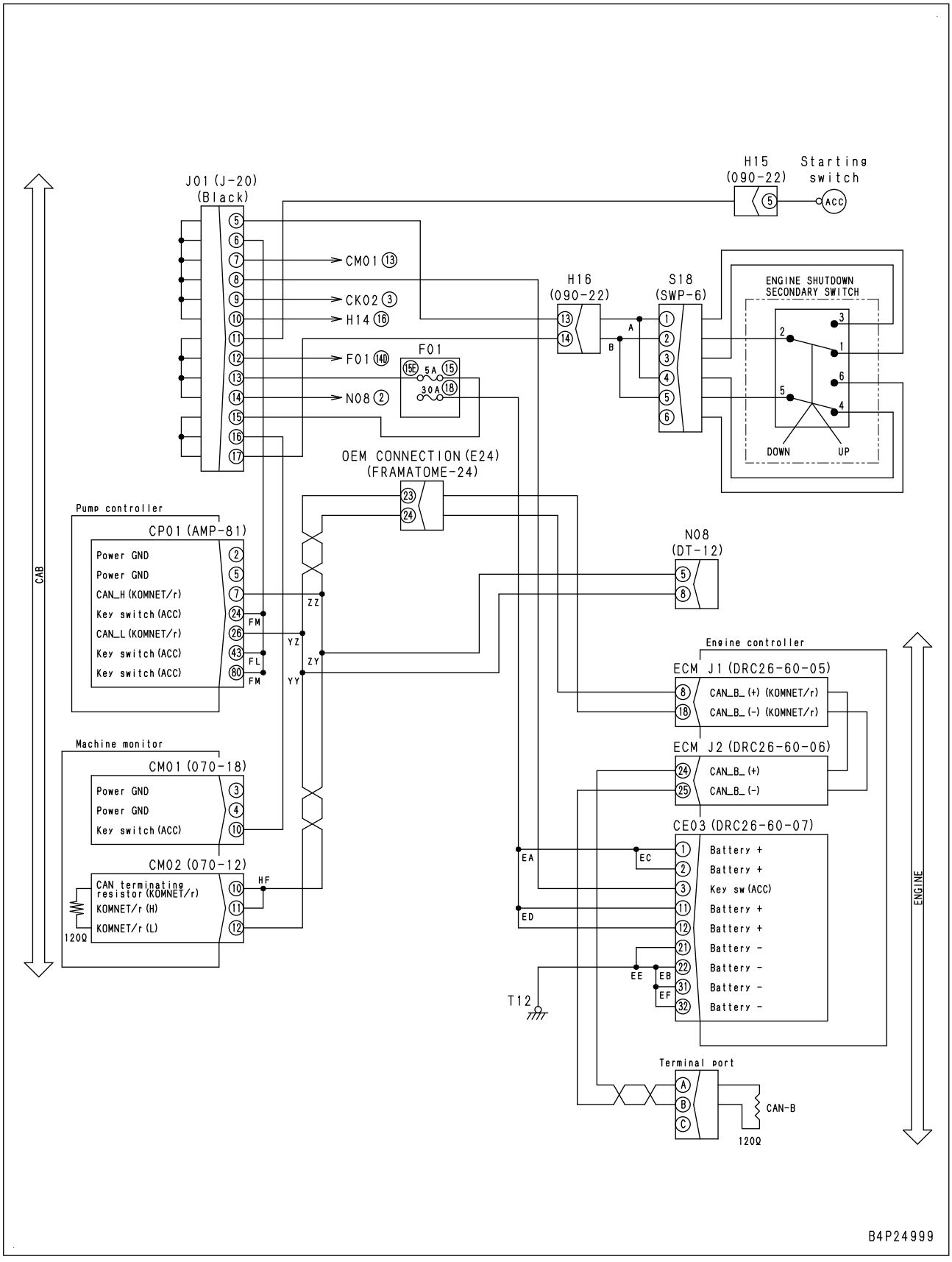
Circuit diagram related to 5V sensor power supply 1



Circuit diagram related to system operating lamp

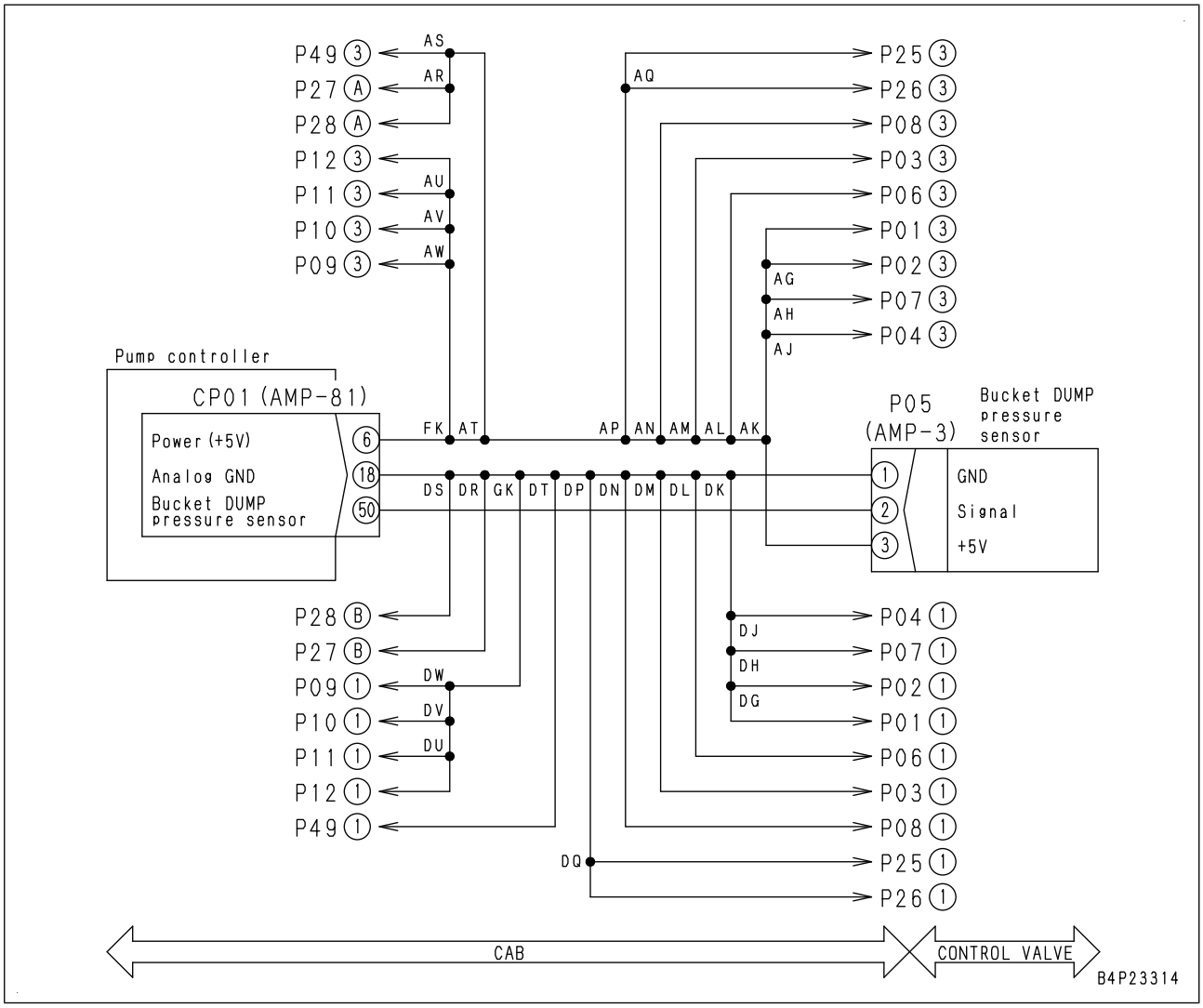


Circuit diagram related to CAN communication line 1



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">4</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 P06, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="3">Resistance</td><td>★ If power supply voltage in check on cause 2 is normal, this check is not required.
Between CP01 (female) (18) and P06 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between CP01 (female) (32) and P06 (female) (2)</td><td>Max. 1 Ω</td></tr>
<tr><td>★ If power supply voltage in check on cause 2 is normal, this check is not required.
Between CP01 (female) (6) and P06 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="2">5</td><td rowspan="2">Ground fault in wiring harness
(contact with GND circuit)</td><td colspan="3">1. Turn starting switch to OFF position.
2. Disconnect connectors CP01 and P06, and connect T-adapters to either female side.</td></tr>
<tr><td>Resistance</td><td>Between ground and CP01 (female) (32) or P06 (female) (2)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">6</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 P06.
3. Connect T-adapters to female side of connector P06.
4. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between P06 (female) (2) and ground</td><td>Max. 1 V</td></tr>
<tr><td>7</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>

Circuit diagram related to bucket DUMP PPC pressure sensor



Failure code [DKR1MA] R Pump Swash Plate Sensor Abnormality *(PC220_10-DKR1MA-400-A-00-A)*

Action level	Failure code	Failure	R pump swash plate sensor malfunction (Pump controller system)
L01	DKR1MA		
Details of failure	• Signal voltage of R pump swash plate sensor circuit is below 0.5 V or above 4.5 V.		
Action of controller	• If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Low-load matching function that lowers engine speed when load on engine is low does not work.		
Related information	★ If 5 V circuit (A) and ground circuit (B) of swash plate sensor are connected inversely, sensor will be broken. Accordingly, take extreme care when checking. • As T-adapter for pump controller connector is "socket-type box", operating voltage cannot be measured at pump controller connector. • Voltage from rear pump swash plate sensor can be checked with monitoring function. (Code: 01140 R pump swash plate sensor voltage) • Method of reproducing failure code: Turn starting switch to ON position or start engine.		

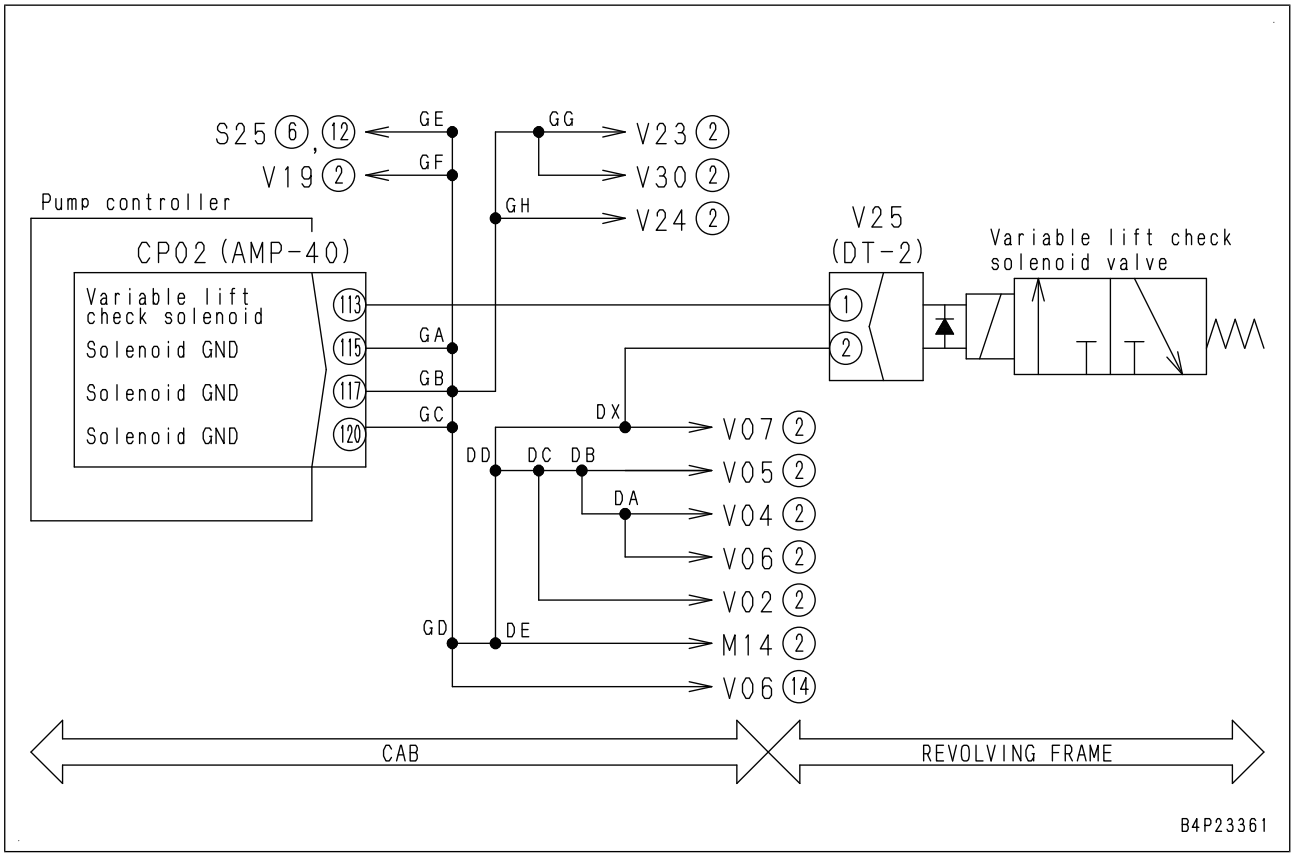
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor power supply 1 line	If failure code **[DA25KP]** is also displayed, perform troubleshooting for it first.			
2	Defective 5 V sensor power supply 1 line	1. Turn starting switch to OFF position. 2. Disconnect connector P28 and connect T-adapters to female side. 3. Turn starting switch to ON position. ★ If power supply voltage is abnormal, proceed to check on cause 6.			
		Voltage	Between P28 (female) (A) and (B)	Power supply	4.5 to 5.5 V
3	Defective R pump swash plate sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector P28 and connect T-adapters to male side.			
		Resistance	Between P28 (male) (A) and (B)		Approx. 6 kΩ
			Between P28 (female) (B) and (C)		Approx. 6 kΩ
			Between P28 (female) (A) and (C)		Approx. 170 Ω
			Between P28 (male) (C) and ground		Min. 1 MΩ
4	Defective R pump swash plate sensor (internal defect)	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector P28. 3. Turn starting switch to ON position.			
		Voltage	Between P28 (C) and (B)	Sensor output	Approx. 3 V
5	Defective R pump swash plate sensor (internal defect)	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector P28. 3. Starting engine. ★ Position all control levers in NEUTRAL position to set swash plate of pump at its minimum angle.			
		Voltage	Between P28 (C) and (B)	Sensor output	Approx. 1.4 V

Failure code [DW45KB] Swing Brake Sol Short Circuit *(PC200-DW45KB-400-A-00-A)*

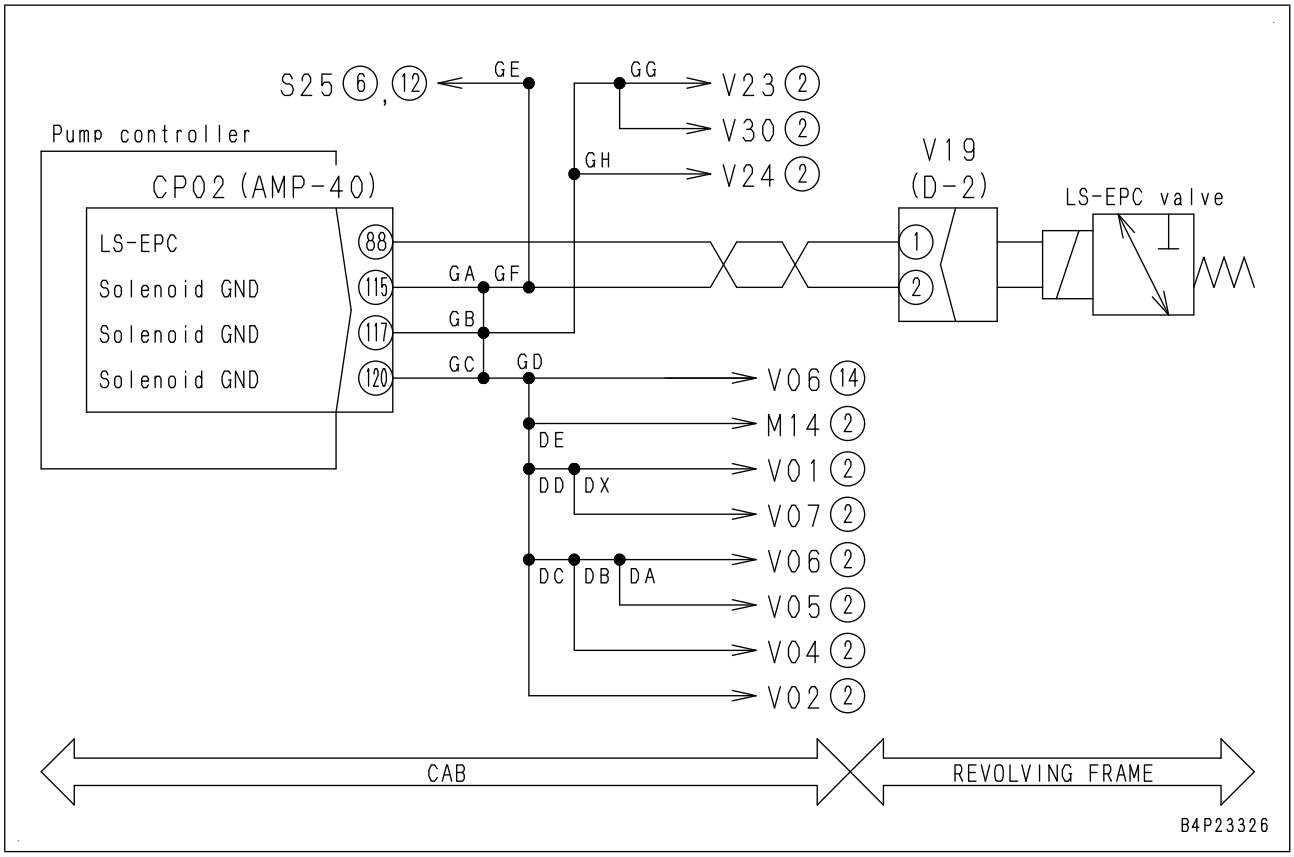
Action level	Failure code	Failure	Swing holding brake solenoid system short circuit (Pump controller system)
L03	DW45KB		
Details of failure	• When outputting current to swing holding brake solenoid, abnormal current flows in circuit and short circuit is detected.		
Action of controller	• Stops output to swing holding brake solenoid. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	• Swing operation cannot be performed (swing holding brake is not released).		
Related information	• If solenoid and harness are normal, operator can swing upper structure by setting swing brake cancel switch in release position (swing holding brake does not work, however, when performing stop operation of upper strueture. Namely, swing holding brake remains applied.) • Both swing lock switch and swing brake cancel switch must be turned to OFF position as long as troubleshooting is continued. • Controller's command (ON/OFF) to swing holding brake solenoid can be checked with monitoring function. (If controller sends solenoid ON command, monitoring display is ON even if solenoid is not switched ON due to short circuit.) (Code: 02300 Solenoid 1) • Method of reproducing failure code: Start engine and operate boom, arm, or bucket or swing upper structure. • Power of swing holding brake solenoid circuit is fed from pin (101) of pump controller connector CP02 or pin (1) of fuse box F01.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Blown No. 1 of fuse F01 (right top fuse)	Even if fuse is blown, perform troubleshooting according to following steps to identify cause.		
2	Defective swing holding brake solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector V03, and connect T-adapter to male side.		
		Resistance	Between V03 (male) (1) and (2)	20 to 60 Ω
			Between V03 (male) (1) and ground	Min. 1 MΩ
3	Defective diode array D01	1. Turn starting switch to OFF position. 2. Remove diode array D01 and connect T-adapters to male side. ★ Check by using multimeter in diode range.		
		Continuity	Between D01 (male) (3) (+) and (7) (-)	No continuity
			Between D01 (male) (7) (+) and (3) (-)	Continuity
4	Defective diode array D03	1. Turn starting switch to OFF position. 2. Remove diode array D03 and connect T-adapters to male side. ★ Check by using multimeter in diode range.		
		Continuity	Between D03 (male) (1) (+) and (5) (-)	No continuity
			Between D03 (male) (5) (+) and (1) (-)	Continuity
5	Ground fault in harness (Contact with GND circuit)	1. Turn starting switch to OFF position. 2. Remove No. 1 of fuse F01 (right top fuse, 5 A) and diode D01. 3. Disconnect connectors CP02 and V03. 4. Connect T-adapters to female sides of connectors CP02 and D01.		
		Resistance	Between CP02 (female) (101) and ground	Min. 1 MΩ
			Between D01 (female) (3) and ground	Min. 1 MΩ
6	Short-circuiting of harness	1. Turn starting switch to OFF position. 2. Remove No. 1 of fuse F01 (right top fuse, 5 A) and diode D01. 3. Disconnect connector CP02. 4. Connect T-adapters to female sides of connectors D01 and CP02.		
		Resistance	Between D01 (female) (3) and each of CP02 (female) (115), (117) and (120)	20 to 60 Ω

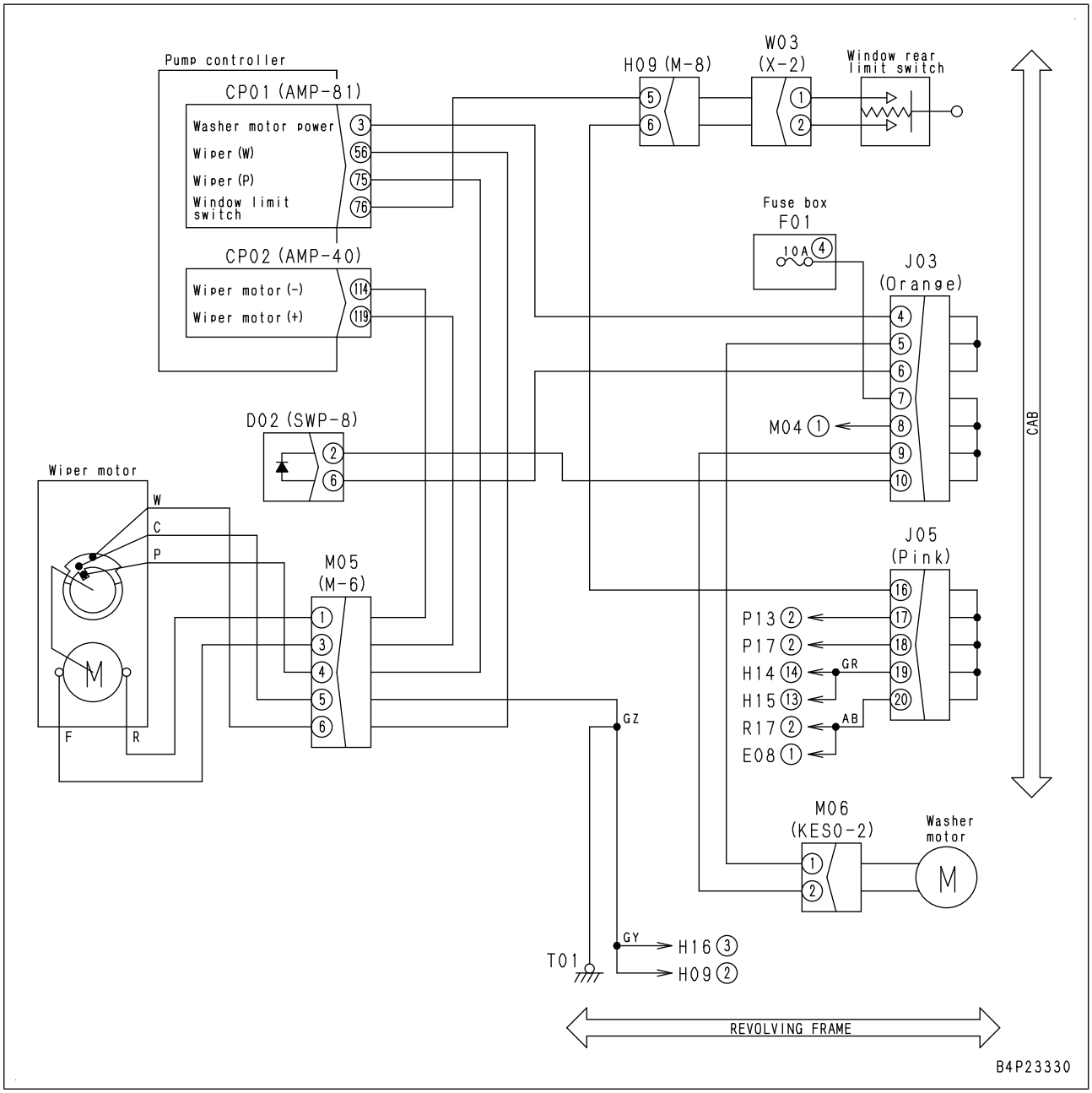
Circuit diagram related to variable back pressure solenoid



Circuit diagram related to LS-EPC solenoid



Circuit diagram related to wiper



No.	Cause	Procedure, measuring location, criteria and remarks		
10	Ground fault in wiring harness (contact with GND circuit)	★ If no failure is found by checks on causes 6 and 7, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors H15 and CM01, terminals R15 and E01, and starting motor terminal B.		
		Resistance	Between heater relay terminal R15 (wiring harness side) and ground	Min. 1 MΩ
			Between input terminal on contact side of heater relay and ground	Min. 1 MΩ
			Between heater relay terminal E01 (wiring harness side) and ground	Min. 1 MΩ

E-13 Water separator monitor lights up while engine is running *(PC220_10-FET-400-A-00-A)*

Failure	• Water separator monitor lights up while engine is running.
Related information	• Water level sensed by WIF sensor can be checked with monitoring function. (Code: 18800 Condition of WIF sensor)

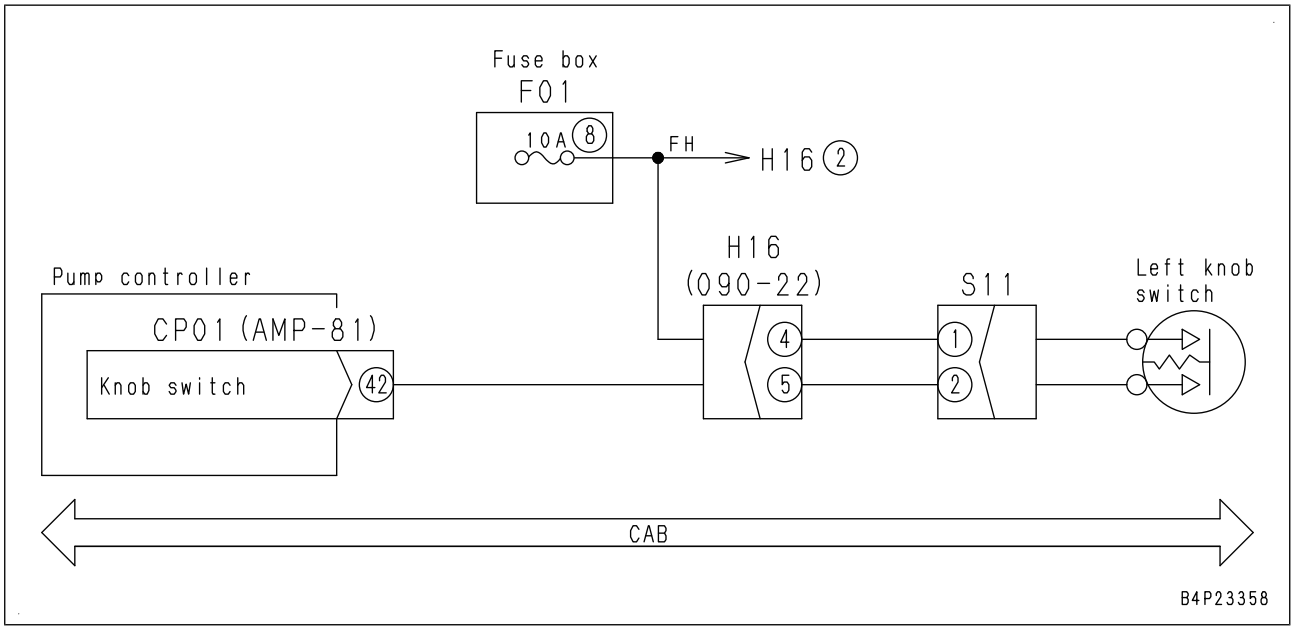
No.	Cause	Procedure, measuring location, criteria and remarks
1	High water level in water separator (When system works properly)	Water is detected in water separator. Check and drain water separator.
2	Defective fuel filter sensor system (engine controller circuit)	If no failure is found by above checks, fuel filter system may be defective. Perform troubleshooting for failure codes **[CA428]** and **[CA429]**.
3	Defective machine monitor	If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

E-28 Auto-deceleration is not actuated or canceled when lever is operated *(PC220_10-FPM-400-A-00-A)*

Failure	• Auto-decelerator is not operated or canceled interlocking with control lever.
Related information	• Since auto-deceleration set speed is 1,050 rpm, auto-deceleration is not operated or canceled if engine speed higher than this speed is set by fuel control dial.

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="11">1</td><td rowspan="11">Defective PPC pressure signal</td><td colspan="4">★ Start engine and perform troubleshooting (with monitoring function).</td></tr>
<tr><td rowspan="10">Correct display</td><td rowspan="7">Monitoring code
01900 Pressure switch 1</td><td>Swing</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Travel</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Boom LOWER</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Boom RAISE</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Arm IN</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Arm OUT</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td rowspan="3">Monitoring code
01901 Pressure switch 2</td><td>Bucket CURL</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Bucket DUMP</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td>Service</td><td>When lever operated: ON
With lever in NEUTRAL: OFF</td></tr>
<tr><td colspan="4">If monitoring data shows any abnormality, perform troubleshooting for "E-49 to 57 Monitoring function does not display *** normally".</td></tr>
<tr><td>2</td><td>Defective machine monitor</td><td colspan="4">If no failure is found by above checks, machine monitor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
<tr><td>3</td><td>Defective pump controller</td><td colspan="4">If no failure is found by above checks, pump controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
<tr><td>4</td><td>Defective engine controller</td><td colspan="4">If no problem is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)</td></tr>
</table>

Circuit diagram related to one-touch power maximizing switch



E-54 BUCKET DUMP indication is not displayed properly with monitoring function *(PC220_10-FFQ-400-A-00-A)*

Failure	• "Bucket DUMP" is not displayed properly with monitoring function.
Related information	• Monitoring code: 01901 Pressure switch 2

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective bucket DUMP PPC oil pressure sensor system	Carry out troubleshooting for failure code **[DHSDMA]**.

Failure mode			Failed parts	PPC valve (right lever)	PPC valve (left lever)	PPC valve (travel lever)	PPC valve (service)	Swing PPC slow return valve	Oil flow adjuster EPC valve for attachment	Solenoid valve						Swing motor						Diagnosis codes
										Work equipment lock solenoid	2-stage relief solenoid	Travel interconnection solenoid	Travel speed selector solenoid	swing parking brake solenoid	ATT return selector solenoid	Piston motor	Safety valve	Check valve	Suction valve	Shockless valve	Parking brake	
Travel	Machine deviates during travel					●						●										H-19
	Travel speed is low					●																H-20
	Machine is not steered well or steered-travel power is low.					●						●										H-21
	Travel speed does not switch or travel speed is too low or high.												●									H-22
	One of tracks does not run																					H-23
Swing	Machine does not swing	Upper structure swings neither to the right nor left												●		●	○				●	H-24
		Upper structure does not swing in only one direction		●														●	●			H-25
	Swing acceleration is poor or swing speed is low	Poor or low for both of the right and left														●	●				●	H-26
		Poor or low for only in one direction		●													●	●				H-27
	Upper structure overruns considerably when it stops swinging	Largely for both of the right and left														●	●					H-28
		Largely for only in one direction		●			●											●	●			H-29
	Large shock is made when upper structure stops swinging			●			●													●		H-30
	Large unusual noise is heard when upper structure stops swinging.																●		●			H-31
	Swing drift on a slope is excessive	When swing parking brake applied												●							●	H-32
		When swing parking brake released															●	●	●	●		H-33
Attachment	Attachment circuit is not switched to desired one.														●							H-34
	Flow rate of attachment circuit cannot be adjusted						●		●													H-35

H-9 Work equipment does not move in single operation *(PC220_10-FTC-400-A-00-A)*

Failure	• Boom does not move when it is operated independently. • Arm does not move when it is operated independently. • Bucket does not move when it is operated independently.
Related information	• Perform all troubleshooting with working mode in power mode (P).

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Malfunction of PPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		PPC valve output pressure	Work equipment control levers	NEUTRAL	0 MPa {0 kg/cm^2}
				Operation	2.84 to 3.43 MPa {29 to 35 kg/cm^2}
2	Malfunction of boom control valve (spool)	Spool of boom control valve may malfunction. Check it.			
3	Malfunction of arm control valve (spool)	Spool of arm control valve may malfunction. Check it.			
4	Malfunction of bucket control valve (spool)	Spool of bucket control valve may malfunction. Check it.			

H-22 Travel speed does not change, or travel speed is too low or high *(PC220_10-BQ4-400-A-00-A)*

Failure	• Travel speed does not change or travel speed is too low or high.
Related information	• Perform all troubleshooting with working mode in power mode (P).

<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Malfunction of LS-EPC valve</td><td colspan="4">★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.
*: Travel speed at Lo setting can be adjusted with adjustment function of machine monitor. Therefore, if it has been changed from initial set value, indicated value changes more or less.</td></tr>
<tr><td rowspan="3">Monitoring code:
01500</td><td rowspan="3">Travel lever:
Operation</td><td>Travel speed: Lo</td><td>617 mA (See *)</td></tr>
<tr><td>Travel speed: Mi</td><td>679 mA</td></tr>
<tr><td>Travel speed: Hi</td><td>0 mA</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Malfunction of LS-EPC valve</td><td colspan="4">★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td rowspan="2">LS-EPC valve output pressure</td><td>Travel lever:
NEUTRAL</td><td>Travel speed: Lo</td><td>Approx. 2.9 MPa
{Approx. 30 kg/cm^2}</td></tr>
<tr><td>Travel lever:
Operation</td><td>Travel speed: Hi</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Malfunction of travel speed selector solenoid valve</td><td colspan="4">★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.</td></tr>
<tr><td rowspan="2">Solenoid valve output pressure</td><td>Travel lever:
NEUTRAL</td><td>Travel speed: Lo</td><td>0 MPa {0 kg/cm^2}</td></tr>
<tr><td>Travel lever:
Operation</td><td>Travel speed: Hi</td><td>Approx. 2.9 MPa
{Approx. 30 kg/cm^2}</td></tr>
<tr><td>4</td><td>Malfunction of travel motor (speed-select unit)</td><td colspan="4">Speed-select unit of travel motor may malfunction. Check it.</td></tr>
</table>

S-2 When engine cranks, smoke does not come out *(PC220_10-A27-400-A-00-A)*

Failure	Engine is cranked but exhaust gas does not come out.
Related information	• If a failure code is displayed, perform troubleshooting for it first.

No.	Cause	Check item and remarks	Remedy
1	Insufficient fuel in tank	• When fuel tank is inspected, it is found to be empty.	Add fuel.
2	Clogged breather hole in fuel tank cap	• Breather hole in fuel tank cap is clogged.	Flush air breather hole in fuel tank cap and clean surrounding area.
3	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.
4	Foreign material in fuel	• Rust and water are found when fuel tank is drained.	Replace fuel.
5	Air in fuel piping	• When air bleeding operation for fuel system is performed, air comes out. (Reference: See Testing and adjusting, "Bleeding air from fuel system".)	Perform air bleeding operation. Correct or replace fuel piping.
6	Leakage from fuel piping system	• Fuel is leaking from fuel piping. (Reference: See Testing and adjusting, "Testing fuel circuit for leakage".)	Correct or replace fuel piping related parts.
7	Defective supply pump	• See Testing and adjusting, "Testing fuel delivery, return and leakage".)	Replace supply pump and pressure limiter.
8	Defective priming pump	• When priming pump is operated, no resistance is felt or it is heavy.	Replace priming pump.
9	Defective air bleeding from common rail and injection pipe	• After common rail pressure (Code: 36400 [Common rail pressure) is checked on machine monitor and engine is stopped, common rail pressure does not decrease. (If air remains, pressure does not decrease)	Loosen mounting nuts of injection pipe and high-pressure pipe on common rail side to bleed air.

S-14 Engine oil pressure drops *(PC220_10-10D-400-A-00-A)*

Failure	Engine oil pressure decreases.
Related information	• If a failure code is displayed, perform troubleshooting for it first. • Check whether machine is operated on a slope steeper than that specified in Operation and Maintenance Manual.

No.	Cause	Check item and remarks	Remedy
1	Lack of oil in oil pan	• Oil level in oil pan is low. • If machine is operated on a slope, oil pressure monitor may light up.	Supply oil.
2	Defective oil pressure sensor or wiring harness	• Check oil pressure sensor, wiring harness, and connector.	Replace oil pressure sensor, wiring harness, and connector.
3	Fuel in oil	• Perform oil analysis to determine whether fuel is mixed in oil. • If mixed, oil has smell of diesel fuel.	If oil is mixed with fuel, perform troubleshooting for "S-15 Fuel is contaminated in engine oil".
4	Water in oil	• Perform oil analysis to determine whether fuel is mixed in oil. • If mixed, oil is milky.	If oil is mixed with water, perform troubleshooting for "S-16 Coolant is contaminated in engine oil (Oil becomes cloudy white)".
5	Clogged oil filter	• Check oil filter. (Reference: when oil filter has been used for more than specified period, oil may be deteriorated extremely). • Oil filter may be blocked when water is in oil	Replace oil filter.
6	Clogged oil strainer	• Check oil strainer.	Clean oil strainer.
7	Crushed or clogged hydraulic piping	• Hydraulic piping may be crushed or clogged.	Replace hydraulic piping.
8	Defective oil pump	• Check oil pump. (Worn or broken gear) • Oil pump rotation is heavy or play is in oil pump.	Replace oil pump.
9	Defective regulator valve	• Check valve spring for fatigue and damage	Replace regulator valve
10	Defective oil pump relief valve	• Valve spring of oil pump relief valve is fatigued or damaged.	Replace oil pump relief valve.
11	Cracked oil pump suction piping	• Check oil pump suction piping (cracking of piping).	Replace oil pump suction piping.
12	Defective seal between oil pump and oil pump suction piping	• Check seal.	Replace seal.
13	Defective boost oil pump	• Check boost oil pump.	Replace boost oil pump.
14	Leakage from EGR hydraulic piping	• Check EGR hydraulic piping.	Replace EGR hydraulic piping.
15	Worn main journal bearing	• Check main journal bearing. • Metal particles may be found in oil drained from oil pan	Replace main journal bearing
16	Worn pin journal bearing	• Check pin journal bearing • Metal particles are found in oil drained from oil pan.	Replace pin journal bearing.
17	Worn idler bushing or broken idler gear	• Check idler bushing and idler gear.	Replace idler bushing and idler gear.
18	Broken or removed piston cooling nozzle	• Check piston cooling nozzle.	Replace piston cooling nozzle.

Liquid gasket

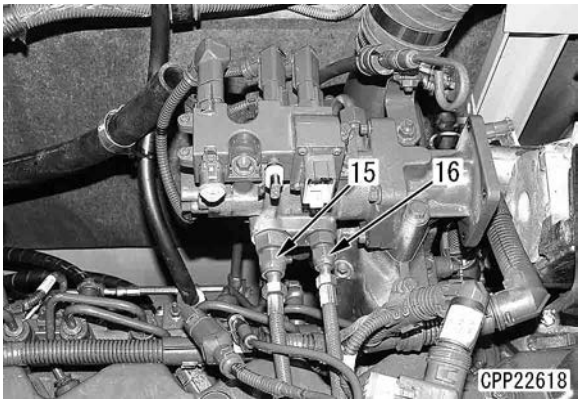
Komatsu code	Part No.	Capacity	Container	Main features and applications
LG-5 ThreeBond 1110F	790-129-9080	1 kg	Polyethy-lene container	• Use to seal various threaded parts, pipe joints, and flanges. • Use to seal taper plugs, elbows, and nipples for hydraulic piping.
LG-6 ThreeBond 1215	790-129-9160	250 g	Tube	• Features: Silicon-based heat and cold-resistant sealant. • Use to seal flange surface and threaded parts. • Use to seal oil pan, final drive case, etc.
LG-7 ThreeBond 1207C	790-129-9170	150 g	Tube	• Features: Silicon-based quick-curing sealant • Use to seal flywheel housing, intake manifold, oil pan, thermostat housing, etc.
LG-8 ThreeBond 1207B	419-15-18131	100 g	Tube	• Features: Silicon-based heat, vibration, and shock-resistant sealant. • Use to seal transfer case, etc.
LG-9 ThreeBond 1206D	790-129-9310	200 g	Tube	• Use for rough surfaces such as the circle gear top seal which is not clamped by bolts, gaps in the weld which must be caulked, etc. • Can be coated with paint.
LG-10 ThreeBond 1206E	790-129-9320	200 g	Tube	• Use as lubricant or sealant when the radiator hoses are put on. • Can be coated with paint.
LG-11 ThreeBond 1121	790-129-9330	200 g	Tube	• Feature: Can be used together with solid gaskets. • Use for covers of the transmission case and steering case etc.
ThreeBond 1211	790-129-9090	100 g	Tube	• Liquid gasket used to repair engine

Molybdenum disulfide lubricant

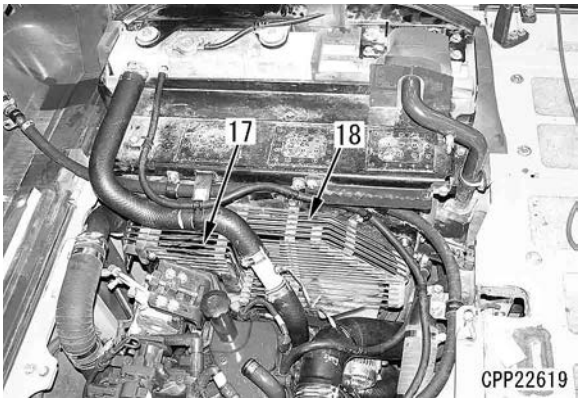
Komatsu code	Part No.	Capacity	Container	Main features and applications
LM-P	09940-00040	200 g	Tube	• Use to prevent galling and seizure of press-fitted parts, shrinkage-fitted parts, and threaded parts. • Use to lubricate linkages, bearings, etc.
LM-S	09995-00250	190 g	Can	• Spray type • Thin molybdenum disulfide films are made on metal surfaces to prevent the metals from galling. • Use for the drive shaft splines, needle bearings, various link pins, bolts, etc.

⚠ When disconnecting the hoses, always disconnect at the intake manifold side to avoid splashing oil to high temperature area which causes fire.

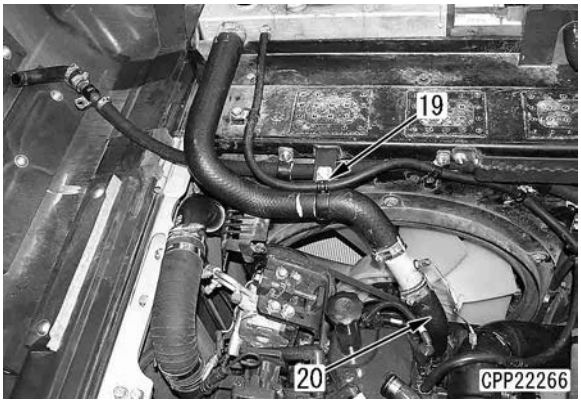
- Hose (15): KVGT control pressure circuit
- Hose (16): KVGT actuator drive pressure circuit



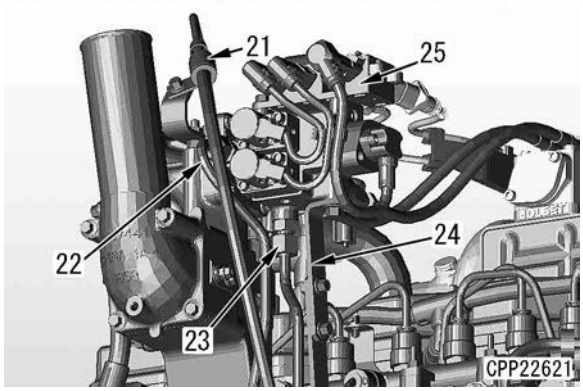
10.Remove fan guards (17) and (18).



11.Disconnect hose clamp (19).**[*4]**
12.Disconnect radiator hose (20).**[*5]**

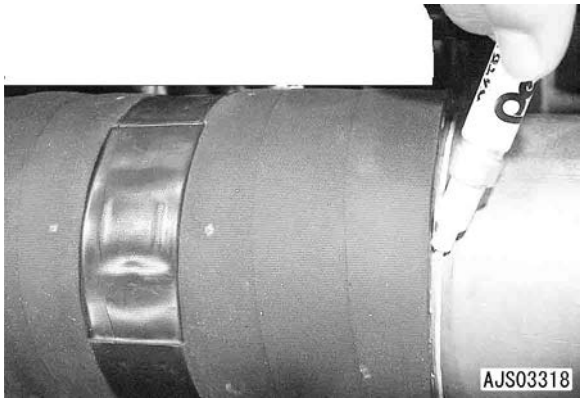


13.Disconnect dipstick pipe (21).
14.Disconnect tubes (22) and (23).
15.Remove lower bracket (24) of the EGR valve.
16.Remove EGR valve (25).

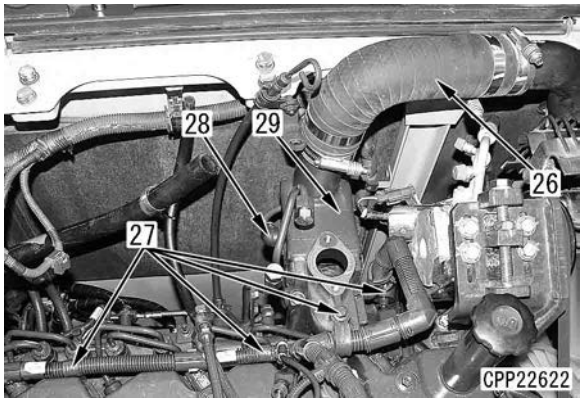


17.Remove air hose (26).

★ Put marks on the hose end and tube to indicate their fitting positions.

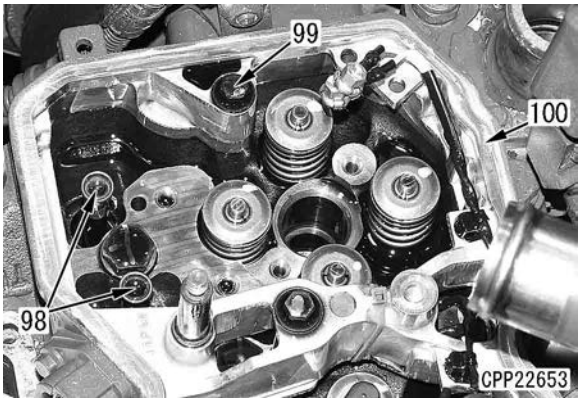


18.Disconnect four wiring harness clamps (27).
19.Disconnect intake air heater E01 (28) and the wiring harness clamp.
20.Remove intake assembly (29).



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

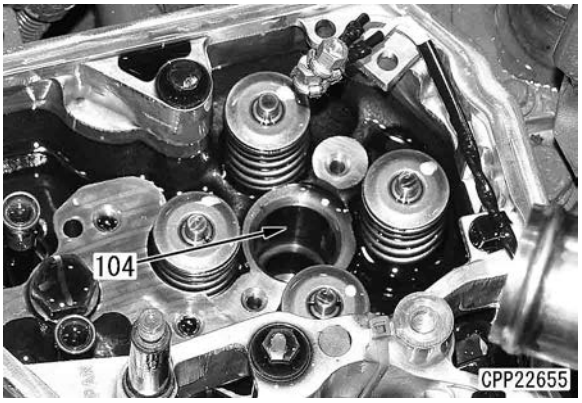
★ After the disconnection, move wiring harness (33) toward the counterweight.



4. Injector assembly

★ When replacing the injector assembly with a new one, be sure to replace the inlet connector with a new one, as well.

★ Check that injector sleeve (104) is free from flaws or dirt.



1) Install O-ring (106) and gasket (107) to injector (105).

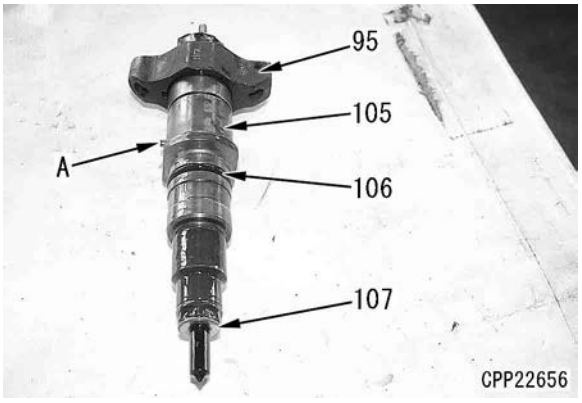
★ Replace the O-ring and gasket with new ones.

2) Apply engine oil to O-ring (106) of injector (105) and the cylinder head side surface.

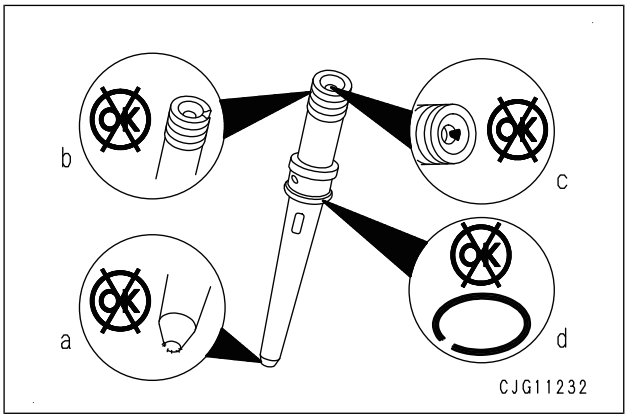
O-ring (106) of injector (105) and the head side:

Engine oil (EO15W-40)

3) Engage the male and female parts at (**A**) to install holder (95) to injector (105).

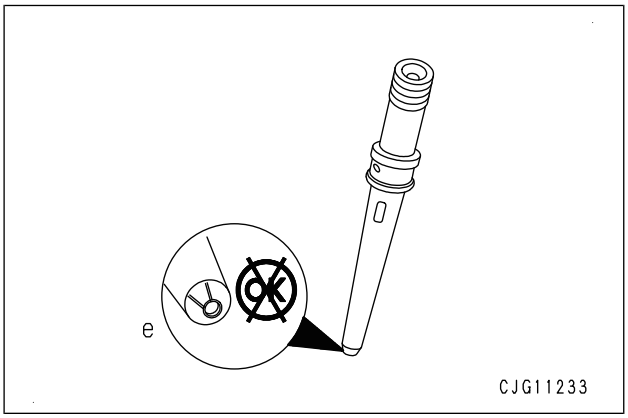


4) Install injector assembly (96) into the cylinder head with the fuel inlet hole facing toward the air intake manifold.
5) Screw in holder mounting bolts (94) three to four threads.
6) Check the inlet connector visually. If it has any of the following faults, replace it.
   1] Burrs or wear is recognizable in the inlet connector top-end (**a**) and rear-end (**b**) portions.
   2] There is foreign matter in the edge filter at rear end (**c**) of the inlet connector.
   3] Cracks or deterioration is recognizable in O-ring of the inlet connector upper portion (**d**).



   4] There is a worn part or an uneven seat contact mark on seating face (**e**) at the top end of the inlet connector.

★ If high-pressure fuel leaks through the inlet connector, the seal face has fine streaks or cracks.



7) Apply engine oil to O-ring (part **C**) of inlet connector (93) and the cylinder head (part **B**).

Inlet connector O-ring and cylinder head:

Engine oil (EO15W-40)

8) Insert inlet connector (93) in the mounting hole for injector (96) and lightly tighten retainer (92).

First battery mounting nut:
1.47 to 1.96 Nm {0.15 to 0.2 kgm}

Battery mounting ock nut:
11.8 to 19.6 Nm {1.2 to 2.0 kgm}

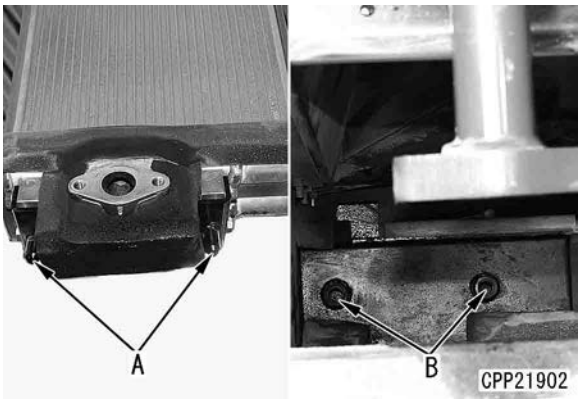
[*2]

★ Check that the heat insulation seal (sponge) on the hydraulic oil cooler periphery is not damaged.

★ If the heat insulation seal (sponge) is damaged, replace it.

★ When installing the hydraulic oil cooler assembly, carefully lower it to avoid the heat insulation seal (sponge) on the periphery from being damaged.

★ Check that the convexed parts (**A**) at the bottom of the hydraulic oil cooler properly fits with the concaved parts (**B**) of the machine from the bottom side.



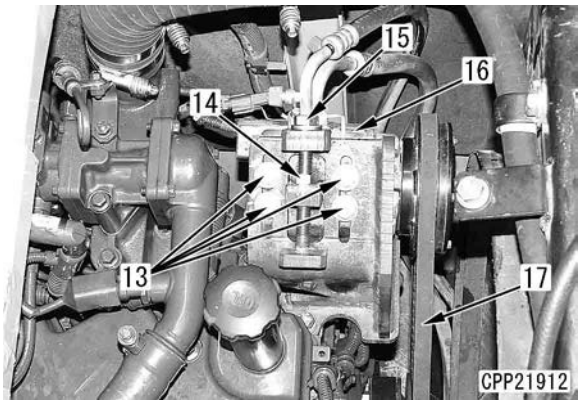
- Refilling of oil

★ Before supplying oil, check that the oil cooler drain plug is securely tightened.

★ Supply hydraulic oil through the oil filler port to the specified level. Run the engine to circulate the oil through the piping. Then, check the oil level again.

Hydraulic tank:
132 ℓ

12.Remove air conditioner compressor belt (17) according to the following procedure. **[*2]**
1) Loosen four bolts (13).
2) Loosen lock nut (14).
3) Turn jack bolt (15) and move air conditioner compressor (16) in the direction of loosening belt tension.
4) Loosen the tension on air conditioner compressor belt (17) and remove the belt.



13.Remove fan belt (18). **[*3]**

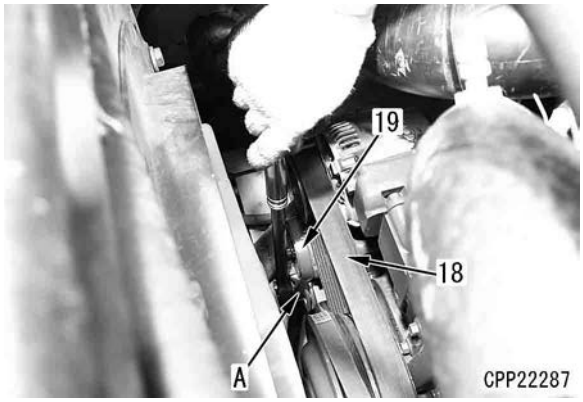
★ Insert a wrench to the portion (A) (width across flats □ 12.7 mm) of the tensioner assembly (19), and rotate it to the opposite to the winding-up direction (R) to decrease the fan belt (18) tension, then remove the fan belt.

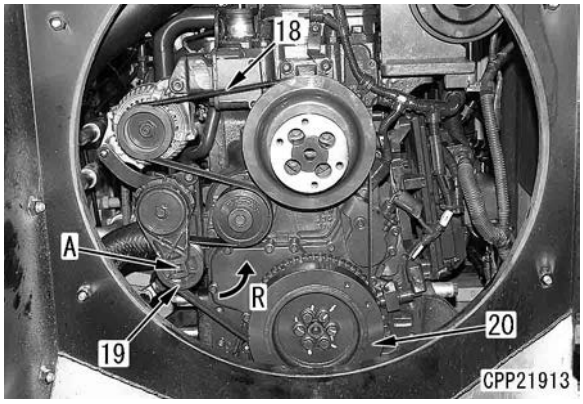
⚠ **Firmly set the wrench on tensioner assembly (19) at portion (A) before applying turning force to the wrench. (The spring of tensioner assembly (19) is strong. If the wrench is loosely inserted, the wrench can accidentally come off and this is extremely dangerous.)**

⚠ **After removing fan belt (18), slowly and carefully restore tensioner assembly (19).**

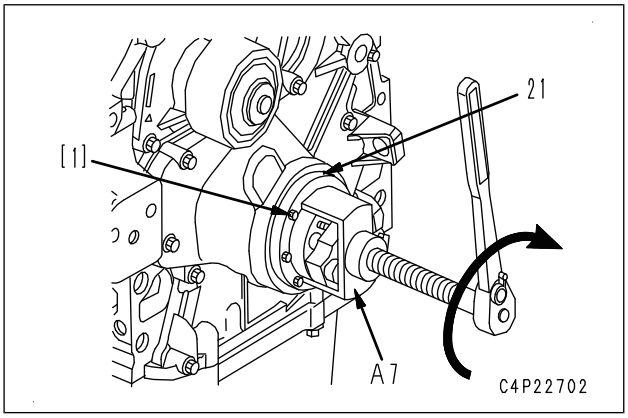
⚠ **Be careful not to get your fingers caught between the pulley and fan belt (18) during work.**

14.Remove six mounting bolts and remove vibration damper (20).





15.Remove engine front oil seal (21) as follows.
1) Install tool A5 to the crankshaft.
2) Screw in tapping screw [1] of tool A7 to the seal carrier section of engine front oil seal (21).
3) Turn the handle clockwise and remove engine front oil seal (21).



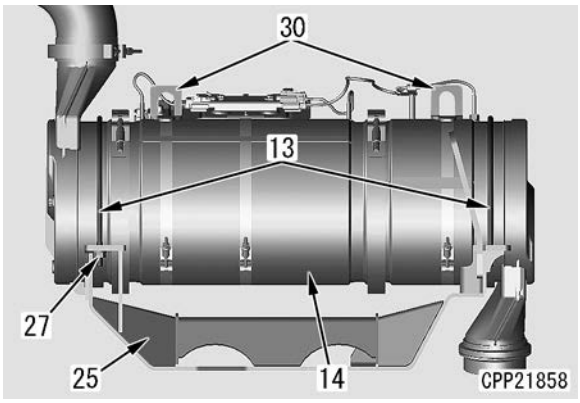
★ Take care in the removal so that the crankshaft is not damaged.

at 4 places so that the position can be adjusted.

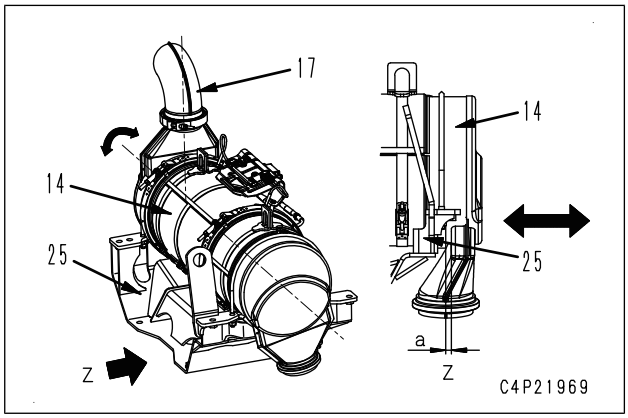
★ Use hanger (30) to sling KDPF assembly (14).

★ When nut (27) is chamfered only one side, install it with its chamfered side downward.

KDPF assembly:
45 kg



2) Move KDPF assembly (14) back or forth or rotate it to obtain correct clearance (a) to bracket (25) and set the exhaust pipe (17) upright.
   • Clearance (a): 10 mm



3. Position adjustment of the KDPF inlet flange connecting part

★ Since the adjustment procedure depends on whether the flange surface of tube (6) can be the reference point for positioning, refer to either procedure to perform installation.

• When the flange surface of tube (6) can be the reference point for positioning. (When tube (6) is not removed.)

★ Adjust the position based on tube (6) flange surface so that the bellows of tube (6) does not get any strain and KDPF assembly can be installed with same flange position before removal.

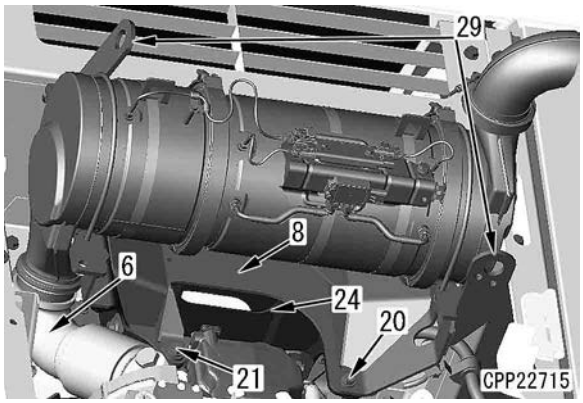
1) Install a new gasket on flange connecting part of tube (6).
2) Sling KDPF bracket assembly (8) to install to base bracket (24) by mating KDPF inlet flange part and flange surface of tube (6).

★ Use sling plate (29) to sling KDPF bracket assembly (8).

★ When installing KDPF bracket assembly (8), take care not to drop the gasket.

KDPF bracket assembly:
75 kg

3) Install KDPF bracket assembly (8) and tighten three mounting bolts (20) and one mounting bolt (21).
   • Length of bolt (20): 30 mm
   • Length of bolt (21): 50 mm

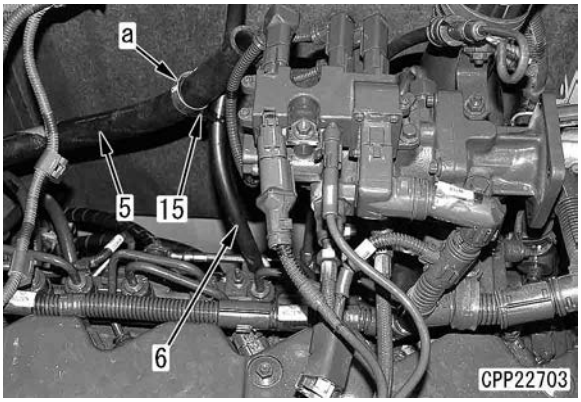


4) Loosen V-clamp (31) of KVGT side of tube (6) and tube support bracket (23), then adjust the clearance between the inlet flange part of KDPF assembly (14) and flange connecting part of tube (6) where the gasket seats.

★ If it is hard to work, you may remove step (32).

★ The clearance between flange and the gasket which is in between KDPF assembly (14) and tube (6) must be within 5 mm all around the circumference.

5) While the clearance at flange is being adjusted, lightly tighten tube support bracket (23). Install V-clamp (5) with pressing tube (6) and lightly tighten by using tool A12 (long socket).

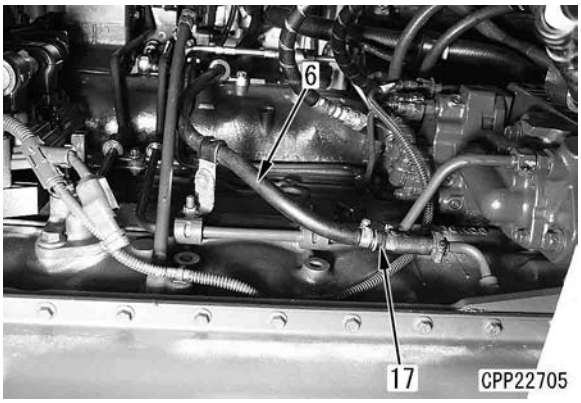


★ Reference

When removing, installing or replacing check valve (17) from oil drain hose (6), install check valve (17) with its gray part to the KCCV side as shown on the L.H. side of the figure.

Hose clamp:

3.3 ± 0.49 Nm {0.34 ± 0.05 kgm}



Disassembly and assembly of swing machinery *(PC290-J120-926-K-00-A)*

★ Special tools

Symbol		Part number	Part name	Necessity	Q'ty
G	1	790-201-2860	Push tool	■	1
	2	796-426-1120	Push tool	■	1
	3	796T-426-1130	Plate	■	1
		790-101-5421	Grip	■	1
		01010-81240	Bolt	■	1

★ The figure shows the equipment on PC200-8. PC290LC-10 is basically the same as PC200-8 but the different figures are noted in the texts.

Disassembly *(PC290-J120-530-K-00-A)*

1. Set the swing motor and swing machinery assembly on block [1].
2. Loosen oil drain plug (1) of the swing machinery to drain the oil from the swing machinery case.

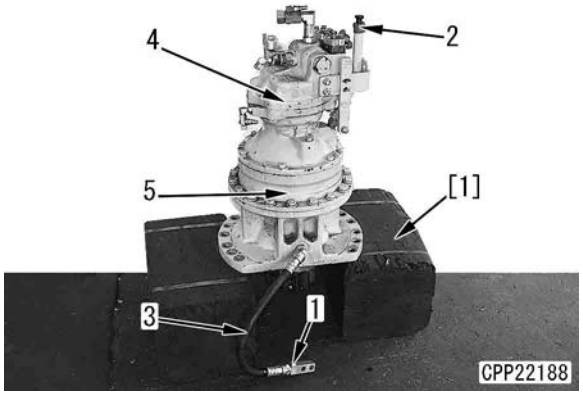
Swing machinery case:
8.2 ℓ

3. Remove oil level gauge/ oil filler cap (2).
4. Remove drain hose (3).
5. Remove the six swing motor mounting bolts to sling and remove swing motor (4).

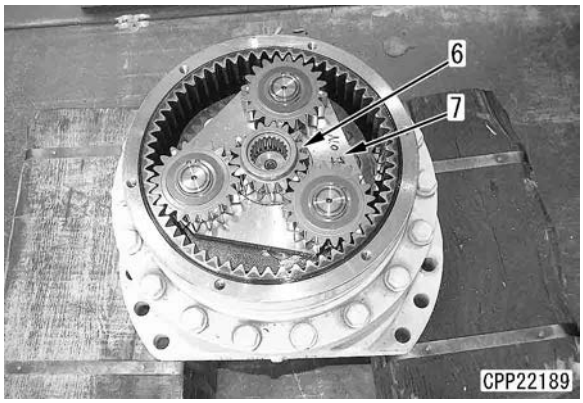
Swing motor:
55 kg

★ Put match marks on swing motor (4) and swing machinery assembly (5) for correct matching during reassembly.

★ Since PC240LC-10 is used in the figure, the layout of the piping is somewhat different from the layout of this model.

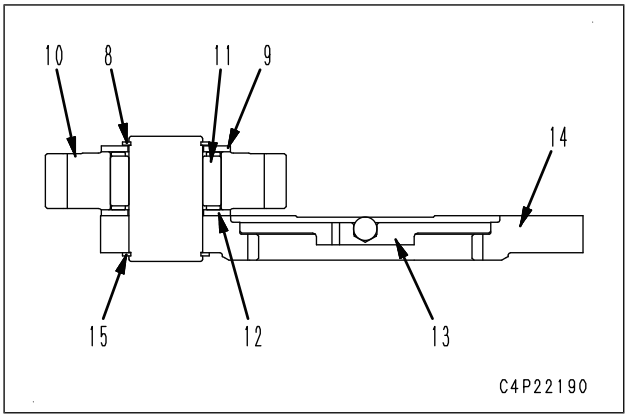


6. Remove No. 1 sun gear (6).
7. Disassembly of No. 1 planetary carrier
   1) Remove No. 1 planetary carrier assembly (7).

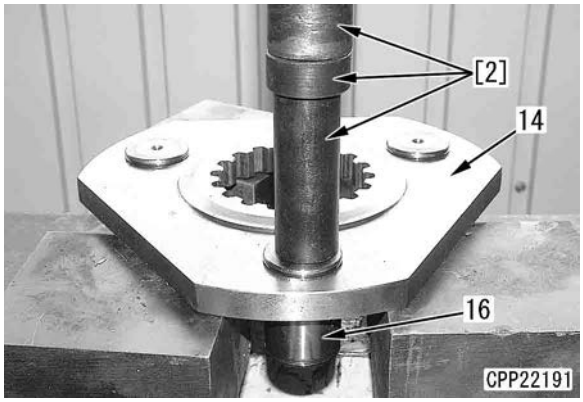


   2) Disassemble No. 1 planetary carrier according to the following procedure.
      1] Remove snap ring (8), thrust washer (9), No. 1 planetary gear (10), bearing (11), and thrust washer (12) in that order.
      2] Remove plate (13).
      3] Reverse carrier (14) and remove snap ring (15).

★ PC290LC-10



   3) Using push tool [2], remove shaft (16) from carrier (14).
      • Press-fitting force of shaft (reference): 13.5 to 30.8 kN {1,374 to 3,140 kg}



8. Remove No. 2 sun gear (17).
9. Remove 22 bolts (18) and sling and remove ring gear (19).

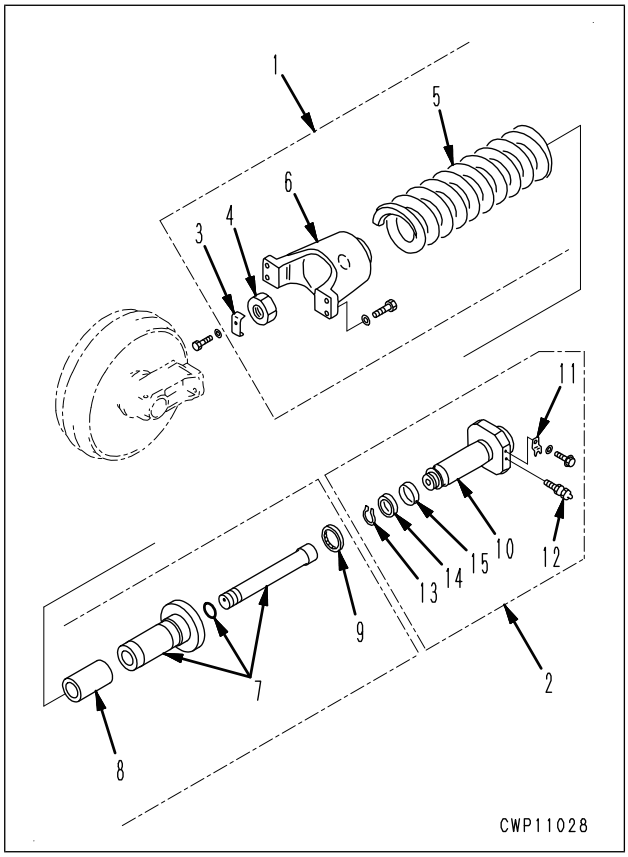
Disassembly and assembly of idler cushion *(PC290-DTBP-926-K-00-A)*

★ Special tools

Symbol		Part number	Part name	Necessity	Q'ty
M	1	791-685-8006	Compressor	■	1
		791-635-3160	Extension	■	1
		790-101-1600	Cylinder (686 kN {70 ton})	■	1
		790-101-1102	Pump	■	1
	2	790-201-1500	Push tool	●	1
		790-101-1620	• Plate		1
		790-101-5021	• Grip		1
		01010-50816	• Bolt		1

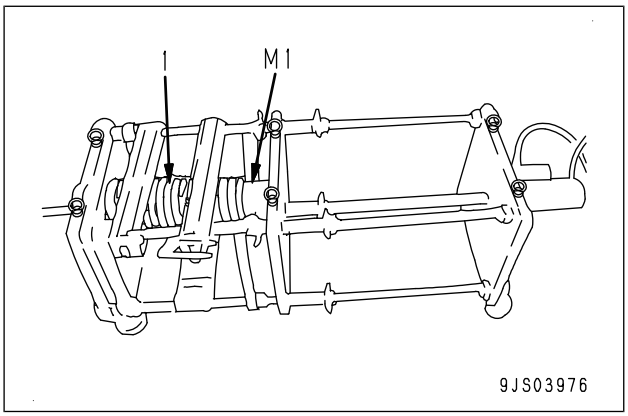
⚠ Since the load at installed length of the spring is large and dangerous, set the recoil spring assembly securely to the tool.

★ Figure of structure

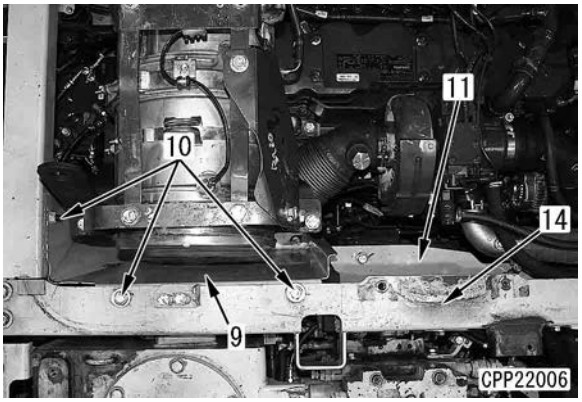


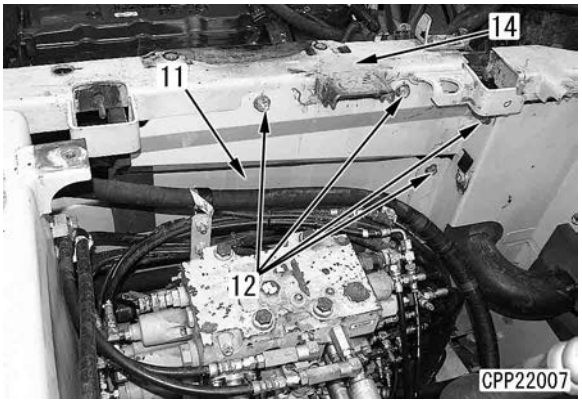
Disassembly *(PC290-DTBP-530-K-00-A)*

1. Remove piston assembly (2) from idler cushion assembly (1).
2. Disassembling idler cushion
   1) Set idler cushion assembly (1) on tool **M1**.
      ★ Load at installed length of spring: 208,741 N {21,287 kg}



   2) Apply hydraulic pressure gradually to compress the spring and remove lock plate (3) and nut (4).
      ★ Compress the spring until the nut becomes loose.
      ★ Release the hydraulic pressure slowly to release the tension of the spring.
      ★ Free length of spring: 811.5 mm
   3) Remove yoke (6), cylinder (7), collar (8), and dust seal (9) from spring (5).
3. Further disassembly of the piston assembly
   1) Remove lock plate (11) from piston assembly (10), then remove valve (12).
   2) Remove snap ring (13), then remove U-packing (14) and ring (15).

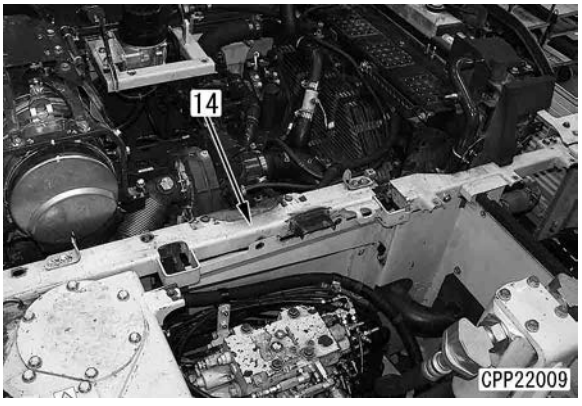




6. Remove cover (13) (four bolts) .

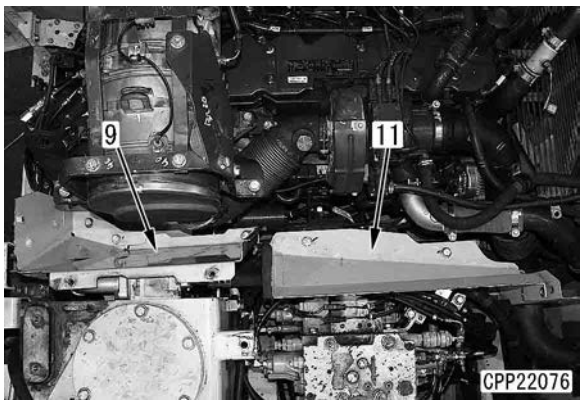
7. Remove frame (14) (seven bolts) .

Frame (14):
15 kg

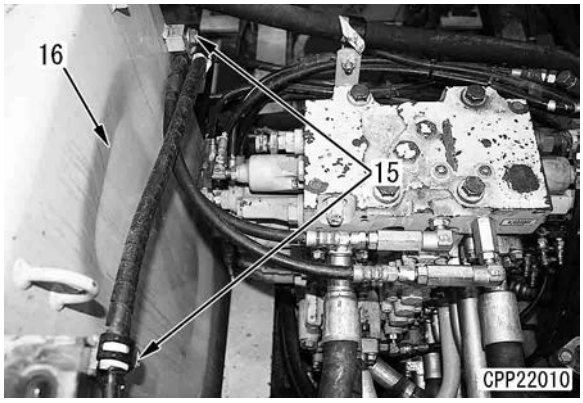


8. Remove covers (9) and (11) by raising them. **[*2]**

★ Take care not to let the cover damage any wiring harness and hose.

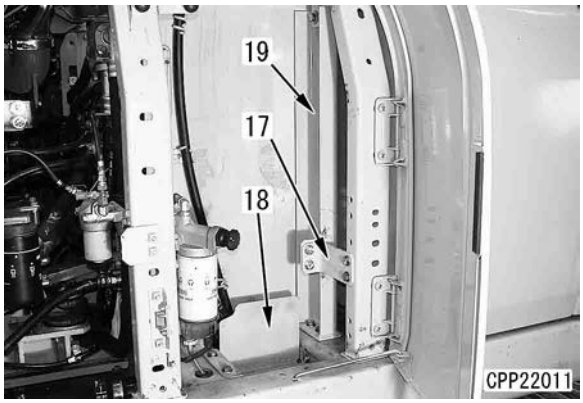


9. Remove clamps (15) (one bolt each) and move them away from hydraulic tank (16) .

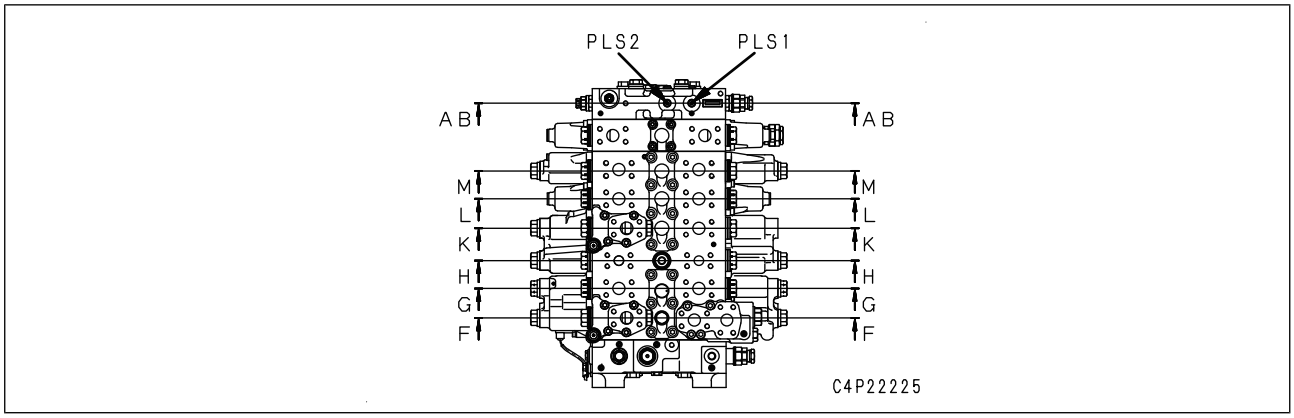


10. Remove plate (17) (four bolts) across the frames and remove lower plate (18) (four bolts) .
11. Remove frame (19) and side cover assembly (20).

Side cover assembly (20):
25 kg



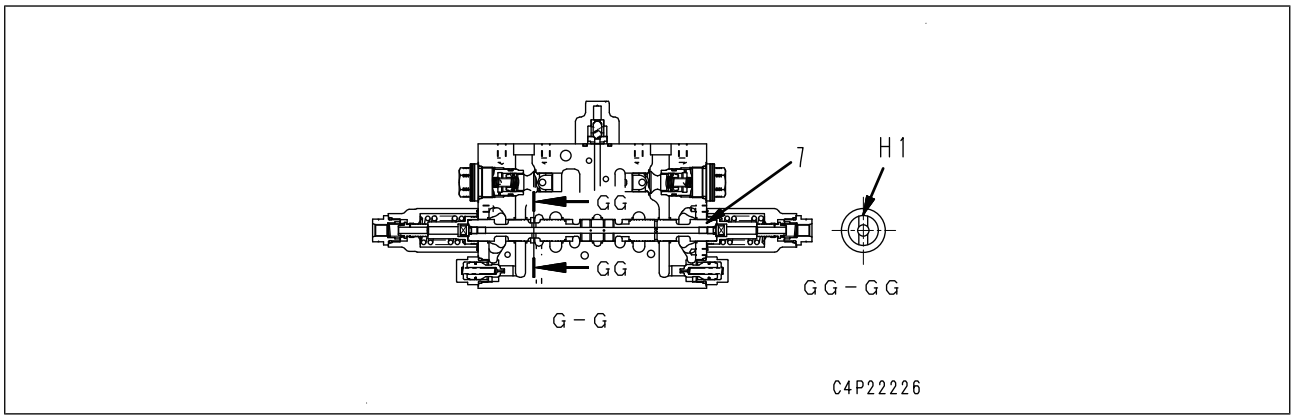
Assembly of control valve *(PC220-C030-530-K-00-A)*



★ Apply engine oil to the sliding surfaces before assembling.

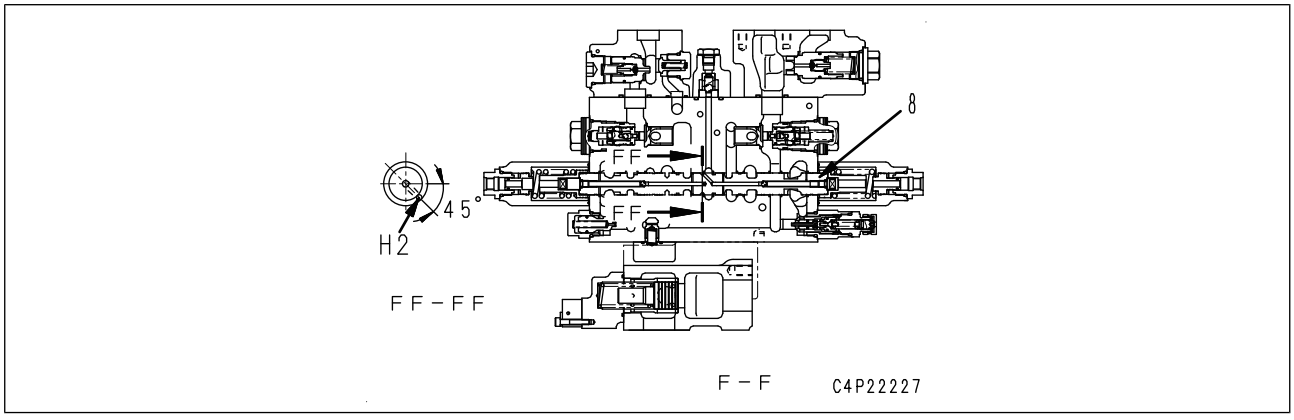
★ When installing spool (7) to the valve chamber, set drilled hole (H1) to the direction shown in the following figure.

★ Do the same with section L-L.

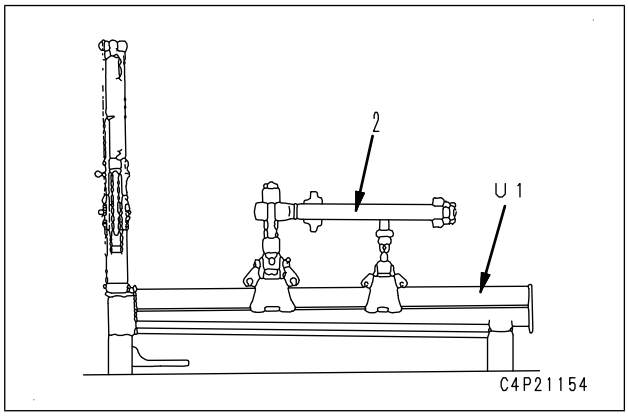


- When installing spool (8) to the valve chamber, set drilled hole (H2) to the direction shown in the following figure.

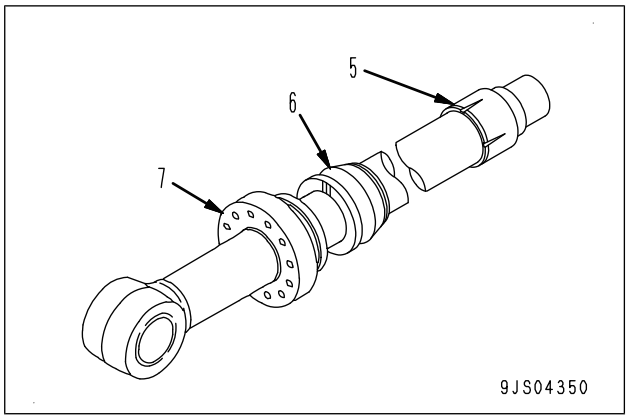
★ Do the same with H-H, K-K and M-M shown in the sectional view.



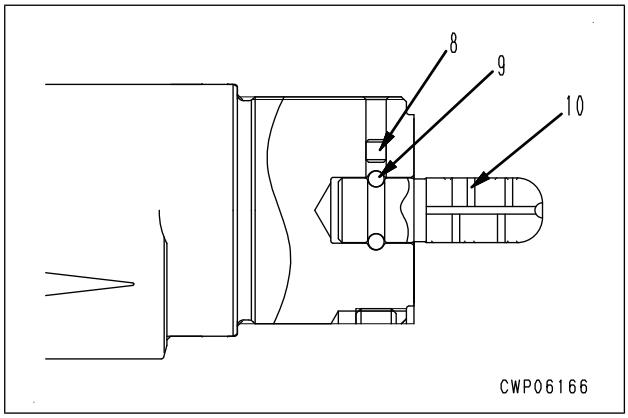
★ Assemble filter (9) installed to the bottom ports (PLS1) and (PLS2) in the direction shown in the figure below. (Pay attention to the position of caulked portion (10).)



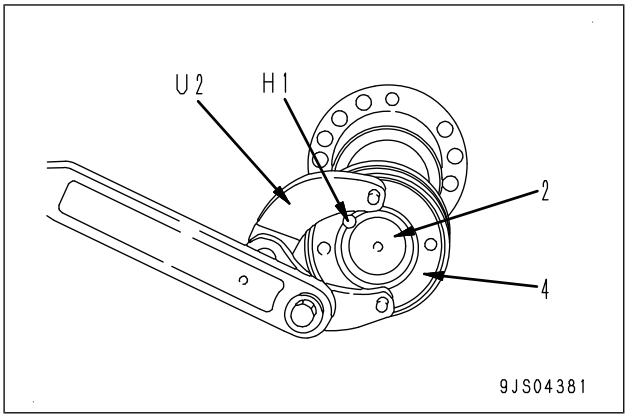
2. Install cylinder head assembly (7).
3. Install the O-ring and the backup rings to collar (6) and install the collar to the piston rod.
   ★ Install the two backup rings, one each in the front and rear of the O-ring.
   ★ Only the boom and arm cylinders
4. Install plunger (5).
   ★ Only the boom and arm cylinders



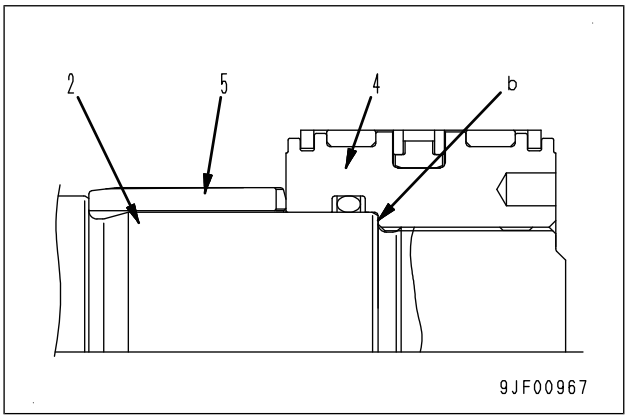
5. Place plunger (10) on piston rod assembly (2). Install 12 balls (9) and cap (8).
   ★ After installing the plunger, check that there is a little play at its end.
   ★ Arm cylinder only



6. If both of piston rod assembly (2) and piston assembly (4) are to be reused, assemble them according to the following procedure. (If either or both of them are to be replaced with new ones, see Step 7.)
   1) Using tool **U2**, install piston assembly (4) to piston rod assembly (2).
      ★ Any burrs or sharp edges on threaded portions must be removed using files before installation.



      ★ Fully tighten piston assembly (4) until it contacts with end face (**b**) of the rod. Then, at around this position, align screw holes (**H**) in the piston and piston rod end face
      ★ For a cylinder with a head cushion, ensure that there is a small play in plunger (5) with piston assembly (4) installed.
        • Only the boom and arm cylinders

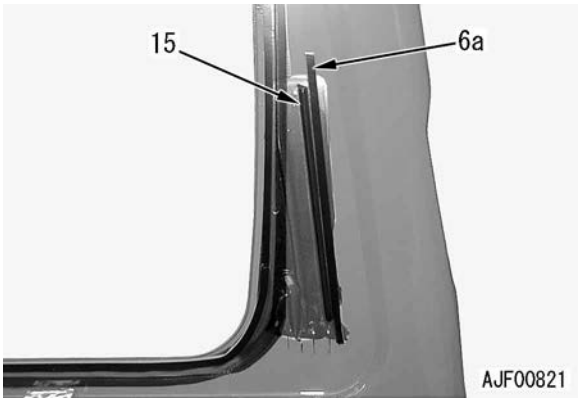


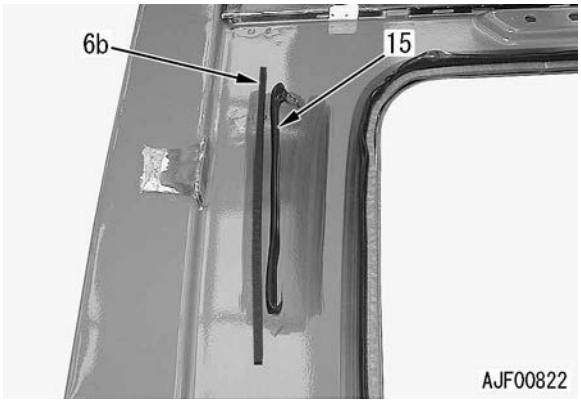
   2) Install screw (3) to lock piston assembly (4) and piston rod assembly (2).

      Screw (3) thread portion:
      Adhesive (Loctite #262)

      Screw (3):
      58.9 – 73.6 Nm {6 – 7.5 kgm}

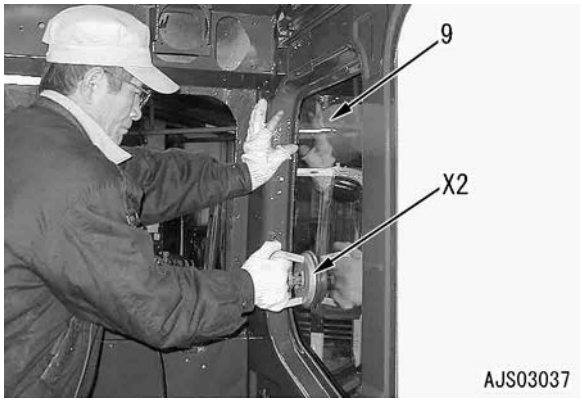
      ★ After installing screw (3), caulk the screw at four peripheral places (**a**).





7. Install the window glass.
   1) Install window glass (9) while aligning the lines drawn on the positioning tapes in step 5.
      ★ Since the window glass cannot be removed and installed again, install it with utmost caution.
      ★ Install the window glass within 5 minutes after applying the adhesive.
   2) After installing window glass (9), press entire circumferential area until it adheres firmly to the dam rubber.
      ★ Press the corners of the window glass firmly.

      ★ You can perform this work efficiently by pulling window glass (9) from inside of the operator's cab using suction cup **X2**.

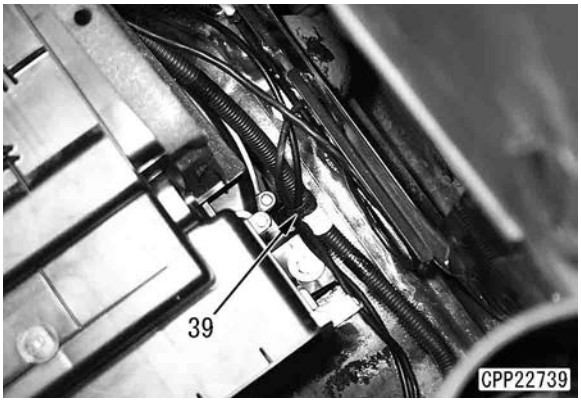


      ★ After installing front window glass (4) fill the clearances between the window glass and center trim seal (16) with caulking material in range (s) with dimensions (**t**) and (**u**).
      ★ After applying the primer to the part of window glass (4) shown in section A-A, apply the adhesive as caulking material.
      - Caulking dimension (**t**): 2 mm
      - Caulking dimension (**u**): 5 mm

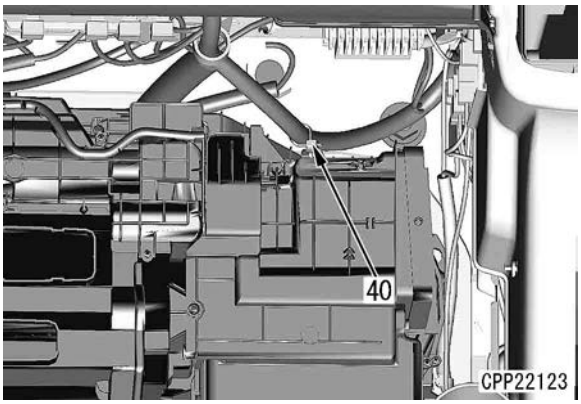
      ★ When caulking, apply masking to the window glass and form the adhesive with a rubber spatula as shown in the figure.
      ★ Wipe off the squeezed adhesive.

Primer for glass:
Sunstar Primer 580 Super for glass

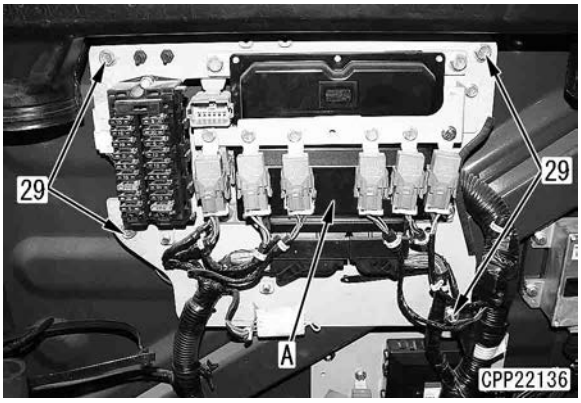
Adhesive:
Sikaflex 250-2



16.Remove cable tie (40) of the floor wiring harness.

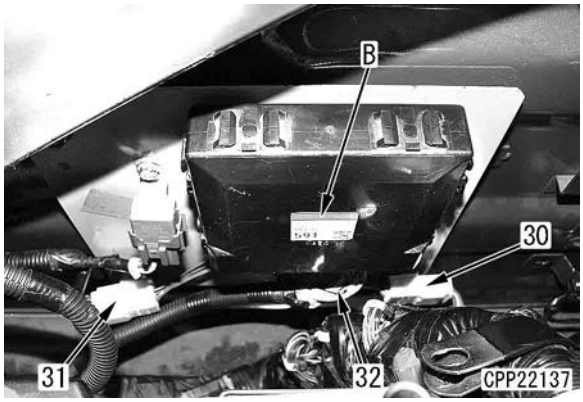


17.Remove four bolts (29) and remove pump controller assembly (A). Arrange the assembly neatly and place it on the floor apart from the operator's cab.



18.Disconnect connectors (30) to (32) from air conditioner controller assembly (B).

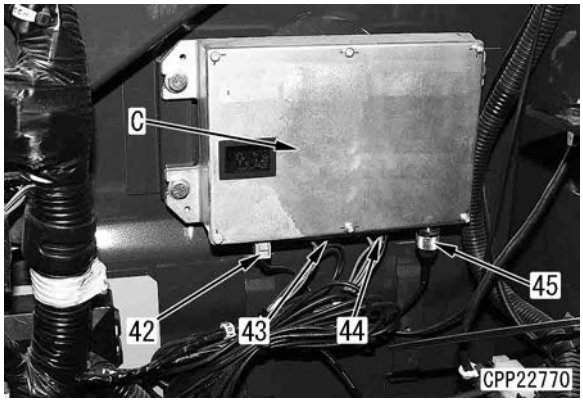
- Connector (30): Machine main harness (AC01)
- Connector (31): Machine main harness (AC02)
- Connector (32): Machine main harness (AC04)



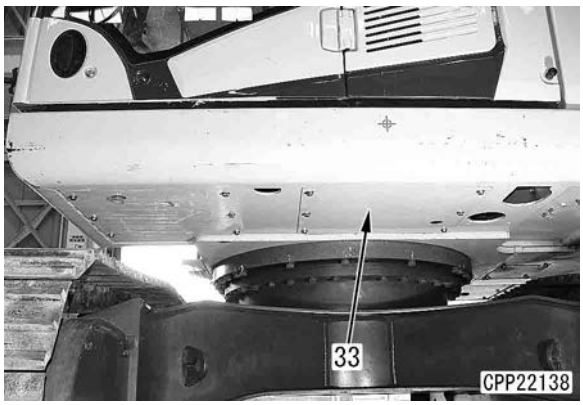
19.Disconnect connectors (42) to (45).

- Connector (42): Communication antenna (GPS)
- Connector (43): Machine main harness (CK01).
- Connector (44): Machine main harness (CK02).
- Connector (45): Communication antenna

20.Remove KOMTRAX terminal (**C**) (four bolts).



21.Remove cover (33).



22.Remove bolt (34), then disconnect tubes (35) of the air conditioner. **[*3]**

23.Disconnect hoses (36) of the heater core. **[*4]**

Removal and installation of air conditioner condenser assembly *(PC220-K580-924-K-00-A)*

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

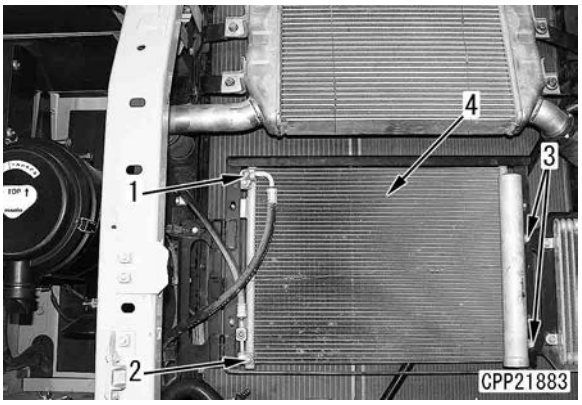
⚠ If refrigerant gas (R134a) gets in your eyes, you may lose your sight. And if it touches your skins, you may suffer from frostbite. Accordingly, put on the protective eyeglasses, gloves and working suits with long sleeves while you are collecting or filling the refrigerant (R134a).

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

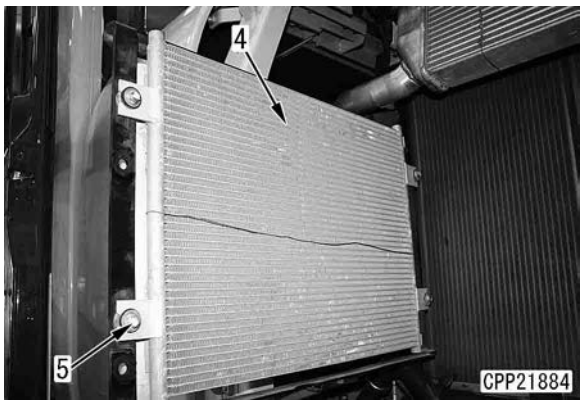
★ Ask a qualified person for collecting, adding, and filling operations of the refrigerant (R134a).

Removal *(PC220-K580-520-K-00-A)*

1. Collect the refrigerant (R134a) from the air conditioner circuit. **[*1]**
   ★ Refrigerant to be collected:
   930 ± 50 g
2. Open the left rear cover and disconnect hoses (1) and (2) from air conditioner condenser assembly (4). **[*2]**
3. Remove mounting bolts (3) and open air conditioner condenser (4).



4. Remove 4 mounting bolts (5) for the air conditioner condenser and then remove air conditioner condenser (4). **[*3]**
   ★ In this removal operation, take care not to damage the core part.



Installation *(PC220-K580-720-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
- Addition of air compressor oil
  For details, see Others, "Filling compressor oil".

[*2]

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

★ Make sure before the installation that there is an O-ring in the piping connector of the air conditioner hose.

★ Do not reuse an O-ring since it is deformed and deteriorated after the first time it was used.

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

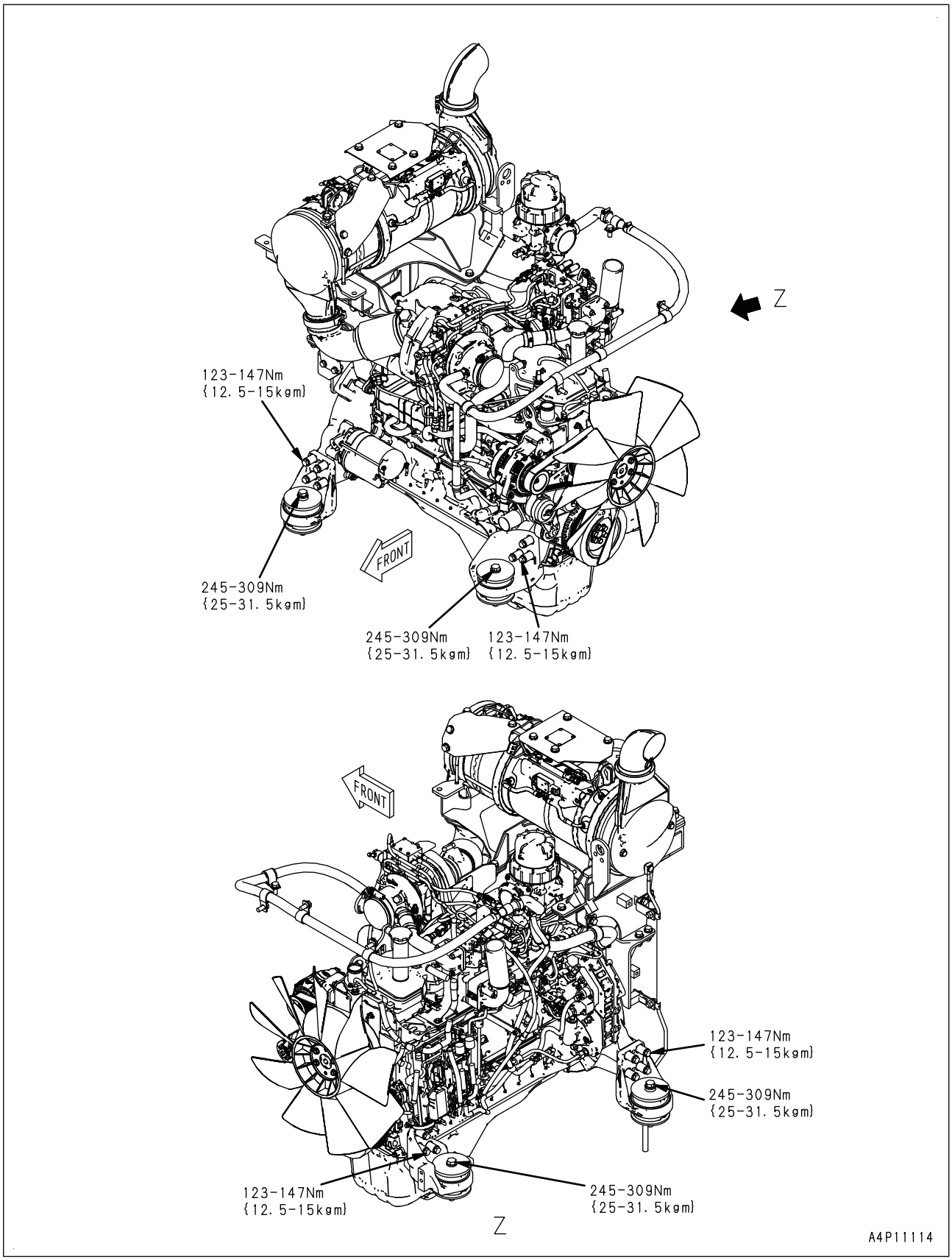
★ Check that there is no defect or deterioration on the O-ring.

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

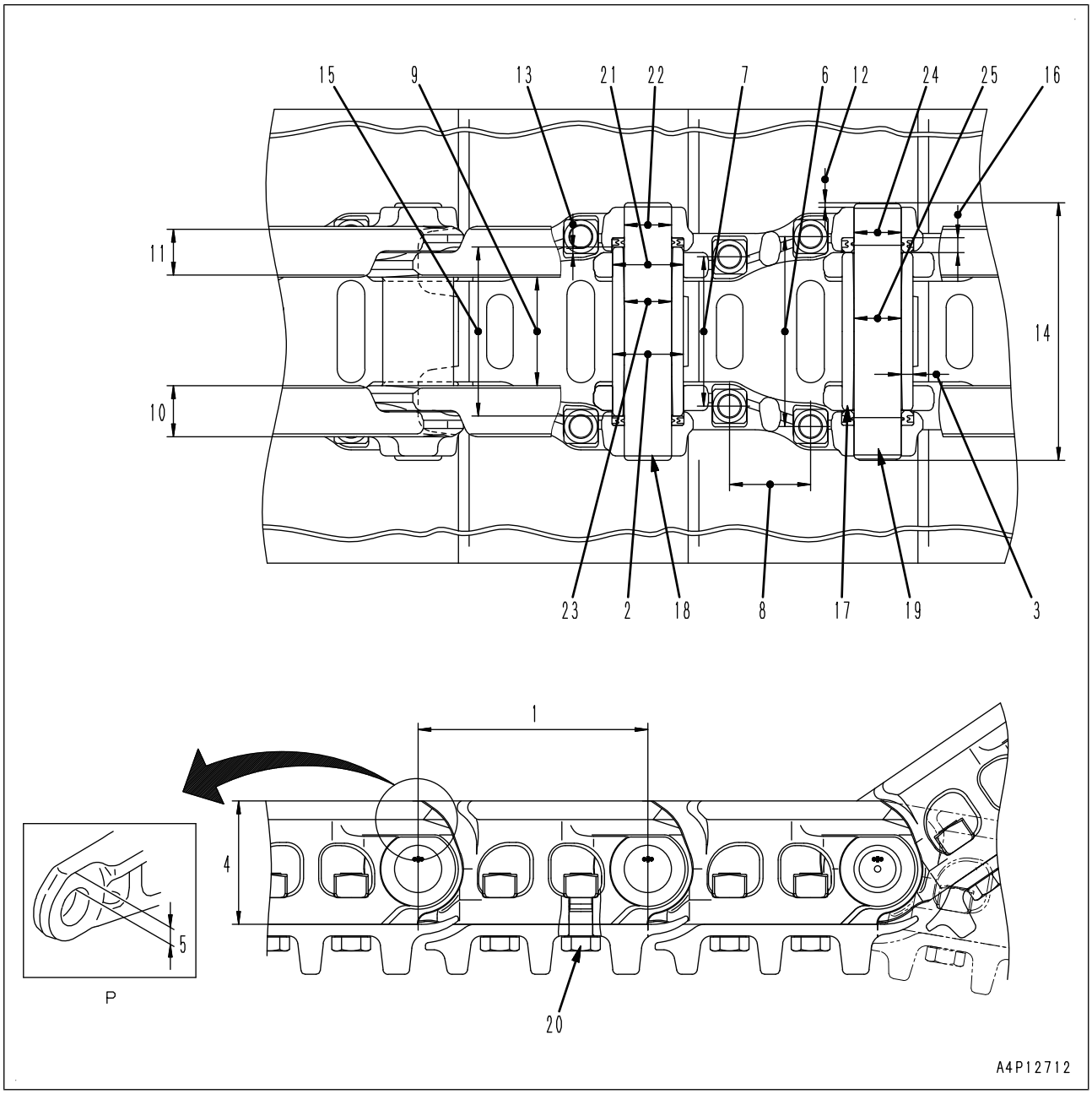
Hose clamp (M6 bolt):
8 to 12 Nm {0.8 to 1.2 kgm}

Engine and cooling system *(ALL-R401-001-K-60-A)*

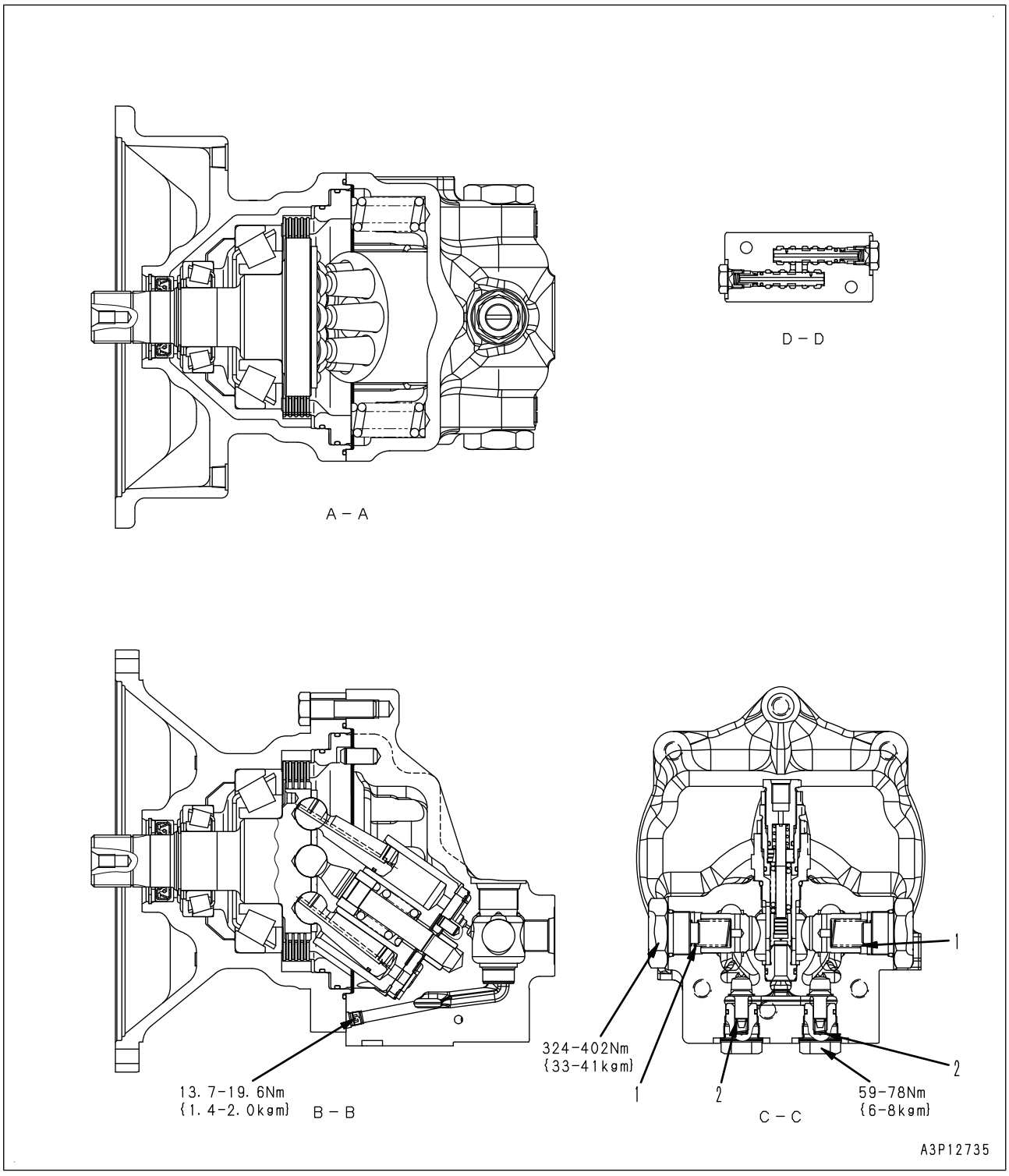
Engine mount *(PC-H320-034-K-00-A)*



Track shoe *(PC300-DTL0-034-K-00-A)*



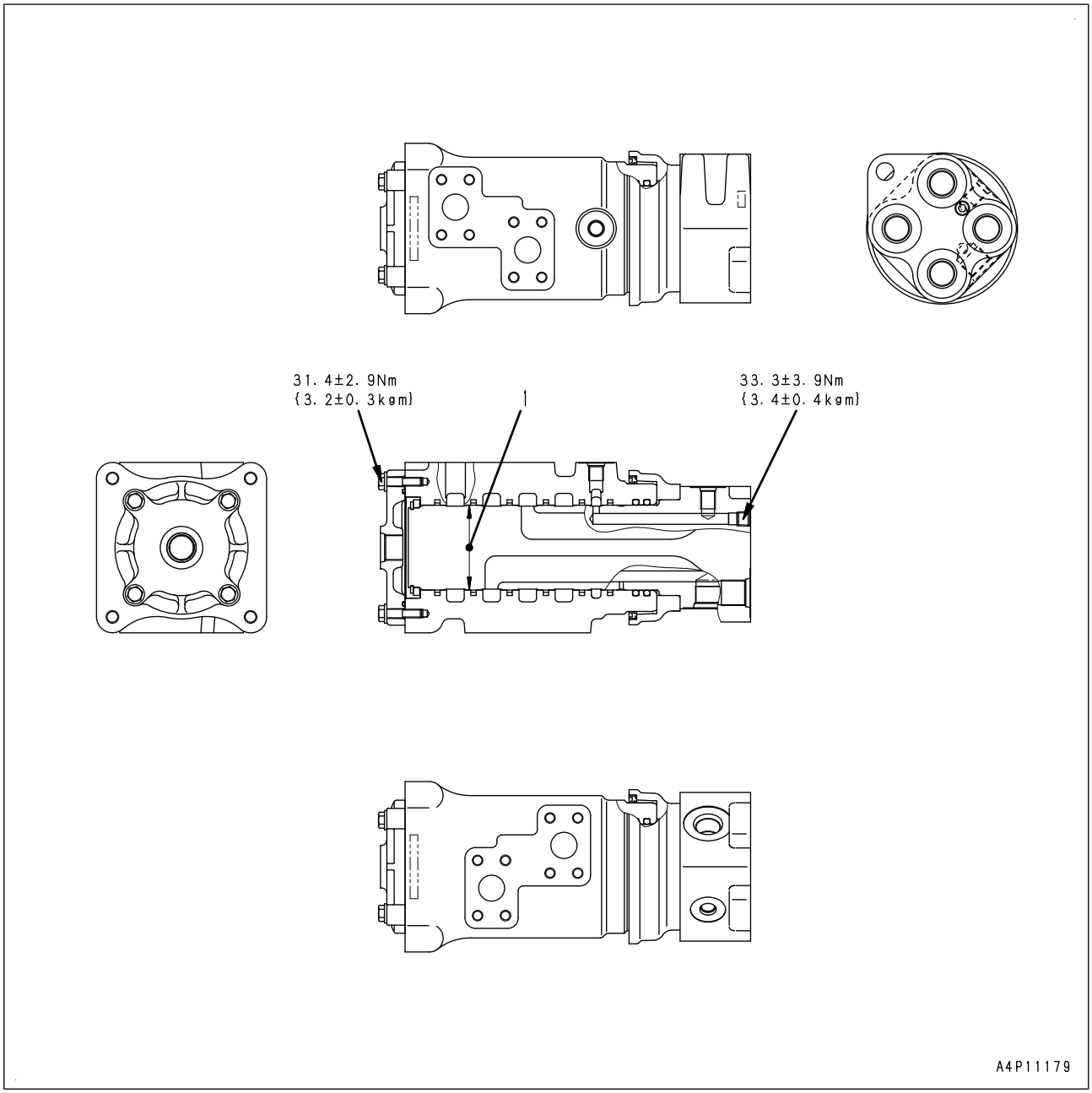
★ Part P shows the link in which the bushing is press-fitted.



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 19.0	30.0	3.53 N {0.36 kg}	—	2.84 N {0.29 kg}	
2	Shuttle valve spring	16.4 x 8.9	11.5	13.7 N {1.4 kg}	—	11.0 N {1.12 kg}	

Center swivel joint *(PC-J8E0-034-K-00-A)*



Unit: mm

No.	Item	Criteria			Remedy
1	Clearance between rotor and shaft	Standard dimension	Standard clearance	Allowable clearance	Replace
		80	0.056 to 0.105	0.111	

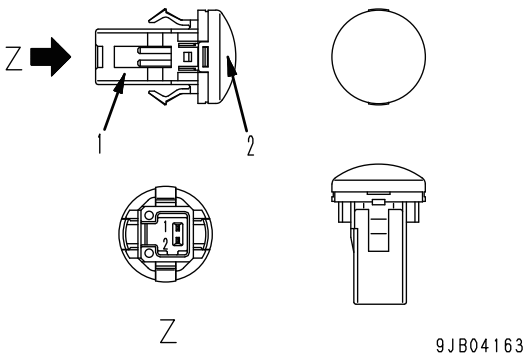
4. Condenser (with modulator)
5. Hot water return pipe
6. Fresh air temperature sensor
7. Fresh air filter
8. Recirculation air filter
9. Compressor
10. Refrigerant piping
11. Sight glass
12. Air conditioner controller
13. Air conditioner unit
14. Dual pressure switch

A: Front vent
B: Rear vent
C: Foot vent
D: Defroster vent
E: Recirculation air inlet
F: Fresh air inlet

Specification *(ALL-K500-030-K-00-A)*

Refrigerant	R134a
Refrigerant refilling level (g)	930 ± 50

Sunlight sensor *(ALL-K5FH-041-K-00-A)*

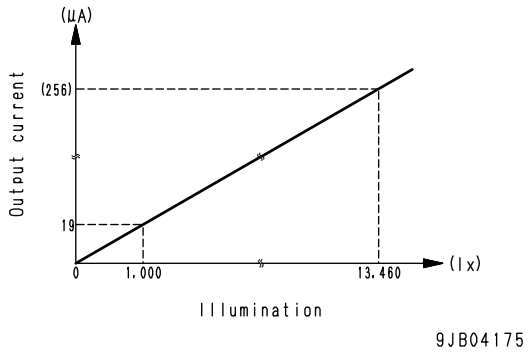


1. Connector
2. Sensor

Function *(ALL-K5FH-042-K-00-A)*

- The sunlight sensor is mounted on top of the machine monitor.
- It detects the strength of incident sunlight and sends signals to the air conditioner controller.
- When performing automatic air conditioning, the air conditioner controller controls the blower motor and the air mix servomotor with the data of the sunlight sensor in order to adjust the temperature and air flow.

Output characteristics

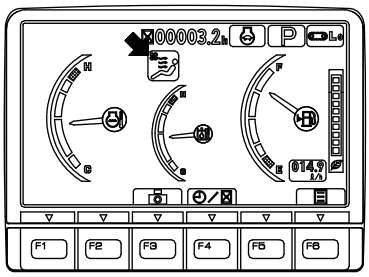


Testing with self-diagnosis function *(ALL-Q19Y-001-K-00-A)*

Testing outline *(ALL-Q19Y-360-K-00-A)*

The air conditioner controller performs various self-diagnosis such as inside air temperature sensor, outside air temperature sensor, evaporator temperature sensor, temperature control system, vent (mode) changeover system, sunlight sensor, and refrigerant pressure with the dual pressure switch. If an error is detected on the temperature control system, vent (mode) changeover system, or refrigerant, the machine monitor momentarily shows a warning screen and then "Air conditioner system state monitor" lights up continuously.

★ The machine monitor displays the system state monitor "!" when an error occurs in the communication between the machine monitor and the air conditioner controller.



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★ The system performs self-diagnosis of various sensors. If any failure is detected, a failure code is displayed on the "Electrical Systems Abnormality Record" screen in the service mode of the machine monitor.

★ Once a failure is detected in the self-diagnosis, the error condition is not canceled even if the failed part returns to normal.

Turning the starting switch "OFF" clears a failure.

★ FRESH/RECIRC air changeover servomotor is not checked in the self-diagnosis.

Failure code [879AKB] A/C Inner sensor Short Circuit *(PC220_10-879AKB-400-A-00-A)*

Action level	Failure code	Failure	Air conditioner inside air temperature sensor short circuit (Machine monitor system)
—	**879AKB**		
Details of failure	• Air conditioner controller detected short circuit in inside (air) temperature sensor.		
Action of controller	• The air conditioner controller sends information about the inside (air) temperature sensor short circuit to the machine monitor via CAN communication. • Stops the air conditioner if it is in automatic mode.		
Problem on machine	• The air conditioner does not operate in automatic mode because of a short circuit in the air conditioner inside air temperature sensor. (The air conditioner can be operated 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. • Troubleshooting cannot be performed since the connector portion of the air conditioner inside (air) temperature sensor cannot be checked while the controller is installed on the machine.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	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.)
2	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.)