

Shop Manual

HYDRAULIC
EXCAVATOR

PC200 -8M0

PC200LC-8M0

PC220 -8M0

PC220LC-8M0

SERIAL NUMBERS

PC200- 401217
PC200LC- 401217
PC220- 101052
PC220LC- 101052

and up

ecot3

KOMATSU

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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.

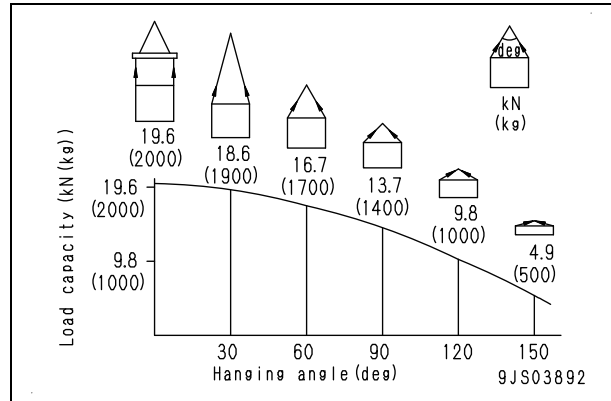
1. Do not stand under the load.
2. Do not step on the load.

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

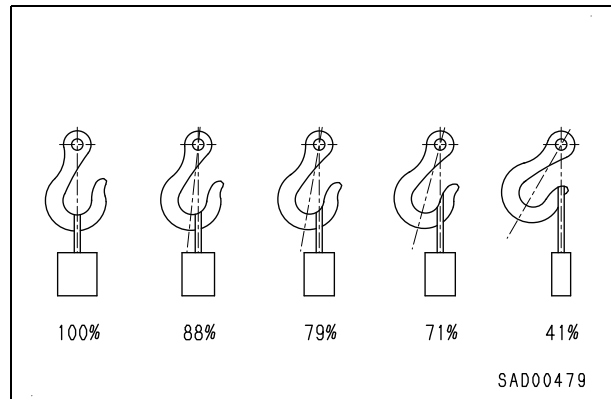
⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original slinging position on the load, which can result in a dangerous accident.

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

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



- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle portion of the hook.
 - ★ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The hook has the maximum strength at the middle part.

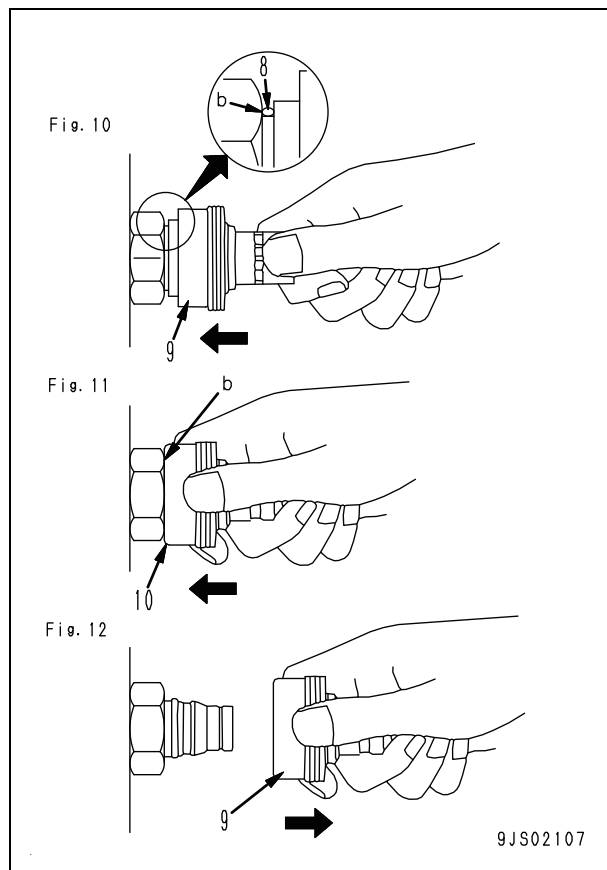


- Do not use twisted or kinked wire ropes.
- When slinging up a load, observe the following.
 1. Wind up the rope slowly until the wire rope tensions. When putting your hands on the wire ropes, do not grasp them but press them down from above. If you grasp them, your fingers may be caught.
 2. After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
 3. If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
 4. Do not lift up the load at an angle.
- When lowering a load, pay attention to the following.

Type 3

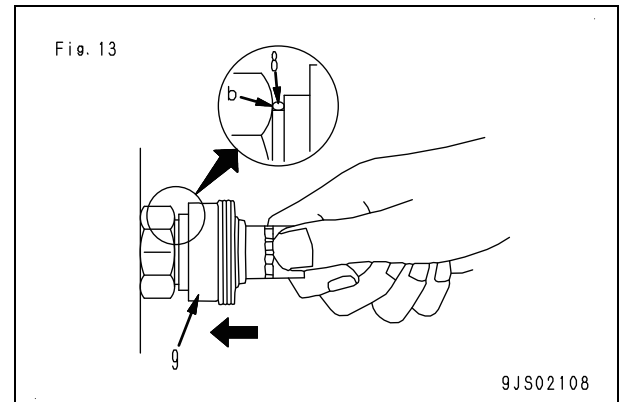
Disconnection

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)



3. Operate the hydraulic cylinder three to four 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.

Check of 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".

Check 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 part.
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 part.
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".

Temperature

Conversion of Fahrenheit to Celsius

- A simple way to convert a Fahrenheit temperature reading into a Celsius temperature reading or vice versa is to see the number in the center column of the following table. The figures on the following table show the temperatures in both Fahrenheit and Celsius.
- When converting from Fahrenheit to Celsius degrees, consider the center column to be a table of Fahrenheit temperatures and read the corresponding Celsius temperature in the column at the left.
- When converting from Celsius to Fahrenheit degrees, consider the center column to be a table of Celsius values, and read the corresponding Fahrenheit temperature on the right.

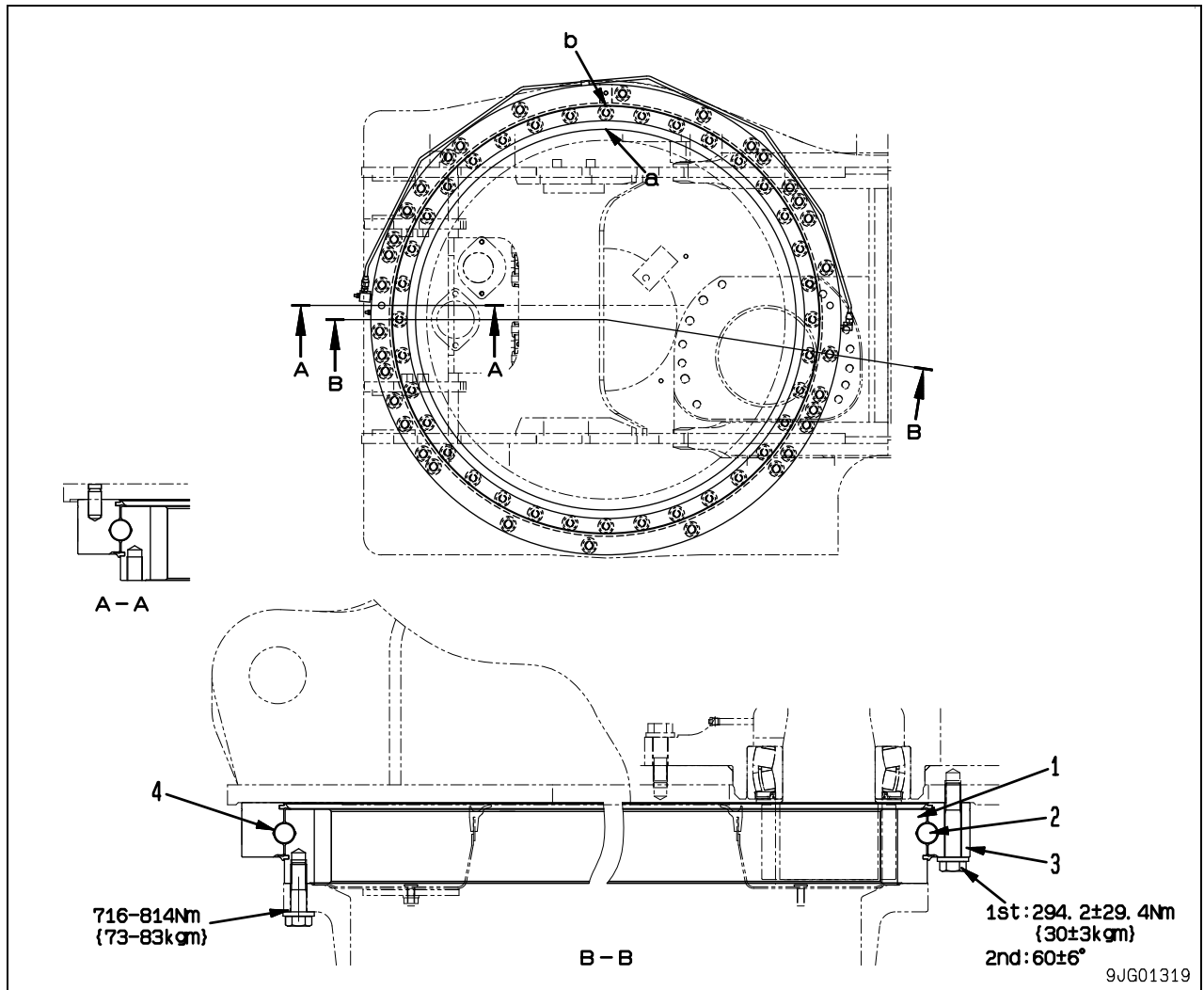
$$1^{\circ}\text{C} = 33.8^{\circ}\text{F}$$

$^{\circ}\text{C}$		$^{\circ}\text{F}$	$^{\circ}\text{C}$		$^{\circ}\text{F}$	$^{\circ}\text{C}$		$^{\circ}\text{F}$	$^{\circ}\text{C}$		$^{\circ}\text{F}$
-40.4	-40	-40.0	-11.7	11	51.8	7.8	46	114.8	27.2	81	177.8
-37.2	-35	-31.0	-11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
-34.4	-30	-22.0	-10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
-31.7	-25	-13.0	-10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
-28.9	-20	-4.0	-9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
-28.3	-19	-2.2	-8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
-27.8	-18	-0.4	-8.3	17	62.6	11.1	52	125.6	30.6	87	188.6
-27.2	-17	1.4	-7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
-26.7	-16	3.2	-7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
-26.1	-15	5.0	-6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
-25.6	-14	6.8	-6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
-25.0	-13	8.6	-5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
-24.4	-12	10.4	-5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
-23.9	-11	12.2	-4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
-23.3	-10	14.0	-3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
-22.8	-9	15.8	-3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
-22.2	-8	17.6	-2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
-21.7	-7	19.4	-2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
-21.1	-6	21.2	-1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
-20.6	-5	23.0	-1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
-20.0	-4	24.8	-0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
-19.4	-3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
-18.9	-2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
-18.3	-1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
-17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
-17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
-16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
-16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
-15.6	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
-15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
-14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
-13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
-13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
-12.8	9	48.2	6.7	44	111.2	26.1	79	174.2	76.7	170	338.0
-12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

Unit: ℓ

Refilling points	PC200(LC)-8M0		PC220, 220LC-8M0	
	Specified capacity	Refill capacity	Specified capacity	Refill capacity
Engine oil pan	25.4	23.1	25.4	23.1
Swing machinery case	7.1	6.5	8.2	7.2
Final drive case (both sides)	3.8	3.6	5.4	5.0
Damper case	0.65	0.65	0.65	0.65
Hydraulic oil system	237	135	244	135
Fuel tank	400	—	400	—
Cooling system	20.3	20.3	19.9	19.9

PC220-8M0, PC220LC-8M0



- 1. Swing circle inner race (No. of teeth: 92)
- 2. Ball
- 3. Swing circle outer race

- a. Inner race soft zone "S" position
- b. Outer race soft zone "S" position

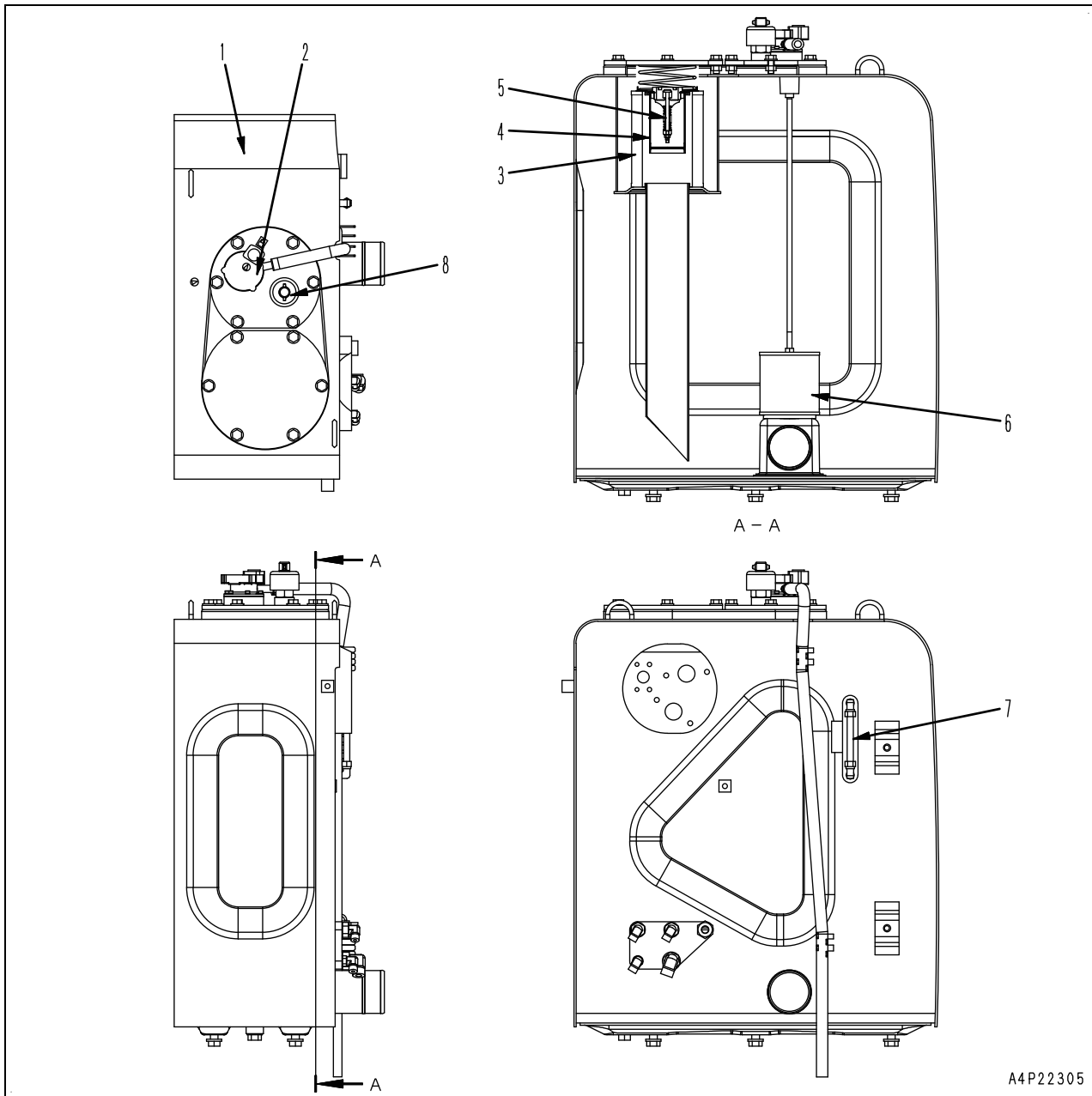
Specifications

Reduction ratio: $-92/13 = -7.077$
 Amount of filled grease: 15.8 l (G2-LI)

Unit: mm

No.	Check item	Criteria		Remedy
		Standard clearance	Allowable clearance	
4	Axial clearance of bearing (when mounted on chassis)	0.5 to 1.6	3.2	Replace

Hydraulic tank and filter



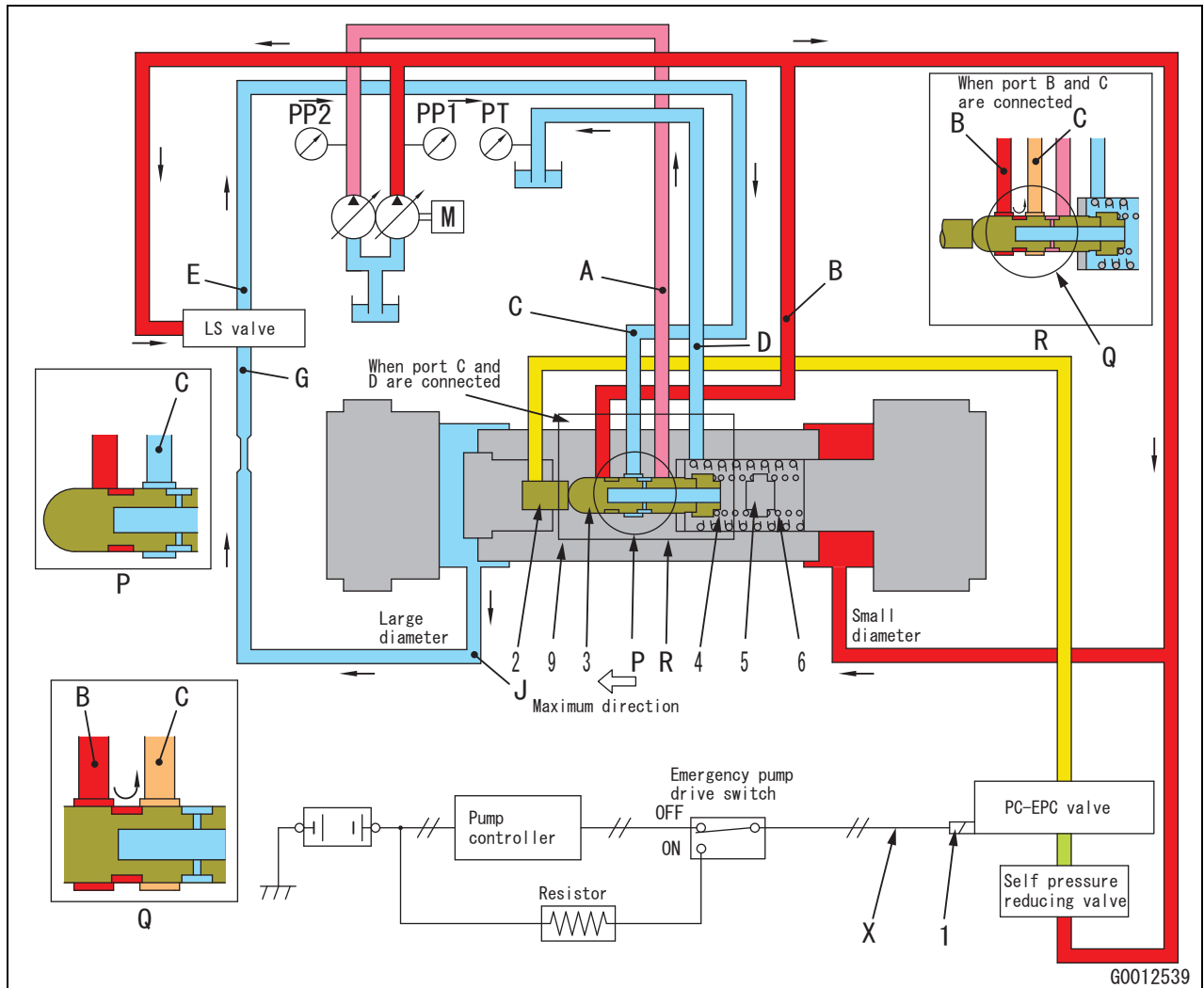
1. Hydraulic tank
2. Oil filler port cap
3. Filter element
4. Strainer
5. Bypass valve
6. Suction strainer
7. Sight gauge
8. Breather

Specifications

Tank capacity : 190 ℓ
 Amount of oil inside tank : 135 ℓ

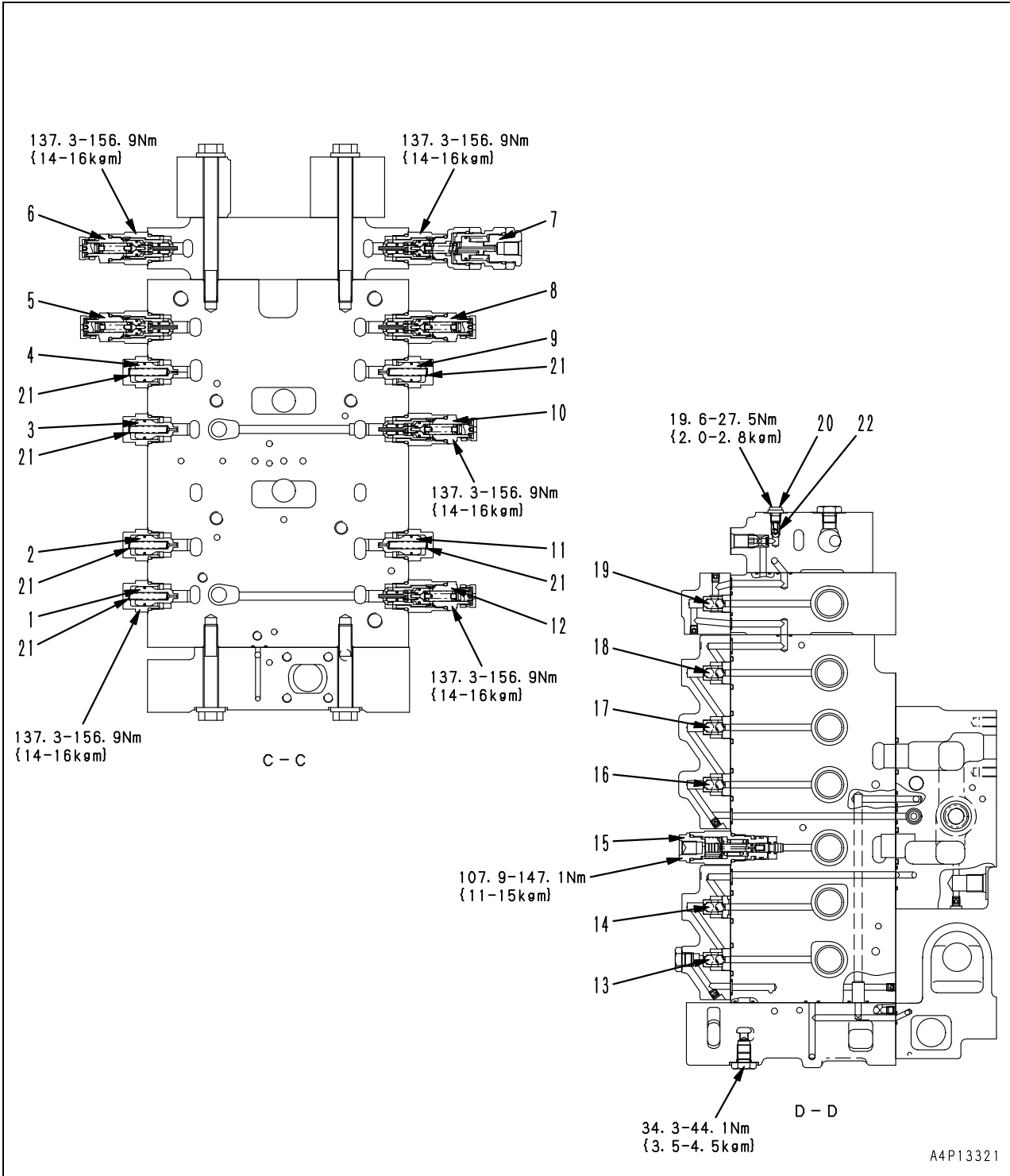
Pressure valve

Relief cracking pressure:
 $16.7 \pm 6.9 \text{ kPa} \{0.17 \pm 0.07 \text{ kg/cm}^2\}$
 Suction cracking pressure:
 $0 \text{ to } 0.49 \text{ kPa} \{0 \text{ to } 0.005 \text{ kg/cm}^2\}$
 Bypass valve set pressure:
 $150 \pm 30 \text{ kPa} \{1.5 \pm 0.3 \text{ kg/cm}^2\}$



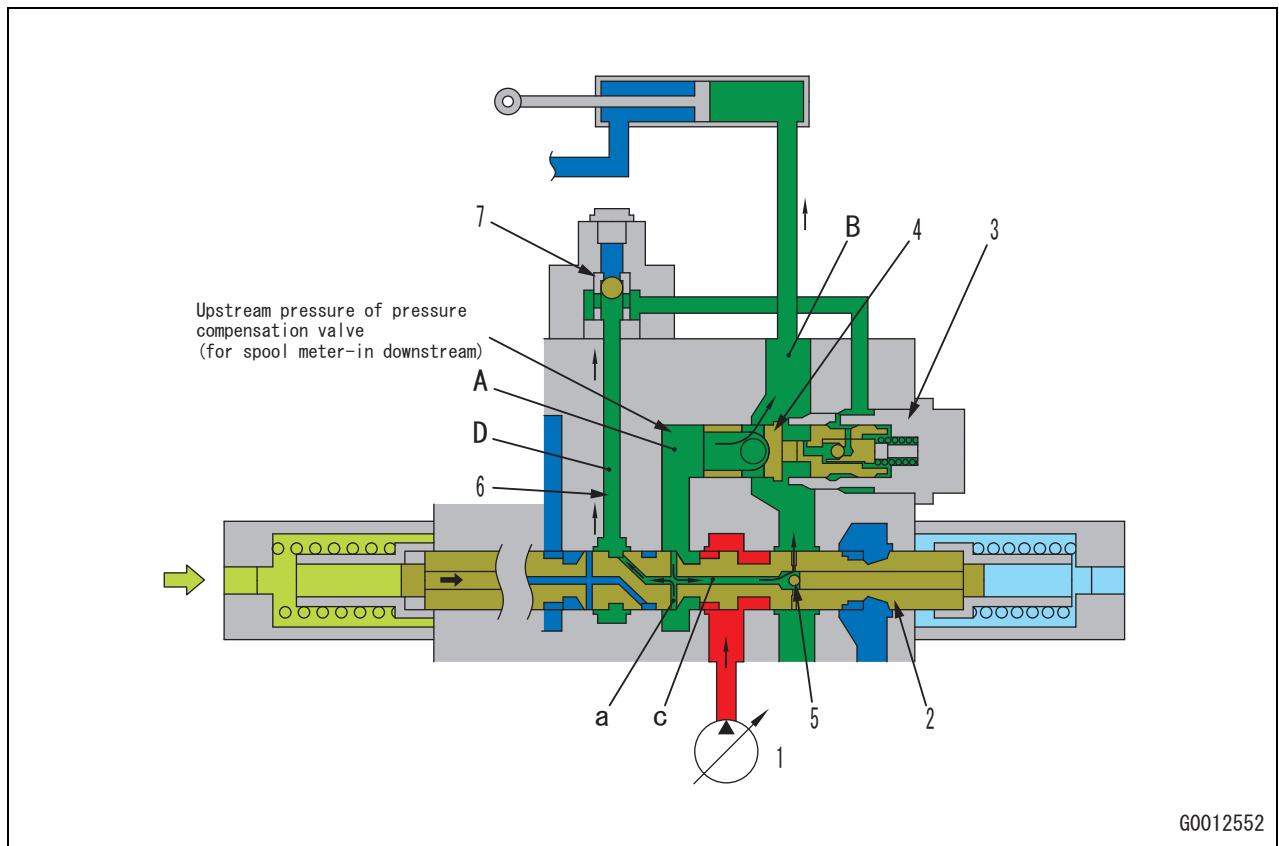
Action of spring

- Load of springs (4) and (6) on the PC valve is determined by the swash plate position.
- As servo piston (9) moves to right, spring (6) is retracted.
- If the servo piston moves further, it will be contacted again seat (5) and spring (6) will be fixed.
- After that, spring (4) alone will operate.
- The spring load is changed by servo piston (9) as it extends or compresses springs (4) and (6).
The spring load changes as the servo piston (9) extends and contracts the springs (4) and (6).
- If the command current (X) to PC-EPC valve solenoid (1) changes, so does the force pushing piston (2).
- Spring load of springs (4) and (6) is also affected by the command current (X) to PC-EPC valve solenoid.
- Port (C) of the PC valve is connected to port (E) of the LS valve.
- Self pressure (PP1) enters port (B) and the small diameter end of servo piston (9), and other pump pressure (PP2) enters port (A).
- When pump pressures (PP1) and (PP2) are small, spool (3) will be positioned in the left side.
- Port (C) and (D) are connected, and the pressure entering the LS valve becomes drain pressure (PT).
- If port (E) and port (G) of the LS valve are connected, the pressure entering the large diameter end of the piston from port (J) becomes drain pressure (PT), and servo piston (9) moves to the left side.
- The pump discharge will be set to the increasing trend.
- Accompanied with move of servo piston (9), springs (4) and (6) will be expanded and the spring force becomes weaker.



Introduction of LS pressure

LS: Abbreviation for Load Sensing



1. Main pump
2. Main spool
3. Pressure compensation valve
4. Valve
5. Check valve
6. LS circuit
7. LS shuttle valve

Function

- The upstream pressure (spool meter-in downstream pressure) of pressure compensation valve (3) is transmitted and led to LS shuttle valve (7) as LS pressure.
- Connected to actuator port (B) through valve (4), and makes LS pressure \approx actuator load pressure.
- In main spool (2), leading hole (a) with a small diameter also acts as an orifice.
- LS pressure works as source pressure when closing unload valve while control lever is operated, and this pressure also functions as operating pressure when pressure compensation valve is compensated.

Operation

- When main spool (2) is operated, the pump pressure is transmitted to port (c) through leading hole (a) and is led to LS circuit.
- When the pump pressure rises to reach the load pressure of port (B), check valve (5) opens and the pressurized oil flows.

Self-pressure reducing valve

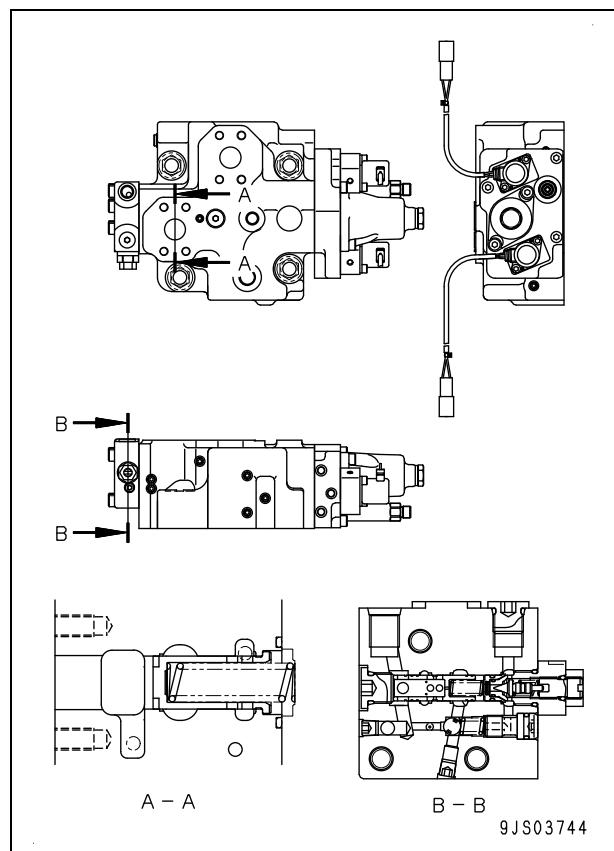
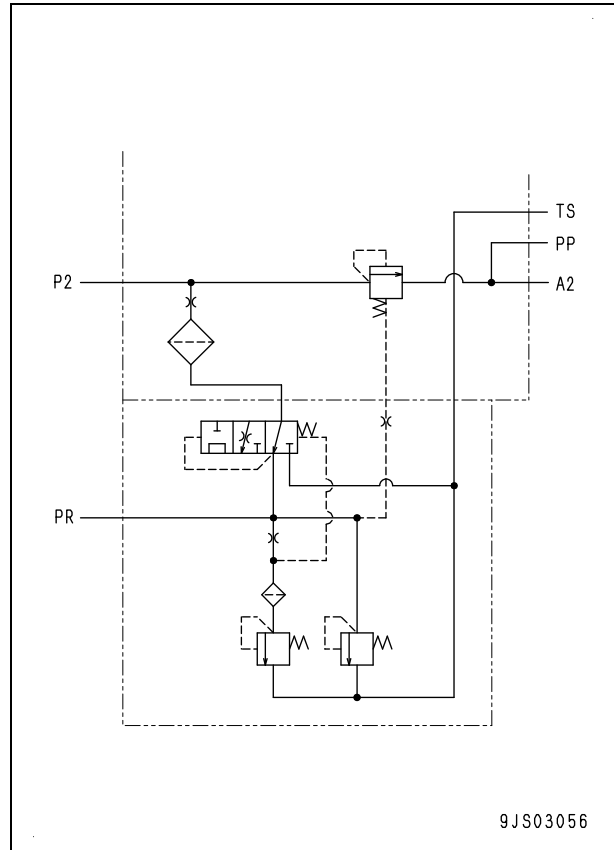
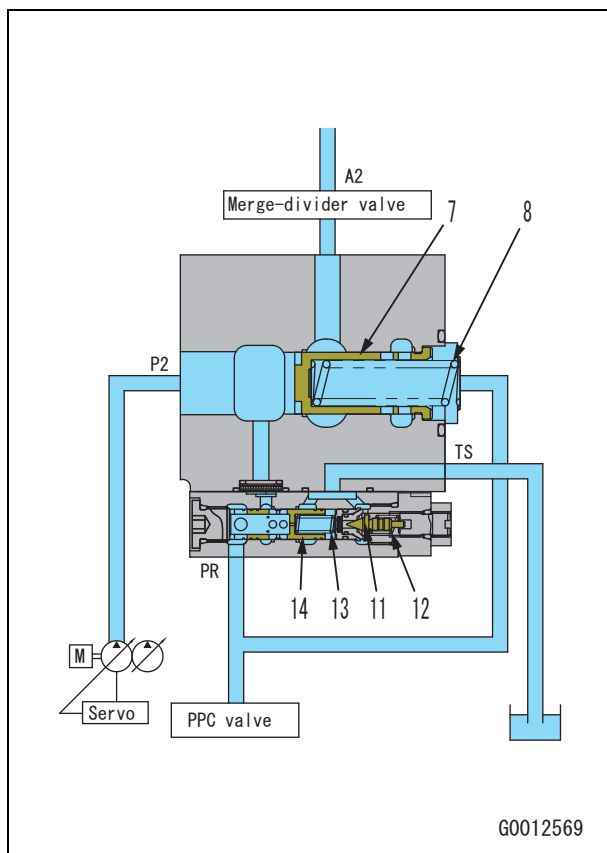
Function

- This valve serves to reduce the discharge pressure of main pump and provide it for solenoid valves, EPC valves, etc. for use as the control pressure.

Operation

When engine is stopped

- Poppet (11) is pressed against the seat by spring (12), so port (PR) is disconnected from port (TS).
- Valve (14) is pressed to the left by spring (13), so port (P2) is disconnected from (TS).
- Valve (7) is pressed to the left by spring (8), so port (P2) is disconnected from port (A2).



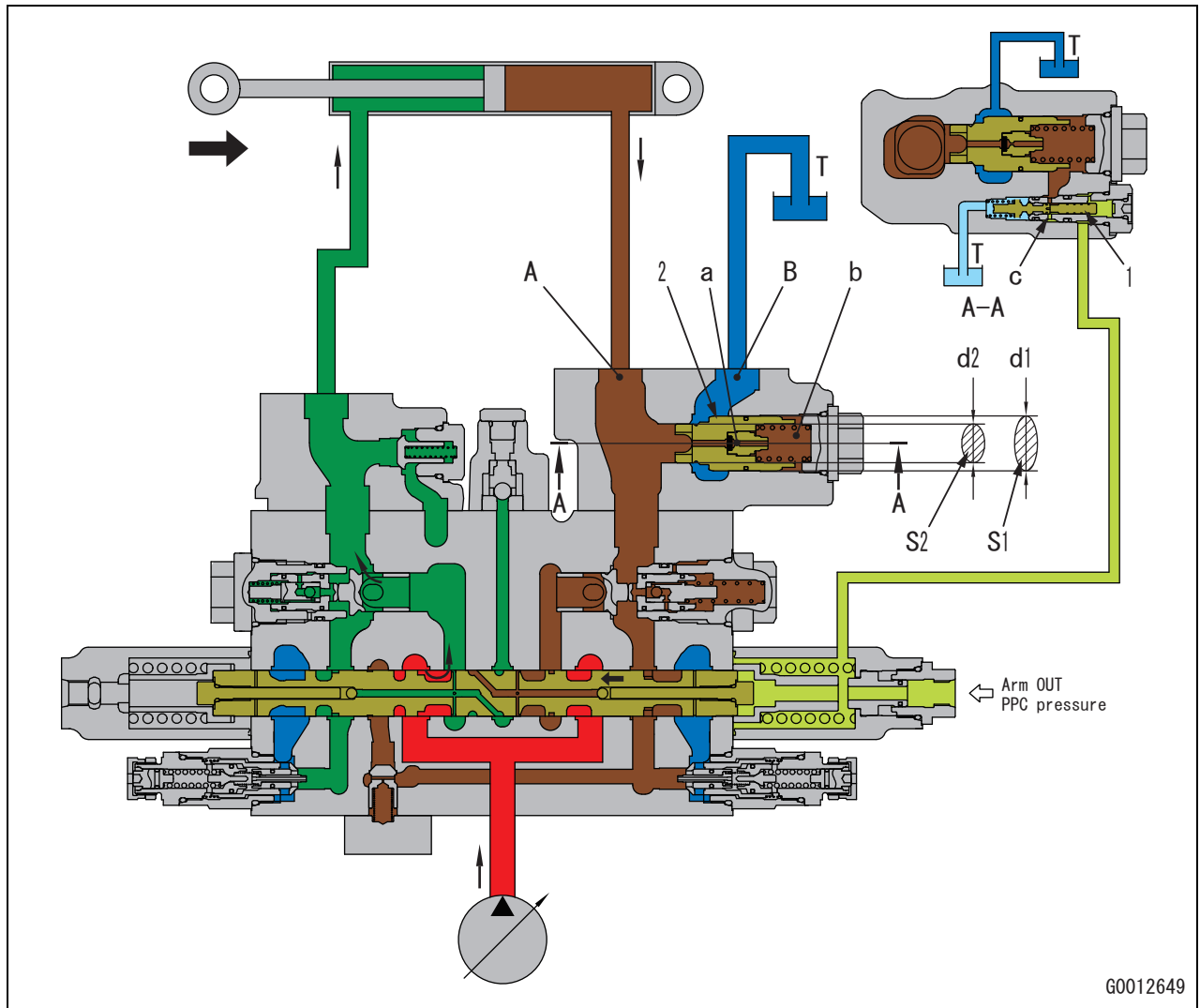
Arm quick return valve

Function

- Large amount of oil is returned from the cylinder bottom when arm OUT operation is performed.
- The valve reduces this pressure loss.

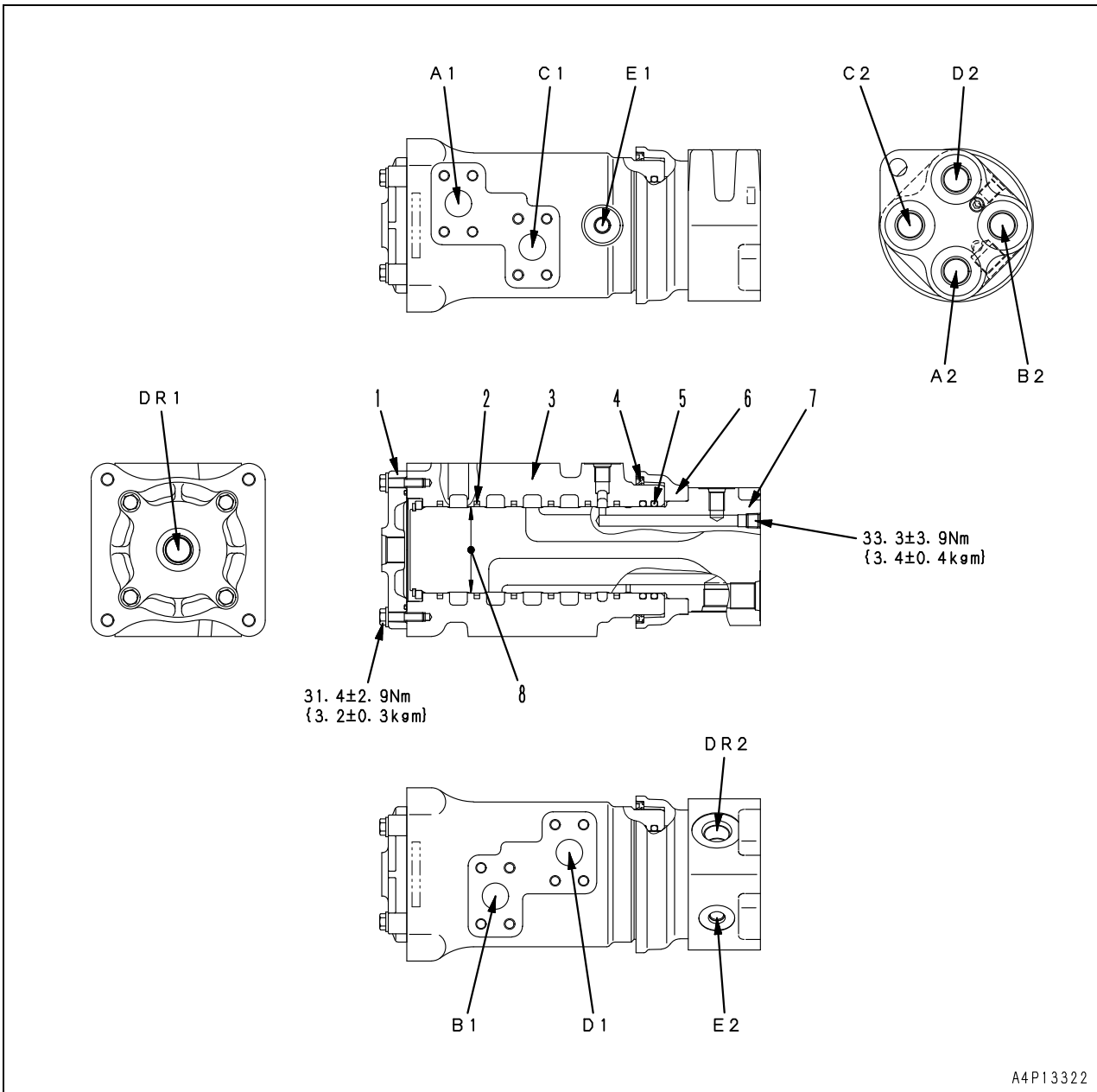
Operation

In arm "OUT" operation



- In arm "OUT" operation, the pilot pressure from the PPC valve pushes pilot piston (1).
- The pressurized oil in chamber (b) inside the valve is drained through orifice (c).
- The pressurized oil of the arm cylinder bottom side flows from orifice (c) to drain port (T) through orifice (a) and chamber (b).
- Chamber (b) and drain port (T) are interconnected, and the pressure of chamber (b) drops.
- If the pressure in chamber (b) drops lower than that of port (A), the force exerted on the pressure receiving surface of [Area (S2) of $\phi d2$ (surface of seat diameter)] on the port (A) side exceeds the combined force of the force exerted on the pressure receiving surface [Area (S1) of $\phi d1$] on the chamber (b) side of valve (2) and the spring force.
- The result is, (Force exerted on surface of $\phi d2 >$ Force exerted on surface of $\phi d1 +$ Force of spring).
- Valve (2) is pressed to the right and pressurized oil flows from port (A) to port (B).
- The pressurized oil of the arm cylinder bottom side is drained directly to the tank from port (B).

Center swivel joint



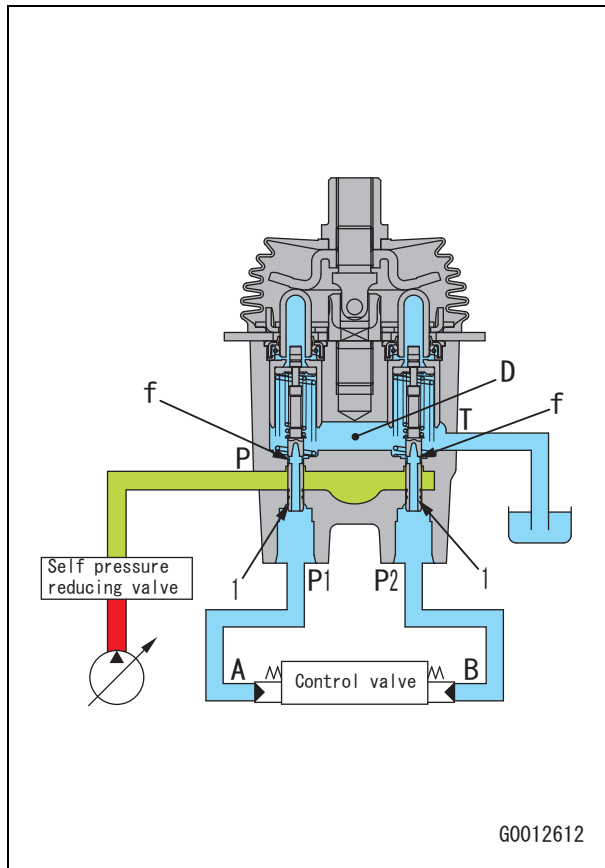
- A1 : To L.H. travel motor port (PB)
- A2 : From control valve (L.H. travel FORWARD port)
- B1 : To L.H. travel motor [Port (PA)]
- B2 : From control valve (L.H. travel REVERSE port)
- C1 : To R.H. travel motor [Port (PA)]
- C2 : From control valve (R.H. travel FORWARD port)
- D1 : To R.H. travel motor [port (PB)]
- D2 : From control valve (R.H. travel REVERSE port)
- E1 : To L.H. and R.H. travel motor [port (P)]
- E2 : From travel speed increase solenoid valve
- DR1 : From L.H. and R.H. travel motor [port (T)]
- DR2 : To hydraulic tank 1.

- 1. Cover
- 2. Slipper seal
- 3. Rotor
- 4. Dust seal
- 5. O-ring
- 6. Cover
- 7. Shaft

Operation

1. When in neutral

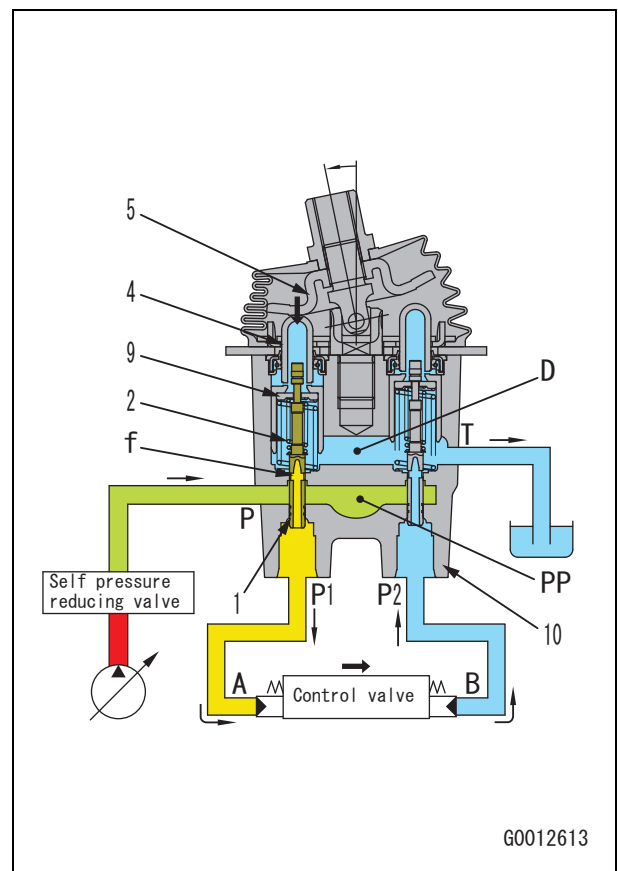
- Ports (A) and (B) of the control valve and ports (P1) and (P2) of the PPC valve are connected to drain chamber (D) through fine control hole (f) in spool (1).



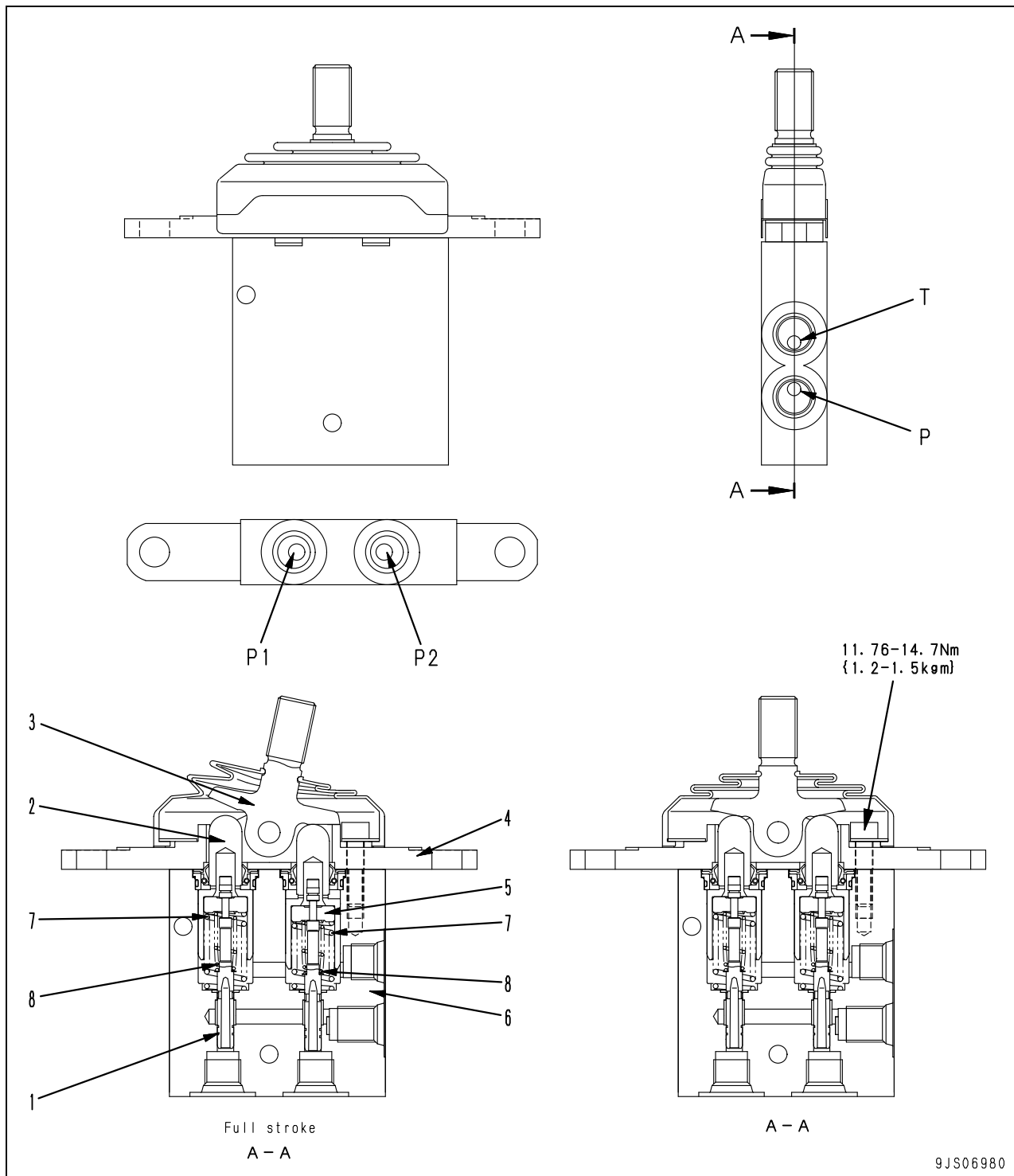
2. During fine control (Neutral → fine control)

- When piston (4) is pushed by disc (5), retainer (9) is pushed, spool (1) is also pushed by metering spring (2), and moves down.
- When fine control hole (f) is shut off from drain chamber (D), it is almost simultaneously interconnected to pump pressure chamber (PP).
- Pilot pressurized oil of the control pump is led to port (A) from port (P1) through fine control hole (f).
- When the pressure at port (P1) becomes higher, spool (1) is pushed back and fine control hole (f) is shut off from pump pressure chamber (PP). At almost the same time, it is connected to drain chamber (D) to release the pressure at port (P1).
- As a result, spool (1) moves up and down until the force of metering spring (2) is balanced with the pressure at port (P1).

- The relationship of the position of spool (1) and body (10) [fine control hole (f) is in the middle between drain chamber (D) and pump pressure chamber (PP)] does not change until retainer (9) contacts spool (1).
- Metering spring (2) contracts in proportion to the stroke of the control lever.
- Pressure at port (P1) also rises in proportion to the stroke of the control lever.
- In this way, the control valve spool moves to a position where the pressure of chamber (A) (same as pressure at port (P1)) and the force of the return spring of the control valve spool are balanced.



Service PPC valve



★ For the details of operation, see the paragraph of “Work equipment and swing PPC valve“.

P: From self pressure reducing valve

P1: To service valve

P2: To service valve

T: To hydraulic tank

- 1. Spool
- 2. Piston
- 3. Lever

Unit: mm

No.	Check item	Cylinder	Standard size	Criteria			Remedy	
				Tolerance		Standard clearance		Clearance limit
				Shaft	Hole			
1	Clearance between piston rod and bushing	Boom	90	-0.036 -0.090	+0.222 +0.047	0.083 to 0.312	0.437	Replace bushing
		Arm	100	-0.036 -0.090	+0.222 +0.047	0.083 to 0.312	0.447	
		Bucket	90	-0.030 -0.076	+0.258 +0.048	0.078 to 0.334	0.447	

100 hours greasing maintenance specification

Unit: mm

No.	Check item	Cylinder	Standard size	Criteria			Remedy	
				Tolerance		Clearance		Clearance limit
				Shaft	Hole			
2	Clearance between piston rod support shaft and bushing	Boom	80	-0.030 -0.060	(+0.457) (+0.370)	(0.400 to 0.517)	1.0	Replace pin or bushing
		Arm	80	-0.030 -0.076	(+0.457) (+0.370)	(0.400 to 0.533)	1.0	
		Bucket	80	-0.030 -0.060	(+0.457) (+0.370)	(0.400 to 0.517)	1.0	
		Boom	80	-0.030 -0.060	(+0.457) (+0.370)	(0.400 to 0.517)	1.0	
3	Clearance between cylinder bottom support shaft and bushing	Arm	80	-0.030 -0.076	(+0.457) (+0.370)	(0.400 to 0.533)	1.0	
		Bucket	80	-0.030 -0.060	(+0.457) (+0.370)	(0.400 to 0.517)	1.0	

(): Reference dimension

500 hours greasing maintenance specification

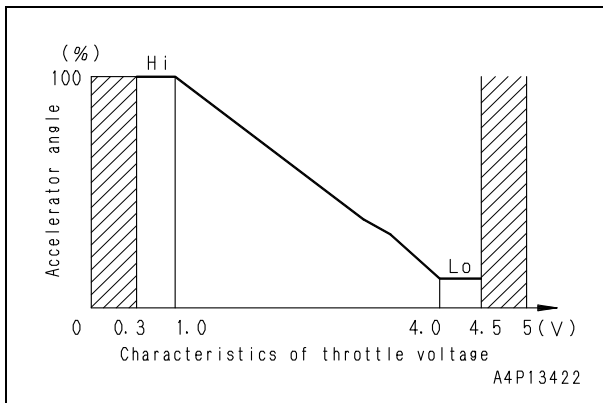
Unit: mm

No.	Check item	Cylinder	Standard size	Criteria			Remedy	
				Tolerance		Clearance		Clearance limit
				Shaft	Hole			
2	Clearance between piston rod support shaft and bushing	Boom	80	-0.030 -0.060	(+0.190) (+0.070)	(0.100 to 0.250)	1.0	Replace pin or bushing
		Arm	80	-0.030 -0.076	(+0.190) (+0.070)	(0.100 to 0.266)	1.0	
		Bucket	80	-0.030 -0.060	(+0.457) (+0.370)	(0.400 to 0.517)	1.0	
		Boom	80	-0.030 -0.060	(+0.190) (+0.070)	(0.075 to 0.225)	1.0	
3	Clearance between cylinder bottom support shaft and bushing	Arm	80	-0.030 -0.076	(+0.190) (+0.070)	(0.100 to 0.266)	1.0	
		Bucket	80	-0.030 -0.060	(+0.190) (+0.070)	(0.075 to 0.225)	1.0	

(): Reference dimension

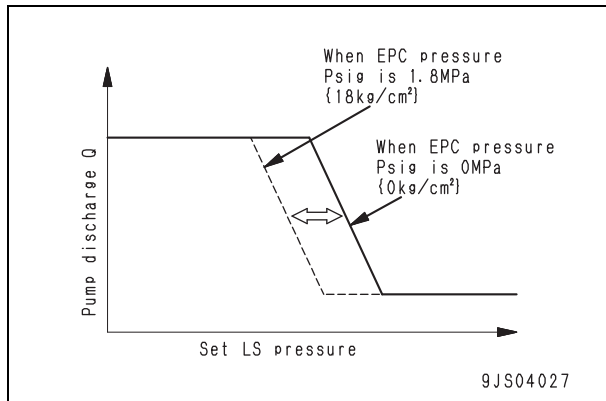
Function

- The fuel control dial is installed under the machine monitor.
- Turning knob (1) rotates the shaft of potentiometer (5).
- The rotation of the shaft changes the resistance of the variable resistor in potentiometer (5), sending any throttle signal to the engine controller.
- The hatched area in the graph is the abnormality detection area. When the throttle voltage is within this area, the engine is running at low idle.



1) LS control function

- Depending on the operation condition of the actuator, this function changes the pressure output from the LS-EPC valve to LS valve to change the change point (LS set differential pressure (DLS)) of the pump discharge in the LS valve.
- By this operation, the start-up time of the pump discharge is optimized and the composite operation and fine control performance is improved.



3) 2-stage relief function

- The relief pressure in the normal work is 34.8 MPa {355 kg/cm²}. If the 2-stage relief function is turned on, however, the relief pressure rises to about 37.2 MPa {380 kg/cm²}. By this operation, the hydraulic force is increased further.

Operating condition for turning on 2-stage relief function	Relief pressure
<ul style="list-style-type: none"> • During travel • When swing lock switch is turned to the ON position • When boom is lowered • When power maximizing function is turned on • When L mode is operated 	<p>34.8 MPa {355 kg/cm²}</p> <p>↓</p> <p>37.2 MPa {380 kg/cm²}</p>

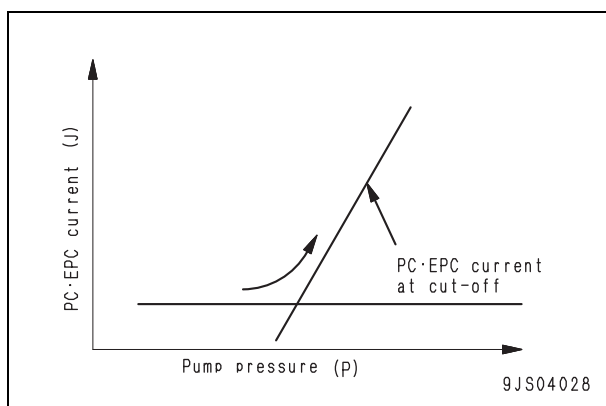
2) Cut-off function

- This function increases PC-EPC current (J) to reduce the flow rate in the relief state, improving fuel consumption.

Operating condition for turning on cut-off function

When the average value of the front and rear pressure sensors is above 27.9 MPa {285 kg/cm²} with the power maximizing function off.

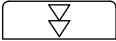











The cut-off function does not work, however, while the machine is travelling in A mode, swing lock switch is in the "ON" position.



CN-C02

Pin No.	Signal name	Input/Output
82	NC (*)	—
83	NC (*)	—
84	NC (*)	—
85	Variable back pressure SOL	Output
86	Attachment selector SOL	Output
87	Travel speed SOL	Output
88	LS-EPC	Output
89	Merge-divider LS EPC	Output
90	NC (*)	—
91	NC (*)	—
92	NC (*)	—
93	NC (*)	—
94	NC (*)	—
95	NC (*)	—
96	PC-EPC (F)	Output
97	Service current EPC	Output
98	NC (*)	—
99	NC (*)	—
100	NC (*)	—
101	Swing parking brake SOL	Output
102	NC (*)	—
103	NC (*)	—
104	PC-EPC (R)	Output
105	NC (*)	—
106	NC (*)	—
107	Travel alarm	Output
108	Battery relay	Output
109	2-stage relief SOL	Output
110	Travel junction SOL	Output
111	NC (*)	—
112	Merge-divider main EPC	Output
113	NC (*)	—
114	Wiper motor (–)	Output
115	Solenoid GND	Input
116	Solenoid power	Input
117	Solenoid GND	Input
118	Solenoid power	Input
119	Wiper motor (+)	Output
120	Solenoid GND	Input
121	Solenoid power	Input

*: Never connect to NC or malfunctions or failures will occur.

Guidance icon	Item	Function
 9JC01201	Switching the select item	Selects the page right below the current page. (To the top page from the bottom page.)
 9JC01202	Clear	Clears selected/displayed item.
 9JC01203	Restores default value	Sets selected item back to default. (Used for screen adjustment.)
 9JC01204	Set	Performs setting.
 9JC01205	Start	Starts function. (Used for starting measurement of split fuel consumption on the fuel consumption display screen.)
 9JC01206	Stop	Stops operation. (Used for stopping measurement of split fuel consumption on fuel consumption display screen.)
 9JC01207	Saving	Saves setting
 9JC01208	Switching to the name setting screen	Switches the current screen to the name setting screen
 9JC01209	Switching to ATT1 oil flow setting screen	Switching the current screen to attachment 1 oil flow setting screen. (Enabled only when attachments 1 and 2 are equipped)
 9JC01210	Switching to ATT2 oil flow setting screen	Switching the current screen to attachment 2 oil flow setting screen. (Enabled only when attachments 1 and 2 are equipped)
 9JC01211	HOLD	Holds the value of the target item of monitoring. (Used when monitoring is turned on)
 9JC01212	Resetting the hold	Resets the currently held value of the target item of monitoring. (Used when monitoring is turned on)

Contents

Standard service value table	20-3
Standard value table for engine related parts	20-3
Standard value table for chassis related parts.....	20-5

Applicable model				PC220, 220LC-8M0		
Category	Item	Measurement condition	Unit	Standard value for new machine	Judgement criteria	
Work equipment	Time lag	Boom	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine running at low idle Working mode: P mode Time required from raise stroke end till bucket touches ground and pushes up machine front For measuring posture, see Work equipment 5 	sec.	Max. 1.0	Max. 1.2
		Arm	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine running at low idle Working mode: P mode Time required from dumping stroke end till bucket stops momentarily after control lever is tilted to digging and starts to move again For measuring posture, see Work equipment 6 	sec.	Max. 2.0	Max. 2.8
		Bucket	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine running at low idle Working mode: P mode Time required from dumping stroke end till bucket stops momentarily after control lever is tilted to digging and starts to move again For measuring posture, see Work equipment 7 	sec.	Max. 1.0	Max. 3.6
	Internal leakage	Cylinders	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine running at high idle 	cc/min	4.5	20
		Center swivel joint	<ul style="list-style-type: none"> Leakage amount for one minute with cylinder or travel to be measured in relief condition 	cc/min	10	50
Performance in compound operation	Swerving amount in simultaneous operation of work equipment and travel	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine at high idle Working mode: P mode Traveling speed: Lo On hard and flat ground, make approach run of 10 m and then measure deviation in the travel of 20 m For measuring posture, see Travel 2 and 3 	mm	Max.200	Max.220	
Characteristics of PC flow control valve	Time required for turning from 0 to 90° with boom raised	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range (45 to 55°C) Engine at high idle Working mode: P mode Rated load applied to bucket (1620 kg) On hard and flat ground, set arm vertically and lower back of bucket to ground Time required till passing spot of 90° starting from illustrated posture and with boom raised For measuring posture, see Work equipment 8 	sec.	4.3 ± 0.4 (Reference value)		
—	Discharge amount of hydraulic pump	See performance of hydraulic pump (next page)				

Testing exhaust gas color

★ Checking tools for exhaust gas color

Symbol	Part No.	Part name
A	1	799-201-9001 Handy smoke checker
	2	Commercially available Smoke meter

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

⚠ **Be careful not to touch any hot part when removing or installing the checking tools.**

- ★ Check the exhaust gas color under the following condition.
 - Engine coolant temperature: Within operating range
- ★ If an air source and an electric power source are not available in the field, use handy smoke checker **A1**. When recording official data, use smoke meter **A2**.

1. Testing with handy smoke checker A1

- 1) Stick a sheet of filter paper to smoke checker **A1**.
- 2) Insert the exhaust gas intake pipe in exhaust pipe (1).
- 3) Start the engine and accelerate it suddenly or run it at high idle and operate the handle of smoke checker **A1** so that the filter paper will absorb the exhaust gas.
 - ★ Absorbing time: 1.4 ± 0.2 sec



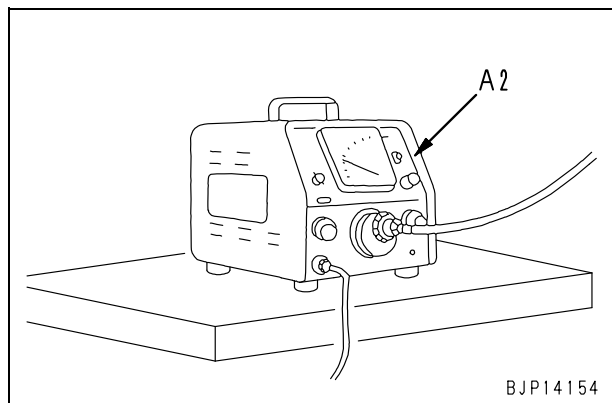
- 4) Remove the filter paper and compare it with the attached scale.
- 5) After finishing measurement, remove the measuring tools and return the removed parts.

2. Checking with smoke meter A2

- 1) Insert probe [1] of smoke meter **A2** in the outlet of the exhaust pipe and fix it to the exhaust pipe with a clip.

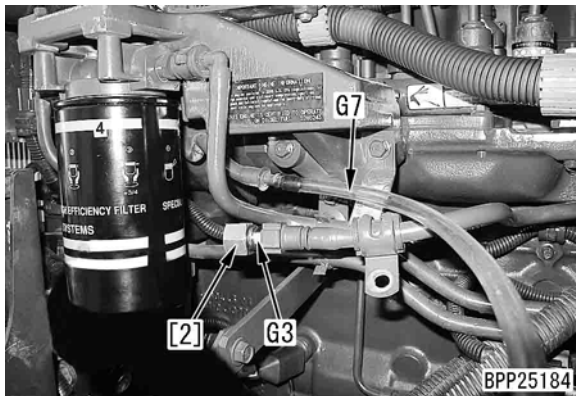


- 2) Connect the probe hose, receptacle of the accelerator switch, and air hose to smoke meter **A2**.
 - ★ Limit the supplied air pressure to 1.5 MPa {15 kg/cm²}.
- 3) Connect the power cable to an AC receptacle.
 - ★ Before connecting the cable, check that the power switch of the smoke meter is turned OFF.
- 4) Loosen the cap nut of the suction pump and fit the filter paper.
 - ★ Fit the filter paper securely so that the exhaust gas will not leak.
- 5) Turn on the power switch of smoke meter **A2**.



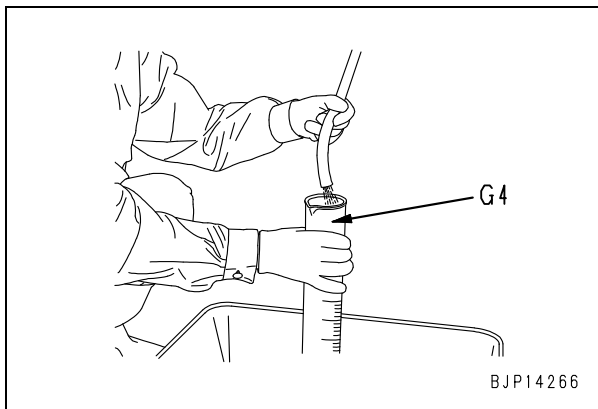
- 6) Start the engine and accelerate it suddenly or run it at high idle and depress the accelerator pedal of smoke meter **A2** and collect the exhaust gas into the filter paper.
- 7) Place the contaminated filter paper on the clean filter paper (at least 10 sheets) in the filter paper holder and read the indicated value.
- 8) After finishing measurement, remove the measuring tools and return the removed parts.

- 2) Insert connector **G6** on the drain side of the hose, and install cap nut [2] of tester kit **G1** to prevent fuel from flowing out.
- 3) Connect test hose **G7** on the pressure limiter side.
 - ★ Arrange the hose run so that slack be eliminated from the test hose. Put the hose's top end in the oil receiving container.



- 4) Start the engine. By using measuring cylinder **G4**, measure the leakage for 1 minute with the engine speed at low idling.
 - ★ If the leakage from the pressure limiter is within the following standard value, it is normal.

At low idle	0 cc (No leakage)
-------------	----------------------



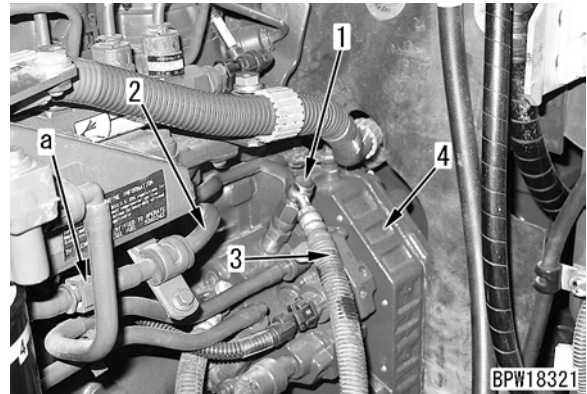
- 5) Remove the tool used after measurement. Be sure to restore the machine.

⚙️ Joint bolt:

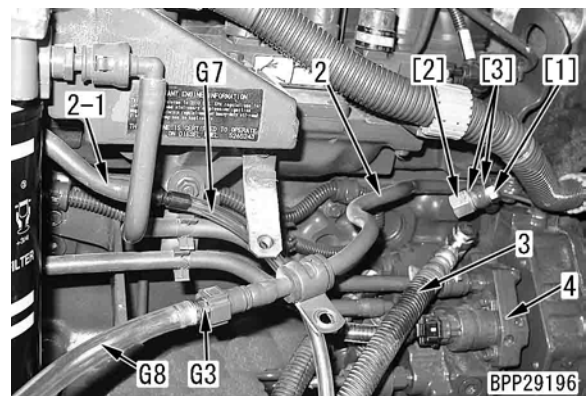
24 ± 4 Nm {2.4 ± 0.4 kgm}

4. Measuring return rate from injector

- 1) Open the right engine side cover. Remove joint bolt (1) from the supply pump (4). Disconnect return hoses (2) and (3).
- 2) Disconnect the return hose (2) at quick coupler (a).



- 3) To prevent the fuel from flowing out, install joint bolt [1], cap nut [2] and seal washer [3] of tester kit **G1** on the drain side of return hose (2).
- 4) Connect return hose (3) to supply pump (4).
 - ⚙️ Joint bolt:
19.6 to 29.4 Nm {2.0 to 3.0 kgm}
- 5) Connect hose **G7** to return hose (2-1).
- 6) Install connector **G6** to return hose (2), and connect test hose **G8**.
 - ★ Arrange the hose run so that slack be eliminated from the test hose. Put the hose's top end in the oil receiving container.



- ★ Measuring condition and method of judgment: If the output pressures are the following values, the PC-EPC valve is normal.

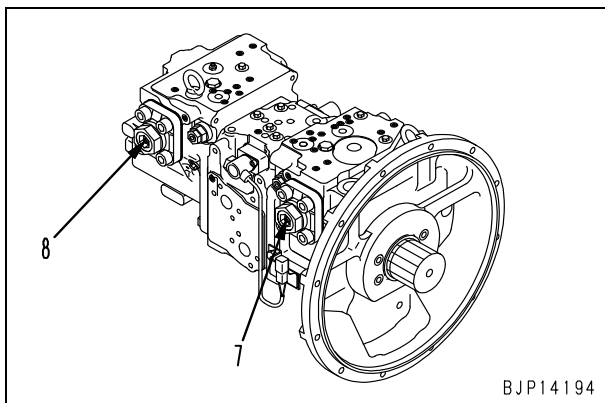
Engine	Operation of lever	Output pressure
Low idle	All control levers and pedals in neutral	Approx. 2.9 MPa {Approx. 30 kg/cm ² }
High idle		0 MPa {0 kg/cm ² }

- 5) After finishing measurement, remove the measuring tools and return the removed parts.

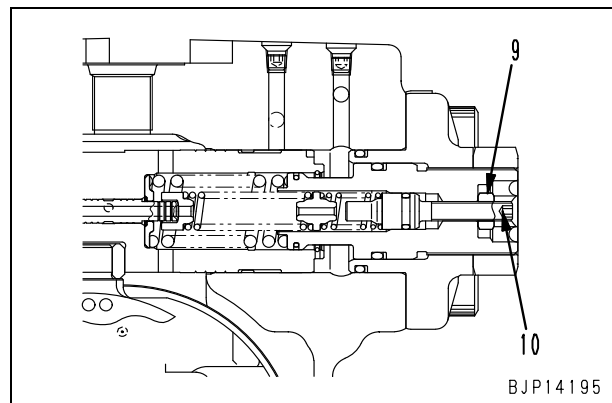
Adjusting

Adjusting pump PC valve

- ★ If either of the following phenomena occurs and the PC valve seems to be defective, adjust PC valves (7) and (8) according to the procedure shown below.
 - As the working load increases, the engine speed lowers remarkably.
 - The engine speed is normal but the work equipment speed is low.
 - (7): Front pump PC valve
 - (8): Rear pump PC valve
- ★ The width across flats of the PC valve locknut is 13 mm and that of the adjustment screw (inside width) is 4 mm.
Do not turn any other locknuts or adjustment screws since they affects the hydraulic pump performance.



1. Loosen locknut (9).
 - ★ Before loosening the locknut, make counter mark at the adjustment screw end so that you can see the position of the locknut before the adjustment (and you can return the locknut to its original position after turning it in reverse).
2. Turn adjustment screw (10) clockwise or counterclockwise to adjust.
 - ★ Turn the adjustment screw
 - Clockwise when the work equipment speed is low (to increase pump absorption torque) and
 - Counterclockwise when the engine speed lowers (to decrease pump absorption torque).
3. Tighten locknut (9).
 - 🔧 Locknut: **27 to 34 Nm {2.8 to 3.5 kgm}**



4. After finishing adjustment, check again that the PC valve output pressure (servo piston inlet pressure) is normal according to the above described measurement procedure.

Testing oil leakage

★ Measuring tools for oil leakage

Symbol	Part No.	Part name
Q	Commercially available	Measuring cylinder

★ Measure the oil leakage under the following condition.

- Hydraulic oil temperature: Within operating range

1. Measuring oil leakage from boom cylinder

- 1) Move the boom cylinder to the RAISE stroke end and stop the engine.

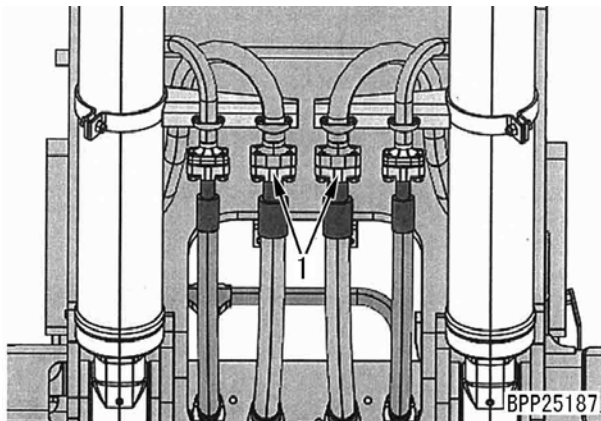
⚠ **Release the residual pressure from the piping on the boom cylinder head side. For details, see "Releasing residual pressure from hydraulic circuit" (Operate the lever in the boom RAISE direction only, however).**

- 2) Disconnect hose (1) on the cylinder head side and block the hose side with a flange.

⚠ **Take care not to disconnect the hose on the cylinder bottom side.**

- ★ Use the following part to block the hose side.

07379-00640 (Flange #06)



- 3) Run the engine at high idle and relieve the boom circuit by raising the boom.

⚠ **Take care not to "lower the boom".**

- 4) Start measuring the oil leakage 30 seconds after relieving is started and measure for 1 minute.

- 5) After finishing measurement, return the removed parts.

2. Measuring oil leakage from arm cylinder

- 1) Move the arm cylinder to the IN stroke end and stop the engine.

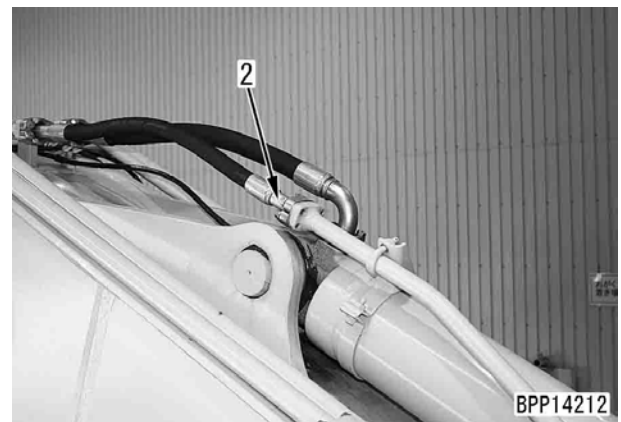
⚠ **Release the residual pressure from the piping on the arm cylinder head side. For details, see Releasing residual pressure from hydraulic circuit (Operate the lever to arm IN only, however).**

- 2) Disconnect hose (2) on the cylinder head side and block the hose side with a flange.

⚠ **Take care not to disconnect the hose on the cylinder bottom side.**

- ★ Use the following part to block the hose side.

07379-00640 (Flange #06)



- 3) Run the engine at high idle and relieve the arm circuit by moving the arm IN.

⚠ **Take care not to "move the arm OUT".**

- 4) Start measuring the oil leakage 30 seconds after relieving is started and measure for 1 minute.

- 5) After finishing measurement, return the removed parts.

Ordinary functions and special functions of machine monitor

The machine monitor has the ordinary functions and special functions and displays information of various types on the multi-information display panel.

Some information are displayed automatically according to the configuration of the machine monitor and the others are displayed according to the operation of the switches.

1. Ordinary functions: Operator mode

The information items in this mode are displayed ordinarily. The operator can display and set them by operating the switches (Display and setting of some items need special operations of the switches).

2. Special function: Service mode

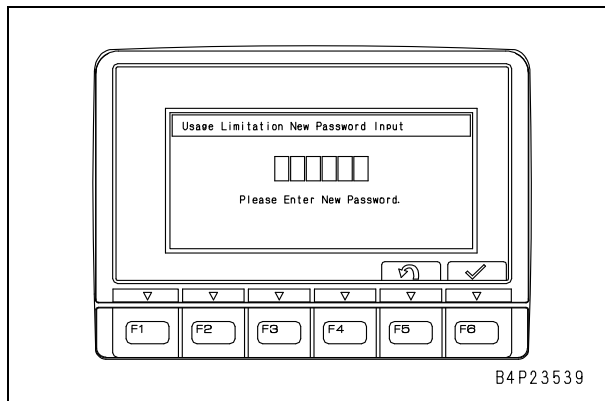
The information items in this mode are not displayed ordinarily. Each technician can display them by operating the switches specially.

This mode is used for special setting, testing, adjusting, or troubleshooting.

4. Changing a password

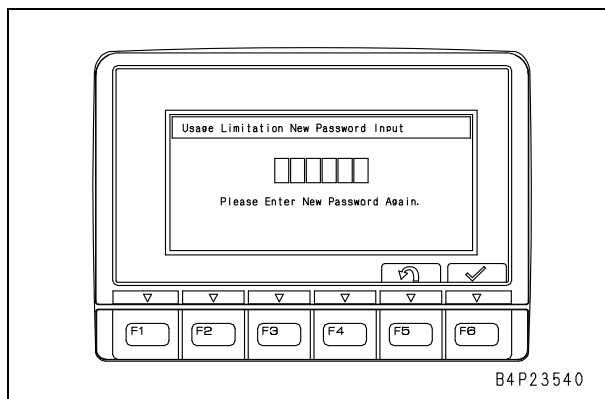
After the "Usage Limitation New Password Input" screen is displayed, input a new password with the numeral input switches and validate it with the function switch.

- [F5]: Deletes the entered numbers/
Returns the display to the preceding screen
- [F6]: Validates the entered password
- ★ Default password: [000000]
- ★ If the input password is correct, the screen changes to the next screen.
- ★ If the input password is incorrect, the message to request inputting the password again is displayed.
- ★ Set a new password in 4 to 6 digits (a password of 3 or less digits or 7 or more digits is not accepted).

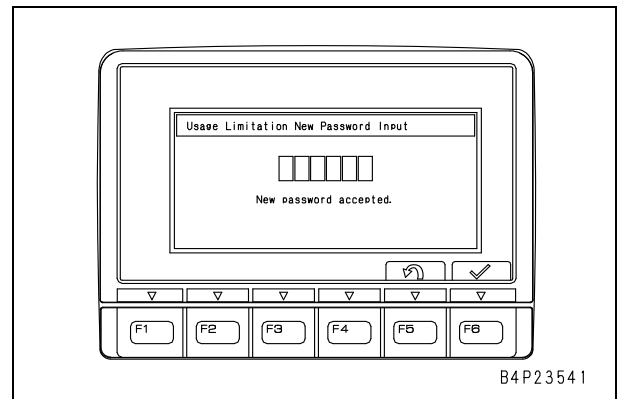


After the "Usage Limitation New Password Input" screen is displayed again, input the new password again with the numeral input switches and validate it with the function switch.

- [F5]: Deletes the entered numbers/
Restores the standard screen
- [F6]: Validates the entered password
- ★ If the input password is different from the entered in the first time, the message to request reentry is displayed.



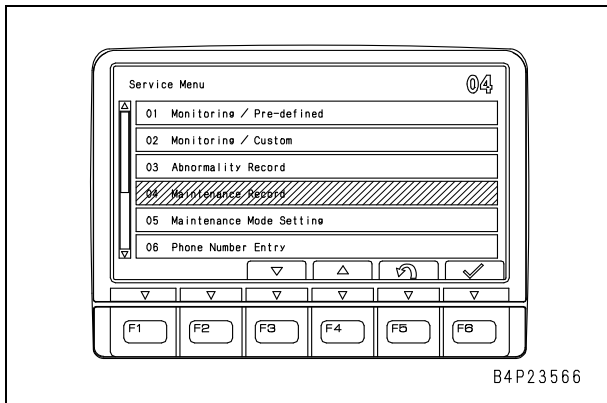
If the screen to notify completion of setting is displayed and then the standard screen is displayed, the password has been changed successfully



Maintenance record

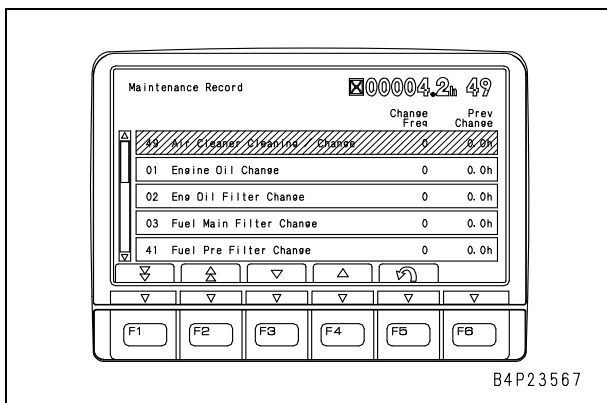
The machine monitor records the maintenance information of the filters, oils, etc., which are displayed and checked by the following operations. When maintenance is performed, if the remaining time is reset in the operator mode, the number of maintenance times is recorded in this record.

1. Selecting the menu
Select "Maintenance Record" on the "Service Menu" screen.



2. Selecting maintenance item
After the "Maintenance Record" screen is displayed, select a maintenance item to be checked by using the function switches or numeral input switches.

- [F1]: Moves to the next page (screen)
 - [F2]: Moves to the previous page (screen)
 - [F3]: Moves to lower item
 - [F4]: Moves to upper item
 - [F5]: Returns the display to the service menu screen
- ★ You may enter a 2-digit code by using the numeral input switches to select the item of that code.

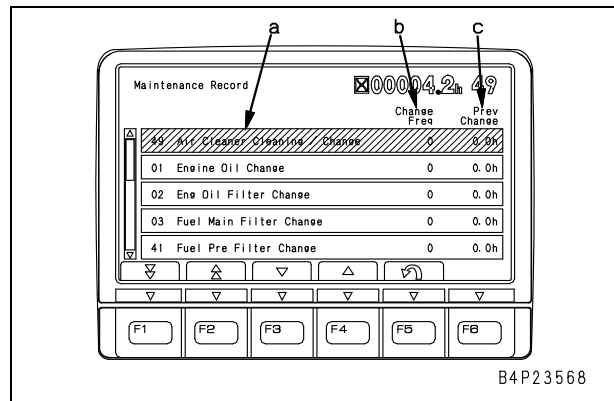


- ★ The following items can be selected on "Maintenance Record" screen.

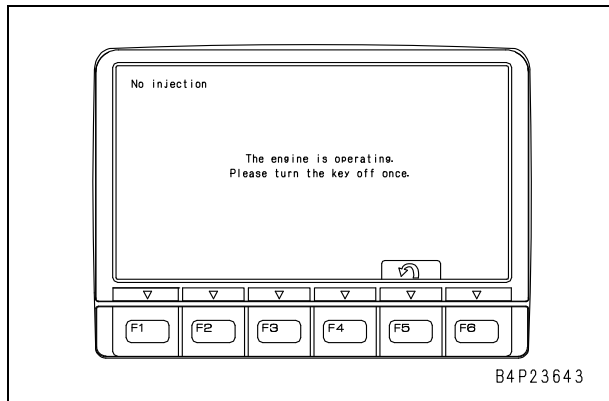
49 Cleaning and replacement of cleaner
01 Engine Oil Change
02 Engine Oil Filter Change
03 Fuel Main Filter Change
41 Fuel Pre Filter Change
04 Hyd Oil Filter Change
05 H/Tank Breather Change
07 Damper Case Service
08 Final Drive Oil Change Interval
09 S/Machinery Oil Change
10 Hydraulic Oil Change

3. Items displayed on Maintenance Record screen
The following information is displayed on the screen.

- (a): Maintenance items
- (b): Replacement time elapsed up to present
- (c): Service meter reading (SMR) at previous replacement

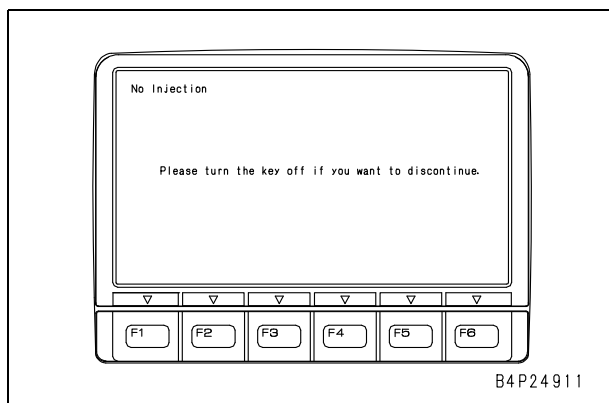


the message "The engine is operating. Please turn the key off once." is displayed and the no injection cranking does not become effective.



And the "Confirmation screen" appears to disable the attempted no injection cranking in the following cases.

- Communication between the monitor and engine controller is not normal.
- Engine was started before the message "No injection cranking is available" appears on the screen.

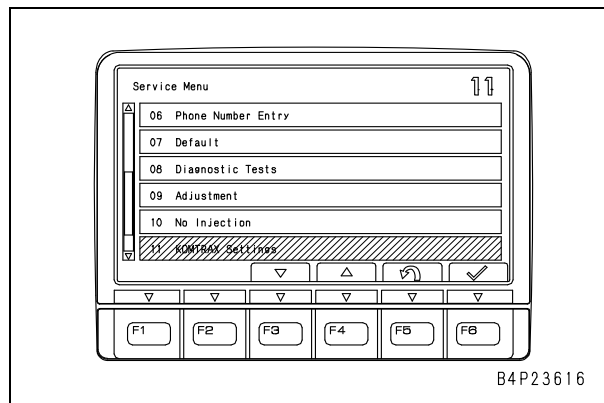


KOMTRAX Settings (Terminal Status)

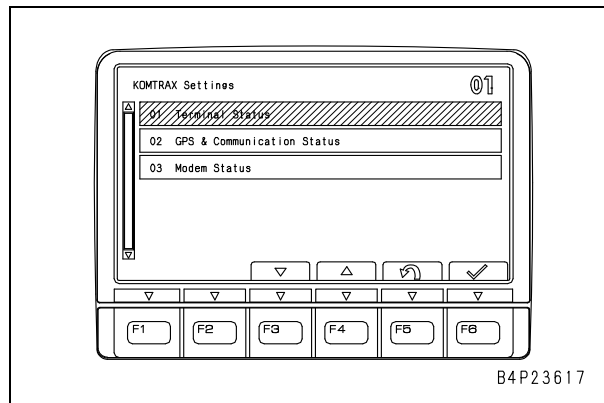
The setting and operating status of KOMTRAX can be checked by using the menu of "KOMTRAX Settings".

"KOMTRAX Settings" is used to check the setting condition of the KOMTRAX terminal.

1. Selecting the menu
Select "KOMTRAX Settings" on the "Service Menu" screen.



2. Selecting submenu
After the "KOMTRAX Settings" screen is displayed, select "Terminal Status" with the function switches or numeral input switches.
★ Select this submenu as in the case of selecting a menu on the "Service Menu" screen.



Check sheet (PC200/200LC-8M0)

Model	Serial No.	Service meter	User's name	Date of execution	Inspector
				/ /	

1. Engine

No.	Check item	Condition for check					Unit	Standard value for new machine	Service limit value	Measured value	Good	Bad
		Fuel control dial	Working mode	Auto-deceleration	Left knob switch	Operation of work equipment						
1	Engine speed	MAX	P	OFF	OFF	All levers in neutral	rpm	1,990 to 2,130	1,990 to 2,130			
2	Engine oil pressure						MPa {kg/cm ² }	Min. 0.29 {Min. 3.0}	0.25 {2.5}			
3	Engine speed	MIN				All levers in neutral	rpm	1,000 to 1,100	1,000 to 1,100			
4	Engine oil pressure						MPa {kg/cm ² }	Min. 0.10 {Min. 1.0}	0.07 {0.7}			
5	Engine speed	MAX		ON	ON	Arm IN relief	rpm	1,850 to 2,050	1,850 to 2,050			
6	Blow-by pressure						kPa {mmH ₂ O}	Max. 0.98 {Max. 100}	1.96 {200}			
7	Engine speed						rpm	950 to 1,050	950 to 1,050			

2. Work equipment speed

No.	Check item	Condition for check				Unit	Standard value for new machine	Service limit value	Measured value	Good	Bad
		Fuel control dial	Working mode	Checking posture, etc.							
1	Boom RAISE	MAX	P	Work equipment extended fully		sec	2.9 to 3.7	Max. 4.7			
2	Arm IN			Boom top horizontal		sec	3.1 to 3.9	Max. 4.5			
						sec	3.2 to 4.0	Max. 4.5			
						sec	6.0 to 7.4	Max. 7.7			
3	Arm OUT			Boom top horizontal		sec	2.4 to 3.0	Max. 3.5			
4	Bucket CURL			Boom top horizontal Arm cylinder retracted fully		sec	2.1 to 2.7	Max. 3.1			
5	Swing (5 turns)			Work equipment extended fully Swing right and left		sec	21.7 to 26.7	Max. 30			
6	Travel (5 idle turns)	Oneside of track pushed up and turned forward and backward		LO	STD	44.6 to 54.9	44.6 to 58.8				
					LC	48.6 to 59.8	48.6 to 63.8				
				MI	STD	33.7 to 41.3	33.7 to 45.3				
					LC	36.7 to 44.9	36.7 to 48.9				
				HI	STD	25.2 to 27.8	25.2 to 29.8				
					LC	27.3 to 30.3	27.3 to 32.3				

Failure code	Trouble (Displayed on screen)	Component in charge	Action level	Category of record
CA428	Water in Fuel Sensor High Error	ENG	L01	Electrical system
CA429	Water in Fuel Sensor Low Error	ENG	L01	Electrical system
CA435	Eng Oil Press Sw Error	ENG	L01	Electrical system
CA441	Battery Voltage Low Error	ENG	L04	Electrical system
CA442	Battery Voltage High Error	ENG	L04	Electrical system
CA449	Rail Press Very High Error	ENG	L03	Electrical system
CA451	Rail Press Sensor High Error	ENG	L03	Electrical system
CA452	Rail Press Sensor Low Error	ENG	L03	Electrical system
CA488	Chg Air Temp High Torque Derate	ENG	L03	Electrical system
CA553	Rail Press High Error	ENG	L01	Electrical system
CA559	Rail Press Low Error	ENG	L01	Electrical system
CA689	Eng Ne Speed Sensor Error	ENG	L01	Electrical system
CA731	Eng Bkup Speed Sens Phase Error	ENG	L01	Electrical system
CA757	All Continuous Data Lost Error	ENG	L04	Electrical system
CA778	Eng Bkup Speed Sensor Error	ENG	L01	Electrical system
CA2185	Throt Sens Sup Volt High Error	ENG	L03	Electrical system
CA2186	Throt Sens Sup Volt Low Error	ENG	L03	Electrical system
CA2249	Rail Press Very Low Error	ENG	L03	Electrical system
CA2311	IMV Solenoid Error	ENG	L03	Electrical system
CA2555	Grid Htr Relay Open Circuit Error	ENG	L01	Electrical system
CA2556	Grid Htr Relay Short Circuit Error	ENG	L01	Electrical system
D110KB	Battery Relay Drive Short Circuit	PUMP	L01	Electrical system
D19JKZ	Personal Code Relay Abnormality	MON	L03	Electrical system
D811MC	KOMTRAX Error	KOMTRAX	—	Electrical system
D862KA	GPS Antenna Open Circuit	KOMTRAX	—	Electrical system

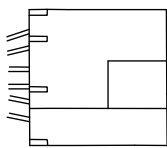
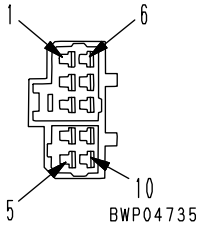
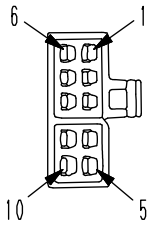
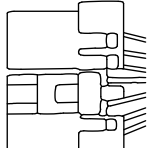
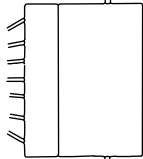
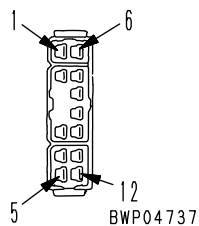
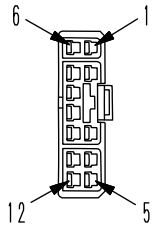
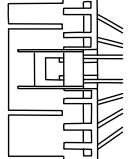
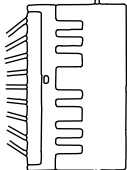
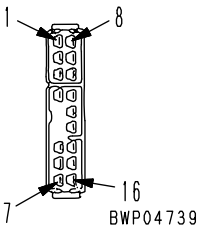
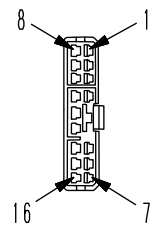
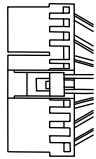
Symptom and troubleshooting numbers

Symptom and troubleshooting number

No.	Symptom of failure	Troubleshooting			
		Display of code	E-mode	H-mode	S-mode
User code and failure code					
1	User code and failure code are displayed on machine monitor	Follow the troubleshooting procedure for the failure code.			
2	The failure code is displayed on the mechanical system abnormality record screen				
3	The failure code is displayed on the electrical system abnormality record screen				
4	The failure code is displayed on the air conditioner or heater abnormality record screen	"Inspection by self-diagnosis function" in Chapter 80			
Check items related to engine					
5	Startability is poor				S-1
6	Engine does not start		E-1		S-2
7	Engine does not pick up smoothly				S-3
8	Engine stops during operation			H-2	S-4
9	Engine runs rough or is unstable (hunts)				S-5
10	Engine lacks power				S-6
11	Exhaust smoke is black (incomplete combustion)				S-7
12	Oil consumption is too much (or exhaust smoke is blue)				S-8
13	Oil becomes contaminated early				S-9
14	Fuel consumption is excessive				S-10
15	Oil is in coolant (or coolant spurts back or coolant level goes down)				S-11
16	Oil pressure drops				S-12
17	Oil level rises (coolant or fuel in oil)				S-13
18	Coolant temperature rises too high (overheating)				S-14
19	Unusual noise is heard				S-15
20	Vibration is excessive				S-16
21	Preheater does not operate		E-2		
22	Automatic warm-up system does not operate (in cold season)		E-13		
23	Auto-decelerator does not operate normally		E-14		
Symptom related to work equipment, swing and travel					
24	All of work equipment, swing, and travel does not work or can not swing lock		E-20	H-3	
25	All of work equipment, swing and travel work slow or lack power			H-1	
26	Engine speed lowers significantly or engine stalls			H-2	S-6
27	Working mode does not change		E-15		
28	Unusual sound is heard from around hydraulic pump			H-4	
29	Fine control performance or response is poor			H-5	
Symptom related to work equipment					
30	Speed or power of boom is low			H-6	
31	Speed or power of arm is low			H-7	
32	Speed or power of bucket is low			H-8	
33	Work equipment does not move in single operation			H-9	
34	Hydraulic drift of work equipment is large			H-10	
35	Time lag of work equipment operation is large			H-11	
36	Other work equipment moves when one of work equipment is relieved			H-12	
37	One-touch power maximizing function does not work.		E-22	H-13	
38	Attachment circuit can not be changed		E-35	H-28	

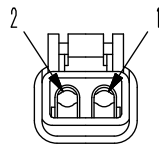
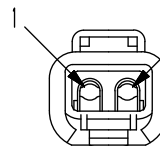
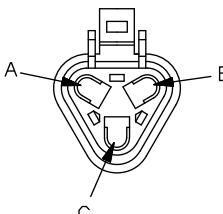
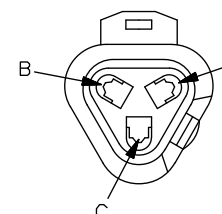
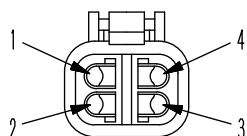
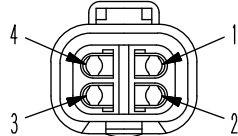
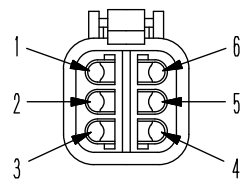
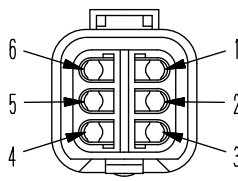
Connector (terminal) No.	Connector From						Connector To		Wire dia./color
	Address		Device name	Type	No. of pins	Pin No.	Connector (terminal) No.	Pin No.	
	Connector layout	Harness drawing							
FJ	-	K205	Joint	-	-	-	FF	-	1.25B
							FG	-	1.25B
							FH	-	3B
FL	-	B229	Joint	-	-	-	C02	120	1.25B
							FH	-	1.25B
							V24	2	0.85B
							XQ	-	0.85B
FM	-	E231	Joint	-	-	-	C01	24	0.5LW
							C01	43	0.5LW
							C01	79	0.5LW
							J03	8	0.5LW
FN	-	J205	Joint	-	-	-	C02	116	1.25RY
							C02	118	1.25RY
							C02	121	1.25RY
							F01	2	3RY
FP	-	K209	Joint	-	-	-	J04	4	0.85B
							S25 (female)	4	0.85B
							S25 (female)	10	0.85B
							S25 (female)	15	0.5B
FS	-	J211	Joint	-	-	-	K01	2	0.85GR
							S25 (female)	1	0.85GR
							S25 (female)	7	0.85GR
FT	-	L218	Joint	-	-	-	J04	8	0.85B
							N08	9	0.5B
							N08	12	0.85B
FUEL RAIL PRESS	AI5	-	Common rail pressure sensor	BOSCH	3	1	S11	-	0.85B
						2	CE01	25	0.85G
						3	S10	-	0.85W
FW	-	E232	Joint	-	-	-	F01	8	2LR
							R05	3	1.25LR
							R10	3	1.25LR
FX	-	K250	Joint	-	-	-	A13 (male)	1	1.25R
							L02	1	1.25R
							R05	5	1.25R
GB	-	K278	Joint	-	-	-	GY	-	2B
							L02	2	1.25B
							T10	-	5B
GC	-	F230	Joint	-	-	-	AC02	4	0.5R
							F01	10	0.85R
							R21	1	0.5R
GD	-	F230	Joint	-	-	-	AC02	2	2RY
							F01	11	2RL
							R21	5	2RY

Connector (terminal) No.	Connector From					Connector To			Wire dia./color
	Address		Device name	Type	No. of pins	Pin No.	Connector (terminal) No.	Pin No.	
	Connector layout	Harness drawing							
S25 (female)	O8	I221	Intermediate connector (emergency operation switch)	090	16	1	FS	-	0.85GR
						2	V11	1	0.85G
						3	C02	96	0.85G
						4	FP	-	0.85B
						5	V11	2	0.85L
						6	FF	-	0.85L
						7	FS	-	0.85GR
						8	V12	1	0.85G
						9	C02	104	0.85G
						10	FP	-	0.85B
						11	V12	2	0.85L
						12	FF	-	0.85L
						13	FD	-	0.85W
						14	J02	2	0.85WR
						15	FP	-	0.5B
						16	C01	38	0.5LB
S26	-	-	Joint	-	-	-	AMB AIR PRES-SURE	2	0.85B
							CE01	38	0.85B
							COOLANT TEMP	A	0.85B
S30	U9	G235	Model Selection	S	8	1	C01	40	0.5R
						2	C01	21	0.5YG
						3	C01	77	0.5YB
						4	C01	58	0.5GW
						7	C01	39	0.5RY
						8	J05	8	0.5B
SB	AE7	L369	Starting motor terminal B (STD)	Terminal	1	B	AB	B	15R
SB	AE7	N426	Starting motor terminal B (large capacity)	Terminal	1	B	AB	B	15R
SB	AE7	-	Starting motor terminal B	Terminal	1	B	R03	-	60R
SC	AE7	O365	Starting motor terminal C	Terminal	1	C	E10 (male)	1	8R
T01	W2	K225	Ground (floor frame)	Terminal	2	-	BP	-	3B
							H16 (female)	11	1.25B
T02	AD2	O352	Ground (cab)	Terminal	1	-	BR	-	3B
T03 (male)	U1	B354	Intermediate connector (radio body ground)	M	1	1	T03A	-	0.5B
T03 (female)	U1	D344	Intermediate connector (radio body ground)	M	1	1	H16 (male)	11	1.25B
T03A	-	B352	Radio body ground	Terminal	1	-	T03 (male)	1	0.5B
T04	S1	M256	Ground (revolving frame)	Terminal	1	-	DM	-	3B
T05	S1	M255	Ground (revolving frame)	Terminal	1	-	DL	-	3B
T06	T1	M254	Ground (revolving frame)	Terminal	1	-	LC	-	1.25B
T07	T1	M253	Ground (revolving frame)	Terminal	1	-	BY	-	5B

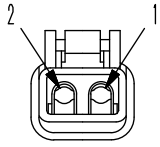
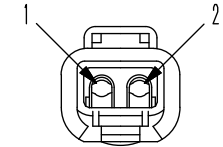
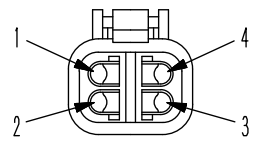
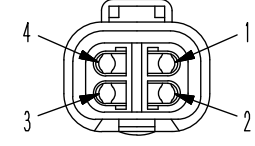
No. of pins	S type connector			Testing connection use special tool Part No.
	Male (female housing)		Female (male housing)	
10 (Blue)	  <p>BWP04735</p>		  <p>BWP04736</p>	—
	—	—	—	
12 (Blue)	  <p>BWP04737</p>		  <p>BWP04738</p>	799-601-7160 (T-adapter)
	Part No. : 08056-11272	Part No. : 08056-11282		
16 (Blue)	  <p>BWP04739</p>		  <p>BWP04740</p>	799-601-7170 (T-adapter)
	Part No. : 08056-11672	Part No. : 08056-11682		

B4D18195

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

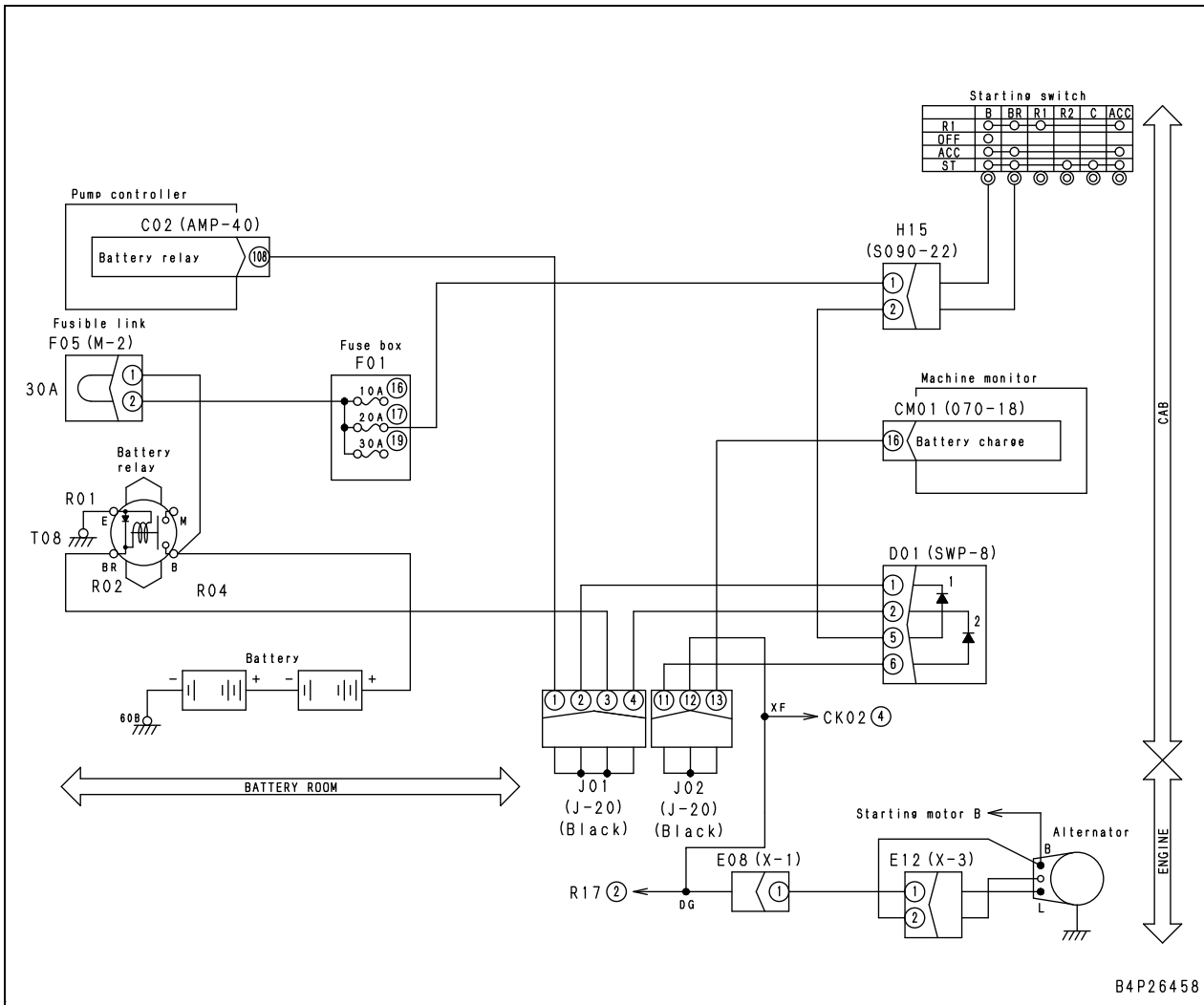
No. of pins	DT Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
2	 <p style="text-align: center;">BWP05037</p> <p style="text-align: center;">Part No. :08192-12200 (normal type) 08192-22200 (fine wire type)</p>	 <p style="text-align: center;">BWP05038</p> <p style="text-align: center;">Part No. :08192-12100 (normal type) 08192-22100 (fine wire type)</p>	<p>799-601-9020 (T-adapter) 799-601-9890 (T-adapter)</p>
	 <p style="text-align: center;">BWP05039</p> <p style="text-align: center;">Part No. :08192-1A200 (normal type) 08192-2A200 (fine wire type)</p>	 <p style="text-align: center;">BWP05040</p> <p style="text-align: center;">Part No. :08192-13100 (normal type) 08192-23100 (fine wire type)</p>	
4	 <p style="text-align: center;">BWP05041</p> <p style="text-align: center;">Part No. :08192-14200 (normal type) 08192-24200 (fine wire type)</p>	 <p style="text-align: center;">BWP05042</p> <p style="text-align: center;">Part No. :08192-14100 (normal type) 08192-24100 (fine wire type)</p>	<p>799-601-9040 (T-adapter) 799-601-9890 (T-adapter)</p>
	 <p style="text-align: center;">BWP05043</p> <p style="text-align: center;">Part No. :08192-16200 (normal type) 08192-26200 (fine wire type)</p>	 <p style="text-align: center;">BWP05044</p> <p style="text-align: center;">Part No. :08192-16100 (normal type) 08192-26100 (fine wire type)</p>	

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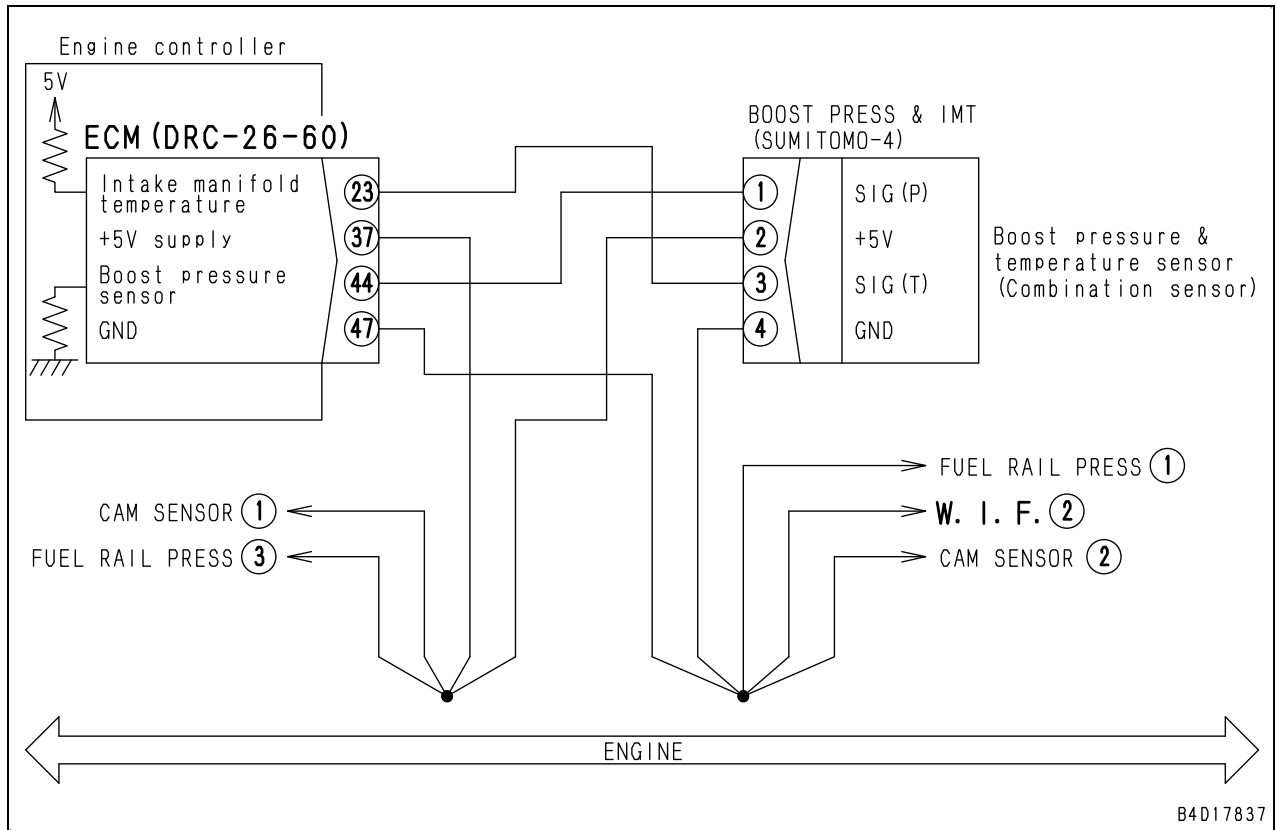
DT series connector for engine			
No. of pins	WIF (water in fuel) sensor (107, 114 engine)		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
2	 <p>BWP05037</p> <p>Part No. :08192-12200 (normal type) 08192-22200 (fine wire type)</p>	 <p>BWP05038</p> <p>Part No. :08192-12100 (normal type) 08192-22100 (fine wire type)</p>	<p>799-601-9020 (T-adapter) (kit:799-601-4101) (kit:799-601-4201)</p>
	EGR (by pass) valve stroke sensor (125, 140, 170 engine)		
4	Body (plug)	Body (receptacle)	<p>799-601-9040 (T-adapter) (kit:799-601-4101) (kit:799-601-4201)</p>
	 <p>BWP05041</p> <p>Part No. :08192-14200 (normal type) 08192-24200 (fine wire type)</p>	 <p>BWP05042</p> <p>Part No. :08192-14100 (normal type) 08192-24100 (fine wire type)</p>	

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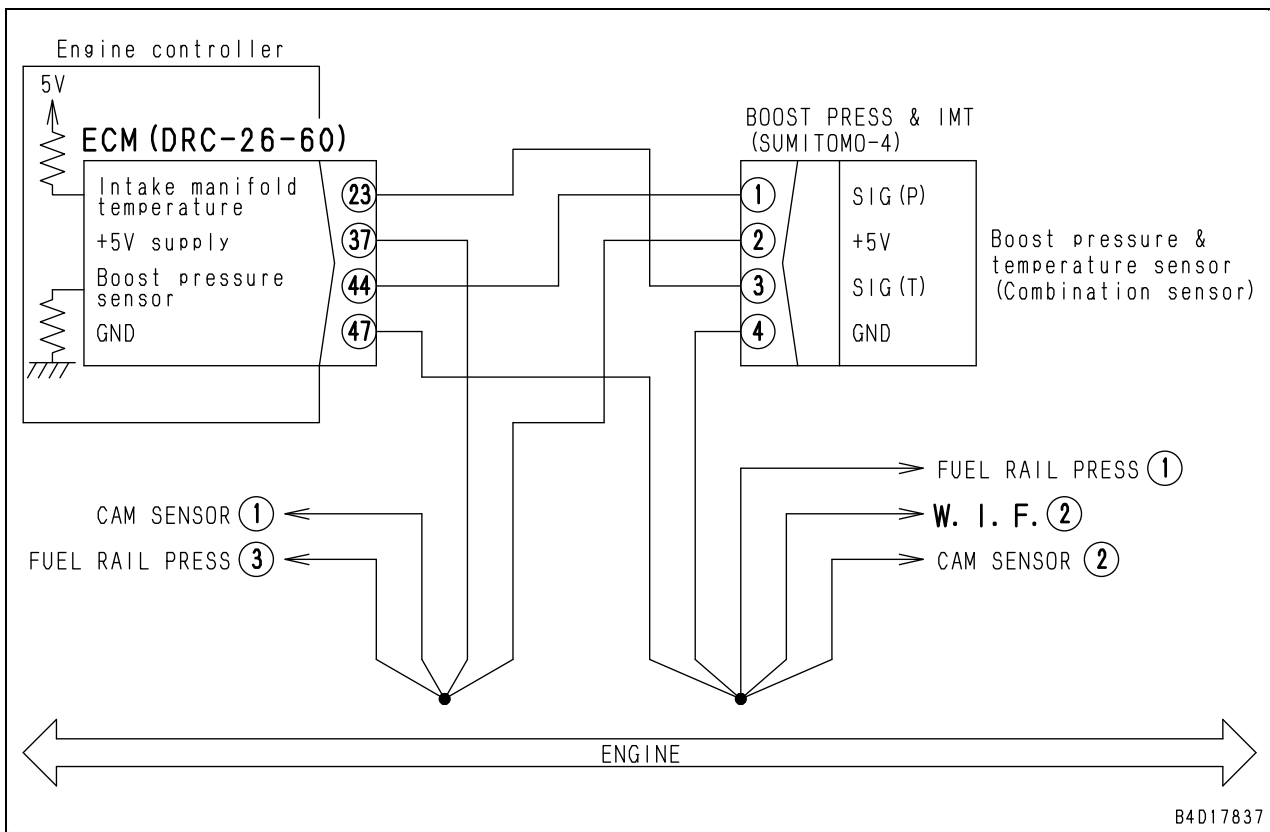
Circuit diagram related to charge



Circuit diagram related to charge air pressure sensor



Circuit diagram related to boost pressure and temperature sensor



Failure code [CA238]

Detail of failure	Low voltage is detected in power supply circuit of engine NE speed sensor.
Action level	L01
Action of controller	Controls by Bkup speed sensor signal.
Problem on machine	<ul style="list-style-type: none"> • Running engine stops (when Bkup speed sensor is also defective). • Stopped engine cannot be started (when Bkup speed sensor is also defective). • Engine startability is poor. • Engine speed hunts.
Related information	-

No.	Inspection item	Troubleshooting procedure		Criterion and remedy		
1	Wiring harness connector	See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "Related information on troubleshooting", and check it.		YES	<ul style="list-style-type: none"> • The state of the wiring harness and connector are normal. • Proceed to the next inspection item. 	
				NO	<ul style="list-style-type: none"> • The wiring harness and connector are defective. • Repair or replace the defective wiring harness and connector. • Proceed to "Repair check". 	
2	Sensor or wiring harness	<ol style="list-style-type: none"> 1. Starting switch: OFF 2. Disconnect following connectors one by one in order and turn starting switch ON each time. 3. Each time troubleshooting is finished, return to step 1. 		YES	<ul style="list-style-type: none"> • The state of the sensor or wiring harness is normal. • Proceed to the next inspection item. 	
		If this failure code is cleared, disconnected sensor or engine wiring harness is defective. ★ Many other failure codes are also displayed at the same time. This is because the connector is disconnected. Ignore failure codes other than this failure code [CA238].				
		Sensor and wiring harness		Connector	NO	<ul style="list-style-type: none"> • The disconnected sensor or wiring harness is defective • Replace the disconnected sensor or wiring harness. • Proceed to "Repair check".
		Ne speed sensor		CRANK SENSOR		
Engine wiring harness		ECM				
3	Recheck of inspection item	<ol style="list-style-type: none"> 1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck? 		YES	Repairs are completed.	
				NO	<ul style="list-style-type: none"> • The engine controller may be defective. • Replace the engine controller. • Proceed to "Repair check". 	
4	Repair check	<ol style="list-style-type: none"> 1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Is this failure code displayed? 		YES	Return to the first inspection item.	
				NO	Repairs are completed.	

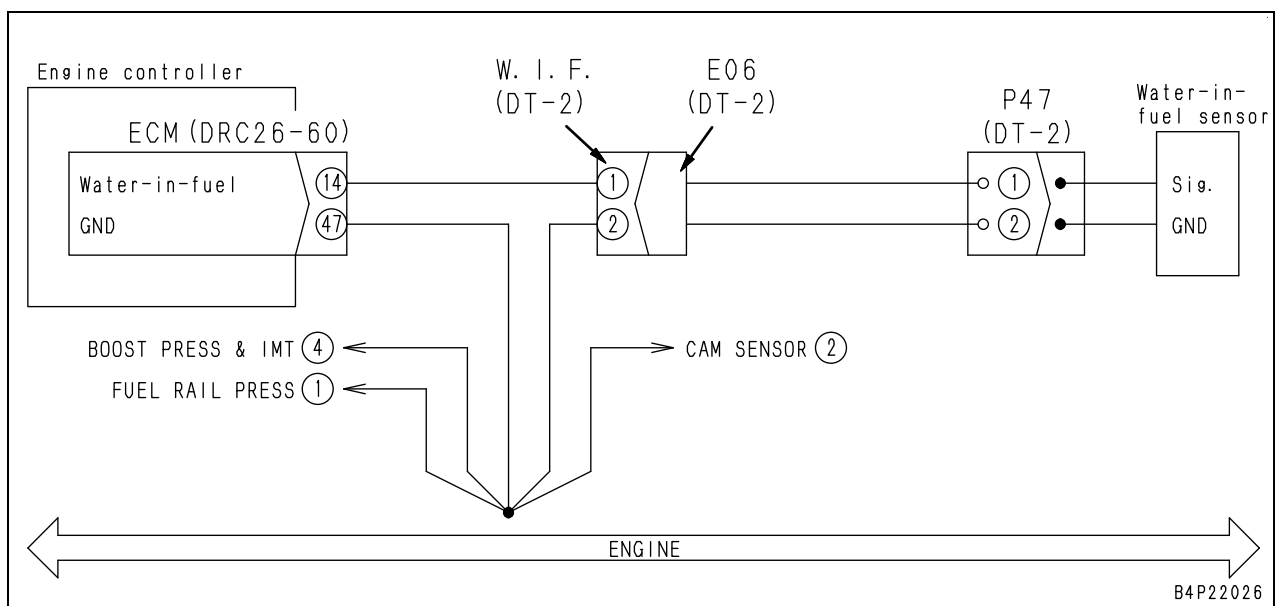
Failure code [CA325]

Detail of failure	An open circuit or short circuit is detected in the drive circuit of the No. 6 injector.
Action level	L03
Action of controller	None in particular
Problem on machine	<ul style="list-style-type: none"> Explosion failure or hunting occurs. Engine output falls.
Related information	While the engine is running normally, approximately 65 V of pulse voltage is supplied to the injector (+) side. Because it is pulse voltage, it cannot be measured using multimeter.

No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
1	Wiring harness connector	See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "Related information on troubleshooting", and check it.			YES	<ul style="list-style-type: none"> The state of the wiring harness and connector are normal. Proceed to the next inspection item.
					NO	<ul style="list-style-type: none"> The wiring harness and connector are defective. Repair or replace the defective wiring harness and connector. Proceed to "Repair check".
2	No. 6 injector	1. Starting switch: OFF 2. Disconnect connector INJECTOR CYL 5&6, and connect the T-adapter to the male side.			YES	<ul style="list-style-type: none"> The state of the No. 6 injector is normal. Proceed to the next inspection item.
		Between INJECTOR CYL 5&6 (male) (A) and (B)	Resistance	Max. 2 Ω	NO	<ul style="list-style-type: none"> No. 6 injector is defective. Replace No. 6 injector. Proceed to "Repair check".
		Between INJECTOR CYL 5&6 (male) (A) and ground	Resistance	Min. 100 kΩ		
3	Open circuit or ground fault in wiring harness	1. Starting switch: OFF 2. Disconnect connector ECM, and connect the T-adapter to the female side.			YES	<ul style="list-style-type: none"> No open circuit or ground fault occurs in the wiring harness. Proceed to the next inspection item.
		Between ECM (female) (57) and (59)	Resistance	Max. 2 Ω	NO	<ul style="list-style-type: none"> An open circuit or ground fault occurs in the wiring harness. Proceed to "Open circuit in wiring harness" or "Ground fault in wiring harness".
		Between ECM (female) (57) and ground	Resistance	Min. 100 kΩ		
4	Open circuit in wiring harness	★ If no failure is found by Inspection item 3, this check is not required. 1. Starting switch: OFF 2. Disconnect connectors ECM and INJECTOR CYL 5&6, and connect the T-adapter to each female side.			YES	<ul style="list-style-type: none"> An open circuit does not occur in the wiring harness. Proceed to the next inspection item.
		Between ECM (female) (57) and INJECTOR CYL 5&6 (female) (A)	Resistance	Max. 2 Ω	NO	<ul style="list-style-type: none"> An open circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
		Between ECM (female) (59) and INJECTOR CYL 5&6 (female) (B)	Resistance	Max. 2 Ω		

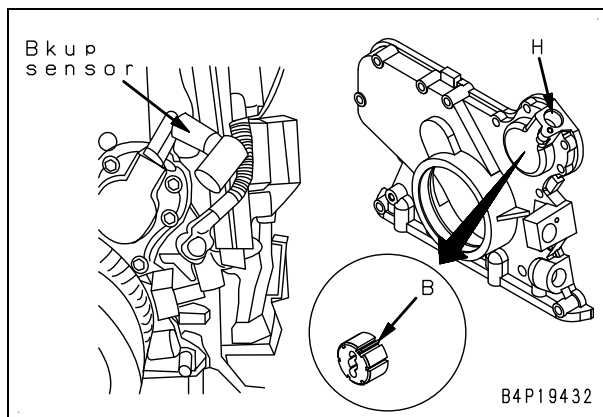
No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
4	Open circuit in wiring harness	★ If no failure is found by Inspection item 3, this check is not required. 1. Starting switch: OFF 2. Disconnect connectors ECM and P47, and connect the T-adapter to each female side.			YES	<ul style="list-style-type: none"> An open circuit does not occur in the wiring harness. Proceed to the next inspection item.
		Between ECM (female) (14) and P47 (female) (1)	Resistance	Max. 10 Ω	NO	<ul style="list-style-type: none"> An open circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
		Between ECM (female) (47) and P47 (female) (2)	Resistance	Max. 10 Ω		
5	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connectors ECM and P47, and connect the T-adapter to the female side of the ECM. ★ Check using multimeter in continuity mode.			YES	<ul style="list-style-type: none"> No short circuit occurs in the wiring harness. Proceed to the next inspection item.
		Between ECM (female) (14) and each pin other than pin (14)	No continuity (no sound is heard)		NO	<ul style="list-style-type: none"> A short circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
6	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?			YES	Repairs are completed.
					NO	<ul style="list-style-type: none"> The engine controller may be defective. Replace the engine controller. Proceed to "Repair check".
7	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Is this failure code displayed?			YES	Return to the first inspection item.
					NO	Repairs are completed.

Circuit diagram related to water-in-fuel sensor

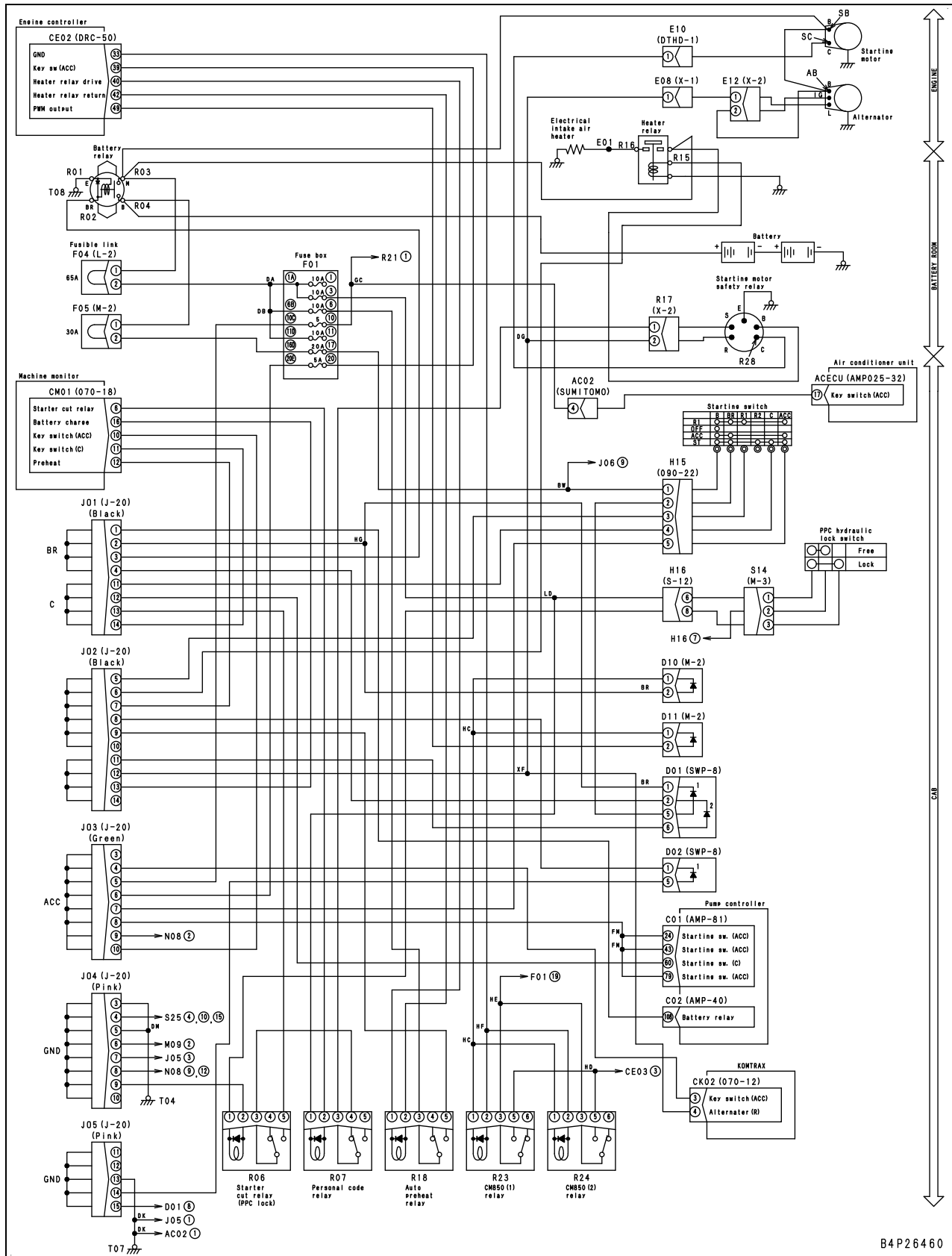


No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
4	Ground fault in wiring harness	1. Starting switch: OFF 2. Disconnect connectors ECM and FUEL RAIL PRESS, and connect the T-adaptor to the female side of the ECM.			YES	<ul style="list-style-type: none"> No ground fault occurs in the wiring harness. Proceed to the next inspection item.
		Between ECM (female) (25) and ground	Resistance	Min. 100 kΩ	NO	<ul style="list-style-type: none"> Ground fault occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
5	Short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connectors ECM and FUEL RAIL PRESS, and connect the T-adaptor to the female side of the ECM.			YES	<ul style="list-style-type: none"> No short circuit occurs in the wiring harness. Proceed to the next inspection item.
		Between ECM (25) and (47)	Resistance	Min. 100 kΩ	NO	<ul style="list-style-type: none"> A short circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
6	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?			YES	Repairs are completed.
					NO	<ul style="list-style-type: none"> The engine controller may be defective. Replace the engine controller. Proceed to "Repair check".
7	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Is this failure code displayed?			YES	Return to the first inspection item.
					NO	Repairs are completed.

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
9	Speed sensing ring	Remove Bkup speed (CAM) sensor, and check through hole (H). ★ If camshaft speed sensing ring (B) is loose, see "Reference".	YES	<ul style="list-style-type: none"> The speed sensing ring is not loosened. Proceed to the next inspection item.
			NO	<ul style="list-style-type: none"> The speed sensing ring is loosened. Remount the speed sensing ring. Proceed to "Repair check".
10	Engine Bkup speed (CAM) sensor	If no abnormalities are identified by the above checks, the engine Bkup speed (CAM) sensor is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	-	<ul style="list-style-type: none"> The engine Bkup speed (CAM) sensor may be defective. Replace the engine Bkup speed (CAM) sensor. Proceed to "Repair check".
11	Recheck of inspection item	<ol style="list-style-type: none"> Recheck the preceding troubleshooting. Can you identify the cause after carrying out a recheck? 	YES	Repairs are completed.
			NO	<ul style="list-style-type: none"> The engine controller may be defective. Replace the engine controller. Proceed to "Repair check".
12	Repair check	<ol style="list-style-type: none"> Turn the starting switch off. Connect all the component parts. Start the engine. Is this failure code displayed? 	YES	Return to the first inspection item.
			NO	Repairs are completed.



Circuit diagram related to intake air heater relay



B4P26460

Failure code [DA25KP]

Detail of failure	Voltage of 5 V sensor power supply output 1 circuit is below 2.5 V or above 6.0 V.
Action level	-
Action of controller	<ul style="list-style-type: none"> Stops output of power from 5 V sensor power supply output 1. Even if the cause of a failure is removed, the state of the machine does not return to normal until the starting switch is turned to OFF position.
Problem on machine	<ul style="list-style-type: none"> Automatic travel speed selector function does not work (pump pressure sensor system). Auto-decelerator function remains activated or fine control performance of work equipment is poor. (PPC (Proportional Pressure Control) pressure sensor system)
Related information	As the T-adapter for the pump controller connector is the "socket-type box", operating voltage cannot be measured at the pump controller connector.

No.	Inspection item	Troubleshooting procedure			Criterion and remedy			
1	Pressure sensor	1. Starting switch: OFF 2. Disconnect the following connectors one by one, and turn the starting switch to ON position each time. ★ If this failure code is cleared, the disconnected sensor is defective. 3. Each time troubleshooting is finished, return to step 1.			YES	<ul style="list-style-type: none"> The state of the pressure sensor is normal. Proceed to the next inspection item. 		
		Sensor		Connector				
		Bucket CURL PPC pressure sensor		P01		NO	<ul style="list-style-type: none"> The disconnected pressure sensor is defective. Replace the disconnected pressure sensor. Proceed to "Repair check". 	
		Boom LOWER PPC pressure sensor		P02				
		Bucket DUMP PPC pressure sensor		P05				
		Arm IN PPC pressure sensor		P04				
		Boom RAISE PPC pressure sensor		P06				
		Swing RIGHT PPC pressure sensor		P07				
		Arm OUT PPC pressure sensor		P08				
		Swing LEFT PPC pressure sensor		P03				
		F pump pressure sensor		P25				
R pump pressure sensor		P26						
2	Hot short circuit in wiring harness	★ Measure voltage before the controller stops outputting. 1. Starting switch: OFF 2. Disconnect connectors P01 to P08, P25, and P26. 3. Connect the T-adapter to the female side of either of the disconnected connectors (e.g. P07). 4. Turn the starting switch ON (with connectors P01 to P08, P25, and P26 disconnected).			YES	<ul style="list-style-type: none"> A hot short circuit does not occur in the wiring harness. Proceed to the next inspection item. 		
		Between P07 (female) (3) and ground	Voltage	4.5 to 5.5 V				NO
3	Ground fault in wiring harness	1. Starting switch: OFF 2. Disconnect connectors C01, P01 to P08, P25, and P26. 3. Connect the T-adapter to the female side of connector C01.			YES	<ul style="list-style-type: none"> No ground fault occurs in the wiring harness. Proceed to the next inspection item. 		
		Between C01 (female) (9) and ground	Resistance	Min. 1 MΩ				NO

Failure code [DAF8KB]

Detail of failure	Output power supply voltage (rating: 8 V) from the machine monitor to the camera falls below 6.0 V or exceeds 10 V.
Action level	L03
Action of machine monitor	<ul style="list-style-type: none"> Stops output power supply voltage (rating: 8 V) to the camera. Even if the cause of a failure is removed, the state of the machine does not return to normal until the starting switch is turned to OFF position.
Problem on machine	Camera image is not displayed on the monitor screen.
Related information	-

No.	Inspection item	Troubleshooting procedure			Criterion and remedy
1	Camera	1. Starting switch: OFF 2. Disconnect the camera connector, and turn the starting switch to ON position.			YES <ul style="list-style-type: none"> The camera is normal. Proceed to the next inspection item.
		If the failure code disappears after disconnecting the camera in order to perform the operation to reproduce the procedure, an internal defect of the camera will be detected.			NO <ul style="list-style-type: none"> The battery is defective. Replace the camera. Proceed to "Repair check".
2	Machine monitor	1. Starting switch: OFF 2. Disconnect connector CM04. 3. Connect the T-adaptor to the male side of connector CM04. 4. Turn the starting switch to ON position.			YES <ul style="list-style-type: none"> The state of the machine monitor is normal. Proceed to the next inspection item.
		Between CM04 (male) (1) and ground	Voltage	6 to 10 V	NO <ul style="list-style-type: none"> The machine monitor is defective. Replace the machine monitor. Proceed to "Repair check".
3	Ground fault in wiring harness	1. Starting switch: OFF 2. Disconnect the camera connector from connector CM04. 3. Connect the T-adaptor to the female side of connector CM04.			YES <ul style="list-style-type: none"> No ground fault occurs in the wiring harness. Proceed to the next inspection item.
		Between CM04 (female) (1) and ground	Resistance	Min. 1 MΩ	NO <ul style="list-style-type: none"> Ground fault occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
4	Hot short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect the camera connector. 3. Insert the T-adaptor into connector CM04. 4. Turn the starting switch to ON position. (Disconnect camera and check that it is normal, in advance.)			YES <ul style="list-style-type: none"> A hot short circuit does not occur in the wiring harness. Proceed to the next inspection item.
		Between CM04 (1) and (5)	Voltage	Max. 10 V	NO <ul style="list-style-type: none"> A hot short circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
5	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Is this failure code displayed?			YES Return to the first inspection item.
					NO Repairs are completed.

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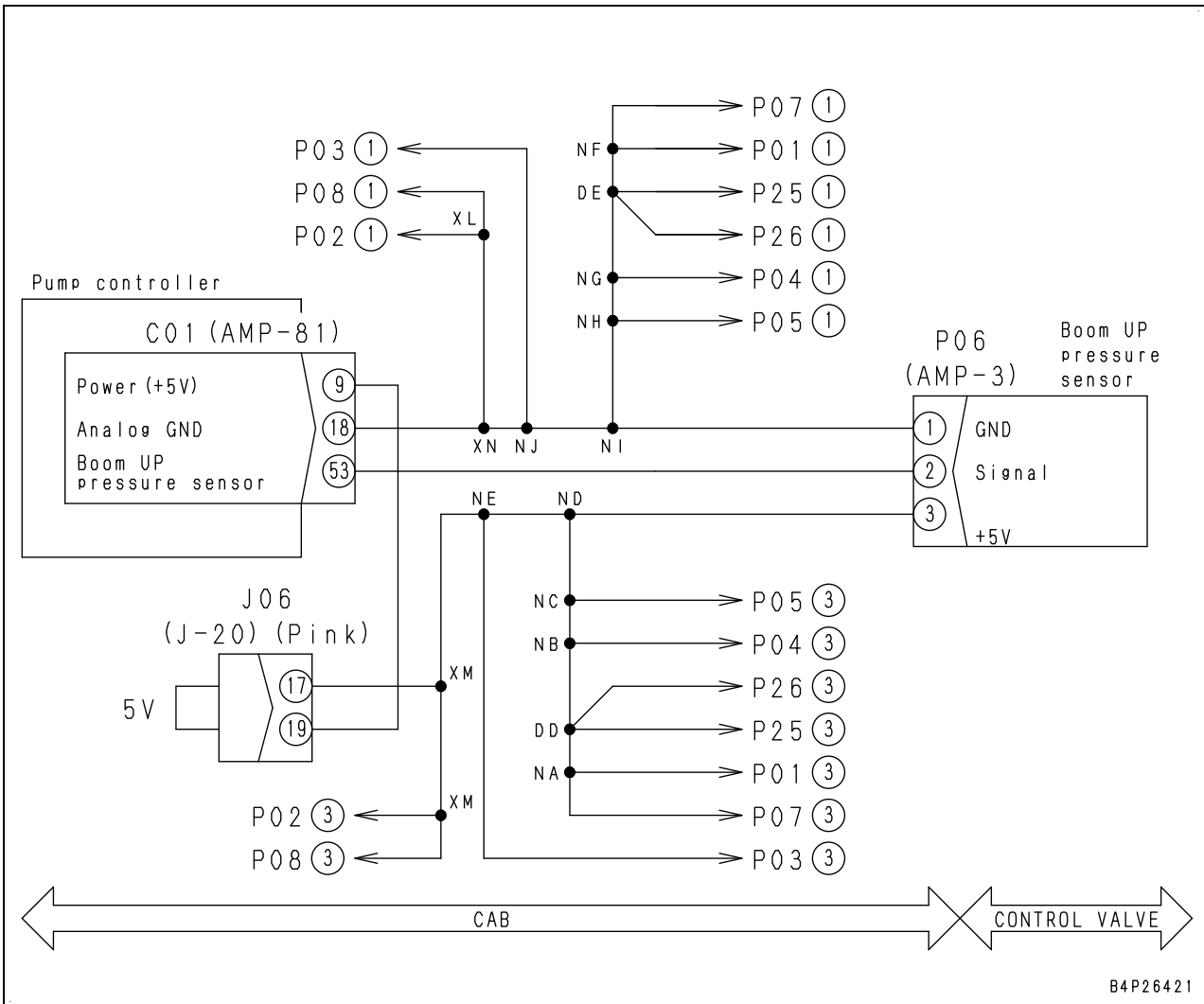
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Failure code [DHA4KA]

Detail of failure	When starting switch is turned to ON position, signal voltage from air cleaner clogging switch is not 1 V or below, and machine monitor detects open circuit (sensor contacts open) of air cleaner clogging sensor.
Action level	L01
Action of controller	Displays the air cleaner clogging monitor in yellow on the machine monitor.
Problem on machine	If machine is used as it is, clogging of air cleaner cannot be detected correctly, and engine may be damaged.
Related information	Input state (ON/OFF) from air cleaner clogging sensor can be checked via the monitoring function. (Code: 04501 monitor input 2)

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
1	Air cleaner clogging system	Perform troubleshooting for failure code [AA10NX].	-	<ul style="list-style-type: none"> Repairs are completed. Proceed to "Repair check".
2	Repair check	<ol style="list-style-type: none"> Turn the starting switch off. Connect all the component parts. Turn the starting switch on. Is this failure code displayed? 	YES	Return to the first inspection item.
			NO	Repairs are completed.

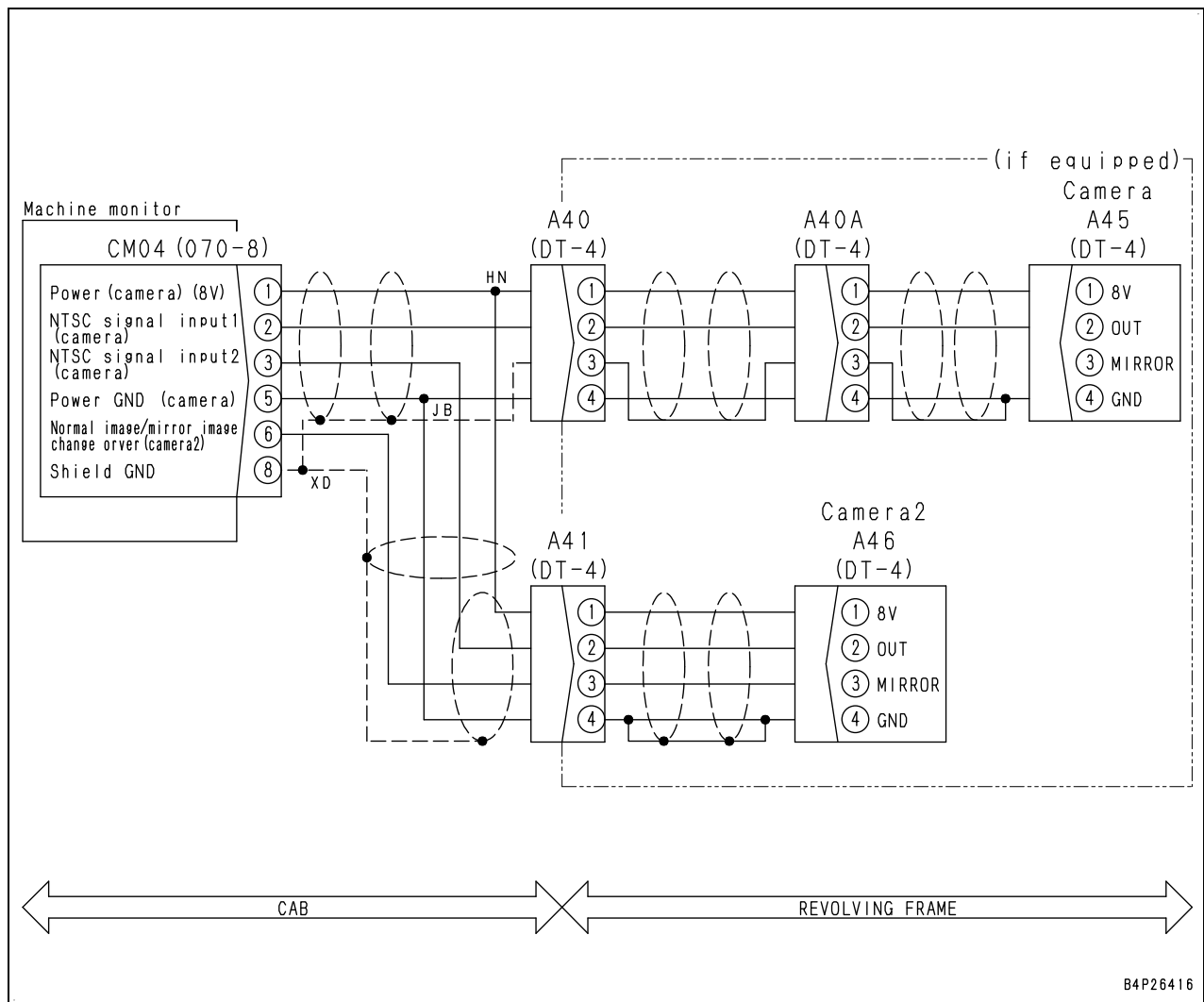
Circuit diagram related to boom RAISE PPC pressure sensor



B4P26421

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
5	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?	YES	Repairs are completed.
			NO	<ul style="list-style-type: none"> The camera 2 or the machine monitor may be defective. Replace the camera 2 or the machine monitor. Proceed to "Repair check".
6	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Is this failure code displayed?	YES	Return to the first inspection item.
			NO	Repairs are completed.

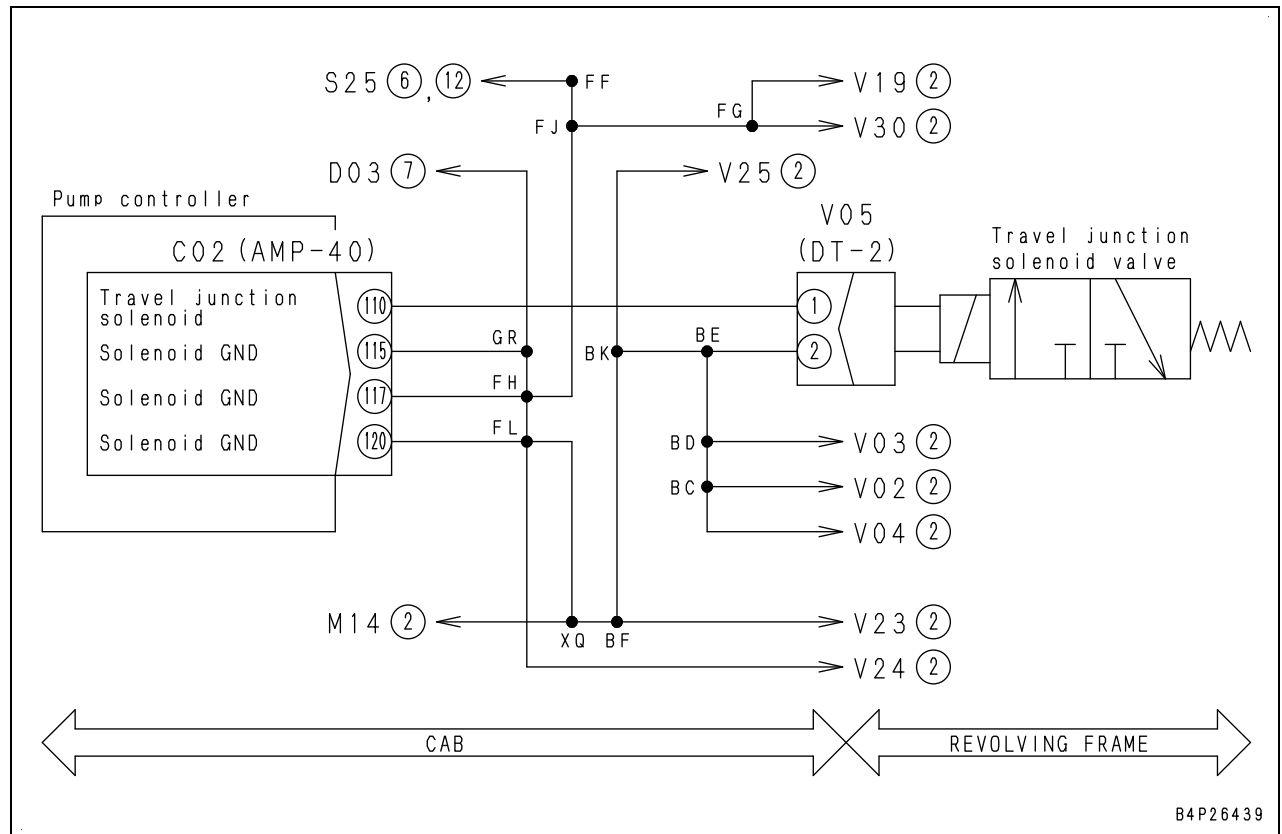
Circuit diagram related to camera 2



B4P26416

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
5	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Start the engine. 4. Perform steering operation using R.H. and L.H. travel levers. 5. Is this failure code displayed?	YES	Return to the first inspection item.
			NO	Repairs are completed.

Circuit diagram related to travel junction solenoid valve



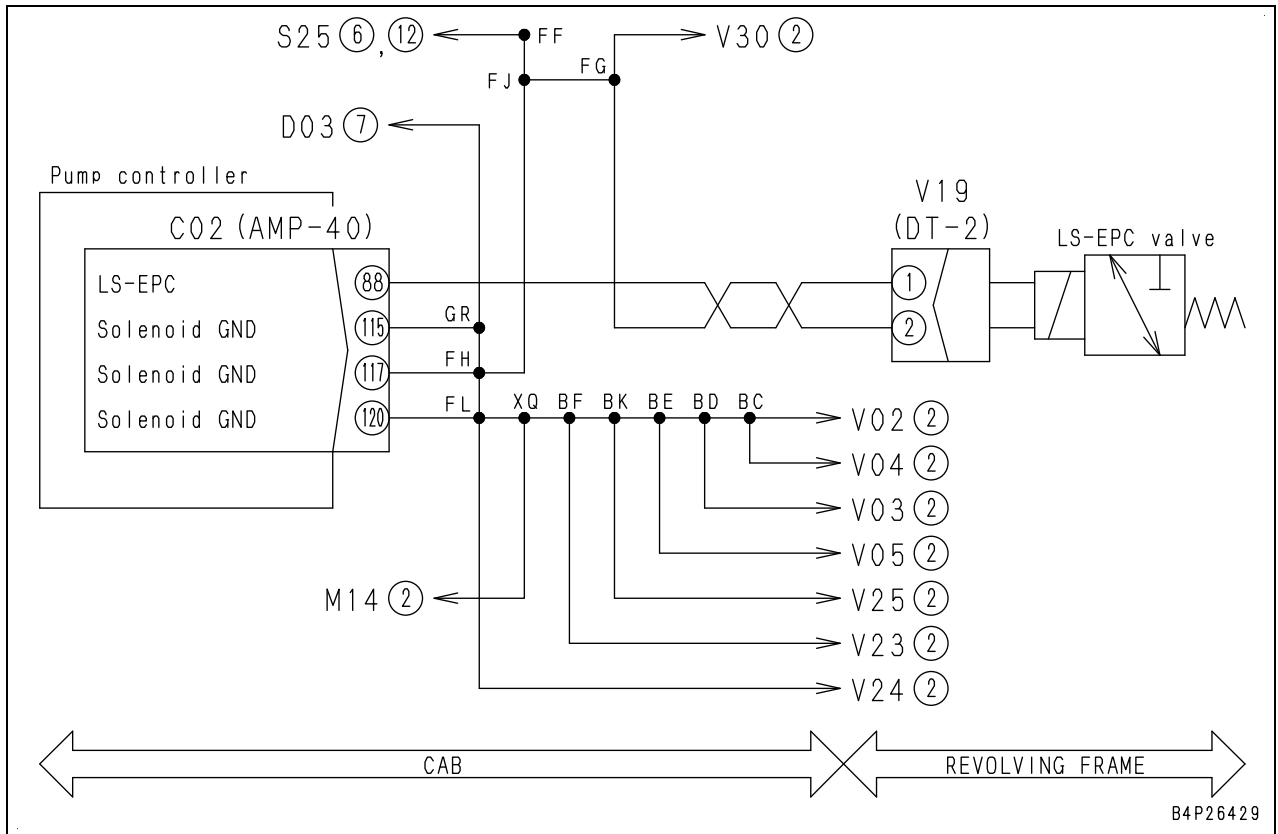
B4P26439

Failure code [DXA8KA]

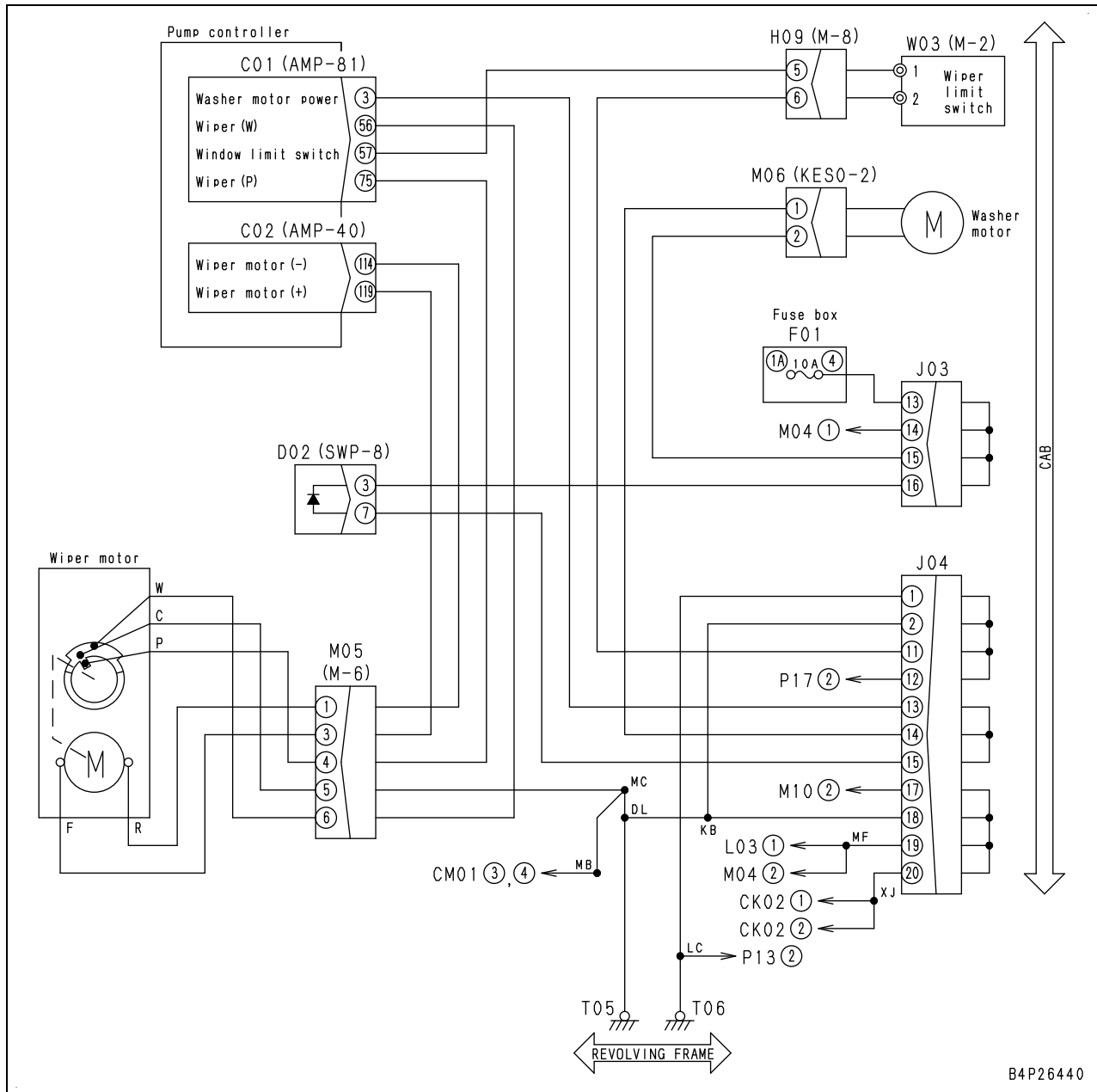
Detail of failure	No current flows when the pump controller drives the PC-EPC (front) solenoid, so the pump controller determines an open circuit exists in the PC-EPC (F) solenoid circuit.
Action level	L03
Action of controller	<ul style="list-style-type: none"> • None in particular (Since no current flows, solenoid is not energized.) • If the cause of the failure is eliminated, the state of the machine returns to normal by itself.
Problem on machine	If pump load increases, engine speed largely decreases and engine may stop.
Related information	<ul style="list-style-type: none"> • When the states of the solenoid and wiring harness are normal, the engine can be prevented from stopping by setting emergency pump drive switch to ON position. • Drive current of PC-EPC (F) solenoid can be checked via the monitoring function. (Code: 01300 PC-EPC (F) Solenoid Current)

No.	Inspection item	Troubleshooting procedure				Criterion and remedy	
1	PC-EPC (F) solenoid	1. Starting switch: OFF 2. Disconnect connector V11, and connect the T-adaptor to the male side.				YES	<ul style="list-style-type: none"> • The state of the PC-EPC (F) solenoid is normal. • Proceed to the next inspection item.
		Between V11 (male) (1) and (2)	Resistance	3 to 14 Ω		NO	<ul style="list-style-type: none"> • The PC-EPC (F) solenoid is defective. • Replace the PC-EPC (F) solenoid. • Proceed to "Repair check".
2	Emergency pump drive switch	1. Starting switch: OFF 2. Disconnect connector S25, and connect the T-adaptor to the male side.				YES	<ul style="list-style-type: none"> • The state of the emergency pump drive switch is normal. • Proceed to the next inspection item.
		Between S25 (male) (3) and (2)	Switch position: Normal	Resistance	Max. 1 Ω	NO	<ul style="list-style-type: none"> • The emergency pump drive switch is defective. • Replace the emergency pump drive switch. • Proceed to "Repair check".
			Switch position: Abnormal	Resistance	Min. 1 MΩ		
		Between S25 (male) (6) and (5)	Switch position: Normal	Resistance	Max. 1 Ω		
Switch position: Abnormal	Resistance		Min. 1 MΩ				
3	Open circuit or short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connector C02, and connect the T-adaptor to the female side. ★ Check that the emergency pump drive switch is turned to the normal position (bottom side).				YES	<ul style="list-style-type: none"> • No open circuit or short circuit occurs in the wiring harness. • Proceed to the next inspection item.
		Between C02 (female) (96) and (115), (117), or (120)	Resistance	3 to 14 Ω		NO	<ul style="list-style-type: none"> • An open circuit or short circuit occurs in the wiring harness. • Proceed to "Open circuit in wiring harness".

Circuit diagram related to LS-EPC solenoid



Circuit diagram related to windshield wiper



B4P26440

E-1 Engine does not start (engine does not rotate)

Failure	Engine does not start (engine does not rotate)
Related information	<ul style="list-style-type: none"> The engine start circuit is equipped with the start lock function of the following two systems. <ol style="list-style-type: none"> Start lock by password of machine monitor Start lock by lock lever If the failure symptom is "Battery relay operation sound is not heard" when the starting switch is turned to ON position, perform troubleshooting for E-1 as well.

No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
1	Fusible link	1. Starting switch: OFF 2. Remove fusible links F04 and F05.			YES	<ul style="list-style-type: none"> The state of the fusible link is normal. Proceed to the next inspection item.
		Between terminals F04 and F05	Resistance	Max. 1 Ω	NO	<ul style="list-style-type: none"> The fusible link is defective. Replace the fusible link. Proceed to "Repair check".
2	Fuse	If fuses No.3 and 17 in fuse box F01 are blown, the circuit may have a ground fault. (See Inspection item 16.)			YES	<ul style="list-style-type: none"> The state of the fuse is normal. Proceed to the next inspection item.
					NO	<ul style="list-style-type: none"> If the fuses have burnt out, proceed to "Ground fault in wiring harness". If the fuses have not burnt out but they have no resistance value, replace the fuses. Proceed to "Repair check".
3	Loose terminal or open circuit at terminal	1. Starting switch: OFF			YES	<ul style="list-style-type: none"> No terminal looseness or open circuit occurs. Proceed to the next inspection item.
		Check the terminals of the starting motor, alternator, battery relay, and ground terminals T04, T07, T08, etc.			NO	<ul style="list-style-type: none"> If any terminal has become loose, re-mount it. If an open circuit is detected, carry out the appropriate replacement. Proceed to "Repair check".

E-3 Machine monitor displays nothing when starting switch is turned to ON position

Failure	When the starting switch is turned to ON position, nothing is displayed on the machine monitor.
Related information	<ul style="list-style-type: none"> When the starting switch is turned to ON position, the machine monitor displays the KOMATSU logo, screen to input password (if set), screen to check breaker mode (if set), pre-start screen, screen to check working mode, screen to check travel speed, and standard screen in order. When starting the engine, the battery voltage may suddenly drop depending on the temperature and battery condition. If this happens, the display on the machine monitor may momentarily go out, but this does not indicate any abnormality.

No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
					YES	NO
1	Battery ground cable connection	Check whether battery ground 60B is connected.			YES	<ul style="list-style-type: none"> The battery ground is connected correctly. Proceed to the next inspection item.
					NO	<ul style="list-style-type: none"> The battery ground is not connected correctly. Connect the battery ground cable. Proceed to "Repair check".
2	Battery	★ Be ready with the starting switch in OFF position, then perform the troubleshooting with the starting switch stayed in OFF position.			YES	<ul style="list-style-type: none"> The state of the battery is normal. Proceed to the next inspection item.
		Battery voltage (2 cells)	Min. 24 V	NO	<ul style="list-style-type: none"> The battery is defective. Replace the battery. Proceed to "Repair check". 	
		Gravity of battery (1 piece)	Min. 1.26			
3	Fusible link, fuse	If fusible link F05 or fuse F01-17 is blown, the circuit may have a ground fault. (See Inspection item 7.)			YES	<ul style="list-style-type: none"> The states of the fusible link and fuse are normal. Proceed to the next inspection item.
					NO	<ul style="list-style-type: none"> If the fuse has burnt out, proceed to "Ground fault in wiring harness". If the fuse has not burnt out but it has no resistance, replace the fusible link and fuse. Proceed to "Repair check".
4	Wiring harness, starting switch, or machine monitor	1. Turn the starting switch OFF, and disconnect the battery ground cable. 2. Insert the T-adaptor into connector CM01. 3. Connect the battery ground cable, and turn the starting switch ON (connect the ACC).			YES	<ul style="list-style-type: none"> The state of the wiring harness, starting switch, and machine monitor are normal. Proceed to the next inspection item.
		Between CM01 (1) and (3)	Voltage	20 to 30 V	NO	<ul style="list-style-type: none"> The wiring harness, starting switch, or machine monitor is defective. Replace the wiring harness, starting switch, or machine monitor. Proceed to the next inspection item.
		Between CM01 (2) and (4)	Voltage	20 to 30 V		
		Between CM01 (10) and (4)	Voltage	20 to 30 V		

E-8 Engine coolant temperature gauge does not indicate correct temperature

Failure	1) When the engine coolant temperature is rising normally, it does not rise above the white range (C). 2) When the engine coolant temperature has stabilized normally, it rises to the red range (H).
Related information	<ul style="list-style-type: none"> A signal from the coolant temperature sensor is input to the engine controller, and then transmitted to the machine monitor through the communication system. Engine coolant temperature can be checked via the monitoring function (Code: 04107 Engine coolant temperature)

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
1	Engine coolant temperature sensor	The coolant temperature sensor system may be defective. Perform troubleshooting for failure codes [CA144] and [CA145].	YES	<ul style="list-style-type: none"> The state of the engine coolant temperature sensor is normal. Proceed to the next inspection item.
			NO	<ul style="list-style-type: none"> The engine coolant temperature sensor is defective. Replace the engine coolant temperature sensor. Proceed to "Repair check".
2	Recheck of inspection item	<ol style="list-style-type: none"> Recheck the preceding troubleshooting. Can you identify the cause after carrying out a recheck? 	YES	Repairs are completed.
			NO	<ul style="list-style-type: none"> The machine monitor may be defective. Replace the machine monitor. Proceed to "Repair check".
3	Repair check	<ol style="list-style-type: none"> Turn the starting switch off. Connect all the component parts. Start the engine. Does this failure recur? 	YES	Return to the first inspection item.
			NO	Repairs are completed.

E-17 Alarm buzzer does not stop sounding

Failure	Alarm buzzer does not stop sounding.
Related information	The signal status of the alarm buzzer stop switch can be checked via the monitoring function. (Code: 04504 Monitor 1st & 2nd Row SW)

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
1	Machine monitor	The machine monitor may be defective. (Because this is an internal defect, troubleshooting cannot be performed.)		<ul style="list-style-type: none"> The machine monitor may be defective. Replace the machine monitor. Proceed to "Repair check".
2	Repair check	<ol style="list-style-type: none"> Turn the starting switch off. Connect all the component parts. Turn the starting switch on. Does this failure recur? 	YES	Return to the first inspection item.
			NO	Repairs are completed.

E-18 Service meter is not displayed while starting switch is in OFF position

Failure	Service meter is not displayed while starting switch is in OFF position.
Related information	The following switch operation with the starting switch set to OFF position displays a service meter in the upper middle of the screen. Operation of switches: [4] + [1] (pressed simultaneously)

No.	Inspection item	Troubleshooting procedure	Criterion and remedy	
1	Backup power supply system	When the starting switch is turned to ON position, if nothing is displayed on the machine monitor, the backup power supply system may be defective. Perform troubleshooting for "E-3 Machine monitor displays nothing when starting switch is turned to ON position."	YES	<ul style="list-style-type: none"> The state of the backup power supply system is normal. Proceed to the next inspection item.
			NO	<ul style="list-style-type: none"> The backup power supply system is defective. Perform troubleshooting for "E-3 Machine monitor displays nothing when starting switch is turned to ON position." Proceed to "Repair check".
2	Recheck of inspection item	<ol style="list-style-type: none"> Recheck the preceding troubleshooting. Can you identify the cause after carrying out a recheck? 	YES	Repairs are completed.
			NO	<ul style="list-style-type: none"> The machine monitor may be defective. Replace the machine monitor. Proceed to "Repair check".
3	Repair check	<ol style="list-style-type: none"> Turn the starting switch off. Connect all the component parts. Press function switches [4] and [1] simultaneously. Does this failure recur? 	YES	Return to the first inspection item.
			NO	Repairs are completed.

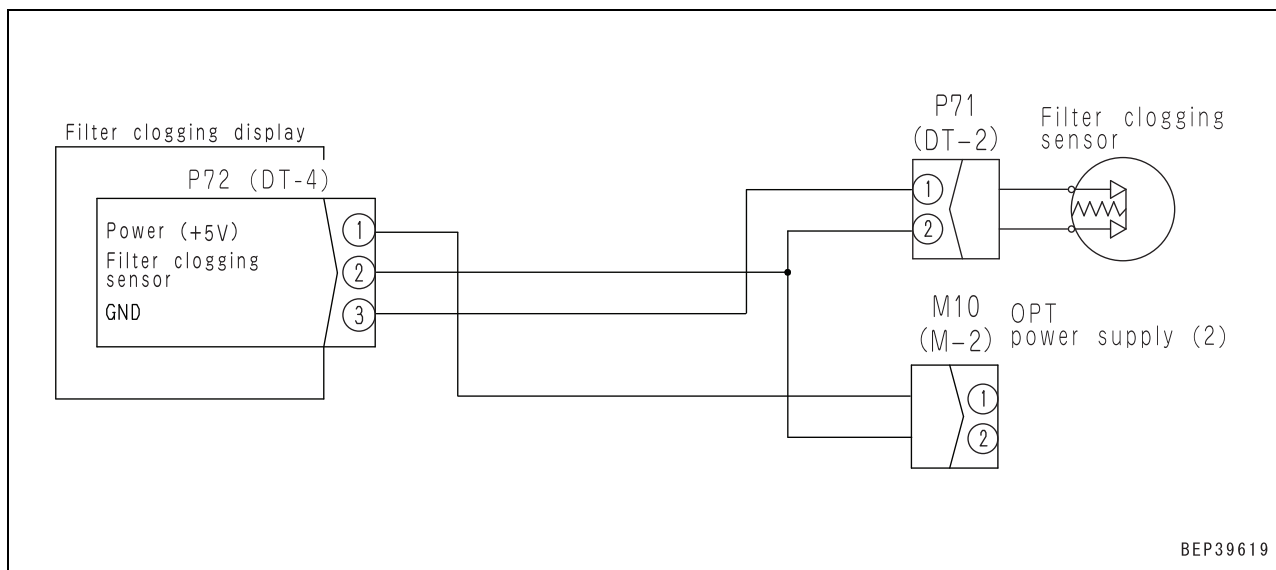
No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
5	Wiring harness	1. Starting switch: OFF 2. Disconnect connector R08, and connect the T-adaptor to the female side. 3. Turn the starting switch to ON position. 4. Press the L.H. knob switch.			YES	<ul style="list-style-type: none"> The state of the wiring harness is normal. Proceed to the next inspection item.
		Between R08 (female) (1) and (2)	Voltage	20 to 30 V	NO	<ul style="list-style-type: none"> The wiring harness is defective. Replace the wiring harness. Proceed to "Repair check".
Between R08 (female) (3) and (2)	Voltage	20 to 30 V				
6	Open circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connector R08, and connect the T-adaptor to the female side.			YES	<ul style="list-style-type: none"> No open circuit occurs in the wiring harness. Proceed to the next inspection item.
		Between R08 (female) (5) and ground	Continuity		NO	<ul style="list-style-type: none"> An open circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
		Between R08 (female) (1) and ground	Continuity			
		★ If no failure is found by Inspection item 5, this check is not required. 1. Starting switch: OFF 2. Remove fuse F01-5. 3. Disconnect connectors R08 and S10 and connect the T-adaptor to each female side.				
		Between F01-5 and S10 (female) (1)	Resistance	Max. 1 Ω		
		Between S10 (female) (2) and R08 (female) (1)	Resistance	Max. 1 Ω		
		Between R08 (female) (2) and ground	Resistance	Max. 1 Ω		
Between R08 (female) (3) and F01-5	Resistance	Max. 1 Ω				
7	Ground fault in wiring harness	★ If the fuse has not blown out, this check is not required. 1. Starting switch: OFF 2. Remove fuse F01-5. 3. Disconnect connectors R08, M07, and M08, and connect the T-adaptor to the female side of the R08.			YES	<ul style="list-style-type: none"> No ground fault occurs in the wiring harness. Proceed to the next inspection item.
		Between R08 (female) (1) and ground	Resistance	Min. 1 MΩ	NO	<ul style="list-style-type: none"> Ground fault occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
		Between R08 (female) (3) and ground	Resistance	Min. 1 MΩ		
		Between R08 (female) (5) and ground	Resistance	Min. 1 MΩ		
8	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?			YES	Repairs are completed.
					NO	<ul style="list-style-type: none"> The horn may be defective. Replace the horn. Proceed to "Repair check".
9	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on.			YES	Return to the first inspection item.
		4. Does this failure recur?			NO	Repairs are completed.

E-37 Breaker clogging caution lamp lights up when breaker is not used

Failure	The lamp lights up when the breaker is not used.
Related information	-

No.	Inspection item	Troubleshooting procedure		Criterion and remedy
1	Breaker clogging lamp	1. Starting switch: OFF 2. Disconnect connector P72, and connect the T-adapter to the male side.		YES <ul style="list-style-type: none"> The state of the breaker clogging lamp is normal. Proceed to the next inspection item.
		Between P72 (2) and (3)	No continuity	NO <ul style="list-style-type: none"> The breaker clogging lamp is defective. Replace the breaker clogging lamp. Proceed to "Repair check".
2	Open circuit or short circuit in wiring harness	1. Starting switch: OFF 2. Disconnect connector P72, and connect the T-adapter to the female side.		YES <ul style="list-style-type: none"> No open circuit or short circuit occurs in the wiring harness. Proceed to the next inspection item.
		Between P72 (3) and P71 (1)	No continuity	NO <ul style="list-style-type: none"> An open circuit or short circuit occurs in the wiring harness. Repair or replace the wiring harness. Proceed to "Repair check".
3	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Start the engine. 4. Does this failure recur?		YES Return to the first inspection item.
				NO Repairs are completed.

Circuit diagram related to breaker clogging caution lamp



H-6 Boom speed is low or power is insufficient

Failure	Boom speed or power is low.
Related information	Perform all troubleshooting with the working mode set in the power mode (P).

No.	Inspection item	Troubleshooting procedure		Criterion and remedy	
1	R.H. PPC valve (Boom circuit)	★ Prepare by stopping the engine, then perform troubleshooting with the engine running at a high idle speed.		YES	<ul style="list-style-type: none"> The state of the R.H. PPC valve is normal. Proceed to the next inspection item.
		R.H. work equipment control lever	PPC valve output pressure	NO	<ul style="list-style-type: none"> The R.H. PPC valve is defective. Replace the R.H. PPC valve. Proceed to "Repair check".
		NEUTRAL	0 MPa {0 kg/cm ² }		
		Boom RAISE Boom LOWER	2.84 to 3.43 MPa {29 to 35 kg/cm ² }		
2	Merge-divider main EPC valve	The merge-divider main EPC valve may malfunction. Check it.		YES	<ul style="list-style-type: none"> The state of the merge-divider main EPC valve is normal. Proceed to the next inspection item.
				NO	<ul style="list-style-type: none"> The merge-divider main EPC valve is defective. Replace the merge-divider main EPC valve. Proceed to "Repair check".
3	Merge-divider LS-EPC valve	The merge-divider LS-EPC valve may malfunction. Check it.		YES	<ul style="list-style-type: none"> The state of the merge-divider LS-EPC valve is normal. Proceed to the next inspection item.
				NO	<ul style="list-style-type: none"> The merge-divider LS-EPC valve is defective. Replace the merge-divider LS-EPC valve. Proceed to "Repair check".
4	Merge-divider main valve	The merge-divider main valve may malfunction. Check it.		YES	<ul style="list-style-type: none"> The state of the merge-divider main valve is normal. Proceed to the next inspection item.
				NO	<ul style="list-style-type: none"> The merge-divider main valve is defective. Replace the merge-divider main valve. Proceed to "Repair check".

H-11 Time lag of work equipment is large

Failure	Time lag of work equipment is large.
Related information	Perform all troubleshooting with the working mode set in the power mode (P).

No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
		Travel speed	Travel lever	LS-EPC valve output pressure	YES	NO
1	LS-EPC valve	★ Prepare by stopping the engine, then perform troubleshooting with the engine running at a high idle speed.			YES	<ul style="list-style-type: none"> The state of the LS-EPC valve is normal. Proceed to the next inspection item.
		Lo	NEUTRAL	Approx. 2.9 MPa {Approx. 30 kg/cm ² }	NO	<ul style="list-style-type: none"> The LS-EPC valve is defective. Clean or replace the LS-EPC valve. Proceed to "Repair check".
		Hi	Operation	0 MPa {0 kg/cm ² }		
2	Arm control valve (Regeneration valve) [Boom and arm only]	The regeneration valve of the control valve may malfunction. Check it.			YES	<ul style="list-style-type: none"> The state of the regeneration valve of the control valve is normal. Proceed to the next inspection item.
					NO	<ul style="list-style-type: none"> The regeneration valve of the control valve is defective. Replace the regeneration valve of the control valve. Proceed to "Repair check".
3	Control valve (Safety & suction valve)	The safety & suction valve of the control valve may malfunction. Check it.			YES	<ul style="list-style-type: none"> The state of the safety & suction valve of the control valve is normal. Proceed to the next inspection item.
		★ Interchange with the safety & suction valve of the appropriate control valve. Check the phenomenon since it changes, then make an appropriate judgment. (However, the set pressure is only different for the boom head circuit.)			NO	<ul style="list-style-type: none"> The safety & suction valve of the control valve is defective. Replace the safety & suction valve of the control valve. Proceed to "Repair check".
4	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?			YES	Repairs are completed.
					NO	<ul style="list-style-type: none"> The pressure compensation valve of the control valve may be defective. Replace the pressure compensation valve of the control valve. Proceed to "Repair check".
5	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Start the engine. 4. Set the working mode to the power mode (P). 5. Does this failure recur?			YES	Repairs are completed.
					NO	Return to the first inspection item.

H-20 Travel speed does not change, or travel speed is too slow or too fast

Failure	Travel speed does not change, or travel speed is too slow or too fast.
Related information	Perform all troubleshooting with the working mode set in the power mode (P).

No.	Inspection item	Troubleshooting procedure			Criterion and remedy	
1	LS-EPC valve	★ Perform troubleshooting when the engine is running at a high idle speed.			YES	<ul style="list-style-type: none"> The state of the LS-EPC valve is normal. Proceed to the next inspection item.
		Travel speed	Travel lever	Monitoring code: 01500	NO	<ul style="list-style-type: none"> The LS-EPC valve is defective. Replace the LS-EPC valve. Proceed to "Repair check".
		Lo (*)	Operation	663 mA (PC200-8M0) 578 mA (PC220-8M0)		
		Mi		424 mA (PC200-8M0) 641 mA (PC220-8M0)		
		Hi		0 mA		
		★ Travel speed of the Lo setting can be adjusted using adjustment function of the machine monitor. If it is changed from the default value, the value changes slightly.				
		★ Prepare by stopping the engine, then perform troubleshooting with the engine running at a high idle speed.				
		Travel speed	Travel lever	LS-EPC valve output pressure		
		Lo	NEUTRAL	Approx. 2.9 MPa {Approx. 30 kg/cm ² }		
			Hi	Operation	0 MPa {0 kg/cm ² }	
2	Travel speed selector solenoid valve	★ Prepare by stopping the engine, then perform troubleshooting with the engine running at a high idle speed.			YES	<ul style="list-style-type: none"> The state of the travel speed selector solenoid valve is normal. Proceed to the next inspection item.
		Travel speed	Travel lever	Travel speed selector solenoid valve output pressure	NO	<ul style="list-style-type: none"> The travel speed selector solenoid valve is defective. Replace the travel speed selector solenoid valve. Proceed to "Repair check".
		Lo	NEUTRAL	0 MPa {0 kg/cm ² }		
		Hi	Operation	Approx. 2.9 MPa {Approx. 30 kg/cm ² }		

H-27 Swing drift on a slope is significant

Failure	(1) Swing drift on a slope is significant (while parking brake is applied).
Related information	<ul style="list-style-type: none"> When the swing lock switch is set to ON position or swing parking brake cancel switch is set to NORMAL position, the swing parking brake is applied and the swing system is locked by the disc brake. Perform all troubleshooting with the working mode set in the power mode (P).

No.	Inspection item	Troubleshooting procedure		Criterion and remedy	
1	Swing parking brake solenoid valve	★ Prepare by stopping the engine, then perform troubleshooting with the engine running at a high idle speed.		YES	<ul style="list-style-type: none"> The state of the swing parking brake solenoid valve is normal. Proceed to the next inspection item.
		L.H. work equipment control lever	Swing parking brake solenoid output pressure	NO	<ul style="list-style-type: none"> The swing parking brake solenoid valve is defective. Replace the swing parking brake solenoid valve. Proceed to "Repair check".
		NEUTRAL	0 MPa {0 kg/cm ² }		
		Swing LEFT Swing RIGHT	Approx. 2.9 MPa {Approx. 30 kg/cm ² }		
2	Recheck of inspection item	1. Recheck the preceding troubleshooting. 2. Can you identify the cause after carrying out a recheck?		YES	Repairs are completed.
				NO	<ul style="list-style-type: none"> The parking brake of the swing motor may be defective. Replace the parking brake of the swing motor. Proceed to "Repair check".
3	Repair check	1. Turn the starting switch off. 2. Connect all the component parts. 3. Turn the starting switch on. 4. Set the working mode to the power mode (P). 5. Does this failure recur?		YES	Return to the first inspection item.
				NO	Repairs are completed.

S-4 Engine stops during operation

General causes why engine stops during operation

- Internal parts of engine seized
- Insufficient supply of fuel
- Engine overheating
- Defect in hydraulic pump

		Cause																
		Damage of valve system (valve, rocker lever, etc.)	Broken or seized piston connecting rod	Broken or seized crankshaft bearing	Broken or seized gear train	Insufficient fuel in tank	Clogged air breather hole in fuel tank cap	Clogged or leaking fuel piping	Clogging of fuel filter	Clogging of feed pump gauze filter	Broken or seized feed pump	Broken supply pump shaft	Stuck or seized supply pump plunger	Broken auxiliary equipment (pump or air compressor, etc.)	Defective hydraulic pump	Defective engine controller power supply wiring	Defective starting switch wiring	
Questions	Check recent repair history.																	
	Machine operation hours	Operated for long period.							△	△								
	Condition when engine stopped	Unusual noise was heard and engine stopped suddenly.	○	○	○	○						○	○	○	○			
		Engine overheated and stopped.		○	○										○			
		Engine stopped slowly.				○				○	○						○	○
		Engine hunted and stopped.				○	○			○	○	○					○	○
	Fuel other than specified one is used								○	○	○		○					
	Filters are not replaced as indicated in the Operation and Maintenance Manual.								○	○								
	Fuel level monitor indicates low level.					○												
	Check items	Fuel tank is found to be empty.				○												
Air breather hole in fuel tank cap is clogged.						○												
Fuel is leaking from fuel piping.							○											
When priming pump is operated, no resistance is felt or it is Rust and water are found when fuel tank is drained.							○	○										
Metal particles are found in oil drained from oil pan.			○	○					○	○	○							
When engine is rotated by hand:		It does not rotate at all.	○	○	○													
		It rotates only in opposite direction.				○												
		Crankshaft moves by amount of gear backlash.				○									○			
		Supply pump shaft does not turn.										○						
Engine operates, but stops when load is applied from machine.												○			○			
Troubleshooting	Check valve system.	●																
	Check piston and connecting rod.		●															
	Check crankshaft bearing.			●														
	Check gear train.				●													
	Check fuel filter.								●									
	Check feed pump gauze filter.									●								
	Check the feed pump.										●							
	Perform troubleshooting for "Supply pump pressure low error" according to failure code (*1).											●	●					
	Engine operates if auxiliary equipment (pump, air compressor, etc.) is removed.													●				
	Check engine controller power supply wiring.															●		
Check starting switch wiring.																●		
Remedy	Replace	Replace	Replace	Replace	Add	Clean	Repair	Replace	Clean	Replace	Replace	Replace	Replace	-	Repair	Repair		

*1: Failure codes [CA559] and [CA2249]

Contents

General information on disassembly and assembly - - - - -	50-4
How to read this manual - - - - -	50-4
Coating materials list - - - - -	50-6
Special tools list - - - - -	50-9
Sketches of special tools - - - - -	50-14
Engine and cooling system - - - - -	50-18
Removal and installation of fuel supply pump assembly - - - - -	50-18
Removal and installation of fuel injector assembly - - - - -	50-25
Removal and installation of engine front oil seal - - - - -	50-35
Removal and installation of engine rear oil seal - - - - -	50-42
Removal and installation of cylinder head assembly - - - - -	50-47
Removal and installation of radiator assembly - - - - -	50-68
Removal and installation of hydraulic oil cooler assembly - - - - -	50-73
Removal and installation of aftercooler assembly - - - - -	50-78
Removal and installation of fuel cooler assembly - - - - -	50-83
Removal and installation of engine and hydraulic pump assembly - - - - -	50-86
Power train - - - - -	50-108
Removal and installation of final drive assembly - - - - -	50-108
Disassembly and assembly of final drive assembly - - - - -	50-113
Disassembly and assembly of final drive assembly - - - - -	50-123
Removal and installation of swing motor and swing machinery assembly - - - - -	50-133
Disassembly and assembly of swing motor and swing machinery assembly - - - - -	50-139
Removal and installation of swing circle assembly - - - - -	50-151
Undercarriage and frame - - - - -	50-154
Disassembly and assembly of carrier roller assembly - - - - -	50-154
Disassembly and assembly of track roller assembly - - - - -	50-158
Removal and installation of idler and idler cushion assembly - - - - -	50-161
Disassembly and assembly of idler - - - - -	50-164
Disassembly and assembly of idler cushion - - - - -	50-169
Removal and installation of sprocket - - - - -	50-172
Separation and connection of track assembly - - - - -	50-174
Removal and installation of revolving frame assembly - - - - -	50-180
Removal and installation of counterweight assembly - - - - -	50-187
Hydraulic system - - - - -	50-191
Removal and installation of center swivel joint assembly - - - - -	50-191
Disassembly and assembly of center swivel joint assembly - - - - -	50-198
Removal and installation of hydraulic tank assembly - - - - -	50-200
Removal and installation of control valve assembly - - - - -	50-210
Disassembly and assembly of control valve - - - - -	50-227
Removal and installation of hydraulic pump assembly - - - - -	50-233
Removal and installation of hydraulic pump input shaft oil seal - - - - -	50-243
Disassembly and assembly of work equipment PPC valve assembly - - - - -	50-244
Disassembly and assembly of travel PPC valve - - - - -	50-246
Disassembly and assembly of work equipment cylinder - - - - -	50-248
Work equipment - - - - -	50-255
Removal and installation of work equipment assembly - - - - -	50-255
Cab and its attachments - - - - -	50-260
Removal and installation of operator's cab assembly - - - - -	50-260
Removal and installation of operator's cab glass (adhered window glass) - - - - -	50-269
Removal and installation of front window assembly - - - - -	50-282
Removal and installation of floor frame assembly - - - - -	50-292
Removal and installation of air conditioner unit assembly - - - - -	50-302

4. Fuel pressure sensor and relief valve

1) Replace the fuel pressure sensor (28) according to the following procedure.

★ Remove the fuel pressure sensor (28) from the common rail (27) only when it needs replacement.


★ Be sure to replace the fuel rail pressure sensor removed from the common rail with a brand-new one.


1] Before removing the fuel pressure sensor, thoroughly remove mud etc. from around it, and clean it.

2] Remove the fuel pressure sensor.

3] Check the fuel pressure sensor connector for crack, breakage, damage of the seal, foreign matter on the pin and corrosion, bend and breakage of the pin.

4] Install a new fuel pressure sensor.

 Threaded part of fuel pressure sensor: Gear oil (#90)

 Fuel pressure sensor: 70±5 Nm {7.1±0.5 kgm}

5] Connect the engine wiring harness. At this time, be careful not to reverse connection of connector.

6] After completing assembly, start the engine, and check for leakage.

★ For the testing procedure, see Testing and adjusting, Testing fuel circuit for leakage.

2) Replace the relief valve (29) according to the following procedure.


1] Before removing the relief valve, thoroughly remove mud etc. from around it, and clean it.


2] Remove the relief valve.

3] If the leakage from the relief valve exceeds the specified value, do not reuse it.

4] Check the relief valve and high-pressure sealing surface (A) on rail for damages.

5] Install the relief valve.

 Threaded part of relief valve: Gear oil (#90)

 Relief valve: 100±4 Nm {10.2±0.4 kgm}

★ Excessive tightening may cause leakage. Take care not to tighten excessively.


6] After completing assembly, start the engine, and check for leakage.

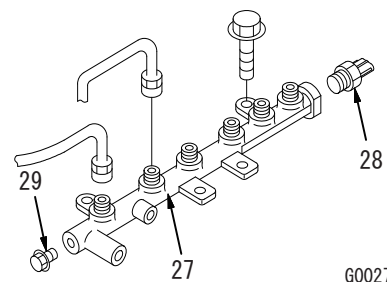
For the testing procedure, see Testing and adjusting, Testing fuel circuit for leakage.

5. Connect the connector (12).

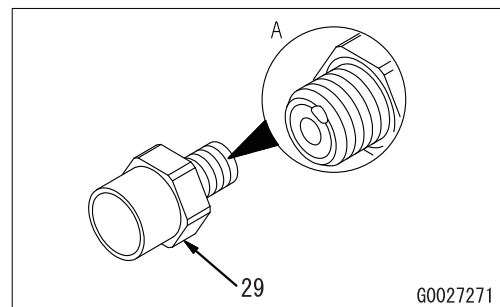
6. Install the harness nuts (11) (12 pieces) to the fuel injectors (10) (6 pieces).

★ Check that wiring harness does not interfere with rocker arm.

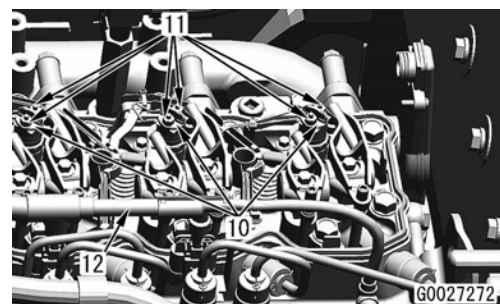
 Fuel injector harness nut 1.5±0.25 Nm {0.15±0.025 kgm}



G0027270



G0027271



G0027272

Removal and installation of cylinder head assembly

Standard tools list

Tools below are shown for reference. Tools other than them may be used if the purposes are the same.

No.	Part name	Part No.	Specifications	Q'ty	Remarks
1	Socket wrench	(Commercially available)	8 mm	1	
2	Socket wrench	(Commercially available)	9.5 mm (3/8 in)	1	
3	Socket wrench	(Commercially available)	12 mm	1	
4	Socket wrench	(Commercially available)	13 mm	1	
5	Socket wrench	(Commercially available)	14 mm	1	
6	Socket wrench	(Commercially available)	17 mm	1	
7	Socket wrench	(Commercially available)	19 mm	1	
8	Socket wrench	(Commercially available)	22 mm	1	
9	Torque wrench set (socket)	(Commercially available)	10.8 to 11.8 Nm 27 to 34 Nm 59 to 74 Nm 98 to 123 Nm 610 to 765 Nm 10.58±0.5 Nm	1	
10	Flat-head screwdriver	(Commercially available)		2	
11	Webbing sling	(Commercially available)		1	

Special tools list

Symbol	Part name	Part No.	Specifications	Q'ty	Remarks
A	3 Puller	795-799-6700		1	
	4 Gear	795-799-1131		1	
	5 Remover	795-799-8150		1	
	6 Angle tightening wrench	790-331-1120		1	
	7 Gauge	795-790-4510		1	

- ⚠ Park the machine on a level ground, swing the upper structure by 90 degrees, lower the work equipment to the ground in a stable posture, and stop the engine.**
- ⚠ Stop the engine, and move the lock lever to LOCK position.**
- ⚠ Disconnect the cable from the negative (-) terminal of the battery.**
- ⚠ Before opening the water filler cap or draining coolant, check that the coolant temperature cools down to the temperature safe enough for anyone not to get burn.**
- ⚠ When the engine and auxiliaries (turbocharger in the exhaust system, etc.) are at high temperature, wait until they cool down to a safe temperature, then start the work.**

- 1) Lightly install the common rail (20) and high-pressure pipes (24a) to (24f).

☞ Sleeve nut and mounting bolt:
0.2 to 0.8 Nm {0.02 to 0.08 kgm}

- 2) Tighten the high-pressure pipes (24a) to (24f) according to the following procedure.

- ☞ Sleeve nut: 35 to 3.5 Nm {3.6±0.4 kgm}
- 1] Head side of high-pressure pipes (24a) and (24f)
 - 2] Common rail side of high-pressure pipes (24f) and (24a)
 - 3] Head side of high-pressure pipes (24b), (24c), (24d), and (24e)
 - 4] Common rail side of high-pressure pipes (24b), (24c), (24d), and (24e)

- 3) Lightly tighten the sleeve nut of the high-pressure pipe (21).

- 4) Tighten the high-pressure pipe (21) in the order of the pump (FSP) side to the common rail side.

☞ Sleeve nut: 35±3.5 Nm {3.6±0.4 kgm}

- 5) Tighten the clamp (21a) of the high-pressure pipe (25b).

☞ Mounting bolt: 24±4 Nm {2.4±0.4 kgm}

- 6) Tighten the common rails (20) with the bolts (4 pieces).
 - ★ Apply sealant (LG-7) to the thread parts of the bolts (2 pieces) inside the engine.

☞ Mounting bolt: 24±4 Nm {2.4±0.4 kgm}

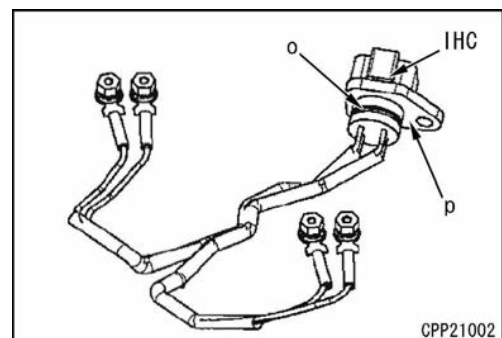
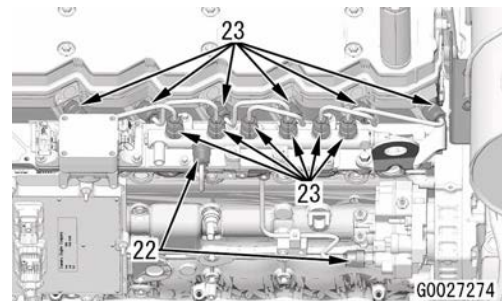
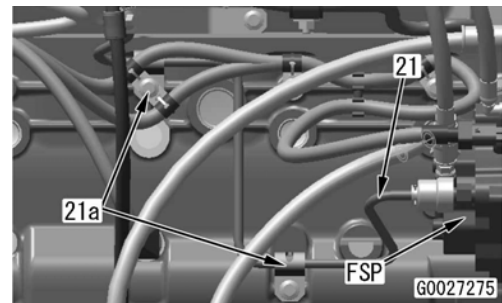
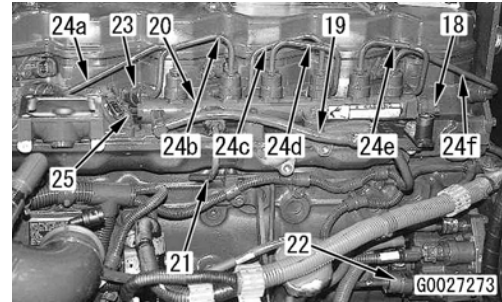
- 7) Install the fuel spray prevention caps (22) (2 pieces) and (23) (12 pieces) to the high-pressure pipes.

- ★ Direct slits of fuel spray prevention caps outward and downward.
- ★ The fuel spray prevention caps are installed so that fuel will not spout over the hot part of the engine and catch fire when it leaks by any chance.
- ★ FSP: Fuel supply pump

- 8) If the injector wiring harness connector (IHC) is removed, apply liquid gasket LG-7 to the O-ring (o) and flange surface (p) of the connector when installing.

- ★ As for O-ring, apply LG-7 φ3 mm in diameter until the O-ring groove is completely hidden.
- ★ When the O-ring is damaged, replace the wiring harness assembly, since the O-ring cannot be supplied singly.

☞ Connector flange mounting bolt:
10±2 Nm {1±0.2 kgm}

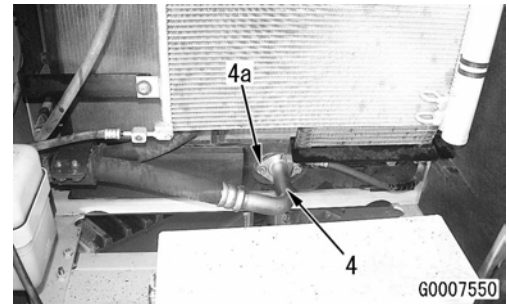


7. Connect the control valve drain hose (4) with the bolts (4a) (2 pieces).

Tools: Torque wrench set (socket)

Bolt (4a): Width across flats 19 mm, M12

🔧 Bolt (4a): 98 to 123 Nm {10 to 12.5 kgm}



8. Close the L.H. side cover (11).



9. Install the cover (3) with the bolts (3a) (5 pieces).

Tools: Torque wrench set (socket)

Bolt (3a): Width across flats 17 mm, M10

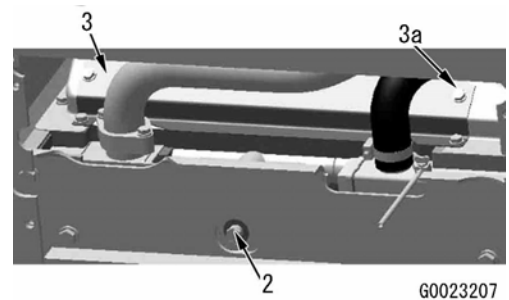
🔧 Bolt (3a): 59 to 74 Nm {6 to 7.5 kgm}

10. Install the plug (2) of the hydraulic oil cooler drain hose.

Tools: Torque wrench set (socket)

Plug (2): Width across flats 22mm, M14

🔧 Plug (2): 153 to 190 Nm {15.5 to 19.5 kgm}



11. Refill the hydraulic tank with hydraulic oil.

★ Refill with oil to the specified level. Run the engine to circulate the hydraulic oil through the piping, and check the oil level again.

★ Check for oil leakage.

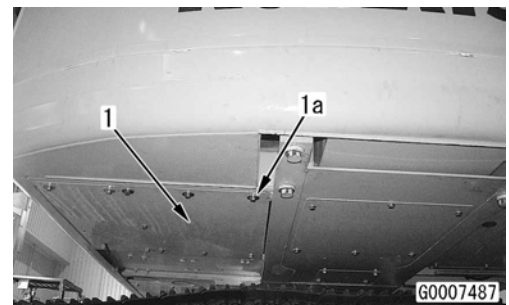
🛢 Hydraulic oil refill capacity: 135 ℓ,
Hydraulic oil cooler capacity: 7 ℓ

12. Install the cover (1) with the bolts (1a) (7 pieces).

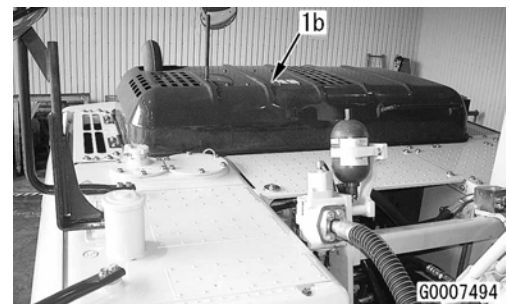
Tools: Torque wrench set (socket)

Bolt (1a): Width across flats 19 mm, M12

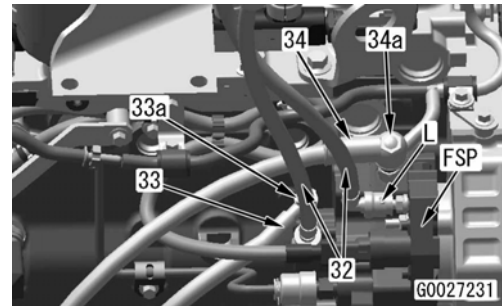
🔧 Bolt (1a): 98 to 123 Nm {10 to 12.5 kgm}



13. Close the engine hood (1b).



35. Disconnect the fuel filter hoses (32) from the fuel supply pump (FSP).
 - ★ Remove mud on the connections beforehand. (To prevent the lock (L) from sticking with mud)
 - ★ Pull out while pressing the lock (L) from both sides.
 - ★ Fuel flows out when the hoses are disconnected. Cover the hose fittings with cloths, etc. However, do not use wooden plugs, which causes wood chips.



36. Remove the joint bolt (33a), and disconnect the fuel supply hose (33).

Tools: Socket wrench

Bolt (33a): Width across flats 17 mm

37. Remove the joint bolt (34a), and disconnect the fuel return hose (34).

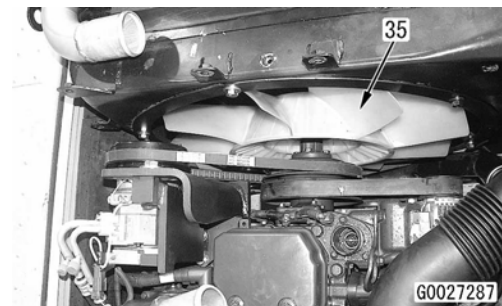
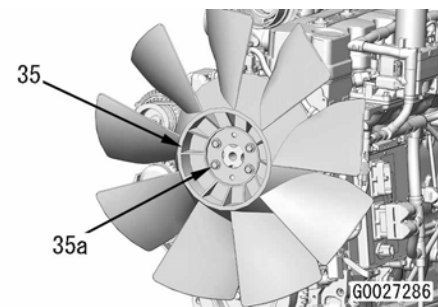
Tools: Socket wrench

Bolt (34a): Width across flats 17 mm

38. Remove the bolts (35a) (4 pieces), and remove the fan (35).

Tools: Socket wrench

Bolt (35a): Width across flats 14 mm, M10



39. Loosen the air conditioner compressor bracket adjustment bolts (36) and (36a).

Tools: Socket wrench

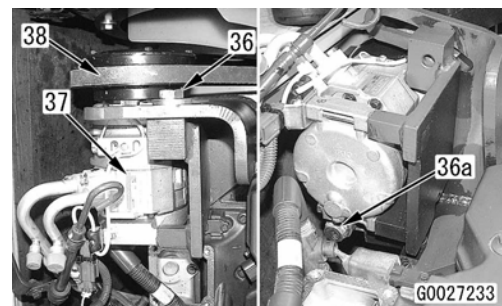
Bolt (36): Width across flats 22 mm, M14

★ One more bolt is on the rear side.

Bolt (36a): Width across flats 13 mm

40. Move the air conditioner compressor assembly (37).

41. Remove the fan belt (38).

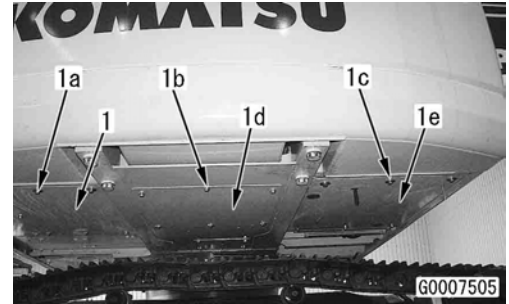


71. Install the covers (1), (1d), and (1e) with the bolts (1a) (7 pieces), (1b) (6 pieces), and (1c) (6 pieces).

Tools: Torque wrench set (socket)

Bolt (1a), (1b), (1c): Width across flats 19 mm, M12

🔩 Bolt (1a), (1b), (1c): 98 to 123 Nm {10 to 12.5 kgm}



72. Check after work

- 1) Visually check the outside, and wipe off sticking oil, grease, coolant, etc., if any. In addition, check for scratches, peeling of paint, etc. made during the removal and installation work.
- 2) Bleed air from the fuel, hydraulic, and coolant system, then start the engine, and check that the machine operates normally.

15. Cover

1) Using eyebolts [1], install cover (1).

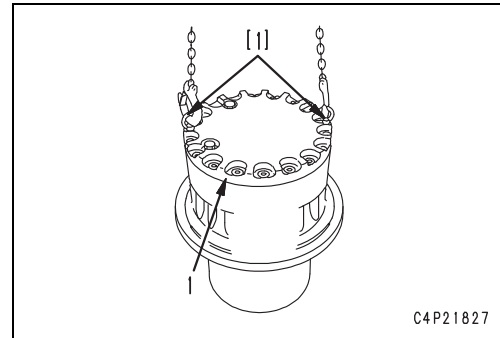


Cover: **20 kg**



Contacting face of cover and ring gear:

Liquid gasket (LG-6)



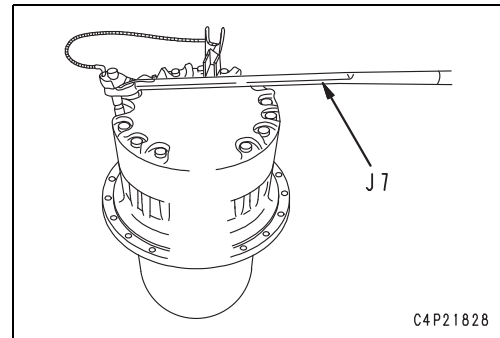
2) Using tool **J7**, tighten the 18 mounting bolts.



Mounting bolts:

First time: 98 Nm {10 kgm}

Second time: 80 to 90° (rotating angle)

**16. Oil refill**

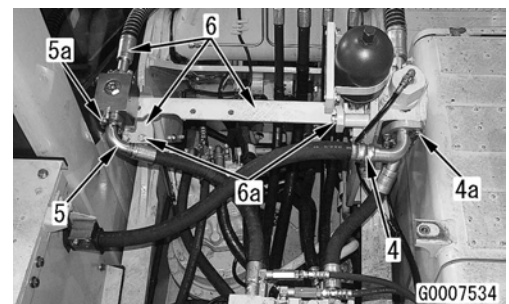
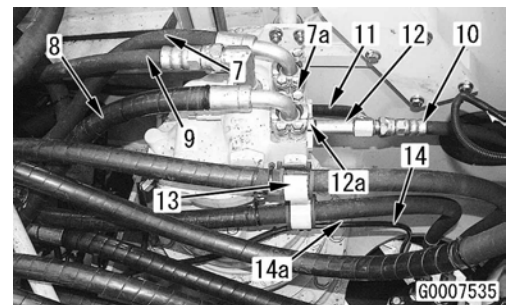
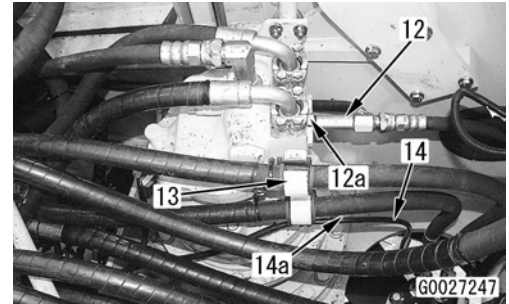
Tighten drain plug and fill power train oil (**TO30**) from the oil filler port.




Final drive case: **Approx. 3.8 l**

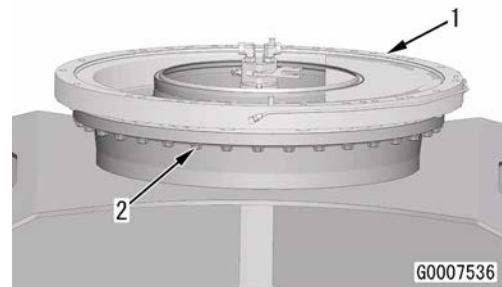
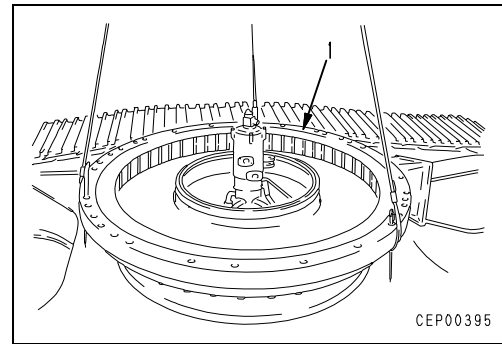
- ★ Do a final check of the oil level at the determined position after installing the final drive assembly to the chassis.

6. Fix the hose (14) with the clamp (14a).
Torque wrench set (socket)
Bolt of clamp (14a): Width across flats 17 mm, M10
 - ☞ Bolt of clamp (14a): 59 to 74 Nm {6 to 7.5 kgm}
7. Connect the clamp (13).
Tools: Torque wrench set (socket)
Clamp (13a) bolt: Width across flats 19 mm, M12
 - ☞ Bolt (13a): 98 to 123 Nm {10 to 12.5 kgm}
8. Install nipple (12) (port T), and fix it with lock nut (12a).
Tools: Wrench
Lock nut (12a): Width across flats 32 mm
Nipple (12): Width across flats 30 mm
9. Connect the hoses (9) to (11) (3 pieces).
 - (9): Suction hose (port S)
 - (10), (11): Drain hose (port T)
 Tools: Torque wrench set (spanner), wrench
Hose (9): Width across flats 36 mm, #06 size
 - ☞ Hose (9): 177 to 245 Nm {18.0 to 25.0 kgm}**Hose (10): Width across flats 32 mm, #05 size**
 - ☞ Hose (10): 128 to 186 Nm {13.0 to 19.0 kgm}**Hose (11): Width across flats 32 mm, #05 size**
 - ☞ Hose (11): 128 to 186 Nm {13.0 to 19.0 kgm}
10. Connect the hoses (7) and (8) with the flanges (7a) and (8a).
 - (7): Between swing motor and control valve (port MA)
 - (8): Between swing motor and control valve (port MB)
 Tools: Torque wrench set (socket)
Bolts of flanges (7a) and (8a): Width across flats 14 mm, M10
 - ☞ Bolts of flanges (7a) and (8a): 59 to 74 Nm {6 to 7.5 kgm}
11. Install the bracket and hose (6) together as a unit with the bolts (6a) (6 pieces). (if equipped)
Tools: Torque wrench set (socket)
Bolt (6a): Width across flats 19 mm, M12
 - ☞ Bolt (6a): 98 to 123 Nm {10 to 12.5 kgm}
12. Connect the hoses (4) and (5) with the flanges (4a) and (5a). (if equipped)
Tools: Torque wrench set (socket)
Flange (4a) bolt: Width across flats 19 mm, M10
 - ☞ Flange (4a) bolt: 59 to 74 Nm {6 to 7.5 kgm}**Flange (5a) bolt: Width across flats 17 mm, M10**
 - ☞ Flange (5a) bolt: 59 to 74 Nm {6 to 7.5 kgm}



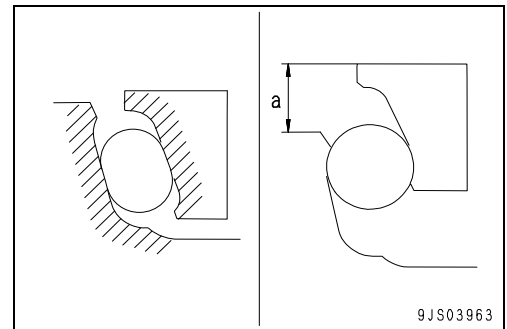
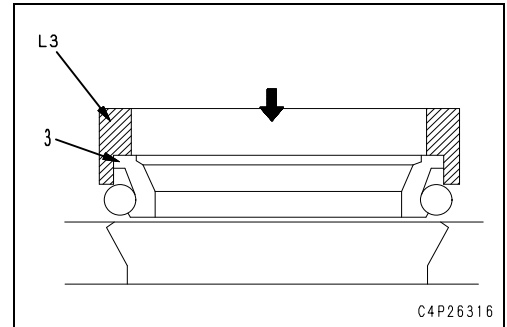
Removal

1. Remove the revolving frame assembly. For details, see "Removal of revolving frame assembly".
2. Sling the swing circle assembly (1) by using the eyebolts and lifting tool, and hold it.
 - ★ Install the eyebolts to 3 of the revolving frame mounting bolt holes of circle by using tools A (nut).
- Tools: Eyebolt, 3-leg wire sling
-  Swing circle assembly: 270 kg
3. Remove the bolts (2) (38 pieces).
 - Tools: Socket wrench
 - Bolt (2): Width across flats 30 mm, M20**
4. Sling the swing circle assembly (1), and remove it.

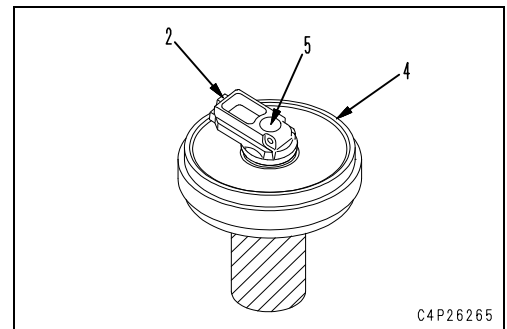


3. By using tool **L3**, install floating seals (3) to idler (4) and the assembly of shaft (5) and support (2).

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

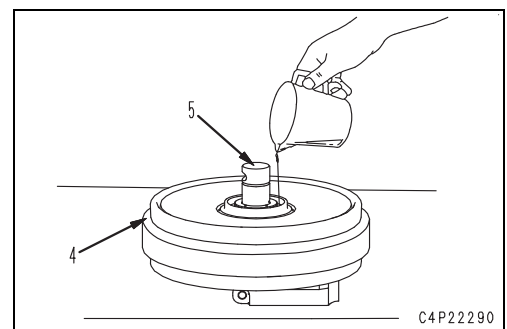


4. Install the assembly of shaft (5) and support (2) to idler (4).



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

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

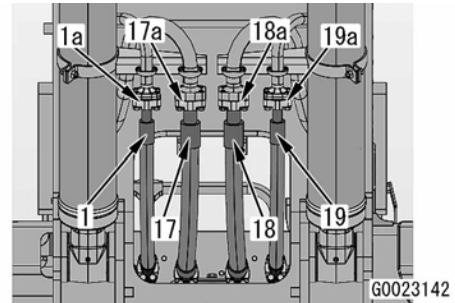


Removal

1. Remove the work equipment assembly. For details, see "Removal and installation of work equipment assembly".
2. Remove the counterweight assembly. For details, see "Removal and installation of counterweight assembly".
3. Remove the flanges (1a), (17a), (18a), and (19a), and disconnect the boom cylinder hoses (1) (4 pieces).

Tools: Socket wrench, special tool C

Bolts of flanges (1a), (17a), (18a), and (19a): Width across flats 14 mm, M10



4. Sling the boom cylinder assembly (2), and hold it.
Tools: Webbing sling



Boom cylinder assembly:
180 kg (PC200/200LC-8M0)
200 kg (PC220/220LC-8M0)

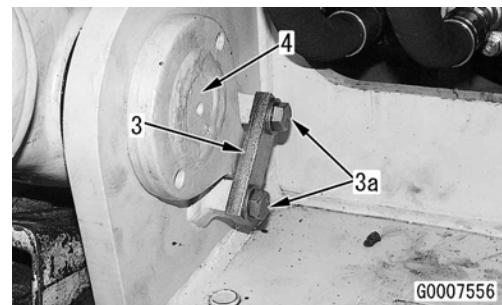


5. Remove the bolts (3a) (2 pieces), and remove the plate (3) and pin (4).

Tools: Socket wrench

Bolt (3a): Width across flats 19 mm, M12

6. Sling the boom cylinder assembly (2), and remove it.
★ Check the positions and number of spacers.
Remove the boom cylinder on the opposite side in the same way.

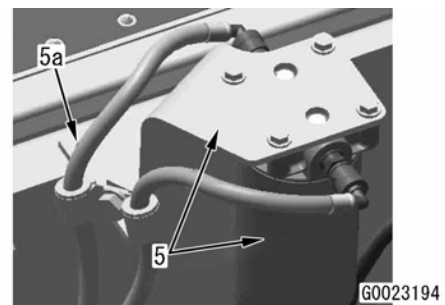


7. Remove the bolts (5a) (2 pieces), and disconnect the fuel filter and bracket assembly (5).

Tools: Socket wrench

Bolt (5a): Width across flats 19 mm, M12

- ★ Fix the fuel filter and bracket assembly (5) to the engine in order to prevent it from interfering with the sling when the revolving frame assembly is removed.
- ★ When other parts can interfere with the lifting tool in removal of the revolving frame, such parts must be removed beforehand.



8. Add oil to the hydraulic tank.



Hydraulic tank:


237 ℓ (PC200/200LC-8M0)

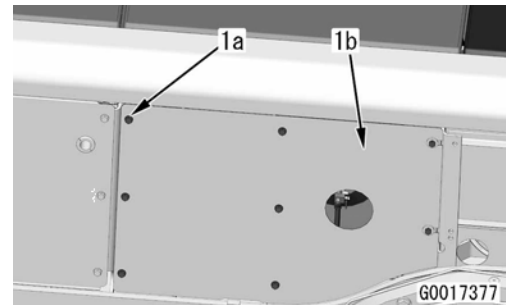
244 ℓ (PC220/220LC-8M0)

- ★ Refill the hydraulic tank with Komatsu genuine oil to the specified level through the oil filler port. Start the engine to circulate the oil through the piping, and check the oil level again. (For details, see Structure and function, Table of fuel, coolant, and lubricants.)
 - ★ When the oil stopper is used, remove it according to "Removal and installation of hydraulic pump assembly".
9. Install the revolving frame lower cover (1b) on the right side of the machine with the bolts (1a) (8 pieces).

Tools: Torque wrench set (socket)

Plug (1a): Width across flats 19 mm, M12

 Plug (1a): 98 to 123 Nm {10 to 12.5 kgm}



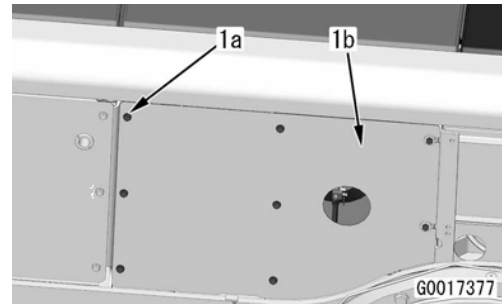
10. Bleed air from the hydraulic circuit. For details, see Testing and adjusting, "Air bleeding from each part".

Removal

1. Remove the bolts (1a) (6 pieces), and remove the cover (1b).

Tools: Socket wrench

Bolt (1a): Width across flats 19 mm, M12



2. Remove the drain plug (1c), and drain the oil from the hydraulic tank.

Tools: Socket wrench

Plug (1c): Width across flats 24 mm

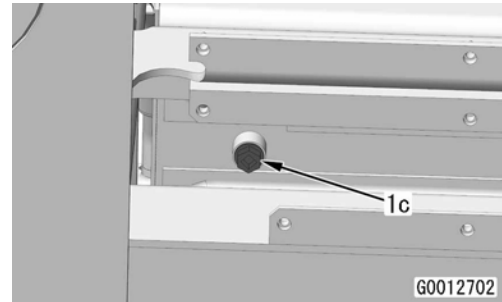


Hydraulic tank:

237 ℓ (PC200/200LC-8M0)

244 ℓ (PC220/220LC-8M0)

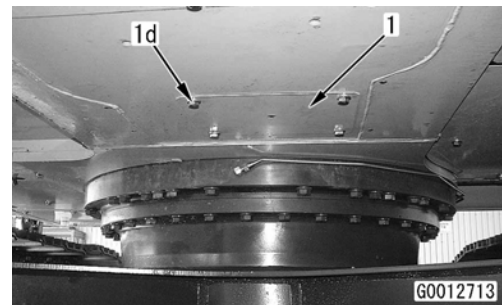
- ★ After draining the oil, install the plug (1c).
- ★ When using the oil stopper instead of draining the oil from the hydraulic tank, install it according to "Removal of hydraulic pump assembly".



3. Remove the bolts (1d) (4 pieces), and remove the cover (1).

Tools: Socket wrench

Bolt (1d): Width across flats 19 mm, M12



4. Disconnect hoses (2) to (8).

Tools: Wrench, special tools A, B

Hose (3): Width across flats 22 mm, #03 size

Special tool B

Hoses (2), (4) to (8): Width across flats 19 mm, #02 size

Special tool A

- ★ Access from underside of the machine.

Band colors

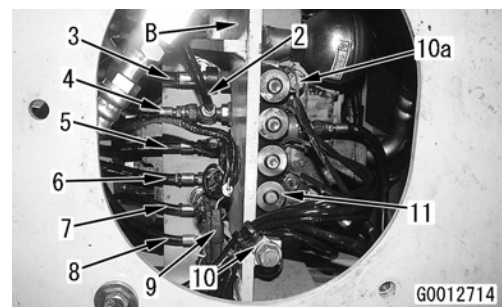
- (2): No color
- (3): Red
- (4): No color
- (5): No color
- (6): Red/Yellow
- (7): Brown
- (8): No color

5. Disconnect connectors (9) (6 places) from the clips.

- ★ Access from underside of the machine.

(From top)

V06
V05
V04
V03
V02
V01



Disassembly and assembly of control valve

★ This section explains only the precautions for assembling the control valve assembly.

Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
T	2	796-946-1310	Guide ϕ 21.8 mm	■	1	
		(For 723-46-40100)				
		796-946-1610	Guide ϕ 21.4 mm	■	1	
		(For 723-46-41100)				
		796-946-1810	Guide ϕ 21.2 mm	■	1	
		(For 723-46-43100 and 723-46-43400)				
		796-946-1910	Guide ϕ 21.0 mm	■	1	
		(For 723-46-46101 and 723-46-46300)				
		796-946-2210	Guide ϕ 20.6 mm	■	1	
	(For 723-46-45100 and 723-46-45700)					
	3	796-946-1320	Guide ϕ 21.8 mm	■	1	
		(For 723-46-40100)				
		796-946-1620	Guide ϕ 21.4 mm	■	1	
		(For 723-46-41100)				
		796-946-1820	Guide ϕ 21.2 mm	■	1	
		(For 723-46-43100 and 723-46-43400)				
		796-946-1920	Guide ϕ 21.0 mm	■	1	
		(For 723-46-46101 and 723-46-46300)				
		796-946-2220	Guide ϕ 20.6 mm	■	1	
	(For 723-46-45100)					
	4	796-946-1420	Guide ϕ 21.6 mm	■	1	
		(For 723-46-42700)				
		796-946-1330	Sleeve	■	1	
		(For 723-46-40100)				
		796-946-1630	Sleeve	■	1	
		(For 723-46-41100)				
		796-946-1830	Sleeve	■	1	
(For 723-46-43100 and 723-46-43400)						
796-946-1930		Sleeve	■	1		
(For 723-46-46101 and 723-46-46300)						
796-946-2230	Sleeve	■	1			
(For 723-46-45100)						
796-946-1430	Sleeve	■	1			
(For 723-46-42700)						

27. Remove bolts (1b), and remove cover (1c), tool A1 (oil stopper), and tool A2 (adapter).

Tools: Torque wrench set (socket)

Bolt (1b): Width across flats 19 mm, M12

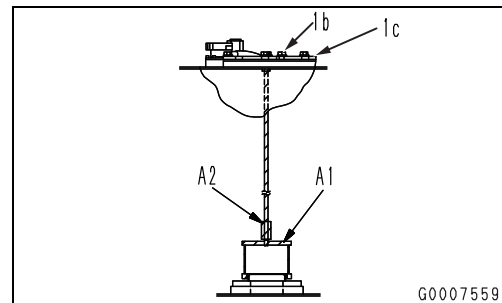
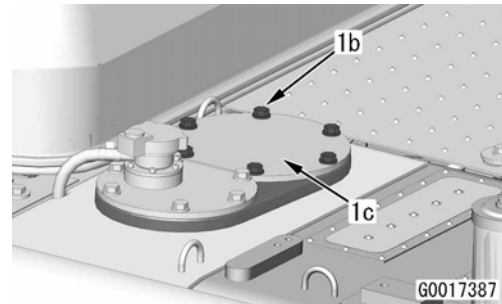
🔧 Bolt (1b): 98 to 123 Nm {10 to 12.5 kgm}

28. Install the strainer assembly and cover (1c) with the bolts (1b) (6 pieces).

Tools: Torque wrench set (socket)

Bolt (1b): Width across flats 19 mm, M12

🔧 Bolt (1b): 98 to 123 Nm {10 to 12.5 kgm}



29. When not using tools A1 (oil stopper) and A2 (adapter), install the drain plug and add hydraulic oil.

🔧 Hydraulic tank drain plug:

58.8 to 78.5 Nm {6.0 to 8.0 kgm}



Hydraulic tank:

237 ℓ (PC200/200LC-8M0)

244 ℓ (PC220/220LC-8M0)

30. Supply the oil through the oil filler port of the damper case to the specified level. (For details, see Structure and function, Table of fuel, coolant, and lubricants.)

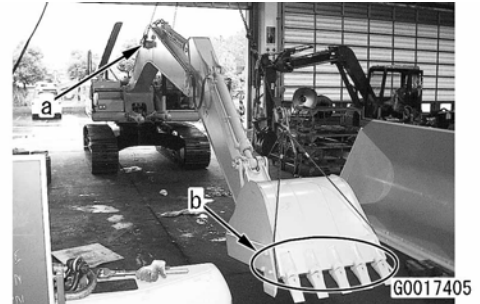


Damper case: 0.65 ℓ (EO30-DH)


- **Bleeding air**

31. See Testing and adjusting, "Bleeding air from various parts".

10. Install the lifting tool to the sling positions (a) and (b).
 ★ Wind the webbing sling around pin part (a) on the boom cylinder head side, and install the wire to bucket end part (b).
 Tools: 3-leg chain sling, lever block, wire



11. Sling the work equipment assembly, and hold it.

 Work equipment assembly:
 3450 kg (PC200/200LC-8M0)
 4450 kg (PC220/220LC-8M0)


12. Remove the bolts (9a) (2 pieces), and remove the plate (9).
 Tools: Socket wrench

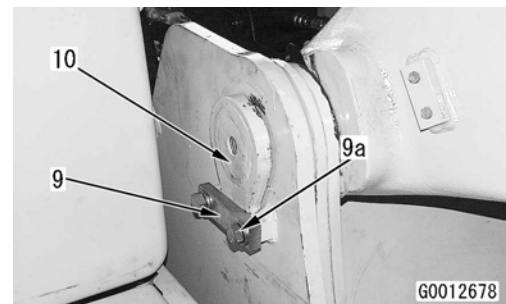
Bolt (9a): Width across flats 24 mm, M16

13. Remove the foot pin (10).

- ★ Sling and remove the foot pin by using the lifting tool before pulling it out of the pin hole.
 ★ Check the quantity and installing positions of installed shims in advance.

Tools: Webbing sling

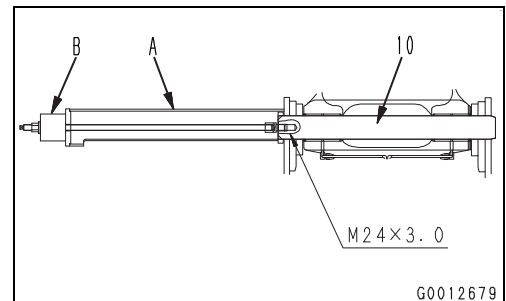
 Pin (10): 45 kg



● **When using tool for removal**

Remove plate (9), and remove foot pin (10) by using tool A (remover), tool B (puller), and tool C (hydraulic pump).

- ★ Check the quantity and installing positions of installed shims in advance.

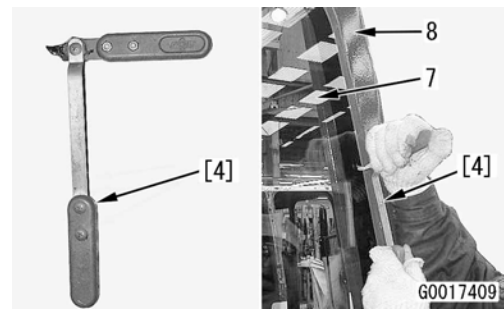


14. Sling work equipment assembly (11), and remove it.



Removal

- ★ Remove the window glass to be replaced according to the following procedure.
1. Cut off the adhesive between the window glass (7) to be replaced and operator' cab (sheet metal) (8) by using the seal cutter [4].
Tools: Seal cutter, utility knife, screwdriver
 - ★ If the window glass is broken in small pieces, it may be removed with utility knife [5] and a flat-head screwdriver.
 - ★ While widening the cut with a flat-head screwdriver, cut the adhesive and dam rubber with a utility knife [5].
 - ★ If the screwdriver is applied directly to the undamaged window glass, it is probably broken.
 2. Remove the window glass.



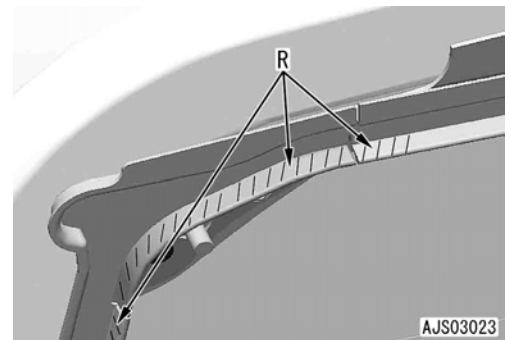
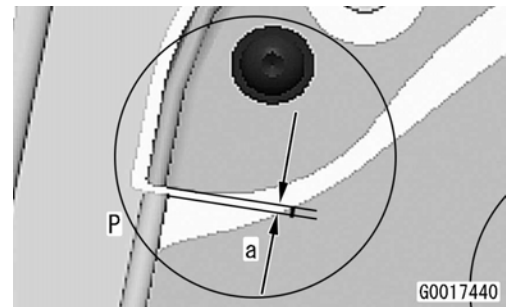
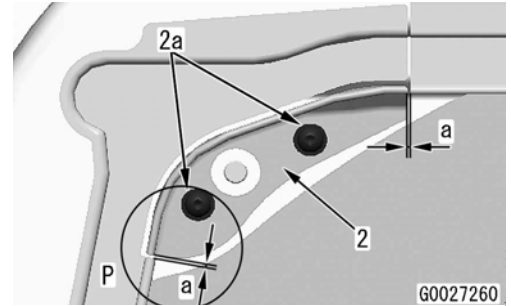
9. Install R.H. corner block (2) with the hexagon socket head screws (2a) (2 pieces).

Tools: Torque wrench set (hexagonal)

Hexagon socket head screw (1a): Width across flats 5 mm, M8

🔧 Hexagon socket head screw (2a): 34.3 Nm {3.5 kgm}

- ★ Lightly tightening is appropriate since it will be tightened to the specified torque after adjustment on "CLOSE" side.
- ★ Install right corner block (2) so that clearance (a) between the rail and right corner block (2) becomes 0 to 2.0 mm.
- ★ Install it so that there is no level difference on rail surface (R) for the roller.



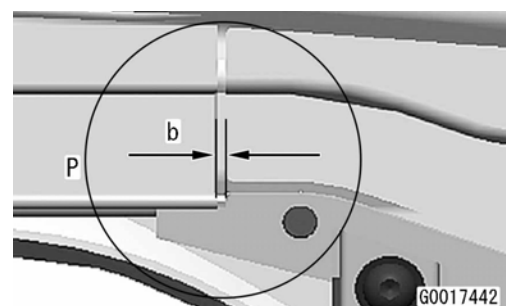
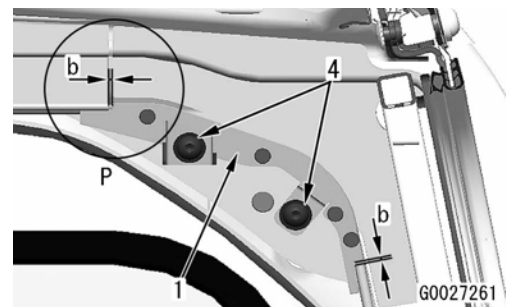
10. Install L.H. corner block (1) with the hexagon socket head screws (4) (2 pieces).

Tools: Torque wrench set (hexagonal)

Hexagon socket head screw (2a): Width across flats 5 mm, M8

🔧 Hexagon socket head screw (2a): 34.3 Nm {3.5 kgm}

- ★ Lightly tightening is appropriate since it will be tightened to the specified torque after adjustment on "CLOSE" side.
- ★ Install left corner block (1) so that clearance (b) between the rail and left corner block (1) becomes 0 to 2.0 mm.
- ★ Install it so that there is no level difference on rail surface (R) for the roller. (See the figure above)



Removal and installation of air conditioner unit assembly

Standard tools list

Tools below are shown for reference. Tools other than them may be used if the purposes are the same.

No.	Part name	Part No.	Specifications	Q'ty	Remarks
1	Socket wrench	(Commercially available)	10 mm	1	
2	Socket wrench	(Commercially available)	12 mm	1	
3	Socket wrench	(Commercially available)	13 mm	1	
4	Socket wrench	(Commercially available)	19 mm	1	
5	Hexagonal wrench	(Commercially available)	4 mm	1	
6	Torque wrench set (socket)	(Commercially available)	8 to 12 Nm 11.8 to 14.7 Nm 27 to 34 Nm 98 to 123 Nm	1	
7	Torque wrench set (hexagonal)	(Commercially available)	9.8 Nm	1	
8	Phillips screwdriver	(Commercially available)		1	

- ⚠ **Park the machine on a level ground, swing the upper structure by 90 degrees, lower the work equipment to the ground in a stable posture, and stop the engine.**
- ⚠ **Stop the engine, and move the lock lever to LOCK position.**
- ⚠ **Disconnect the cable from the negative (-) terminal of the battery.**

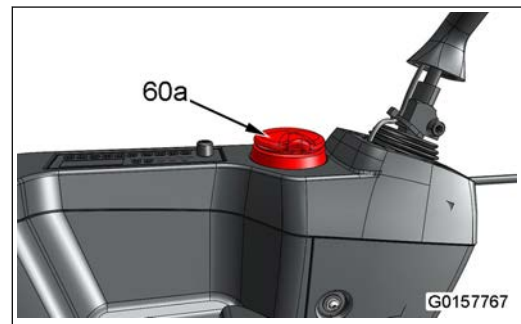
- **Precautions for handling refrigerant**

- ⚠ **Collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit.**
- ⚠ **If refrigerant (air conditioner gas: R134a) gets in your eyes, you may lose your sight. Put on protective eyeglasses during collecting or filling operation.**
- ⚠ **If you disconnect the heater hoses when the coolant in radiator is still hot, you may be scalded. Wait until the coolant temperature drops, then disconnect the heater hoses.**

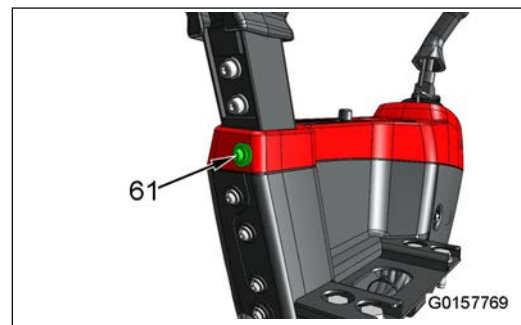
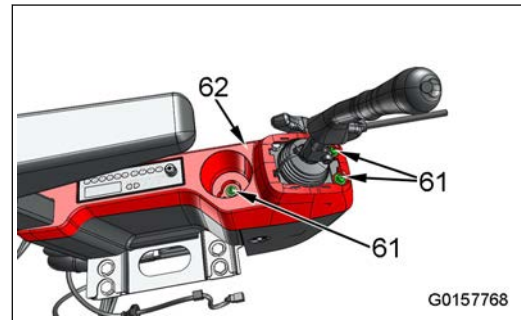
NOTICE

- **Ask a registered person for collecting, adding and filling operations of the refrigerant (air conditioner gas: R134a).**
- **Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.**
- **Before disconnecting the wiring and hoses, write down their connector numbers and installed positions.**

9. Remove the ashtray (60a).



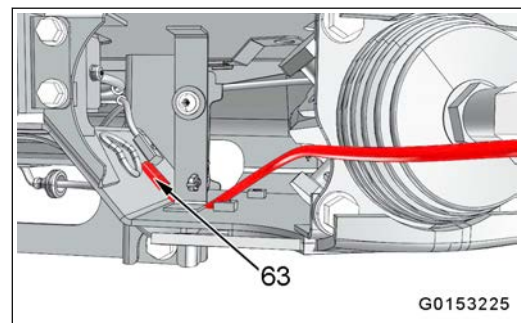
10. Remove the 4 bolts (61), and slide up the cover (62).



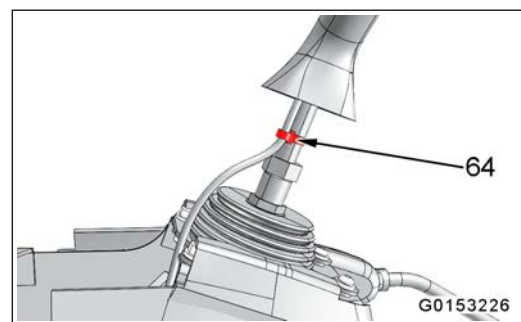
11. Remove the work equipment control lever assembly as follows.

- Threaded type

- 1) Disconnect the connector (63).



- 2) Cut the band (64).



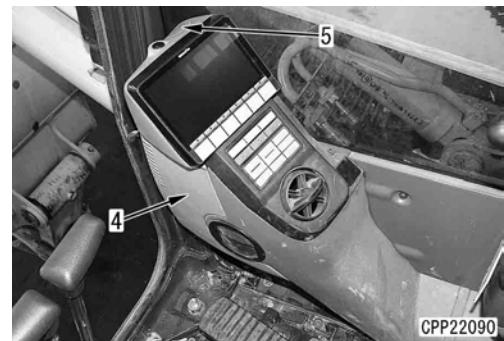
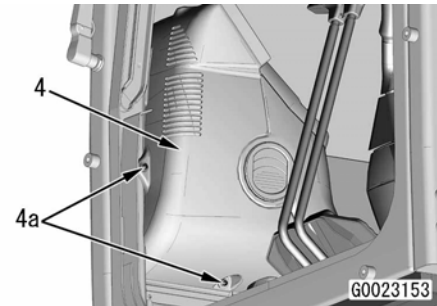
7. Install the cover (4) with the hexagon socket head screws (4a) (3 pieces).

Tools: Torque wrench set (hexagonal)

Hexagon socket head screw (4a): Width across flats 4 mm, M6

🔩 Hexagon socket head screw (4a): 9.8 Nm {1.05 kgm}

- ★ One of the three hexagon socket head screws (4a) is covered with the cap (5).



8. Install the floor mat (3) with the bolts (3a) (2 pieces).

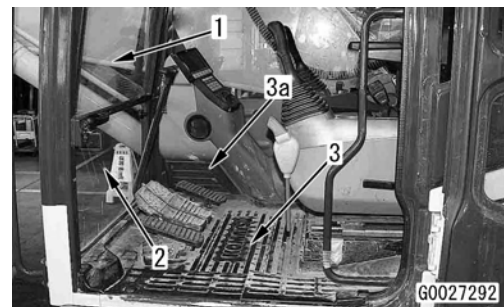
Bolt (3a): Width across flats 10 mm, M6

🔩 Bolt (3a): 11.8 to 14.7 Nm {1.2 to 1.5 kgm}

9. Install the front window (lower) (2).

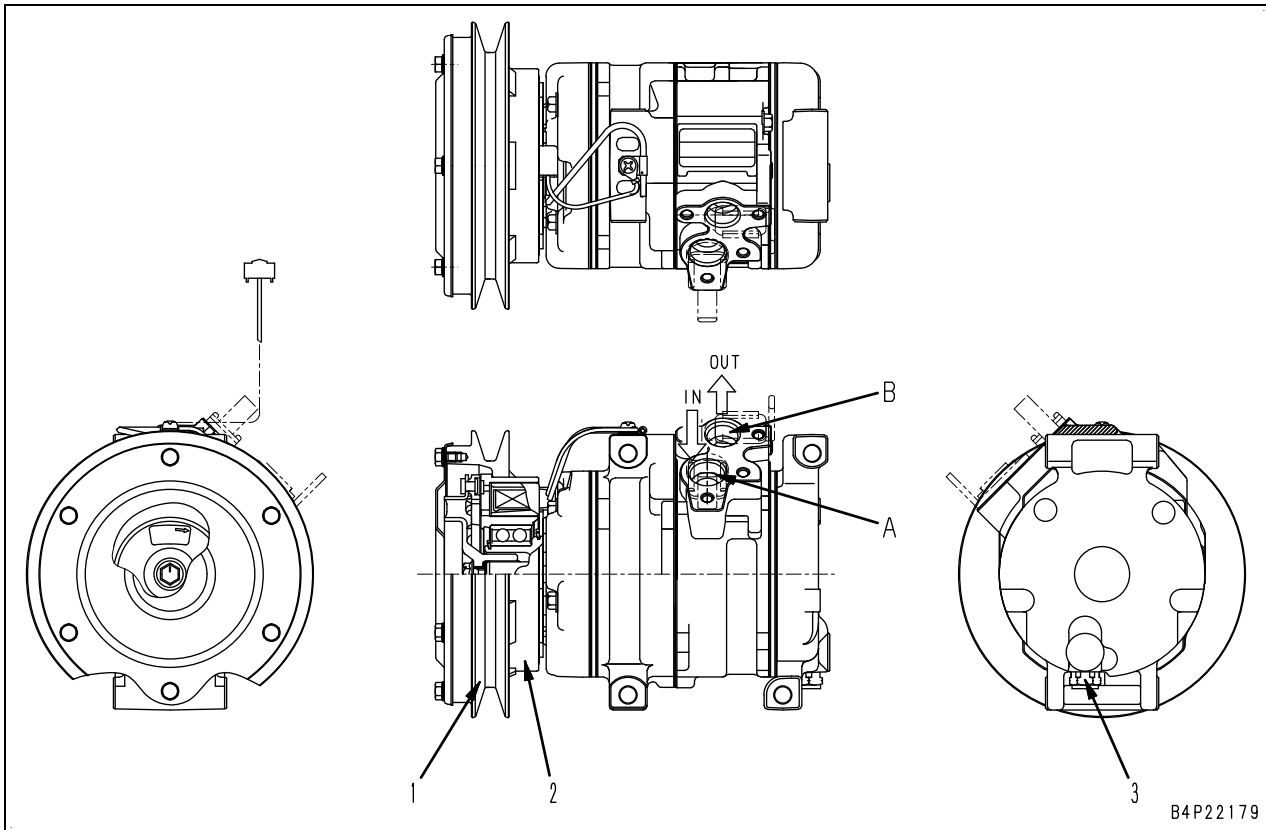
10. Lower the front window assembly (1) from the ceiling, and lock it.

- ★ Check that the lock is securely locked.



80 Appendix

Compressor



A: Refrigerant inlet (from air conditioner unit)

B: Refrigerant outlet (to condenser)

- 1. Pulley
- 2. Magnetic clutch
- 3. Relief valve

Function

- The compressor circulates the refrigerant and compresses the gaseous refrigerant from the evaporator into a misty refrigerant at high pressure and high temperature so that it will be easily regenerated (liquefied) at the normal temperature.
- Calling into account of the evaporator temperature and refrigerant pressure, the air conditioner controller activates magnetic clutch (2) built in the compressor.
- When the magnetic clutch is engaged, the power of the engine rotates the compressor shaft along with pulley (1) to drive the compressor.

Specifications

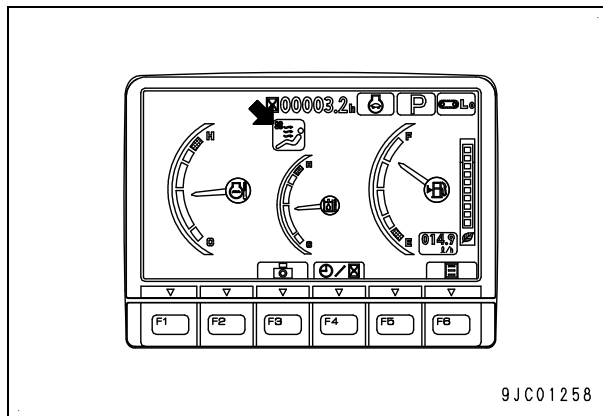
Number of cylinder – Bore x Stroke (mm)	10 - 32 x 20.8
Piston capacity (cc/rev)	157.3
Allowable maximum speed (rpm)	6,000
Compressor oil	Denso: ND-OIL8 (For R134a)
Compressor oil refill capacity (cc)	180

Testing with self-diagnosis function

Testing outline

The air conditioner controller performs various self-diagnosis such as sunlight sensor, inside air temperature sensor, outside air temperature sensor, evaporator temperature sensor, temperature control system, vent (mode) changeover system, and refrigerant pressure with the pressure switch. If an error is detected on the temperature control system, vent (mode) changeover system, or refrigerant, the machine monitor momentarily shows "L01" (2) and then "Air conditioner system state monitor" is displayed 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.



- ★ Even if the cause of a detected problem is restored to normal, the self-diagnosis failure condition will not automatically be reset. To reset the failure condition, the starter switch must be set to OFF.
- ★ On the "Electrical System" screen in the service mode of the machine monitor, the system performs self-diagnosis for various sensors. If a problem is detected, failure information is displayed.
- ★ FRESH/RECIRC air changeover servomotor is not checked with self-diagnosis function.

How to enter air conditioner "Electrical Systems" screen in service mode of the machine monitor.

- **Overview of machine monitor operating procedure**

Normal screen

↓ While pressing number key (4), press (1), (2), and (3) in this order.

Service menu (Mode)

↓ Press [F3] twice. Press [F6].

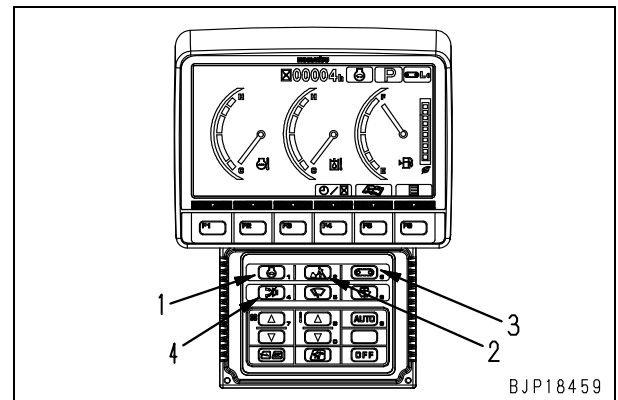
03 Abnormality record

↓ Press [F3] once. Press [F6].

02 Electrical Systems screen

- **Detailed description of machine monitor operating procedure**

1. On the normal operation screen, while pressing number key (4), press (1), (2), and (3) in this order.



Failure code [879BKA] A/C Outer sensor Open Circuit

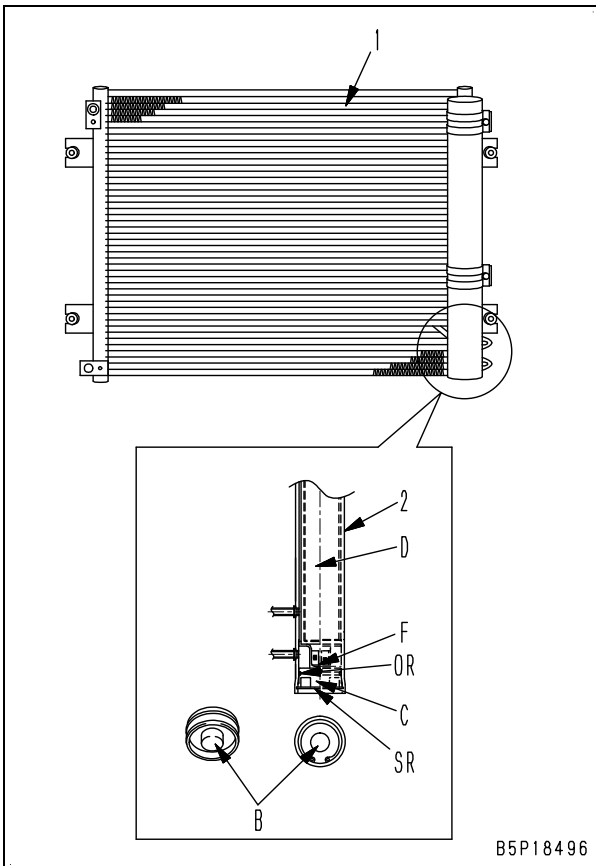
Action level	Failure code	Failure	Open circuit in air conditioner outside air temperature sensor (Machine monitor system)
–	879BKA		
Detail of failure	<ul style="list-style-type: none"> An open circuit is detected in the air conditioner controller outside air temperature sensor 		
Action of controller	<ul style="list-style-type: none"> The air conditioner controller sends information about the outside air temperature sensor open circuit to the machine monitor via CAN communication. Continues control of air conditioner in automatic mode, ignoring data of outside air temperature sensor. 		
Problem on machine	<ul style="list-style-type: none"> Since there is an open circuit in the air conditioner outside temperature sensor, outside temperature is not counted in automatic mode. (does not have any effect to the air conditioner in manual mode) 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. Check whether this failure code is displayed in the "Electrical Systems" (electrical systems abnormality record) screen in the service mode of the machine monitor. For connectors etc., see "Parts and connectors layout". Since connector ACECU of the air conditioner controller has small pins and does not have a T-adaptor, perform troubleshooting by using the intermediate connector (Although the intermediate connector does not have a T-adaptor either, it does have large pins). To replace the air conditioner harness between air conditioner controller connector ACECU and intermediate controller, the air conditioner unit must be replaced. 		

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

Cause		Procedure, measuring location, criteria and remarks		
4	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector R21 and carryout troubleshooting without turning starting switch ON. ★ Ensure that test result for cause 2 (air conditioner compressor is normal) is normal.		
		Resistance	Between connector R21 (female) (5) and F01-11 (Dual pressure switch is turned ON)	Max. 1 Ω
			Between connector R21 (female) (3) and chassis ground (Air conditioner compressor coil resistance)	Approx. 15 Ω
			Between F01-10 and AC01 (female) (4) ★ Relay coil resistance	300 – 500 Ω
5	Ground fault in wiring harness (contact with ground circuit)	★ If the fuse is not blown, skip troubleshooting. 1. Turn starting switch to OFF position. 2. Disconnect connectors AC03 and R21, and connect a T-adapter to the female side of AC03.		
		Resistance	Between AC03 (female) (1) and chassis ground	Min. 1 MΩ
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors AC01, AC02, and R21. ★ Ensure that test result for cause 2 is normal.		
		Resistance	Between wiring harness side (2) of connector R21 and AC02 (female) (2), (3), and (4)	Min. 1 MΩ
7	Defective air conditioner controller	1. Turn starting switch to OFF position. 2. Disconnect connector R21. 3. Turn starting switch to ON position. 4. Display the air conditioner operation screen on the machine monitor and press the A/C switch.		
		Voltage	Between connector R21 (female) (2) and ground	Max. 1 V
8	Defective machine monitor (defective switch)	1. Turn starting switch to ON position. 2. Display the air conditioner operation screen on the machine monitor.		
		Press A/C switch.	"A/C ON" is displayed	
9	Defective air conditioner unit	If no failure is found by above checks, air conditioner unit may be defective.		

Desiccant replacement procedure

★ Prepare desiccant replacement kit (20Y-810-1250).



⚠ When replacing the desiccant, be sure to collect the refrigerant from the air conditioning cycle. If the desiccant is replaced without collecting the refrigerant, the refrigerant may blind you or cap (C) may fly out and injure you because of the refrigerant pressure in the cycle.

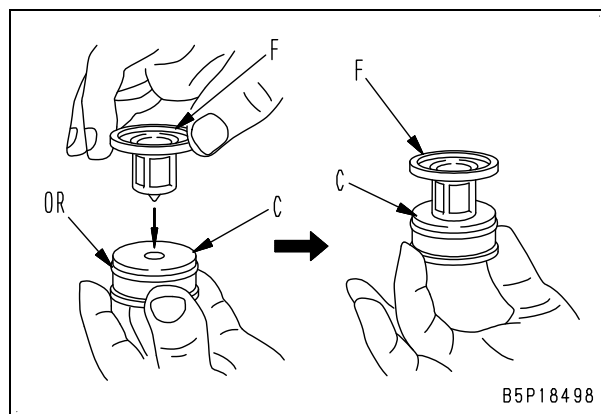
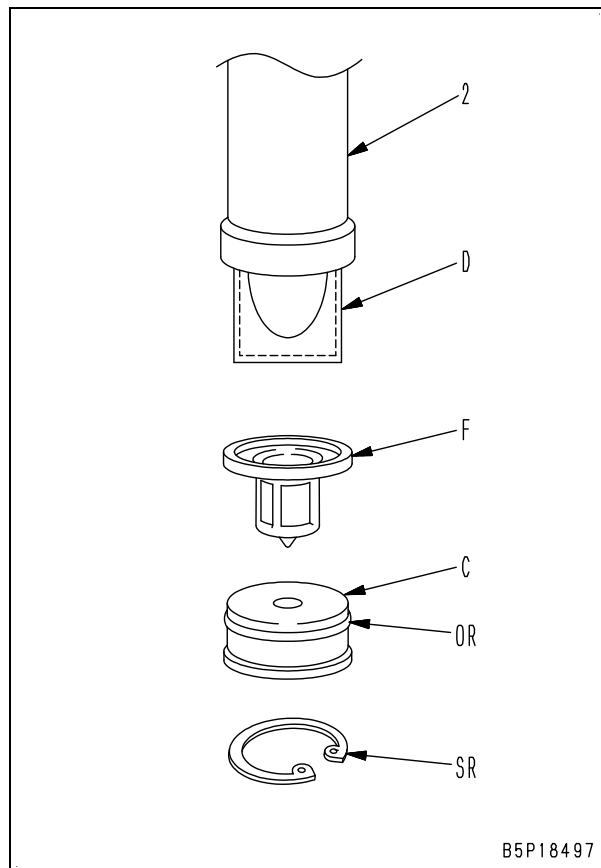
1. Condenser
 2. Receiver drier
- ★ The desiccant is in receiver drier (2).

Installing new desiccant (D)

1. Apply ND-OIL 8 to the periphery of O-ring (OR) of cap (C).
2. Install filter (F) to cap (C).

Taking out desiccant (D)

1. Remove snap ring (SR) from receiver drier (2).
2. Remove cap (C) from receiver drier (2).
Hold boss (B) of cap (C) with pliers etc. to remove.
★ Cap (C) may be hard to remove. When removing it, take care not to damage or deform the seal or receiver drier (2).
3. Remove filter (F) from receiver drier (2)
4. Take desiccant (D) out of receiver drier (2).
★ Removed snap ring (SR), cap (C), filter (F), desiccant (D) will be replaced with the parts of the drier (desiccant replacement kit) and will not be necessary any more.



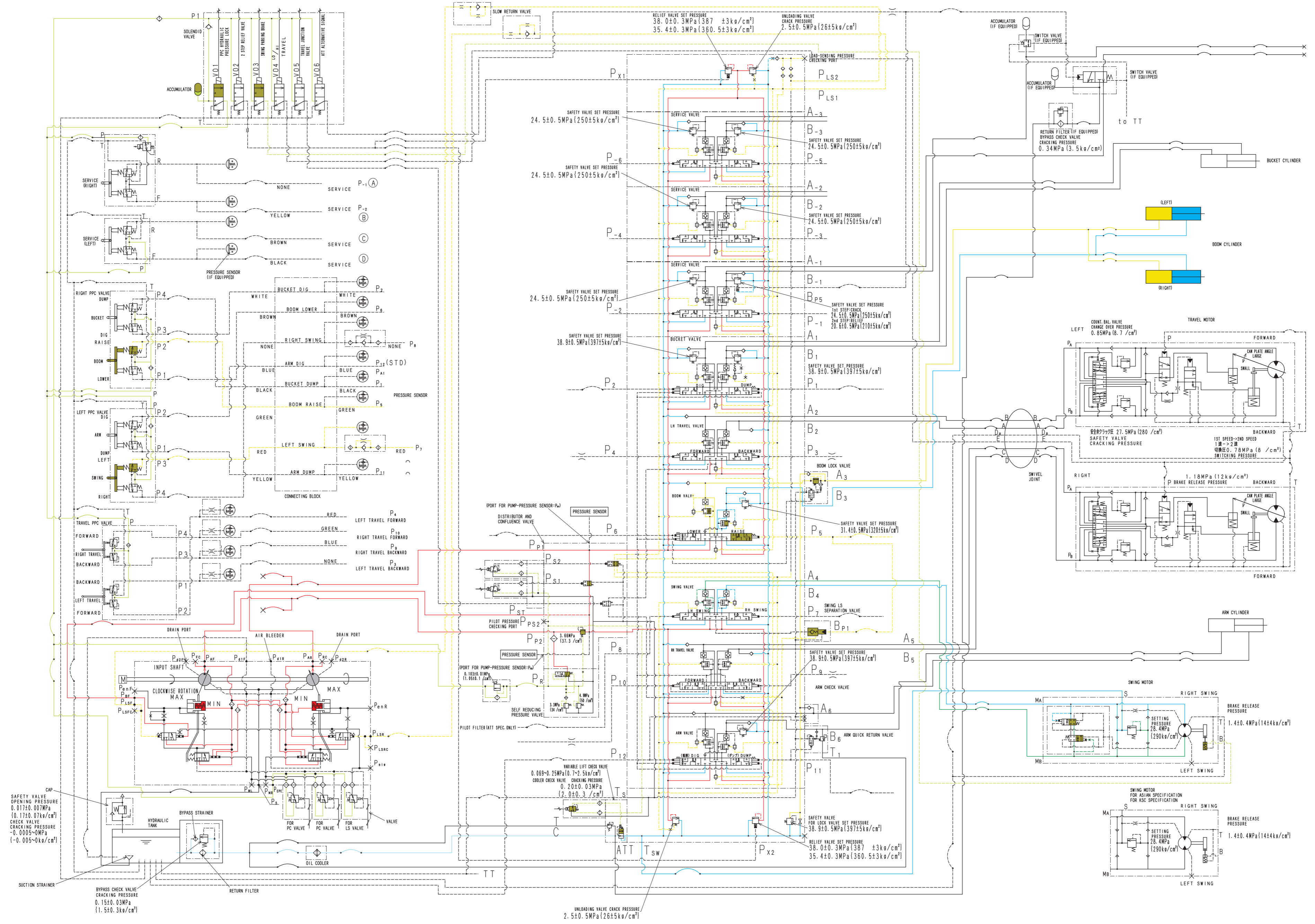
3. Insert desiccant (D) in receiver drier (2).
4. Install cap (C) with filter (F) to receiver drier (2).

Hydraulic circuit diagram (Boom RAISE+Swing LEFT)

PC200-8M0, PC200LC-8M0, PC220-8M0, PC220LC-8M0

★ This figure covers the equipment and devices that are unavailable as optional items in some areas.

Hydraulic circuit diagram (Boom RAISE+Swing LEFT)
PC200, 200LC, 220, 220LC-8M0



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