

# Shop Manual

HYDRAULIC  
EXCAVATOR

**PC600 -8**

**PC600LC-8**

SERIAL NUMBERS

PC600- 30001

PC600LC-30001

and up

**ecot3**

**KOMATSU**

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## How to read the shop manual

- Some attachments and optional parts in this shop manual may not be delivered to certain areas. If one of them is required, consult KOMATSU distributors.
- Materials and specifications are subject to change without notice.
- Shop manuals are divided into the “Chassis volume” and “Engine volume”. For the engine unit, see the engine volume of the engine model mounted on the machine.

### 1. Composition of shop manual

This shop manual contains the necessary technical information for services performed in a workshop. For ease of understanding, the manual is divided into the following sections.

#### 00. Index and foreword

This section explains the shop manuals list, table of contents, safety, and basic information.

#### 01. Specification

This section explains the specifications of the machine.

#### 10. Structure, function and maintenance standard

This section explains the structure, function, and maintenance standard values of each component. The structure and function sub-section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting. The maintenance standard sub-section explains the criteria and remedies for disassembly and service.

#### 20. Standard value table

This section explains the standard values for new machine and judgement criteria for testing, adjusting, and troubleshooting. This standard value table is used to check the standard values in testing and adjusting and to judge parts in troubleshooting.

#### 30. Testing and adjusting

This section explains measuring instruments and measuring methods for testing and adjusting, and method of adjusting each part. The standard values and judgement criteria for testing and adjusting are explained in Testing and adjusting.

#### 40. Troubleshooting

This section explains how to find out failed parts and how to repair them. The troubleshooting is divided by failure modes. The “S mode” of the troubleshooting related to the engine may be also explained in the Chassis volume and Engine volume. In this case, see the Chassis volume.

#### 50. Disassembly and assembly

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

#### 90. Diagrams and drawings (chassis volume)/Repair and replacement of parts (engine volume)

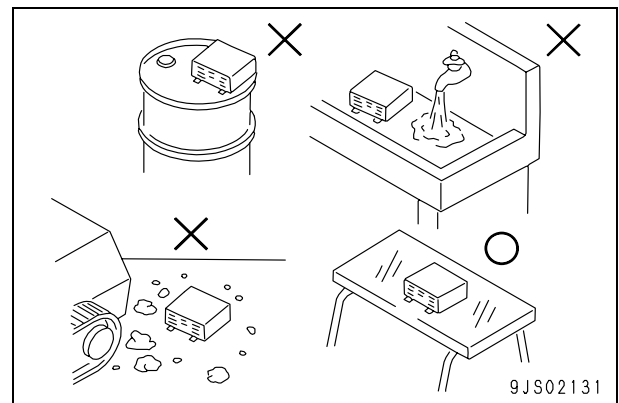
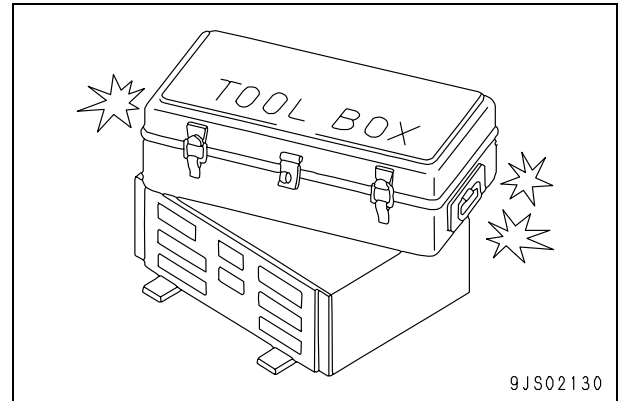
- Chassis volume  
This section gives hydraulic circuit diagrams and electrical circuit diagrams.
- Engine volume  
This section explains the method of reproducing, repairing, and replacing parts.

### 2. Revision and distribution

Any additions, revisions, or other change of notices will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

#### 4. Handling controller

- 1) The controller contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine, so be extremely careful when handling the controller.
- 2) Do not place objects on top of the controller.
- 3) Cover the control connectors with tape or a vinyl bag. Never touch the connector contacts with your hand.
- 4) During rainy weather, do not leave the controller in a place where it is exposed to rain.
- 5) Do not place the controller on oil, water, or soil, or in any hot place, even for a short time. (Place it on a suitable dry stand).
- 6) Precautions when carrying out arc welding  
When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the controller. Fit an arc welding ground close to the welding point.



#### 5. Points to remember when troubleshooting electric circuits

- 1) Always turn the power OFF before disconnecting or connecting connectors.
- 2) Before carrying out troubleshooting, check that all the related connectors are properly inserted.
  - ★ Disconnect and connect the related connectors several times to check.
- 3) Always connect any disconnected connectors before going on to the next step.
  - ★ If the power is turned ON with the connectors still disconnected, unnecessary abnormality displays will be generated.
- 4) When carrying out troubleshooting of circuits (measuring the voltage, resistance, continuity, or current), move the related wiring and connectors several times and check that there is no change in the reading of the tester.
  - ★ If there is any change, there is probably defective contact in that circuit.

## 2. Precautions when carrying out installation work

- Tighten all bolts and nuts (sleeve nuts) to the specified (KES) torque.
  - Install the hoses without twisting or interference and fix them with intermediate clamps, if there are any.
  - Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
  - Bend the cotter pins and lock plates securely.
  - When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2 – 3 drops of adhesive.
  - When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
  - Clean all parts, and correct any damage, dents, burrs, or rust.
  - Coat rotating parts and sliding parts with engine oil.
  - When press fitting parts, coat the surface with anti-friction compound (LM-P).
  - After fitting snap rings, check that the snap ring is fitted securely in the ring groove.
  - When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
  - When using eyebolts, check that there is no deformation or deterioration, screw them in fully, and align the direction of the hook.
  - When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
- ★ When operating the hydraulic cylinders for the first time after reassembling cylinders, pumps and other hydraulic equipment removed for repair, always bleed the air as follows:
- 1) Start the engine and run at low idle.
  - 2) Operate the work equipment control lever to operate the hydraulic cylinder 4 – 5 times, stopping the cylinder 100 mm from the end of its stroke.
  - 3) Next, operate the hydraulic cylinder 3 – 4 times to the end of its stroke.
  - 4) After doing this, run the engine at normal speed.
- ★ When using the machine for the first time after repair or long storage, follow the same procedure.

## 3. Precautions when completing the operation

- 1) Refilling with coolant, oil and grease
  - If the coolant has been drained, tighten the drain valve, and add coolant to the specified level. Run the engine to circulate the coolant through the system. Then check the coolant level again.
  - If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
  - If the piping or hydraulic equipment have been removed, always bleed the air from the system after reassembling the parts.
    - ★ For details, see Testing and adjusting, "Bleeding air".
  - Add the specified amount of grease (molybdenum disulphide grease) to the work equipment parts.
- 2) Checking cylinder head and manifolds for looseness
 

Check the cylinder head and intake and exhaust manifold for looseness.  
If any part is loosened, retighten it.

  - For the tightening torque, see "Disassembly and assembly".
- 3) Checking 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 loosened or damaged, retighten or repair it.

Cooling system

Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for coolant leakage.  
If any part is loosened or damaged, retighten or repair it.

Fuel system

Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for fuel leakage.  
If any part is loosened or damaged, retighten or repair it.

**Millimeters to inches**

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

**Kilogram to pound**

1 kg = 2.2046 lb

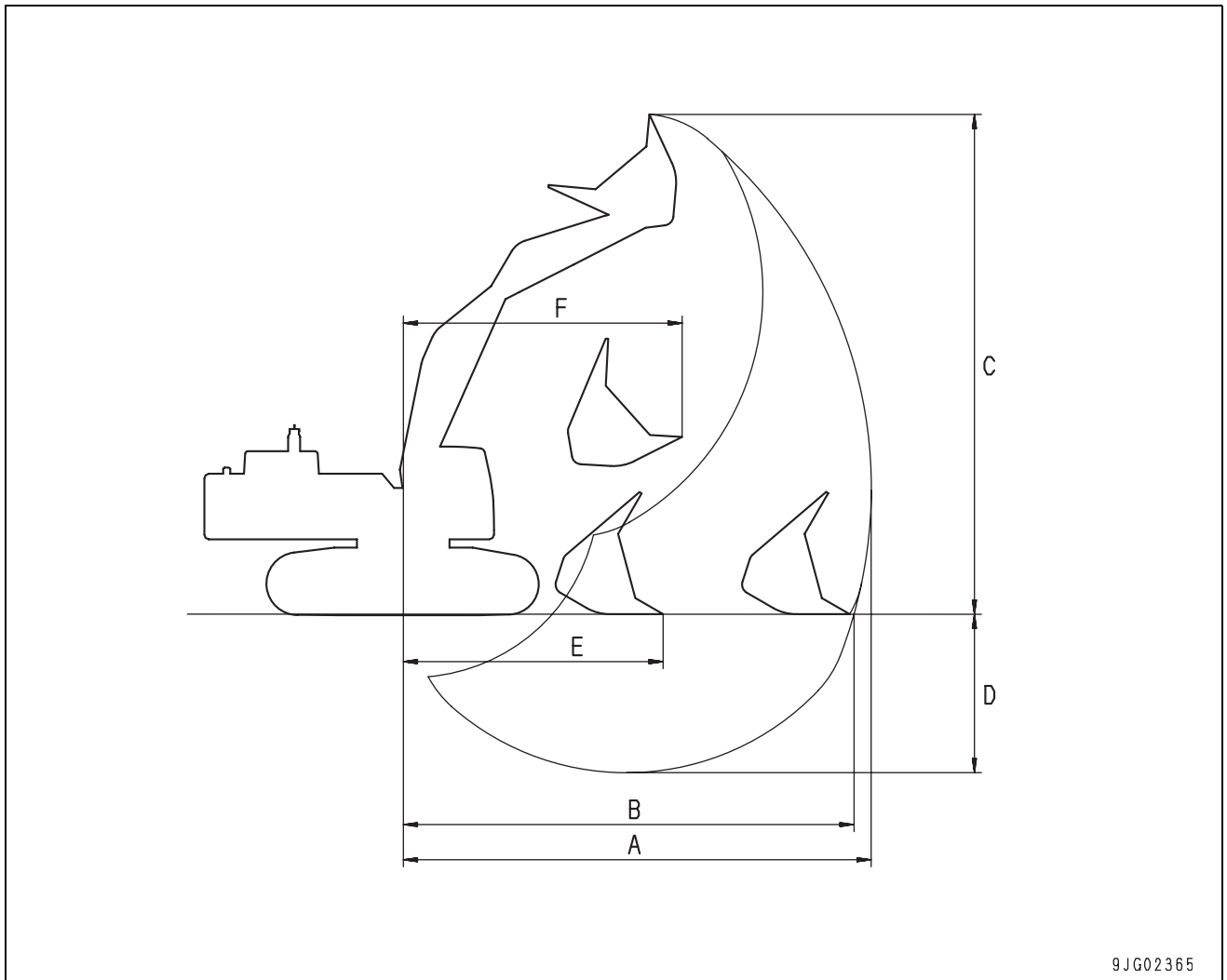
	0	1	2	3	4	5	6	7	8	9
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

**Liters to U.S. Gallons**

1 ℓ = 0.2642 U.S. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.264	0.528	0.793	1.057	1.321	1.585	1.849	2.113	2.378
10	2.642	2.906	3.170	3.434	3.698	3.963	4.227	4.491	4.755	5.019
20	5.283	5.548	5.812	6.076	6.340	6.604	6.869	7.133	7.397	7.661
30	7.925	8.189	8.454	8.718	8.982	9.246	9.510	9.774	10.039	10.303
40	10.567	10.831	11.095	11.359	11.624	11.888	12.152	12.416	12.680	12.944
50	13.209	13.473	13.737	14.001	14.265	14.529	14.795	15.058	15.322	15.586
60	15.850	16.115	16.379	16.643	16.907	17.171	17.435	17.700	17.964	18.228
70	18.492	18.756	19.020	19.285	19.549	19.813	20.077	20.341	20.605	20.870
80	21.134	21.398	21.662	21.926	22.190	22.455	22.719	22.983	23.247	23.511
90	23.775	24.040	24.304	24.568	24.832	25.096	25.361	25.625	25.889	26.153

## Loading shovel specification



	Working ranges	Unit	PC600-8 Loading shovel specification	PC600LC-8 Loading shovel specification
A	Max. digging reach	mm	9,190	9,190
B	Max. digging reach at ground level	mm	8,850	8,850
C	Max. digging height	mm	10,090	10,090
D	Max. digging depth	mm	3,495	3,495
E	Min. digging radius at ground level	mm	5,135	5,135
F	Min. turning radius of work equipment	mm	5,515	5,515

Unit: kg

Machine model	PC600-8	PC600LC-8
Serial number	30001 and up	30001 and up
Track shoe assembly		
• Standard triple grouser shoe (600 mm)	5,930	6,290
• Wide triple grouser shoe (750 mm)	6,750	7,170
Boom assembly	4,820	4,820
Arm assembly	3,250	3,250
Bucket assembly	2,430	2,430
Boom cylinder assembly	496 × 2	496 × 2
Arm cylinder assembly	734	734
Bucket cylinder assembly	482	482
Link assembly (large)	345	345
Link assembly (small)	—	—
Boom pin	149 + 26 × 2 + 76 + 104 + 36	149 + 26 × 2 + 76 + 104 + 36
Arm pin	32 + 55	32 + 55
Bucket pin	55 + 62	55 + 62
Link pin	45 × 2	45 × 2

Unit: mm

No.	Check item	Criteria		Remedy
8	Backlash between drive gear and driven gear	Standard clearance	Clearance limit	Adjust
		0.23 – 0.74	—	
9	Backlash of SAL56 pump input shaft	0.273 – 0.374	—	
10	Backlash between main shaft and connecting hub assembly	0.074 – 0.226	—	

Unit: mm

No.	Check item	Criteria		Remedy
		Standard clearance	Clearance limit	
16	Backlash between No. 2 planet carrier and motor	0.06 – 0.21	—	Replace
		0.21 – 0.69	1.10	
17	Backlash between No. 2 planet gear and No. 2 ring gear	0.18 – 0.63	1.10	
18	Backlash between No. 1 planet gear and No. 1 ring gear	0.17 – 0.62	1.00	
19	Backlash between No. 2 sun gear and No. 2 planet gear	0.14 – 0.45	1.00	
20	Backlash between No. 1 sun gear and No. 1 planet gear	0.16 – 0.56	1.00	
21	Backlash between No. 1 planet carrier and No. 2 sun gear	0.10 – 0.15	—	
22	End play of sprocket shaft	Standard size	Repair limit	
23	Sprocket tooth width	104	101.5	
		24	Wear of sprocket teeth	Repair limit: 6

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
9	Recoil spring	Free length x OD	Installed length	Installed load	Free length	Installed load	Replace
		859 x 299	715	292 kN {29,770 kg}	—	233.6 kN {23,816 kg}	
					Standard size	Tolerance	
10	Top-to-bottom width of idler guide	Track frame		163.5	163.5 $^{+4}_0$	167.5	Rebuild or replace
		Idler support		161	161 $^{+1}_0$	159	
		Track frame		329	329 $^{+4}_0$	334	
11	Left-to-right width of idler guide	Idler support		324	—	322	

**Standard shoe**

Model	PC600-8	PC600LC-8
Item		
Shoe width (mm) (triple shoe)	600	600
Link pitch (mm)	228.6	228.6
No. of shoes (each side)	49	52

**Selection of track shoe**

- Select the most suitable track shoe from the following table

	PC600-8		PC600LC-8	
	Specifications	Category	Specifications	Category
Standard	600 mm triple	A	600 mm triple	A
If equipped	700 mm triple	B	—	—
If equipped	750 mm triple	B	750 mm triple	B
If equipped	900 mm triple	B	900 mm triple	B

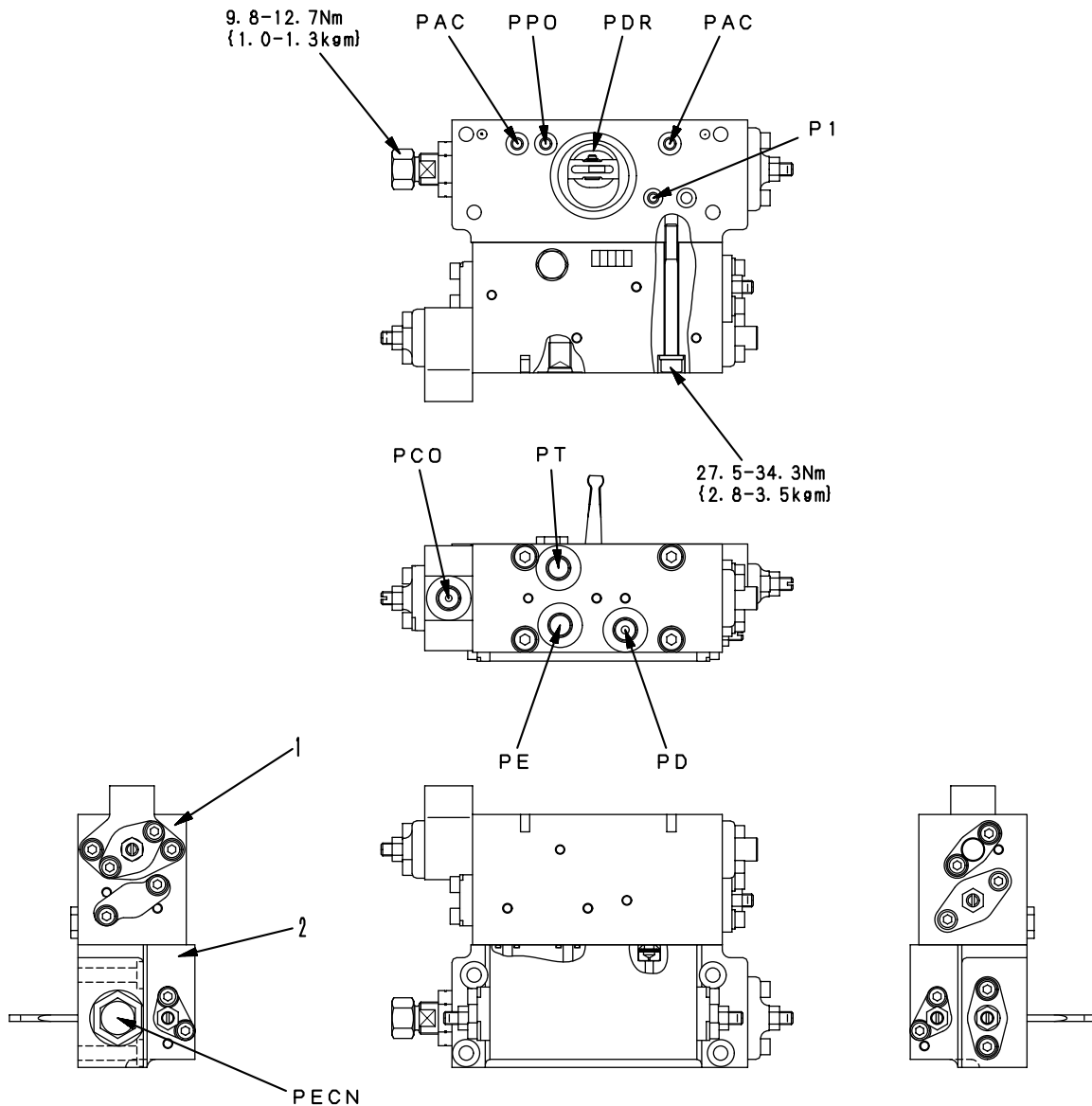
Category	Use	Precautions when using
A	Rocky ground, normal river soil	<ul style="list-style-type: none"> <li>Travel in Lo speed when traveling on rough ground with obstacles such as large boulders and fallen trees.</li> </ul>
B	Normal soil, soft land	<ul style="list-style-type: none"> <li>Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees.</li> <li>Travel in Hi speed only on flat ground; when it is impossible to avoid traveling over obstacles, lower the travel speed to approx. half of Lo speed.</li> </ul>
C	Extremely soft ground (swampy ground)	<ul style="list-style-type: none"> <li>Use only for ground where "A" and "B" sink and are impossible to use.</li> <li>Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees</li> <li>Travel in Hi speed only on flat ground; when it is impossible to avoid traveling over obstacles, lower the travel speed to approx. half of Lo speed.</li> </ul>
D	Paved surface	<ul style="list-style-type: none"> <li>The shoes are flat, so they have low gradeability</li> </ul>
E	Paved surface	<ul style="list-style-type: none"> <li>The shoes are made of rubber, so be careful when traveling on rough ground</li> </ul>

★ Categories "B" and "C" are wide shoes, so there are restrictions on their use. Therefore, before using, check the restrictions and consider carefully the conditions of use before recommending a suitable shoe width. If necessary, give the customer guidance in their use.

★ When selecting the shoe width, select the narrowest shoe possible within the range that will give no problem with flotation and ground pressure. If a wider shoe than necessary is used, there will be a large load on the shoe, and this may lead to bending of the shoe, cracking of the links, breakage of the pins, loosening of the shoe bolts, or other problems.

**Servo valve**

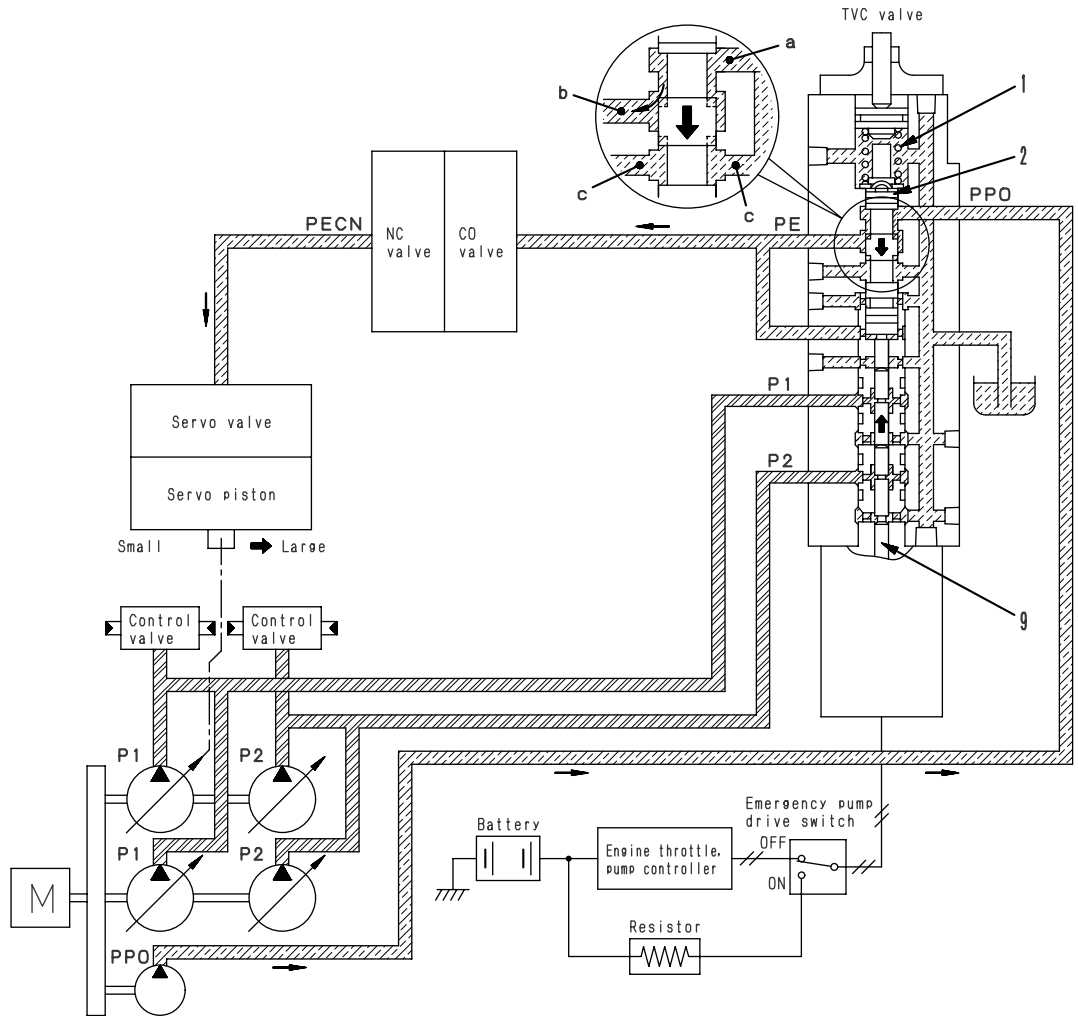
**1. Servo valve assembly (No. 1 front)**



SJP09751

- P1** : Main pump pressure IN port
- PE** : TVC valve output pressure front, rear interconnection port
- PCO** : CO selector pilot port
- PD** : Jet sensor downstream pressure IN port
- PT** : Jet sensor upstream pressure IN port
- PAC** : Servo actuator port
- PDR** : Servo valve drain OUT port
- PPO** : Servo basic pressure IN port
- PECN** : CO+NC valve output pressure output port
- 1.** CO+NC valve
- 2.** Servo valve

3) When emergency pump drive switch is turned ON and pump load is small

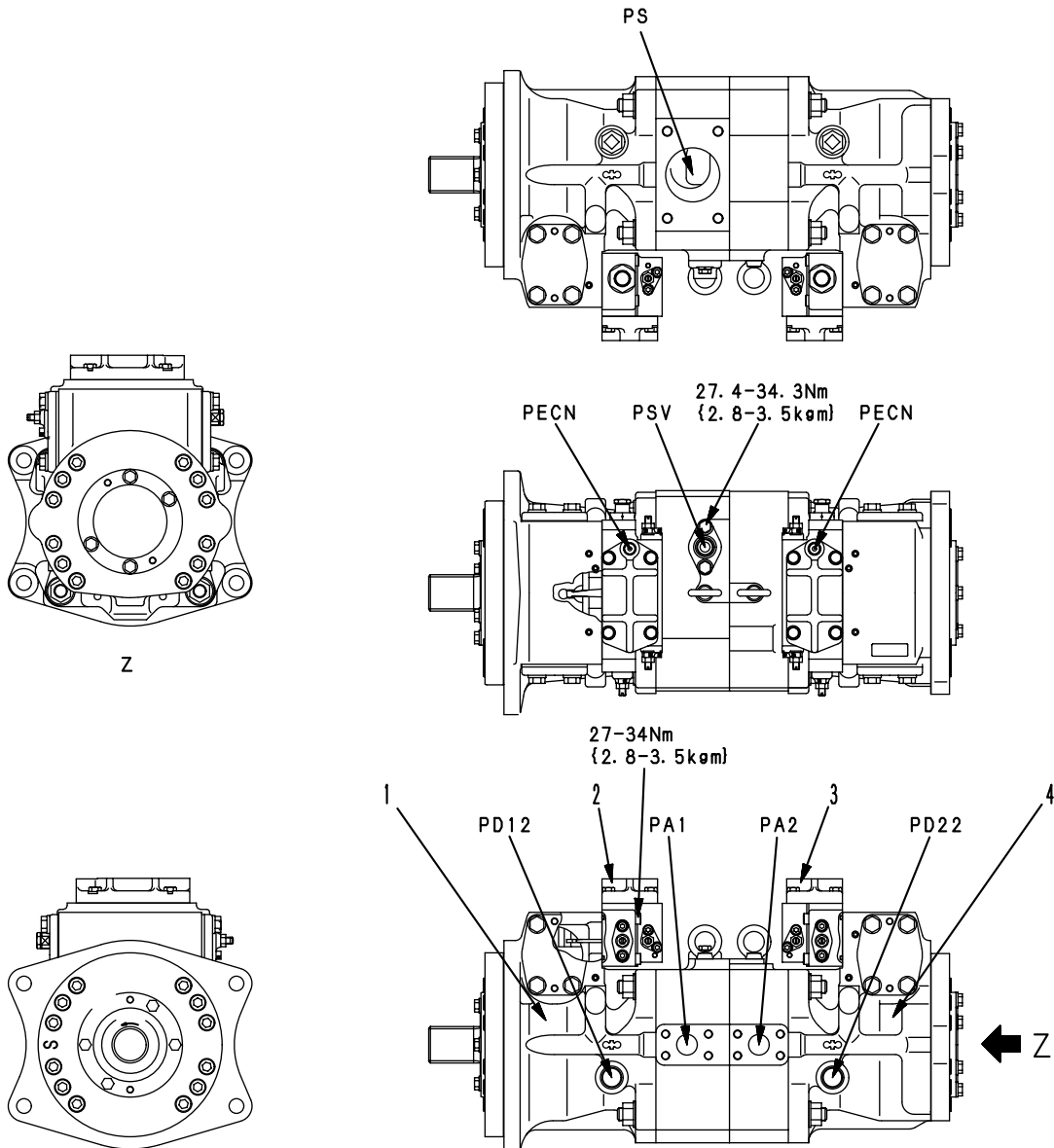


SJW09809

**Operation**

- If the emergency pump drive switch is turned ON, the command current increases and the force of solenoid push pin (9) becomes larger. As a result, spring (1) is kept compressed.
- Since main pump discharge pressures **P1** and **P2** are low, spring (1) keeps pressing spool (2) down. As a result, control pump discharge pressure **PPO** becomes equal to TVC valve output pressure **PE**. At this time, TVC valve output pressure **PE** and the pump discharge amount increase.

**No. 2 main pump**  
**Model: HPV95+95**



SJP09764

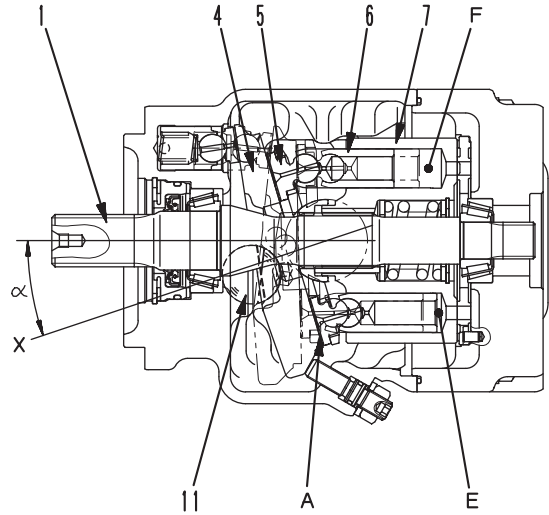
- PA1** : Front pump discharge port
- PA2** : Rear pump discharge port
- PD12** : Drain port
- PD22** : Drain port
- PS** : Pump suction port
- PSV** : Servo basic pressure IN port
- PECN** : CO+NC valve output pressure port

- 1. Front pump
- 2. Front servo valve
- 3. Rear servo valve
- 4. Rear pump

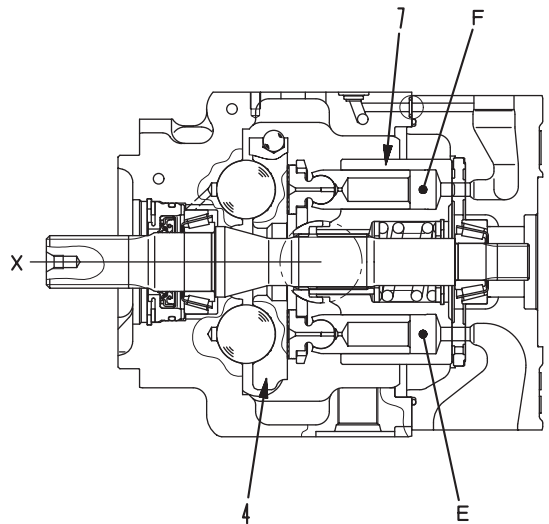
**Operation**

**1. Operation of pump**

- Cylinder block (7) rotates together with shaft (1) and shoe (5) slides on plane **A**. At this time, rocker cam (4) tilts around ball (11). As a result, angle  $\alpha$  between center line **X** of rocker cam (4) and the axis of cylinder block (7) changes. Angle  $\alpha$  is called the swash plate angle.
- If angle  $\alpha$  is made between center line **X** of rocker cam (7) and the axis of cylinder block (7), plane **A** works as a cam for shoe (5).
- Accordingly, piston (6) slides inside cylinder block (7) and a difference is made between volumes **E** and **F** in cylinder block (7). As a result, each piston (6) sucks and discharges oil by **F** – **E**.
- In other words, if cylinder block (7) rotates and the volume of chamber **E** is decreased, the oil is discharged from chamber **E**. On the other hand, the volume of chamber **F** is increased and the oil is sucked in chamber **F**. (In the figure, chamber **F** is at the end of the suction stroke and chamber **E** is at the end of the discharge stroke.)
- If center line **X** of rocker cam (4) is equal to the axis of cylinder block (7) (the swash plate angle is 0), there is not a difference between volumes **E** and **F** in cylinder block (7) and oil is not sucked or discharged. (The swash plate angle is not set to 0 actually, however.)
- In short, swash plate angle  $\alpha$  is in proportion to the pump discharge.



9JG01454



9JG01455

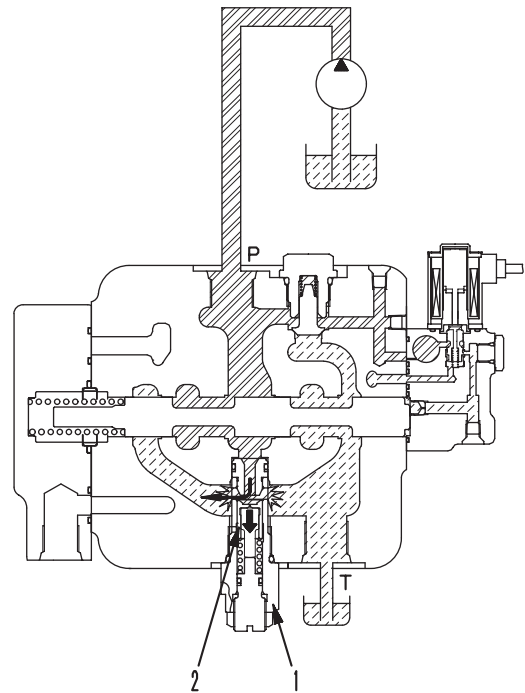
#### 4. Safety valve

##### Function

- When the engine is started, the pressure in port **P** of the fan motor is heightened in some cases.
- Safety valve (1) is installed to protect the fan system circuit.

##### Operation

- If the pressure in port **P** rises above the cracking pressure of safety valve (1), valve (2) of safety valve (1) opens to release the hydraulic oil into port **T**.
- By this operation, generation of abnormal pressure in port **P** is prevented.



SJD05430

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
		Free length x OD	Installed length	Installed load	Free length	Installed load	
14	Check valve spring	20.8 x 12.2	13.5	12.7 N {1.3 kg}	—	10.2 N {1.04 kg}	Replace spring if damaged or deformed
15	Check valve spring	31.8 x 7.6	26.5	0.98 N {0.10 kg}	—	0.78 N {0.08 kg}	
16	Spool return spring	30.7 x 32.5	26.5	255 N {26.0 kg}	—	204 N {20.8 kg}	
17	Spool return spring	54.0 x 34.2	52.0	255 N {26.0 kg}	—	204 N {20.8 kg}	
18	Spool return spring	54.8 x 34.0	53.5	125 N {12.7 kg}	—	100 N {10.2 kg}	
19	Spool return spring	21.0 x 16.9	18.2	207 N {21.1 kg}	—	—	
20	Spool return spring	54.9 x 34.0	53.5	125 N {12.7 kg}	—	100 N {10.2 kg}	
21	Check valve spring	55.9 x 30.2	29.0	7.85 N {0.80 kg}	—	6.28 N {0.64 kg}	

## Arm throttle valve

### Function

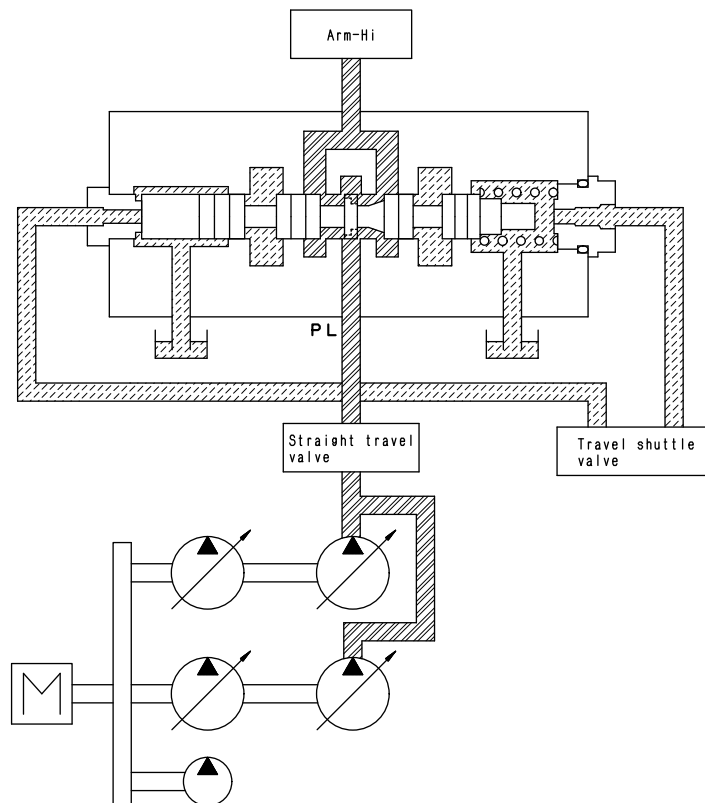
#### When arm and boom are operated at same time

- When the arm and boom are operated at the same time, a large amount of the pressure oil flows to the arm circuit where the load is small, so little pressure oil flows to the boom circuit.
- This makes the arm speed too fast for the boom speed, and causes poor combination in simultaneous operation. This is a particular problem when the arm OUT and boom RAISE are operated at the same time.
- To overcome this, the arm throttle valve is actuated to throttle the pressure oil flowing to the arm Hi control valve in order to restrict the arm speed and improve the simultaneous operation performance.

#### When arm and bucket are operated at same time

- The arm is actuated by the merged flow from two pumps and the bucket is actuated by the oil from one pump.
- In this condition, if the arm and bucket are operated at the same time, a large amount of the pressure oil flows to the arm circuit, so little pressure oil flows to the bucket circuit. This makes the arm speed too fast for the bucket speed, and causes poor combination in simultaneous operation. This is a particular problem when the arm OUT and bucket CURL are operated at the same time.
- To overcome this, the arm throttle valve is actuated to throttle the pressure oil flowing to the arm Hi control valve in order to restrict the arm speed and improve the simultaneous operation performance.

### 1. When arm is operated independently



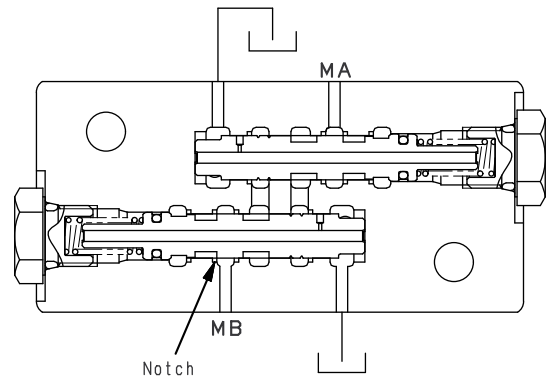
SJW09815

### Operation

- No pilot pressure oil flows from the travel shuttle valve, so the arm throttle valve is not actuated.
- For this reason, all the pressure oil from the rear main pump passes through port **PL** and flows to the arm Hi control valve.

**Function**

- When the swing is stopped, this valve reduces the rocking motion of the swing body due to the inertia of the swing body, backlash of the machinery system, the compressibility of the hydraulic oil, etc.
- This valve is effective to prevent the cargo from being spilled when the swing is stopped as well as to shorten recycle time (excellent in the positioning accuracy and the next operation can be started quickly).

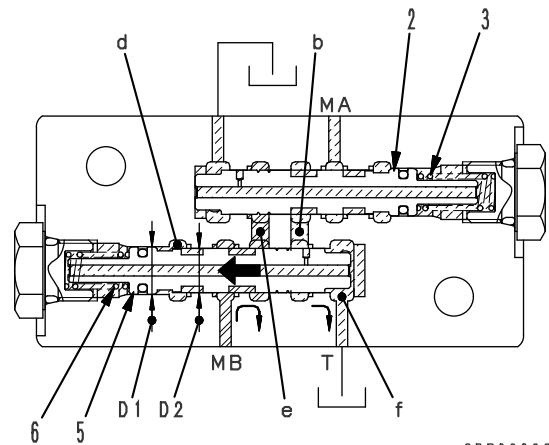


SDP02479

**Operation**

**1. When the braking pressure is present at port MB**

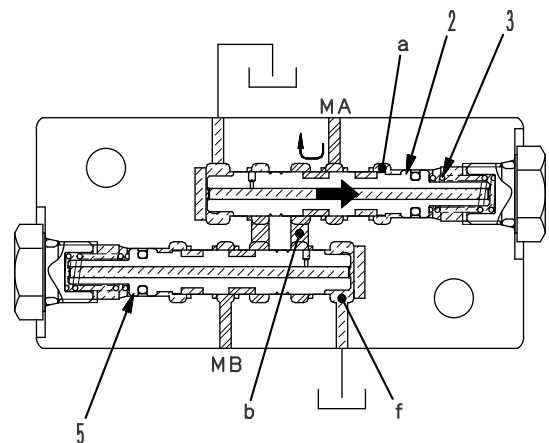
- **MB** pressure is introduced to chamber **d** via the notch and spool (5) makes a stroke motion to the left, pressing spring (6) due to the difference in area ( $D1 > D2$ ) and the interconnection of **MB** to **e** is established.
- On this occasion, **MA** pressure is less than the set pressure of spring (3), so that spool (2) does not make a stroke motion and the pressure oil is closed by spool (2), and the braking force is secured.



SDP02036

**2. When the motor stopped temporarily**

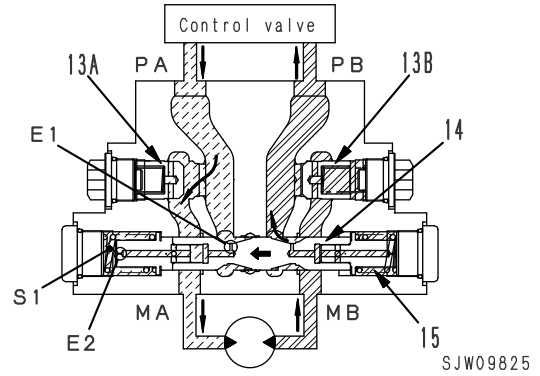
- The motor is reversed by the shutoff pressure that occurred at port **MB**. (First reversal)
- On this occasion, the reverse pressure is generated at port **MA** side. This pressure at port **MA** is introduced to chamber **a**, and spool (2) makes a stroke motion to the right, pressing spring (3), and the interconnection of **MA** to **b** is established.
- Also, the interconnection of **b** to **f** is established through the drill hole of spool (5) and the reverse pressure at port **MA** is bypassed to port **T**, thereby preventing the second reversal.



SDP02037

**Operation of brake when traveling downhill**

- If the machine tries to run away when traveling downhill, the motor will turn under no load, so the pressure at the motor inlet port will drop, and the pressure in chamber **S1** through orifices **E1** and **E2** will also drop.
- When the pressure in chamber **S1** drops below the spool switching pressure, spool (14) is returned to the left by spring (15), and outlet port **MB** is throttled.
- As a result, the pressure at the outlet port side rises, resistance is generated to the rotation of the motor, and this prevents the machine from running away.
- In other words, the spool moves to a position where the pressure at outlet port **MB** balances the pressure at the inlet port and the force generated by the weight of the machine. It throttles the outlet port circuit and controls the travel speed according to the amount of oil discharged from the pump.



**2. Safety valve (2-direction operation, 2-stage set safety valve)**

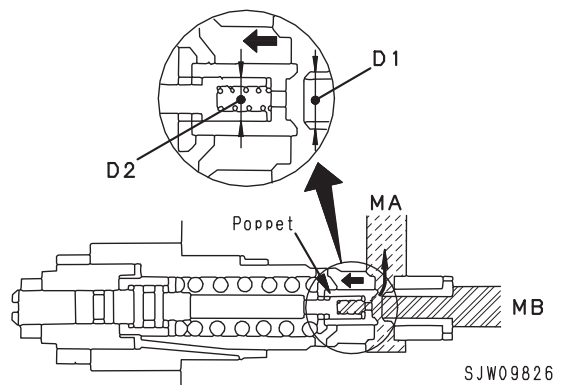
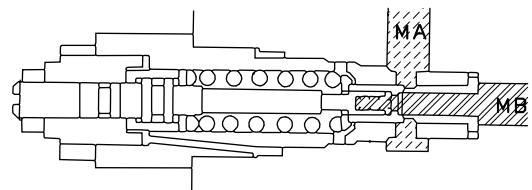
**Function**

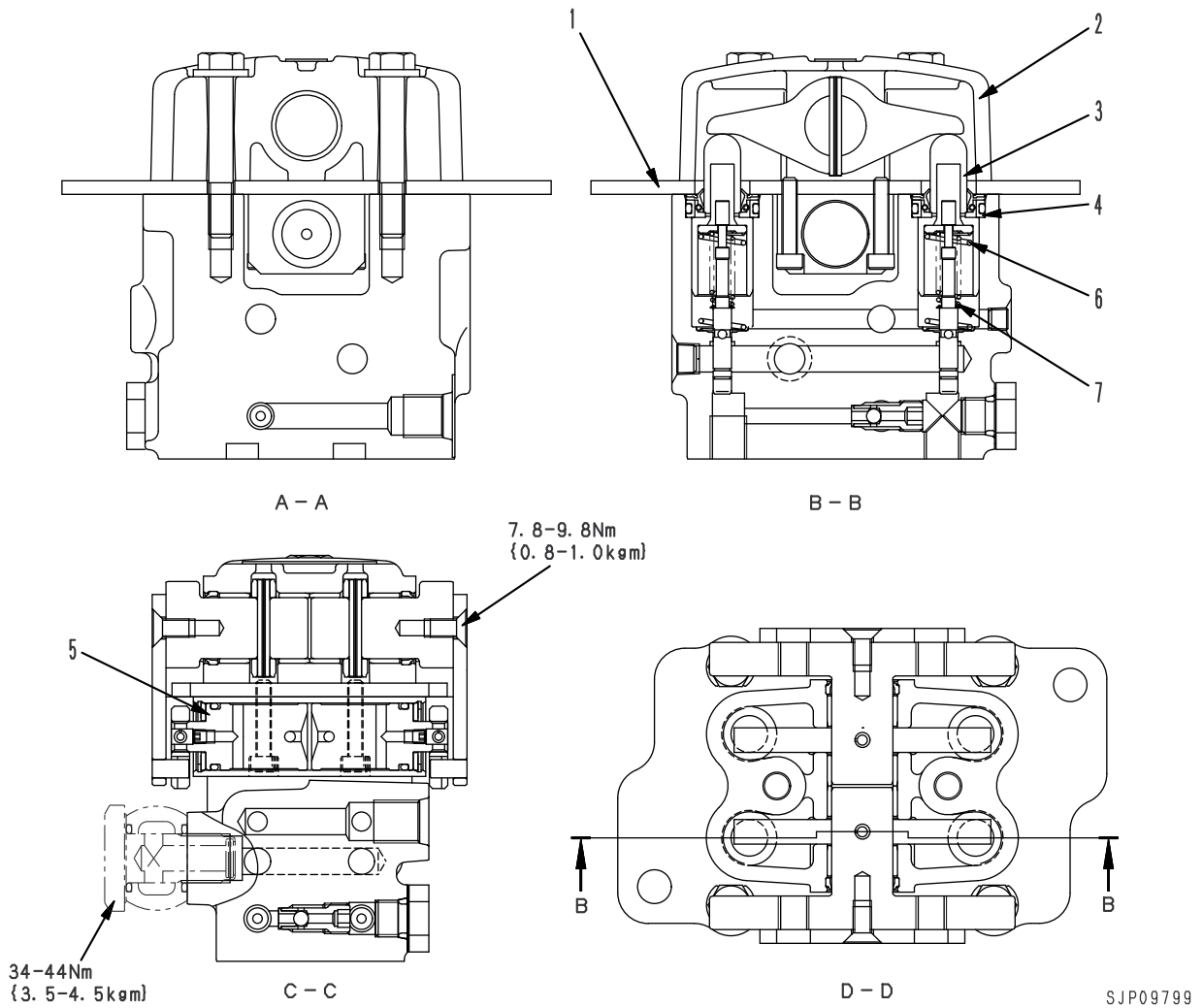
- When travel is stopped (or when traveling downhill), the circuits at the inlet and outlet ports of the motor are closed by the counterbalance valve. However, the motor is rotated by inertia, so the pressure at the outlet port of the motor will become abnormally high and will damage the motor or piping.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

**Operation in both directions**

**1) When pressure in chamber MB has become high (when rotating clockwise)**

- When the travel is stopped (or when traveling downhill), chamber **MB** in the outlet port circuit is closed by the check valve of the counterbalance valve, but the pressure at the outlet port rises because of inertia.
- If the pressure goes above the set pressure, the force produced by the difference in area between **D1** and **D2** [ $\pi/4(D1^2 - D2^2) \times \text{pressure}$ ] overcomes the force of the spring and moves the poppet to the left, so the oil flows to chamber **MA** in the circuit on the opposite side.





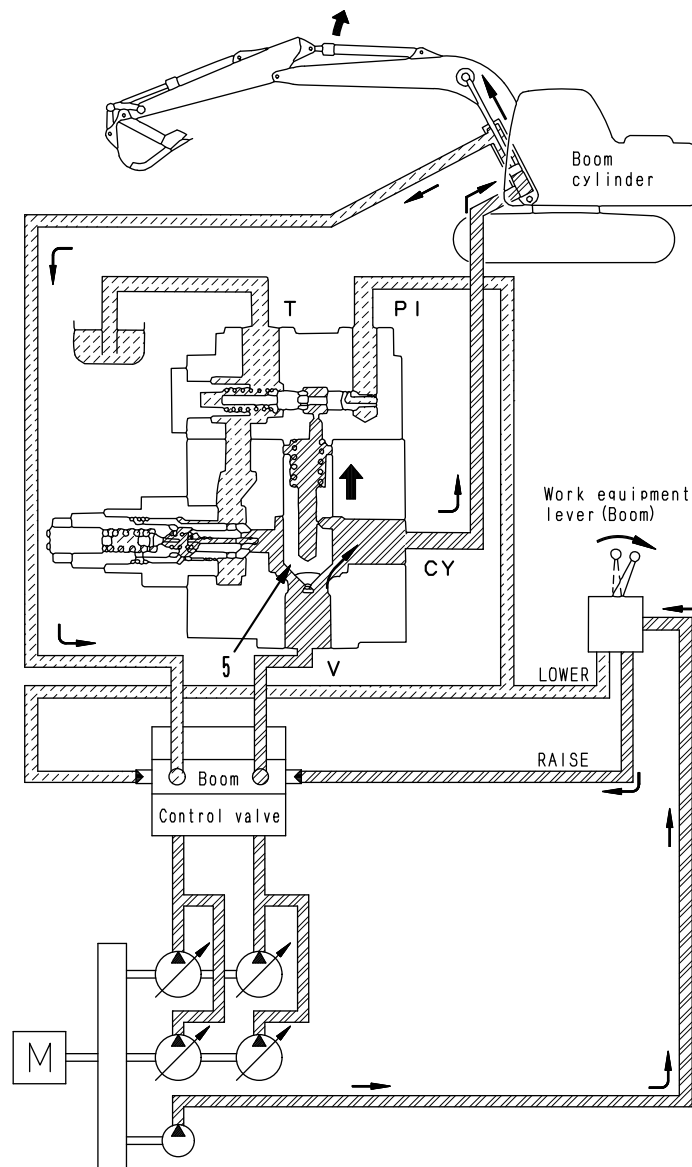
- 1. Plate
- 2. Body
- 3. Piston

- 4. Collar
- 5. Valve

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
		Free length x OD	Installed length	Installed load	Free length	Installed load	
6	Centering spring	48.6 x 15.5	32.5	108 N {11.0 kg}	—	86.3 N {8.8 kg}	Replace spring if damaged or deformed
7	Metering spring	26.5 x 8.15	24.9	16.7 N {1.7 kg}	—	13.7 N {1.4 kg}	

## 1. Boom at RAISE



SJW09831

### Operation

- When the boom is raised, the main pressure from the control valve pushes poppet (5) up. Because of this, the main pressurized oil from the control valve passes through the valve and flows to the bottom end of the boom cylinder.

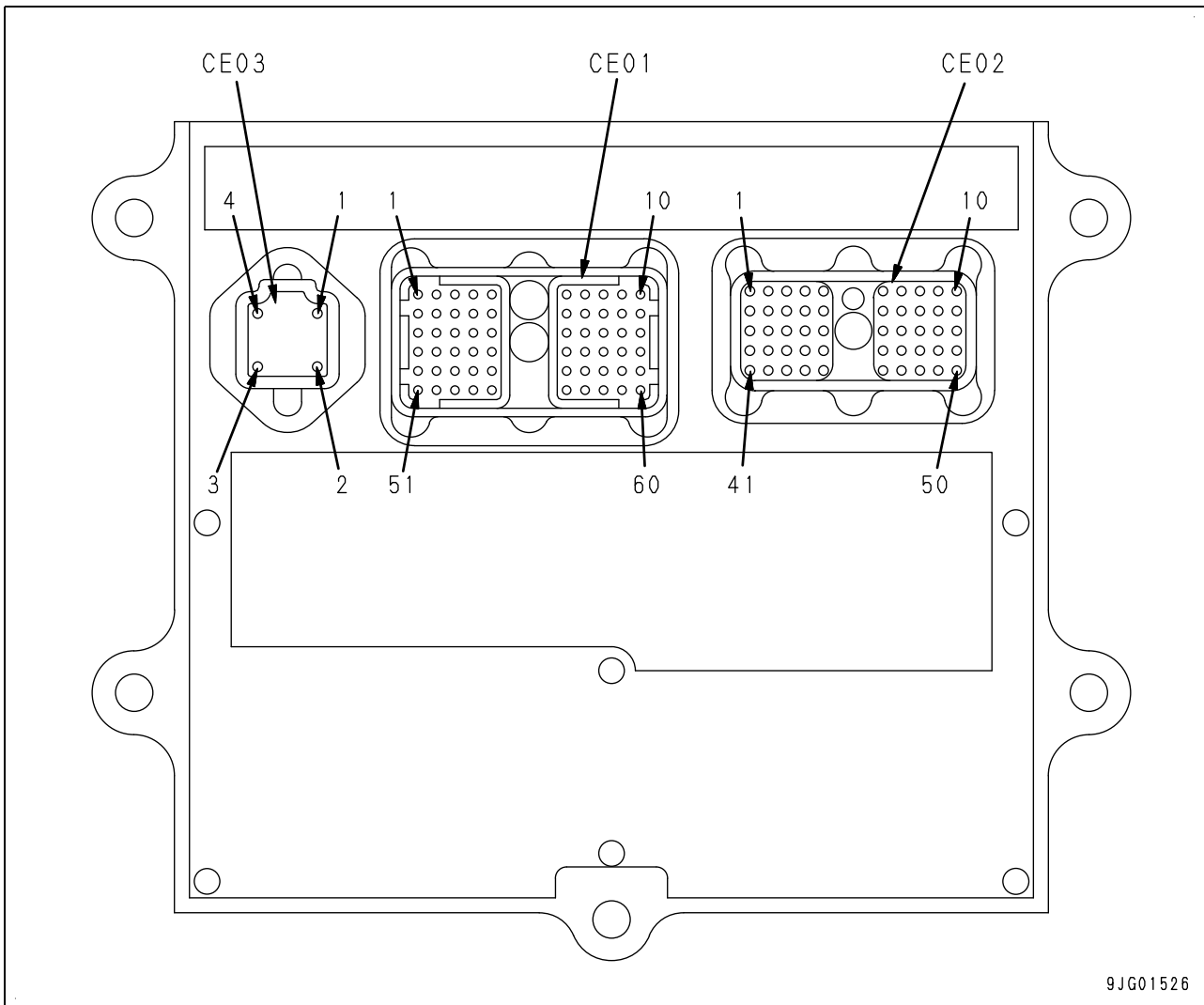
Unit: mm

No.	Check item		Criteria					Remedy
			Standard size	Tolerance		Standard clearance	Clearance limit	
Name of cylinder	Shaft	Hole						
1	Clearance between piston rod and bushing	Boom	120	-0.036 -0.090	+0.263 +0.048	0.084 – 0.353	0.453	Replace bushing
		Arm	140	-0.043 -0.106	+0.256 +0.039	0.082 – 0.362	0.662	
		Bucket	130	-0.043 -0.106	+0.256 +0.040	0.083 – 0.362	0.462	
2	Clearance between piston rod support shaft and bushing	Boom	125	-0.043 -0.106	+0.495 +0.395	0.438 – 0.601	1.5	Replace pin, bushing
		Arm	125	-0.043 -0.106	+0.495 +0.395	0.438 – 0.601	1.5	
		Bucket	110	-0.036 -0.090	+0.457 +0.370	0.406 – 0.547	1.5	
3	Clearance between cylinder bottom support shaft and bushing	Boom	110	-0.036 -0.090	+0.151 +0.074	0.110 – 0.241	1.5	
		Arm	120	-0.036 -0.090	+0.457 +0.370	0.406 – 0.547	1.5	
		Bucket	110	-0.036 -0.090	+0.457 +0.370	0.406 – 0.547	1.5	

Unit: mm

Model		PC600, PC600LC-8			
		2.9 m Arm	3.5 m Arm	4.3m Arm	5.2m Arm
No.					
1		∅125	∅125	∅125	∅125
2		148	148	148	148
3		458	458	458	458
4		∅130	∅130	∅130	∅130
5		499	582	627.7	666.9
6		460.6	321.7	338	352
7		1,188.9	1,187.2	1,182.7	1,178.6
8		2,863.2	3,465.2	4,256.6	5,188.1
9		3,624	3,324.2	3,315.9	3,308.2
10		471.3	497.6	497.6	497.6
11		910	810	810	810
12		700	700	700	700
13		678	608	608	608
14		2,197	2,166	2,166	2,166
15		∅115	∅115	∅115	∅115
16		456 ± 0.5	456 ± 0.5	456 ± 0.5	456 ± 0.5
17		∅115	∅115	∅115	∅115
18	Arm as individual part	448 <sup>0</sup> <sub>-0.5</sub>	448 <sup>0</sup> <sub>-0.5</sub>	448 <sup>0</sup> <sub>-0.5</sub>	448 <sup>0</sup> <sub>-0.5</sub>
	When press-fitting bushing	464	464	464	464
19	Min.	2,380	2,152	2,152	2,152
	Max.	3,990	3,577	3,577	3,577

Engine controller

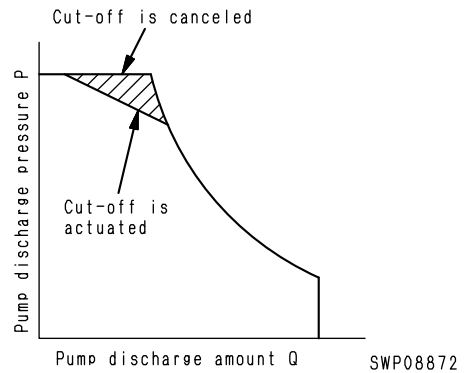


**2) Cut-off function**

- If the load during operation increases and the pump discharge pressure rises to near the relief pressure, the main pump cut-off valve is actuated to reduce the relief loss.

**3) Cut-off cancel function**

- The cut-off cancel function acts to stop the operation of the cut-off function in order to ensure the pump flow close to the relief pressure, thereby preventing any drop in speed.
- The actuation and cancellation of the cut-off function is set automatically by operating the power max. switch, or travel lever.



- Cut-off function and actuation of each switch

Function \ Switch	Working mode switch			Travel lever		Power max. switch		Swing lock switch	
	P	E	L	ON	OFF	ON	OFF	ON	OFF
Cut-off function	Actuated	Actuated	Cancel	Cancel	Actuated	Cancel	Actuated	Cancel	Actuated

**4) 2-stage relief function**

When L mode switch is ON, the pilot pressure of the 2-stage relief valve raises the set pressure of the main relief valve from 31.9 MPa {325 kg/cm<sup>2</sup>} to 37.2 MPa {380 kg/cm<sup>2</sup>} to increase the hydraulic power.

**Travel speed selection function**

- 1) Manual selection using travel speed switch  
If the travel speed switch is set to Lo, Hi, the pump controller controls the pump flow and motor volume at each speed range as shown on the right to switch the travel speed.
- 2) Automatic selection according to engine speed  
If the engine speed is reduced to below 1,200 rpm by the fuel control dial:
  - If the machine is traveling in Lo, it will not shift even if Hi is selected.
  - If the machine is traveling in Hi, it will automatically shift to Lo.

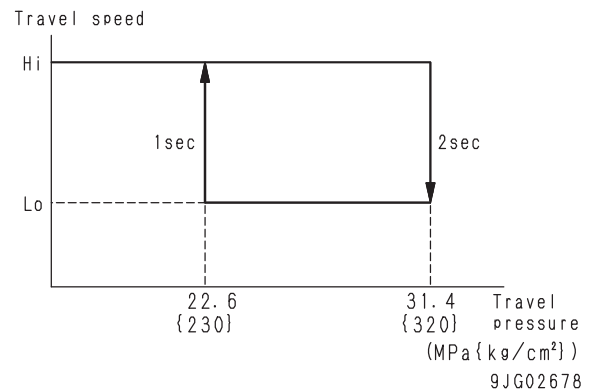
Travel speed switch	Lo (Low speed)	Hi (High speed)
Motor volume	Max.	Min
Travel speed (km/h)	3.0	4.9

- 3) Automatic selection according to pump discharge pressure

If the machine is traveling with the travel speed switch at Hi, and the load increases, such as when traveling up a steep hill, if the travel pressure continues at 31.4 MPa {320 kg/cm<sup>2</sup>} for more than 2.0 sec, the pump volume is automatically switched and the travel speed changes to Lo.

(The travel speed switch stays at Hi.)

The machine continues to travel in Lo, and when the load is reduced, such as when the machine travels again on flat ground or goes downhill, and the travel pressure stays at 22.6 MPa {230 kg/cm<sup>2</sup>} or less for more than 1.0 sec, the pump volume is automatically switched and the travel speed returns to Hi.



**Travel pressure increasing function**

**Outline**

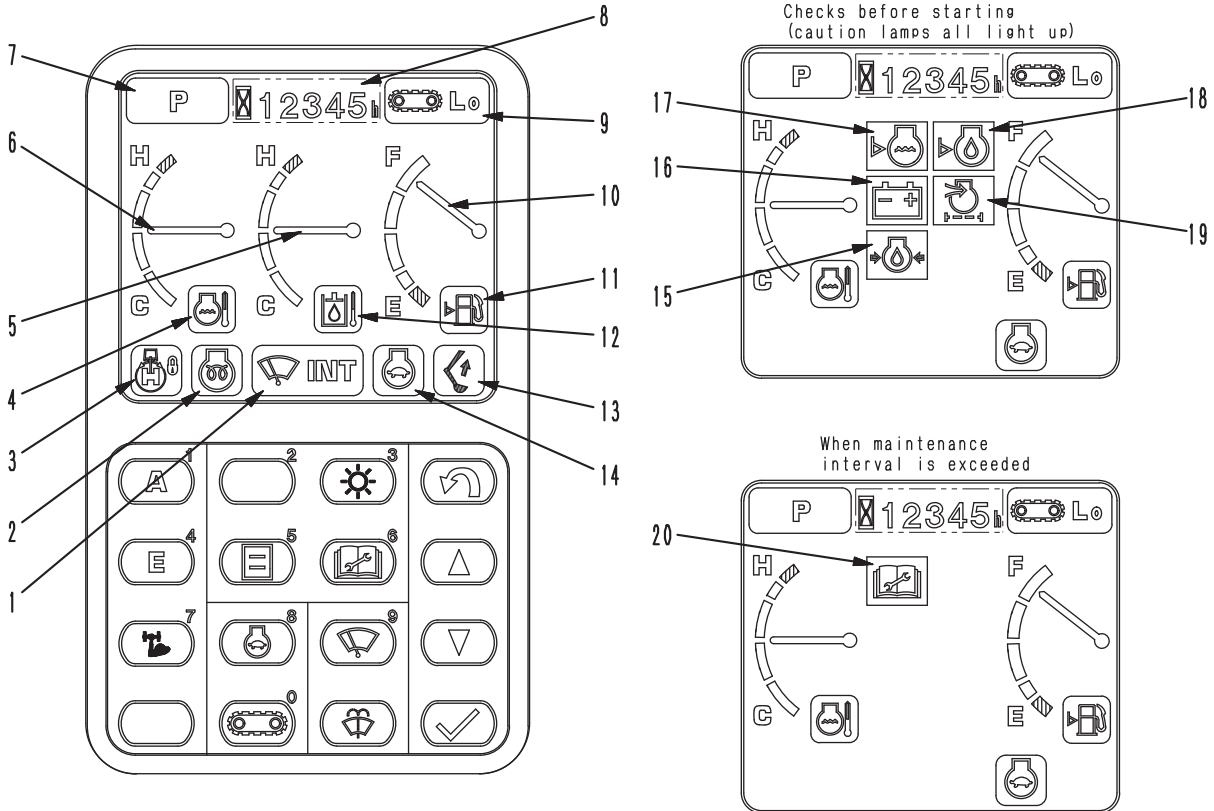
To maintain the drawbar pull when traveling, the cut-off is canceled and the pressure is raised from 31.9 MPa {325 kg/cm<sup>2</sup>} to 34.3 MPa {350 kg/cm<sup>2</sup>}.

**Operation**

	Pressure increase solenoid valve	Main relief valve set pressure	Cut-off cancel solenoid valve	CO valve
When traveling	De-energized	31.9 MPa {325 kg/cm <sup>2</sup> }	Energized	Canceled
When not traveling	De-energized	31.9 MPa {325 kg/cm <sup>2</sup> }	De-energized	Actuated

**Monitor control, display portion**

**Monitor portion**

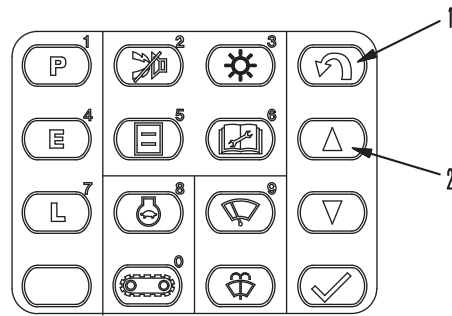


9JG01584

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. Wiper monitor</li> <li>2. Preheating monitor</li> <li>3. Swing lock monitor</li> <li>4. Engine coolant temperature monitor</li> <li>5. Hydraulic oil temperature gauge</li> <li>6. Engine coolant temperature gauge</li> <li>7. Working mode monitor</li> <li>8. Service monitor</li> <li>9. Travel speed meter</li> <li>10. Fuel gauge</li> </ul> | <ul style="list-style-type: none"> <li>11. Fuel level monitor</li> <li>12. Hydraulic oil temperature monitor</li> <li>13. Power Max. monitor</li> <li>14. Auto-deceleration monitor</li> <li>15. Radiator coolant level caution</li> <li>16. Battery charge caution</li> <li>17. Engine oil pressure caution</li> <li>18. Engine oil level caution</li> <li>19. Air cleaner clogging</li> <li>20. Maintenance time warning caution</li> </ul> |
|--|---|

**Service meter check function**

- When the starting switch is at the OFF position, keep return switch (1) and control switch (2) of the monitor pressed at the same time, and the service meter is shown on the display.
- This display is shown only while the two switches are being pressed. When the switches are released, the display goes out.  
Note that it takes 3 – 5 seconds after the switches are pressed for the service meter display to appear.



9JG01369

**Display LCD check function**

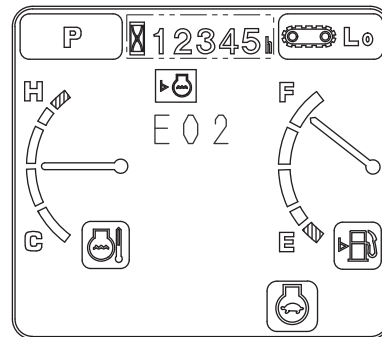
- On the password input screen or on the normal screen, if monitor return switch (1) and working mode (A) switch are kept pressed at the same time, all the LCD display will light up and the whole screen will become white, so the display can be checked.  
If any part of the display is black, the LCD is broken.



SJP08943

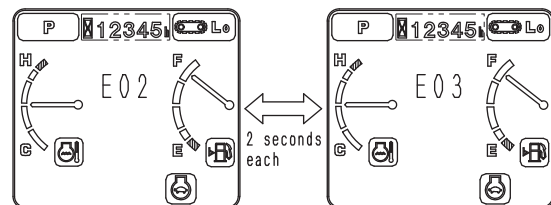
**User code display function**

- If there is any problem in operating the machine, the user code is displayed on the monitor to advise the operator of the steps to take. This code display appears on the operator screen.
- On the operator screen, the user code is displayed on the portion for the hydraulic oil temperature gauge.



9JG01370

- If more than one user code is generated at the same time, the user codes are displayed in turn for 2 seconds each to display all the user codes.



9JG01588

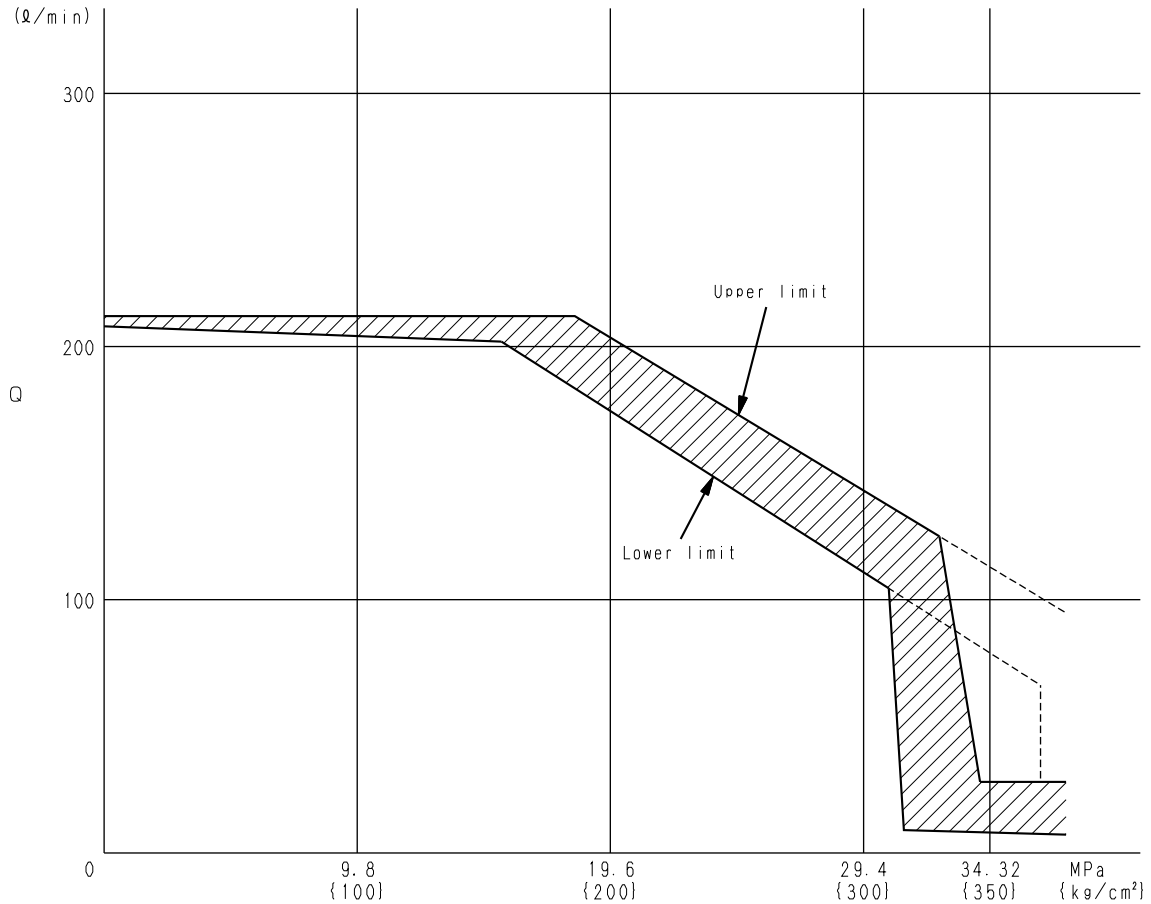
## Standard value table for engine

Machine model			PC600, 600LC-8		
Engine			SAA6D140E-5		
Item	Measurement condition	Unit	Standard value	Permissible value	
Engine speed	High idle	rpm	1,950 ± 50	1,950 ± 50	
	Low idle		800 ± 25	800 ± 25	
	Rated speed		1,800	1,800	
Intake air pressure	At rated output	kPa {mmHg}	Min 147 {Min. 1,100}	125 {940}	
Exhaust gas pressure	All speed range (intake air temp: 20°C)	°C	Max. 650	700	
Exhaust gas color	At sudden acceleration (low → high idle) At high idle	% (Bosch index)	Max. 25 (Max. 2.5) (Max. 1.0)	35 (3.5) (2.0)	
Valve clearance (at cold)	Intake valve	mm	0.35	—	
	Exhaust valve		0.57	—	
EGR valve and bypass valve drive oil pres- sure	High idle	MPa	Min. 1.18 {Min. 12}	Min. 1.18 {Min. 12}	
	Low idle	{kg/cm <sup>2</sup> }	Min. 1.43 {Min. 14.6}	Min. 1.43 {Min. 14.6}	
Compression pressure	Oil temperature: 40 – 60°C Engine speed: 200 – 250 rpm	MPa {kg/cm <sup>2</sup> }	Min. 4.1 {Min. 42}	2.8 {29}	
Blow-by pressure	(Coolant temperature: Min. 70°C) At rated output	kPa {mmH <sub>2</sub> O}	Max. 2.94 {Max. 300}	3.92 {400}	
Oil pressure	Oil temperature: Min. 80°C Rated output (At high idle)	SAE0W30E0S SAE5W40E0S SAE10W30DH SAE15W40DH SAE30DH	MPa {kg/cm <sup>2</sup> }	Min. 0.34 {Min. 3.5}	0.21 {2.1}
	Oil temperature: Min. 80°C Rated output (At low idle)			Min. 0.10 {Min. 1.0}	0.08 {0.8}
EGR valve and bypass valve drive oil pres- sure	High idle	MPa {kg/cm <sup>2</sup> }	Min. 1.43 {Min. 14.6}	Min. 1.43 {Min. 14.6}	
	Low idle		Min. 1.18 {Min. 12}	Min. 1.18 {Min. 12}	
Oil temperature	All speed range (inside oil pan)	°C	90 – 110	120	
Alternator belt tension	Deflection when pressed with finger force of approx. 58.8 N {6 kg}	mm	13 – 16	13 – 16	
Air conditioner compressor belt tension	Deflection when pressed with finger force of approx. 58.8 N {6 kg}	mm	10 – 15	10 – 15	

Applicable model				PC600, 600LC-8	
Category	Item	Measurement conditions	Unit	Standard value	Permissible value

**Discharge amount of one hydraulic pump**

Performance of hydraulic pump



$$P = \frac{P1 + P2}{2} \text{ (MPa {kg/cm}^2)}$$

BJP12713

- TVC current : 400 mA
- Pump speed: At 2,000 rpm (Engine rated speed at 1,800 rpm)

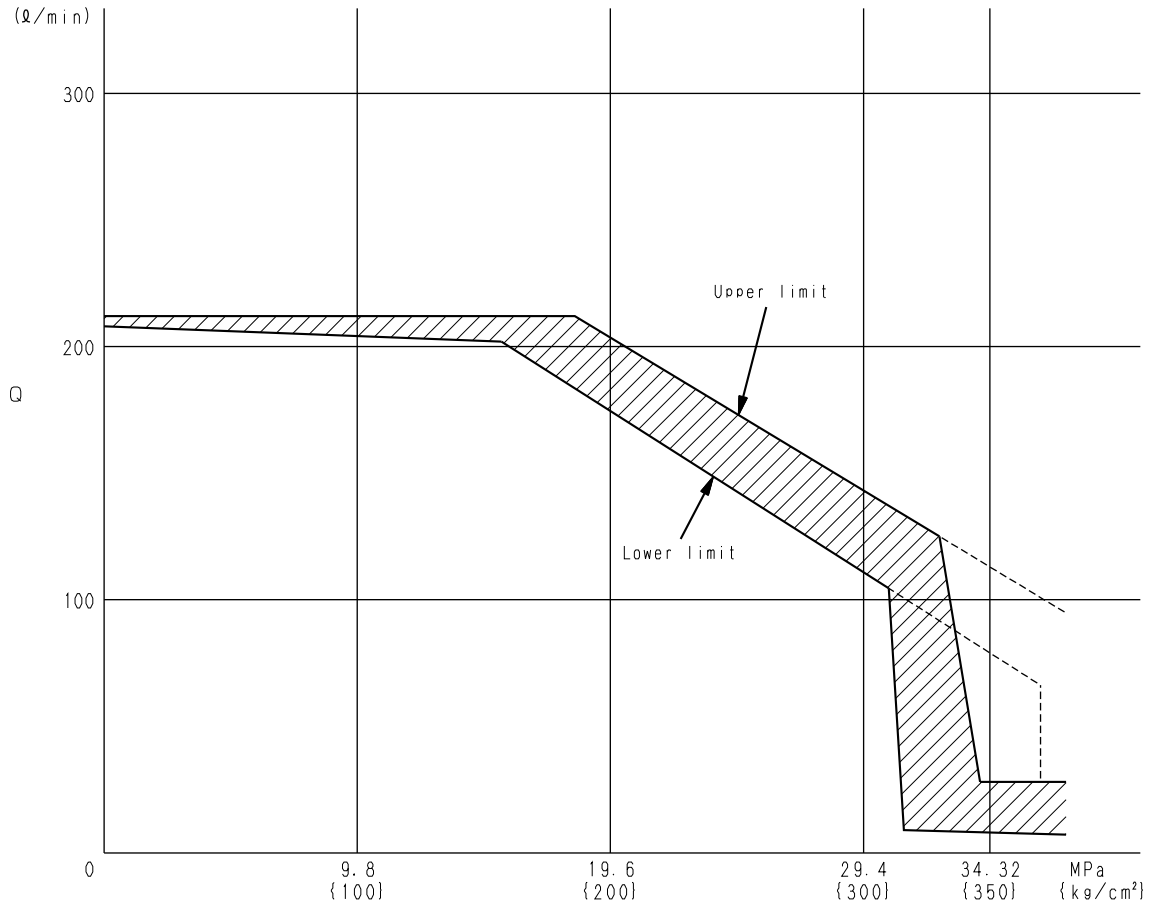
Check point	Test pump discharge pressure (MPa {kg/cm <sup>2</sup> })	Discharge pressure of other pump (MPa {kg/cm <sup>2</sup> })	Average pressure (MPa {kg/cm <sup>2</sup> })	Standard value for discharge amount Q (l/min)	Judgement standard lower limit Q (l/min)
As desired	P1	P2	$P = \frac{P1 + P2}{2}$	See graph	See graph

- ★ As far as possible, bring pump discharge pressure P1 and P2 as close as possible to the average pressure when measuring.  
The error is large near the point where the graph curves, so avoid measuring at this point.
- ★ When measuring with the pump mounted on the machine, if it is impossible to set the engine speed to the specified speed with the fuel control dial, take the pump discharge amount and the engine speed at the point of measurement, and use them as a base for calculating the pump discharge amount at the specified speed.

Applicable model				PC600, 600LC-8	
Category	Item	Measurement conditions	Unit	Standard value	Permissible value

**Discharge amount of one hydraulic pump**

Performance of hydraulic pump



$$P = \frac{P1 + P2}{2} \text{ (MPa {kg/cm}^2)}$$

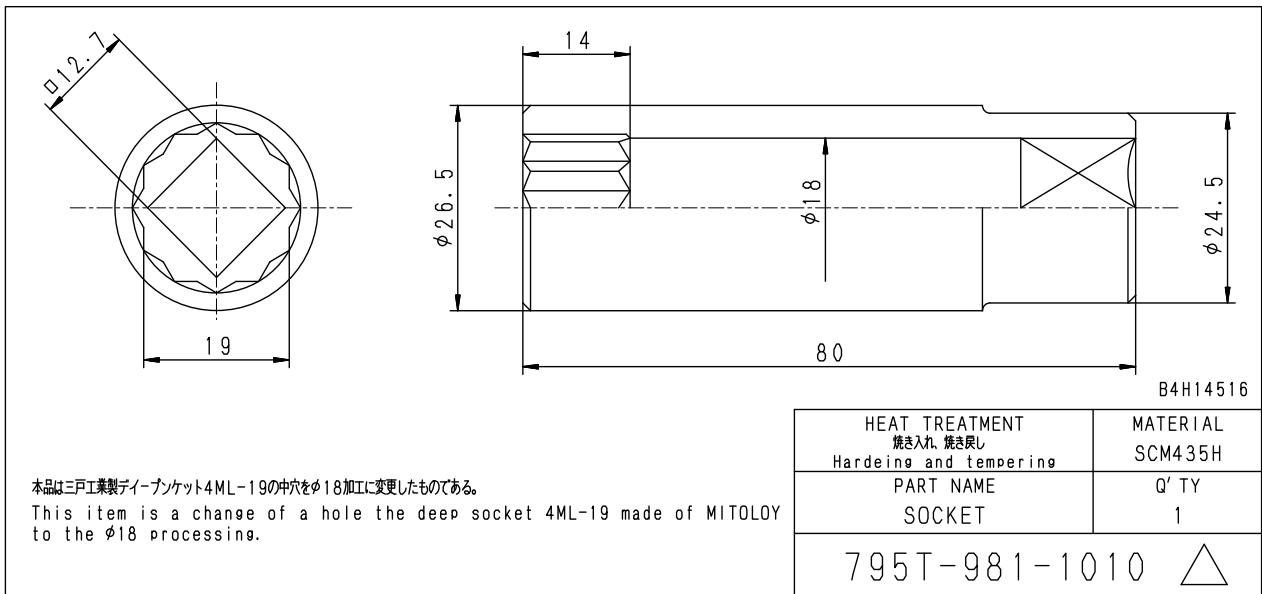
BJP12713

- TVC current : 400 mA
- Pump speed: At 2,000 rpm (Engine rated speed at 1,800 rpm)

Check point	Test pump discharge pressure (MPa {kg/cm <sup>2</sup> })	Discharge pressure of other pump (MPa {kg/cm <sup>2</sup> })	Average pressure (MPa {kg/cm <sup>2</sup> })	Standard value for discharge amount Q (l/min)	Judgement standard lower limit Q (l/min)
As desired	P1	P2	$P = \frac{P1 + P2}{2}$	See graph	See graph

- ★ As far as possible, bring pump discharge pressure P1 and P2 as close as possible to the average pressure when measuring.  
The error is large near the point where the graph curves, so avoid measuring at this point.
- ★ When measuring with the pump mounted on the machine, if it is impossible to set the engine speed to the specified speed with the fuel control dial, take the pump discharge amount and the engine speed at the point of measurement, and use them as a base for calculating the pump discharge amount at the specified speed.

Socket



本品は三戸工業製ディーブソケット4ML-19の中穴をφ18加工に変更したものである。  
 This item is a change of a hole the deep socket 4ML-19 made of MITOLLOY to the φ18 processing.

## Handling equipment in fuel circuit

- ★ Precautions in inspection and maintenance of fuel system equipment  
The common rail type fuel injection system (CRI) is composed of more precise components than the usual fuel injection pump and nozzle and will probably get out of order when foreign matters enter the system.  
During inspection and maintenance of the fuel system, pay more attention to foreign matters than in case of usual fuel injection pumps and wash the system carefully with clean fuel if dusts enter the system.
- ★ Precautions in replacement of fuel filter cartridge  
Be sure to use genuine fuel filter cartridge of Komatsu.  
The common rail type fuel injection system (CRI) is composed of more precise components than the usual fuel injection pump and nozzle and is equipped with special filter with highly efficient filtration performance to prevent foreign matters from entering the system.  
Therefore, be sure to use genuine filters only.  
Otherwise, the fuel system will possibly get out of order.

## Releasing remaining pressure in fuel system

- ★ While the engine is rotating, pressures occur in the low pressure circuit and the high pressure circuit of the fuel system.  
Low pressure circuit : feed pump – fuel filter – fuel supply pump  
High pressure circuit : fuel supply pump – common rail – fuel injector
- ★ When 30 seconds elapse after the engine stopped, pressures in both the low pressure circuit and the high pressure circuit drop to the safe level automatically.
- ★ Since pressure remaining in the fuel system should be released certainly before inspection of the fuel system and mounting and removing of equipment, be sure to observe the following precautions:
  - ⚠ Inspect the fuel system or mount or remove equipment more than 30 seconds after the engine stopped and after pressure remaining in the fuel system is released. (Pressure remains in the fuel system right after the engine stopped, so do not start any work until 30 seconds elapse.)

# Testing clearance of swing circle bearing

★ Tools for testing clearance of swing circle bearing

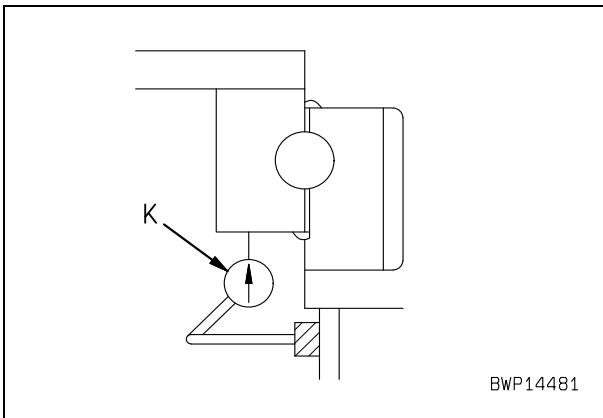
Symbol	Part No.	Part name
K	Commercially available	Dial gauge (with magnet)

★ When measuring swing circle bearing clearance on a machine, follow the procedures below:

★ For the standard values, see "Structure, function and maintenance standard", "Swing circle".

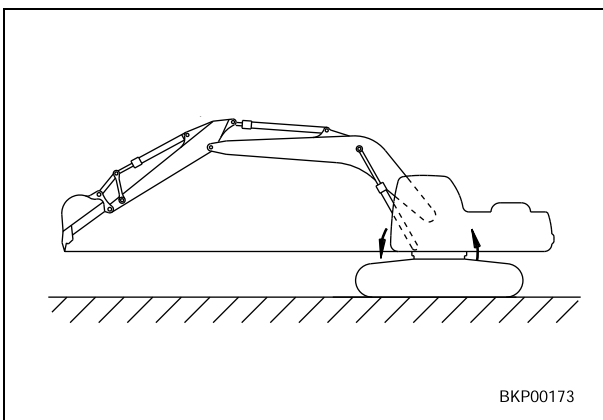
1. Fix the dial gauge **K** to the track frame (center frame) and bring the stylus to the outer race end face.

★ Set the dial gauge to the front or to the rear.

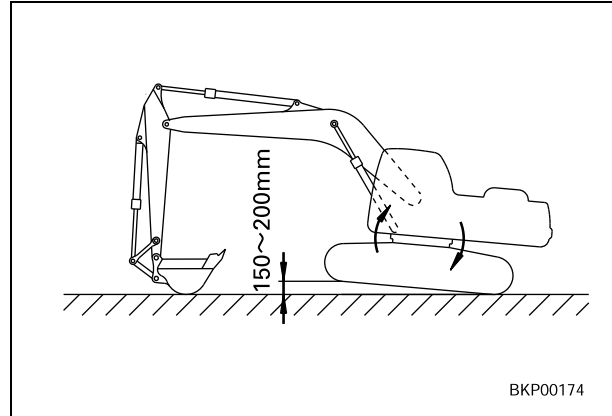


2. Set the work equipment to the maximum reach and set the bucket tip to the height of the revolving frame lower face.

★ At the time, the front of the upper structure lowers and its rear rises.



3. Set the dial gauge **K** to the zero point.
4. Arrange the arm almost at right angles to the ground and lower the boom until the front leg of the machine body rises.
  - ★ At the time, the front of the upper structure rises and its rear lowers.



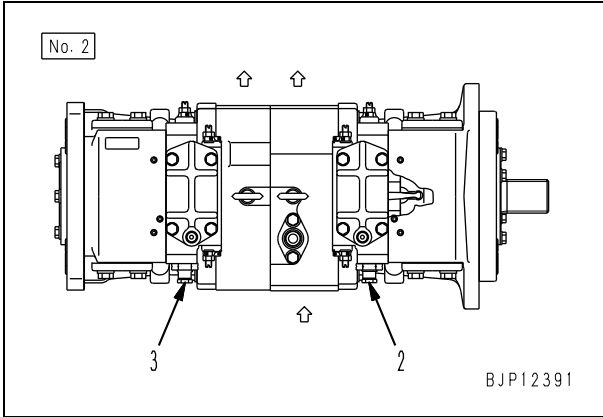
5. At the time, read the value on the dial gauge **K**. This value on the dial gauge indicates the swing circle bearing clearance.

**!** During the measurement, never place hands and legs below the undercarriage.

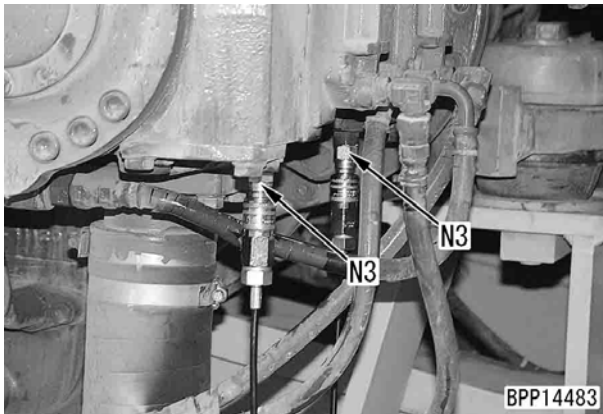
6. Return the work equipment to the state in Paragraph 2 and make sure that the dial gauge **K** has returned to the zero point. If not, repeat Steps 2 to 5.

**2. Measuring CO • NC valve output pressure**

- 1) Open the undercover of the No. 2 pump.
- 2) Remove oil pressure measurement plugs (2) and (3) of the No. 2 pump.
  - (2): For front pump circuit
  - (3): For rear pump circuit

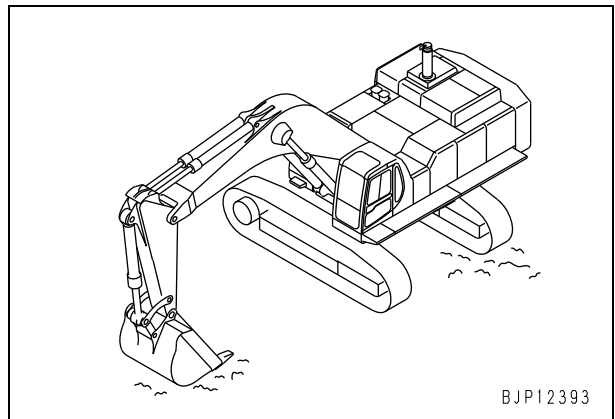


- 3) Install nipple **N3** and connect oil pressure gauge [1] of hydraulic tester **N1**.
  - ★ Use the oil pressure gauges of 6 MPa {60 kg/cm<sup>2</sup>}.



- 4) Start the engine and set the working mode switch in the P mode position.
- 5) Set all the control levers in neutral and measure the CO • NC valve output pressure under the following condition.
  - i) Set all the control levers in neutral.
  - ii) Run the engine at high idle and measure the output pressure.
- 6) Relieve the boom circuit by raising the boom (P mode) and measure the CO • NC valve output pressure under the following condition.
  - i) Run the engine at high idle, relieve the boom circuit by raising the boom, and measure the output pressure.

- 7) Drive the travel motor under no load and measure the CO • NC valve output pressure under the following condition.
  - i) Raise the track shoe to be measured by using the boom and arm.
  - ii) Run the engine at high idle, drive the travel motor under no load (with the lever at the stroke end), and measure the output pressure.
- 8) Set the working mode switch in the L mode position, relieve the boom circuit by raising the boom, and measure the output pressure under the following condition.
  - i) Select L mode.
  - ii) Run the engine at high idle, relieve the boom circuit by raising the boom, and measure the output pressure.



- 9) After completing the measurement, remove the measuring tools and set to the original condition.

## Measuring outlet pressures of solenoid valve and PPC shuttle valve

★ Tools for measuring outlet pressures of solenoid valve and PPC shuttle valve

Symbol	Part No.	Part name
R	1	799-101-5002 Hydraulic tester
		790-261-1204 Digital hydraulic tester
	2	799-401-3200 Adapter (Size: 03)

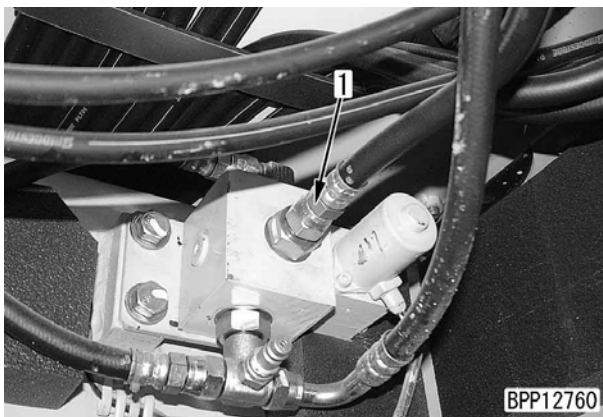
★ Measure the outlet pressures of solenoid valve and PPC shuttle valve under the following condition.

- Hydraulic oil temperature: Within operating range

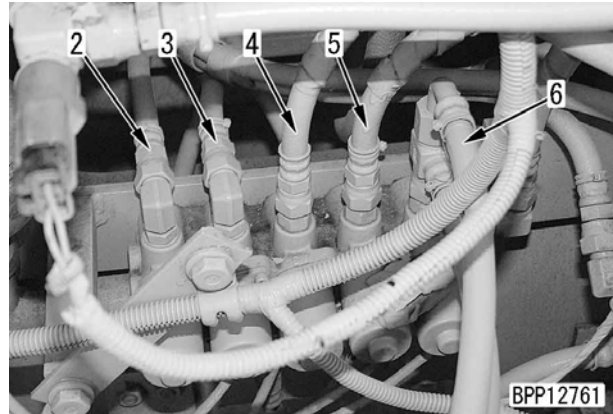
**⚠** Lower the work equipment to the ground and stop the engine. Operate the control levers several times to release the remaining pressure in the piping, and then loosen the oil filler cap of the hydraulic tank slowly to release the internal pressure of the hydraulic tank.

### 1. Measuring outlet pressure of solenoid valve

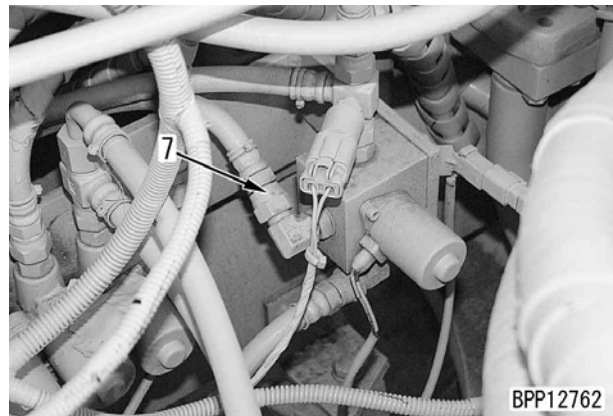
- Remove operator's cab under cover (rear side) or control valve upper cover.
- Disconnect outlet hoses (1) – (7) of the solenoid valves to be measured, and install adapter **R2** and connect the hoses again.
  - (1): PPC lock solenoid valve



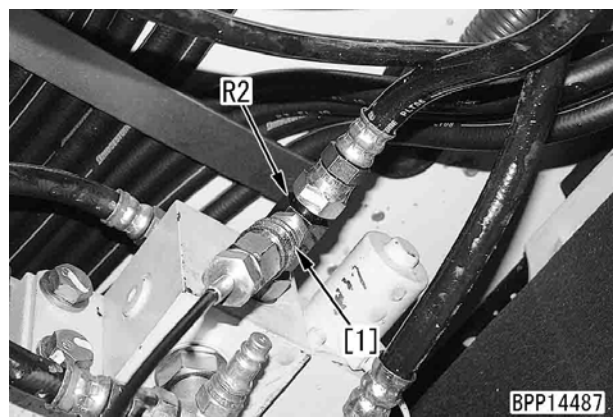
- (2): CO cancel solenoid valve
- (3): 2-stage relief solenoid valve
- (4): Machine push-up solenoid valve
- (5): Travel speed select solenoid valve
- (6): Swing holding brake solenoid valve



- (7): Bucket CURL Hi cancel solenoid valve



- Install nipple [1] of hydraulic tester **R1** and connect it to oil pressure gauge [2].
  - ★ Use a pressure gauge of 6 MPa {60 kg/cm<sup>2</sup>}.
  - ★ The following figure shows the measuring devices installed to the outlet hose of the safety lock solenoid valve.

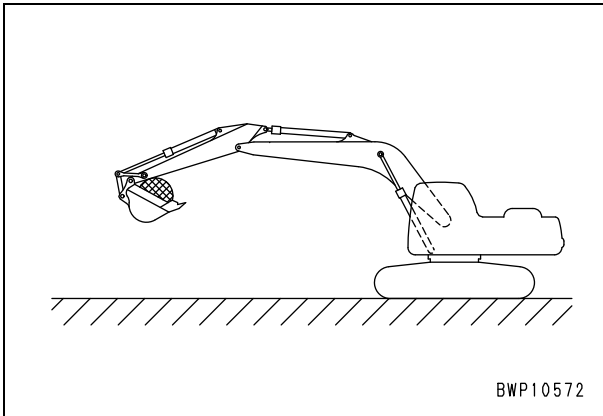


## Inspection of locations of hydraulic drift of work equipment

★ If there is any hydraulic drift in the work equipment (cylinders), check in the following manner to determine if the cause is in the cylinder packing or in the control valve.

### 1. Inspection of boom and bucket cylinders

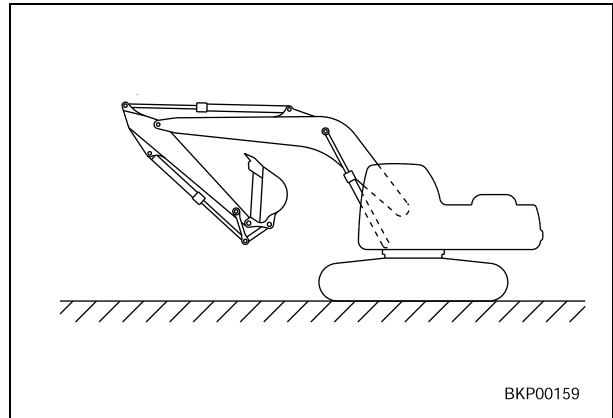
- 1) Set the work equipment in the same posture as when measuring hydraulic drift, and stop the engine.
  - ★ Fill the bucket with earth or apply the rated load to the bucket.



- 2) Operate the control lever to the RAISE position or the bucket control lever to the CURL position.
  - If the lowering speed increases, the cylinder packing is defective.
  - If there is no change, the control valve is defective.
  - ★ Operate the control lever with the engine starting switch in the ON position.
  - ★ If pressure in the accumulator has dropped, run the engine for approx. 10 seconds to charge the accumulator again.

### 2. Inspection of arm cylinder

- 1) Operate the arm cylinder to move the arm to the position 100 mm before the digging stroke end, and stop the engine.



- 2) Operate the control lever to the CURL position.
    - If the lowering speed increases, the cylinder packing is defective.
    - If there is no change, the control valve is defective.
    - ★ Operate the control lever with the engine starting switch in the ON position.
    - ★ If pressure in the accumulator has dropped, run the engine for approx. 10 seconds to charge the accumulator again.
- [Reference] If the cause of the hydraulic drift is in the defective packing, and the above operation is carried out, downward movement is accelerated for the following reasons.
- 1) If the work equipment is set to the above posture (holding pressure applied to the bottom end), the oil at the bottom end leaks to the head end. However, the volume at the head end is smaller than the volume at the bottom end by the volume of the rod end, so the internal pressure at the head end increases because of the oil flowing in from the bottom end.
  - 2) When the internal pressure at the head end increases, the pressure at the bottom end also rises in proportion to this. The balance is maintained at a certain pressure (this differs according to the amount of leakage) by repeating this procedure.
  - 3) When the pressure is balanced, the downward movement becomes slower. If the lever is then operated according to the procedure given above, the circuit at the head end is opened to the drain circuit (the bottom end is closed by the check valve), so the oil at the head end flows to the drain circuit and the downward movement becomes faster.

PC600, 600LC-8 Hydraulic excavator

Form No. SEN00444-04

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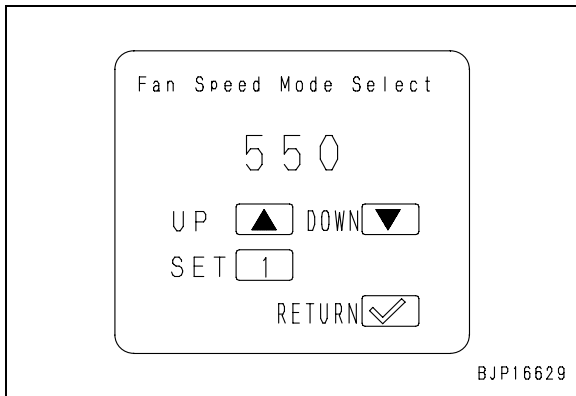
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Action code	Failure code	Trouble (Displayed on screen)	Alarm buzzer	Component in charge	Category of record
E11	CA272	IMV/PCV1 Open Error	●	ENG	Electrical system
E11	CA273	PCV2 Short Error	●	ENG	Electrical system
E11	CA274	PCV2 Open Error	●	ENG	Electrical system
E11	CA322	Inj #1(L#1) Open/Short Error	●	ENG	Electrical system
E11	CA323	Inj #5(L#5) Open/Short Error	●	ENG	Electrical system
E11	CA324	Inj #3(L#3) Open/Short Error	●	ENG	Electrical system
E11	CA325	Inj #6(L#6) Open/Short Error	●	ENG	Electrical system
E11	CA331	Inj #2(L#2) Open/Short Error	●	ENG	Electrical system
E11	CA332	Inj #4(L#4) Open/Short Error	●	ENG	Electrical system
E10	CA342	Calibration Code Incompatibility		ENG	Electrical system
E10	CA351	Injectors Drive Circuit Error	●	ENG	Electrical system
E15	CA352	Sens Supply 1 Volt Low Error	●	ENG	Electrical system
E15	CA386	Sens Supply 1 Volt High Error	●	ENG	Electrical system
E10	CA441	Battery Voltage low error	●	ENG	Electrical system
E10	CA442	Battery Voltage high error	●	ENG	Mechanical system
E11	CA449	Rail Press Very High Error	●	ENG	Electrical system
E11	CA451	Rail Press Sensor High Error	●	ENG	Electrical system
E11	CA452	Rail Press Sensor Low Error	●	ENG	Electrical system
E15	CA553	Rail Press High Error	●	ENG	Electrical system
—	CA554	Rail Press Sensor In Range Error		ENG	Electrical system
E15	CA559	Rail Press Low Error	●	ENG	Electrical system
E11	CA689	Eng Ne Speed Sensor Error	●	ENG	Electrical system
E11	CA731	Eng Bkup Speed Sens Phase Error	●	ENG	Electrical system
E10	CA757	All Persistent Data Lost Error	●	ENG	Electrical system
E11	CA778	Eng Bkup Speed Sensor Error	●	ENG	Electrical system
E15	CA1228	EGR Valve Servo Error 1	●	ENG	Electrical system
E11	CA1625	EGR Valve Servo Error 2	●	ENG	Electrical system
E11	CA1626	BP Valve Sol Current High Error	●	ENG	Electrical system
E11	CA1627	BP Valve Sol Current Low Error	●	ENG	Electrical system
E15	CA1628	Bypass Valve Servo Error 1	●	ENG	Electrical system

Code No.	Monitoring item		Unit (Default: ISO)			Remarks
			ISO	meter	inch	
37401	Ambient Press Sens Volt		V	V	V	
18401	Intake Temp Sens Volt		V	V	V	
18501	Charge Temp Sens Volt		V	V	V	
36501	Charge Press Sens Volt		V	V	V	
36401	Rail Pressure Sens Volt		V	V	V	
18001	EGR In Press Sens Volt		V	V	V	
18101	EGR Valve Pos Sens Volt		V	V	V	
18201	BPS Valve Pos Sens Volt		V	V	V	
17201	PCV Close Timing		CA	CA	CA	
17500	Engine Power Mode		—	—	—	
31701	Throttle Position		%	%	%	
31706	Final Throttle Position		%	%	%	
18600	Inject Fueling Command		mg/st	mg/st	mg/st	
36200	Rail Press Command		MPa	kg/cm <sup>2</sup>	PSi	
36300	Injection Timing Command		CA	CA	CA	
37300	Fuel Rate (Note 1)		L/h	L/h	L/h	
01602	2nd Eng. Speed Command		%	%	%	
13113	Main Pump Absorb Torque		Nm	kgm	lbft	
13114	Fan Pump Absorb Torque		Nm	kgm	lbft	
13112	Total Pump Absorb Torque		Nm	kgm	lbft	
01900	Pressure Switch 1	Swing	Display of ON/OFF			
		Travel	Display of ON/OFF			
		Boom Lower	Display of ON/OFF			
		Boom Raise	Display of ON/OFF			
		Arm Curl	Display of ON/OFF			
		Arm Dump	Display of ON/OFF			
01901	Pressure Switch 2	Bucket Curl	Display of ON/OFF			
		Bucket Dump	Display of ON/OFF			
		Service	Display of ON/OFF			
		Travel Steering	Display of ON/OFF			
02300	Solenoid 1	Bucket Hi Cancel	Display of ON/OFF			
		Swing Brake	Display of ON/OFF			
		2-Stage Relief	Display of ON/OFF			
		Travel Speed	Display of ON/OFF			
		Fan Reverse	Display of ON/OFF			
		CO Cancel	Display of ON/OFF			
02200	Switch Input 1	Lever SW	Display of ON/OFF			
		Swing Release SW	Display of ON/OFF			
		Swing Brake S	Display of ON/OFF			

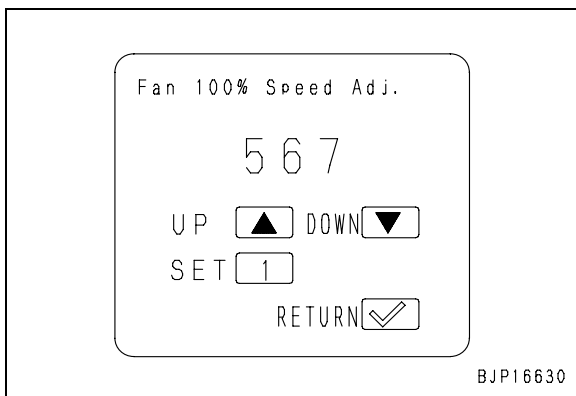
- 4) Fan speed mode selection function  
To adjust the fan speed, it must be fixed temporarily. Select one of the following modes as necessary.



Adjustment value	Fan speed mode selection
550	Normal mode: For normal operation
551	70% speed mode: For check of meeting of regulations
552	100% speed mode: For fan speed adjustment

- ★ If the starting switch is turned OFF, the fan speed mode returns to "550: Normal mode". Keep the starting switch ON while adjusting the fan speed.

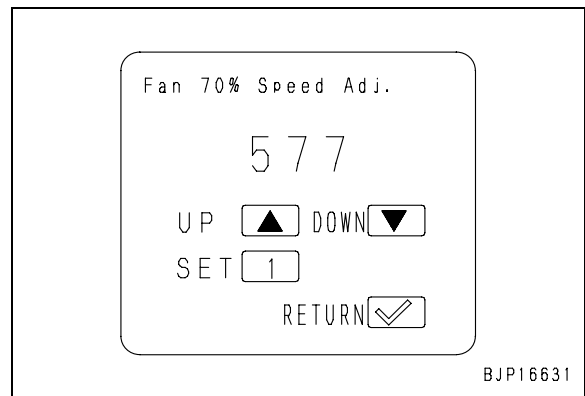
- 5) Fan 100% speed adjustment function  
After "100% speed" is set in 4) above, the fan speed can be adjusted within the following range.
- ★ Adjust the fan speed within the standard range (1,050 ± 50 rpm).



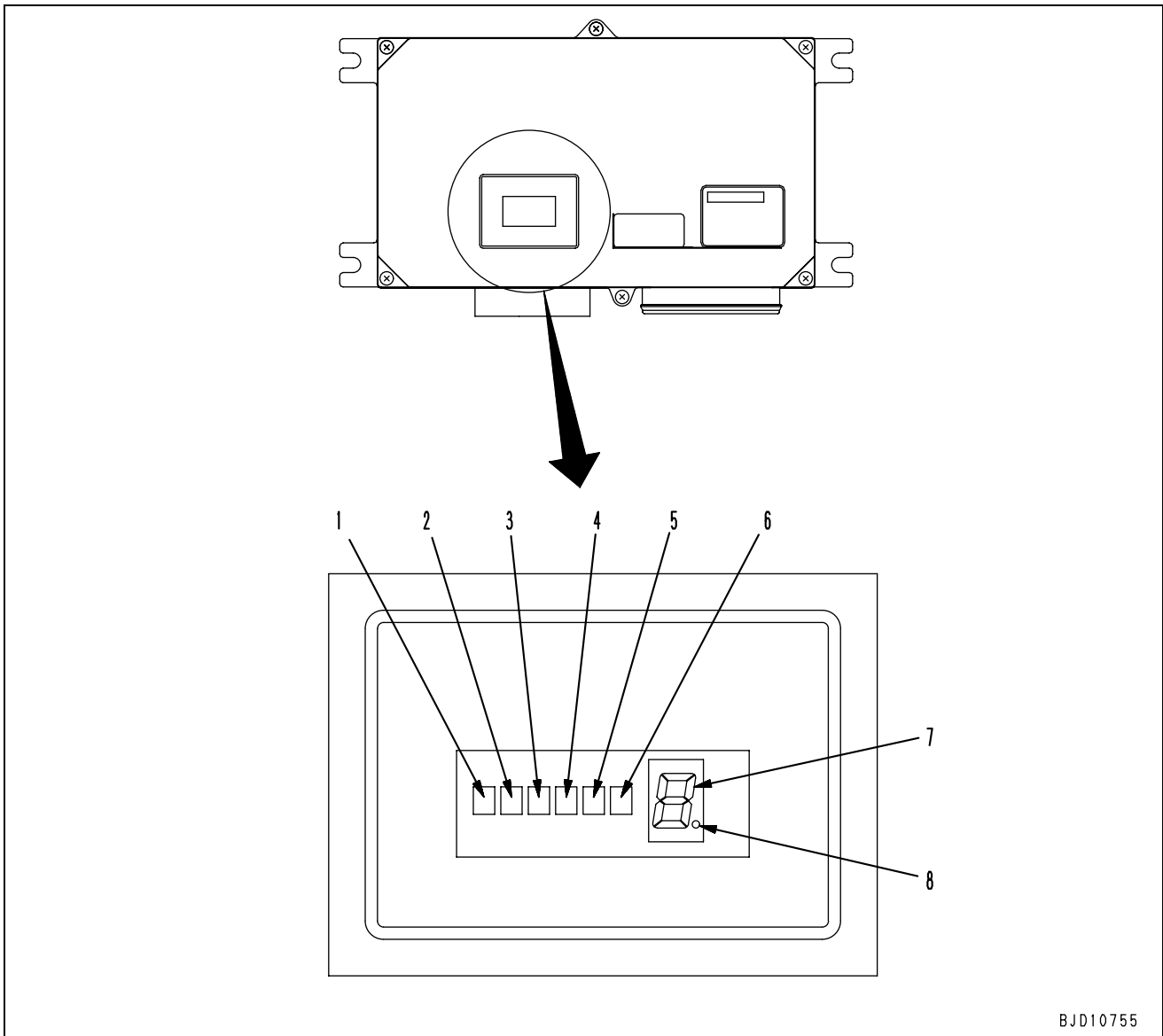
- ★ The set value is kept even after the starting switch is turned OFF.

Adjustment value	Fan 100% Speed
560	+ 140 rpm
561	+ 120 rpm
562	+ 100 rpm
563	+ 80 rpm
564	+ 60 rpm
565	+ 40 rpm
566	+ 20 rpm
567	0
568	- 20 rpm
569	- 40 rpm
56A	- 60 rpm
56B	- 80 rpm
56C	- 100 rpm
56D	- 120 rpm
56E	- 140 rpm

- 6) Fan 70% speed adjustment function  
After "70% speed" is set in 4) above, the fan speed can be adjusted within the following range.



## KOMTRAX terminal lamp indications



BJD10755

### LED for CPU

- 1. LED-C1 (R signal and ACC signal)
- 2. LED-C2 (Initial output state)
- 3. LED-C3 (S-NET and C signal state)
- 4. LED-C4 (CAN state)
- 5. LED-C5 (Download writing state)
- 6. LED-C6 (Download writing state)

### 7-segment and dot for CPU

- 7. 7-segment (Number of mails which are not transmitted yet and condition of satellite link)
- 8. Dot (GPS positioning state)



# Pm-CLINIC SERVICE PC600, 600LC-8

Measurement item	Condition	Unit	Standard value for new machine	Service limit value	Measurement result	Good	Bad
4. Relief oil pressure	1. Front pump pressure	Raise boom to relieve	MPa {kg/cm <sup>2</sup> }	30.89 – 33.34 {315 – 340}	30.89 – 33.34 {315 – 340}		
		Raise boom to relieve (Turn power max. switch ON)		33.34 – 35.79 {340 – 365}	33.34 – 35.79 {340 – 365}		
		Raise boom to relieve (L mode)		37.2 <sup>+1.5</sup> <sub>-2.0</sub> {380 <sup>+15</sup>	37.2 <sup>+1.5</sup> <sub>-2.0</sub> {380 <sup>+15</sup>		
		Relieve L.H. travel		35.30 – 37.75 {360 – 385}	35.30 – 37.75 {360 – 385}		
		Relieve left swing		28.93 – 30.89 {295 – 315}	28.93 – 30.89 {295 – 315}		
		Relieve right swing		28.93 – 30.89 {295 – 315}	28.93 – 30.89 {295 – 315}		
	2. Rear pump pressure	Raise boom to relieve		30.89 – 33.34 {315 – 340}	30.89 – 33.34 {315 – 340}		
		Raise boom to relieve (L mode)		37.2 ± 1.5 {380 ± 15}	37.2 ± 1.5 {380 ± 15}		
		Raise boom to relieve (Turn power max. switch ON)		33.34 – 35.79 {340 – 365}	33.34 – 35.79 {340 – 365}		
		Relieve R.H. travel		35.30 – 37.75 {360 – 385}	35.30 – 37.75 {360 – 385}		
		3. Control pressure		Set all control levers in neutral	3.14 – 3.53 {32 – 36}	3.14 – 3.53 {32 – 36}	

5. OLSS oil pressure	1. TVC valve output pressure	Set all control levers in neutral	MPa {kg/cm <sup>2</sup> }	2.05 – 2.45 {21 – 25}	Min. 1.76 {Min. 18}		
		Raise boom to relieve		0.57 – 1.30 {5.8 – 13.2}	0.52 – 1.25 {5.3 – 12.7}		
		Raise boom to relieve (Turn power max. switch ON)		0.82 – 1.22 {8.4 – 12.4}	0.77 – 1.17 {7.9 – 11.9}		
	2. Front CO • NC valve output pressure	Set all control levers in neutral		Max. 0.4 {Max. 4}	Max. 0.55 {Max. 5.5}		
		Raise boom to relieve		0.57 – 1.30 {5.8 – 13.2}	0.52 – 1.25 {5.3 – 12.7}		
		Run L.H. travel under no load (Set lever at stroke end)		Min. 1.7 {Min. 17}	Max. 1.7 {Max. 17}		
		Raise boom to relieve (Turn power max. switch ON)		0.82 – 1.22 {8.4 – 12.4}	0.77 – 1.17 {7.9 – 11.9}		
		Set all control levers in neutral		Max. 0.4 {Max. 4}	Max. 0.55 {Max. 5.5}		
		Raise boom to relieve		0.57 – 1.30 {5.8 – 13.2}	0.52 – 1.25 {5.3 – 12.7}		
	3. Rear CO • NC valve output pressure	Run R.H. travel under no load (Set lever at stroke end)		Max. 1.7 {Max. 17}	Max. 1.7 {Max. 17}		
		Raise boom to relieve (Turn power max. switch ON)		0.82 – 1.22 {8.4 – 12.4}	0.77 – 1.17 {7.9 – 11.9}		

6	Hydraulic drift of work equipment	Oil temperature: 45 – 55°C Bucket: Empty	Hydraulic drift of tooth tip	mm/15 min.	Max. 1,200	Max. 1,800		
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7	Hydraulic tank strainer	Check strainer visually (for metal dust, rubber chips, etc.)	—	There must not be excessive metal dust or foreign matter.				
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Memo							

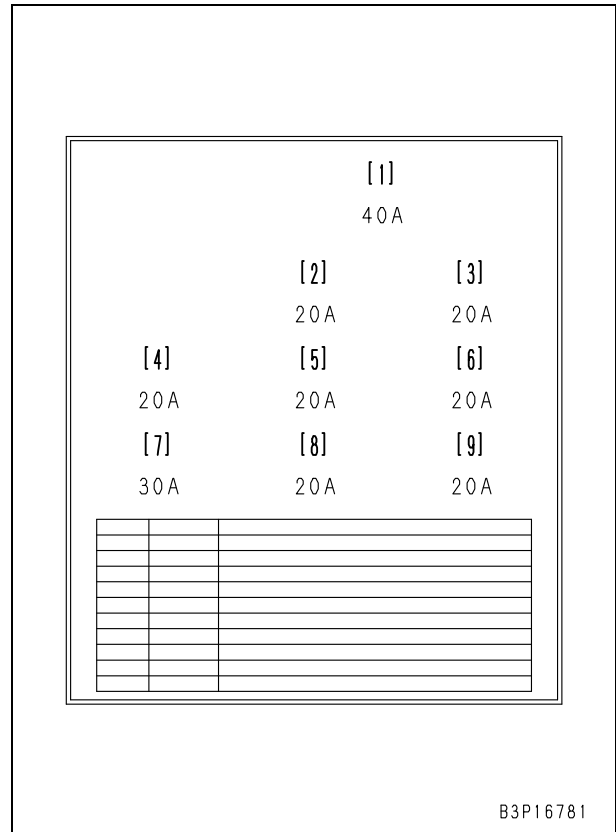
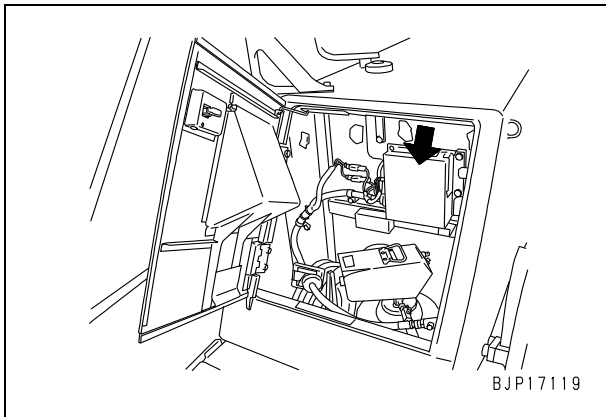
## Fuse locations

### Connection table of circuit breakers

- ★ This connection table shows the devices to which each power supply of the circuit breakers supplies power (A switch power supply is a device which supplies power while the starting switch is at the ON position and a constant power supply is a device which supplies power while the starting switch is at the OFF position).
- ★ When carrying out troubleshooting for a displayed code, you should check the circuit breakers to see if the power is supplied normally.

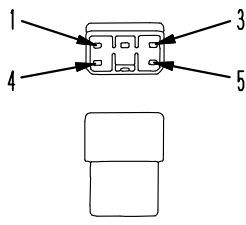
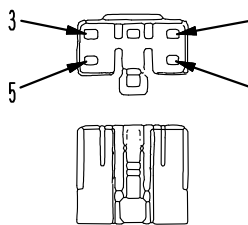
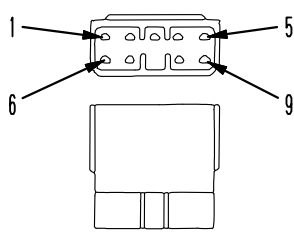
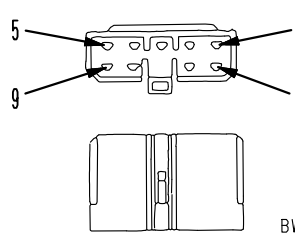
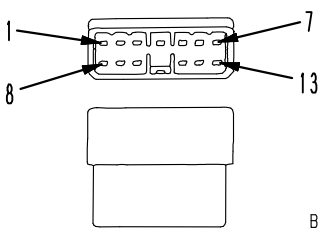
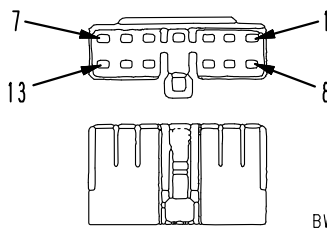
Type of power supply	Circuit breaker No.	Circuit breaker capacity	Destination of power
Switch power supply (Battery relay terminal M)	1	40A	Fuse box (Fuses No. 1 – 15)
	2	20A	Boom working lamp, right headlamp
	3	20A	Grease pump
	4	20A	Pump controller power source
	5	20A	Head lamp on cab
Constant power supply (Battery relay terminal B)	6	20A	Starting switch, Pump controller (Power supply for solenoid)
	7	30A	Engine controller (Power supply drive)
	8	20A	Machine monitor, Buzzer
	9	20A	Fuse box (Fuses No. 16 – 20)

Circuit breaker box inside the grease pump box located at the front right of machine.



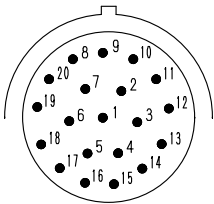
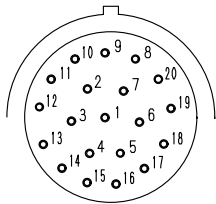
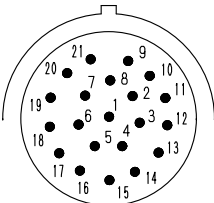
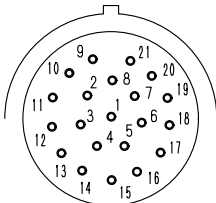
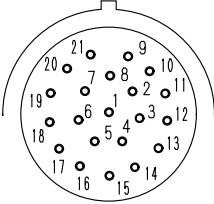
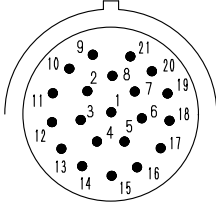
## Failure-looking phenomenon and troubleshooting No.

No.	Failure-looking phenomenon	Troubleshooting			
		Code display	E mode	H mode	S mode
<b>Action to be taken concerning User Code, Error Code and Failure Code</b>					
1	Display User Code in monitor panel	According to displayed code			
2	Display Failure Code in mechanical system after checking Abnormality Record				
<b>Engine related failure</b>					
3	Starting performance is poor (starting always takes time)				S-1
4	Engine does not start	Engine does not turn		E-1	S-2 a)
5		Engine turns but no exhaust smoke comes out			S-2 b)
6		Exhaust smoke comes out but engine does not start (Fuel is being injected)			S-2 c)
7	Engine does not pick up smoothly (follow-up is poor)				S-3
8	Engine stops during operations				S-4
9	Engine does not rotate smoothly (hunting)				S-5
10	Engine lacks output (or lacks power)				S-6
11	Exhaust smoke is black (incomplete combustion)				S-7
12	Oil consumption is excessive (or exhaust smoke is blue)				S-8
13	Oil becomes contaminated quickly				S-9
14	Fuel consumption is excessive				S-10
15	Oil is in cooling water (or water spurts back, or water level goes down)				S-11
16	Oil pressure caution lamp lights up (drop in oil pressure)				S-12
17	Oil level rises (water, fuel in oil)				S-13
18	Water temperature becomes too high (overheating)				S-14
19	Abnormal noise is made				S-15
20	Vibration is excessive				S-16
21	Preheater does not operate		E-2		
22	Auto engine warm-up device does not work		E-3		
23	Auto-decelerator does not operate		E-4	H-5	
<b>Failure related to work equipment, swing and travel</b>					
24	Speed or power of all work equipment, travel, and swing is low			H-1	
25	Engine speed lowers remarkably or engine stalls			H-2	
26	All work equipment, travel, and swing systems do not work		E-5	H-3	
27	Abnormal sound is heard from around pump			H-4	
<b>Work equipment-related failure</b>					
28	Boom speed or power is low			H-6	
29	Arm speed or power is low			H-7	
30	Bucket speed or power is low			H-8	
31	Boom does not move			H-9	

No. of pins	MIC type connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
7	Body part No. : 79A-222-2640 (Q' ty:5)	Body part No. : 79A-222-2630 (Q' ty:5)	—
11	Body part No. : 79A-222-2680 (Q' ty:5)	Body part No. : 79A-222-2670 (Q' ty:5)	—
5	 <p>BWP04741</p>	 <p>BWP04742</p>	799-601-2710 (T-adapter)
	Body part No. : 79A-222-2620 (Q' ty:5)	Body part No. : 79A-222-2610 (Q' ty:5)	
9	 <p>BWP04743</p>	 <p>BWP04744</p>	799-601-2950 (T-adapter)
	Body part No. : 79A-222-2660 (Q' ty:5)	Body part No. : 79A-222-2650 (Q' ty:5)	
13	 <p>BWP04745</p>	 <p>BWP04746</p>	799-601-2720 (T-adapter)
	Body part No. : 79A-222-2710 (Q' ty:2)	Body part No. : 79A-222-2690 (Q' ty:2)	

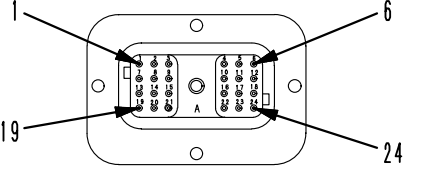
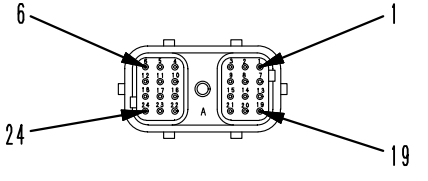
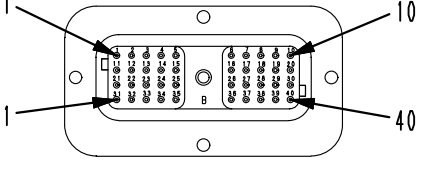
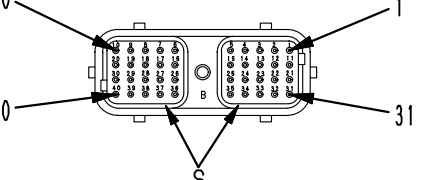
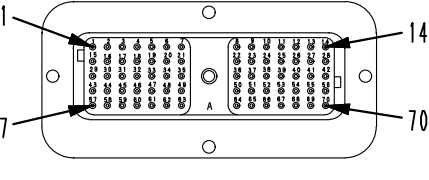
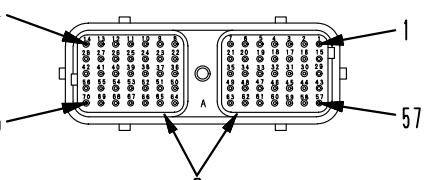
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[The pin No. is also marked on the connector (electric wire insertion end)]

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
18-20 (3)	Pin (male terminal)	Socket (female terminal)	799-601-9230 (T-adapter)
			
	Part No. :08191-31201, 08191-31202	Part No. :08191-34101, 08191-34102	
	Socket (female terminal)	Pin (male terminal)	
18-21 (4)	Pin (male terminal)	Socket (female terminal)	799-601-9240 (T-adapter)
			
	Part No. :08191-41201, 08191-42202	Part No. :08191-44101, 08191-44102	
	Socket (female terminal)	Pin (male terminal)	
18-21 (4)	Pin (male terminal)	Socket (female terminal)	799-601-9240 (T-adapter)
			
	Part No. :08191-42201, 08191-42202	Part No. :08191-43101, 08191-43102	
	Socket (female terminal)	Pin (male terminal)	

B4D18406

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

No. of pins	DRC12, 16 Series connector		
	DRC12:Male pin (female housing)	DRC16:Female pin (male housing)	Testing connection use special tool Part No.
24 (A)※ (B) (C)			-
40 (A)※ (B) (C)			-
	-	Seal (S) Part No. : 17A-06-41830	
70 (A)※ (B) (C)			-
	-	Seal (S) Part No. : 17A-06-41840	

※ (A)、(B)、(C) :Key position

B4D18416

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**Failure code [AB00KE] Charge Voltage Low**

Action code	Failure code	Failure phenomenon	Charge Voltage Low (Machine monitor system)
—	<b>AB00KE</b>		
Failure content	<ul style="list-style-type: none"> <li>Signal voltage from alternator is Max. 20 V while the engine is running.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>None in particular.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>If the machine is used as it is, the battery may not be charged.</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>If the charge level monitor on the machine monitor lights up in red while the engine is running, this failure code is recorded.</li> <li>Input from the alternator (Voltage, ON or OFF) can be checked in the monitoring function. (Code No. 04300: Charge voltage, 04501: Monitor input 2)</li> </ul>		

	Cause	Standard value in normalcy and references for troubleshooting		
		Alternator	Engine	Voltage
Presumed cause and standard value in normalcy	1 Alternator defective (Internal defect)	★ Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
		Between terminal R and grounding	Above low idle	27.5 – 29.5 V
		If the voltage is abnormal, check the belt tension too.		
	2 Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
		Wiring harness between CM02 (female) (11) and alternator terminal R	Resistance value	Max. 1 Ω
	3 Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
		Between wiring harness between CM02 (female) (11) and alternator terminal R, or between CM02 (female) (11), D01, J01, and starting switch terminal BR, or between CM02 (female) (11), battery relay terminal BR and grounding	Resistance value	Min. 1 MΩ
	4 Machine monitor defective	★ Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
		CM02	Engine	Voltage
		Between (11) and grounding	Above low idle	27.5 – 29.5 V

**Failure code [CA115] Eng Ne and Bkup Speed Sens Error**

Action code	Failure code	Trouble	Eng Ne and Bkup Speed Sens Error (Engine controller system)
<b>E10</b>	<b>CA115</b>		
Contents of trouble	• Abnormality occurred in Ne speed sensor circuit and Bkup speed sensor circuit simultaneously.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine cannot be started (if engine has been stopped). • Engine stops (if engine has been running).		
Related information			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective Ne speed sensor system	
2	Defective Bkup speed sensor system		Carry out troubleshooting for Failure code [CA778].
3	Defective mount of Ne speed sensor		Check mount of Ne speed sensor directly for defect (defective installation of sensor, internal trouble of flywheel, etc.)
4	Defective mount of Bkup speed sensor		Check mount of Bkup speed sensor directly for defect (defective installation of sensor, internal trouble of supply pump, etc.)
5	Defective connection (Wrong connection)		Check Ne speed sensor and Bkup speed sensor directly for defective connection (wrong connection).
6	Defective engine controller		If causes 1 – 5 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

**Failure code [CA135] Eng Oil Press Sensor High Error**

Action code	Failure code	Trouble	Eng Oil Press Sensor High Error (Engine controller system)
<b>E15</b>	<b>CA135</b>		
Contents of trouble	• Signal voltage in oil pressure sensor circuit is abnormally high.		
Action of controller	• Sets oil pressure to default value (250 kPa {2.5 kg/cm <sup>2</sup> }) and continues operation.		
Problem that appears on machine	—		
Related information	• Signal voltage of oil pressure sensor can be checked with monitoring function. (Code: 37201 Oil pressure sensor voltage)		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Defective sensor power supply system	If failure code [CA187] or [CA227] is indicated, carry out troubleshooting for it first.		
	2	Defective oil pressure sensor (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			POIL		Voltage
			Between (1) – (2)	Power supply	4.75 – 5.25 V
	Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.				
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – POIL (female) (1) and between ENG (female) (47) – POIL (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – POIL (female) (1) and between ENG (female) (13) – POIL (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – POIL (female) (2) and between ENG (female) (13) – POIL (female) (3)	Resistance	Min. 1 MΩ
	4	Hot short (Short circuit with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			Wiring harness between ENG (female) (37) – POIL (female) (1)	Voltage	Max. 1 V
			Wiring harness between ENG (female) (47) – POIL (female) (2)	Voltage	Max. 1 V
			Wiring harness between ENG (female) (13) – POIL (female) (3)	Voltage	Max. 1 V
	5	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
ENG			Voltage		
Between (37) – (47)			Power supply	4.75 – 5.25 V	

**Failure code [CA154] Chg Air Temp Sensor Low Error**

Action code	Failure code	Trouble	Chg Air Temp Sensor Low Error (Engine controller system)
<b>E15</b>	<b>CA154</b>		
Contents of trouble	<ul style="list-style-type: none"> <li>Signal voltage in charge temperature sensor circuit is abnormally low.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Fixes charge temperature (intake air temperature) (70°C) and continues operation.</li> </ul>		
Problem that appears on machine	—		
Related information	<ul style="list-style-type: none"> <li>Signal voltage of boost temperature sensor can be checked with monitoring function. (Code: 18501 Boost temperature sensor voltage)</li> </ul>		
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting	
	Carry out troubleshooting for failure code [CA153].		

**Failure code [CA187] Sens Supply 2 Volt Low Error**

Action code	Failure code	Trouble	Sens Supply 2 Volt Low Error (Engine controller system)
<b>E15</b>	<b>CA187</b>		
Contents of trouble	<ul style="list-style-type: none"> <li>Signal voltage in sensor power supply 2 (5 V) circuit is abnormally low.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Operates Bkup speed sensor with signals of Ne speed sensor.</li> <li>Sets oil pressure sensor to default value (250 kPa {2.5 kg/cm<sup>2</sup>}) and continues operation.</li> <li>Sets atmospheric pressure sensor to default value (52.44 kPa {0.53 kg/cm<sup>2</sup>}) and continues operation.</li> <li>Fixes charge pressure sensor value (400 kPa {4.1 kg/cm<sup>2</sup>}) and continues operation.</li> <li>Sets EGR inlet pressure sensor to default value (102 kPa {1.0 kg/cm<sup>2</sup>}) and continues operation.</li> <li>Limits output of EGR valve lift sensor and closes EGR valve and bypass valve.</li> <li>Limits output of bypass valve lift sensor and closes EGR valve and bypass valve.</li> </ul>		
Problem that appears on machine	<ul style="list-style-type: none"> <li>Output drops.</li> </ul>		
Related information			
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting	
	Carry out troubleshooting for failure code [CA227].		

**Failure code [CA263] Fuel Temp Sensor High Error**

Action code	Failure code	Trouble	Fuel Temp Sensor High Error (Engine controller system)
<b>E15</b>	<b>CA263</b>		
Contents of trouble	• Signal voltage in fuel temperature sensor circuit is abnormally high.		
Action of controller	• Fixes fuel temperature (90°C) and continues operation.		
Problem that appears on machine	—		
Related information	• Signal voltage of fuel temperature sensor can be checked with monitoring function. (Code: 14201 fuel temperature sensor voltage)		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective fuel temperature sensor (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
TFUEL (male)				Fuel temperature	Resistance
Between (A) – (B)				10 – 100°C	0.6 – 20 kΩ
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (30) – TFUEL (female) (A)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – TFUEL (female) (B)	Resistance	Max. 1 Ω
3		Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (30) – TFUEL (female) (A) and chassis ground	Resistance	Min. 1 MΩ
4		Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Fuel temperature	Resistance
			Between (30) – (47)	10 – 100°C	0.6 – 20 kΩ

Failure code [CA757] All Persistent Data Lost Error ..... 35

Failure code [CA778] Engine Bkup Speed Sensor Error ..... 36

Failure code [CA1228] EGR Valve Servo Error 1 ..... 38

Failure code [CA1625] EGR Valve Servo Error 2 ..... 39

Failure code [CA1626] BP Valve Sol Current High Error ..... 40

Failure code [CA1627] BP Valve Sol Current Low Error ..... 42

Failure code [CA1628] Bypass Valve Servo Error 1..... 43

Failure code [CA1629] Bypass Valve Servo Error 2..... 44

Failure code [CA1631] BP Valve Pos Sens High Error ..... 45

Failure code [CA1632] BP Valve Pos Sens Low Error..... 47

Failure code [CA1633] KOMNET Datalink Timeout Error ..... 48

Failure code [CA1642] EGR Inlet Press Sens Low Error..... 51

Failure code [CA1653] EGR Inlet Press Sens High Error ..... 52

Failure code [CA2185] Throt Sens Sup Volt High Error..... 54

Failure code [CA2186] Throt Sens Sup Volt Low Error..... 56

Failure code [CA2249] Rail Press Very Low Error ..... 57

Failure code [CA2271] EGR Valve Pos Sens High Error ..... 58

Failure code [CA2272] EGR Valve Pos Sens Low Error ..... 60

Failure code [CA2351] EGR Valve Sol Current High Error ..... 62

Failure code [CA2352] EGR Valve Sol Current Low Error ..... 64

Failure code [CA2555] Grid Htr Relay Volt Low Error ..... 65

Failure code [CA2556] Grid Htr Relay Volt High Error ..... 66

**Failure code [CA331] Inj #2 (L#2) Open/Short Error**

Action code	Failure code	Trouble	Inj #2 (L#2) Open/Short Error (Engine controller system)
<b>E11</b>	<b>CA331</b>		
Contents of trouble	• There is disconnection or short circuit in injector #2 circuit.		
Action of controller	• None in particular.		
Problem that appears on machine	• Output drops.		
Related information	—		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective injector #2 (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
CN2 (male)				Resistance	
Between (1) – (2)				0.4 – 1.1 Ω	
Between (1), (2) – chassis ground				Min. 1 MΩ	
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (54) – CN2 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (51) – CN2 (female) (2)	Resistance	Max. 1 Ω
3		Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (54) – CN2 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (51) – CN2 (female) (2) and chassis ground	Resistance	Min. 1 MΩ
4		Defective another cylinder injector or wiring harness	If multiple failure codes are displayed for injector malfunction, carry out troubleshooting for them, too.		
5		Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			ENG (female)	Resistance	
	Between (54) – (51)		0.4 – 1.1 Ω		
	Between (54), (51) – chassis ground		Min. 1 MΩ		

**Failure code [CA441] Battery Voltage Low Error**

Action code	Failure code	Trouble	Battery Voltage Low Error (Engine controller system)
<b>E10</b>	<b>CA441</b>		
Contents of trouble	• Power supply voltage is abnormally low.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine continues operation normally, but it may stop during operation or may not be able to start.		
Related information	• Signal voltage of power supply voltage can be checked with monitoring function. (Code: 03200 Power supply voltage)		

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code <b>[CA111]</b> .	

**Failure code [CA442] Battery Voltage High Error**

Action code	Failure code	Trouble	Battery Voltage High Error (Engine controller system)
<b>E10</b>	<b>CA442</b>		
Contents of trouble	• Power supply voltage is abnormally high.		
Action of controller	• None in particular.		
Problem that appears on machine	• Engine continues operation normally, but it may stop during operation or may not be able to start.		
Related information	—		

Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting
	Carry out troubleshooting for failure code <b>[CA111]</b> .	

**Failure code [CA689] Eng Ne Speed Sensor Error**

Action code	Failure code	Trouble	Eng Ne Speed Sensor Error (Engine controller system)
<b>E11</b>	<b>CA689</b>		
Contents of trouble	• Abnormality occurred in engine Ne speed sensor circuit.		
Action of controller	• Operates with signals of Bkup speed sensor.		
Problem that appears on machine	• Running engine stops (when Bkup speed sensor is also abnormal). • Stopped engine cannot be started (when Bkup speed sensor is also abnormal).		
Related information	—		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting			
		1	Defective sensor power supply system	If failure code [CA238] is indicated, carry out troubleshooting for it first.		
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between ENG (female) (48) – NE (female) (2)	Resistance	Max. 1 Ω	
3		Ground fault in wiring harness (Short circuit with GND circuit)	Wiring harness between ENG (female) (27) – NE (female) (3)	Resistance	Max. 1 Ω	
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (48) – NE (female) (2) and chassis ground	Resistance	Min. 1 MΩ	
4		Short circuit in wiring harness (with another wiring harness)	Wiring harness between ENG (female) (27) – NE (female) (3) and chassis ground	Resistance	Min. 1 MΩ	
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between ENG (female) (16) – NE (female) (1) and between ENG (female) (48) – NE (female) (2)	Resistance	Min. 1 MΩ	
5		Defective engine Ne speed sensor	Wiring harness between ENG (female) (16) – NE (female) (1) and between ENG (female) (27) – NE (female) (3)	Resistance	Min. 1 MΩ	
			Wiring harness between ENG (female) (48) – NE (female) (2) and between ENG (female) (27) – NE (female) (3)	Resistance	Min. 1 MΩ	
6		Defective engine controller	If causes 1 – 4 are not detected, engine Ne speed sensor may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			
			If causes 1 – 4 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)			

**Failure code [CA1627] BP Valve Sol Current Low Error**

Action code	Failure code	Trouble	BP Valve Sol Current Low Error (Engine controller system)
<b>E11</b>	<b>CA1627</b>		
Contents of trouble	<ul style="list-style-type: none"> <li>• There is disconnection in drive circuit of bypass valve solenoid.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>• Limits output and continues operation.</li> <li>• Closes EGR valve and bypass valve.</li> </ul>		
Problem that appears on machine	<ul style="list-style-type: none"> <li>• Output drops.</li> </ul>		
Related information	—		
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting	
	Carry out troubleshooting for failure code [CA1626].		

**Failure code [CA1653] EGR Inlet Press Sens High Error**

**Serial numbers : 30001 – 30070**

Action code	Failure code	Trouble	EGR Inlet Press Sens High Error (Engine controller system)
<b>E11</b>	<b>CA1653</b>		
Contents of trouble	<ul style="list-style-type: none"> <li>Signal voltage in EGR inlet pressure sensor circuit is abnormally high.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Sets EGR inlet pressure to default value (102 kPa {1.0 kg/cm<sup>2</sup>}) and continues operation.</li> <li>Limits output and continues operation.</li> </ul>		
Problem that appears on machine	<ul style="list-style-type: none"> <li>Output drops.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Signal voltage of EGR inlet pressure sensor can be checked with monitoring function. (Code: 18001 EGR inlet pressure sensor voltage)</li> </ul>		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective sensor power supply	If failure code [CA187] or [CA227] is indicated, carry out troubleshooting for it first.	
2				Defective EGR inlet pressure sensor (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.
		PEVA			
		Between (1) – (2)	Power supply		4.75 – 5.25 V
		Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.			
3		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between ENG (female) (47) – PEVA (female) (2)	Resistance	Max. 1Ω
			Wiring harness between ENG (female) (20) – PEVA (female) (3)	Resistance	Max. 1 Ω
4		Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PEVA (female) (2) and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (20) – PEVA (female) (3) and chassis ground	Resistance	Min. 1 MΩ
5		Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and between ENG (female) (47) – PEVA (female) (2)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (37) – PEVA (female) (1) and between ENG (female) (20) – PEVA (female) (3)	Resistance	Min. 1 MΩ
			Wiring harness between ENG (female) (47) – PEVA (female) (2) and between ENG (female) (20) – PEVA (female) (3)	Resistance	Min. 1 MΩ
6		Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON or start engine and carry out troubleshooting.		
			ENG		
			Between (37) – (47)	Voltage	4.75 – 5.25 V

**Failure code [CA2351] EGR Valve Sol Current High Error**

Action code	Failure code	Trouble	EGR Valve Sol Current High Error (Engine controller system)
<b>E11</b>	<b>CA2351</b>		
Contents of trouble	• There is short circuit in drive circuit of EGR valve solenoid.		
Action of controller	• Limits output and continues operation. • Closes EGR valve and bypass valve.		
Problem that appears on machine	• Output drops.		
Related information	—		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting	
		1	Defective EGR valve solenoid (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.
EGR (male)				Resistance
Between (1) – (2)				10 – 21 Ω
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
			Wiring harness between ENG (female) (22) – EGR (female) (1)	Resistance Max. 1 Ω
			Wiring harness between ENG (female) (11) – EGR (female) (2)	Resistance Max. 1 Ω
3		Ground fault in wiring harness (Short circuit with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
			Wiring harness between ENG (female) (22) – EGR (female) (1) and chassis ground	Resistance Min. 1 MΩ
			Wiring harness between ENG (female) (11) – EGR (female) (2) and chassis ground	Resistance Min. 1 MΩ
4		Hot short (Short circuit with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.	
			Wiring harness between ENG (female) (22) – EGR (female) (1) and chassis ground	Voltage Max. 1 V
			Wiring harness between ENG (female) (11) – EGR (female) (2) and chassis ground	Voltage Max. 1 V
5		Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
			ENG (female)	Resistance
			Between (22) – (11)	10 – 21 Ω

**Failure code [D110KB] Battery Relay Drive S/C**

Action code	Failure code	Failure phenomenon	Battery Relay Drive S/C (Pump controller system)
—	<b>D110KB</b>		
Failure content	<ul style="list-style-type: none"> <li>When a signal is output to the battery relay drive circuit, abnormal current flowed.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>The controller turns OFF the output to the battery relay drive circuit.</li> <li>When the failure cause disappears of itself, the machine operation returns to normalcy.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>There may be a trouble in writing data into the ROM (non-volatile memory) of each controller.</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>Operation of the battery relay (ON or OFF) can be checked in the monitoring function. (Code No. 03700: Controller output 1)</li> </ul>		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Battery relay defective (Internal short-circuiting or grounding fault)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
Battery relay (Unit)			Resistance value			
Between BR and E			Approx. 100 Ω			
Between BR and grounding			Min. 1 MΩ			
2		Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP03 (female) (4), D01, J01, battery relay terminal BR or between CP03 (female) (4) and starting switch terminal BR or between CP03 (female) (4) and D01 (female) (2) and grounding	Resistance value	Min. 1 MΩ	
3		Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CP03 (female)	Starting switch	Voltage	
			Between (4) and grounding	ON → OFF	20 – 30 V (For 0.5 sec)	

★ S/C: Short circuit

**Failure code [DA2SKQ] Model Selection Abnormality**

Action code	Failure code	Failure phenomenon	Model Selection Abnormality (Pump controller system)
—	<b>DA2SKQ</b>		
Failure content	<ul style="list-style-type: none"> <li>A model code signal was inputted which indicates another model that is not registered in the controller.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>The controller treats it as a default-set model (PC600).</li> <li>Even if the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>None in particular with PC600 model</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>Model names (expressed in number) that the controller recognizes can be confirmed in the monitoring function. (Code No. 00200: Controller Model Code)</li> <li>★ Input of model selecting signals (ON or OFF) can be confirmed in the monitoring function. (Code No. 02201: Switch Input 2)</li> </ul>		

	Cause		Standard value in normalcy and references for troubleshooting			
	Presumed cause and standard value in normalcy	1	Model selection connector defective (Internal disconnection or short-circuiting)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
S30 (male)				Resistance value		
Between (2), (3), (4) and (8)				Min. 1 MΩ		
Between (1) and (8)				Max. 1 Ω		
2		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP02 (female) (37) and S30 (male) (1)	Resistance value	Max. 1 Ω	
			Between wiring harness between S30 (male) (8) to J05, A07, J14, J15 and grounding	Resistance value	Max. 1 Ω	
3		Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP02 (female) (27) and S30 (male) (2) and grounding	Resistance value	Min. 1 MΩ	
			Between wiring harness between CP02 (female) (17) and S30 (male) (3) and grounding	Resistance value	Min. 1 MΩ	
4		Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			CP02	Voltage		
			Between (7), (17), (27) and grounding	20 – 30 V		
			Between (37) and grounding	Max. 1 V		

**Failure code [DHPAMA] F pump P. Sensor Abnormality**

Action code	Failure code	Failure phenomenon	F pump P. Sensor Abnormality (Pump controller system)
—	<b>DHPAMA</b>		
Failure content	<ul style="list-style-type: none"> <li>Signal voltage from the front pump pressure sensor is Max. 0.3 V or Min. 4.42 V.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>When the failure cause disappears of itself, the machine operation returns to normalcy.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>The travel speed does not shift automatically (The travel load pressure cannot be detected).</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>★ If the 5-V circuit (B) and GND circuit (A) of the pressure sensor are connected inversely, the pressure sensor will be broken. Accordingly, take extreme care when checking.</li> <li>Input from the front pump pressure sensor (pressure) can be checked in the monitoring function. (Code No. 01100: Front pump pressure)</li> </ul>		

	Cause		Standard value in normalcy and references for troubleshooting			
	Presumed cause and standard value in normalcy	1	Sensor power supply system defective	If failure code [DA25KP] is displayed, carry out troubleshooting for it first.		
2		Front pump pressure sensor defective (Internal defect)	★ Turn the engine starting switch OFF for the preparations, and turn to ON or keep the engine running during the troubleshooting.			
			P25		Voltage	
			Between (B) and (A)	Power supply	4.5 – 5.5 V	
			Between (C) and (A)	Signal	0.5 – 4.5 V	
The pressure sensor voltage is measured with the wiring harness connected. Accordingly, if the voltage is abnormal, check the wiring harness and controller, too, for another cause of the trouble, and then judge.						
3		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP01 (female) (22), A06, J25, and P25 (female) (B)	Resistance value	Max. 1 Ω	
			Wiring harness between CP01 (female) (10), A06, and P25 (female) (A)	Resistance value	Max. 1 Ω	
			Wiring harness between CP01 (female) (8) and P25 (female) (C)	Resistance value	Max. 1 Ω	
4		Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Between wiring harness between CP01 (female) (8) and P25 (female) (C) and grounding	Resistance value	Min. 1 MΩ	
5		Hot short (Short circuit with 24 V circuit) in wiring harness	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP01 (female) (22), A06, J25, and P25 (female) (B) and grounding	Voltage	Max. 1 V	
			Between wiring harness between C01 (female) (8) and P25 (female) (C) and grounding	Voltage	Max. 1 V	
6		Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and turn to ON or keep the engine running during the troubleshooting.			
			CP01		Voltage	
			Between (22) and (10)	4.5 – 5.5 V		
		Between (8) and (10)	0.5 – 4.5 V			

**Failure code [DW45KA] Swing Brake Sol. Disc.**

Action code	Failure code	Failure phenomenon	Swing Brake Sol. Disc. (Pump controller system)
—	<b>DW45KA</b>		
Failure content	<ul style="list-style-type: none"> <li>No current flows in the swing holding brake solenoid circuit, when power is supplied to the circuit.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>None in particular (The solenoid does not function as there is no current flowing to it).</li> <li>When the failure cause disappears of itself, the machine operation returns to normalcy.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>The machine cannot swing (The swing holding brake cannot be released).</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>Operation of the swing holding brake solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1)</li> <li>If the solenoid and wiring harness are normal, the machine can swing by setting the swing holding brake release switch in the RELEASE position (The parking brake does not operate when the machine stops, however).</li> <li>Keep the swing lock switch in the OFF position and the swing holding brake release switch in the RELEASE position during troubleshooting.</li> <li>Since the controller detects disconnection while the solenoid output is turned ON, be sure to turn the solenoid output ON when checking the solenoid again after repairing it. (For how to turn power ON or OFF, refer to the troubleshooting under failure code [DW45KB].)</li> </ul>		

	Cause		Standard value in normalcy and references for troubleshooting			
	Presumed cause and standard value in normalcy	1	Swing holding brake solenoid defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
V05 (male)				Resistance value		
Between (2) and (1)				20 – 60 Ω		
2		Assembled-type diode D01 defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			D01 (male)	Digital tester	Continuity	
			Between (7) and (3)	Diode mode	Continued	
3		Swing lock switch defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			S04 (female)	Swing lock switch	Resistance value	
			Between (3) and (4)	OFF	Max. 1 Ω	
				LOCK	Min. 1 MΩ	
4		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (37) and D01 (female) (7)		Resistance value	Max. 1 Ω
			Wiring harness between D01 (female) (3), J04, and S04 (male) (3)		Resistance value	Max. 1 Ω
			Wiring harness between S04 (male) (4), V05 (female) (2)		Resistance value	Max. 1 Ω
			Wiring harness between V05 (female) (1), J23, A05, J08 and CP03 (female) (3), (13) and (23)		Resistance value	Max. 1 Ω
5		Hot short (Short circuit with 24V circuit) in wiring harness	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP03 (female) (37) and D01 (female) (7)		Voltage	Max. 1 V
6		Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP03 (female)	Disconnect D01 and directly connect pins (3) and (7) on the female side.	Resistance value	
	Between (37) and grounding		20 – 60 Ω			

**Failure code [DW4XKA] Bucket Curl Hi Cancel Sol. Disc.**

Action code	Failure code	Failure phenomenon	Bucket Curl Hi Cancel Sol. Disc. (Pump controller system)
—	<b>DW4XKA</b>		
Failure content	<ul style="list-style-type: none"> <li>Any current does not flow to the bucket Curl Hi cancel solenoid circuit, when power was supplied to the circuit.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>None in particular (Since any current does not flow, the solenoid does not operate).</li> <li>When the failure cause disappears of itself, the machine operation returns to normalcy.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>When the bucket and other work equipment are operated simultaneously, the speed of the other work equipment is low (The bucket Curl Hi function is not cancelled).</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>Operation of the bucket Curl Hi cancel solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 02300: Solenoid 1)</li> <li>Since the controller detects disconnection when the solenoid output is turned ON, be sure to turn the solenoid output ON when checking for reproduction of the failure after repair. (For the method of checking the ON/OFF state of the output, see troubleshooting for failure code [DW4XKB].)</li> </ul>		

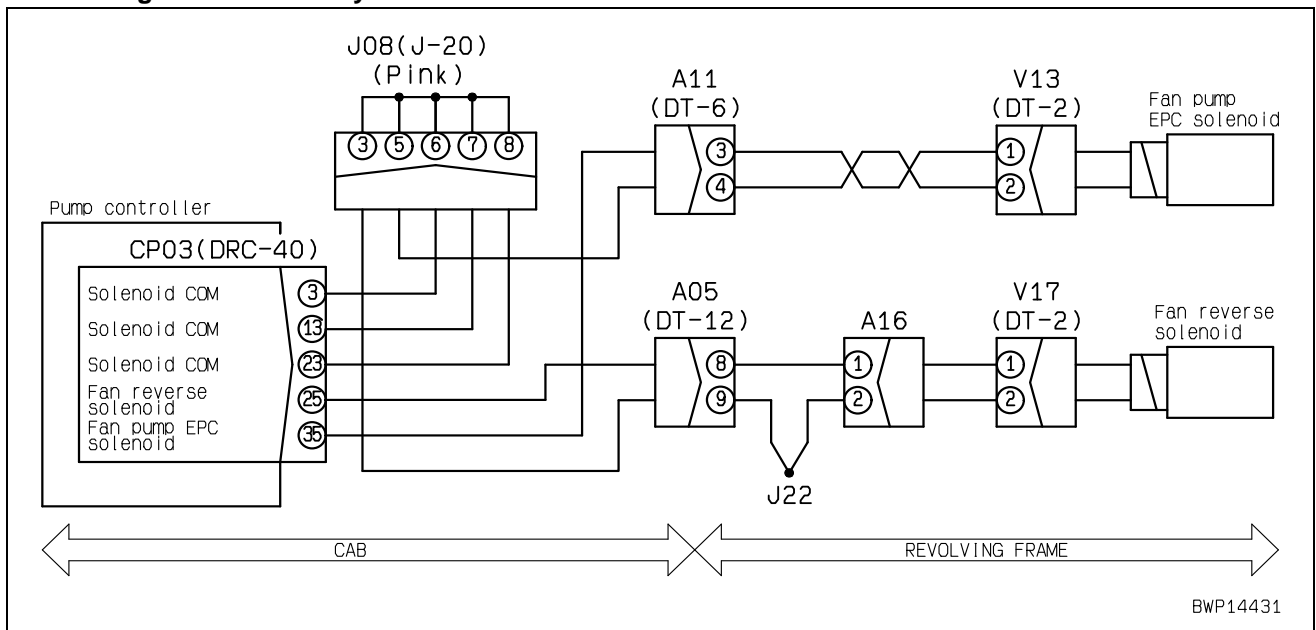
Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	Presumed cause and standard value in normalcy	1	Bucket Curl Hi cancel solenoid defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
V03 (male)				Resistance value		
Between (2) and (1)				20 – 60 Ω		
2		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			Wiring harness between CP03 (female) (38), A05, and V03 (female) (2)		Resistance value	Max. 1 Ω
			Wiring harness between CP03 (female) (3), J08, and V03 (female) (1)		Resistance value	Max. 1 Ω
3		Hot short (Short circuit with 24 V circuit) in wiring harness	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between CP03 (female) (38), A05, and V03 (female) (2) and grounding		Voltage	Max. 1 V
4		Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			CP03 (female)		Resistance value	
			Between (38) and grounding		20 – 60 Ω	

**Failure code [DX16KB] Fan Pump EPC Sol. S/C**

Action code	Failure code	Failure phenomenon	Fan Pump EPC Sol. S/C (Pump controller system)
—	<b>DX16KB</b>		
Failure content	<ul style="list-style-type: none"> <li>Abnormal current flowed in hydraulic fan EPC solenoid circuit.</li> </ul>		
Response from controller	<ul style="list-style-type: none"> <li>Fan pump is set to maximum swash plate angle and fan may rotate at excessive speed. Accordingly, protection mode is selected to lower engine speed.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>Fan motor speed cannot be controlled.</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>If fan EPC solenoid system has disconnection or short circuit, fan cannot be reversed.</li> <li>Output (current) to hydraulic fan EPC solenoid can be checked with monitoring function. (Code No. 31623: Hydraulic fan EPC solenoid current)</li> </ul>		

Presumed cause and standard value in normalcy	Cause	Standard value in normalcy and references for troubleshooting		
	1	Defective hydraulic fan EPC solenoid (Internal short circuit or ground fault)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
V13 (male)			Resistance	
Between (1) – (2)			7 – 14 Ω	
Between (1) – chassis ground			Min. 1 MΩ	
2		Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
			Wiring harness between CP03 (female) (35) – V13 (female) (1) and chassis ground	Resistance Min. 1 MΩ
3		Defective pump controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
			CP03 (female)	Resistance
			Between (35) – (3), (12), (23)	7 – 14 Ω
	Between (35) – chassis ground		Min. 1 MΩ	

**Circuit diagram related to hydraulic fan**



**Single wiper specification**

Action code	Failure code	Failure phenomenon	Wiper Parking Abnormality (Machine monitor system)
—	<b>DY20MA</b>		
Failure content	<ul style="list-style-type: none"> <li>• P signal in the retraction range is not inputted, when the wiper is retracted.</li> </ul>		
Response from Monitor Panel	<ul style="list-style-type: none"> <li>• Power supply to the wiper motor is switched OFF, when the wiper is retracted.</li> </ul>		
Phenomenon occurring on machine	<ul style="list-style-type: none"> <li>• The wiper cannot be retracted completely.</li> </ul>		
Relative information	<ul style="list-style-type: none"> <li>• It can be checked in the monitoring function whether P signal (ON or OFF) in the retraction operation range is inputted or not. (Code No.: 04502 Monitor Input 3)</li> </ul>		

	Cause		Standard value in normalcy and references for troubleshooting		
	Presumed cause and standard value in normalcy	1	Wiper motor defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.	
M05 (female)				Wiper blade	Resistance value
Between (4) and (5)				Retraction range	Max. 1 Ω
				Operation range	Min. 1 MΩ
2		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between CM01 (female) (12) and M05 (male) (4)	Resistance value	Max. 1 Ω
			Between wiring harness M05 (male) (5) and grounding	Resistance value	Max. 1 Ω
3		Machine monitor defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			CM01	Wiper blade	Voltage
			Between (12) and grounding	Retraction range	Max. 1V
	Operation range			20 – 30 V	

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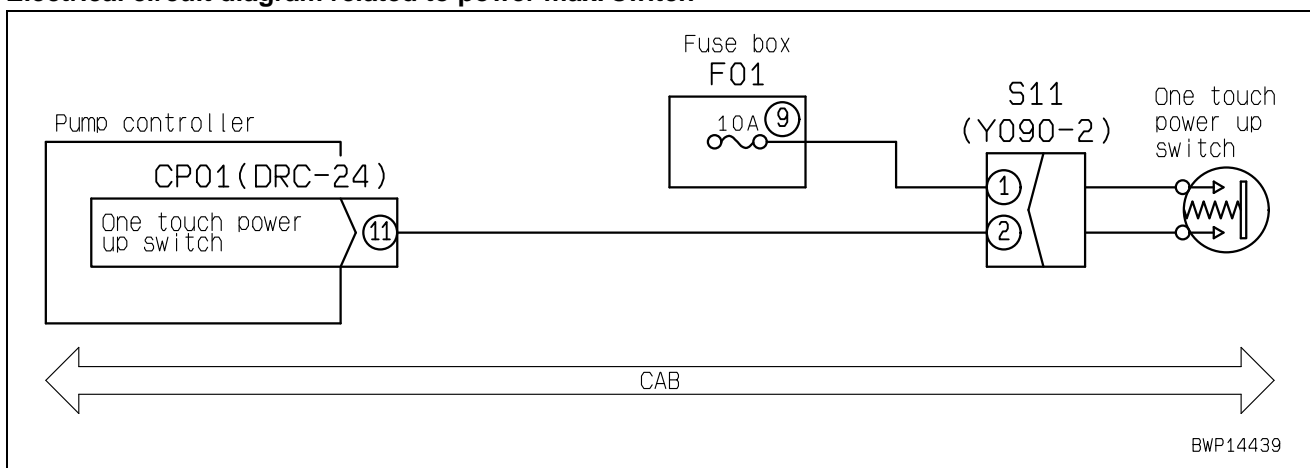
E-23 "Bucket DUMP" is not correctly displayed in monitoring function .....	41
E-24 "Swing" is not correctly displayed in monitoring function .....	42
E-25 "Travel" is not correctly displayed in monitoring function.....	44
E-26 Air conditioner does not work .....	46
E-27 Step light does not light up or go off .....	48
E-28 Electric grease gun does not operate.....	52
E-29 Travel alarm does not sound or does not stop sounding.....	54
E-30 Horn does not sound .....	56
E-31 Bottom dump does not move.....	58

**E-6 Power max. function does not operate**

Failure information	<ul style="list-style-type: none"> <li>Power max. function does not operate</li> </ul>
Relative information	<ul style="list-style-type: none"> <li>If the power max. switch is pressed while the engine is running, the power max. monitor is displayed on the monitor panel.</li> <li>Input condition of the power max. switch (left knob switch) (ON or OFF) can be checked in the monitoring function. (Code No. 02200: Switch input 1)</li> </ul>

	Cause		Standard value in normalcy and references for troubleshooting		
	Presumed cause and standard value in normalcy	1	Fuse No. 9 defective	If the fuse is broken, there is a big possibility that grounding fault occurred in the circuit. (See cause 4.)	
2		Power max. switch defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			M23 (male)	Power max. switch	Resistance value
			Between (1) and (2)	Released	Min. 1 MΩ
Pressed		Max. 1 Ω			
3		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between F01-9 outlet and S11 (female) (1)	Resistance value	Max. 1 Ω
4		Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness between F01-9 outlet and S11 (female) (1) and grounding	Resistance value	Min. 1 MΩ
			Between wiring harness between S11 (female) (2) and CP01 (female) (11) and grounding	Resistance value	Min. 1 MΩ
5	Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
		CP01	Power max. switch	Voltage	
		Between (11) and grounding	Released	Max. 1 V	
Pressed	20 – 30 V				

**Electrical circuit diagram related to power max. switch**



### E-15 Swing lock monitor does not display correctly

Failure information	<ul style="list-style-type: none"> <li>Swing lock monitor does not display correctly</li> </ul>	(1) Though the swing lock switch was turned ON, the swing lock monitor does not light up. (2) Though the swing lock switch was turned OFF, the swing lock monitor lights up.
Relative information	<ul style="list-style-type: none"> <li>Input from the swing lock switch (ON or OFF) can be confirmed in the monitor function. (Code No.: 04502 Monitor input 3)</li> </ul>	

	Cause		Standard value in normalcy and references for troubleshooting		
	Presumed cause and standard value in normalcy	1	Swing lock switch defective (Internal disconnection or short-circuiting)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.	
S04 (female)				Swing lock switch	Resistance value
Between (1) and (2)				OFF	Min. 1 MΩ
		ON	Max. 1 Ω		
2		Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness from CM02 (female) (17) to J07 and S04 (male) (1)	Resistance value	Max. 1 Ω
			Wiring harness from S04 (male) (2) to J03 and grounding	Resistance value	Max. 1 Ω
3		Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness from CM02 (female) (17) to J07 and S04 (male) (1), or between CM02 (female) (17) to CP02 (female) (38) and grounding	Resistance value	Min. 1 MΩ
4		Hot short (Short circuit with 24 V circuit) in wiring harness	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Between wiring harness from CM02 (female) (17) to J07 and S04 (male) (1), or between CM02 (female) (17) to CP02 (female) (38) and grounding	Voltage	Max. 1 V
5		Machine monitor defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			CM02	Swing lock switch	Voltage
			Between (17) and grounding	OFF	20 – 30 V
ON		Max. 1 V			

Failure information	• Wiper and window washer do not work.	(4) Window washer does not operate.
Relative information	—	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting		
	1	Fuse No. 4 defective	If fuse is broken, the circuit probably has grounding fault, etc. (See cause 4.)		
	2	Washer motor defective (Internal disconnection or grounding fault)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			M06 (male)	Resistance value	
			Between (1) and (2)	5 – 20 Ω	
		Between (1) and grounding	Min. 1 MΩ		
	3	Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness from F01-4 outlet to J02 and M06 (female) (1)	Resistance value	Max. 1 Ω
			Wiring harness from M06 (female) (2) and CM01 (female) (3)	Resistance value	Max. 1 Ω
	4	Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness from F01-4 outlet to J04 and M06 (female) (1), or F01-4 outlet to D04 (female) (2), and to other relative circuits and grounding	Resistance value	Min. 1 MΩ
	5	Machine monitor defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			CM01	Washer switch	Voltage
			Between (3) and grounding	OFF	20 – 30 V
	ON	Max. 1 V			

**E-24 "Swing" is not correctly displayed in monitoring function**

Failure information	<ul style="list-style-type: none"> <li>"Swing" is not correctly displayed in monitoring function</li> </ul>	"Swing" is not correctly displayed in the monitoring function (special function) on the machine monitor.
Relative information	—	

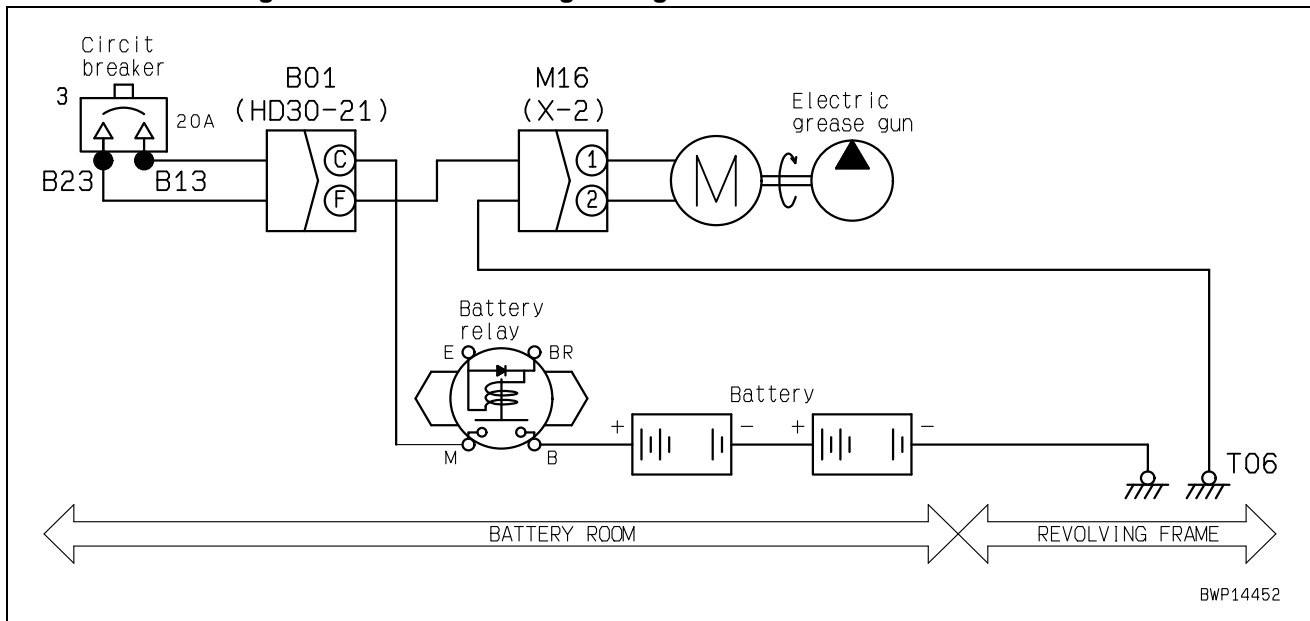
		Cause	Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	1	Swing PPC pressure switch defective (Internal disconnection or short-circuiting)	★ Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.		
			P03 (male)	R.H. work equipment control lever	Resistance value
			Between (2) and (1)	NEUTRAL	Min. 1 MΩ
				Swing operated	Max. 1 Ω
	2	Disconnection of wiring harness (Disconnection or defective contact with connector)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between CP03 (female) (29) and P03 (female) (2)	Resistance value	Max. 1 Ω
			Wiring harness between P03 (female) (1) and grounding	Resistance value	Max. 1 Ω
	3	Grounding fault of wiring harness (Contact with grounding (GND) circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between CP03 (female) (29) and P03 (female) (2) and grounding	Resistance value	Min. 1 MΩ
	4	Hot short (Short circuit with 24 V circuit) in wiring harness	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Wiring harness between CP03 (female) (29) and P03 (female) (2) and grounding	Voltage	Max. 1 V
	5	Pump controller defective	★ Turn the engine starting switch OFF for the preparations, and start the engine during the troubleshooting.		
			CP03	R.H. work equipment control lever	Voltage
			Between (29) and grounding	NEUTRAL	20 – 30 V
	Swing operated	Max. 1 V			

**E-28 Electric grease gun does not operate**

Failure information	<ul style="list-style-type: none"> <li>• Electric grease gun does not operate.</li> </ul>
Relative information	—

Presumed cause and standard value in normalcy	Cause	Standard value in normalcy and references for troubleshooting		
	1	Circuit breaker No. 3 defective	If the circuit breaker is turned OFF, there is a big possibility that grounding fault occurred in the circuit (See cause 3).	
2	Disconnection of wiring harness (Disconnection or defective contact with connector)	Wiring harness between B01 (female) (F) and M16 (male) (1)	Resistance value	Max. 1 Ω
		Wiring harness between M16 (male) (2) and grounding	Resistance value	Max. 1 Ω
3	Grounding fault of wiring harness (Contact with grounding circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
		Wiring harness between B01 (female) (F) and M16 (male) (1) and grounding	Resistance value	Min. 1 MΩ
4	Grease pump defective	If causes 1 – 3 are not detected, the grease pump may be defective. (Since trouble is in the grease pump, troubleshooting cannot be carried out.)		

**Electrical circuit diagram related to electric grease gun**



H-18 When bucket and boom, arm, swing, travel are operated simultaneously, boom, arm, swing, travel speed is low .....	27
H-19 When arm and swing are operated simultaneously, swing speed is low .....	28
H-20 Machine deviates in one direction .....	29
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H-28 Upper structure overruns excessively when it stops swinging .....	38
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H-30 Large abnormal sound is made when upper structure stops swinging .....	40
H-31 Hydraulic drift of swing is large .....	41

## H-2 Engine speed lowers remarkably or engine stalls

Failure Phenomenon	<ul style="list-style-type: none"> <li>Engine speed lowers remarkably or engine stalls</li> </ul>
Related Information	<ul style="list-style-type: none"> <li>Carry out all the troubleshooting in working mode P.</li> </ul>

		Cause	Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective adjustment or malfunction of TVC valve	★ Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
			R.H. work equipment control lever	TVC valve output pressure
			All control levers in neutral	Min. 1.76 MPa {Min. 18 kg/cm <sup>2</sup> }
			Boom relieved in RAISE position	1.05 <sup>+0.20</sup> <sub>-0.53</sub> MPa {10.7 <sup>+2.0</sup> <sub>-5.4</sub> kg/cm <sup>2</sup> }
			If the oil pressure cannot be set normally by adjustment, the TVC valve may have a malfunction. Check the TVC valve directly.	
	2	Defective adjustment or malfunction of CO, NC valve	★ Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle. (Check cause 1 and confirm that the result is normal before troubleshooting.)	
			R.H. work equipment control lever	CO, NC valve output pressure
			Boom relieved in RAISE position	1.05 <sup>+0.20</sup> <sub>-0.53</sub> MPa {10.7 <sup>+2.0</sup> <sub>-5.4</sub> kg/cm <sup>2</sup> }
			If the oil pressure cannot be set normally by adjustment, the CO, NC valve may have a malfunction. Check the CO, NC valve directly.	
	3	Defective engine	If the results of check of causes 1 and 2 are normal, the engine may be defective. Check the engine	

**H-9 Boom does not move**

Failure Phenomenon	<ul style="list-style-type: none"> <li>• Boom does not move</li> </ul>
Related Information	<ul style="list-style-type: none"> <li>• Check that operations of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.)</li> <li>• Carry out all the troubleshooting in working mode P.</li> </ul>

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of right PPC valve (boom circuit)	★ Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
R.H. work equipment control lever			PPC valve output pressure	
Boom RAISE, LOWER full stroke			Min. 2.74 MPa {Min. 28 kg/cm <sup>2</sup> }	
2	Malfunction of boom control valve (spool)	Since the spool of the boom control valve (Lo, Hi) may have a malfunction, check it directly.		

**H-10 Arm does not move**

Failure Phenomenon	<ul style="list-style-type: none"> <li>• Arm does not move</li> </ul>
Related Information	<ul style="list-style-type: none"> <li>• Check that operations of the other work equipment, travel, and swing are normal. (If they are abnormal, carry out the related troubleshooting.)</li> <li>• Carry out all the troubleshooting in working mode P.</li> </ul>

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of left PPC valve (arm circuit)	★ Prepare with the engine stopped, then carry out troubleshooting with the engine at high idle.	
L.H. work equipment control lever			PPC valve output pressure	
Arm IN, OUT full stroke			Min. 2.74 MPa {Min. 28 kg/cm <sup>2</sup> }	
2	Malfunction of arm control valve (spool)	Since the spool of the arm control valve (Lo, Hi) may have a malfunction, check it directly.		

**H-22 Travel deviation is large during compound operation**

Failure Phenomenon	<ul style="list-style-type: none"> <li>Travel deviation is large during compound operation</li> </ul>
Related Information	<ul style="list-style-type: none"> <li>Check that the machine does not deviate while any work equipment is not operated. (If the machine deviates, carry out troubleshooting related to travel deviation.)</li> <li>Carry out all the troubleshooting in working mode P.</li> </ul>

	Cause		Standard value in normalcy and references for troubleshooting		
	Presumed cause and standard value in normalcy	1	Malfunction of boom, bucket PPC shuttle valve	★ Stop the engine for the preparations, and keep it running at high idle during the troubleshooting.	
R.H. work equipment control lever				Shuttle valve outlet pressure	
Neutral				0 MPa {0 kg/cm <sup>2</sup> }	
Boom or bucket full stroke				Min. 2.74 MPa {Min. 28 kg/cm <sup>2</sup> }	
2		Malfunction of arm, swing PPC shuttle valve (arm side)	★ Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.		
			L.H. work equipment control lever	Shuttle valve outlet pressure	
			Neutral	0 MPa {0 kg/cm <sup>2</sup> }	
			Arm CURL • DUMP full stroke	Min. 2.74 MPa {Min. 28 kg/cm <sup>2</sup> }	
3		Malfunction of arm, swing PPC shuttle valve (swing side)	★ Keep the engine stopped for the preparations, and run it at high idle during troubleshooting.		
			Left work equipment control lever	Shuttle valve outlet pressure	
			Neutral	0 MPa {0 kg/cm <sup>2</sup> }	
			Swing LEFT, RIGHT full stroke	Min. 2.74 MPa {Min. 28 kg/cm <sup>2</sup> }	
4		Malfunction of control valve (travel shuttle valve)	The travel shuttle valve of the control valve may malfunction. Check it directly.		
5		Malfunction of control valve (straight travel valve)	The straight travel valve of the control valve may malfunction. Check it directly.		

PC600, 600LC-8 Hydraulic excavator

Form No. SEN00452-02

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**b) Engine turns but no exhaust smoke comes out**

General causes why engine turns but no exhaust smoke comes out

- Fuel is not being supplied
- Supply of fuel is extremely small
- Improper selection of fuel (particularly in winter)

		Causes													
		Use of improper fuel	Insufficient fuel in tank	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter element	Clogged feed pump gauze filter	Seized, abnormally worn feed pump	Broken supply pump shaft, key	Stuck, seized supply pump plunger	Defective supply pump PCV	Wrong connection of supply pump PCV	Defective operation of overflow valve (Does not close)	Defective operation of flow damper	Defective fuel injector
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period				△	△	△							
	Exhaust smoke suddenly stopped coming out (when starting again)							○	○	○	○	○		△	△
	Replacement of filters has not been carried out according to Operation and Maintenance Manual						○	○		△					○
	When fuel tank is inspected, it is found to be empty		○												
	Air breather hole of fuel tank cap is clogged		○	○											
	Rust and water are found when fuel tank is drained					○	○	○		○	○				
	When fuel filter is removed, there is not fuel in it		○			○									
	Fuel is leaking from fuel piping					○									
	When priming pump is operated, it makes no reaction or it is heavy					○	○								
Check items	While engine is cranked with starting motor	If air bleeding plug of fuel filter is removed, fuel does not flow out			○	○			○	○					
		If spill hose from injector is disconnected, little fuel spills				○				○	○	○			○
Troubleshooting	When air is bled from fuel system, air comes out					●									
	Inspect fuel filter directly						●								
	Inspect feed pump gauze filter directly							●							
	Inspect feed pump directly								●						
	Carry out troubleshooting according to "No-pressure feed by supply pump (*1)"									●	●		●		
	Carry out troubleshooting according to "Abnormality in PCV1 (*2) or Abnormality in PCV2 (*3)"											●			
	Inspect overflow valve directly												●		
	Engine can be started in reduced cylinder mode													●	●
	Remedy	Replace	Add	Correct	Correct	Replace	Clean	Replace	Replace	Replace	Replace	Correct	Replace	Replace	Replace

\*1: Failure code [CA559] and failure code [CA2249]  
 \*2: Failure code [CA271] and failure code [CA272]  
 \*3: Failure code [CA273] and failure code [CA274]

**S-11 Oil is in coolant (or coolant spurts back or coolant level goes down)**

General causes why oil is in coolant

- Internal leakage in lubrication system
- Internal leakage in cooling system

		Causes					
		Broken cylinder head, head gasket	Internal cracks in cylinder block	Damaged cylinder liner O-ring, holes caused by pitting	Insufficient protrusion of cylinder liner	Broken oil cooler core, O-ring	
<b>Questions</b>	Confirm recent repair history						
	Degree of use of machine	Operated for long period			△	△	
	Oil level	Suddenly increased	○				○
		Gradually increased		○	○		
	Hard water is being used as coolant			○		○	
	Oil level has risen and oil is milky		○	○		⊙	
<b>Check items</b>	There are excessive air bubbles in radiator, coolant spurts back	⊙			⊙		
<b>Troubleshooting</b>	Pressure-tightness test of cylinder head shows there is leakage	●					
	Inspect cylinder block, liner directly		●	●			
	Inspect cylinder liner directly				●		
	Pressure-tightness test of oil cooler shows there is leakage					●	
	Remedy	Replace	Replace	Replace	Replace	Replace	

## How to read this manual

(Rev. 2009.1)

### 1. Removal and installation of assemblies

#### Special tools

- Special tools which are necessary for removal or installation of parts are described as **A1**, **••• X1** etc. and their part numbers, part names and quantities are described in the special tool list.
  - Also the following information is described in the special tool list.
- 1) Necessity
    - : Special tools that cannot be substituted and should always be used
    - : Special tools that will be useful if available and are substitutable with tools available on the market
  - 2) Distinction of new and existing special tools
    - N : Tools newly developed for this model. They have a new part number respectively.
    - R : Tools made available by redesigning the existing tools which were developed for other models. Each of them has a new part number assigned by setting forward the part number of the existing tool.
    - Blank : Tools already available for other models. They can be used without any modification.
  - 3) Circle mark ○ in sketch column:
    - The sketch of the special tool is presented in the section of "Sketches of special tools".
    - Part No. of special tools starting with 79\***T-\*\*\*-\*\*\*\***: means that they are not available from Komatsu Ltd. (i.e. tools to be made locally).

#### Removal

- In "Removal" section, the work procedures, precautions and know-how to do the work, and the amount of oil and coolant to be drained are described.
- Common tools that are necessary for removal are described as [1], [2]••• etc. and their part numbers, part names and quantities are not described.
- Various symbols used in "Removal" section are explained and listed below.

#### : Precautions related to work safety

- ★ : Guidance or precautions for the work
- [\*1] : This mark shows that instructions or precautions for parts installation work are given in "Installation" section.



: Amount of oil or coolant to be drained



: Weight of part or component

#### Installation

- Unless otherwise instructed, installation of parts is to be done in the reverse order to removal.
- Instructions and precautions for parts installation is shown with the mark ([\*1], [\*2]...) which corresponds to the mark in "Removal" section.
- Common tools that are necessary for installation are described as [1], [2]••• etc. and their part numbers, part names and quantities are not described.
- Marks shown in the "Installation" section stand for the following.

#### : Precautions related to work safety

- ★ : Guidance or precautions for the work



: Type of coating material



: Tightening torque



: Amount of oil or coolant to be replenished

#### Sketches of special tools

- Various special tools are illustrated for the local manufacture.

Component	Symbol		Part No.	Part Name	Necessity	Q'ty	New/remodel	Sketch	Nature of work, remarks
Removal of boom, arm assembly	V	1	796T-670-1210	Sleeve	■	1		○	Boom foot pin
			796T-670-1220	Sleeve	■	1		○	Boom top pin
			791-775-1130	Plate	■	1			Removal of pin
			796-670-1130	Screw	■	1			
			796-870-1110	Adapter	■	1			
			01643-33080	Washer	■	1			
			01803-13034	Nut	■	1			
			790-101-4000	Puller (490 kN {50 ton})	■	1			
			790-101-1102	Pump	■	1			
Operator's cab glass	Y	1	793-498-1210	Lifter (Suction cup)	■	2		Installation of operator's cab glass	
		2	20Y-54-13180	Adapter	■	2			

## Removal and installation of fuel supply pump assembly

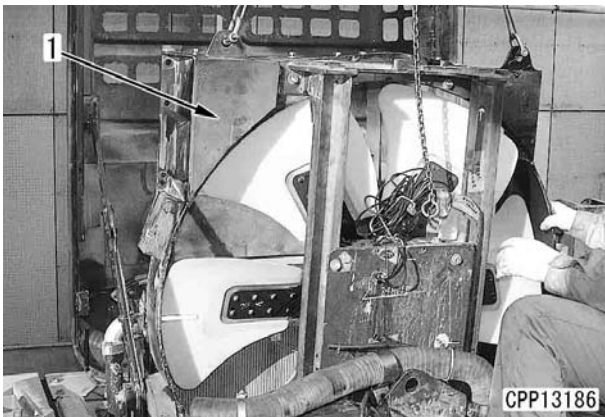
### Special tools

Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
A 1	795-630-5500	Standard puller	■	1		
	01010-81090	Bolt	■	2		
	01643-31032	Washer	■	2		

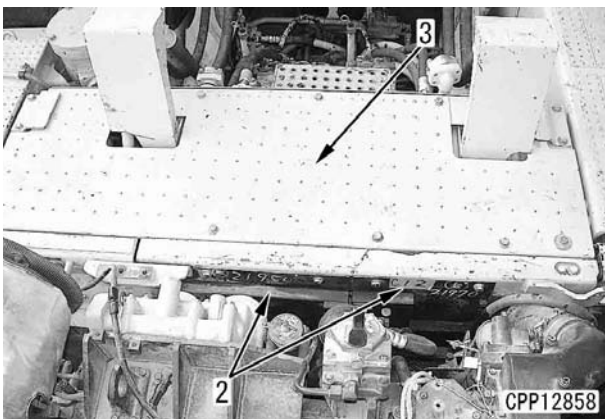
### Removal

- ⚠ Lower the work equipment to the ground and stop the engine.
- ⚠ Disconnect the cable from the negative (-) terminal of the battery.

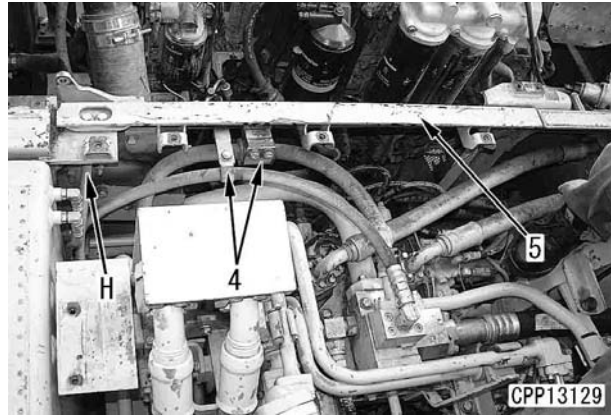
1. Remove the counterweight assembly. For details, see "Removal and installation of counterweight assembly".
2. Remove the fan, fan motor and shroud assembly (1). For details, see "Removal and installation of fan motor assembly".



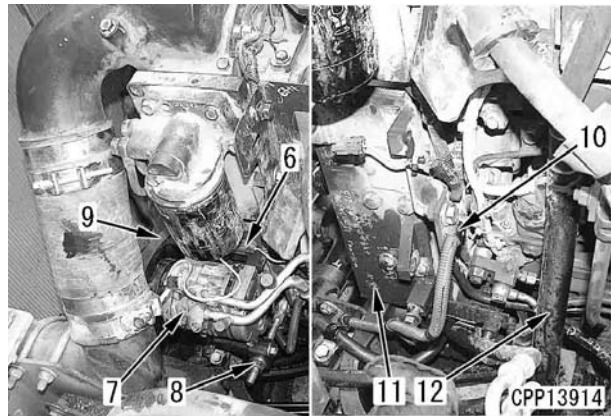
3. Remove covers (2) and (3).



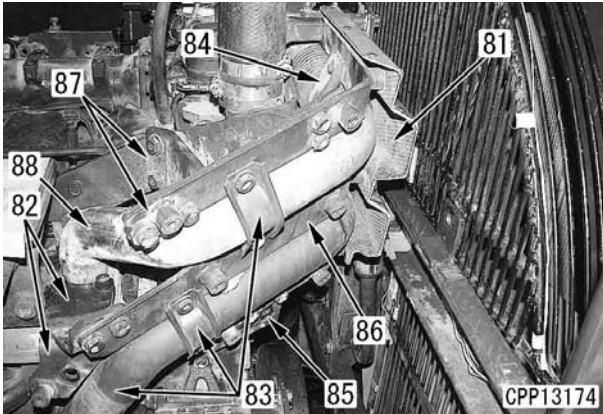
4. Disconnect hose clamps (4).
  - ★ Disconnect the clamp of hose (H), too.
5. Remove frame (5).



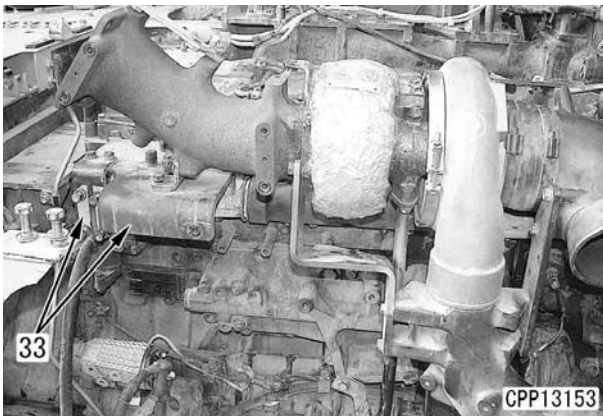
6. Disconnect connector M34 (6) from air conditioner compressor (7). Loosen locknut (8) and disconnect air conditioner compressor (7). [\*1]
  - ★ Do not disconnect air conditioner hoses.
7. Remove air conditioner compressor belt (9).
8. Disconnect clamp (10).
9. Remove bracket (11).
10. Remove blow-by hose (12).



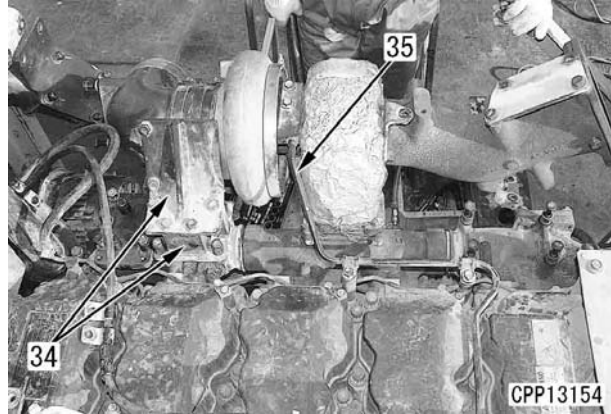
- 38. Remove cover (81).
- 39. Remove brackets (82).
- 40. Disconnect clamps (83) and (84).
- 41. Remove brackets (85) – (87).
- 42. Disconnect bypass tube (88). [\*7]



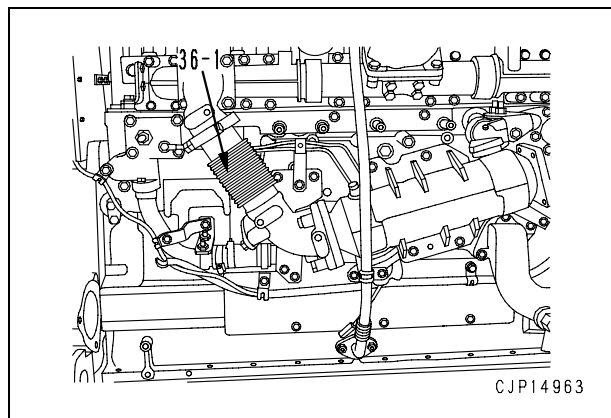
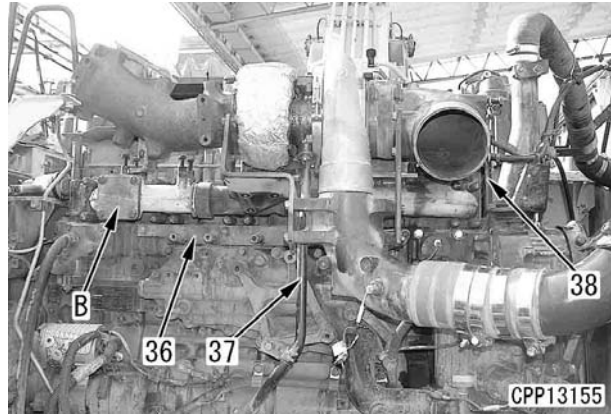
- 43. Remove brackets (33).



- 44. Remove brackets (34).
- 45. Disconnect lubrication tube (35). [\*8]
  - ★ Disconnect lubrication tube (35) from the clamp and cylinder block side and take it out after removing the exhaust manifold.

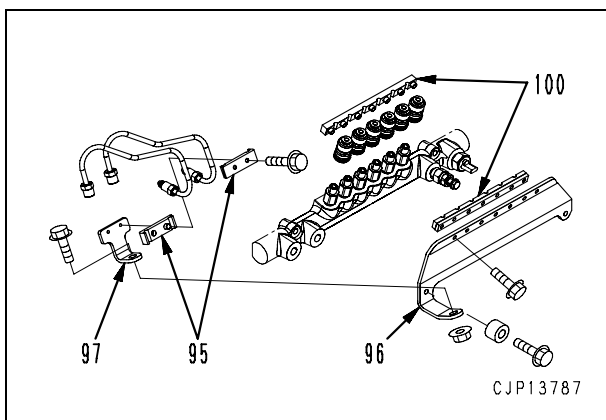
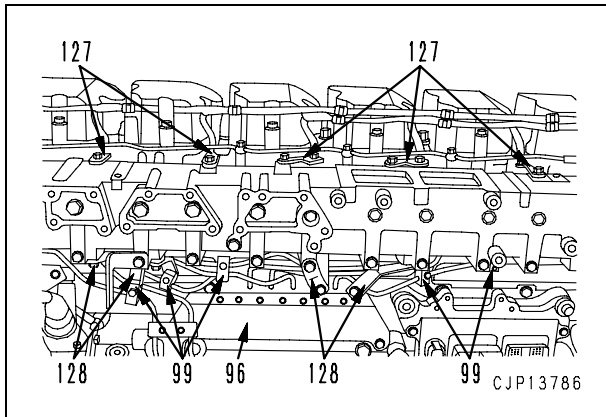


- 46. Remove the tube (36-1) between EGR cooler from part (B). [\*9]
- 47. Remove bracket (36).
- 48. Remove lubrication tube (37).
- 49. Disconnect the turbocharger from plate (38).



**16. High-pressure pipe clamp**

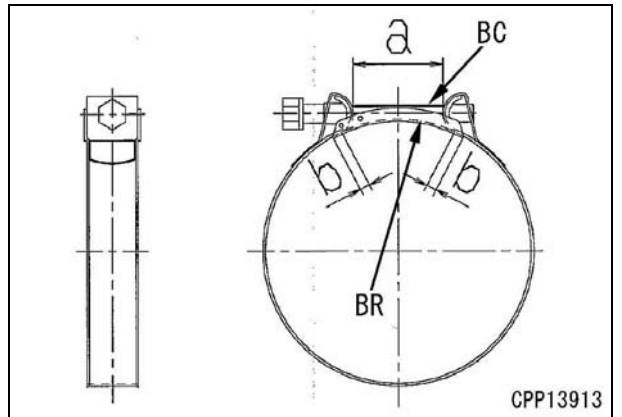
- 1) Tighten high-pressure pipe clamps (126) above the air intake manifold (described above) and stay (127) permanently.
  - ★ Bend the rubber in advance.
  - ☞ Clamping bolt:
    - 9.8 ± 1 Nm {1 ± 0.1 kgm}**
- 2) Tighten stays (128) of clamps (99) under the air intake manifold (described above) temporarily.
- 3) Install high-pressure pipe clamp (100) and bracket (96) temporarily with the fingers.
- 4) Install high-pressure pipe clamp (95) and bracket (97) temporarily.
- 5) Tighten high-pressure pipe clamps (100) and (95) permanently first.
  - ☞ Clamping bolt:
    - 9.8 ± 1 Nm {1 ± 0.1 kgm}**
- 6) Tighten brackets (96) and (97) permanently.
- 7) Tighten high-pressure pipe clamps (99) permanently.
  - ☞ Clamping bolt:
    - 9.8 ± 1 Nm {1 ± 0.1 kgm}**
- 8) Tighten stays (128) permanently.



- Carry out the following installation in the reverse order to removal.

[\*1]  
☞ Air hose clamp (Right and left):  
**8.8 ± 0.5 Nm {0.9 ± 0.05 kgm}**

- [\*2]  
MIKALOR clamp
- ★ Use a new MIKALOR clamp.
  - 1) Set the hose to the original position. (Insertion depth of air hose: 80 mm)
  - 2) Set bridge (BR) under the clamp bolt and adjust its overlap (b) with bridge (BR) and band to at least 5 mm.
  - 3) Tightening of the clamp.
    - ☞ Threads of clamp bolt (BC):  
**Lubricating oil (THREEBOND PANDO 18B)**
    - ★ Do not use an impact wrench.
    - When reusing the hose.  
Install the clamp to the clamp mark made on the hose.
    - ☞ Clamp bolt: **Min. 6 Nm {0.6 kgm}**
    - When using a new hose.  
Tighten until dimension (a) is 5 – 8 mm.



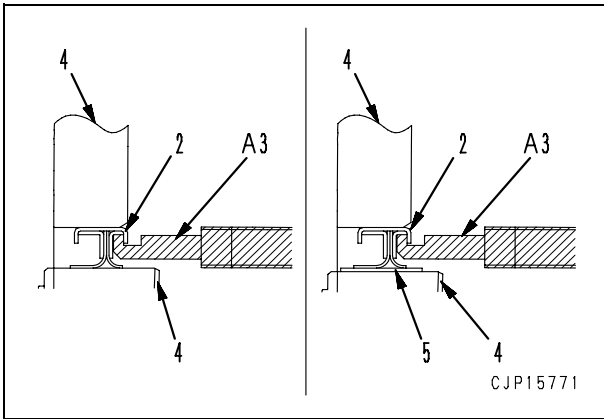
[\*3]  
☞ Tightening torque for fuel hose (19):  
**43 – 47 Nm {4.4 – 4.8 kgm}**

[\*4]  
☞ Tightening torque for fuel tube (21):  
**43 – 47 Nm {4.4 – 4.8 kgm} (Upper side)**  
**14.8 – 19.6 Nm {1.5 – 2.0 kgm} (Lower side)**

[\*5]  
☞ Tightening torque for fuel tube assembly (23):  
**24.5 – 34.3 Nm {2.5 – 3.5 kgm} (Filter side)**  
**14.8 – 19.6 Nm {1.5 – 2.0 kgm} (Lower side)**

[\*7]  
☞ Mounting bolt of bypass tube (88):  
**44.1 – 53.9 Nm {4.5 – 5.5 kgm}**

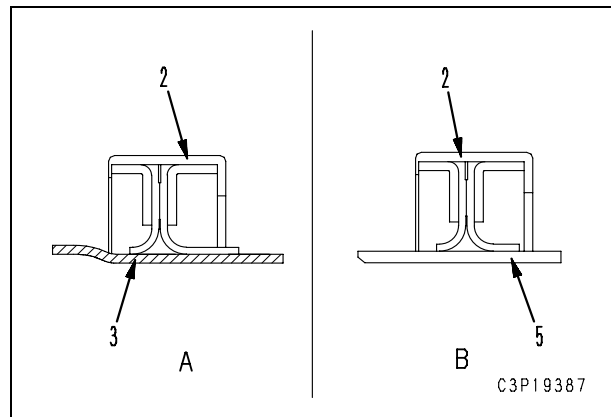
★ Left: Standard seal, Right: Sleeved seal



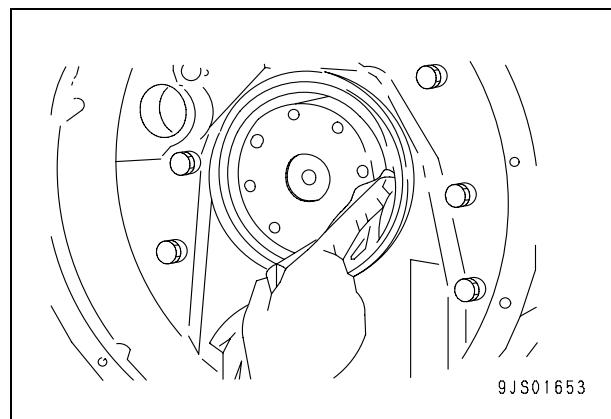
**Installation**

- ★ Check the Teflon seal (Laydown lip seal) by checking the wear of the crankshaft and replace it with the "standard seal" or "sleeved seal".
- If the shaft is worn to the degree of luster (If wear which you feel with your finger is less than 10 μm) and does not have any flaw, install standard seal (A). In other cases, install sleeved seal (B).
- ★ (3): Plastic inside cylinder which is also used as installation guide.
- ★ (5): Sleeve.
- ★ Do not remove installation guide (3) from rear seal (2) before installing the rear seal.
- ★ Handle rear seal (2) and sleeve (5) as an assembly and never separate them from each other.

● Standard spare seal      ● Sleeved seal

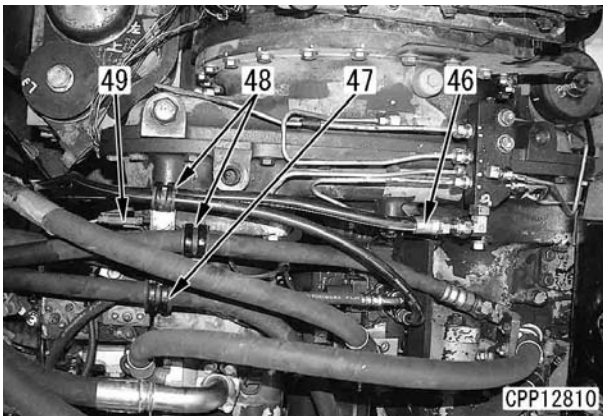


- ★ Clean, degrease, and dry the seal surface on the flywheel housing side.
- ★ Clean, degrease, and dry the seal lip surface (periphery of the crankshaft).
- ★ Before installing the seal, check that the end corners and lip sliding surfaces of the crankshaft are free from flaw, burr, and rust of the housing.

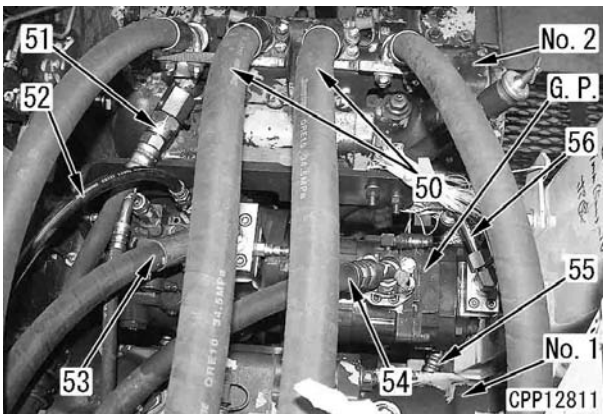




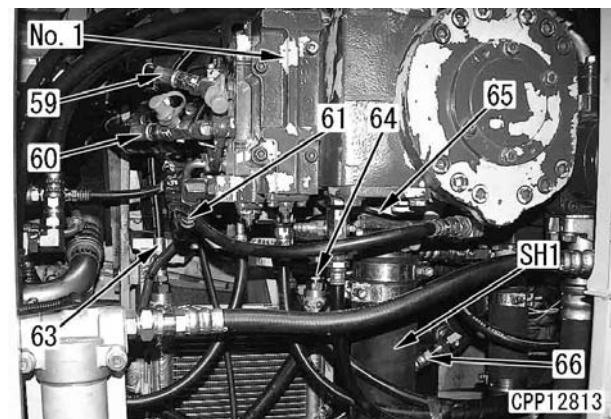
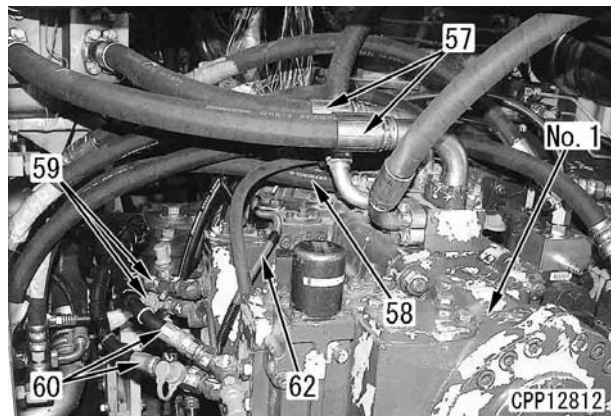
- 42. Disconnect lubrication hose (46) from above the PTO.
- 43. Disconnect clamps (47) and (48).
- 44. Disconnect connector (49).



- 45. Remove 2 hoses (50) from pump No. 2.
- 46. Disconnect hose (51).
- 47. Disconnect hoses (52) – (56) from gear pump (G.P.).

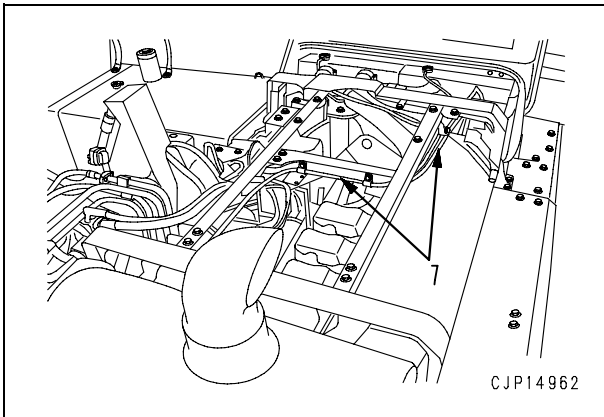


- 48. Disconnect 2 hoses (57) from pump No. 1.
- 49. Disconnect hoses (58) – (61).
- 50. Disconnect wiring harness (62).
- 51. Disconnect hoses (63) and (64) from the PTO oil cooler.
- 52. Disconnect suction connector (65) from pump No. 1.
  - ★ Do not disconnect suction hose (SH1) from suction connector (65).
- 53. Disconnect hose (66) from under the PTO.

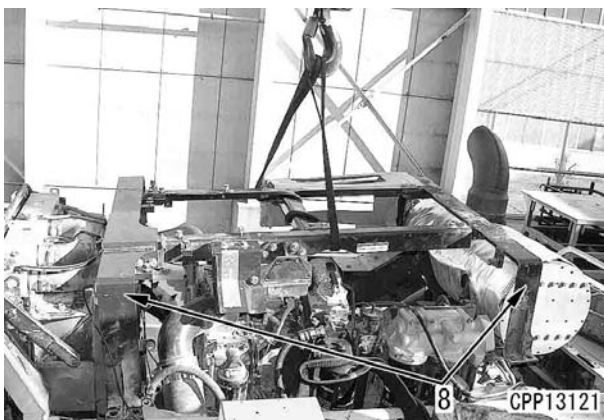


- 54. Disconnect clamps (67).
- 55. Disconnect hose (68) from the gear pump.
- 56. Disconnect suction connector (70) from the gear pump.
  - ★ Do not disconnect suction hose (SH1) from suction connector (70).

9. Disconnect reservoir tank hoses (7).



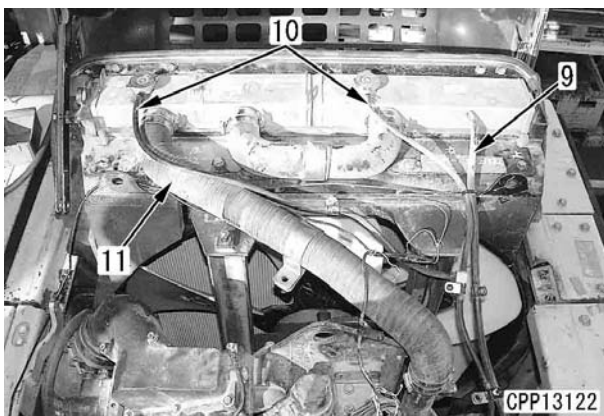
10. Lift off frame assembly (8).



11. Disconnect hose (9).

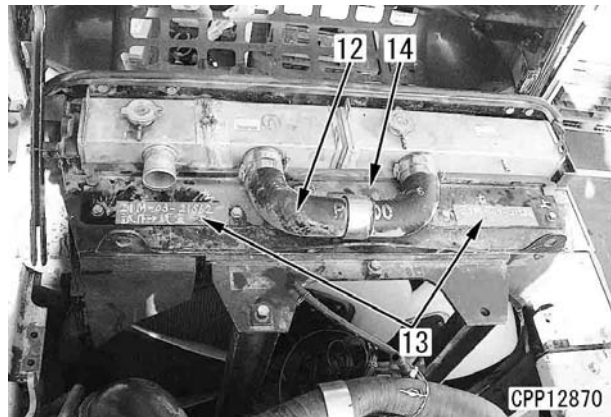
12. Disconnect 2 reservoir tank hoses (10).

13. Disconnect radiator hose (11). [\*1]



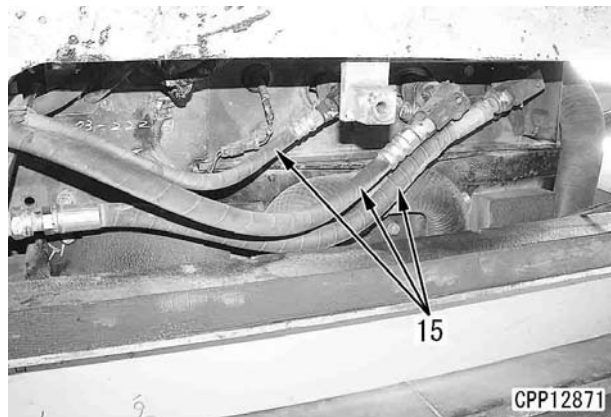
14. Disconnect radiator hose (12). [\*1]

15. Disconnect plates (13) and (14).



16. Disconnect 3 fan motor hoses (15) from the bottom of the fan motor.

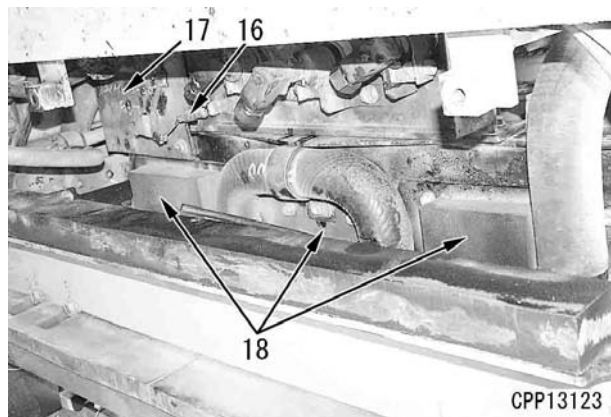
- ★ Before disconnecting each hose, mark it with a tag etc. to indicate its position.
- ★ Prepare an oil receiver.
- ★ Fit a plug.
  - Adapter size: #06 --- 2 pieces
  - #04 --- 2 pieces
- ★ Remove the clip, too.



17. Disconnect connector A16 (16).


18. Remove cover (17).

19. Remove 3 covers (18).



### 3. Gears


- 1) Install nipples (5) and (6) to case (14).

 Nipple:

**2.9 – 5.9 Nm {0.3 – 0.6 kgm}**

- 2) Install gears (4), (3), and (2).


- ★ Check that the gears rotate smoothly and then apply red lead and check the tooth contact.

 Rolling surface of bearing:


**Grease (G2-LI)**

### 4. Case

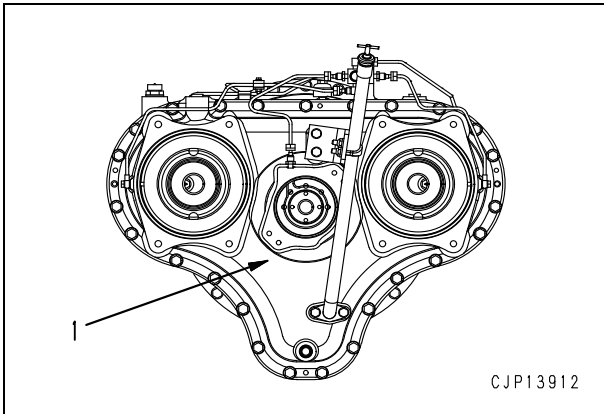
Install case (1).

 Mating face of case:

**Gasket sealant (LG-11)**

 Mounting bolt:

**98 – 123 Nm {10 – 12.5 kgm}**



## Disassembly and assembly of final drive assembly


### Special tools

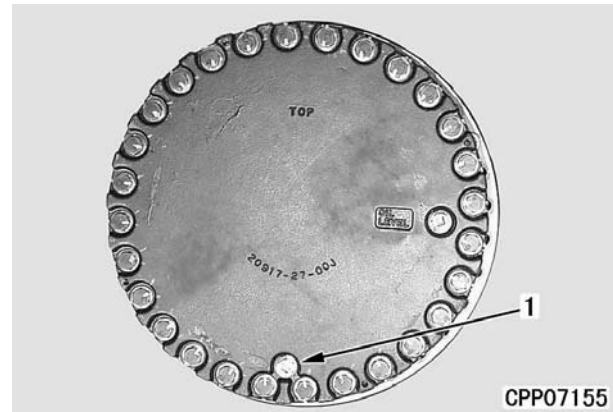
Symbol	Part number	Part name	Necessity	Q'ty	N/R	Sketch
1	790-501-5000	Unit repair stand	●	1		
	790-501-5200	Unit repair stand	●	1		
	790-901-4110	Bracket	●	1		
2	796T-627-1510	Plate	●	1		○
3	796T-627-1520	Plate	●	1		○
4	970-431-1031	Block	■	1		
	791-730-1130	Bolt	■	2		
	790-101-2360	Plate	■	2		
	01643-32060	Washer	■	2		
	01580-12016	Nut	■	2		
	796-627-1420	Adapter	■	2		
	790-201-2790	Spacer	■	1		
	790-201-2690	Plate	■	1		
	790-101-2102	Puller (294 N {30 ton})	■	1		
	790-101-1102	Pump	■	1		
5	796-627-1020	Installer	■	1		
6	790-101-2510	Block	■	1		
	791-830-1320	Rod	■	2		
	790-101-2570	Washer	■	2		
	01643-31645	Washer	■	2		
	01580-11613	Nut	■	2		
	796-627-1410	Adapter	■	2		
	796T-627-1330	Push tool	●	1		○
	790-101-2102	Puller	■	1		
790-101-1102	Pump	■	1			
7	790-331-1110	Wrench	■	1		

### Disassembly

#### 1. Draining oil

Set drain plug (1) at bottom and remove it to drain oil from final drive case.

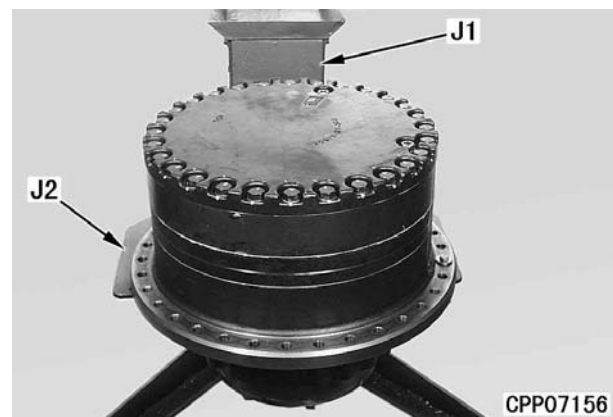
 Final drive case: **10.5 ℓ (Each side)**



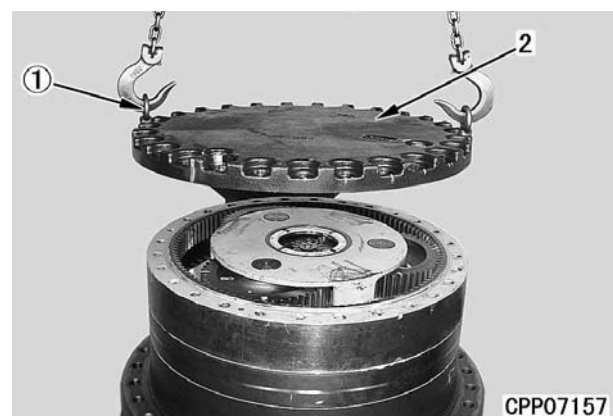
#### 2. Cover

1) Using tools **J1** and **J2**, support final drive assembly.

★ Install by using the sprocket mounting bolt holes on the hub.



2) Using eyebolts [1], lift off cover (2).



PC600, 600LC-8 Hydraulic excavator

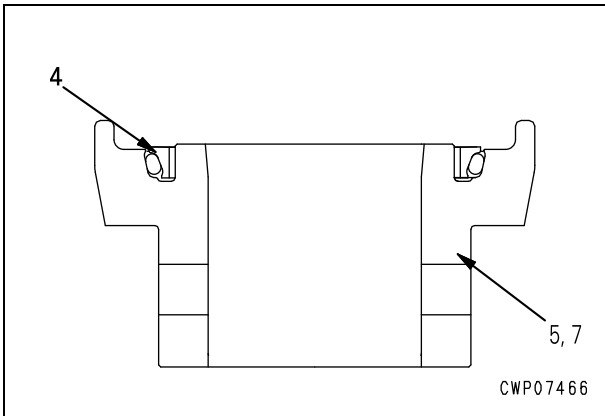
Form No. SEN01605-03

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Printed in Japan 08-10

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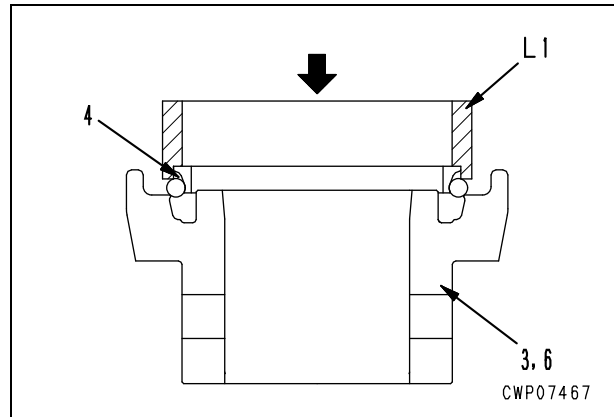
- Remove floating seals (4) from supports (5) and (7).



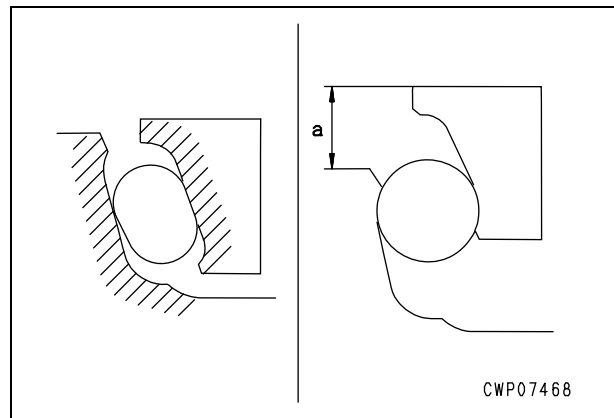
### Assembly

- ★ Clean all parts, and check for dirt or damage.

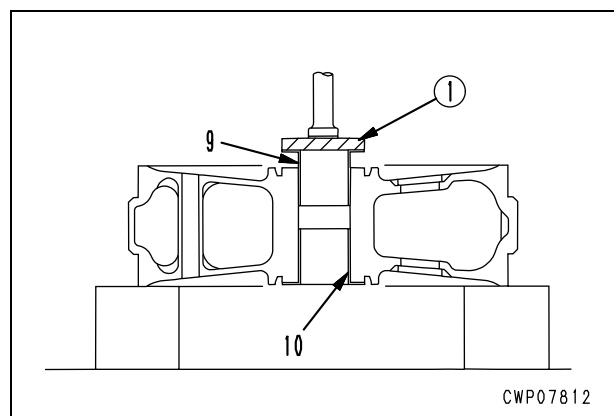
- Using tool L1, assemble floating seals (4) to supports (6) and (3).



- ★ When installing the floating seal, clean, degrease and completely dry the contact faces of the O-ring and floating seal (hatched parts in the figure below). Take care that dirt does not stick to the contact face of the floating seal.
- ★ After installing the floating seal, check that its angle is within 1 mm and its projection (a) is 9 – 11 mm.

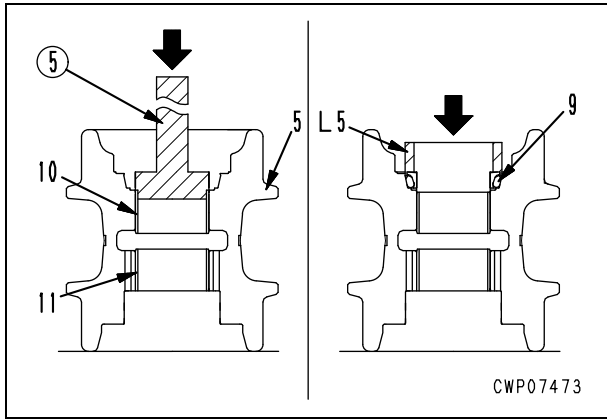


- Using tool [1], press fit bushings (10) and (9) to idler.

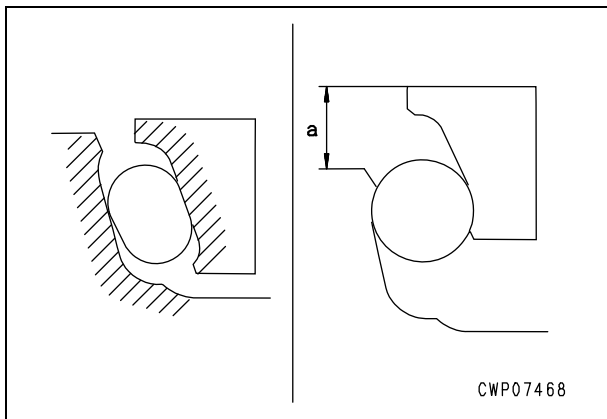


**Assembly**

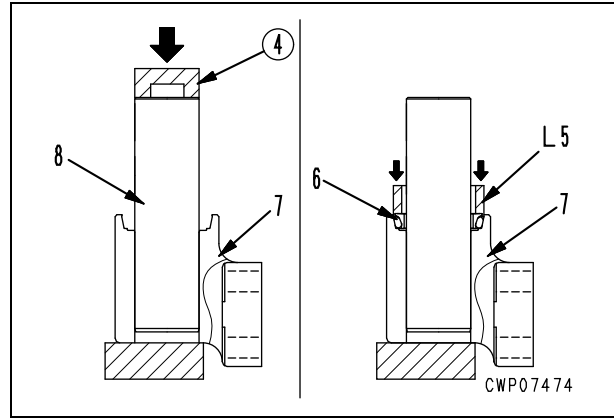
1. Using tool [5], press fit bushing (10) to roller (5).  
 ★ Press fit bushing (11) similarly.
2. Using tool L5, press fit floating seal (9) to roller (5).



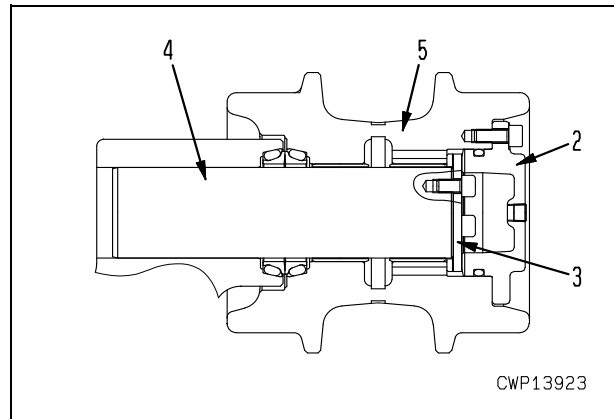
- ★ When installing the floating seal, clean, degrease and completely dry the contact faces of the O-ring and floating seal (hatched parts in the figure below). Take care that dirt does not stick to the contact face of the floating seal.
- ★ After installing the floating seal, check that its angle is within 1 mm and its projection (a) is 9 – 11 mm.



3. Using push tool [4], press fit shaft (8) to support (7).
4. Using tool L5, press fit floating seal (6) to support (7).  
 ★ For fitting procedure of the floating seal, see 2 above.



5. Install shaft assembly (4) to roller (5).
6. Install cover (3).  
 ☞ Mounting bolt:  
**44.12 – 53.93 Nm {4.5 – 5.5 kgm}**
7. Install cover (2).  
 ☞ Mounting bolt:  
**44.12 – 53.93 Nm {4.5 – 5.5 kgm}**

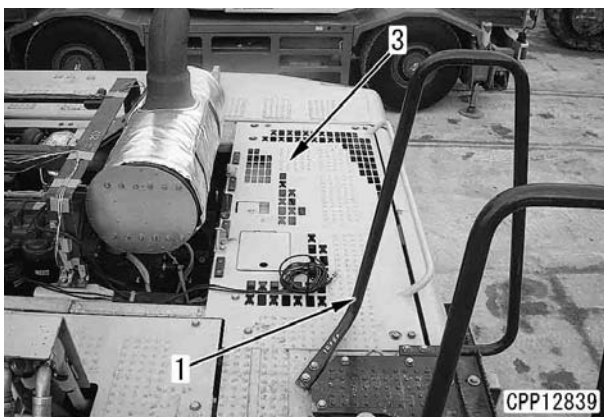
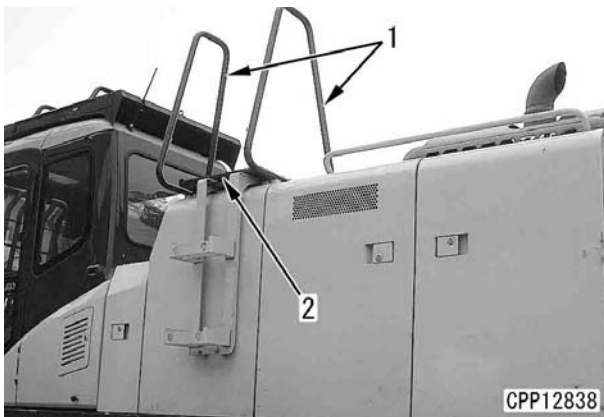


## Removal and installation of hydraulic tank assembly

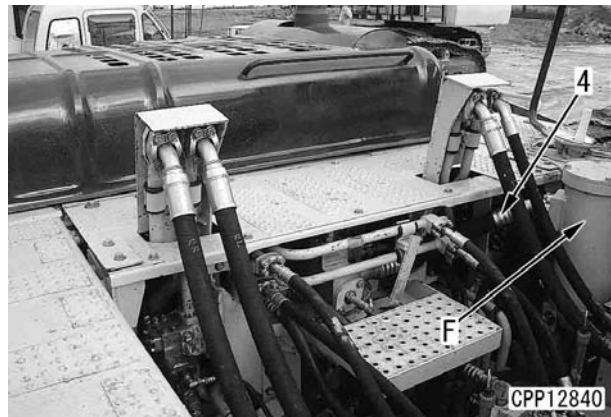
### Removal

- ⚠ Lower the work equipment to the ground and stop the engine.
- ⚠ Loosen the cap of the hydraulic tank gradually to release the internal pressure of the hydraulic tank.
- ⚠ Disconnect the cable from the negative (-) terminal of the battery.
- ★ Install oil stopper plugs to the disconnected tubes and hoses.
- ★ Before disconnecting each hose, mark it with a tag etc. to indicate its position.

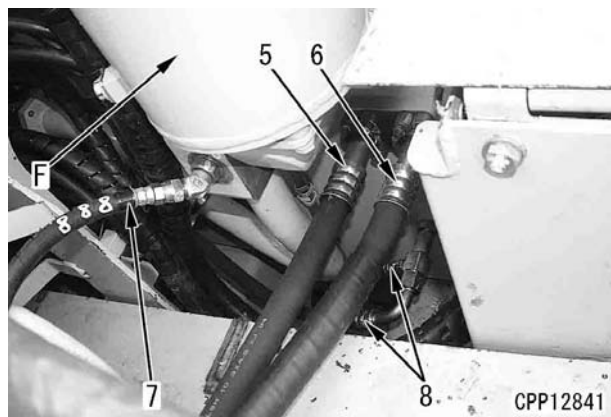
1. Drain the hydraulic oil.
  - 🛢 Hydraulic oil: **360 ℓ (Refill capacity)**
2. Remove handrails (1).
3. Remove plate (2).
4. Remove cover (3).



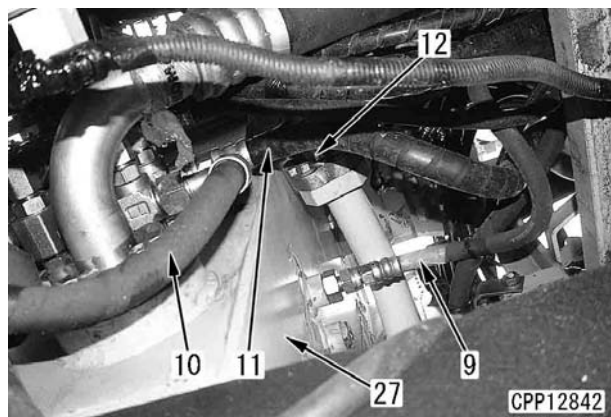
5. Disconnect hose (4) from filter (F).



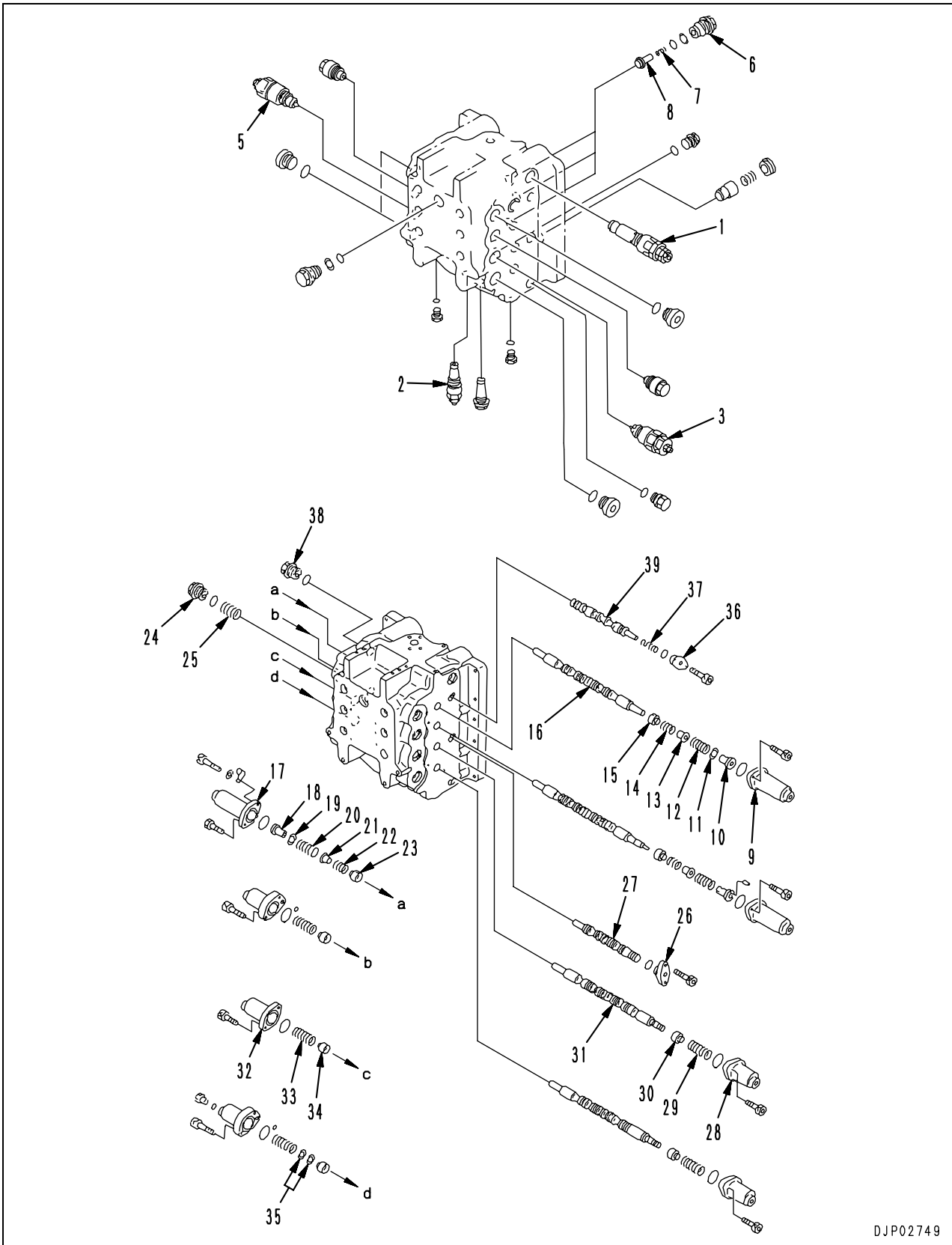
6. Disconnect hoses (5) – (8) from under filter (F).



7. Remove the undercover.
8. Disconnect hoses (9) – (12) from the inside rear of hydraulic tank (27).



Assembly



DJP02749

- ★ Tighten each part to the following torque.
  - Plug (29): 6 – 11 Nm {0.6 – 1.1 kgm}
  - Plug (28): 4 – 9 Nm {0.4 – 0.9 kgm}
  - Screw (27): 7.8 – 9.8 Nm {0.8 – 1.0 kgm}
  - Bolt (15): 25 – 30 Nm {2.5 – 3.2 kgm}
  - Bolt (17): 27 – 30 Nm {2.8 – 3.5 kgm}

## Removal and installation of bucket cylinder assembly (Backhoe specification)

### Removal

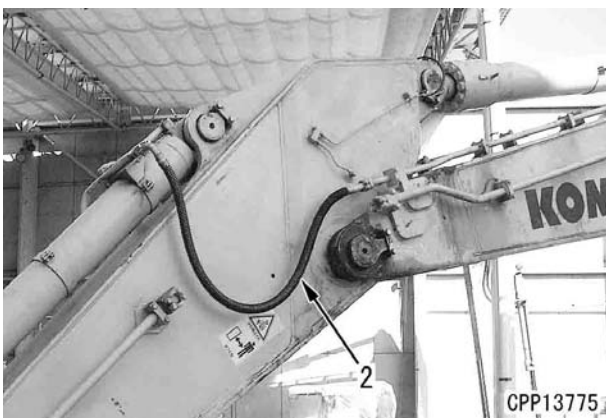
**⚠** Retract the bucket cylinder piston rod to about 200 mm before the dump stroke end, lower the work equipment to the ground, and set the lock lever in the lock position.

1. Set block [1] under the arm top, block [2] between the link and arm, and block [3] between the bucket cylinder and arm. [\*1]
2. Remove pin (1) on the head side. [\*1]





3. Run the engine and retract the piston rod and bind it with wires etc. to prevent it from coming out.
  - ⚠ Stop the engine and release the residual pressure from the hydraulic circuit. For details, see Testing and adjusting, "Releasing remaining pressure in hydraulic circuit."**

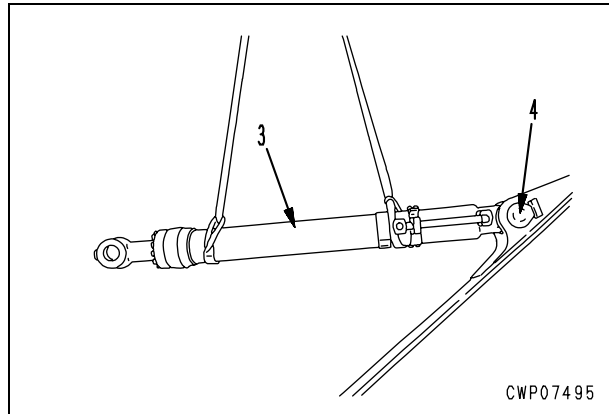
4. Disconnect right and left hoses (2).



5. Sling bucket cylinder assembly (3) temporarily and remove pin (4) on the bottom side and then remove bucket cylinder assembly. [\*2]
  - ★ Check the quantity and positions of the inserted shims.

 Pin (4): **25 kg**

 Bucket cylinder assembly: **470 kg**



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