SHOP MANUAL

KOMATSU

PC270-7

MACHINE MODEL	SERIAL NUMBER
PC270-7	**10001 and up**

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- PC270-7 mount the SAA6D102E-2 engine.
  For details of the engine, see the 102 Series Engine Shop Manual.

Printed in Japan 08-05 (01)

HOW TO READ THE SHOP MANUAL

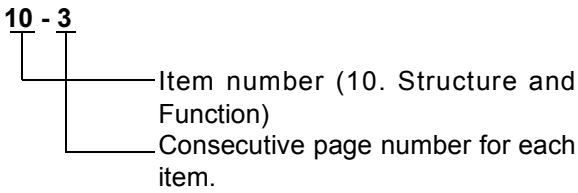
VOLUMES
Shop manuals are issued as a guide to carrying out repairs. They are divided as follows:

Chassis volume: Issued for every machine model
Engine volume: Issued for each engine series
Electrical volume:
Attachments volume: } Each issued as one volume to cover all models

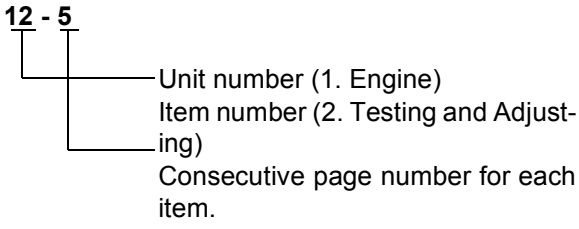
These various volumes are designed to avoid duplicating the same information. Therefore, to deal with all repairs for any model , it is necessary that chassis, engine, electrical and attachment volumes be available.

DISTRIBUTION AND UPDATING
Any additions, amendments or other changes will be sent to KOMATSU distributors. Get the most up-to-date information before you start any work.

FILING METHOD
1. See the page number on the bottom of the page. File the pages in correct order.
2. Following examples show how to read the page number.
   Example 1 (Chassis volume):



   Example 2 (Engine volume):



3. Additional pages: Additional pages are indicated by a hyphen (-) and number after the page number. File as in the example.
   Example:

REVISED EDITION MARK
When a manual is revised, an edition mark ((1)(2)(3)....) is recorded on the bottom of the pages.

REVISIONS
Revised pages are shown in the LIST OF REVISED PAGES next to the CONTENTS page.

SYMBOLS
So that the shop manual can be of ample practical use, important safety and quality portions are marked with the following symbols.

Symbol	Item	Remarks
⚠	Safety	Special safety precautions are necessary when performing the work.
★	Caution	Special technical precautions or other precautions for preserving standards are necessary when performing the work.
	Weight	Weight of parts of systems. Caution necessary when selecting hoisting wire, or when working posture is important, etc.
	Tightening torque	Places that require special attention for the tightening torque during assembly.
	Coat	Places to be coated with adhesives and lubricants, etc.
	Oil, water	Places where oil, water or fuel must be added, and the capacity.
	Drain	Places where oil or water must be drained, and quantity to be drained.

CONVERSION TABLE

METHOD OF USING THE CONVERSION TABLE

The Conversion Table in this section is provided to enable simple conversion of figures. For details of the method of using the Conversion Table, see the example given below.

EXAMPLE

- Method of using the Conversion Table to convert from millimeters to inches

1. Convert 55 mm into inches.
   (1) Locate the number 50 in the vertical column at the left side, take this as (A), then draw a horizontal line from (A).
   (2) Locate the number 5 in the row across the top, take this as (B), then draw a perpendicular line down from (B).
   (3) Take the point where the two lines cross as (C). This point (C) gives the value when converting from millimeters to inches. Therefore, 55 mm = 2.165 inches.
2. Convert 550 mm into inches.
   (1) The number 550 does not appear in the table, so divide by 10 (move the decimal point one place to the left) to convert it to 55 mm.
   (2) Carry out the same procedure as above to convert 55 mm to 2.165 inches.
   (3) The original value (550 mm) was divided by 10, so multiply 2.165 inches by 10 (move the decimal point one place to the right) to return to the original value. This gives 550 mm = 21.65 inches.

Millimeters to inches

(B)

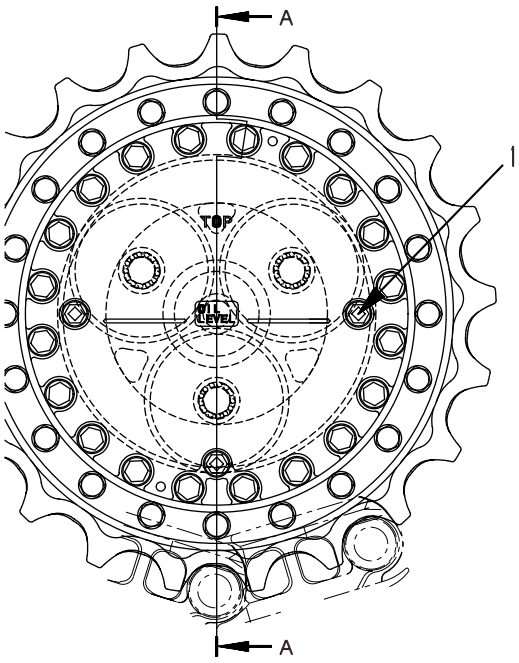
1 mm = 0.03937 in

	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
(A) 50	1.969	2.008	2.047	2.087	2.126	(C) 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

SPECIFICATIONS

Machine model				PC270-7
Serial Number				10001 and up
Bucket capacity			m^3	1.26
Operating weight			kg	26,900
Performance	Working ranges	Max. digging depth	mm	6,460
		Max. vertical wall depth	mm	5,650
		Max. digging reach	mm	10,100
		Max. reach at ground level	mm	9,900
		Max. digging height	mm	10,000
		Max. dumping height	mm	7,035
	Max. digging force		kN {kg}	184 {18,700}
	(using power max. function)			(198.1 {20,197})
	Swing speed		rpm	10.5
	Swing max. slope angle		deg.	20
	Travel speed		km/h	Lo: 3.0 (※ 2.8) Mi: 4.1 (※ 3.3)
				Hi: 5.5 (※ 4.5)
	Gradeability		deg.	35
	Ground pressure		kPa {kg/cm²}	54.9 {0.56}
	[standard shoe width]		[mm]	[600]
Dimensions	Overall length (for transport)		mm	9,790
	Overall width		mm	3,190
	Overall width of track		mm	3,190
	Overall height (for transport)		mm	3,210
	Overall height to chassis		mm	3,100
	Ground clearance to bottom of upper structure		mm	1,186
	Min. ground clearance		mm	498
	Tail swing radius		mm	2,940
	Min. swing radius of work equipment		mm	3,430
	Height of work equipment at min. swing radius		mm	8,150
	Length of track on ground		mm	3,700
	Track gauge		mm	2,590
	Height of machine cab		mm	2,560

※: With optional heavy duty travel motor.



SJP08992

1. Level plug
2. Drain plug
3. No. 1 planetary gear (No. of teeth: 46)
4. No. 1 sun gear (No. of teeth: 11)
5. No. 2 sun gear (No. of teeth: 19)
6. No. 1 planetary carrier
7. No. 2 planetary carrier
8. Cover
9. Ring gear (No. of teeth: 97)
10. Hub
11. Sprocket
12. Floating seal
13. Travel motor
14. No. 2 planetary gear (No. of teeth: 38)

SPECIFICATIONS

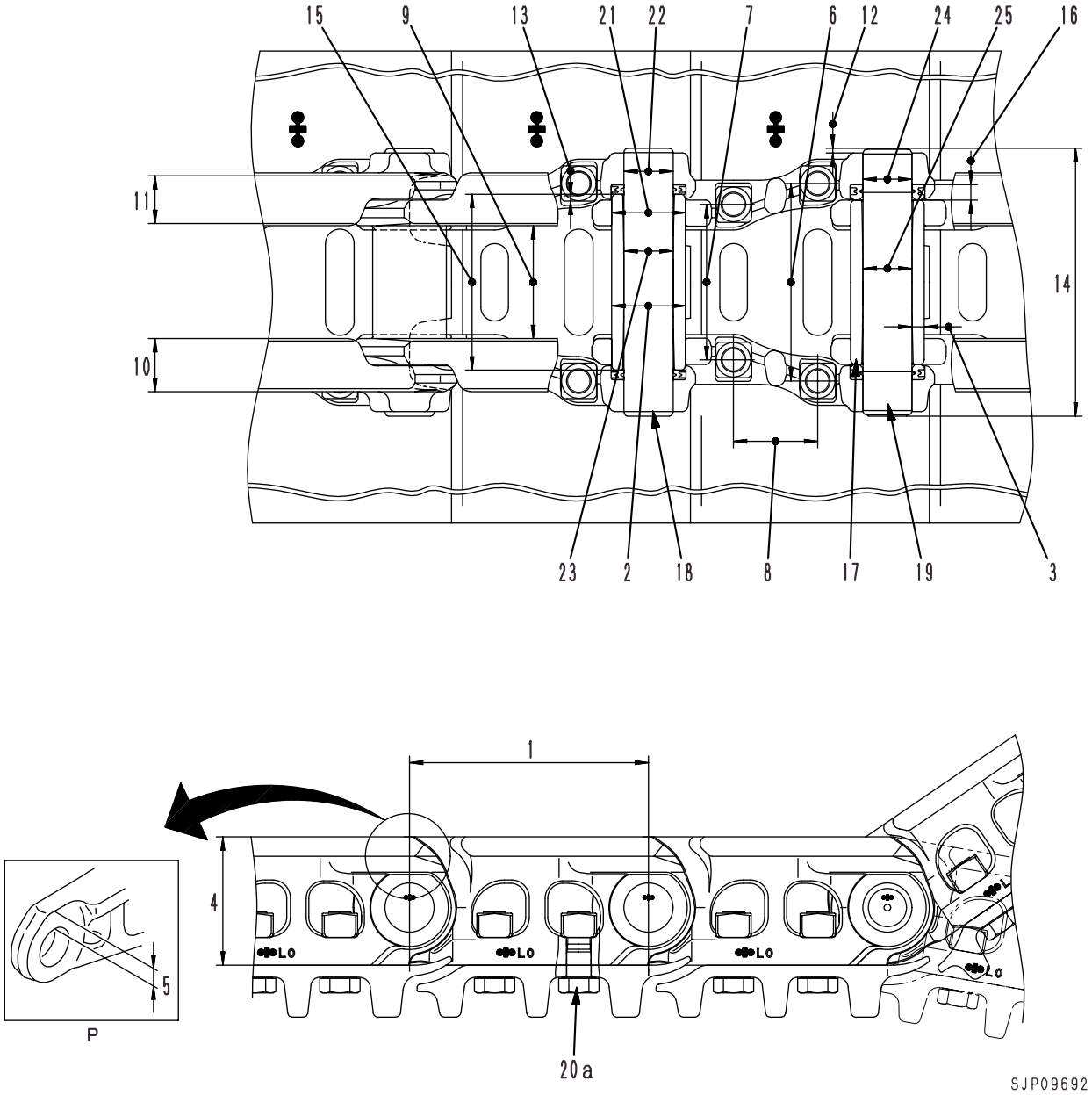
Reduction ratio:

$$-\left(\frac{11 + 106}{11}\right) \times \left(\frac{19 + 97}{19}\right) + 1 = -63.938$$

Unit: mm

No.	Check item	Criteria		Remedy
15	Backlash between No. 1 sun gear and No. 1 planetary gear	Standard clearance	Clearance limit	Replace
		0.12 ~ 0.44	0.90	
16	Backlash between No. 1 planetary gear and ring gear	0.18 ~ 0.62	1.20	
17	Backlash between No. 2 planetary carrier and motor	0.06 ~ 0.25	—	
18	Backlash between No. 2 sun gear and No. 2 planetary gear	0.15 ~ 0.51	1.00	
19	Backlash between No. 2 planetary gear and ring gear	0.19 ~ 0.66	1.30	
20	Backlash between No. 2 planetary carrier and No. 2 sun gear	0.39 ~ 0.80	1.60	
21	Amount of wear on sprocket tooth	Repair limit: 6		Rebuild or replace
22	Width of sprocket tooth	Standard size	Repair limit	
		87	84	

TRACK SHOE



★ P portion shows the link of bushing press fitting end.

Operation

1) Operation of pump

i Cylinder block (7) rotates together with shaft (1), and shoe (5) slides on flat surface **A**.

When this happens, rocker cam (4) moves along cylindrical surface **B**, so angle α between center line **X** of rocker cam (4) and the axial direction of cylinder block (7) changes. (Angle α is called the swash plate angle.)

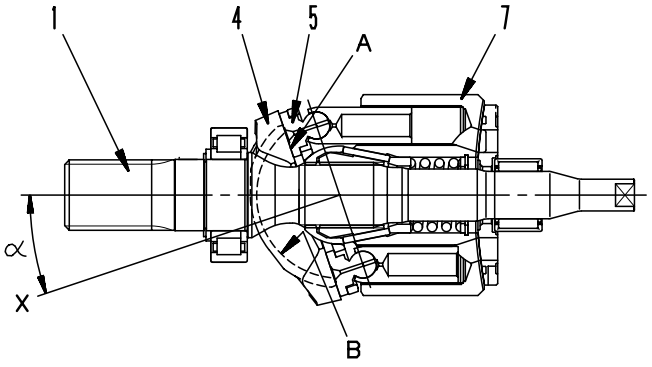
ii Center line **X** of rocker cam (4) maintains swash plate angle α in relation to the axial direction of cylinder block (7), and flat surface **A** moves as a cam in relation to shoe (5).

In this way, piston (6) slides on the inside of cylinder block (7), so a difference between volumes **E** and **F** is created inside cylinder block (7). The suction and discharge is carried out by this difference **F** - **E**.

In other words, when cylinder block (7) rotates and the volume of chamber **E** becomes smaller, the oil is discharged during that stroke. On the other hand, the volume of chamber **F** becomes larger, and as the volume becomes bigger, the oil is sucked in.

iii If center line **X** of rocker cam (4) is in line with the axial direction of cylinder block (7) (swash plate angle = 0), the difference between volumes **E** and **F** inside cylinder block (7) becomes 0, so the pump does not carry out any suction or discharge of oil.

(In actual fact, the swash plate angle never becomes 0.)



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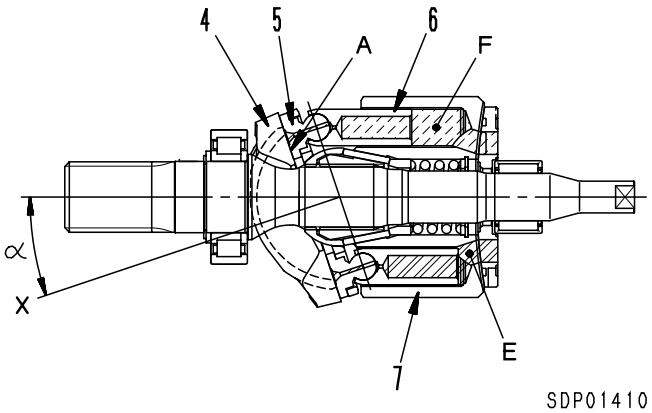

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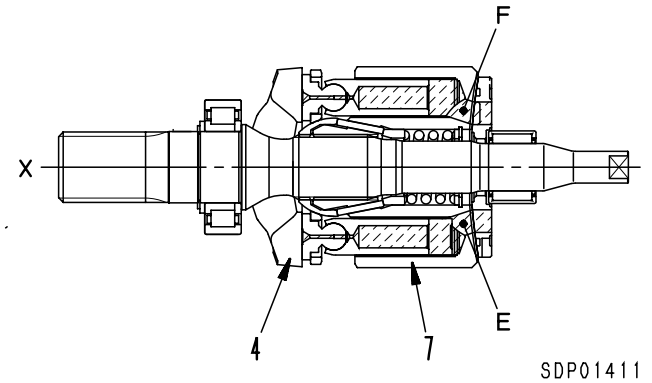
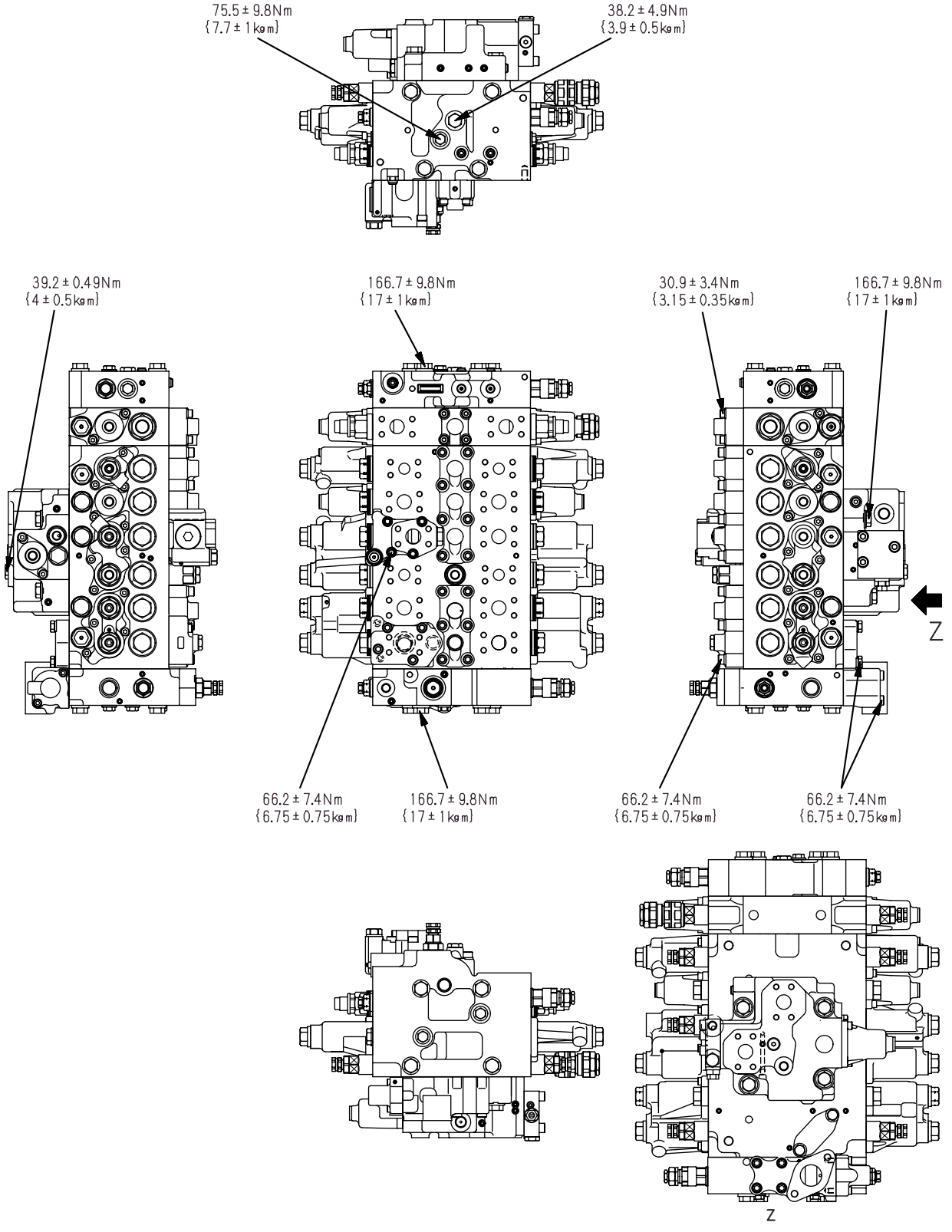


SDP01411

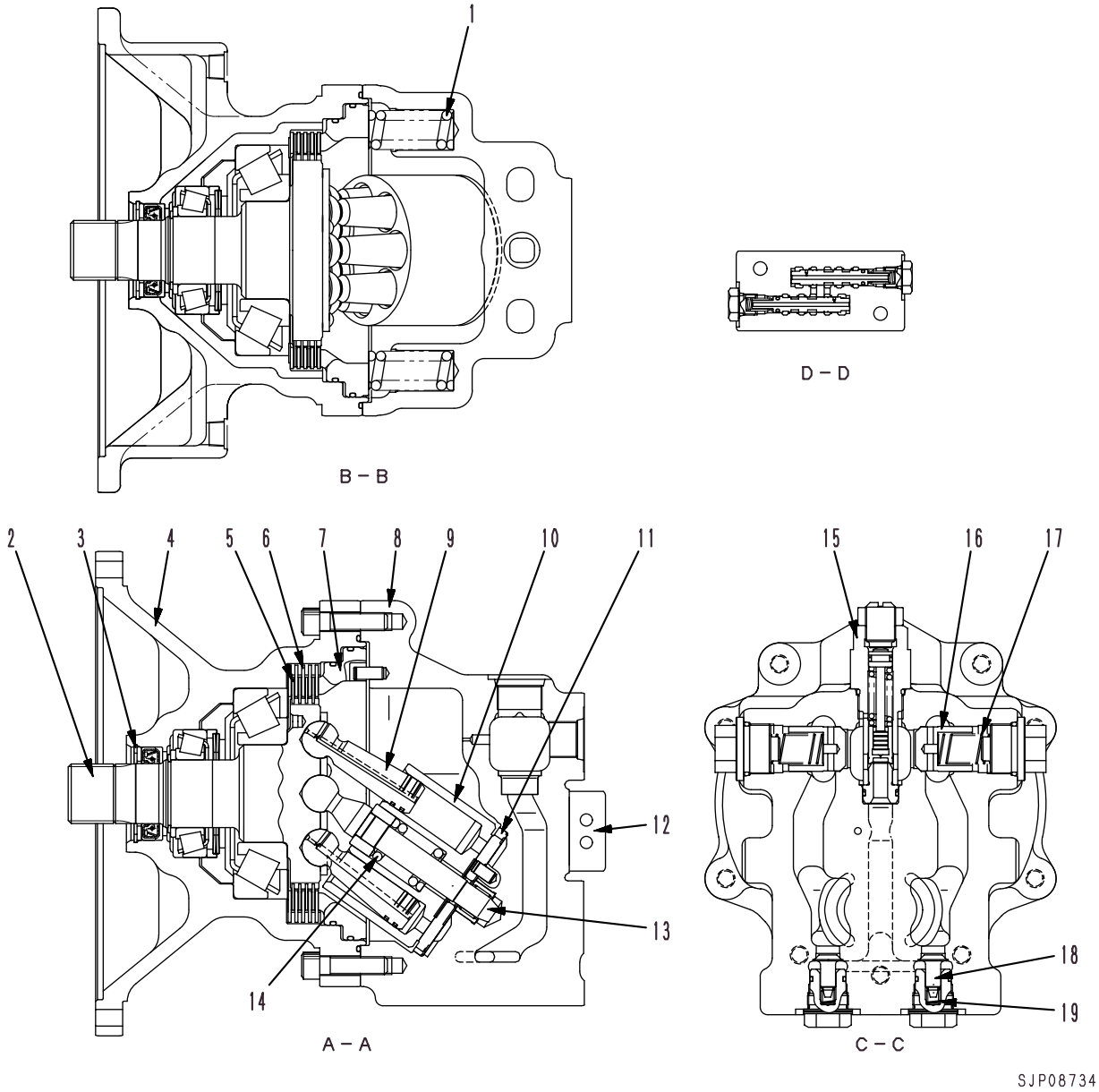
- Port **C** of the PC valve is connected to port **E** of the LS valve (see (1) LS valve). Self pressure **PP1** enters port **B** and the small diameter end of servo piston (9), and other pump pressure **PP2** enters port **A**.
- When pump pressures **PP1** and **PP2** are small, spool (3) is on the left. At this point, port **C** and **D** are connected, and the pressure entering the LS valve becomes drain pressure **PT**. If port **E** and port **G** of the LS valve are connected (see (1) LS valve), the pressure entering the large diameter end of the piston from port **J** becomes drain pressure **PT**, and servo piston (9) moves to the right. In this way, the pump discharge amount moves in the direction of increase.
- As servo piston (9) moves further, springs (4) and (6) expand and the spring force becomes weaker. When the spring force becomes weaker, spool (3) moves to the right, so the connection between port **C** and port **D** is cut, and the pump discharge pressure ports **B** and **C** are connected. As a result, the pressure at port **C** rises, and the pressure at the large diameter end of the piston also rises, so the movement of piston (9) to the right is stopped.
- In other words, the stop position for piston (9) (= pump discharge amount) is decided at the point where the force of springs (4) and (6) and the pushing force from the PC-EPC valve solenoid and the pushing force created by the pressures **PP1** and **PP2** acting on the spool (3) are in balance.

(2/9)


75.5 ± 9.8Nm
{7.7 ± 1kgm}
38.2 ± 4.9Nm
{3.9 ± 0.5kgm}
39.2 ± 0.49Nm
{4 ± 0.5kgm}
166.7 ± 9.8Nm
{17 ± 1kgm}
30.9 ± 3.4Nm
{3.15 ± 0.35kgm}
166.7 ± 9.8Nm
{17 ± 1kgm}
Z
66.2 ± 7.4Nm
{6.75 ± 0.75kgm}
166.7 ± 9.8Nm
{17 ± 1kgm}
66.2 ± 7.4Nm
{6.75 ± 0.75kgm}
66.2 ± 7.4Nm
{6.75 ± 0.75kgm}
Z
SJP09099

Unit: mm

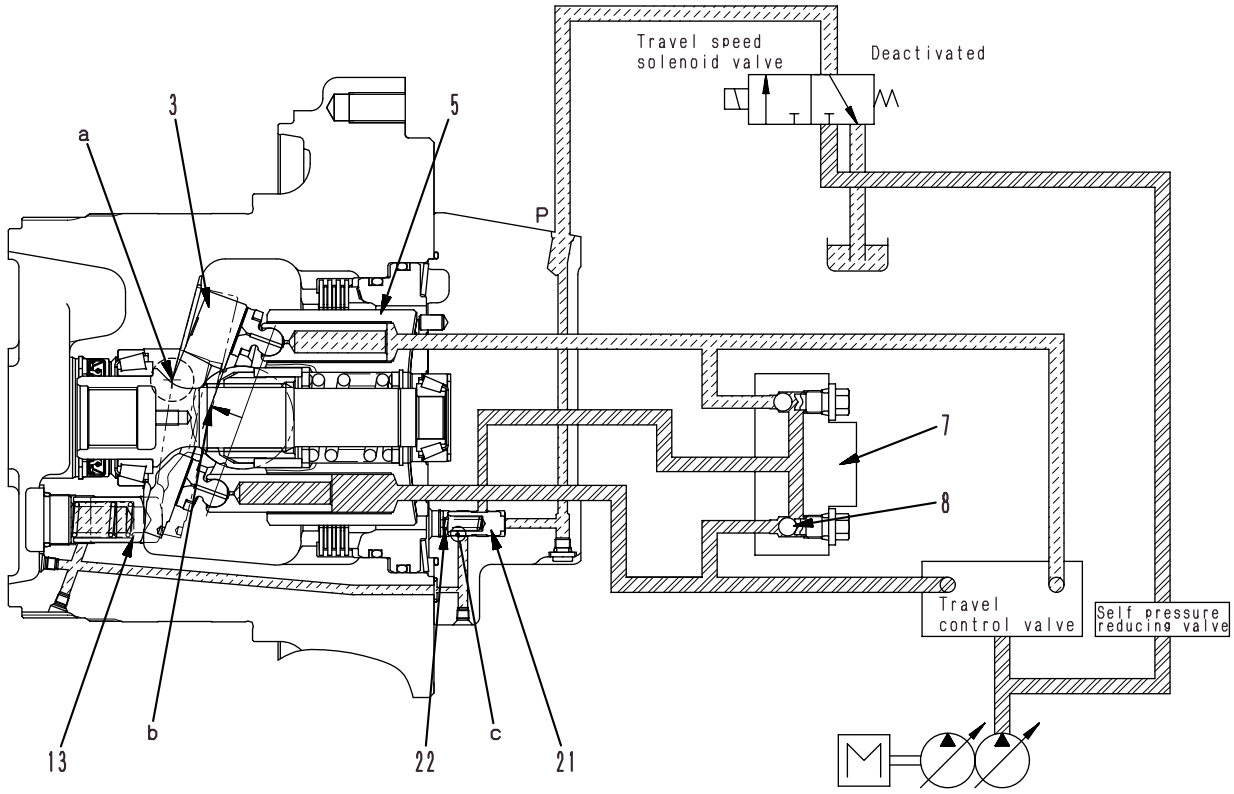
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
17	Valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	
		10.45 x 7	4.8	3.1 N {0.32 kg}	—	2.5 N {0.26 kg}	
18	Unload spring	31.5 x 10.2	26.8	70.6 N {7.2 kg}	—	56.4 N {5.8 kg}	
19	Check valve spring	11.5 x 4.6	8.5	1.5 N {0.15 kg}	—	1.2 N {0.12 kg}	If damaged or deformed, replace spring
20	Spool return spring	46.6 x 21.8	3.3	156.8 N {16.0 kg}	—	125.5 N {12.8 kg}	
21	Spool return spring	64.5 x 32.3	63	177.5 N {18.1 kg}	—	142.0 N {14.5 kg}	
22	Sequence valve spring	70.9 x 18.0	59	199.8 N {20.4 kg}	—	160.0 N {16.3 kg}	
23	Spool return spring	29.9 x 11.0	10.7	10.4 N {1.1 kg}	—	8.3 N {0.8 kg}	
24	Relief spring	34.7 x 10.4	32.3	430.2 N {43.9 kg)	—	344.2 N {35.1 kg}	



1. Brake spring
2. Drive shaft
3. Spacer
4. Case
5. Disc
6. Plate
7. Brake piston
8. Housing
9. Piston
10. Cylinder block
11. Valve plate
12. Reverse prevention valve
13. Center shaft
14. Center spring
15. Safety valve
16. Check valve
17. Check valve spring
18. Shuttle valve
19. Shuttle valve spring

OPERATION OF MOTOR

1) At low speed (motor swash plate angle at maximum)

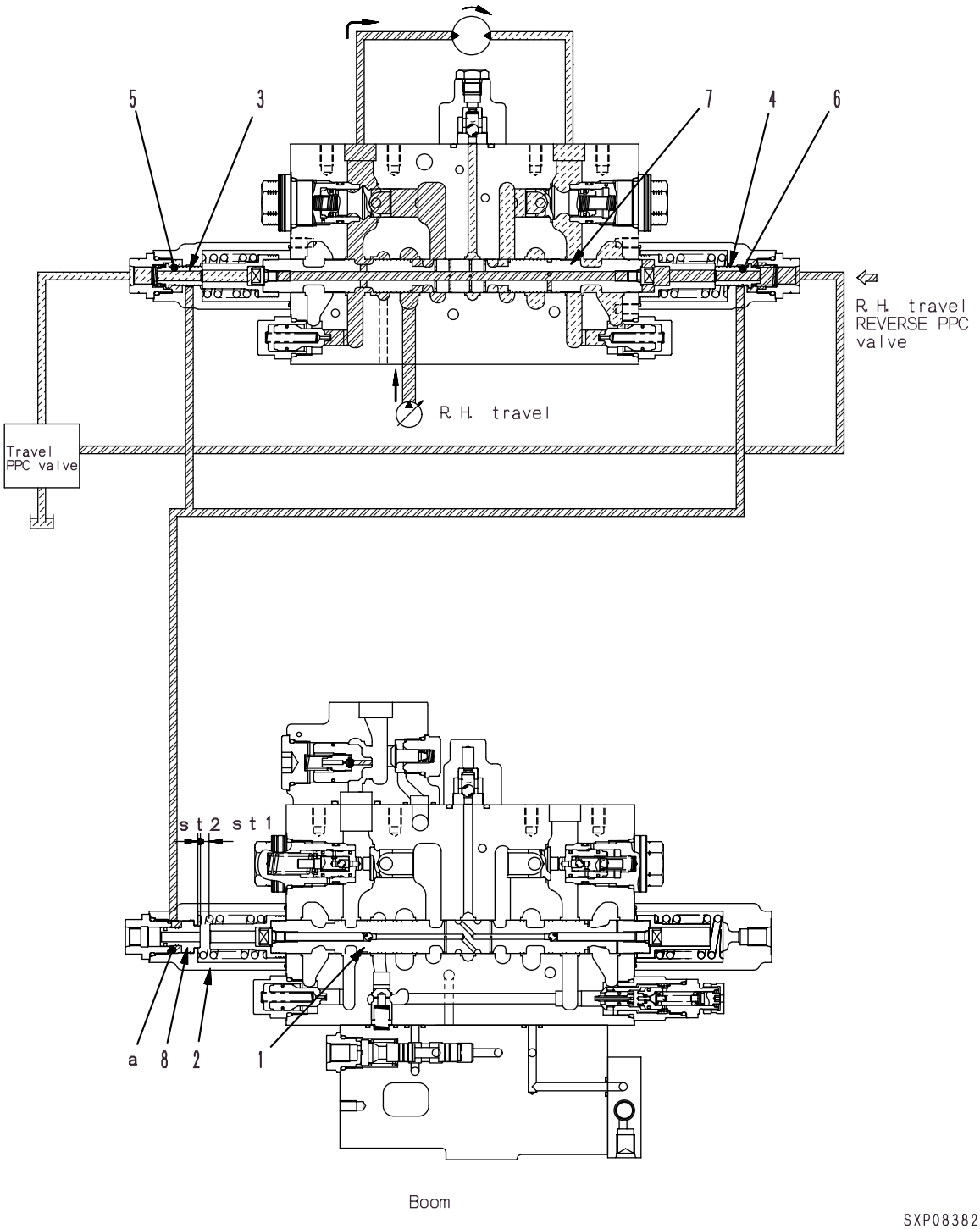


SXP09151

- The solenoid valve is deactivated, so the pilot pressure oil from the main pump does not flow to port **P**.
  For this reason, regulator valve (21) is pushed to the right by spring (22).
- Because of this, it pushes slow return valve (8), and the main pressure oil from the control valve going to end cover (7) is shut off by regulator valve (21).
- Fulcrum **a** of rocker cam (3) is eccentric to point of force **b** of the combined force of the propulsion force of cylinder (5), so the combined force of the piston propulsion force acts as a moment to angle rocker cam (3) in the direction of the maximum swash plate angle.
- At the same time, the pressurized oil at regulator piston (13) passes through orifice **c** in regulator valve (21) and is drained to the motor case.
- As a result, rocker cam (3) moves in the maximum swash plate angle direction, the motor capacity becomes maximum, and the system is set to low speed.

2. When travel lever is operated

- If the right travel lever is set in the reverse (or forward) direction, the right travel reverse (or forward) PPC pressure pushes spool (7) to the left (or right).
- Spool (7) pushes piston (3) to close orifice (5) and shut off stroke regulation signal chamber "a" from the drain circuit of the travel PPC valve.
- At this time, the right travel reverse (or forward) PPC pressure is applied through orifice (6) of piston (4) to the left end of piston (8) to push piston (8) to the right.
- When boom RAISE, arm IN, OUT, bucket CURL, DUMP are operated, spool (1) moves to the left, but the maximum stroke of the spool is limited to st1, the amount of movement (st2) of piston (8).



3) Fine control (control lever returned)

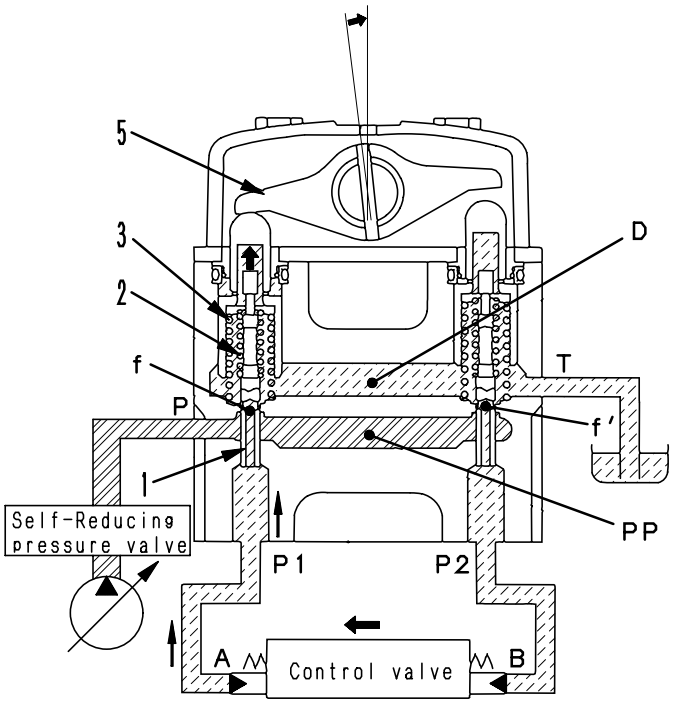
When lever (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

Because of this, fine control hole **f** is connected to drain chamber **D**, and the pressurized oil at port **P1** is released.

If the pressure at port **P1** drops too much, spool (1) is pushed up by metering spring (2), so fine control hole **f** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, so the pressure at port **P1** supplies the pump pressure until the pressure recovers to a pressure equivalent to the position of the lever.

When the control valve returns, oil in drain chamber **D** flows in from fine control hole **f'** of the valve on the side that is not moving.

It passes through port **P2** and goes to chamber **B** to charge the oil. (Fig. 3)

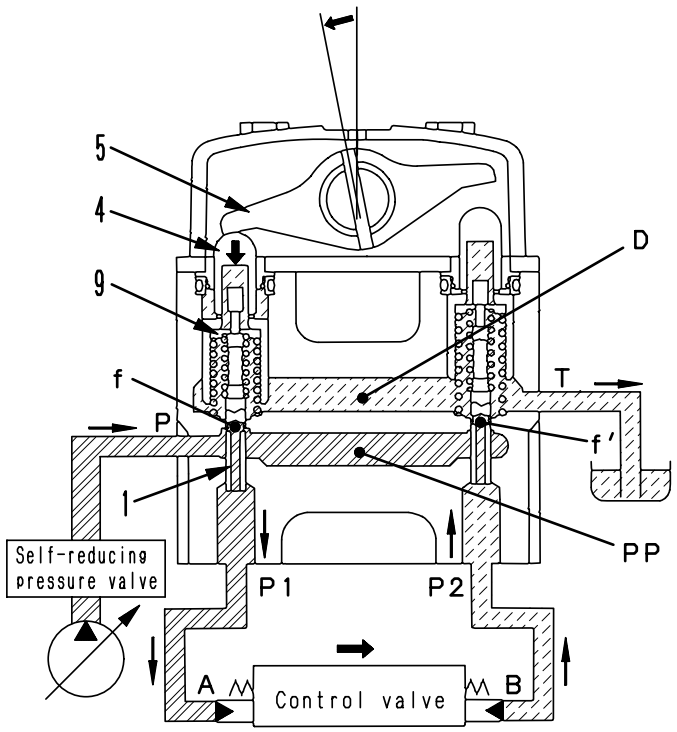


(Fig. 3)

SBP03499

4) At full stroke

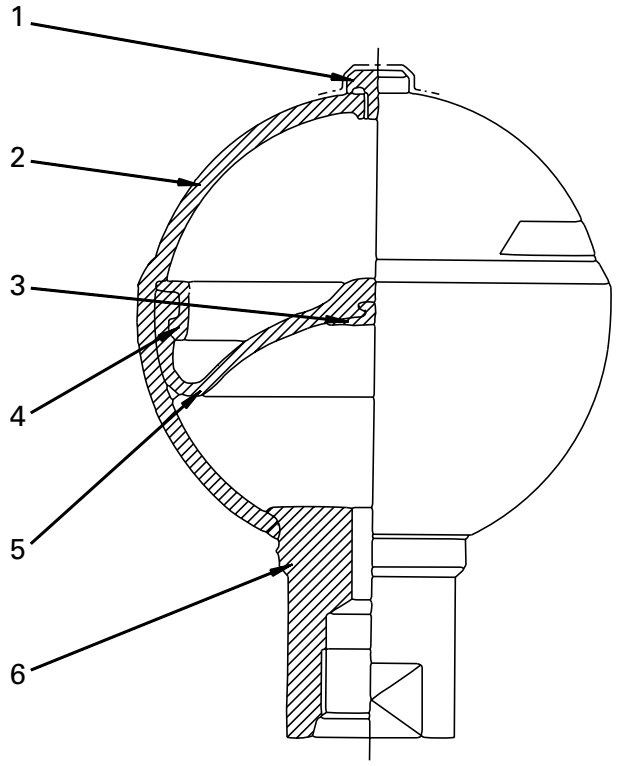
Lever (5) pushes down piston (4), and retainer (9) pushes down on spool (1). Fine control hole **f** is shut off from drain chamber **D**, and is connected to pump pressure chamber **PP**. Therefore, the pilot pressure oil from the main pump passes through fine control hole **f** and flows to chamber **A** from port **P1** to push the control valve spool. The return oil from chamber **B** passes from port **P2** through fine control hole **f'** and flows to drain chamber **D**. (Fig. 4)



(Fig. 4)

SJP09689

PPC ACCUMULATOR

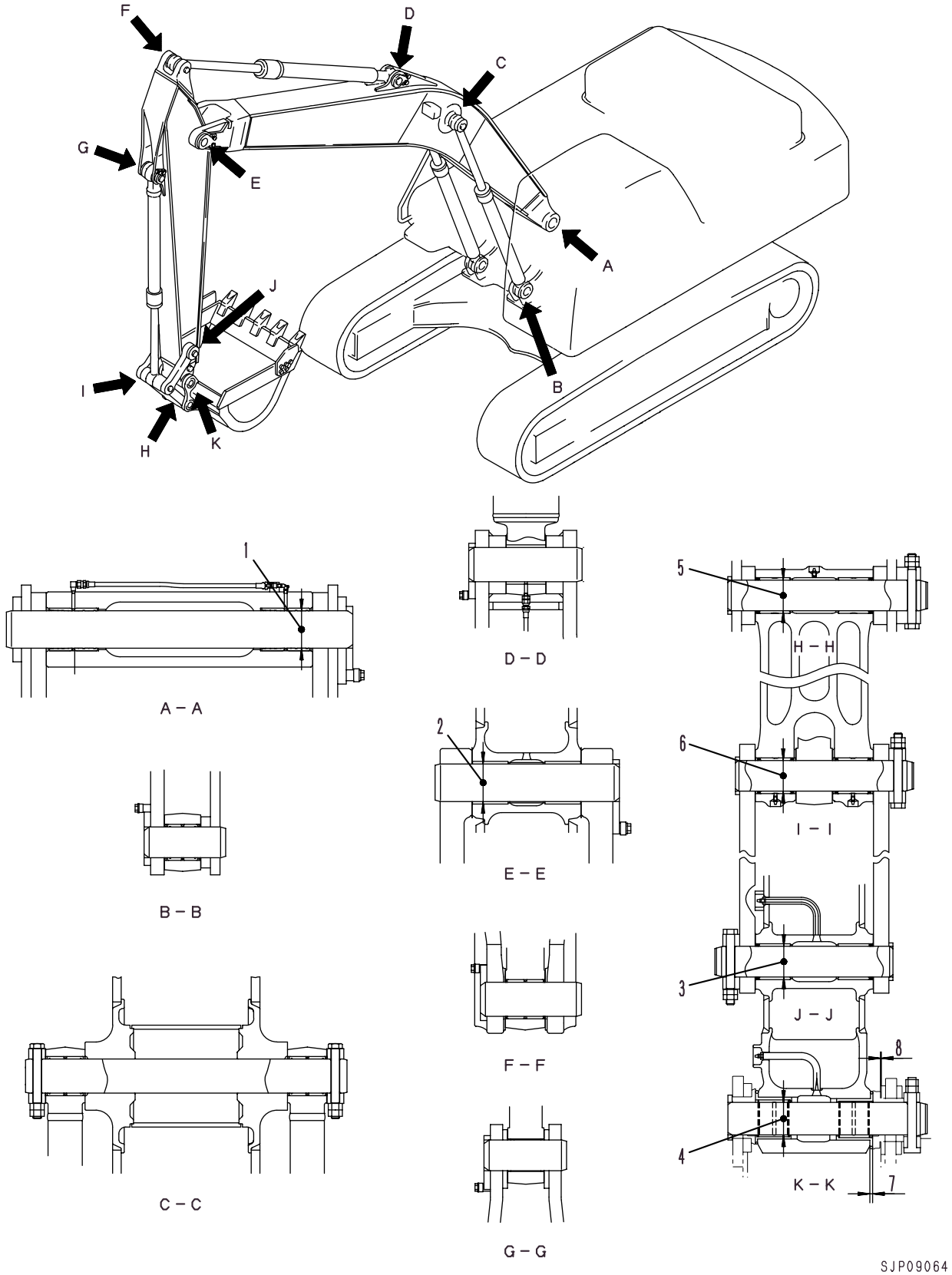


SBP00290

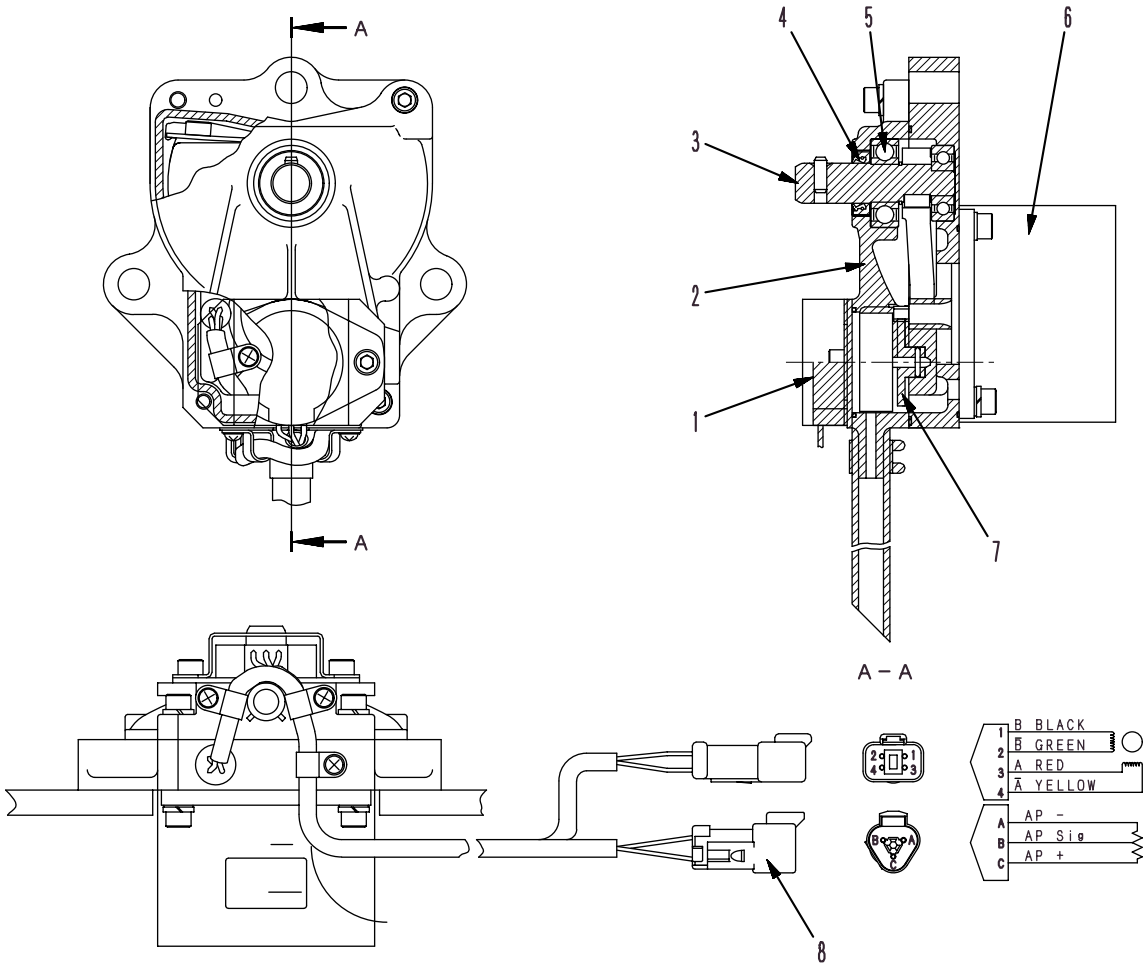
1. Gas plug
2. Shell
3. Poppet
4. Holder
5. Bladder
6. Oil port

SPECIFICATIONS
Gas capacity:300 cc (for PPC)

WORK EQUIPMENT



Governor motor



SJP09072

1. Potentiometer
2. Cover
3. Shaft
4. Dust seal
5. Bearing
6. Motor
7. Gear
8. Connector

Function

- The motor is turned according to the drive signal from the engine throttle and pump controller to control the governor lever of the fuel injection pump.

  This motor used as the motive power source is a stepping motor.
- A potentiometer for feedback is installed to monitor the operation of the motor.
- Revolution of the motor is transmitted through the gear to the potentiometer.

Operation

While motor is stopped

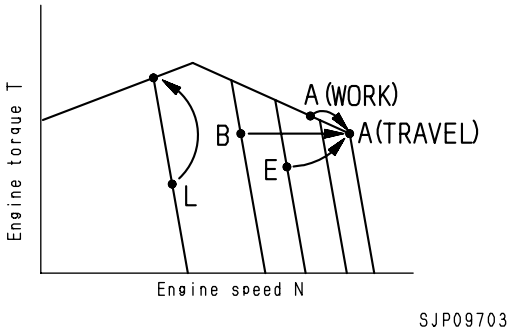
- Electric power is applied to both phases A and B of the motor.

While motor is running

- The engine throttle and pump controller supplies a pulse current to phases A and B, and the motor revolves, synchronizing to the pulse.

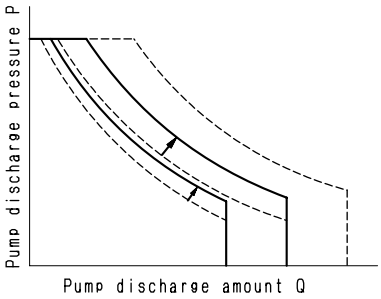
2) Function to control pump during travel

- When the travel is operated in A operation, or E or B working mode, the working mode stays as it is, and the pump absorption torque and engine speed rise to A travel mode.



SJP09703

- If the machine travels in mode L, the working mode and engine speed do not change, but the pump absorption torque is increased.

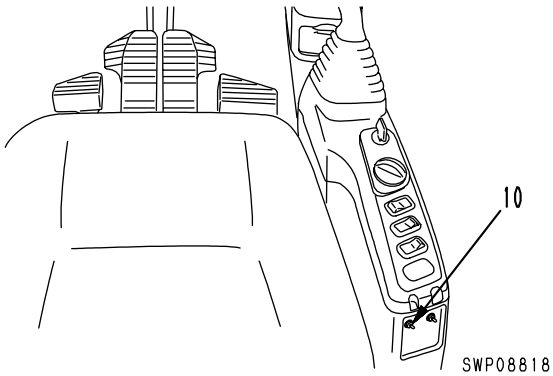


SAP03542

3) Function to control when emergency pump drive switch is turned ON

- Even if the controller or a sensor has a trouble, the functions of the machine can be secured with pump absorption torque almost equivalent to mode E by turning on emergency pump drive switch (10).

  In this case, a constant current flows from the battery to the EPC valve for PC and the oil pressure is sensed by only the EPC valve for PC.

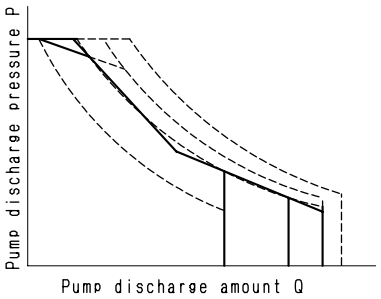


SWP08818

4) Function of engine drive switch when emergency occurs

- If there is a failure in the controller or any problem in the chassis wiring or relays, and the engine cannot be started because the engine stop solenoid cannot drive, turn the switch ON for approx. 5 seconds before the starting signal comes ON. This makes it possible to drive the solenoid forcibly.

  (However, if current flows through this solenoid continuously for more than 30 seconds, there is danger that it will burn out, so correctly control the time that the current flows.)



SAP03544

1) Swing lock and swing holding brake functions

- The swing lock function (manual) is used to lock machine from swinging at any position. The swing holding brake function (automatic) is used to prevent hydraulic drift after the machine stops swinging.
- Swing lock switch and swing lock/holding brake

Lock switch	Lock lamp	Function	Operation
OFF	OFF	Swing holding brake	If swing lever is set in neutral, swing brake operates in about 5 sec. If swing lever is operated, brake is released and machine can swing freely.
ON	ON	Swing lock	Swing lock operates and machine is locked from swinging. Even if swing lever is operated, swing lock is not reset and machine does not swing.

※ Operation of swing holding brake release switch

- If the controller, etc. has a problem, the swing holding brake does not work normally, and the machine cannot swing, the swing lock can be reset with the swing holding brake release switch.

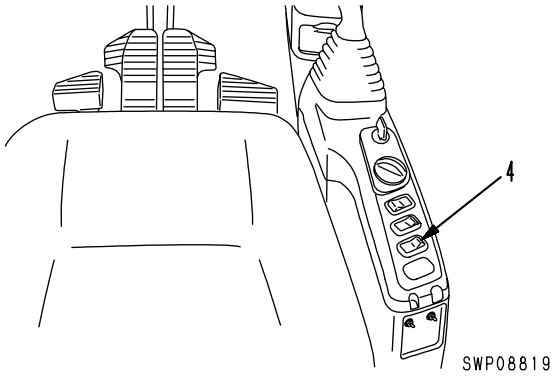
Swing holding brake release switch	ON (When control has trouble)		OFF (When controller is normal)	
Swing lock switch	ON	OFF	ON	OFF
Swing brake	Swing lock is turned on.	Swing lock is canceled.	Swing lock is turned on.	Swing holding brake is turned on.

★ Even if the swing holding brake release switch is turned on, if the swing lock switch is turned on, the swing brake is not released.

★ If the swing lock is reset, swinging is stopped by only the hydraulic brake of the safety valve. Accordingly, if swinging is stopped on a slope, the upper structure may drift hydraulically.

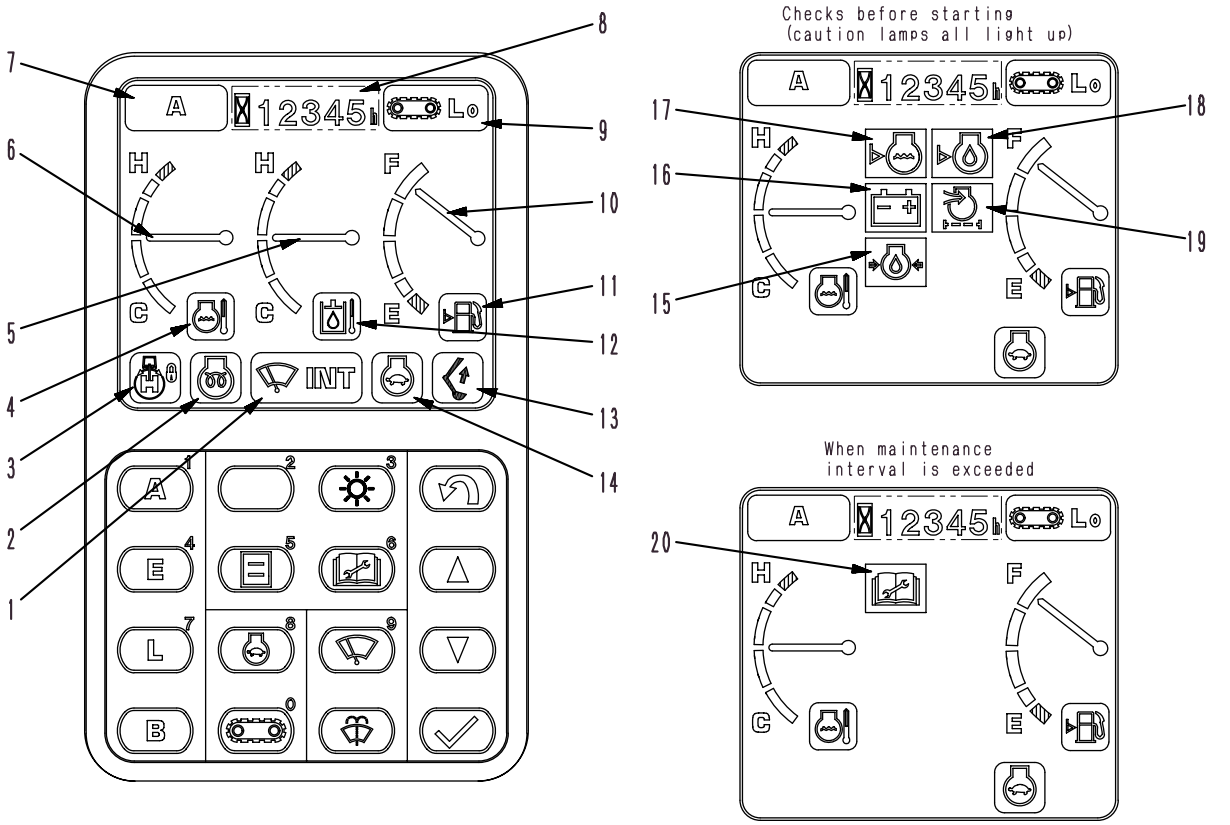
2) Quick hydraulic oil warm-up function when swing lock switch is turned on

- If swing lock switch (4) is turned on, the pump-cut function is cancelled and the relief pressure rises from 34.8 MPa {355 kg/cm^2} to 37.2 MPa {380 kg/cm^2}. If the work equipment is relieved under this condition, the hydraulic oil temperature rises quickly and the warm-up time can be shortened.



MONITOR CONTROL, DISPLAY PORTION

MONITOR PORTION



1. Wiper motor
2. Preheating monitor
3. Swing lock monitor
4. Engine water temperature monitor
5. Hydraulic oil temperature gauge
6. Engine water temperature gauge
7. Working mode monitor
8. Service monitor
9. Travel speed monitor
10. Fuel gauge
11. Fuel level monitor
12. Hydraulic oil temperature monitor
13. Power max. monitor
14. Auto-deceleration monitor
15. Radiator water level caution
16. Battery charge caution
17. Engine oil pressure caution
18. Engine oil level caution
19. Air cleaner clogging
20. Maintenance time warning caution

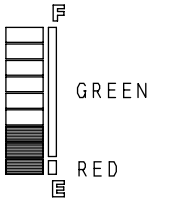
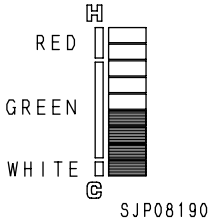
6) After completing the level selection, press input confirmation switch (3).
The selected flow level is confirmed and the screen moves to the operator screen.
From the moment that the flow level is selected, the content of the selection is reflected for the attachment flow.
★ Before the input confirmation switch is pressed, the flow level is not confirmed, so press return switch (4) to return to the normal screen. This function can be used to return to the previously set flow.
The relationship between the set flow level and the flow value is as shown in the table on the right.

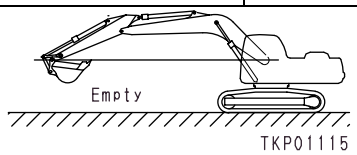
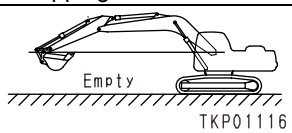
7) Check the set value with the working mode monitor.
The relationship between the display level and the set value is as shown in the table on the right, and it is possible to check the level of the flow that can be set.

Flow level	When flow is 100 L/min.	When flow is 140 L/min.	When flow is 180 L/min.	Remarks
7	130	170	210	
6	120	160	200	
5	110	150	190	
4	100	140	180	❊ Default
3	90	130	170	
2	80	120	160	
1	70	110	150	

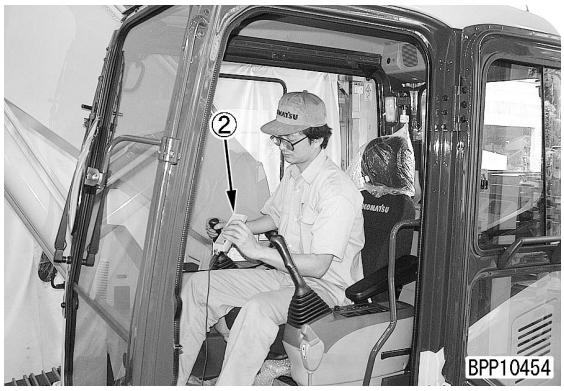
Display level	Set value (ℓ/min.)
8	200 or 210
7	180 or 190
6	160 or 170
5	140 or 150
4	120 or 130
3	100 or 110
2	80 or 90
1	70

Monitored items and display

Symbol	Displayed item	Display range	When engine is stopped	While engine is running
 SAP00520	Engine oil pressure	Max. 1,500 rpm Max. 0.05 MPa {0.5 kg/cm²} Min. 1,500 rpm Max. 0.15 MPa {1.5 kg/cm²}	Lights when normal. (Goes off when engine is started.)	Flashes and buzzer sounds when abnormal.
 SAP00521	Air cleaner clogging	When clogged	Goes off.	Flashes when abnormal.
 SAP00522	Charge level	When charge is abnormal	Lights when normal. (Goes off when engine is started.)	Flashes when abnormal.
 SAP00523	Engine oil level	Below low level	Flashes when abnormal.	Goes off.
 SAT00098	Packing (Swing lock)	When swing is locked	Lights up when swing is locked. Flashes when swing holding brake release switch is turned on.	
 SAP02732	Oil maintenance	See "OIL MAINTENANCE FUNCTION" on next page.		
 SAP00526	Preheating	When preheated	Lights up for 30 sec. when starting switch is set to HEAT. Then, flashes for 10 sec. to indicated completion of preheating.	
 SAD01482	Coolant temperature	Flashes at 102°C or higher. Flashes and buzzer sounds at 105°C or higher.	 SJP08189	
 SAD01486	Fuel level	Flashes when below low level.	 SJP08190	

Applicable model					PC270-7	
Category	Item	Measurement Condition		Unit	Standard value	Permissible value
Hydraulic pressure	Unload pressure	• Hydraulic oil temperature: Within operation range • Engine at high idling • Working mode: A mode • Hydraulic pump output pressure with all control levers in NEUTRAL position		MPa {kg/cm^2}	3.9±1.0 {40±10}	3.9±1.0 {40±10}
	Boom	• Hydraulic oil temperature: Within operation range • Engine at high idling	RAISE		34.8±1.0 {355±10}	33.3–36.8 {340–375}
			LOWER		31.4±1.0 {320±10}	30.4–32.4 {310–330}
	Arm	• Working mode: A mode • Hydraulic pump output pressure with all measurement circuits relieved • Values inside parenthesis: Hydraulic oil pressure with one-touch power max. switch in ON mode (reference only)			34.8±1.0 {355±10}	33.3–36.8 {340–375}
	Bucket				37.3±1.0 {380±10}	36.3–39.2 {370–400}
	Swing				30.9±1.5 {315±15}	28.9–32.9 {295–335}
	Travel				38.7±1.0 {395±10}	37.3–40.2 {380–410}
	Control circuit source pressure	• Hydraulic oil temperature: Within operation range • Engine running at high idling • Self-reducing pressure valve output pressure with all control levers in NEUTRAL position			3.23±0.2 {33±2}	2.84–3.43 {29–35}
	Self-reducing pressure valve	• Hydraulic oil temperature: Within operation range • Engine at high idling • Working mode: A mode • Traveling speed: Hi • Hydraulic oil pump pressure - LS pressure	When all control levers in NEUTRAL position		3.9±1.0 {40±10}	3.9±1.0 {40±10}
			When traveling at half stroke (without load)		2.2±0.1 {22±1}	2.2±0.1 {22±1}
Swing	Swing brake angle	 • Hydraulic oil temperature: Within operation range • Engine running at high idling • Working mode: A mode • Swing circle misalignment amount when stopping after one turn		deg. (mm)	Max. 110 (–)	Max. 140 (–)
	Time taken to start swing	 • Hydraulic oil temperature: Within operation range • Engine running at high idling • Working mode: A mode • Time required for passing points 90 and 180 degrees from starting point	90°	sec.	3.2±0.3	Max. 3.8
			180°		4.7±0.5	Max. 5.9

5) Engine speed when auto-decelerator is set
   i) Turn the auto-decelerator ON.
   ii) Set the fuel dial at high idle (MAX).
   iii) Move all the control levers of work equipment, swing and travel to the NEUTRAL position.
   ★ Approx. 5 seconds after all the control levers are moved to the NEUTRAL position, the engine speed falls automatically. That is when the engine speed with the auto-decelerator in motion should be measured.



4. Detach all the measurement tools after the inspection, and make sure that the machine is back to normal condition.

Adjustment

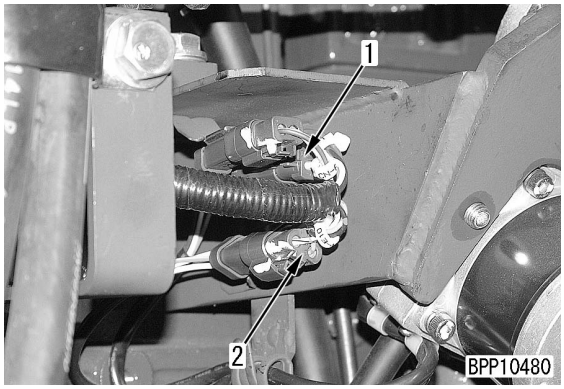
1. Adjustment of engine speed at low idle
   ★ If the engine speed at low idle deviates from the standard value, make adjustment using the adjustment function provided in the monitor panel.
   ★ For the adjustment procedures, refer to the section, "Special Function of Monitor Panel"

2. Adjustment of Governor Spring
   ★ If the engine speed at high idle deviates from the standard value, or it is unsteady (hunting), adjust the governor spring securing dimensions, using the adjustment function in the monitor panel.
   ★ For the adjustment procedures, refer to the section, “Special Function of Monitor Panel”

EMERGENT ESCAPE FROM FAILURE IN ENGINE CONTROL SYSTEM

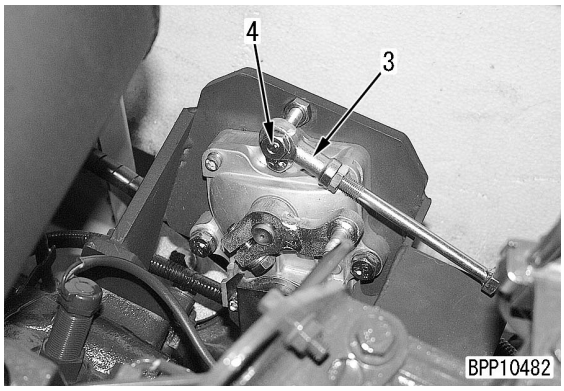
★ If a failure occurs on any of the engine control devices like fuel dial, governor pump controller or governor motor potentiometer, and the engine gets out of control, first fix the engine rpm and take the following steps to avoid the immediate danger.
★ The suggested steps are provisional ones. Identify the cause for the failure and carry out repairs promptly thereafter.

1. Disconnect **E11** connector (1) of the governor motor from **E10** connector (2) of the governor potentiometer.
⚠ If the governor motor connector is left connected, the governor motor will be suddenly activated while the engine is running, causing a mechanical damage. Be sure to disconnect it.
★ The following arrangement of wiring varies partly from machine model to machine model.



2. Detach governor spring (3) on the governor motor side.

3. Remove bolt (4), connect governor spring (3) and fix it at the original position.
★ Tilt the governor motor lever to the fuel injection pump side, but stop short of the governor spring.
★ The governor lever of the fuel injection pump is fixed at a near-idling position.



4. Start the engine again and travel the machine to a safe place.

5. Disconnect governor spring (3) and stop the engine.
⚠ Operation of stopping the engine is to be carried out while the engine is running at high speed. Be careful not to touch the parts of high temperature or get caught in rotating parts.
★ If the governor spring is tilted all the way to the fuel injection pump, the pump stops with no more injection.
★ Hold the governor spring until the engine comes to a complete stop. Otherwise the fuel injection pump automatically returns to the low idling position, and the engine does not stop.

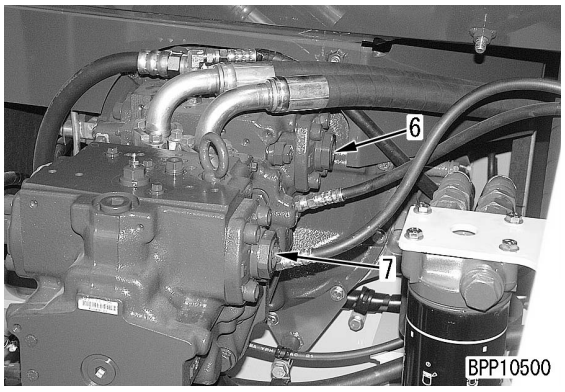
4) Measure the hydraulic oil pressure with all the control levers kept in the NEUTRAL position and the engine running at high idling and at low idling.
   ★ If PC-EPC valve output pressure changes to the following values, it is judged normal.

Engine speed	Control lever	Hydraulic oil pressure
Low idling	Neutral	2.9 MPa {30 kg/cm^2}
High idling		0 MPa {0 kg/cm^2}

Adjustment

★ If any of the phenomena mentioned below occurs and PC valve malfunctioning is suspected, adjust PC valves (6) and (7) in the following manner.
- As workload increases, the engine rpm sharply drops.
- While the engine rpm is normal, the work equipment moves slowly.
- (6): Front pump PC valve
- (7): Rear pump PC valve

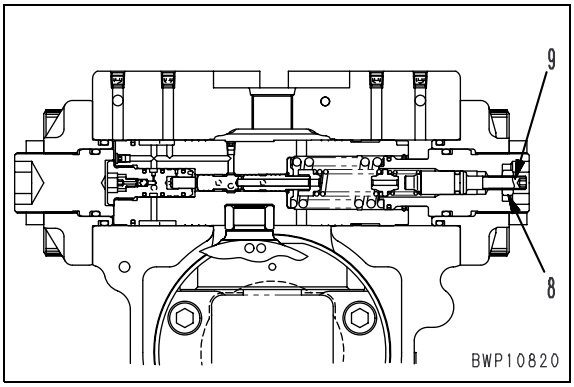
★ The width across flats of the locknut for the PC valve is 13 mm and that of the adjustment screw (inside width) is 4 mm. Do not turn any other locknut or adjustment screw since it has effects on the performance of the hydraulic pumps.



1. Loosen locknut (8).
   ★ Before loosening the locknut, make match marks at the adjustment screw end so that you can see the position of the locknut before the adjustment (and you can return the locknut to its original position after turning it in reverse).

2. Turn adjustment screw (9) to the right or left to adjust.
   ★ Turn the adjustment screw in the following directions.
   - If the work equipment speed is low, turn the adjustment screw to the right (to increase the pump absorption torque).
   - If the engine speed lowers, turn the adjustment screw to the left (to decrease the pump absorption torque).

3. Tighten locknut (8).
   Locknut:
   27.5 –34.3 Nm {2.8 – 3.5 kgm}



4. Confirm that the PC valve output pressure (servo piston inlet pressure) is normal after the adjustment, following the measurement steps explained earlier.

ADJUSTMENT OF WORK EQUIPMENT AND SWING PPC VALVE

★ If there is excessive play in the work equipment or swing lever, adjust it in the following manner.

1. Remove work equipment and swing PPC valve ass'y.

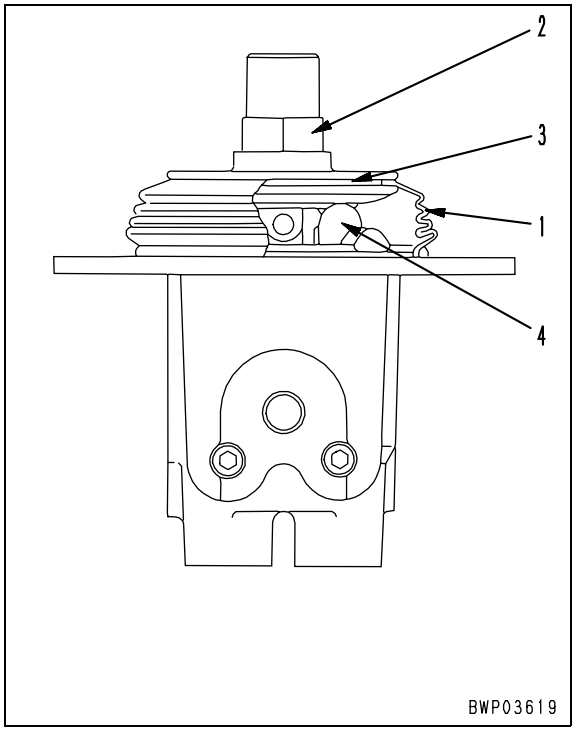
2. Take off boot (1).

3. Loosen lock nut (2) and screw in disc (3) until it contacts the heads of four pistons (4).
★ Do not move the piston while doing this work.

4. Keep disc (3) in place and tighten lock nut (2) to the specified tightening torque.
Lock nut: **98–127Nm{10–13 kgm}**

5. Install boot (1).

6. Install work equipment and swing PPC valve ass'y.

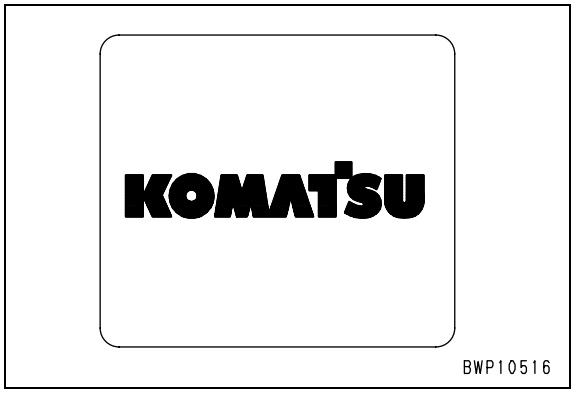


Operation of Operator's Menu and Display (Outline)

★ This section introduces only the outline of the operator's menu. For details on the contents and operation steps of each menu, refer to the operation and maintenance manual or the chapter of "STRUCTURE AND FUNCTION" in this shop manual.

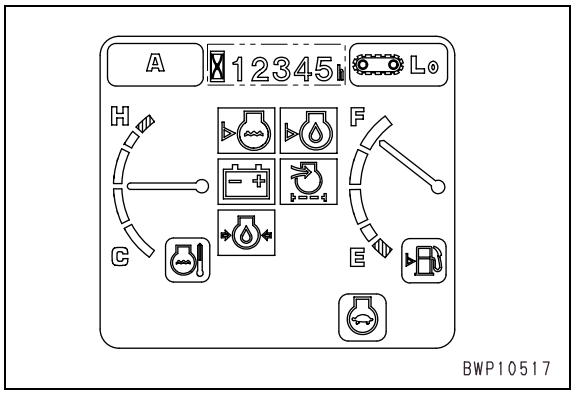
1. Function for showing KOMATSU logo

When a password is inputted, or when the engine starting switch is turned ON, KOMATSU logo is shown for two seconds.



2. Function for machine inspection before starting day's work

Following the KOMATSU logo, the display of machine inspection before starting day's work is shown for 2 seconds.



3. Function for machine maintenance

Following the display of machine inspection before starting day's work, the maintenance mark appears for 30 seconds, if there is an oil filter whose maintenance time is approaching or has just passed.

★ This display appears only when the maintenance function is set.

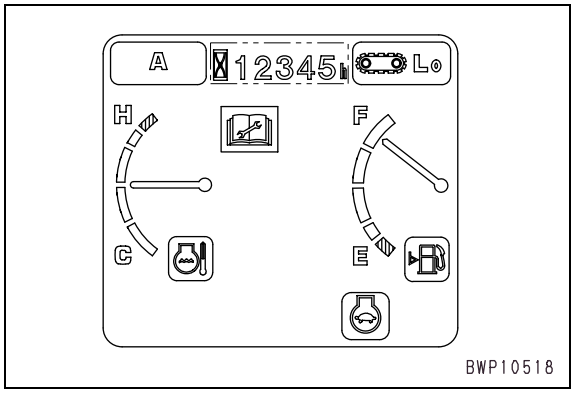


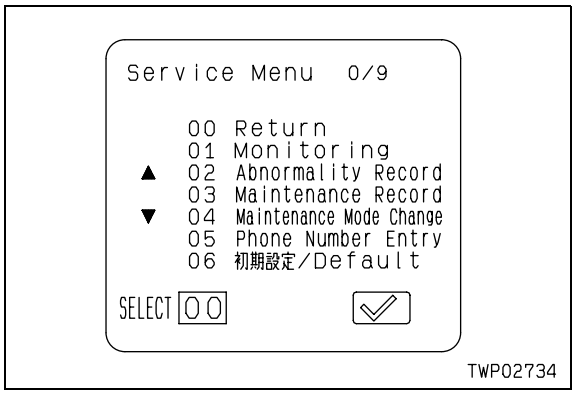
Table for Monitoring Items

Code No.	Item to be monitored		Unit (Default: ISO)			Remark
			ISO	Meter	Inch	
000	Return		(Not displayed)			Termination menu
999	To Display Screen		(Not displayed)			Execute Command menu
002	Controller Model Select		Figure			
003	Controller Model Select		Figure			
010	Engine Speed		r/min	rpm	rpm	
011	F Pump Pressure		MPa	kg/cm^2	psi	
012	R Pump Pressure		MPa	kg/cm^2	psi	
013	PC-EPC Sol. Curr.		mA	mA	mA	
015	LS-EPC Sol. Curr.		mA	mA	mA	
016	2nd Eng. Speed Command		r/min	rpm	rpm	
017	Service Sol. Curr.		mA	mA	mA	
019	Pressure Switch 1	Swing	ON/OFF			
		Travel	ON/OFF			
		Boom Lower	ON/OFF			
		Boom Raise	ON/OFF			
		Arm Curl	ON/OFF			
		Arm Dump	ON/OFF			
021	Pressure Switch 2	Bucket Curl	ON/OFF			
		Bucket Dump	ON/OFF			
		Offset	ON/OFF			(Not used)
		Service	ON/OFF			
		Travel Steering	ON/OFF			
022	Switch Input 1	Lever Sw.	ON/OFF			
		Swing Release Sw.	ON/OFF			
		Swing Brake Sw.	ON/OFF			
023	Solenoid valve 1	Travel Junction	ON/OFF			
		Swing Brake	ON/OFF			
		Merge-divider	ON/OFF			
		2-stage Relief	ON/OFF			
		Travel Speed	ON/OFF			
024	Solenoid valve 2	Service Return	ON/OFF			
027	Switch Input 2	Model Select 1	ON/OFF			
		Model Select 2	ON/OFF			
		Model Select 3	ON/OFF			
		Model Select 4	ON/OFF			
		Model Select 5	ON/OFF			
030	Fuel Dial Vol.		V	V	V	
031	Gov. Motor Potentio Vol.		V	V	V	
032	Battery Voltage		V	V	V	
033	Gov. Motor Phase A Curr.		mA	mA	mA	
034	Gov. Motor Phase B Curr.		mA	mA	mA	
035	Battery Relay O/P Vol.		V	V	V	
036	Switch Input 3	Key Switch	ON/OFF			
037	Controller Output	Batt. Relay Dr.	ON/OFF			
041	Engine Water Temperature		ºC	ºC	ºF	
042	Fuel Lever Sensor Vol.		V	V	V	

21. Function for Adjustment [07]

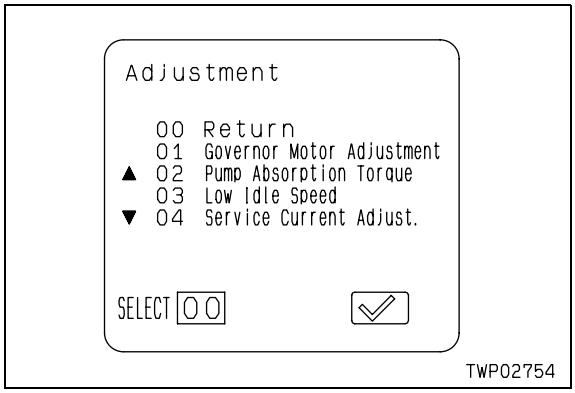
The monitor panel has a function of making various adjustments of the machine.

1) Selection of menu
   Select 07 adjustment in the initial display of Service Menu, and depress [✓] switch.

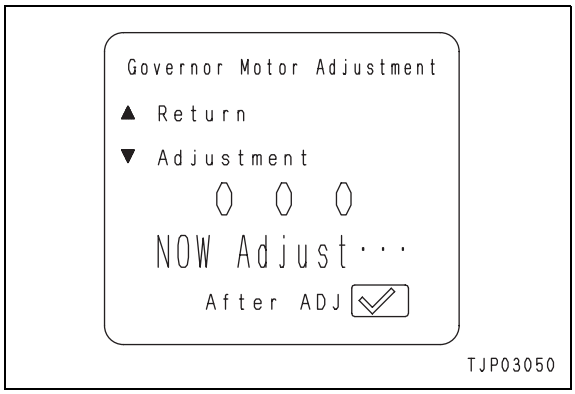


2) Selection of submenu
   Select an item to change from the submenu and depress [✓] switch.

No.	Adjustment submenu
00	Return (termination of adjustment)
01	Governor Motor Adjustment
02	Pump Absorption Torque
03	Low Idle Speed
04	Service Current Adjust.

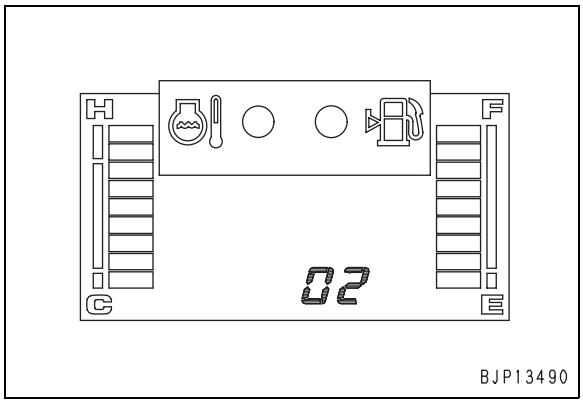


3) Function for Governor Stroke Adjustment
   ★ If the governor actuator, fuel injection pump, or governor spring is removed and installed or the high idling speed is low or the engine speed is unstable, adjust the governor lever stroke according to the following procedure.
   i) Call the display of governor lever stroke adjustment and set the fuel dial at MAX.
      ★ Under this condition, the governor actuator lever moves to the FULL position. Keep this display until adjustment is finished.
      ★ The engine speed is indicated in 10 rpm at the center of the display.
      ★ The turning direction of the governor spring when the fuel injection pump is seen from the governor actuator is indicated.



4. Monitoring function [02]

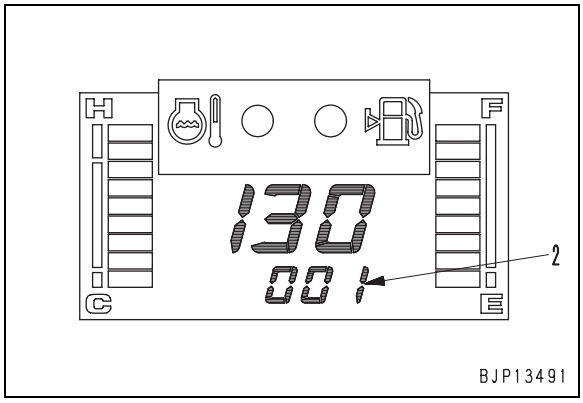
With this function, you can monitor the revolution speed, oil pressure, current, voltage, input condition, output condition, etc. in real time by the signals from the sensors, switches, and solenoids installed to various parts of the machine.



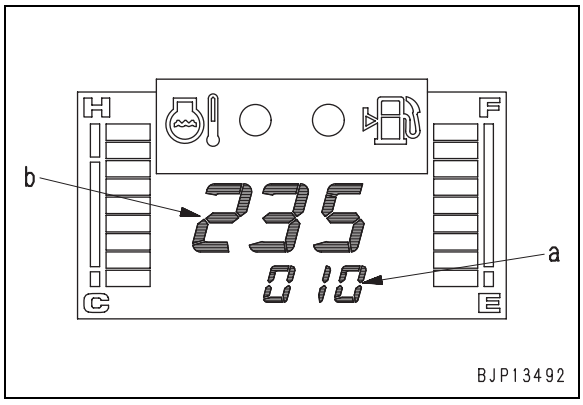
1) Selecting and executing function
   i) Select menu No. [02] in the menu selection mode.
   ii) Press set switch (5) to execute this function.

2) Selecting and executing monitoring code
   While holding caution buzzer stop switch (3), operate working mode selector switches (7) and (8) to select a monitoring code displayed in service meter section (1).
   - UP switch (7): Increase code No.
   - DOWN switch (8): Decrease code No.

   ★ This function displays monitoring code [001] and its information first.
   ★ For the items and code Nos. which you can monitor, see the "Monitoring codes table".

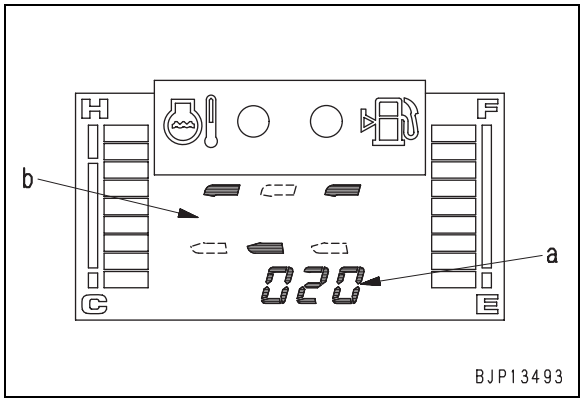


3) Information displayed in display section and service meter section 1 (When numeral code is displayed)
   If a numeral monitoring code is selected, the following information is displayed in display section (1) and service meter section (2).
   (a): Monitoring code
   (b): Monitoring information (Value is displayed)



4) Information displayed in display section and service meter section 2 (When 6-bit code is displayed)
   If a 6-bit monitoring code is selected, the following information is displayed in display section (1) and service meter section (2).
   (a): Monitoring code
   (b): Monitoring information (6 pieces of information are displayed in bits)

   ★ In the 6-bit display mode, only the top and bottom of the 7-segments mark are used to display. "Solid black" indicates the ON state, and "white on black background" indicates the OFF state.
   ★ For the No. of each bit, see the "Monitoring codes table" and the drawing attached to it.



PREPARATIONS FOR TROUBLESHOOTING ELECTRICAL SYSTEM

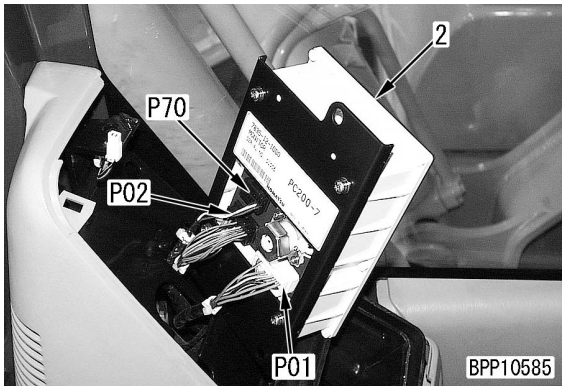
Serial No. 10001 – 10500

★ When diagnosing electric circuits related to the monitor panel and governor pump controller, first open up the connector portions in the following manner.

1. Monitor panel

1) Take off cover (1).
   ★ The cover is fixed with two upper and lower clips. Pull it up for the removal.
   ★ If a sunlight sensor is equipped for an air conditioner, detach **P15** connector at the cover rear side.

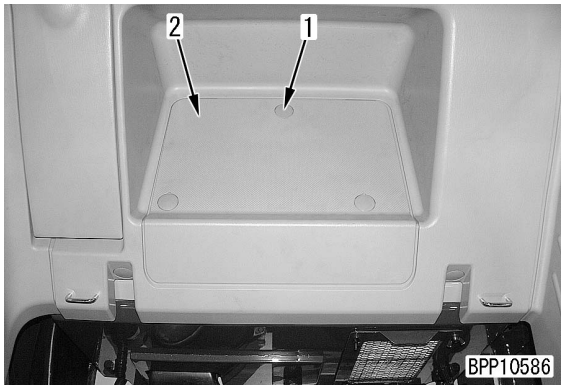
2) Remove three securing screws and take monitor panel (2) off the mount.
   ★ Be careful not to let fall the securing screws inside the console.
3) Insert or connect a T-adaptor for diagnosis with **P01**, **P02** and **P70** (multi-monitor only) connectors.



2. Governor pump controller

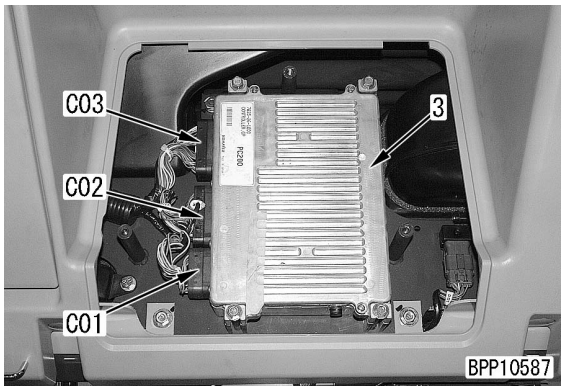
★ The governor pump controller is installed under a cover behind the operator's seat.

1) Remove three caps (1) and then three securing bolts.
   ★ When removing the caps, use of a thin flat-head screw driver is recommended.
2) Take off cover (2).

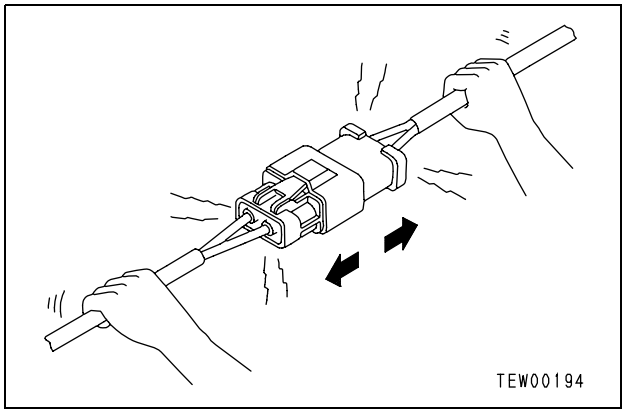


3) Insert or connect a T-adapter for diagnosis with **C01**, **C02** and **C03** connectors of governor pump controller (3).
   ★ The connectors are fixed with screws. Loosen the screws and detach the connectors.
   ★ When putting the connectors back into position, tighten them to the specified torque.

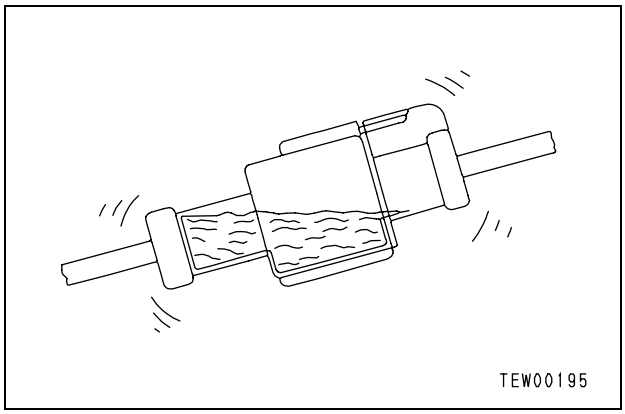
   Screw: **2.82 Nm {0.288 kgm}**



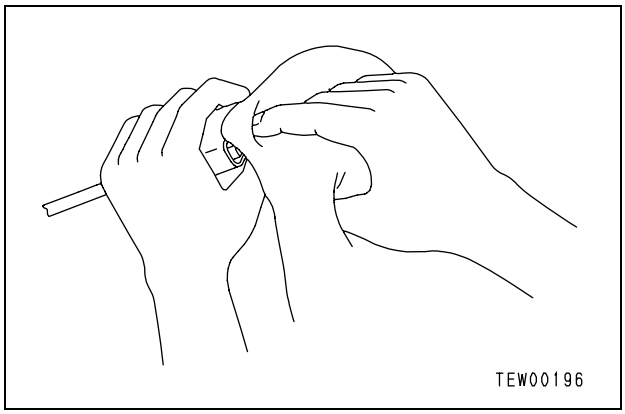
3) Disconnections in wiring
If the wiring is held and the connectors are pulled apart, or components are lifted with a crane with the wiring still connected, or a heavy object hits the wiring, the crimping of the connector may separate, or the soldering may be damaged, or the wiring may be broken.



4) High-pressure water entering connector
The connector is designed to make it difficult for water to enter (drip-proof structure), but if high-pressure water is sprayed directly on the connector, water may enter the connector, depending on the direction of the water jet.
As already said, the connector is designed to prevent water from entering, but at the same time, if water does enter, it is difficult for it to be drained. Therefore, if water should get into the connector, the pins will be short-circuited by the water, so if any water gets in, immediately dry the connector or take other appropriate action before passing electricity through it.

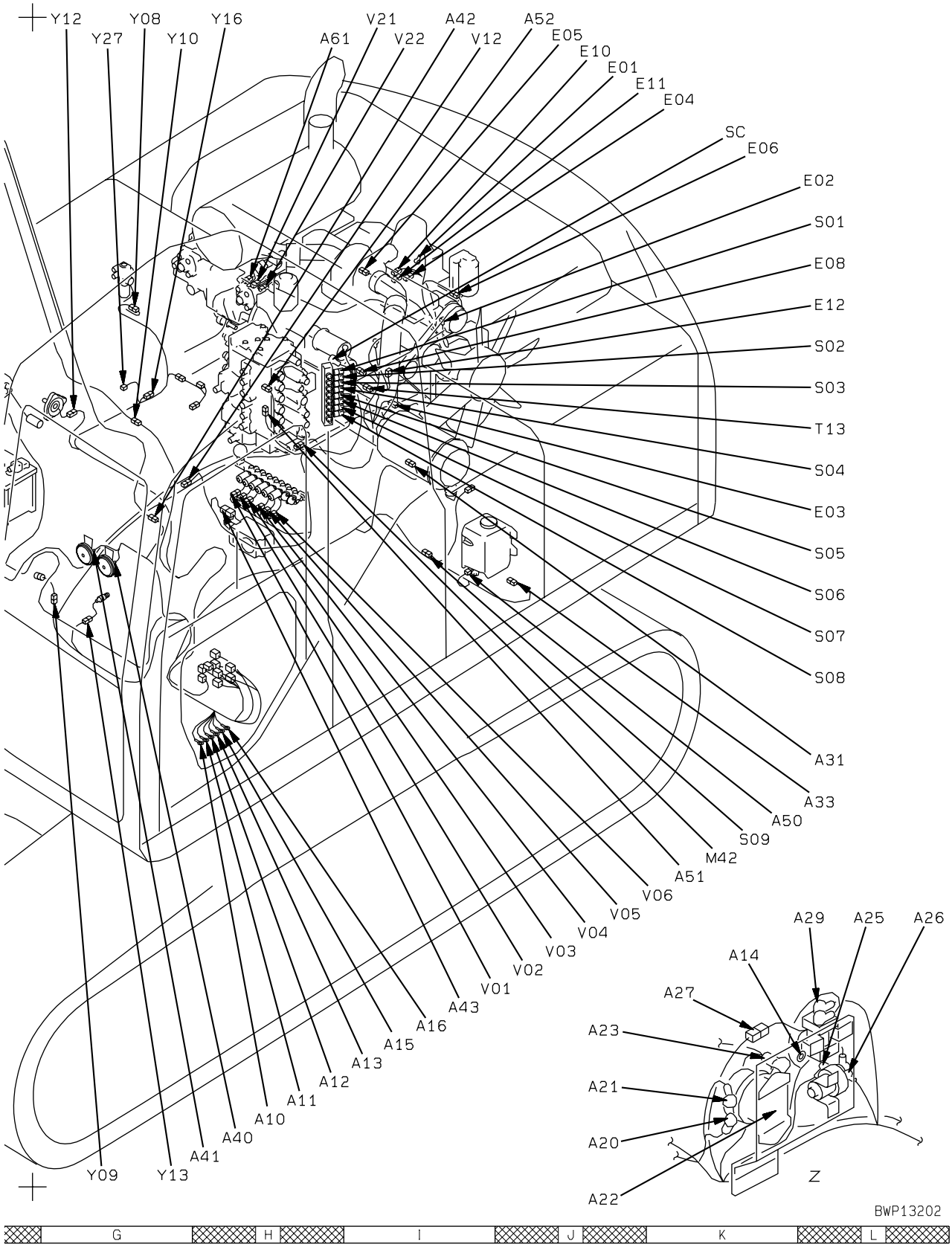


5) Oil or dirt stuck to connector
If oil or grease are stuck to the connector and an oil film is formed on the mating surface between the male and female pins, the oil will not let the electricity pass, so there will be defective contact.
If there is oil or grease stuck to the connector, wipe it off with a dry cloth or blow it dry with compressed air and spray it with a contact restorer.
★ When wiping the mating portion of the connector, be careful not to use excessive force or deform the pins.
★ If there is oil or water in the compressed air, the contacts will become even dirtier, so remove the oil and water from the compressed air completely before cleaning with compressed air.



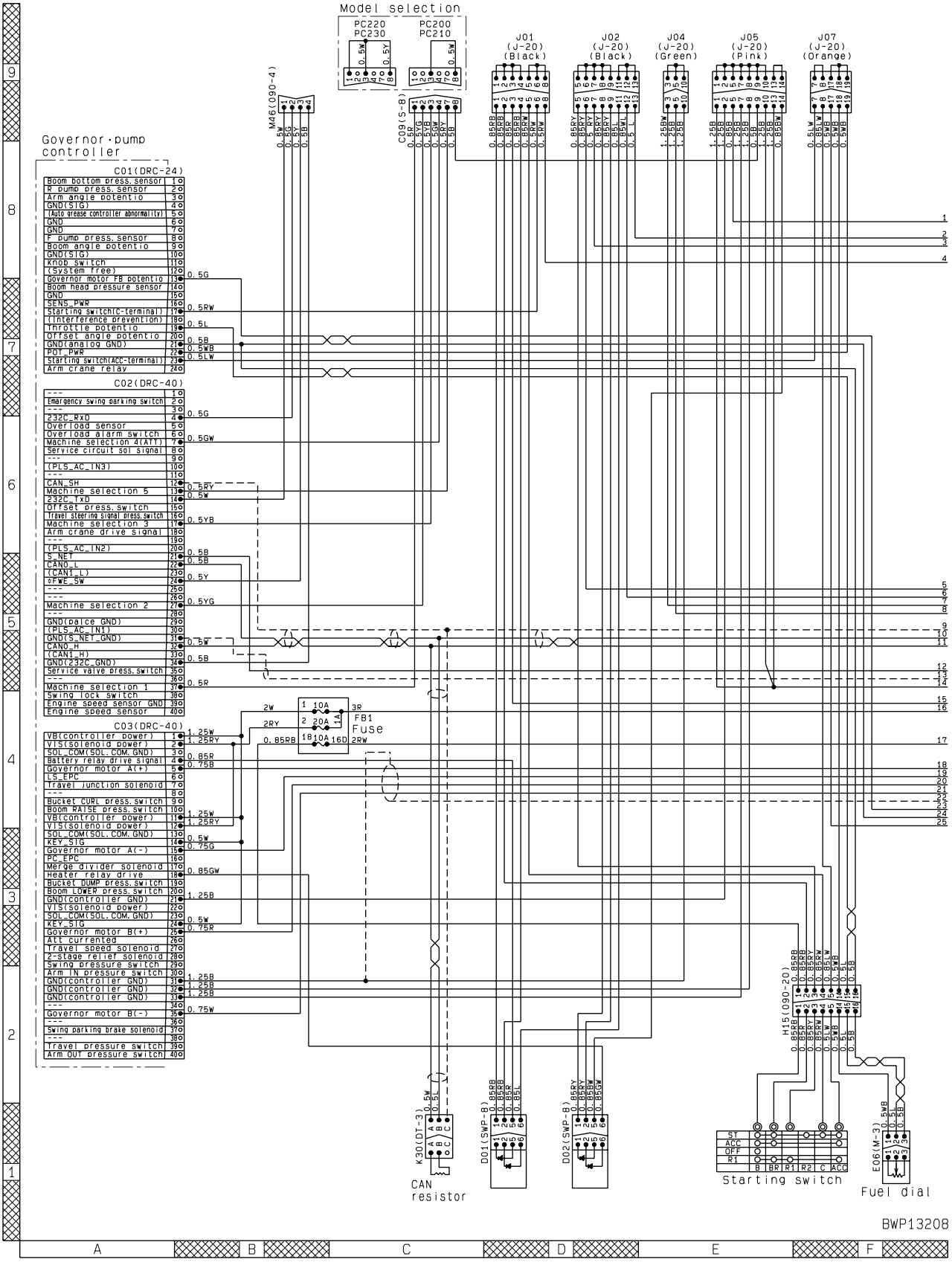
No.	Failure-looking phenomenon	Troubleshooting			
		Code display	E mode	H mode	S mode
Work equipment-related failure					
29	Boom moves slowly or lacks power		E-21, 22	H-7	
30	Arm moves slowly or lacks power		E-23, 24	H-8	
31	Bucket moves slowly or lacks power		E-25, 26	H-9	
32	Work equipment does not move when individual operation			H-10	
33	Hydraulic drift of work equipment is too fast			H-11	
34	Work equipment time lag is too big			H-12	
35	Other work equipment moves, when specific work equipment is relieved			H-13	
36	One-touch power max. switch does not work	E-9, 21–26		H-14	
Compound operation-related failure					
37	In compound operation, work equipment with larger load moves slowly			H-15	
38	In swing + boom RAISE operation, boom moves slowly			H-16	
39	In swing + travel operation, travel speed drops sharply			H-17	
Travel-related failure					
40	Machine tends to swerve while in travel			H-18	
41	Travel speed is slow		E-28	H-19	
42	Machine cannot be easily steered, or lacks power		E-28, 29	H-20	
43	Travel speed cannot be shifted or is slow or fast		E-28	H-21	
44	Track shoe does not move (only on one side)			H-22	
Swing-related failure					
45	Machine does not swing		E-27	H-23	
46	Swing acceleration is poor, or swing speed is slow			H-24	
47	Upper structure overruns excessively, when stopping swing			H-25	
48	There is a big shock caused when stopping swing			H-26	
49	There is big abnormal noise generated when stopping swing			H-27	
50	Hydraulic drift of swing is large			H-28	
Monitor panel-related failure (Operator's Menu: ordinary display)					
51	No display appears in monitor panel at all		E-10		
52	Part of display is missing in monitor panel		E-11		
53	Descriptions on monitor panel do not apply to the machine model		E-12		
54	In startup inspection, radiator water level monitor lamp lights up red	B@BCZK			
55	In startup inspection, engine oil level monitor lamp lights up red	B@BAZK			

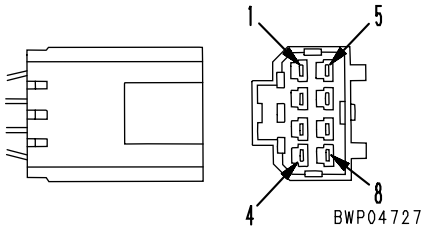
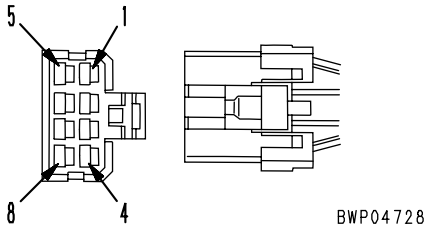
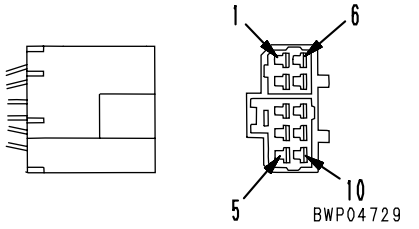
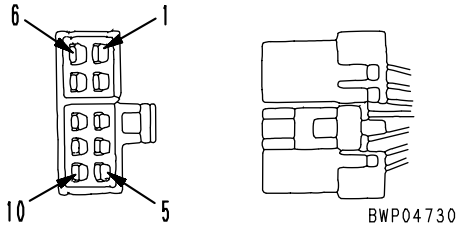
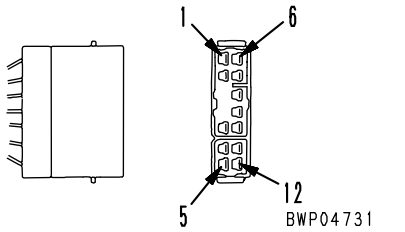
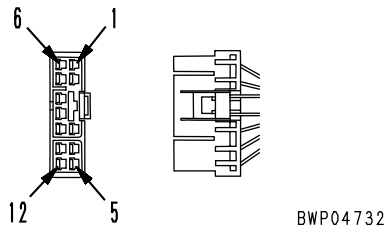
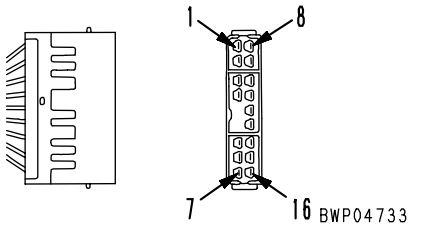
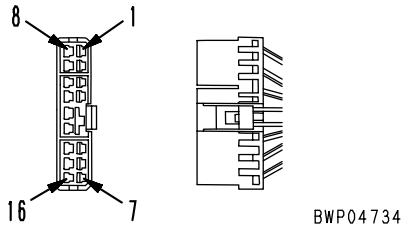
Connector No.	Type	No. of pin	Name of device	Address			
				Stereo -gram	M circuit	G circuit	P circuit
K30	D	3	CAN terminating resistor	T-9	A-2	C-1	
K31	D	3	CAN terminating resistor	N-4	A-4	K-7	
M07	M	3	Lamp switch	P-8	C-1		
M09	M	1	Working lamp (front right)	E-9	K-7		
M13	KES0	2	Speaker (right)	AC-8			
M19	YAZAKI	2	Cigarette lighter	N-3			
M21	PA	9	Radio	T-1			
M22	Y090	2	Horn switch	N-7			
M23	Y090	2	One-touch power max. switch	S-1			
M26	S	12	Intermediate connector	W-3			
M27	SWP	18	Air conditioner unit	W-5			
M29	040	20	Air control panel	T-2			
M30	040	16	Air control panel	U-2			
M31	M	2	Option power source (2)	W-6			
M32	M	2	Option power source (1)	W-5			
M33	M	2	Option power source (3)	W-7			
M33	SUMIT-OMO	4	Air conditioner unit	W-5			
M40	YAZAKI	2	Working lamp	Z-8	K-8		
M41	YAZAKI	2	Working lamp (additional)	Y-7	K-8		
M42	M	1	Intermediate connector	K-3	K-7		
M43	M	1	Working lamp (rear)	–	K-7		
M45	D	12	Intermediate connector	W-7			
M46	S090	4	RS232C relaying connector	V-9		B-9	
M71	M	2	Room lamp	Z-8			
M72	M	4	DC/AC converter	W-7			
M73	KES0	2	Speaker (left)	AD-8			
M79	YAZAKI	2	12V electrical equipment socket	W-8			
P01	070	12	Monitor panel	N-6	A-7	K-8	
P02	040	20	Monitor panel	N-5	A-6	K-8	A-9
P03	M	2	Buzzer canceling switch	P-9	D-1		
P05	M	2	Revolving warning lamp switch	U-2			
P15	Y050	2	Air conditioner sun light sensor	N-6			
P17	S09	2	Air conditioner high/low pressure switch	–			
P70	040	16	Monitor panel	N-4	A-5	K-8	
R10	R	5	Lamp relay	O-8	E-1		
R11	R	5	Engine starting motor cutting relay (PPC lock)	P-8	E-1		
R13	R	5	Engine starting motor cutting relay (personal code)	Q-9	F-1		
R20	R	5	Attachment circuit switching relay	U-9			C-9
R21	–	–	–				


Y12
Y08
Y16
Y27
Y10
A61
V21
V22
A42
V12
A52
E05
E10
E01
E11
E04
SC
E06
E02
S01
E08
E12
S02
S03
T13
S04
E03
S05
S06
S07
S08
A31
A33
A50
S09
M42
A51
V06
V05
V04
V03
V02
V01
A43
A16
A15
A13
A12
A11
A10
A40
A41
Y09
Y13
A29
A25
A26
A14
A27
A23
A21
A20
A22
Z
BWP13202
G
H
I
J
K
L

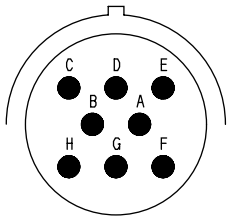
Governor Control System Circuit Diagram (G Circuit) of Governor•Pump Controller

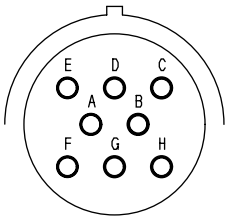
Serial No. 10501 and up

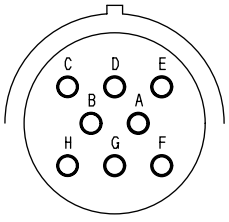


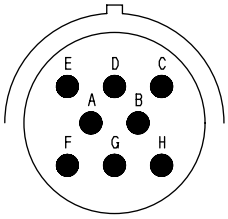
No.of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			799-601-7140
	Part No.: 08056-10871	Part No.: 08056-10881	
10 (White)			799-601-7150
	Part No.: 08056-11071	Part No.: 08056-11081	
12 (White)			799-601-7350
	Part No.: 08056-11271	Part No.: 08056-11281	
16 (White)			799-601-7330
	Part No.: 08056-11671	Part No.: 08056-11681	

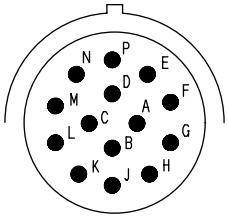
[The pin No. is also marked on the connector (electric wire insertion end)]

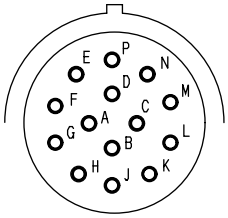
<table>
<tr><td rowspan="2">Type (shell size code)</td><td colspan="2">HD30 Series connector</td><td rowspan="2">T-adapter Part No.</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td></tr>
<tr><td rowspan="4">18-8 (1)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9210</td></tr>
<tr><td> 

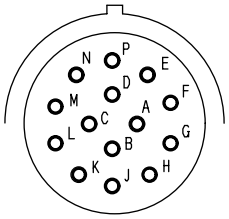
BWP05001</td><td> 

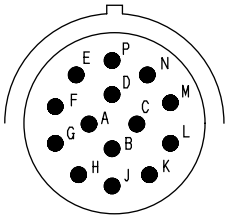
BWP05002</td></tr>
<tr><td>Part No.: 08191-11201, 08191-11202, 08191-11205, 08191-11206</td><td>Part No.: 08191-14101, 08191-14102, 08191-14105, 08191-14106</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="2">799-601-9210</td></tr>
<tr><td> 

BWP05003</td><td> 

BWP05004</td></tr>
<tr><td></td><td>Part No.: 08191-12201, 08191-12202, 08191-12205, 08191-12206</td><td>Part No.: 08191-13101, 08191-13102, 08191-13105, 08191-13106</td><td></td></tr>
<tr><td rowspan="4">18-14 (2)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9220</td></tr>
<tr><td> 

BWP05005</td><td> 

BWP05006</td></tr>
<tr><td>Part No.: 08191-21201, 08191-12202, 08191-21205, 08191-12206</td><td>Part No.: 08191-24101, 08191-24102, 08191-24105, 08191-24106</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="2">799-601-9220</td></tr>
<tr><td> 

BWP05007</td><td> 

BWP05008</td></tr>
<tr><td></td><td>Part No.: 08191-22201, 08191-22202, 08191-22205, 08191-22206</td><td>Part No.: 08191-23101, 08191-23102, 08191-23105, 08191-23106</td><td></td></tr>
</table>

Part No.	Connector type or part name	No. of pins	799-601-2500	799-601-2700	799-601-2800	799-601-2900	799-601-3000	799-601-5500	799-601-6000	799-601-6500	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	—
799-601-7140	S	8P									○	○	○		○					
799-601-7150	S	10P-White									○	○	○		○					
799-601-7160	S	12P-Blue									○	○	○							
799-601-7170	S	16P-Blue									○	○	○		○					
799-601-7330	S	16P-White													○					
799-601-7350	S	12P-White																		○
799-601-7180	AMP040	8P											○							
799-601-7190	AMP040	12P											○		○					
799-601-7210	AMP040	16P									○	○	○		○					
799-601-7220	AMP040	20P									○	○	○		○					
799-601-7230	Short connector	X-2									○	○	○		○					
799-601-7240	Case										○	○								
799-601-7270	Case												○							
799-601-7510	070	10P												○						
799-601-7520	070	12P												○						
799-601-7530	070	14P												○						
799-601-7540	070	18P												○						
799-601-7550	070	20P												○						
799-601-7360	Relay connector	5P																		○
799-601-7370	Relay connector	6P																		○
799-601-7380	JFC connector	2P																		○
799-601-9010	DTM	2P														○		○		
799-601-9020	DT	2P														○		○		
799-601-9030	DT	3P														○		○		
799-601-9040	DT	4P														○		○		
799-601-9050	DT	6P														○		○		
799-601-9060	DT	8P-Gray														○		○		
799-601-9070	DT	8P-Black														○		○		
799-601-9080	DT	8P-Green														○		○		
799-601-9090	DT	8P-Brown														○		○		
799-601-9110	DT	12P-Gray														○		○		
799-601-9120	DT	12P-Black														○		○		
799-601-9130	DT	12P-Green														○		○		
799-601-9140	DT	12P-Brown														○		○		
799-601-9210	HD30	18-8														○	○			
799-601-9220	HD30	18-14														○	○			
799-601-9230	HD30	18-20														○	○			
799-601-9240	HD30	18-21														○	○			
799-601-9250	HD24	24-9														○	○			
799-601-9260	HD30	24-16														○	○			
799-601-9270	HD30	24-21														○	○			
799-601-9280	HD30	24-23														○	○			
799-601-9290	HD30	24-31														○	○			
799-601-9310	Plate	For HD30														○	○		○	
799-601-9320	Measurement box	For DT, HD														○	○		○	
799-601-9330	Case															○				
799-601-9340	Case																○			
799-601-9350	DRC26	40P																	○	
799-601-9360	DRC26	24P																	○	
799-601-9410	For NE, G sensor	2P																		○
799-601-9420	For fuel, boost press.	3P																		○
799-601-9430	PVC socket	2P																		○

INFORMATION CONTAINED IN TROUBLESHOOTING TABLE

★ The troubleshooting table and the related circuit diagrams contain the following information. Grasp their contents fully before proceeding to actual troubleshooting work.

User Code	Service Code	Failure Code	Failure phenomenon	Title of failure phenomenon shown in failure history
Display in monitor panel	Display in monitor panel	Display in monitor panel		
Failure content	Failure status as detected by monitor panel or controller			
Response from monitor panel or controller	Action taken by the monitor panel or controller to protect an affected system or equipment, when they detect some failure.			
Phenomenon occurring on machine	Phenomenon that occurs on the machine, resulting from the above action taken by the monitor panel or controller			
Relative information	Information on the failure occurred as well as the troubleshooting			

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting
	1	Cause that presumably triggered failure in question (The assigned No. is for filing purpose only. It does not stand for any priority)	<Content Included> • Standard value in normalcy by which to pass "Good" or "No good" judgement over the presumed cause • Reference for passing the above "Good" or "No Good" judgement <Phenomenon of Wiring Harness Failure> • Disconnection There is a faulty contact at the connector or disconnection of wiring harness occurred. • Defective grounding A wiring harness that is not connected with a grounding circuit has a contact with the grounding circuit. • Short-circuiting A wiring harness that is not connected with a 24 V electric circuit has a contact with the electric circuit. <Precaution for Troubleshooting> 1) Connector No. display method and handling of T-adapter Insert or connect T-adapters in the following manner before starting troubleshooting unless otherwise instructed. • If there is no indication of "male" or "female" in a specific connector No., disconnect the connector and insert the T-adapter into both male and female sides. • If there is an indication of "male" or "female" in a specific connector No., disconnect the connector and connect the T-adepter with only one side of either "male" or "female". 2) Entry sequence of pin No. and handling of circuit tester lead Connect the positive (+) lead and the negative (–) lead OFF a circuit tester in the following manner unless otherwise instructed. • Connect the positive (+) lead with the pin No. indicated at the front or the wiring harness. • Connect the negative (–) lead with the pin No. indicated at the front or the wiring harness.
	2		
	3		
	4		
	5		

Serial No. 10501 and up

User Code	Service Code	Failure Code	Failure phenomenon	Short-circuiting in window washer drive system (in Monitor Panel system)
—	**E114**	**DY2CKB**		
Failure content	• Abnormal current flew to the window washer drive circuit, when the circuit was grounded and power was switched ON.			
Response from Monitor Panel	• Power supply to the grounding in the window washer motor circuit was switched OFF.			
Phenomenon occurring on machine	• The window washer stopped moving.			

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	Window washer drive motor defective (Internal short-circuiting)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position for the troubleshooting.			
			A50 (male)		Resistance value	
			Between (1) and (2)		5 – 20 Ω	
	2	Short-circuiting of wiring harness (Contact with 24 V circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position for the troubleshooting.			
			Between wiring harness from P01 (female) (3) to J04 to A50 (female) (2) and grounding, or between wiring harness between P01 (female) (3) and D02 (female) (8) and grounding		Voltage	Below 1 V
	3	Monitor panel defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position for the troubleshooting.			
			P01	Window washer switch	Voltage	
			Between (3) and grounding	OFF	20 – 30 V	
				ON	Below 1 V	

Service Code in Electrical System E203
(Short-circuiting in swing holding brake solenoid)

Serial No. 10001 – 10500

User Code	Service Code	Failure Code	Failure phenomenon	Short-circuiting in swing holding brake solenoid (in governor • pump controller system)
E03	**E203**	**DW45KB**		
Failure content	• Abnormal current flew to the swing holding brake solenoid circuit, when power was supplied to the circuit.			
Response from controller	• Power supply to the swing holding brake solenoid circuit is switched OFF. • Even after the failure cause disappears of itself, the swing holding brake does not return to normalcy, unless the engine starting switch is once turned OFF.			
Phenomenon occurring on machine	• The upper structure cannot swing. (The swing holding brake is not released)			
Relative information	• Operation of the swing holding brake solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 023: Solenoid 1) • If there is no abnormality with the solenoid or wiring harness, the upper structure can swing by turning the emergency swing brake releasing switch to the FREE position. (In this case, however, the parking brake does not work, when stopping the machine)			

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	Swing holding brake solenoid 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.			
			V05 (male)	Resistance value		
			Between ① and ②	20 – 60 Ω		
			Between ① and grounding	Above 1 MΩ		
	2	Assembled-type diode D03 defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			D03 (male)	Resistance value		
			Between ④ and ⑧	Above 1 MΩ		
	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 from C03 (female) ㊲ to D01 to J02 to X05 to J06 to V05 (female) ①, or between wiring harness between C03 (female) ㊲ and D03 (female) ④ and grounding	Resistance value	Above 1 MΩ	
	4	Governor • pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it running during the troubleshooting.			
			C03	Swing control lever	Voltage	
			Between ㊲ and grounding	NEUTRAL	Below 1 V	
				Swing	20 – 30 V	

Serial No. 10501 and up

User Code	Service Code	Failure Code	Failure phenomenon	Short-circuiting in 2-stage relief solenoid (in governor • pump controller system)
—	**E205**	**DWK0KB**		
Failure content	• Abnormal current flew to the 2-stage relief solenoid circuit, when power was supplied to the circuit.			
Response from controller	• Power supply to the 2-stage relief solenoid circuit is switched OFF. • Even after the failure cause disappears of itself, the machine operation does not return to normalcy, unless the engine starting switch is once turned OFF.			
Phenomenon occurring on machine	• The one-touch power max. switch does not work. (The main relief valve is not set to high pressure)			
Relative information	• Operation of the 2-stage relief solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 023: Solenoid 1)			

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	2-stage relief solenoid 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.			
			V06 (male)	Resistance value		
			Between (1) and (2)	20 – 60 Ω		
			Between (1) and grounding	Above 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.			
			Wiring harness from C03 (female) (28) to V06 (female) (1), or between wiring harness between C03 (female) (28) and grounding	Resistance value	Above 1 MΩ	
	3	Governor • pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			C03	Working mode	Voltage	
			Between (28) and grounding	Other than L mode	Below 1 V	
				L mode	20 – 30 V	

Service Code in Electrical System E213
(Disconnection in Swing holding Brake Solenoid)

Serial No. 10001 – 10500

User Code	Service Code	Failure Code	Failure phenomenon	Disconnection in swing holding brake solenoid (in governor • pump controller system)
E03	**E213**	**DW45KA**		
Failure content	• No current flows to the swing holding brake solenoid circuit, when power is supplied to the circuit.			
Response from controller	• None in particular (The solenoid does not function as there is no current flowing to it) • When the failure cause disappears of itself, the machine operation returns to normalcy.			
Phenomenon occurring on machine	• The machine's upper structure does not swing. (The swing holding brake is not released)			
Relative information	• Operation of the swing holding brake solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 023: Solenoid 1) • If there is abnormality neither with the solenoid nor with wiring harnesses, the upper structure can swing by moving the emergency swing brake release switch to the FREE position. (In this case, however, the parking brake does not work, when stopping the machine) ★While in troubleshooting, hold both the swing lock switch and the emergency swing release switch in the OFF position. ★The solenoid detects disconnection, when power is ON. Hence be sure to check it with power ON after the repairs. (For how to turn power ON or OFF, refer to the troubleshooting under Service Code [E203].)			

Presumed cause and standard value in normalcy

	Cause	Standard value in normalcy and references for troubleshooting			
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 ① and ②		20 – 60 Ω	
2	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.			
		X05 (female)	Swing lock switch	Resistance value	
		Between ③ and ④	OFF	Below 1 Ω	
			LOCK	Above 1 MΩ	
3	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 type circuit tester	Continuity	
		Between ⑦ and ③	Diode mode	Continued	
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 C03 (female) ㊲ and D01 (female) ⑦		Resistance value	Below 1 Ω
		Wiring harness from D01 (female) ③ to J02 to X05 (male) ③		Resistance value	Below 1 Ω
		Wiring harness from X05 (male) ④ to J06 to V05 (female) ①		Resistance value	Below 1 Ω
		Wiring harness between V05 (female) ② and grounding		Resistance value	Below 1 Ω
5	Short-circuiting of Wiring harness (Contact with 24V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
		Between wiring harness between C03 (female) ㊲ and D01 (female) ⑦ and grounding		Voltage	Below 1 V
6	Governor • pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
		C03 (female)	Disconnect D01 and connect pins ③ and ⑦ of the male side.	Resistance value	
		Between ㊲ and grounding		20 – 60 Ω	

Serial No. 10501 and up

User Code	Service Code	Failure Code	Failure phenomenon	Disconnection in 2-stage relief solenoid (in governor • pump controller system)
—	**E215**	**DWK0KA**		
Failure content	• No current flows to the 2-stage relief solenoid circuit, when power is supplied to the circuit.			
Response from controller	• None in particular (The solenoid does not function as there is no current flowing to it) • When the failure cause disappears of itself, the machine operation returns to normalcy.			
Phenomenon occurring on machine	• The one-touch power max. switch does not work. (The main relief valve cannot be set to high-pressure set)			
Relative information	• Operation of the 2-stage relief solenoid (ON or OFF) can be checked in the monitoring function. (Code No. 023: Solenoid 1) ★ The solenoid detects disconnection, when power is ON. Hence be sure to check it with power ON after the repairs. (For how to turn power ON or OFF, refer to the troubleshooting under Service Code [E205].)			

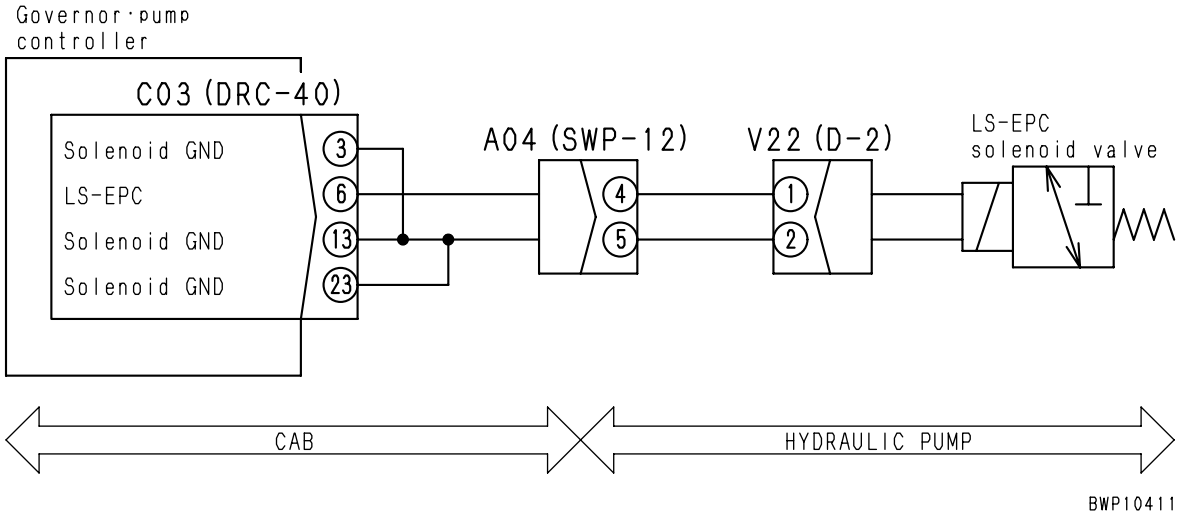
Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	2-stage relief solenoid defective (Internal disconnection)	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			V06 (male)	Resistance value		
			Between (1) and (2)	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 C03 (female) (28) and V06 (female) (1)	Resistance value	Max. 1 Ω	
			Wiring harness between C03 (female) (3) (13) (23) and V06 (female) (2)	Resistance value	Max. 1 Ω	
	3	Short-circuiting of wiring harness (Contact with 24 V circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Wiring harness from C03 (female) (28) to V06 (female) (1) and grounding	Voltage	Max. 1 V	
	4	Governor • pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			C03 (female)	Resistance value		
			Between (28) and (3) (13) (23)	20 – 60 Ω		

Service Code in Electrical System E222 (Short-circuiting in LS-EPC solenoid)

User Code	Service Code	Failure Code	Failure phenomenon	Disconnection in LS-EPC solenoid (in governor • pump controller system)
—	**E222**	**DXE0KB**		
Failure content	• Abnormal current flew to the LS-EPC solenoid circuit.			
Response from controller	• The controller reduces the output to the LS-EPC solenoid circuit to 0. • Even if the failure cause disappears, the current does not return to normalcy, unless the engine starting switch is once turned OFF.			
Phenomenon occurring on machine	• The travel speed is slow at Mi and Lo, or in L mode, speeds of the work equipment and swing are too fast. (The LS valve set pressure cannot be controlled)			
Relative information	• Output to LS-EPC solenoid (ampere) can be confirmed in the monitor function. (Code No. 015: LS-EPC solenoid current)			

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	LS-EPC solenoid 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.			
			V22 (male)	Resistance value		
			Between ① and ②	7 – 14 Ω		
			Between ① and grounding	Above 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 C03 (female) ⑥ and V22 (female) ① and grounding	Resistance value	Above 1 MΩ	
	3	Governor • pump controller defective	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			C03 (female)	Resistance value		
			Between ⑥ and ③ ⑬ ㉓	7 – 14 Ω		
			Between ⑥ and grounding	Above 1 MΩ		

Electrical Circuit Diagram for LS-EPC Solenoid in Governor • Pump Controller



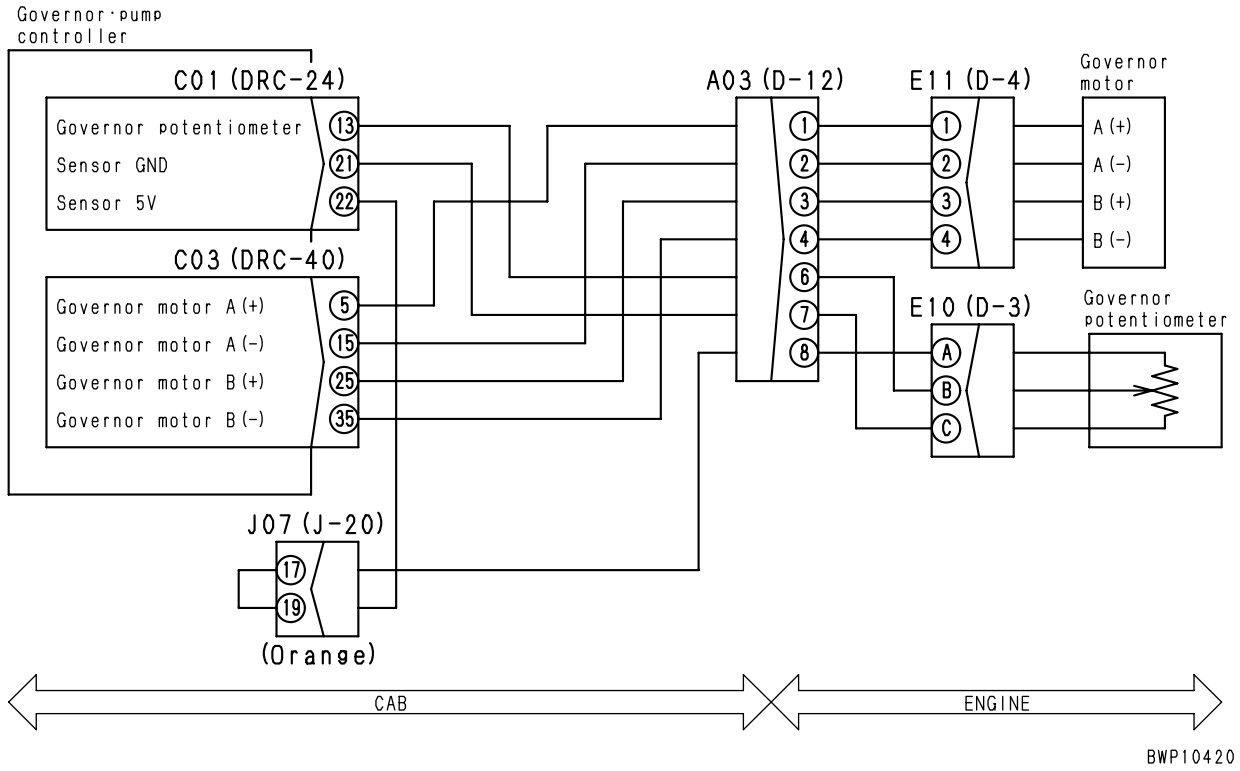
Service Code in Electrical System E232 (Short-circuiting in PC-EPC Solenoid)

User Code	Service Code	Failure Code	Failure phenomenon	Disconnection in PC-EPC solenoid (in governor • pump controller system)
E02	**E232**	**DXA0KB**		
Failure content	• Abnormal current flew to the PC-EPC solenoid circuit.			
Response from controller	• The controller reduces the output to the PC-EPC solenoid circuit to 0. • Even if the failure cause disappears, the current does not return to normalcy, unless the engine starting switch is once turned OFF.			
Phenomenon occurring on machine	• As load to the pump increases, the engine rotation drops sharply and sometimes the engine stalls. (The pump absorption torque cannot be controlled)			
Relative information	• Output to PC-EPC solenoid (ampere) can be confirmed in the monitor function. (Code No. 013: PC-EPC solenoid current) • If there is no abnormality with the solenoid or any of the wiring harnesses, the machine can be operated in a working mode equivalent to E mode by turning the emergency drive switch ON. (At that time the monitor panel continues to display service code No. [E232], but this is not abnormal) ★ Turn the emergency driving switch ON during the troubleshooting.			

Presumed cause and standard value in normalcy

Cause		Standard value in normalcy and references for troubleshooting			
1	PC-EPC solenoid 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.			
		V21 (male)		Resistance value	
		Between (1) and (2)		7 – 14 Ω	
		Between (1) and grounding		Min. 1 MΩ	
2	Emergency pump driving switch 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.			
		S25 (male)	Emergency pump drive switch	Resistance value	
		Between (3) and (4)	Normal	Min. 1 MΩ	
		Between (3) and grounding		Min. 1 MΩ	
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 from C03 (female) (16) to S25 (female) (3) and grounding		Resistance value	Min. 1 MΩ
		Between wiring harness from S25 (female) (2) to V21 (female) (1) and grounding		Resistance value	Min. 1 MΩ
4	Governor • pump controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
		C03 (female)		Resistance value	
		Between (16) and (3) (13) (23)		7 – 14 Ω	
		Between (16) and grounding		Min. 1 MΩ	

Electrical Circuit Diagram for Governor Motor in Governor • Pump Controller



Service Code in Electrical System E501 ("Model Selection" function not provided yet)

User Code	Service Code	Failure Code	Failure phenomenon	"Model Selection" function not provided yet (in governor • pump controller system)
—	**E501**	**DA2AKM**		
Failure content	• Model Code is not inputted yet.			
Response from controller	• Model data and rated load cannot be set. • Even when the failure cause disappears, Service Code does not return to normalcy, unless the engine starting switch is once turned OFF.			
Phenomenon occurring on machine	• The excess load alarm does not work normally.			
Relative information	• Model names that the controller recognizes (figure) can be confirmed in the monitor function. (Code No. 150: Model Code)			

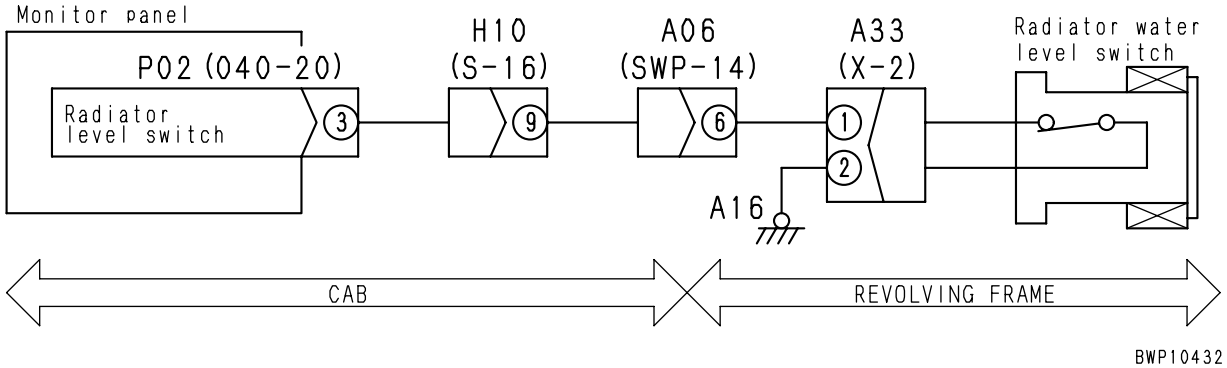
	Cause		Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Setting work not finished yet	Refer to the section "Special Function of Monitor Panel" in this manual. ★There is a possibility that model selection operation has never been tried with that specific model from its delivery ex-works up to this moment.
	2	Governor • pump controller defective	As this is an internal failure, no troubleshooting can be conducted. (If there is no problem with the setting work above, the controller may be judged as defective.)

Failure Code in Mechanical System B@BCZK (Abnormally lowered radiator water level)

User Code	Service Code	Failure Code	Failure phenomenon	Radiator water level abnormally lowered (in mechanical system)
—	—	**B@BCZK**		
Failure content	• The signal circuit in the radiator water level switch was opened (i.e. disconnected from grounding).			
Response from monitor panel	• None in particular			
Phenomenon occurring on machine	• There is a possibility that the engine seizes, if it is kept running without a corrective action.			
Relative information	• This Failure Code is recorded, if the radiator water level caution symbol is displayed in the monitor panel, when the engine is running. • Input from the radiator water level switch (ON or OFF) can be confirmed in the monitor function. (Code No. 045: Monitor input 1)			

Presumed cause and standard value in normalcy	Cause	Standard value in normalcy and references for troubleshooting			
	1 Radiator water level lowered (system in normal condition)	★Check the water level and refill cooling water. (If this phenomenon occurs frequently, check the cause)			
	2 Radiator water level switch defective (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
		A33 (male)	Engine cooling water level	Resistance value	
		Between ① and ②	When in normal condition	Below 1 Ω	
			When lowered	Above 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 between P02 (female) ③ and A33 (female) ①		Resistance value	Below 1 Ω
		Wiring harness between A33 (female) ② and grounding		Resistance value	Below 1 Ω
	4 Monitor panel defective	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
		P02	Engine water temperature	Resistance value	
		Between ③ and grounding	When in normal condition	Below 1 V	
			When lowered	20 – 30 V	

Electrical Circuit Diagram for Radiator Water Level Switch in Monitor Panel



E-3 Engine speed is irregular, or there is hunting

Failure information	• Engine speed is irregular at low idling. • There is hunting. • Engine speed is lower than specified at high idling.
Relative information	• Engine rotation can be confirmed in the monitor function. (Code No. 010: Engine rotation)

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	Model code signal fault (Internal failure)	If the monitor display is not normal, proceed to Service Code [E217].			
			Monitoring Code	Item	Normal display	
			002 003	Controller model code	200	
	2	Governor lever improperly adjusted	Refer to the section "Special Function of Monitor Panel" in this manual.			
	3	Governor motor improperly working	If the governor motor lever moves smoothly in the following operations, it is judged as normal. • The fuel dial is operated between low idling and high idling. • The engine is stopped with the fuel dial.			
	4	Engine fuel control system defective	Refer to the Engine Shop Manual.			
	5	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 C01 (female) ㉓ to J07 to H15 (female) ⑤	Resistance value	Below 1 Ω	
	6	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 C01 (female) ㉓ to J17 and H15 (female) ⑤ and grounding	Resistance value	Above 1 MΩ	
	7	Governor • pump controller defective	As this is an internal failure, troubleshooting cannot be conducted. (If there is none of the causes from Item 1 to 6 above, the controller is judged as defective)			

E-8 All work equipment, swing and travel do not move

Failure information	• All the work equipment, swing and travel do not move.
Relative information	—

Presumed cause and standard value in normalcy

	Cause	Standard value in normalcy and references for troubleshooting
1	Fuse No. 3 fault	If the fuse is blown, there is a big possibility that grounding fault occurred in the circuit.
2	Safety switch lock defective (Internal disconnection)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting. (Refer to cause 6)

S14 (female)	Safety control lever	Resistance value
Between ① and ②	Lock	Above 1 MΩ
	Release	Below 1 Ω

3	PPC lock solenoid fault (Internal disconnection or short-circuiting)

★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.

V01 (male)	Resistance value
Between ① and ②	20 – 60 Ω
Between ① and grounding	Above 1 MΩ

4	Assembled-type diode D01 fault (Internal short-circuiting)

★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.

D01 (male)	Resistance value
Between ⑧ and ④	Above 1 MΩ

5	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.

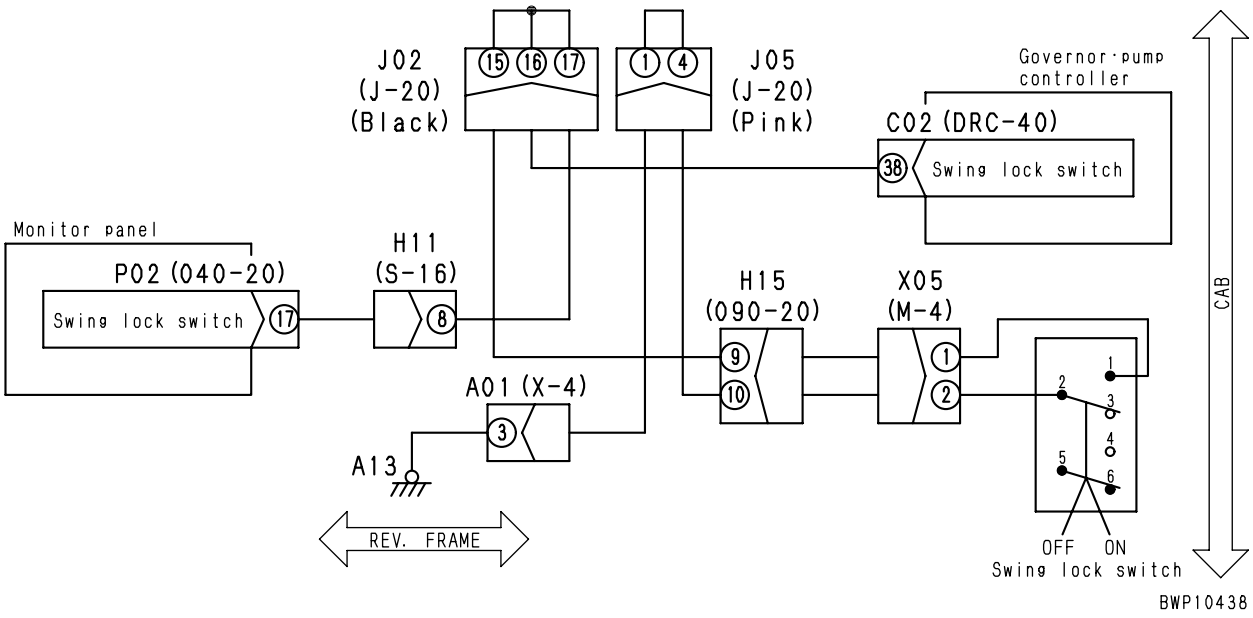
Wiring harness between FB1-3 outlet and S14 (male) ①	Resistance value	Below 1 Ω
Wiring harness from S14 (male) ② to J02 to V01 (female) ①	Resistance value	Below 1 Ω
Wiring harness between V01 (female) ② and grounding	Resistance value	Below 1 Ω

6	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 between FB1-3 outlet and S14 (male) ① and grounding	Resistance value	Above 1 MΩ
Wiring harness from S14 (male) ② to J02 to V01 (female) ①, or between wiring harness between S14 (male) ② and D01 (female) ⑧ and grounding	Resistance value	Above 1 MΩ

Electrical Circuit Diagram for Swing Lock Switch

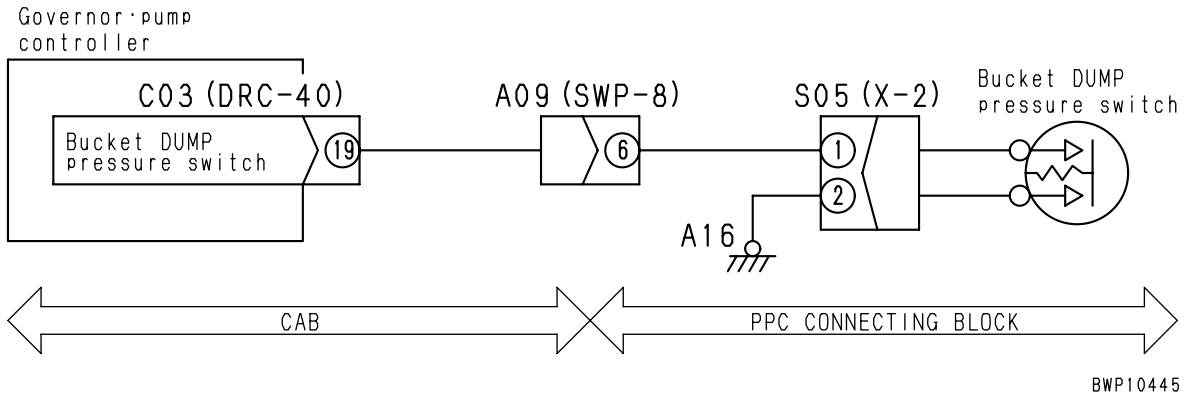


E-26 "Bucket DUMPING" is not correctly displayed in monitor function

Failure information	• "Bucket DUMPING" is not correctly displayed in the monitor function (special function) on the monitor panel.
Relative information	—

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting			
	1	Bucket DUMPING PPC hydraulic switch fault (Internal disconnection and short-circuiting)	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			S05 (male)	Bucket control lever	Resistance value	
			Between ① and ②	NEUTRAL	Above 1 MΩ	
				DUMPING	Below 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 C03 (female) ⑲ and S05 (female) ①		Resistance value	Below 1 Ω
			Wiring harness between S05 (female) ② and grounding		Resistance value	Below 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 between C03 (female) ⑲ and S05 (female) ① and grounding		Resistance value	Above 1 MΩ
	4	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.			
			Between wiring harness between C03 (female) ⑲ and S05 (female) ① and grounding		Voltage	Below 1 V
	5	Governor • pump controller defective	★Turn the engine starting switch OFF for the preparations, and keep the engine running during the troubleshooting.			
			C03	Bucket control lever	Voltage	
			Between ⑲ and grounding	NEUTRAL	20 – 30 V	
				DUMPING	Below 1 V	

Electrical Circuit Diagram for Bucket DUMPING PPC hydraulic Switch



Serial No. 10501 and up

Troubleshooting procedure for air conditioner system

★ The control panel of the air conditioner constantly monitors the sensors and other devices in the system . When it detects any abnormality, “Self-diagnosis notice” is displayed by operating switches specially.

★ If you feel any abnormality in the air conditioner system, check the “Self-diagnosis notice” first according to the procedure for “Troubleshooting by self-diagnosis notice”, and then;

- If the “Self-diagnosis notice” is displayed, continue the “Troubleshooting by self-diagnosis notice”.
- If the “Self-diagnosis notice” is not displayed, carry out the “Troubleshooting by failure phenomenon”.

Troubleshooting by self-diagnosis notice

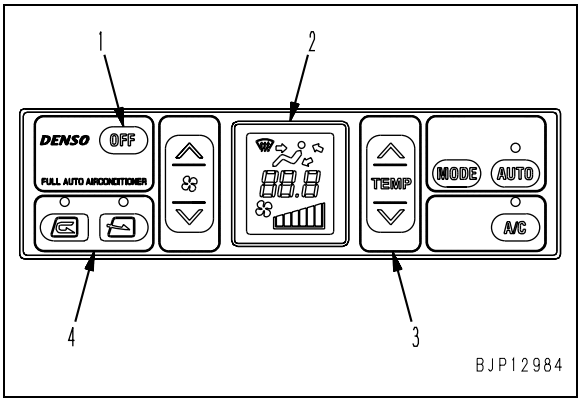
★ Check the “Self-diagnosis notice” on the control panel according to the following procedure.

- How to display “Self-diagnosis notice”
  1) Turn the starting switch ON.
  2) Press OFF switch (1) and check that anything is not displayed on display monitor (2).
  3) Hold the UP switch (∧) and DOWN switch (∨) of temperature setting switch (3) simultaneously for 3 seconds or more.
  4) Check the “Self-diagnosis notice” displayed on display monitor (2).

- How to select “Self-diagnosis notice”
  If multiple “Self-diagnosis notices” are recorded, press the UP switch (∧) or DOWN switch (∨) of temperature setting switch (3) to select another notice.

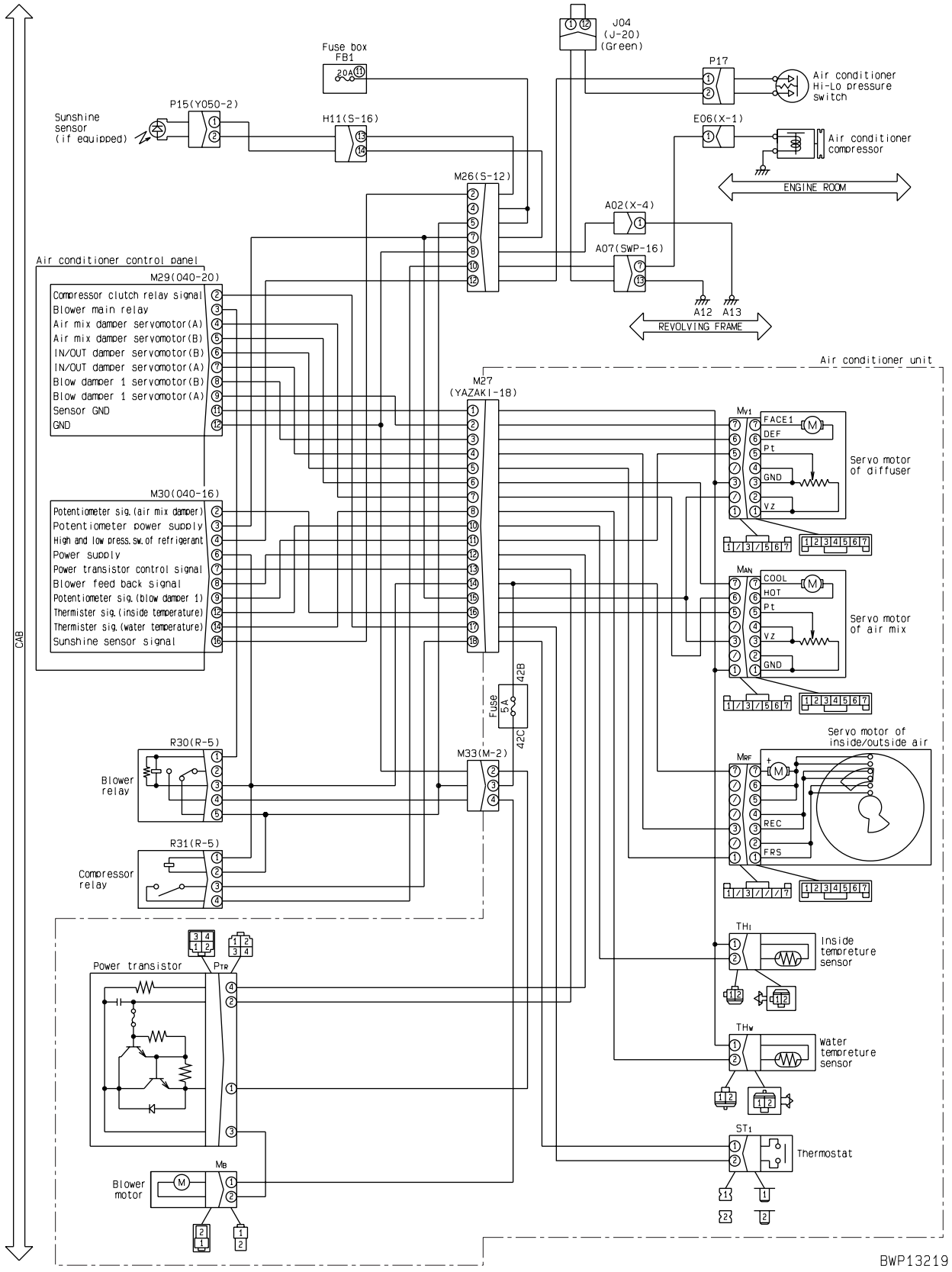
- How to delete “Self-diagnosis notice”
  When reproducing the “Self-diagnosis notices” or after removing the cause of a failure, press the switches on both sides of recirc/fresh air selector switch (4) simultaneously for 3 seconds or more, and all the “Self-diagnosis notices” are deleted.

- Finishing display of “Self-diagnosis notice”
  To finish display of the “Self-diagnosis notice”, press OFF switch (1) or turn the starting switch OFF.



Self-diagnosis notice	Failure mode
E--	No failures
E11	Disconnection in recirculated air sensor
E12	Short-circuit in recirculated air sensor
E15	Disconnection in water temperature sensor
E16	Short-circuit in water temperature sensor
E18	Short-circuit in daylight sensor
E43	Abnormality in air outlet damper
E44	Abnormality in air mix damper
E45	Abnormality in recirculated and fresh air damper

Electrical Circuit Diagram for Air Conditioner



H-7 Boom moves slowly or lacks power

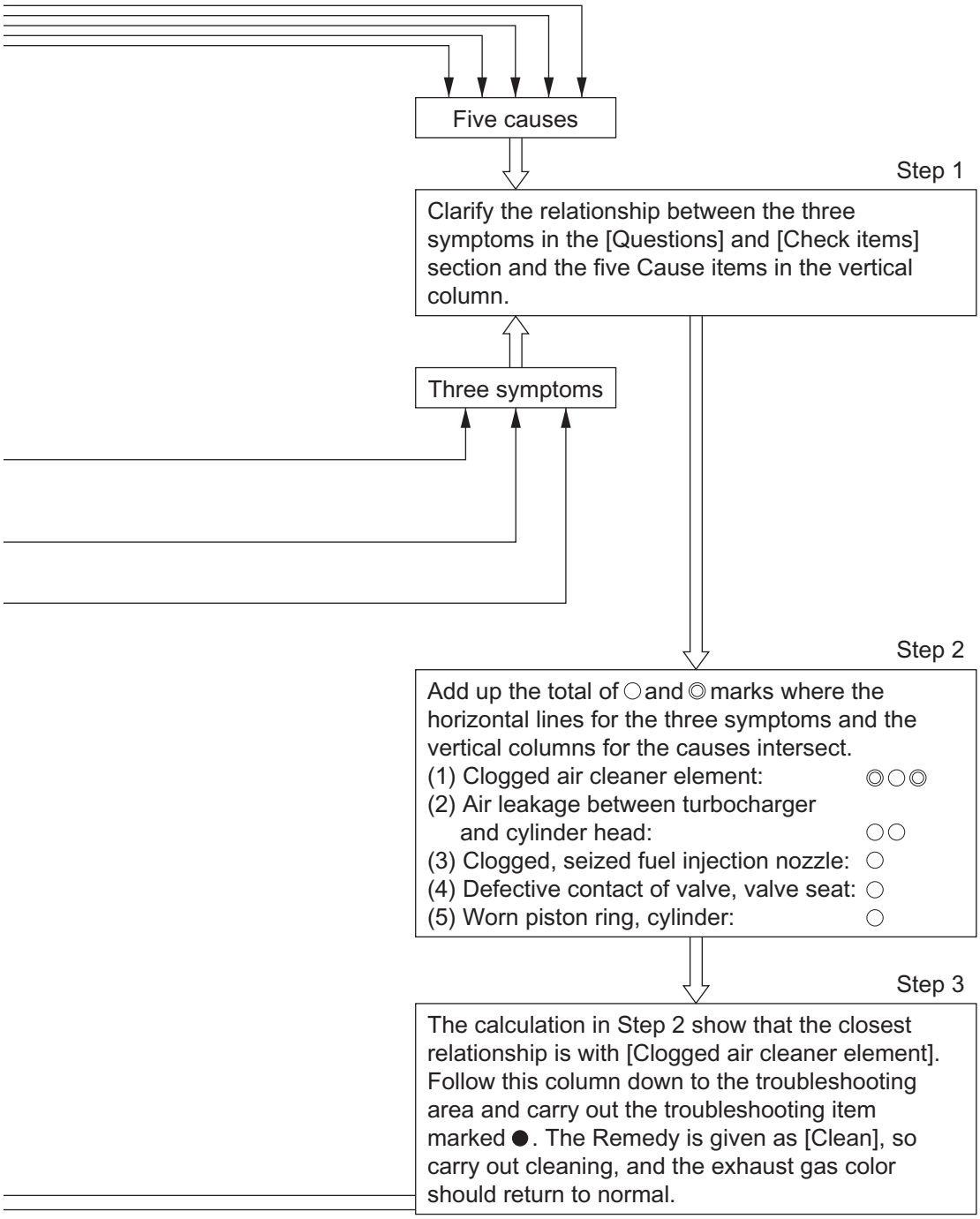
Failure information	• The boom moves slowly or lacks power
Relative information	• Set the working mode at A mode for the troubleshooting.

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunctioning of right PPC valve (in boom circuit)	★Stop engine for preparations. Start troubleshooting at engine high idling.	
			Boom lever	PPC valve output pressure
			NEUTRAL	0{0}
			RAISE or LOWER	Above 2.7 MPa {Above 28 kg/cm^2}
	2	Malfunction of merge/divide solenoid valve	★Stop engine for preparations. Start troubleshooting at engine high idling.	
			Working mode	Solenoid output pressure
			A mode	0{0}
			Other than A mode	2.84 – 3.43 MPa {29 – 35 kg/cm^2}
	3	Malfunctioning of merge/divide valve (main and LS valves)	The merge/divide valve (main and LS valves) is presumed to malfunction. Check the valve itself.	
	4	Malfunctioning of boom control valve (spool)	The spool in the boom control valve is presumed to malfunction. Check the valve itself.	
	5	Malfunctioning of boom control valve (pressure compensation valve)	The pressure compensation valve in the boom control valve is presumed to malfunction. Check the valve itself.	
	6	Malfunctioning of boom control valve (regeneration valve)	The regeneration valve in the boom control valve or the seal is presumed to malfunction. Check the valve itself.	
	7	Malfunctioning of boom control valve (lock valve)	The lock valve in the boom control valve is presumed to malfunction. Check the valve itself.	
	8	Malfunctioning of safety valve for lock valve or seal defective	The safety valve for the lock valve is presumed to malfunction, or the seal is suspected to be defective. Check the valve itself.	
	9	Malfunctioning of boom control valve (suction valve) or seal defective	The suction valve in the boom control valve is presumed to malfunction, or the seal is suspected to be defective.	
	10	Malfunctioning of boom control valve (safety and suction valves) or seal defective	The safety and suction valves in the boom control valve are presumed to malfunction, or the seal is suspected to be defective. Check those valves themselves.	
	11	Malfunctioning of LS shuttle valve (left travel, bucket and service valves)	LS shuttle valves in the left travel control valve, bucket control valve and service control valve are presumed to malfunction. Check those valves themselves.	
	12	Boom cylinder defective	★Stop engine for preparations. Start troubleshooting at engine high idling.	
			Boom lever	Amount oil leakage from cylinder
			Raise relief	20 cc/min

H-22 Track shoe does not turn (on one side only)

Failure information	• A track shoe does not turn (only on one side).
Relative information	• Set the working mode at A mode for the troubleshooting.

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting	
	1	Travel control valve (suction valve) seat defective	The suction valve seat in the travel control valve is suspected of defect. Check the seat itself.	
	2	Travel motor (safety valve) seat defective	The safety valve seat in the travel motor is suspected of defect. Check the seat itself.	
	3	Travel motor (check valve) seat defective	The check valve seat in the travel motor is suspected of defect. Check the seat itself.	
	4	Travel Motor speed reduced	★Stop engine for preparations. Start troubleshooting at engine high idling.	
			Travel control lever	Amount of oil leakage from travel motor
			Travel relief	27.2 ℓ/min
	5	Final drive defective	The final drive is suspected of an internal failure. Check the inside of the final drive directly. ★A failure inside the final drive may well be determined by an abnormal noise from within, abnormal heat generated or metal dust or chips contained in the drained oil.	


Five causes
Step 1
Clarify the relationship between the three symptoms in the [Questions] and [Check items] section and the five Cause items in the vertical column.
Three symptoms
Step 2
Add up the total of ○ and ◎ marks where the horizontal lines for the three symptoms and the vertical columns for the causes intersect.
(1) Clogged air cleaner element: ◎○◎
(2) Air leakage between turbocharger and cylinder head: ○○
(3) Clogged, seized fuel injection nozzle: ○
(4) Defective contact of valve, valve seat: ○
(5) Worn piston ring, cylinder: ○
Step 3
The calculation in Step 2 show that the closest relationship is with [Clogged air cleaner element]. Follow this column down to the troubleshooting area and carry out the troubleshooting item marked ●. The Remedy is given as [Clean], so carry out cleaning, and the exhaust gas color should return to normal.

S-7 Exhaust smoke is black (Incomplete combustion)

General causes why exhaust smoke is black

- Insufficient intake of air
- Improper condition of fuel injection
- Excessive injection of fuel

			Causes: Seized turbocharger, interference	Clogged air cleaner element	Worn piston ring, cylinder	Clogged injection nozzle, defective spray	Improper injection timing	Defective injection pump (excessive injection)	Improper valve clearance	Crushed, clogged muffler	Leakage of air between turbocharger and intake manifold	Defective contact of valve and valve seat	Defective injection pump (rack, plunger seized)
Questions	Confirm recent repair history												
	Degree of use of machine	Operated for long period		△	△	△						△	
	Color of exhaust gas	Suddenly became black	◎			○							○
		Gradually became black		◎		○					○		
		Blue under light load			◎								
	Engine oil must be added more frequently				◎								
	Power was lost	Suddenly	◎			○				○			○
		Gradually		○	○						○	○	
	Non-specified fuel is being used					○							○
Check items	Noise of interference is heard from around turbocharger		◎										
	Air cleaner clogging monitor lights up			◎									
	Blow-by gas is excessive				◎								
	Engine pickup is poor and combustion is irregular		○			◎			○	○	○		○
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low					◎							○
	Timing lock on fuel injection pump does not match						◎						
	Seal on injection pump has come off							◎					
	Clanging sound is heard from around cylinder head								◎				
	Exhaust noise is abnormal		○			○				◎			
	Muffler is crushed									◎			
	Leakage of air between turbocharger and head, loose clamp										◎		
Troubleshooting	When turbocharger is rotated by hand, it is found to be heavy		●										
	When air cleaner element is inspected directly, it is found to be clogged			●									
	When compression pressure is measured, it is found to be low				●							●	
	Speed does not change when operation of certain cylinders is stopped					●							
	When check is made using delivery method, injection timing is found to be incorrect						●						
	Injection pump test shows that injection amount is incorrect							●					
	When valve clearance is checked directly it is found to be outside standard value								●				
	When muffler is removed, exhaust color returns to normal									●			
	When control rack is pushed, it is found to be heavy, or does not return												●
		Remedy	Replace	Clean	Replace	Replace	Adjust	Adjust	Adjust	Replace	Correct	Replace	Replace

30 DISASSEMBLY AND ASSEMBLY

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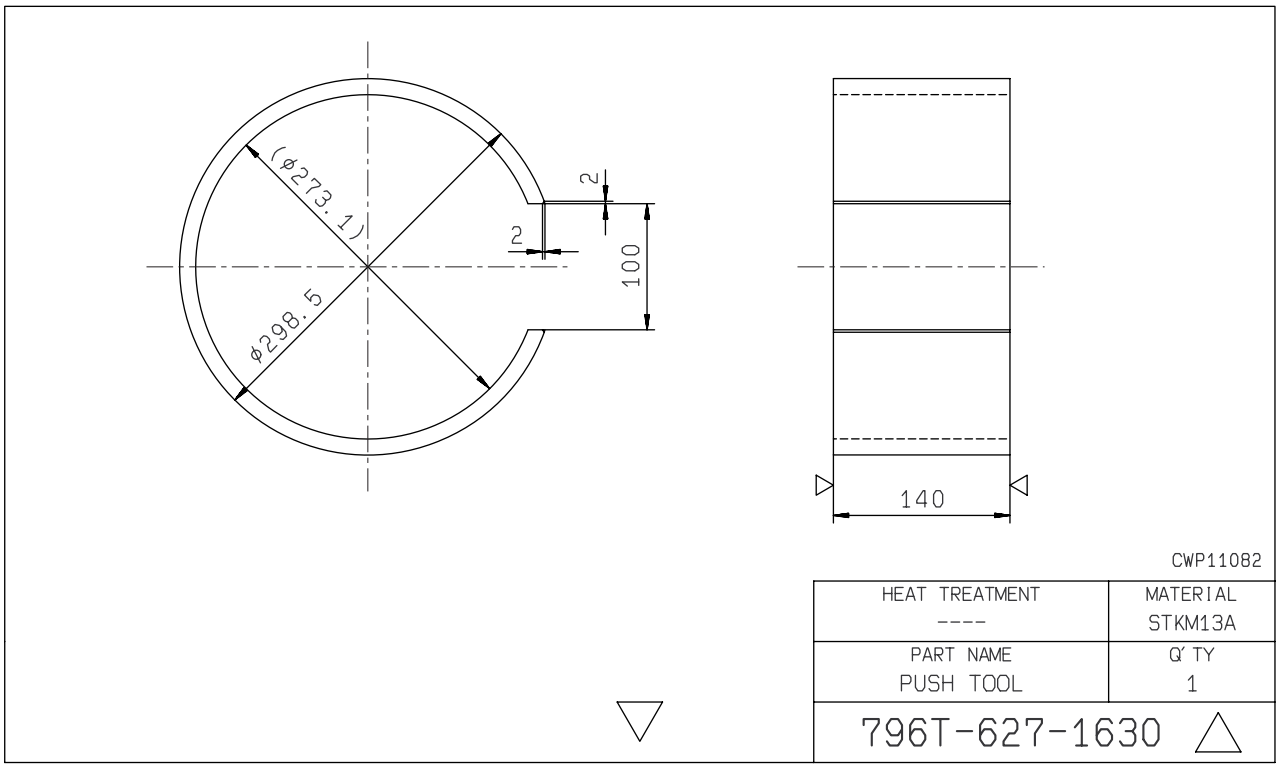
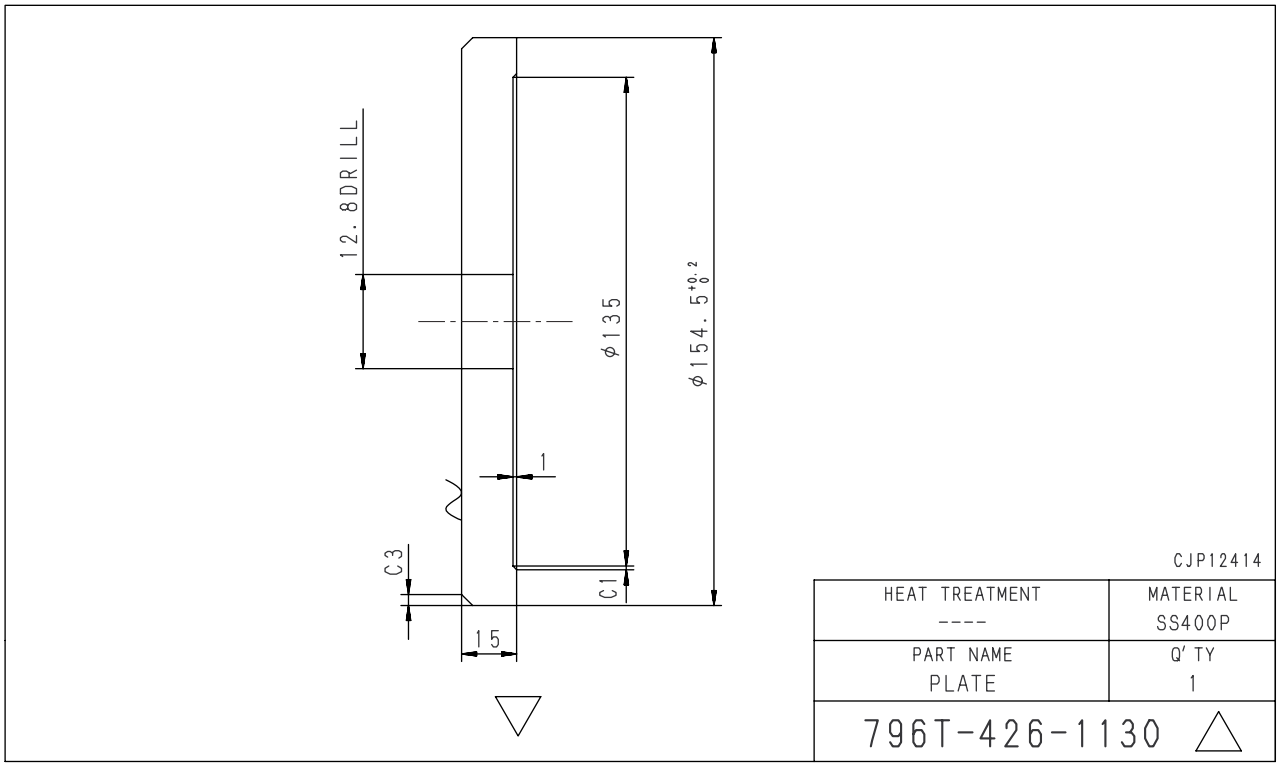
SKETCHES OF SPECIAL TOOLS

Note: Komatsu cannot accept any responsibility for special tools manufactured according to these sketches.

F2 Push Tool



G3 Plate



REMOVAL AND INSTALLATION OF CYLINDER HEAD ASSEMBLY

SPECIAL TOOLS

Mark		Part No.	Part Name	Necessity	Qty	Distinction*	Sketch
C	1	795-799-1170	Installer	■	1		
	2	790-331-1110	Wrench	■	1		

*Distinction between new and existing part.

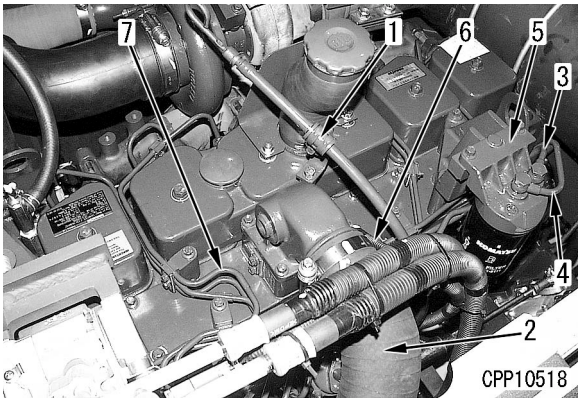
REMOVAL

⚠ .Disconnect the cable from the negative terminal (-) of battery.

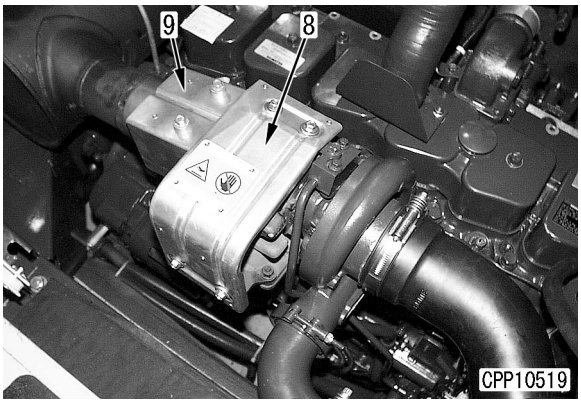
1. Drain engine coolant.

   Hydraulic oil: 22.8 ℓ

2. Close the fuel stop valve.
3. Open up the engine hood.
4. Remove clamp (1) from the engine oil level gauge guide. ※1
   ★ Put the clamp aside near the counter-weight after removing it.
5. Disconnect air intake hose (2). ※2
6. Disconnect tubes (3) and (4) between the fuel filter and the fuel injection pump. ※3
7. Remove bracket (5) in one piece with the fuel filter assembly. ※4
8. Remove ribbon heater harness CN-E01 (6).
9. Disconnect six delivery tubes (7). ※5



10. Remove heat cover (8) from the turbocharger assembly.
11. Remove exhaust muffler connector cover (9).



12. Disconnect air cleaner suction hose (10). ※6
13. Disconnect air intake hose (11) between the turbocharger and the after-cooler. ※7
14. Remove V clamp (12) from the exhaust muffler.
15. Disconnect lubricant inlet tube (13) and lubricant outlet tube (14).
16. Remove turbocharger assembly (15).

REMOVAL AND INSTALLATION OF ENGINE AND HYDRAULIC PUMP ASSEMBLIES

SPECIAL TOOLS

Mark	Part No.	Part Name	Necessity	Qty	Distinction	Sketch
D	796-460-1210	Oil Stopper	●	1		
	796-770-1320	Adapter	●	1		

REMOVAL

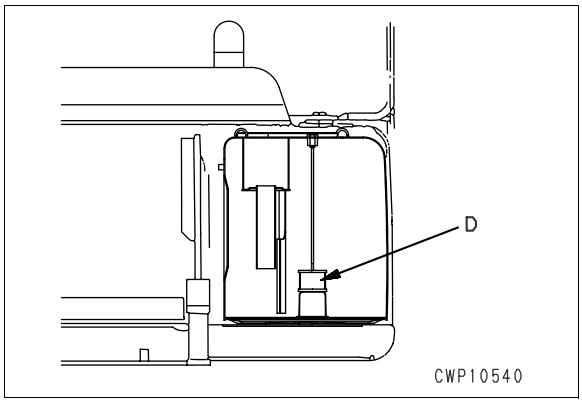
⚠ Lower the work equipment to the ground for safety and stop the engine. Disconnect the cable from the negative terminal (-) of the battery.

⚠ To release the internal pressure, gradually loosen the oil filler cap on the hydraulic tank.

★ Attach an identification tag to each pipe. This will avoid a possible mistake when reinstalling.

1. Remove the hydraulic tank strainer and stop the flow of oil, using Tool **D**.
   ★ When not using tool **D**, remove the drain plug to drain oil from the hydraulic tank and piping.

   Hydraulic tank: Approx. 240 ℓ



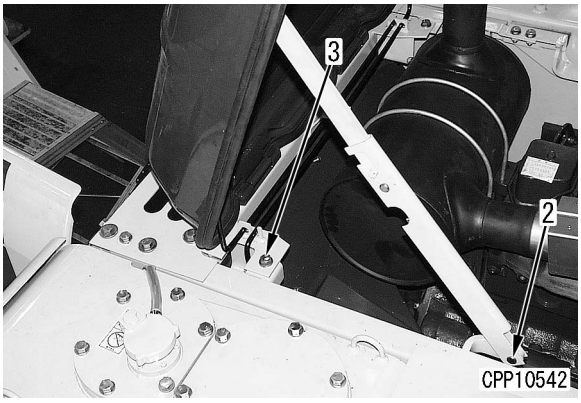
2. Drain engine cooling water.

   Engine cooling water: Approx. 22.8 ℓ

3. Lift up engine hood (1).

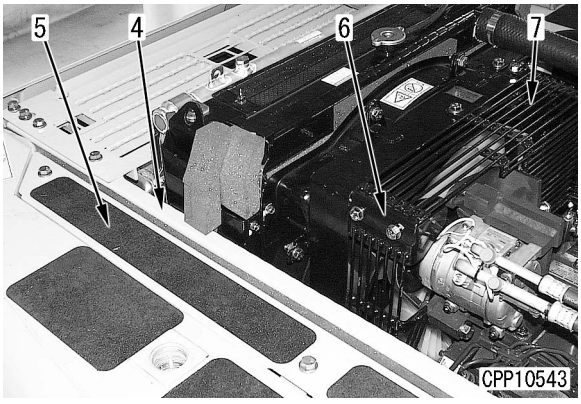
⚠ Support the engine hood with an appropriate strap and lifting device.

4. Remove pin (2) and mounting bolt (3). Lift off the hood and set it aside.



5. Remove covers (4) and (5).

6. Remove radiator fan guards (6) and (7).

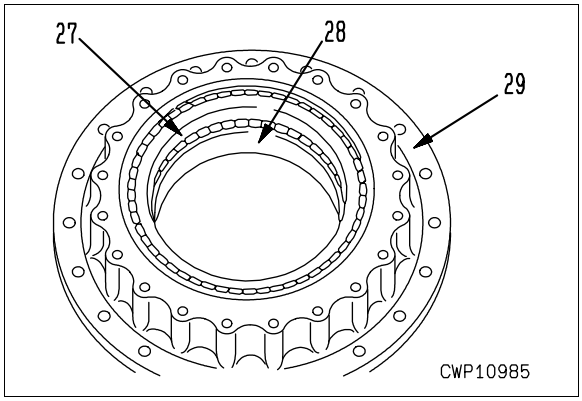


ASSEMBLY

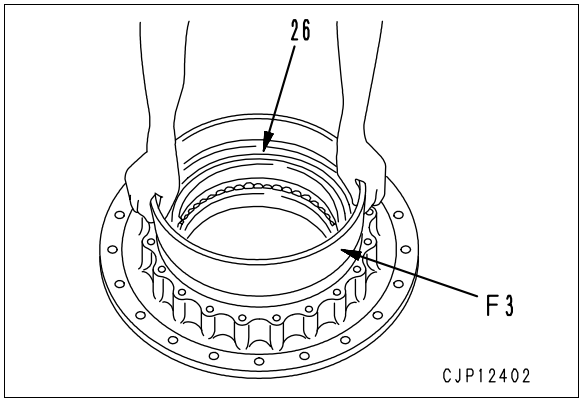
★ Clean all parts and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.

1. Hub assembly

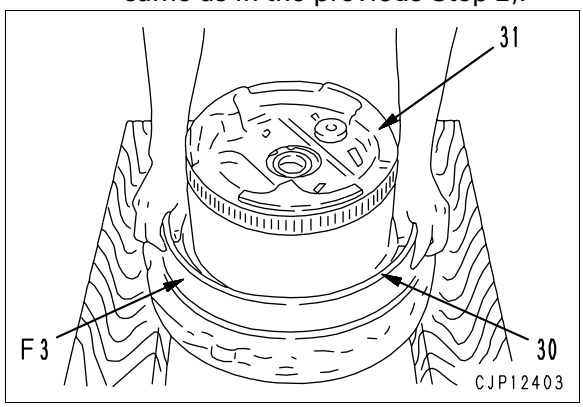
1) Assemble hub assembly as follows. Using push tool, press fit bearings (27) and (28) to hub (29).



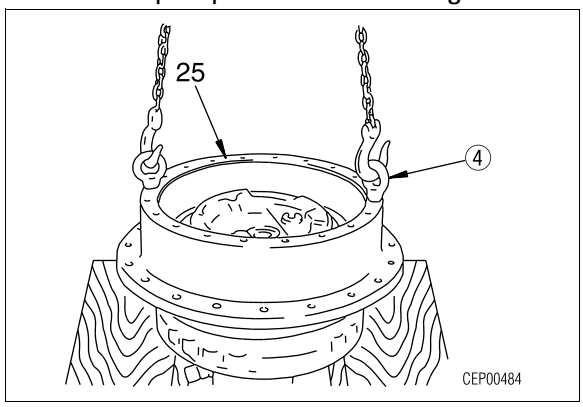
2) Using tool **F3**, install floating seal (26).
   - ★ Remove all oil and grease from the O-ring and O-ring contact surface. Dry the parts before installing the floating seal.
   - ★ After installing the floating seal, check that the angle of the floating seal is within 1 mm.
   - ★ After installing the floating seal, coat the sliding surface thinly with engine oil.



3) Using tool **F3**, install floating seal (30) onto travel motor (31).
   - ★ The procedure for installation is the same as in the previous Step 2).

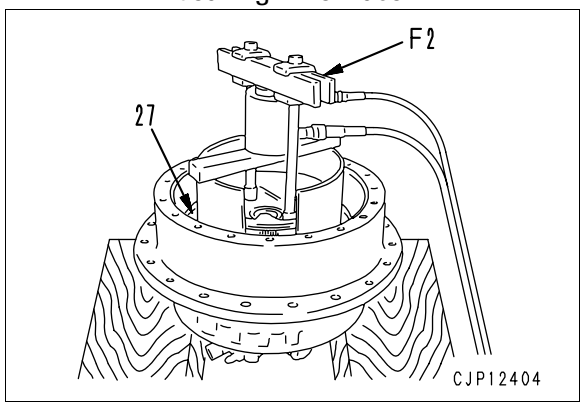


4) Using eyebolts ④, set hub assembly (25) onto the travel motor. Use the push tool and tap to press fit the bearing.

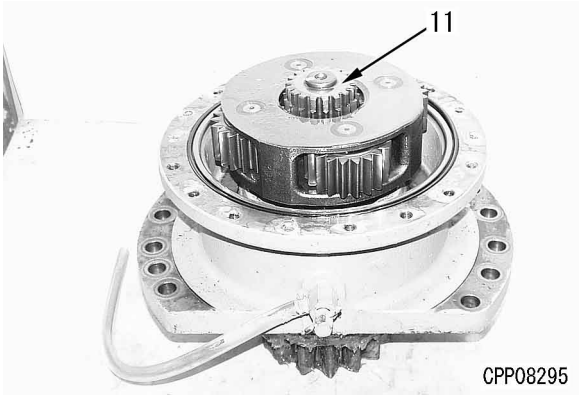


2. Nut

1) Install nut as follows.
   i) Using tool **F2**, push bearing inner race (27).
      - ★ Pushing force: 12.7 - 16.7 kN {1.3 - 1.7 tons}
      - ★ Rotate the hub 2 - 3 times before applying the pushing force to the bearing inner race.



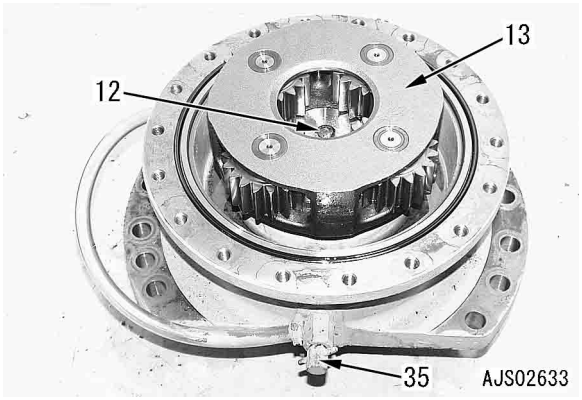
6. No. 2 sun gear
Remove No. 2 sun gear (11).



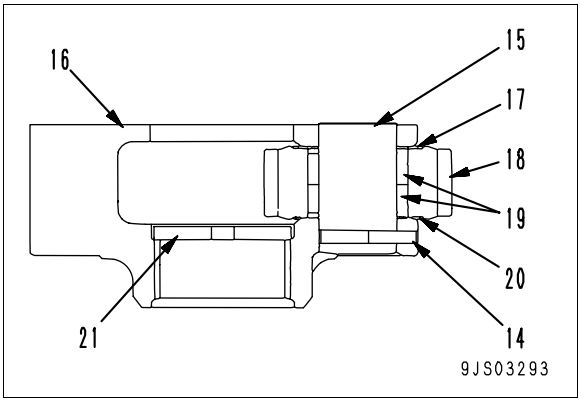
7. Bolt
Remove the holder mounting bolt (12).

8. No. 2 carrier assembly

1) Remove No. 2 carrier assembly (13).
2) Remove drain part (35) from the case.
   ★ When repairing, reuse the drain part.



3) Disassemble the No. 2 carrier assembly in the following manner.
   i) Insert pin (14) and shaft (15) out of carrier (16).
   ★ Pull out pin (14) after removing the shaft.
   ii) Remove thrust washer (17), gear (18), bearing (19) and thrust washer (20).
   iii) Remove plate (21).

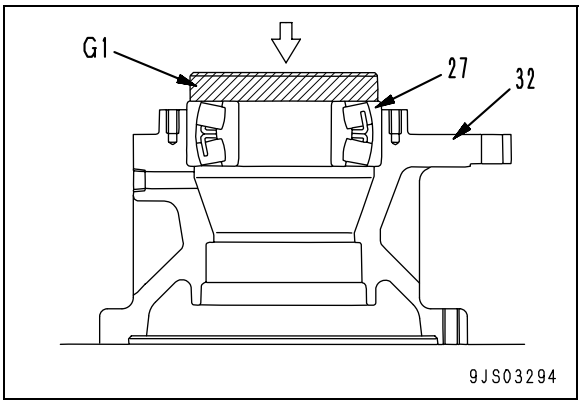


9. Bearing-shaft-case assembly
If the bearing-shaft-case assembly needs to be disassembled, do not disassemble it for repair but discard it. (Described before)

ASSEMBLY

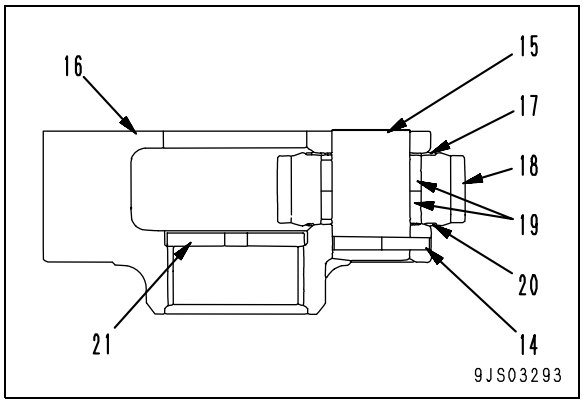
★ Clean the all parts and check them for dirt or damage. Coat their sliding surfaces with engine oil before installing.
★ Steps 1 – 4 are procedures for assembling the repaired section. Use the prepared parts for those steps (described before).

1. Bearing
Using push tool **G1**, press fit bearing (27) to case (32).

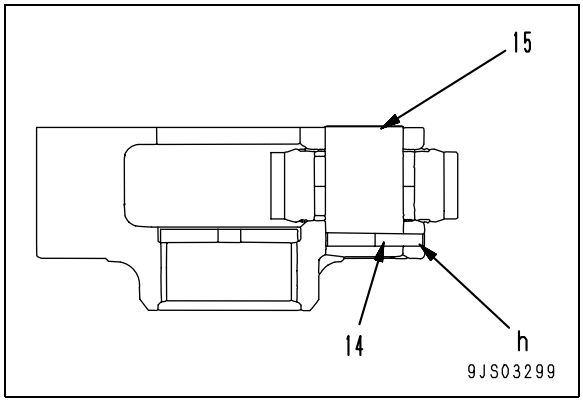


5. No. 2 carrier assembly

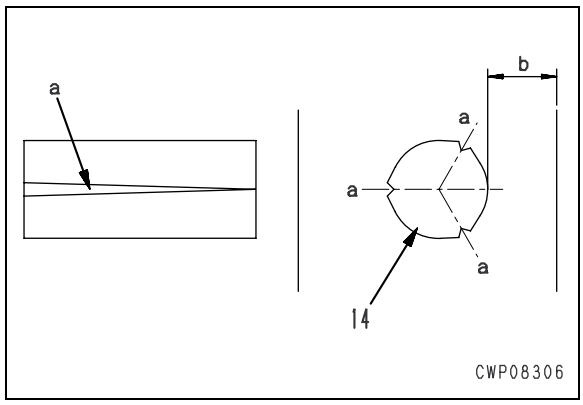
1) Reassemble the No. 2 carrier assembly in the following manner.
   ★ There are traces of expansion on the end surface of carrier side hole **h** which were originally caused when the pin was inserted. Make such the end surfaces are smooth enough before reassembly.
   i) Assemble plate (21) in carrier (16).
   ii) Assemble bearing (19) in gear (18), then fit upper and lower thrust washers (17) and (20) to the gear and set the gear assembly to carrier (16).



   iii) Align both pin holes of the shaft and the gear, and install shaft (15), tapping it with a plastic hammer.
   ★ Install the shaft, rotating the planetary gear. Take care so that the thrust washer is not damaged.
   iv) Insert pin (14).



   ★ When inserting the pin, take care so that any of the 3 pawls provided on the circumference (Portion **a**) will not come to the slender side of the carrier (Portion **b**). Take note, however, that the slender side is likely to be on the opposite side of the carrier, depending on actual individual items. Pay attention so that a pin pawl will not come to the slender side of the carrier any way.



   ★ Expand the pin of the carrier after inserting.

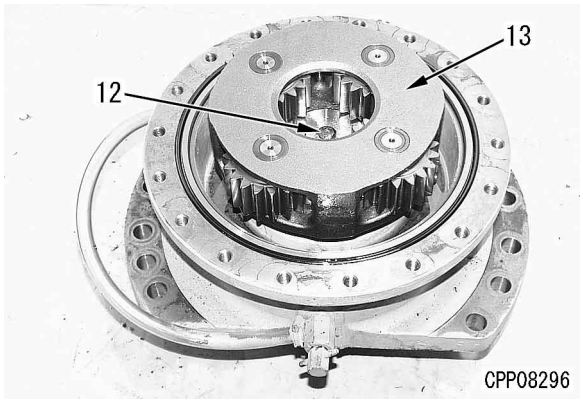
2) Assemble No. 2 carrier assembly (13).

6. Bolt

Tighten bolt (12).

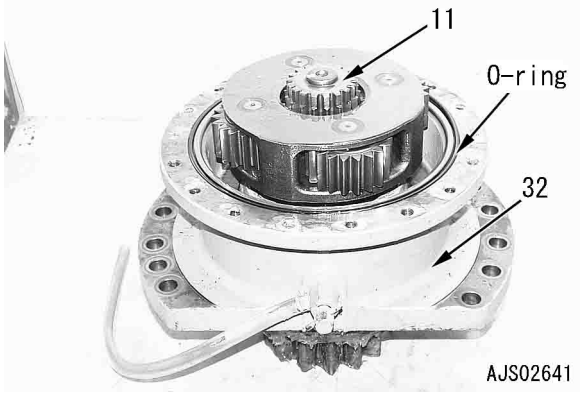
Mounting bolt thread:
Adhesive compound (LT-2)

Mounting bolt:
157 – 196 Nm {16 – 20 kgm}

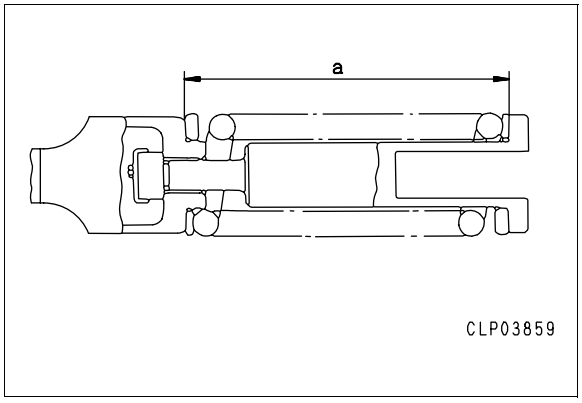


7. No. 2 sun gear

1) Install No. 2 sun gear (11).
2) Fit an O-ring to case (32) side.



3) Apply hydraulic pressure slowly to compress the spring and tighten nut (4) so that the installed length of the spring is dimension **a**, then secure it with lock plate (3).
   ★ Installed length **a** of spring: **655 mm**



4) Remove recoil spring assembly (1) from tool **J1**.

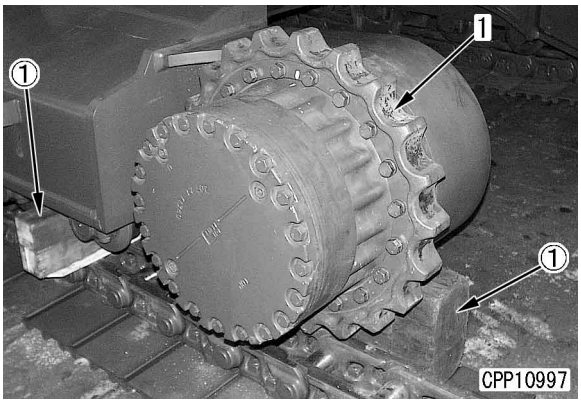
3. Assemble piston assembly (2) to recoil spring assembly (1).
   Sliding portion of wear ring: **Grease (G2-L1)**
   ★ Install the piston assembly so the valve installing position is on the outside.
   ★ Fill the inside of the cylinder with 180 cc of grease (G2-L1), then bleed the air and check that grease comes out of the grease hole.

REMOVAL AND INSTALLATION OF SPROCKET

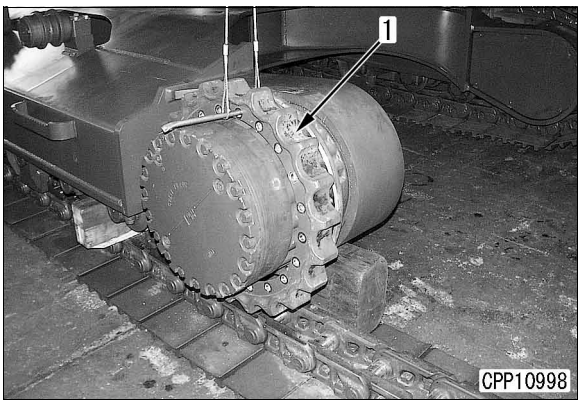
REMOVAL

1. Remove track shoe assembly. For details, see TRACK SHOE ASSEMBLY, REMOVAL.

2. Swing work equipment 90°, push up chassis with work equipment and place block ① between track frame and track shoe.



3. Remove mounting bolts and lift off sprocket (1). ※1
   kg Sprocket: **65 kg**



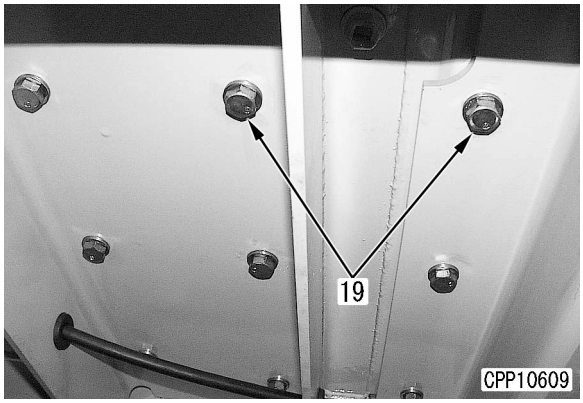
INSTALLATION

- Install in reverse order of removal.

※1
Thread of sprocket mounting bolt: **Gasket sealant (LG-6)**

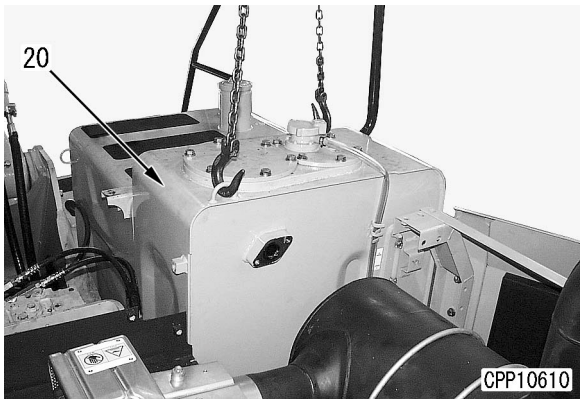
N·m Sprocket mounting bolt: **640 - 785 Nm {65 - 80 kgm}**

9. Sling the hydraulic tank assembly and remove six mounting bolts (19). ※3



10. Lift off hydraulic tank assembly (20) to remove it.

kg Hydraulic tank assembly: 130 kg



INSTALLATION

- Install in reverse order of removal.

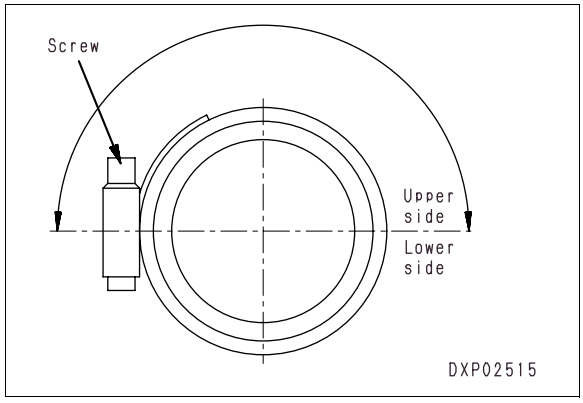
※1

N·m Hydraulic tank drain plug:
58.8 - 78.5 Nm
{6.0 - 8.0 kgm}

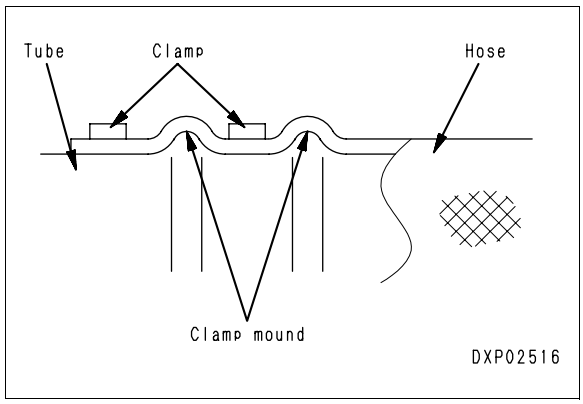
※2

★ After tightening the suction hose clamp screw, check that the screw is located within the range shown in the diagram.

N·m Hose clamp screw:
8.8 ± 0.5 Nm {90 ± 5 kgm}



★ Install the hose clamp and tighten the clamp screw as shown in the diagram below.



※3

N·m Hose clamp screw:
245.2 - 308.9 Nm
{25 - 31.5 kgm}

- **Refilling with oil (hydraulic tank)**
  ★ Add oil through the oil filler to the specified level.
  Run the engine to circulate the oil through the system. Then check the oil level again.

  Hydraulic tank: **Approx. 240 ℓ**

- **Bleeding air**
  ★ Bleed the air.
  For details, see TESTING AND ADJUSTING. Air Bleeding of Various Parts.

REMOVAL AND INSTALLATION OF OIL SEAL IN HYDRAULIC PUMP INPUT SHAFT

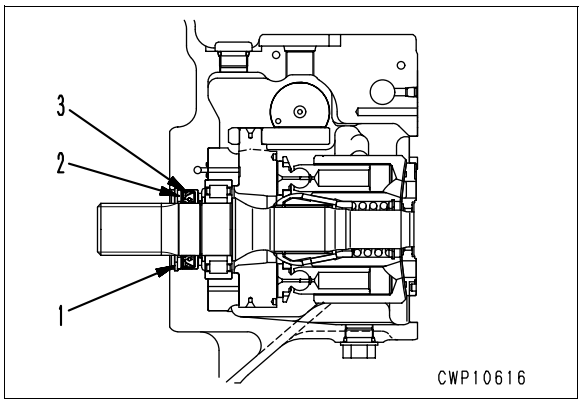
SPECIAL TOOLS

Mark	Part No.	Part Name	Necessity	Qty	Distinction*	Sketch
N	791-463-1141	Push tool	■	1		
	790-201-2740	Spacer	■	1		

*Distinction between new and existing part.

REMOVAL

1. Remove the hydraulic pump assembly, referring to the section of Removing Hydraulic Pump Assembly.
2. Remove snap ring (1) and then remove spacer (2).
3. Pry off oil seal (3) with a screwdriver. ※1
   - ★ When attempting to pry off the seal, do not damage the shaft.



INSTALLATION

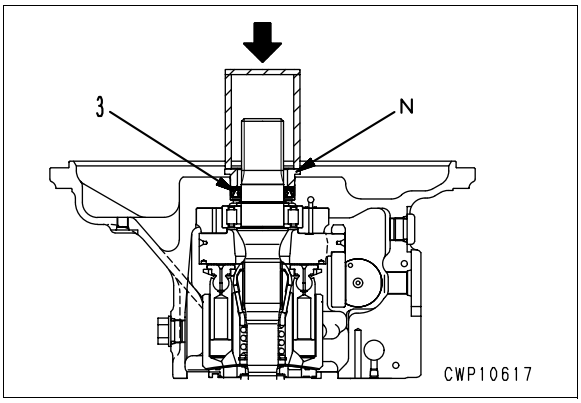
- Install in reverse order of removal.

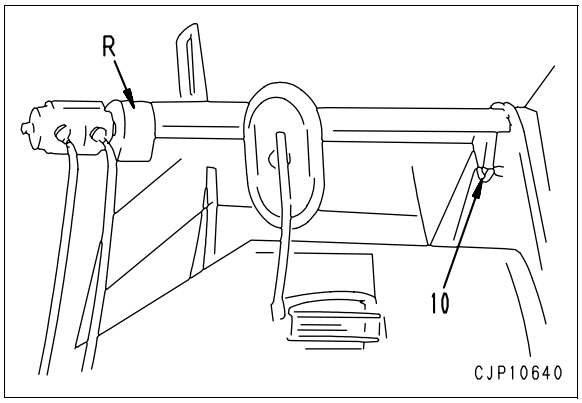
※1

Oil seal lip portion: Grease (G2-LI)

Oil seal outer circumference: Grease (G2-LI)

- ★ Coat the oil seal outer circumference thinly with grease.
- ★ Press-fit oil seal (3), using tool **N**.





8. Lift off work equipment assembly (11) and disassemble it.

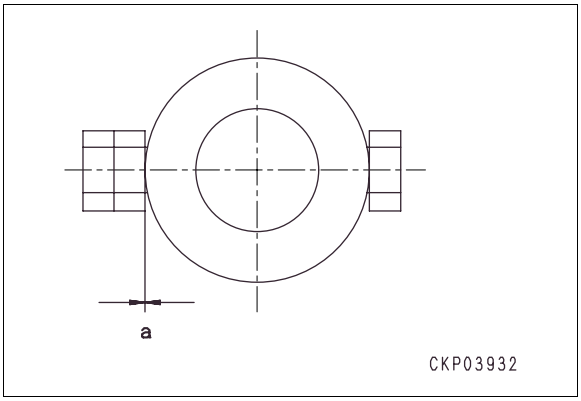
kg Work equipment assembly: 3,300 kg

INSTALLATION

- Install in reverse order of removal.

※1

★ When tightening the locknut, tighten so that clearance **a** between the plate and nut is 0.5 - 1.5 mm.



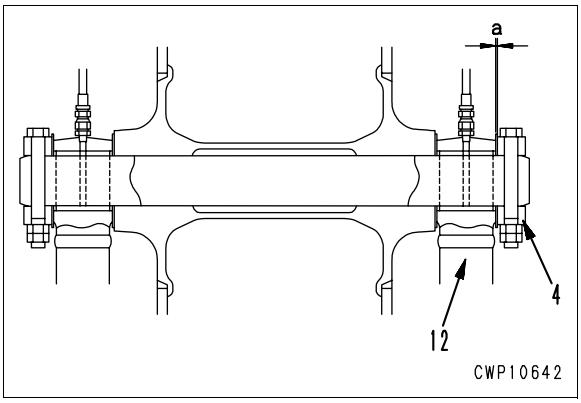
Inside surface of bushing when assembling pin:
Anti-friction compound (LM-P)

Grease after assembling pin:
Grease (LM-G)

⚠ When aligning the position of the pin hole, never insert your fingers into the pin hole.

★ Adjust the shim thickness so that clearance **a** between cylinder rod (12) and plate (4) is below 1 mm.

★ Standard shim thickness: 1.0 mm and 2.0 mm.

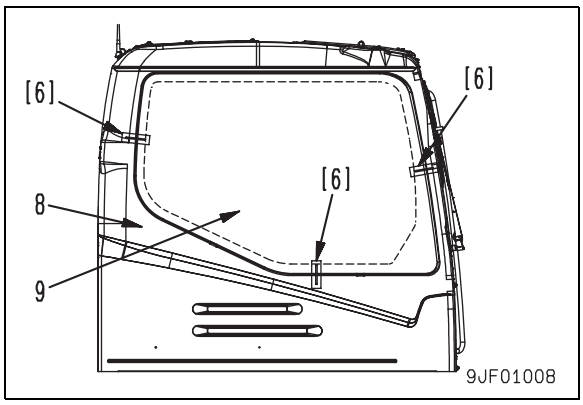


17. Lift off operator's cab assembly (27) to remove it.

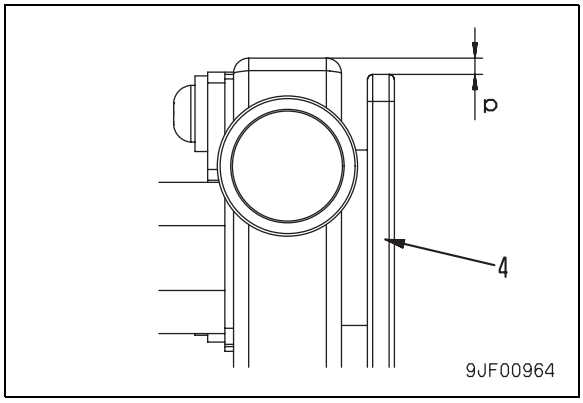
Operator's cab assembly: 290 kg

INSTALLATION

- Install in reverse order of removal.



★ When positioning front window glass (4), set its horizontal position to the frame width and set its vertical position so that height difference p between it and the frame top will be 3 mm.



6. Apply adhesive.

★ Use either of the 2 types of the adhesive.

Adhesive (Summer):
SUNSTAR PENGUINE SEAL 580 SUPER "S"

Adhesive (Winter):
SUNSTAR PENGUINE SEAL 580 SUPER "W"

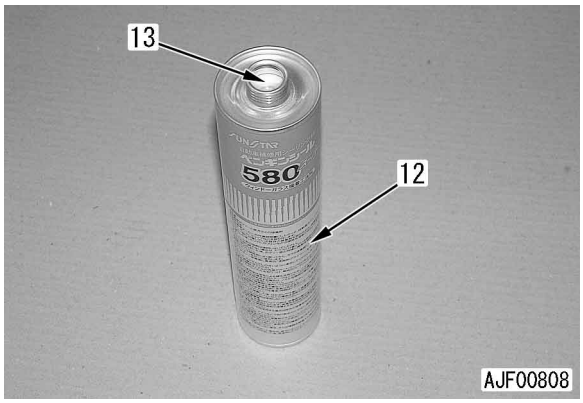
★ The using limit of the adhesive is 4 months after the date of manufacture. Do not use the adhesive after this limit.

★ Keep the adhesive in a dark place where the temperature is below 25°C.

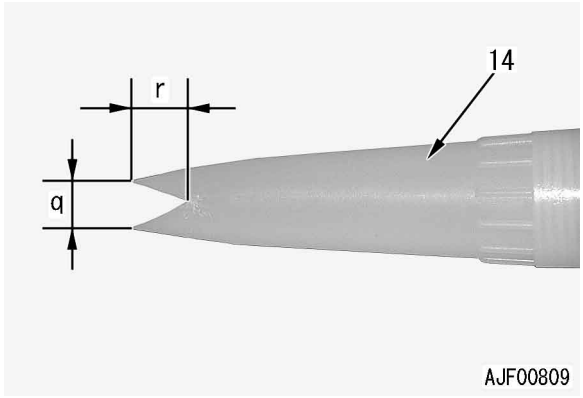
★ Never heat the adhesive higher than 30°C.

★ When reusing the adhesive, remove the all hardened part from the nozzle tip.

1) Break aluminum seal (13) of the outlet of adhesive cartridge (12) and install the nozzle.

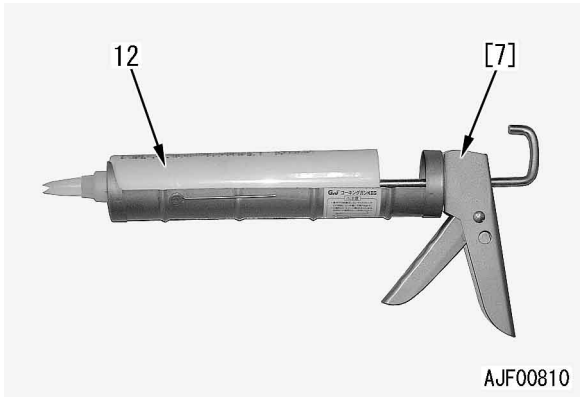


2) Cut the tip of the adhesive nozzle (14) so that dimensions q and r will be as follows.
   - Dimension **q** : **10 mm**
   - Dimension **r** : **15 mm**



3) Set adhesive cartridge (12) to caulking gun [7].

★ An electric caulking gun is more efficient.



REMOVAL AND INSTALLATION OF GOVERNOR, PUMP CONTROLLER ASSEMBLY

Serial No. 10001 – 10500

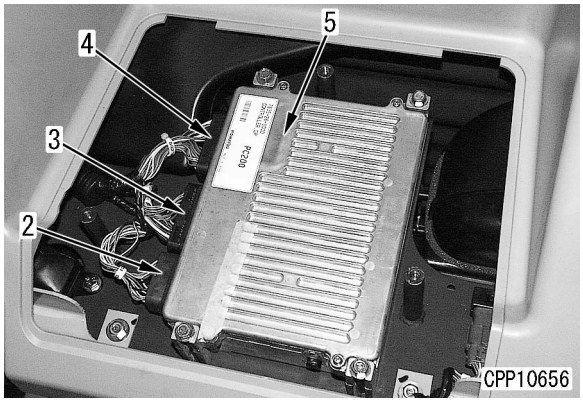
REMOVAL

⚠ First, disconnect the cable from the negative terminal (–) of the battery.

1. Remove cover (1).

2. Disconnect governor, pump controller wiring connectors C01 (2), C02 (3) and C03 (4).

3. Remove the four mounting bolts and remove governor, pump controller assembly (5).



INSTALLATION

- Install in reverse order of removal.

Serial No. 250001 and up

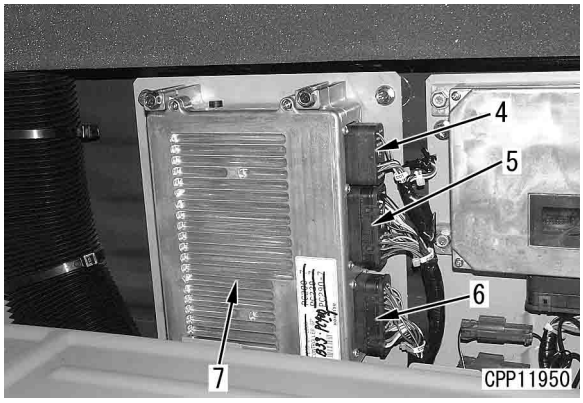
REMOVAL

⚠ First, disconnect the cable from the negative terminal (–) of the battery.

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

2. Disconnect governor, pump controller wiring connectors C01 (4), C02 (5) and C03 (6).

3. Remove the four mounting bolts and remove governor, pump controller assembly (7).



INSTALLATION

- Install in reverse order of removal.