SHOP MANUAL

KOMATSU

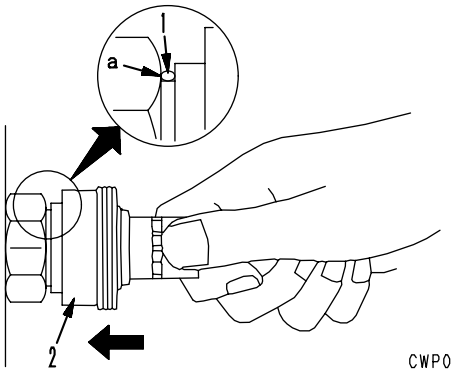
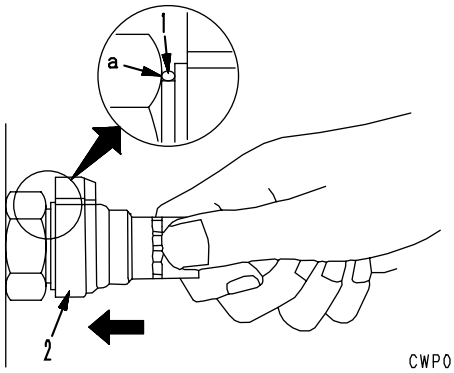
CD110R-1

MACHINE MODEL
CD110R-1

SERIAL NUMBER
1317 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
- CD110R-1 mounts the SAA6D108E-2 engine.
  For details of the engine, see the 108-2 Series Engine Shop Manual.

Printed in USA 04-01

	Type 1	Type 2
Connection	• Hold the mouthpiece of the tightening portion and push body (2) in straight until sliding prevention ring (1) contacts contact surface a of the hexagonal portion at the male end to connect it. 	• Hold the mouthpiece of the tightening portion and push body (2) in straight until sliding prevention ring (1) contacts contact surface a of the hexagonal portion at the male end to connect it. 

kgm to ft. lb

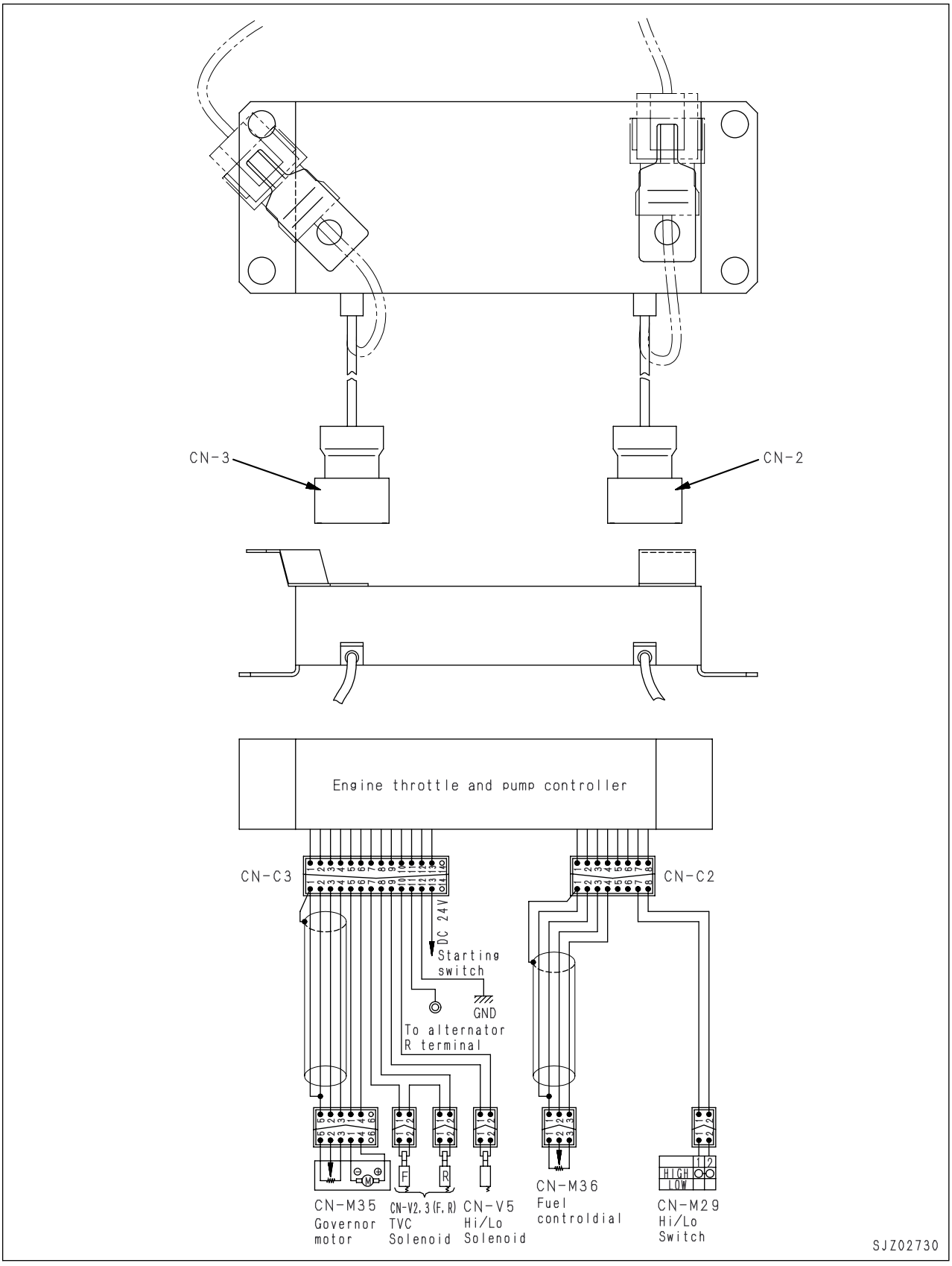
1 kgm = 7.233 ft. lb

	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

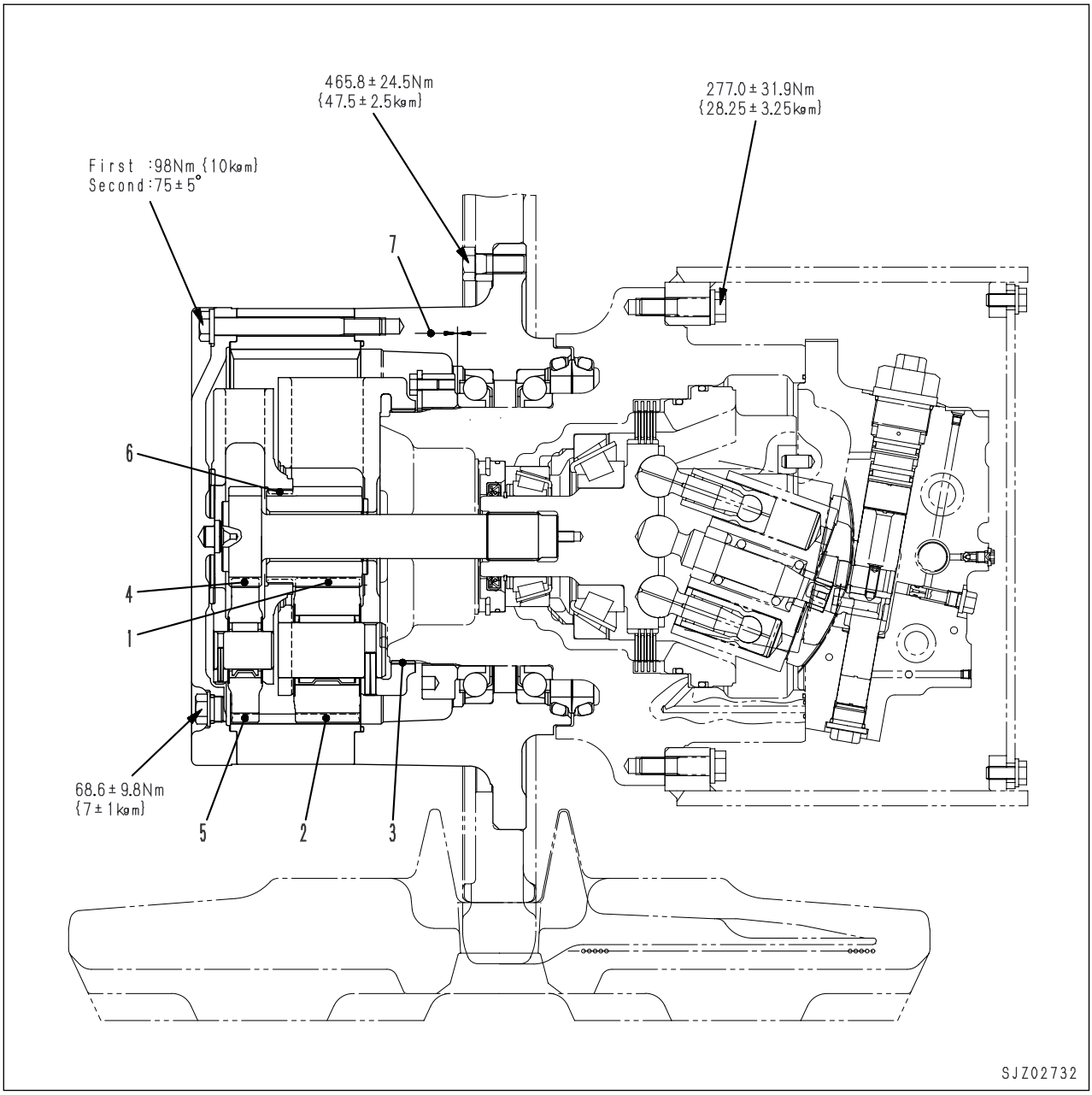
TABLE OF OIL AND COOLANT CAPACITIES

RESERVOIR	KIND OF FLUID	SELECTION ACCORDING TO AMBIENT TEMPERATURE -30 -20 -10 0 10 20 30 40 50°C	CAPACITY (ℓ)	
			Specified	Refill
Engine oil pan	Engine oil	SAE30CD SAE10WCD SAE10W-30CD SAE 15W-40CD	31	28
Swing machinery		SAE 30CD	2.5	2.5
Final drive case			6.1	6.1
Idler (each)			0.23-0.24	0.23-0.24
Track roller (each)			1.02-1.04	1.02-1.04
Bogy fulcrum (each)		SAE 30CD	0.19-0.21	0.19-0.21
Carrier roller (each)			0.07	0.07
Hydraulic system		SAE 10WCD SAE 10W 30CD SAE 15W 40CD	326	207
Fuel tank	Diesel fuel	ASTM D975 No. 2 ASTM D975 No. 1	300	—
Cooling system	Coolant	Add antifreeze	30.5	—

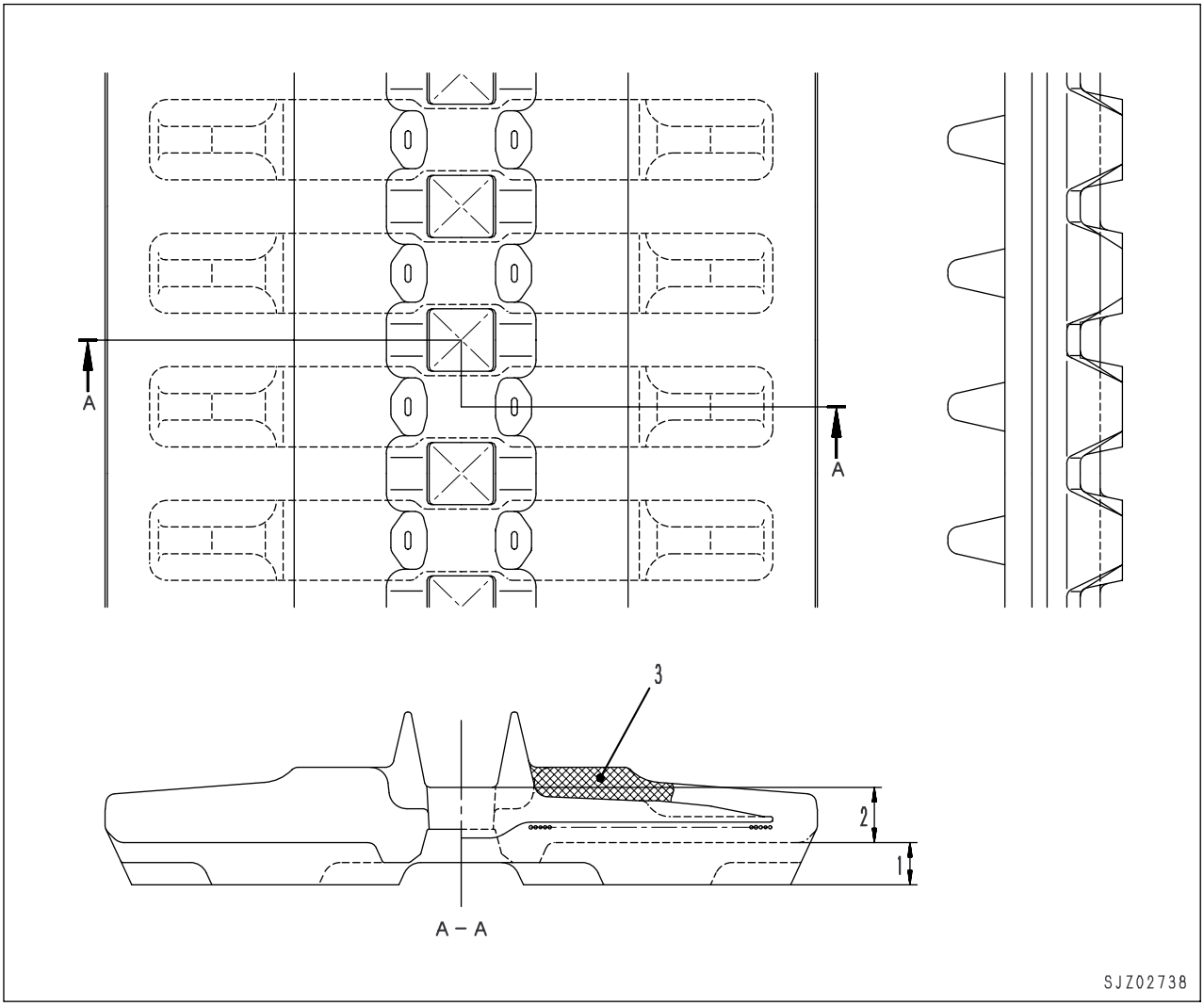
Engine throttle and pump controller



FINAL DRIVE

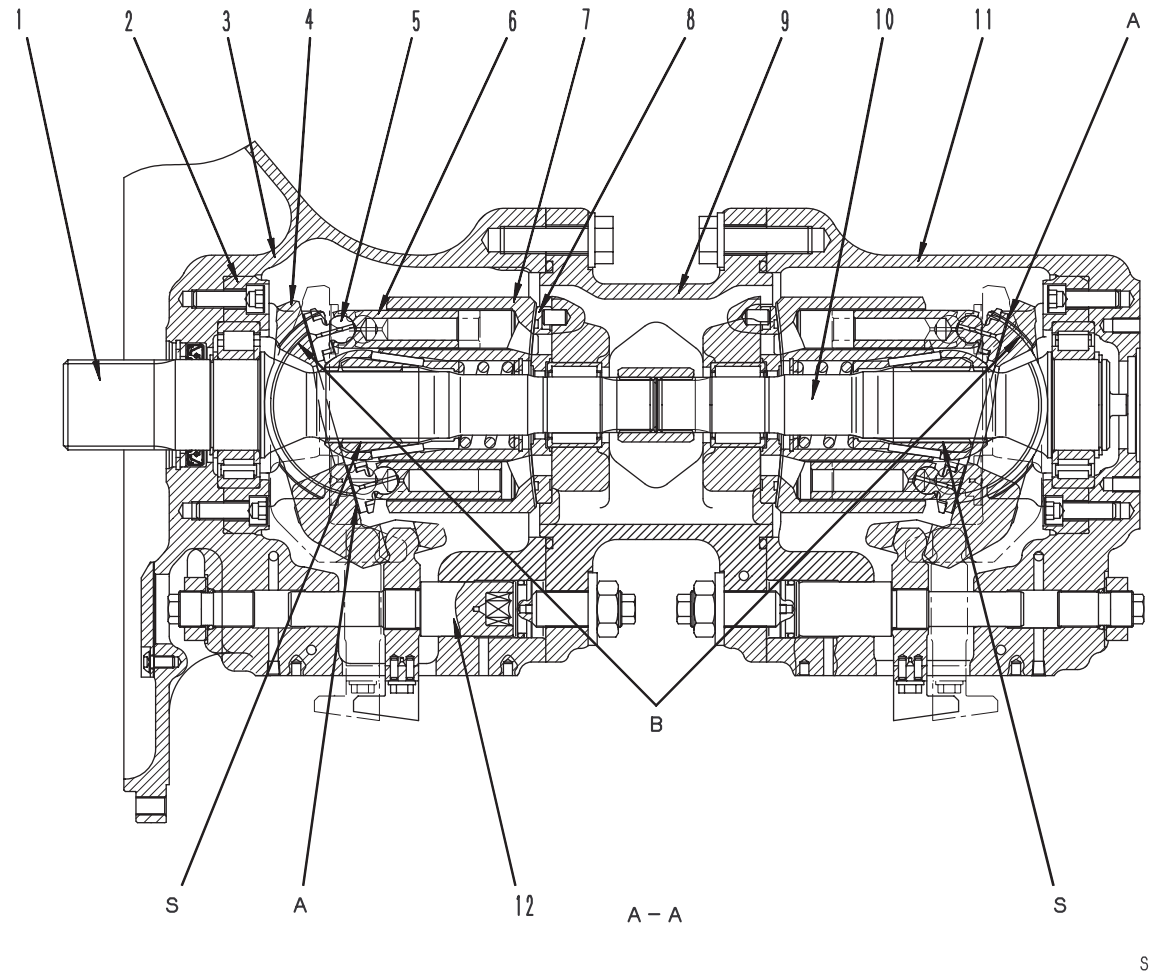

465.8±24.5Nm
{47.5±2.5kgm}
277.0±31.9Nm
{28.25±3.25kgm}
First :98Nm{10kgm}
Second:75±5°
7
6
4
1
68.6±9.8Nm
{7±1kgm}
5
2
3
SJZ02732

TRACK SHOE



Unit:mm

No.	Check item	Standard size	Repair limit	Remedy
1	Wear of lug height	47.5	5	Replace
2	Wear of sprocket meshing portion	62	57	
3	Wear of roller tread height	Hatched part rubber is lost and one part of place is exposed		



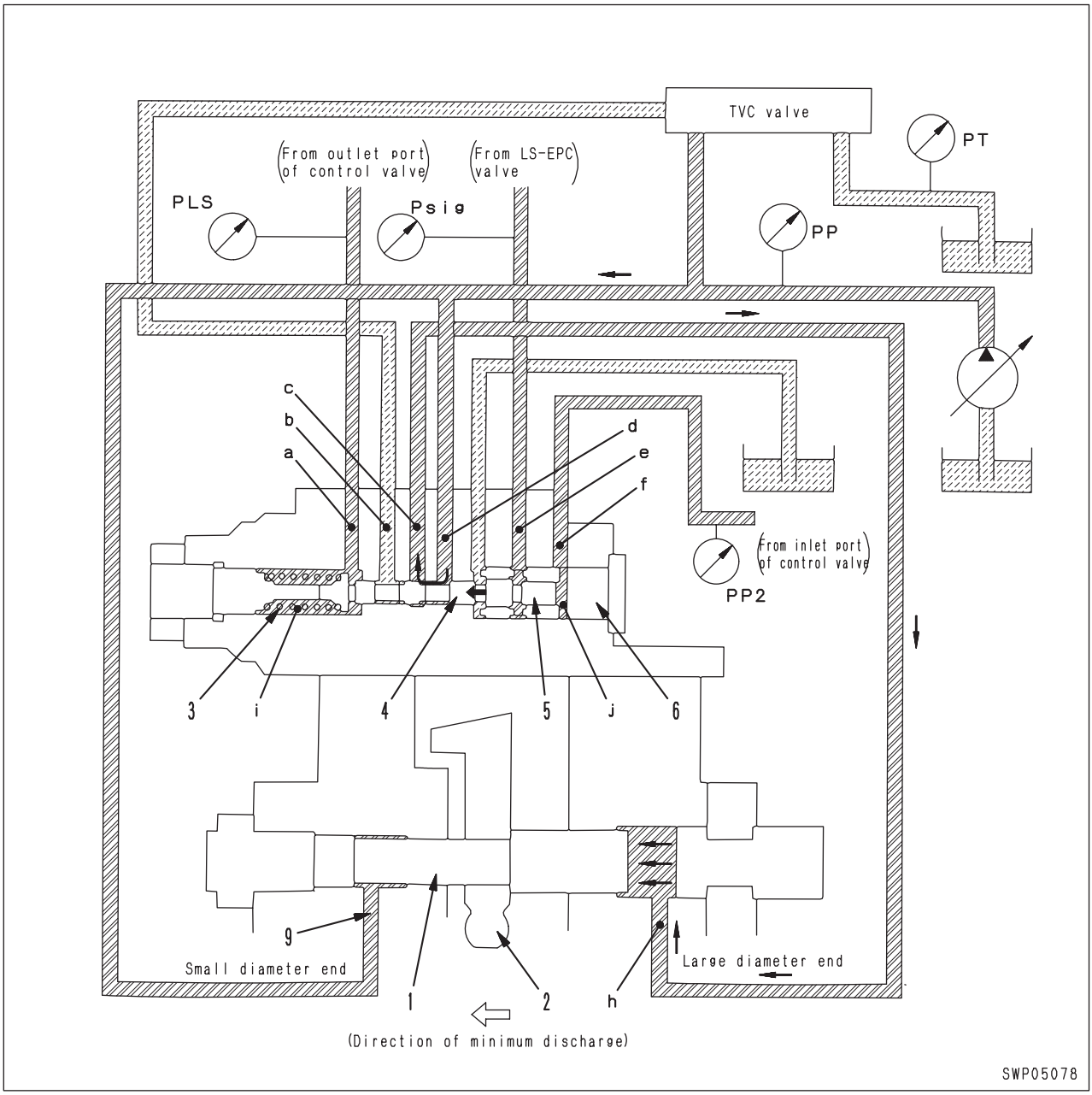
Function

- The engine rotation and torque transmitted to the pump shaft is converted into hydraulic energy, and pressurized oil is discharged according to the load.
- It is possible to change the delivery amount by changing the swash plate angle.

Structure

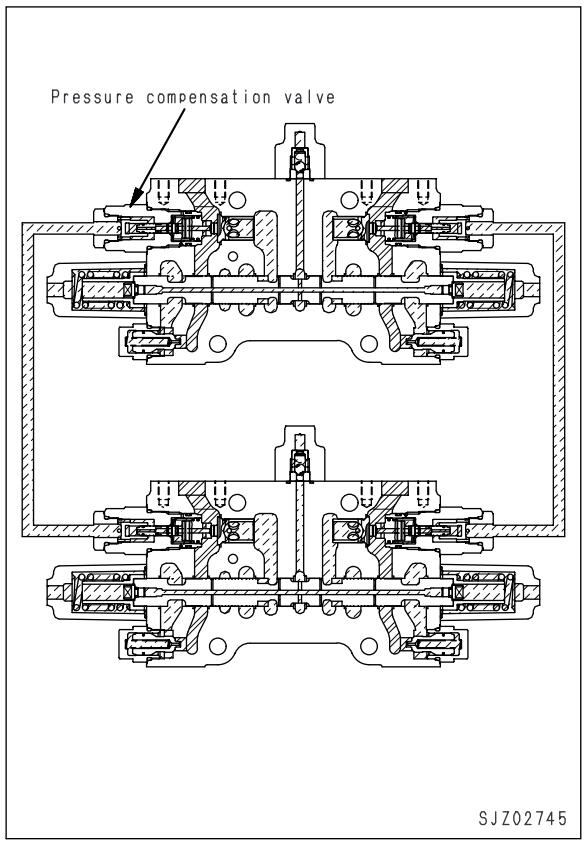
- Cylinder block (7) is supported to shaft (1) by spline **S**. and shaft (1) is supported by the front and rear bearings.
- The tip of piston (6) is a concave ball, and shoe (5) is caulked to it to form one unit Piston (5) and shoe (5) form a spherical bearing.
- Rocker cam (4) has flat surface **A**, and shoe (5) is always pressed against this surface while sliding in a circular movement. Rocker cam (4) brings high-pressure oil at cylindrical surface **B** with cradle (2), which is secured to the case, and forms a static pressure bearing when it slides.
- Piston (6) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (7).
- The cylinder block seals the pressure oil to valve plate (8) and carries out relative rotation. This surface is designed so that the oil pressure balance is maintained at a suitable level. The oil inside each cylinder chamber of cylinder block (7) is sucked in and discharged through valve plate (8).

4) When servo piston is balanced



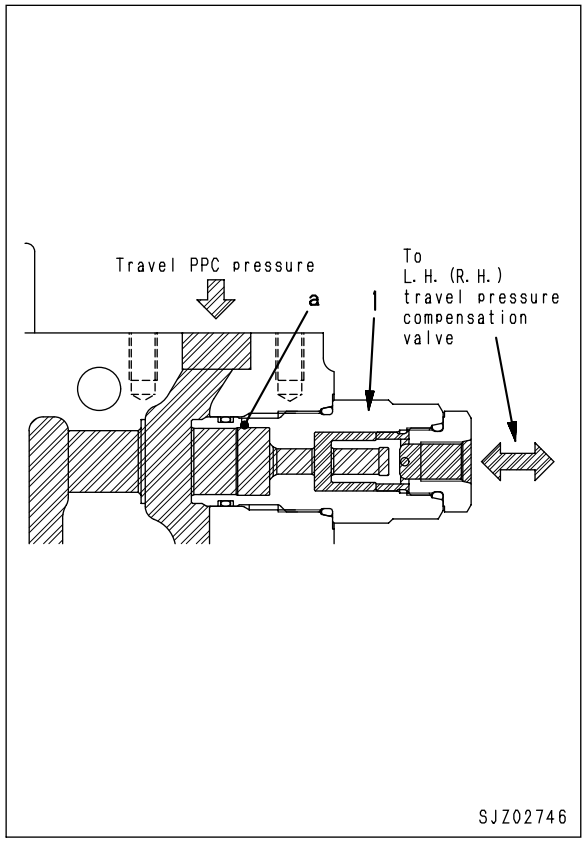
- Let us take the area receiving the pressure at the large piston diameter end as A1, the area receiving the pressure at the small diameter end as A0, and the pressure flowing into the large piston diameter end as **Pen**. If main pump discharge pressure **P_{2P}** of the LS valve and the combined force of force **F** of spring (3) and LS pressure **P_{LS}** are balanced, and the relationship is A0 x **P_P** = A1 x **Pen**, servo piston (1) will stop in that position, and the swash plate will be kept at an intermediate position. (It will stop at a position where the opening of the throttle between port **b** and port **c** and between port **d** and port **c** of spool (4) is approximately the same. At this point, the pressure of port **c** is approx. 1/2 pump pressure **P_P**.)
- At this point, the relationship between the area receiving the pressure at both ends of piston (1) is A0 : A1 = 1 : 2, so the pressure applied to both ends of the piston when it is balanced becomes **P_P** : **Pen** - 2 : 1.
- The position where spool (4) is balanced and stopped is the standard center, and the force of spring (3) is adjusted so that it is determined when **P_{2P}** - **P_{LS}** = 2.5 MPa (25 kg/cm^2). However, if Psig (the output pressure of 0 - 2.9 MPa (0 - 30 kg/cm^2) of the EPC valve of the LS valve) is applied to port **e**, the balance stop position will change in proportion to pressure **Psig** between **P_{2P}** - **P_{LS}** = 2.5 - 1.0 MPa (25-10 kg/cm^2).

Travel junction circuit



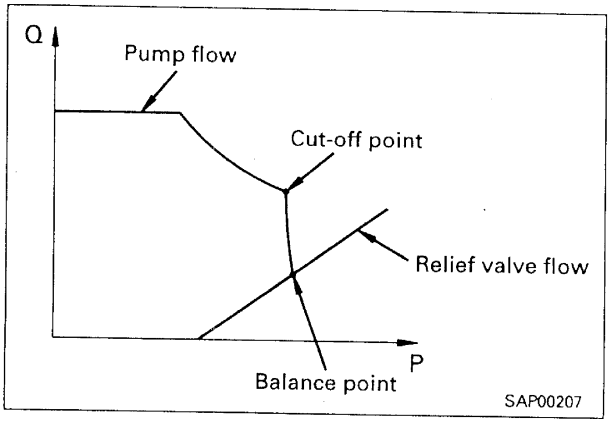
Functions

- This circuit connects the forward and reverse pressure compensation valves of the travel circuit on each side to each other by external piping so that the machine will travel straight.
- Both ports are connected to each other through path "**a**" in travel pressure compensation valve (1) as shown in the figure at right.
- The straight travel performance and steering performance of the machine can be satisfied by setting the choke of junction circuit "**a**" properly.

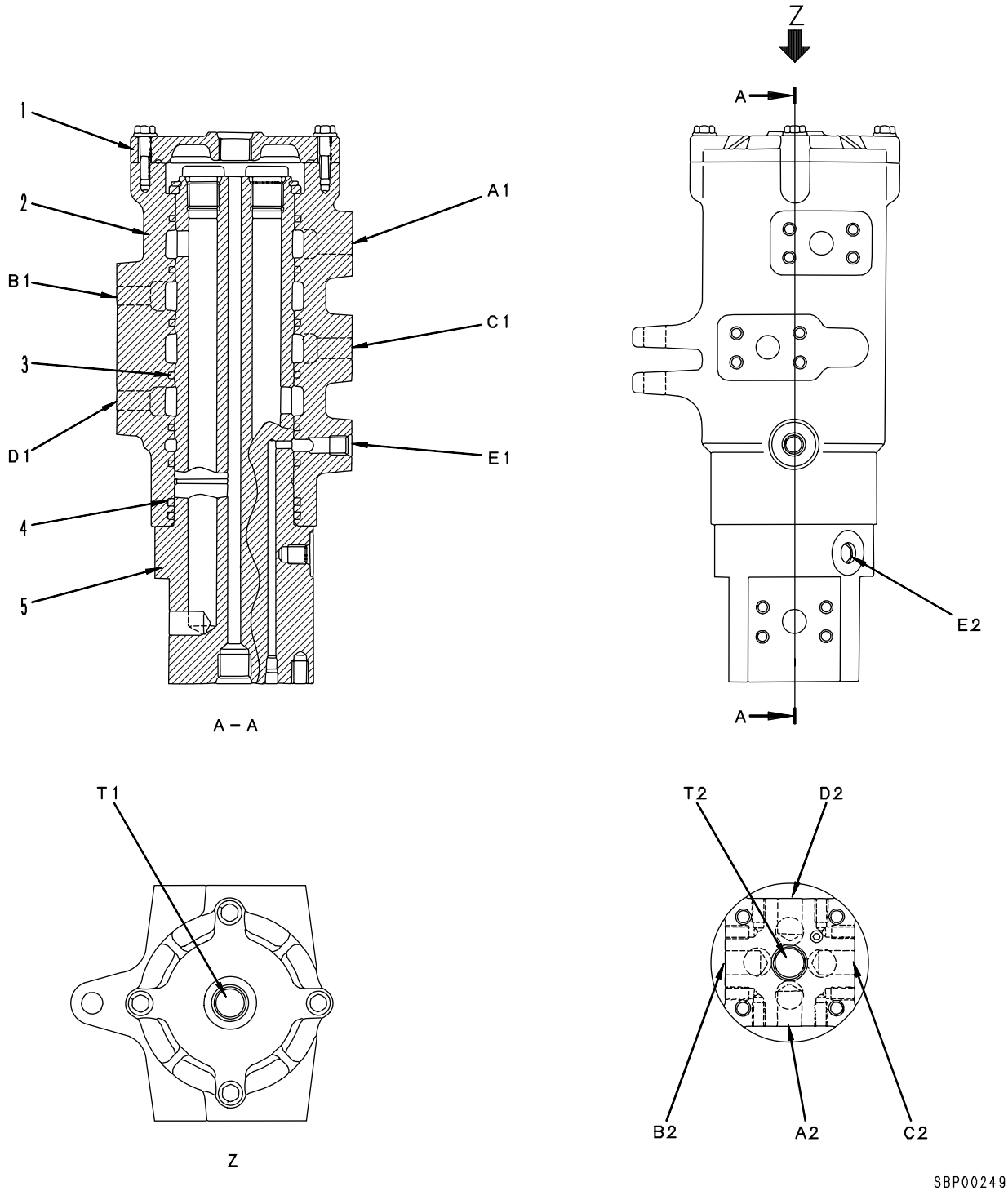


2. Operation of relief valve

- If the pump pressure (set pressure) rises high, the main relief valve opens and pump discharge **Q** is relieved into the tank.
- Since the oil does not flow on the upper and lower side of the spool, pump discharge pressure **Pp** and LS pressure **PLS** are almost the same and LS differential pressure **ΔPLS** is 0MPa {0 kg/cm^2}.



CENTER SWIVEL JOINT



1. Cover
2. Body
3. Slipper seal
4. O-ring
5. Shaft

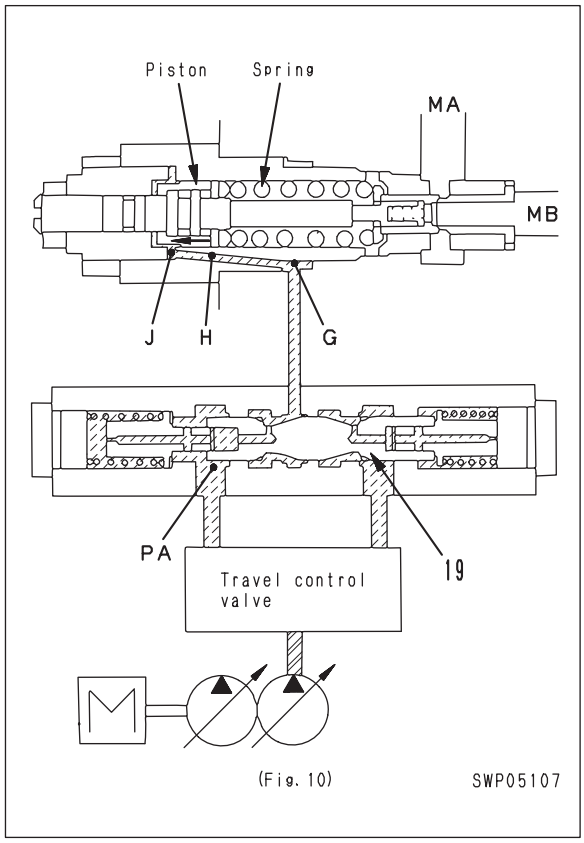
A1. From control valve port **B2**
A2. To R.H. travel motor port **PB**
B1. From control valve port **B5**
B2. To LH. travel motor port **PA**
C1. From control valve port **A2**
C2. To R.H. travel motor port **PA**
D1. From control valve port **A5**
D2. To LH. travel motor port **PB**
E1. From travel speed EPC valve
E2. To LH. and R.H. travel motors port **P**
T1. To tank
T2. From LH. and R.H. travel motors port **T**

2) When stopping travel (low-pressure setting)

- When the travel lever is placed at neutral, the pressure in chamber **PA** drops end counterbalance valve spool (19) returns to the neutral position. While the counterbalance valve spool ls returning to the neutral position, the pressurized oil in chamber **J** passes through passage **H**, and escapes to chamber **PA** from chamber **G**. The piston moves to the left, and the set load becomes smaller. Because of this, the set pressure of the safety valve is switched to the low-pressure setting and relieves the shock when reducing speed.

(Set pressure of safety valve)

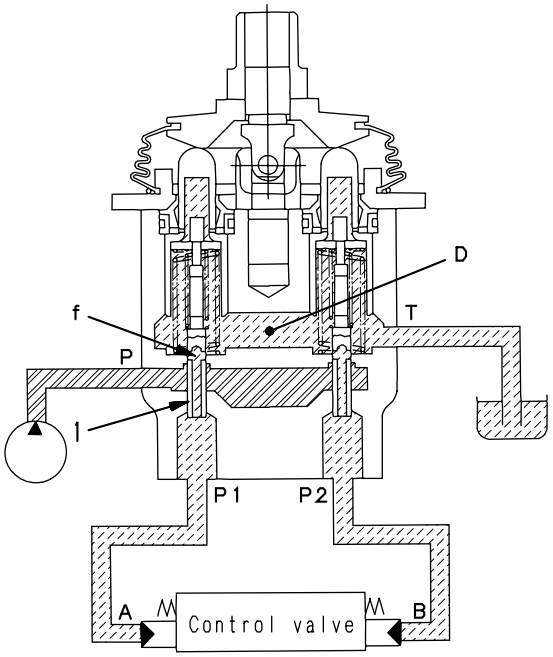
When starting, when traveling } High pressure setting	When stopping: Low-pressure setting
37.7 MPa (385 kg/cm^2)	27.4 MPa (280 kg/cm^2)



OPERATION

1) At neutral

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



(Fig 1)

SEP02569

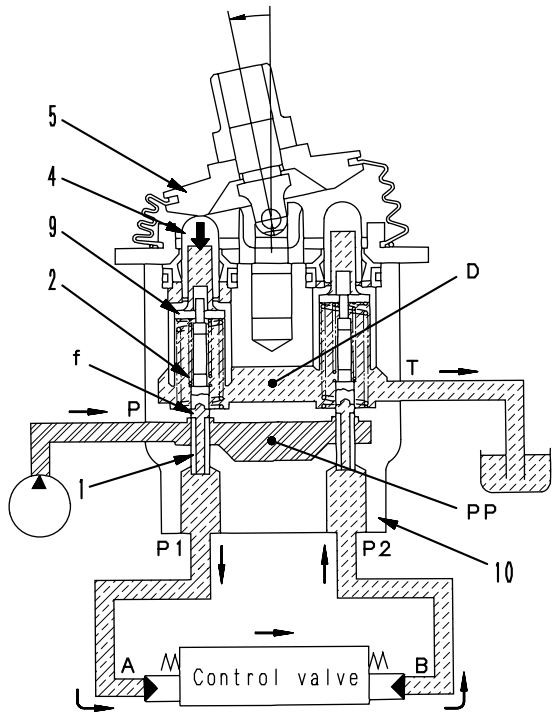
2) During fine control (neutral to fine control)

When, piston (4) starts to be pushed by disc (5), retainer (9) is pushed; spool (1) is also pushed by metering spring (2), and moves down.

When this happens, fine control hole **f** is shut off from drain chamber **D**, and at almost the same time, it is connected to pump pressure chamber **PP**, so pilot pressure oil from the control pump passes through fine control hole **f** and goes from port **P1** to port **A**.

When the pressure at port **P1** becomes higher, spool (1) is pushed back and fine control hole **f** is shutoff from pump pressure chamber **PP**. At almost the same time, it is connected to drain chamber **D** to release the pressure at port **P1**. When this happens, spool (1) moves up or down so that the force of metering spring (2) is balanced with the pressure at port **P1**. The relationship in the position of spool (1) and body (10) (fine control hole **f** is at a point midway between drain hole **D** and pump pressure chamber **PP**) does not change until retainer (9) contacts spool (1).

Therefore, metering spring (2) is compressed proportionally to the amount of movement of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever. In this way, the control valve spool moves to a position where the pressure in chamber **A** (the same as the pressure at port **P1**) and the force of the control valve spool return spring are balanced. (Fig. 2)



(Fig 2)

SEP02570

20 TESTING AND ADJUSTING

* Note the following when making judgements using the standard value tables for testing, adjusting or troubleshooting.

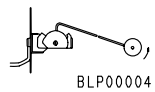
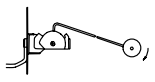
1. The standard value for a new machine given in the table is the value used when shipping the machine from the factory and is given for reference. It is used as a guideline for judging the progress of wear after the machine has been operated, and as a reference value when carrying out repairs.
2. The service limit value given in the tables is the estimated value for the shipped machine based on the results of various tests. It is used for reference together with the state of repair and the history of operation to judge if there is a failure.
3. These standard values are not the standards used in dealing with claims.

⚠ When carrying out testing, adjusting, or troubleshooting, park the machine on level ground, inset the safety pins, and use blocks to prevent the machine from moving.

⚠ When carrying out work together with other workers, always use signals and do not let unauthorized people near the machine.

⚠ When checking the water level, always wait for the water to cool down. If the radiator cap is removed when the water is still hot, the water will spurt out and cause bums.

⚠ Be careful not to get caught in the fan, fan belt or other rotating parts.

<table>
<tr><th>System</th><th>Device name</th><th>Connector No.</th><th>Check method</th><th>Criteria</th><th>Measuring condition</th></tr>
<tr><td rowspan="4">Machine monitor system</td><td>Alternator</td><td>Between alternator terminal R and machine body</td><td>Measuring voltage</td><td>While engine is running (with throttle opened more than 1/2) → 27.5 - 29.5 V
* If battery performance is lowered or in cold district, voltage may not rise for a while after engine is started</td><td>1) Start engine.</td></tr>
<tr><td>Coolant temperature sensor (Engine water temperature sensor)</td><td>P7 (Male)</td><td>Measuring resistance</td><td>Normal resistance range is shown below.<table><tr><td>Normal temperature (25°C)</td><td>Approx. 37 - 50 kΩ</td></tr><tr><td>100°C</td><td>Approx. 3.5 - 4.0 kΩ</td></tr></table></td><td>1) Turn starting switch to OFF.
2) Disconnect connector P7.
3) Insert T-adapter to connector on sensor side.</td></tr>
<tr><td>Engine oil pressure sensor</td><td>—</td><td>Measuring resistance</td><td>Normal resistance range is shown below.<table><tr><td>Engine oil pressure: Min. 69 kPa {0.7 kg/cm²}</td><td>Min. 1 MΩ</td></tr><tr><td>Engine oil pressure: Min. 29 kPa {0.3 kg/cm²}</td><td>Max. 1 Ω</td></tr></table></td><td>1) Install gauge for measuring oil pressure.
2) Remove harness terminal.
3) Start engine.
4) Apply tester to sensor terminal and machine body.</td></tr>
<tr><td>Fuel level sensor</td><td>P 5 (Male)</td><td>Measuring resistance</td><td>Normal resistance range is shown below.<table><tr><td> 
BLP00004</td><td>Raise float up to stopper.</td><td>Approx. max. 10 Ω</td></tr><tr><td> 
BLP00005</td><td>Lower float up to stopper.</td><td>Approx. 85 - 110 Ω</td></tr></table></td><td>1) Turn starting switch OFF.
2) Disconnect connector P5.
3) Drain fuel and remove sensor.
4) Insert T-adapter ★ to sensor.
* Connect T-adapter to sensor connector and sensor flange.</td></tr>
</table>

3. Take out spring (8) and delivery valve (9) from inside the delivery valve holder, then assemble the delivery valve holder again.

4. Set the fuel control lever at the FULL position, then operate the priming pump and rotate the crankshaft slowly in the normal direction.

   Check the point where the fuel stops flowing from the delivery valve holder.

5. Check that the injection timing line of the crankshaft pulley (1) and the pointer (2) are aligned at the point where the fuel stops flowing.

   * BEYOND injection timing line : Timing RETARTED

   * BEFORE injection timing line Timing ADVANCED

   * If the test shows that the injection timing is incorrect adjust the fuel, injection timing as follows.

   * After testing and adjusting, do not forget to reassemble the spring and delivery valve.

   1) Rotate the crankshaft 30 - 40° in the reverse direction from the No.1 cylinder TOP position.

   2) Rotate it slowly in the normal direction, and align pointer (2) with the fuel injection timing line on crankshaft pulley (1).

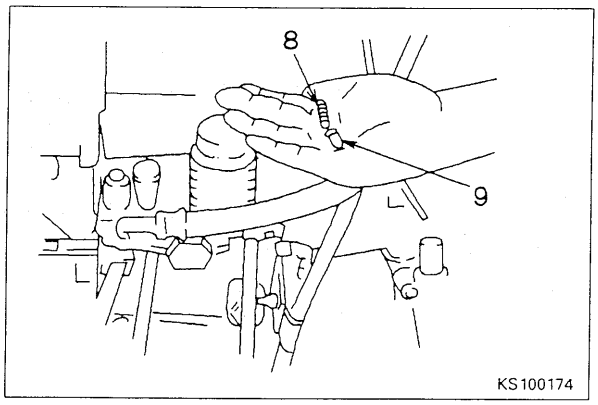
   3) Loosen nut (3) in the oblong hole in the mounting flange of the fuel injection pump, and pump mounting nut (4), then operate the priming pump and rotate the pump flange a little at a time. Stop at the point where the fuel stops flowing from the delivery valve holder.

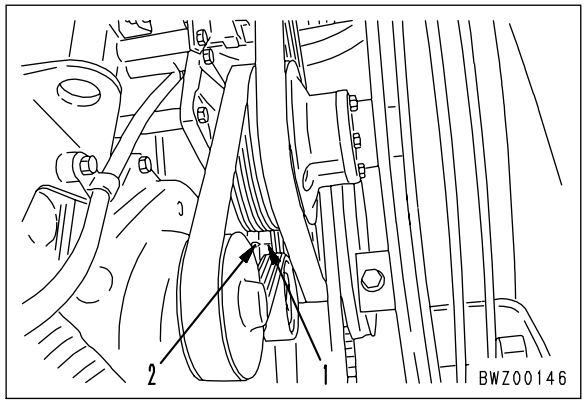
   4) Tighten the nut in the oblong hole in the mounting flange of the fuel injection pump, and the pump mounting bolt.

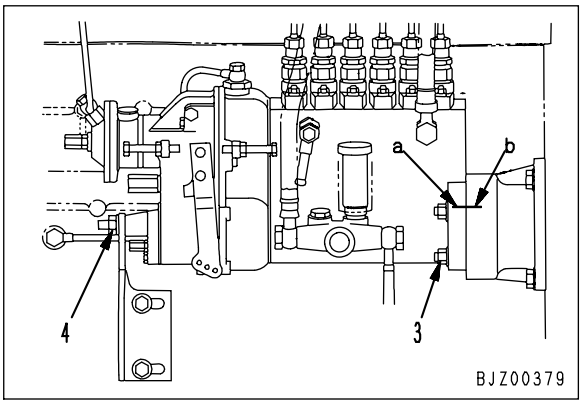
   * Check the injection timing again to confirm that the timing is correct.

   5) Make match mark (a) and (b).

   * After checking, adjusting, never fail to reassemle spring and delivery valve.
   * Always replace delivery valve copper gasket and O-ring with a new part.







TESTING AND ADJUSTING HYDRAULIC PRESSURE IN BODY AND SWING CIRCUIT

Measuring of relief pressure

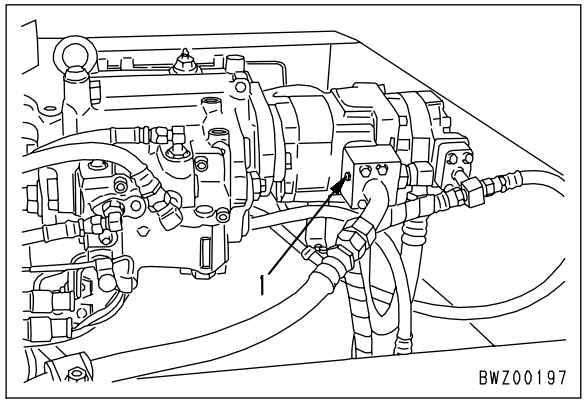
* Oil temperature for measuring: 45 - 55°C

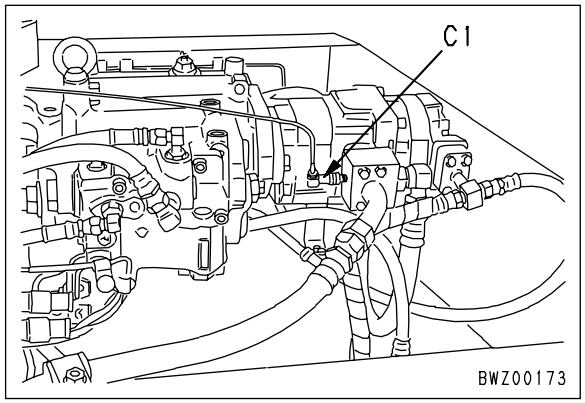
⚠ Raise the dumping body and set the safety rod. Stop the engine and loosen the oil filler of the hydraulic tank to release the internal pressure, then set the safety lock lever to the LOCK position.

1. Remove oil pressure measuring plug (1) (10 mm, P = 1.25) from the circuit to be measured and install oil pressure gauge **C1** (58.8 MPa {600 kg/cm^2}).

2. Run the engine at full throttle.

3. Raise the dumping body and measure the relief pressure.





Adjusting

* If the work equipment valve relief pressure is abnormal, adjust relief valve (2) according to the following procedure.

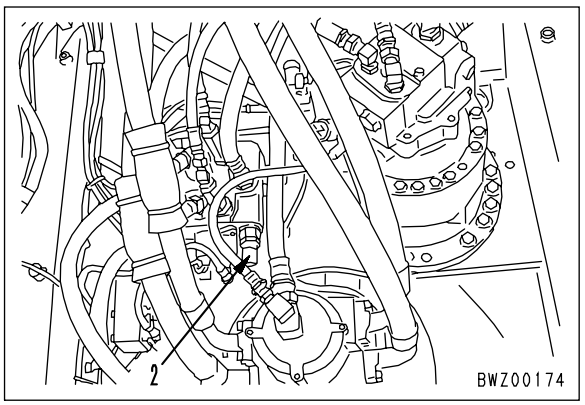
1. Remove cap (3).

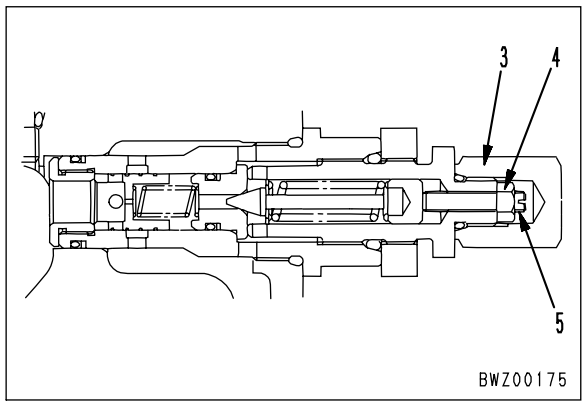
2. Loosen locknut (4) and turn adjustment screw (5).
   * Turn adjustment screw (5) to the right to heighten the pressure or to the left to lower the pressure.
   * Adjustment quantity by 1 turn of adjustment screw (5):
     2.43 MPa {24.8 kg/cm^2}

3. After adjusting, tighten locknut (4).

kgm **Locknut: 11.8 - 14.7 Nm {1.2 - 1.5 kgm}**

kgm **Cap: 29 - 39 Nm {3 - 4 kgm}**

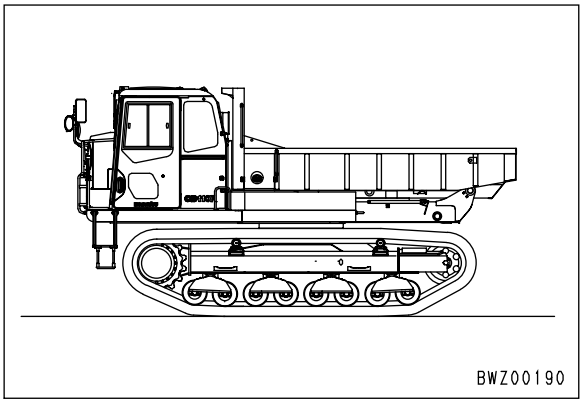


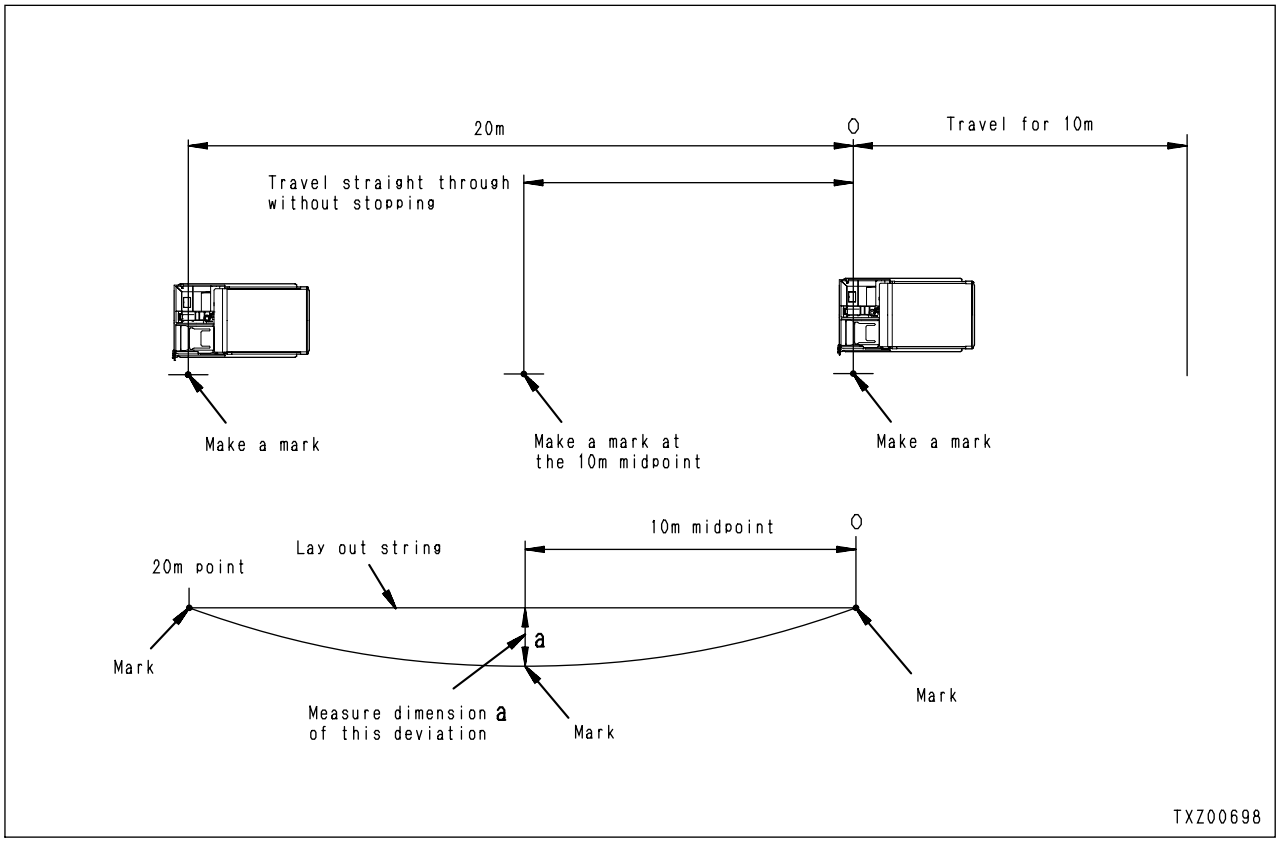


TESTING TRAVEL DEVIATION

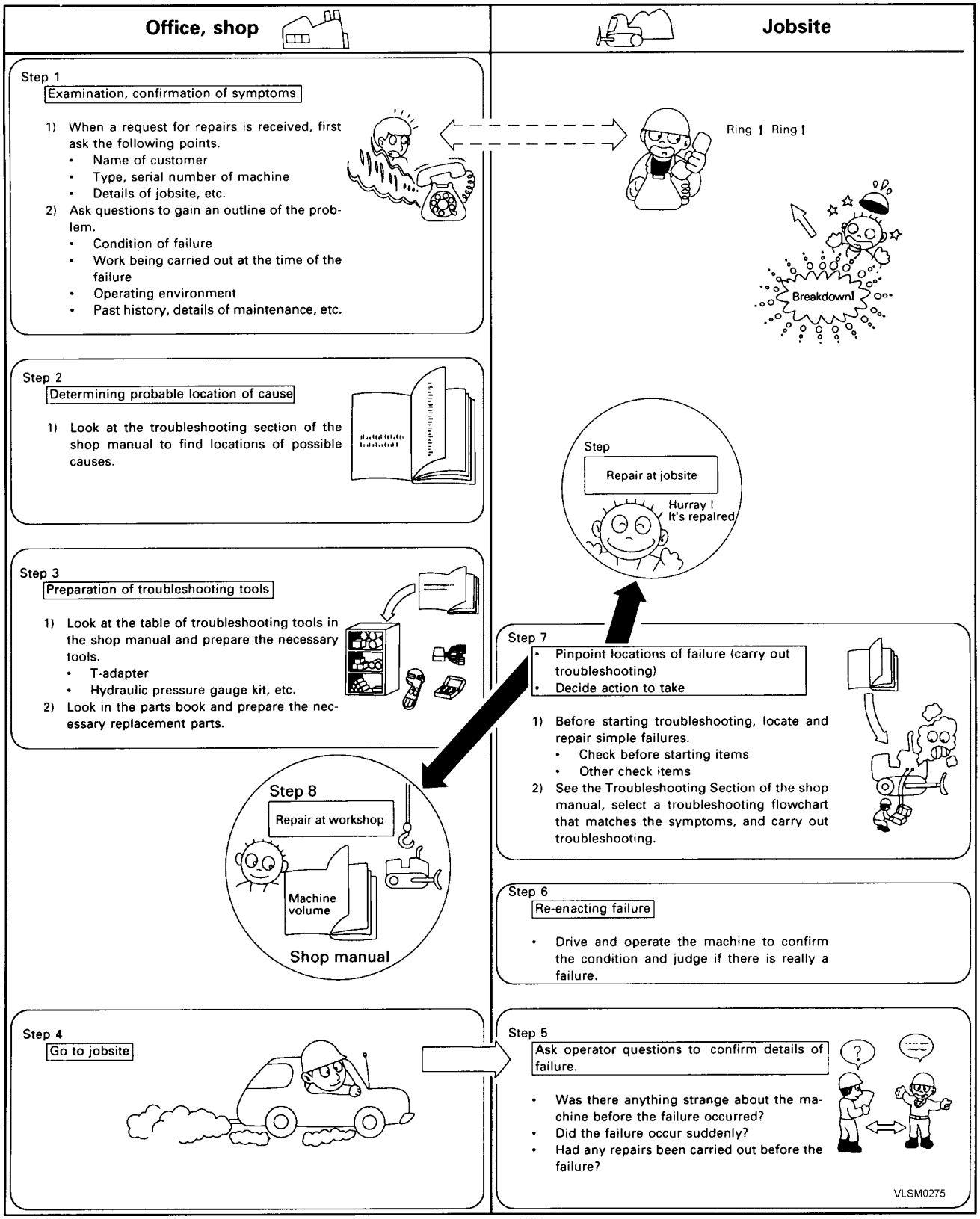
1. Measuring when traveling

1) Set the machine to the travel posture.
   * Travel posture: No load in body.
2) Travel for at least 10 m, then measure the amount of deviation when traveling for the next 20 m.
   * Measure with the engine at full throttle.
   * Travel speed: Hi
   * Install an oil pressure gauge and measure the pump discharge pressure at the same time.





SEQUENCE OF EVENTS IN TROUBLESHOOTING

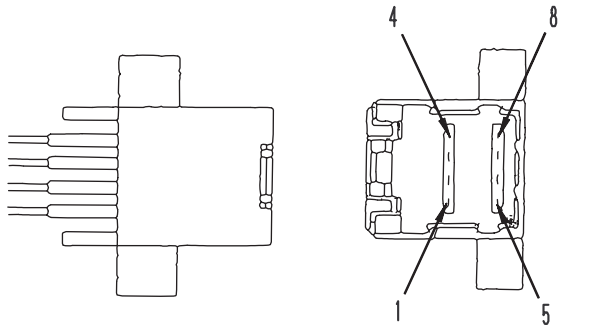
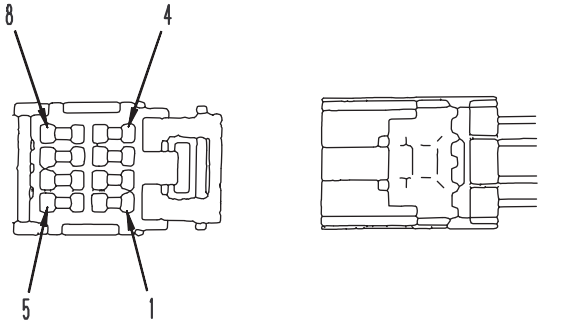
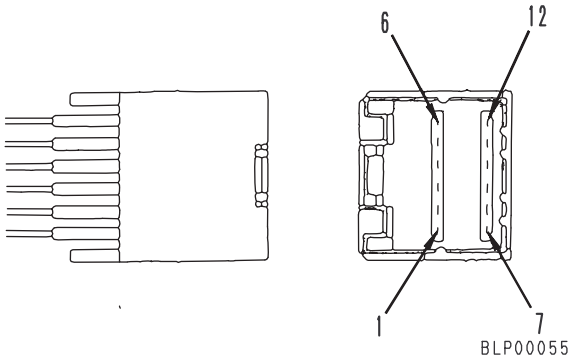
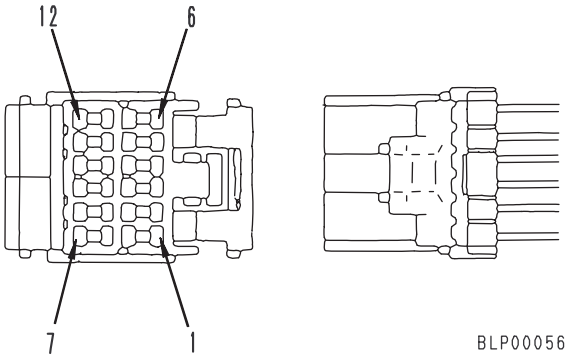
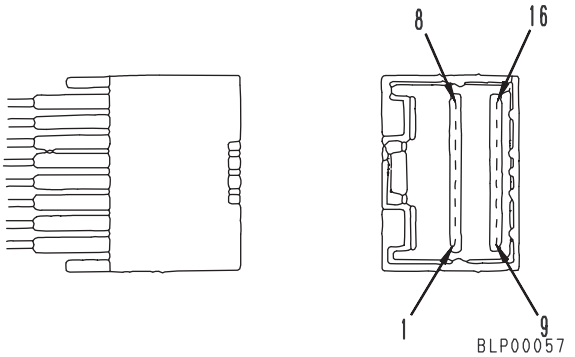
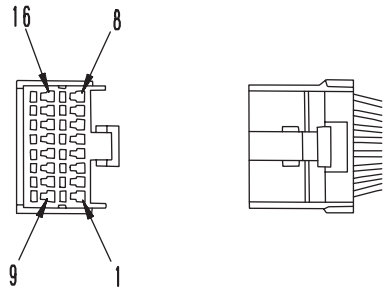
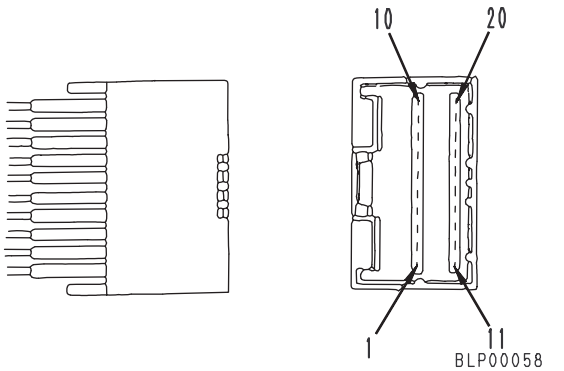
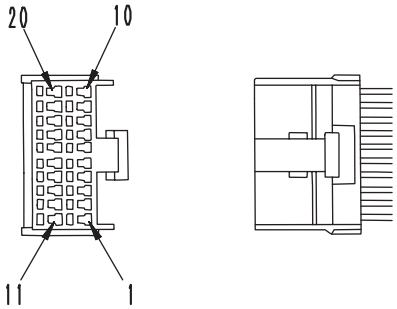


CONNECTOR TYPES AND MOUNTING LOCATIONS

* The Address column in the table shows the address in the connector arrangement drawing (3-dimensional drawing).

Connector No.	Connector type	No. of Pins	Place of use	Address
BR	Terminal	1	Battery relay (BR)	H2
C1	M	4	Swing controller	A1
C2	SWP	8	Controller	C1
C3	SWP	14	Controller	C1
CN2	Terminal	1	Engine oil pressure switch	V7
CN3	Terminal	1	Glow plug	U7
CN4	Terminal	1	Starting motor (B)	X5
CN5	Terminal	1	Alternator (B)	V2
CN6	Terminal	1	Alternator (R)	U2
CN7	Terminal	1	Alternator (E)	T2
CN8	Terminal	1	Heater relay	U2
CN9	Terminal	1	Heater relay	T7
CN10	Terminal	1	Diode (Washer motor)	U7
CN11	Terminal	1	Diode (Alarm buzzer)	S6
D1	KES1	2	Diode (Swing holding brake solenoid)	R3
D2	KES1	2	Diode (Swing pressure switch)	E7
D5	KES1	2	Diode (Travel speed selection solenoid)	R4
D6	KES1	2	Diode	R4
D7	KES1	2	Diode (PPC lock solenoid)	R3
D11	KES1	2	Heater relay	R5
D18	KES 1	2	Fuse	R5
E11	X	2	Fuse	T7
FB1	—	—	Intermediate connector	C7
FB2	—	2	Intermediate connector (Controller)	D7
H1	S (white)	16	Intermediate connector	F4
H2	SWP	12	Starting motor	F4
H3	SWP	8	Intermediate connector (Engine)	F4
H4	L	2	Intermediate connector	F3
M2	X	2	Intermediate connector (Left headlamp, left swing pilot lamp)	X4
M2	SWP	8	Intermediate connector (Right headlamp, right swing pilot lamp)	W3
M4		16	Right headlamp	F3
M38	Terminal	1	Travel alarm	Q8
MK1	X	2	Center position pilot lamp	A4

Connector No.	Connector type	No. of Pins	Place of use	Address
M7	X	2	Travel alarm	R6
M8	X	2	Center pilot lamp	I1
M10	KES 1	1	Relay (Reverse travel pilot lamp)	G4
M10	KES 1	1	Relay (For indication of center)	K1
M11	L	2	Intermediate connector	I2
M11	M	1	Relay (Flasher)	G5
M11	M	1	Relay (Stop motor)	L1
M14	KES 1	4	Monitor	L9
M15	L	2	Alarm buzzer	I2
M16	Connector	2	Fuel level sensor	G4
M17	M	6	Engine water temperature sensor	J1
M18	M	3	Battery relay (E)	F5
M19	M	2	Battery relay (M)	F6
M22	M	2	Swing pressure switch	A5
M26	M	6	Reverse travel indication proximity switch	Q1
M27	Connector	1	Center indication proximity switch	I8
M28	KES 1	2	PPC lock switch	G7
M29	M	2	Battery relay (B)	F4
M30	M	2	GND (Revolving frame)	P1
M31	SWP	8	GND (Backup alarm)	G6
CN90	KES 1	4	Starting switch (B)	H8
M32	X	2	Starting switch (R2)	G5
M32	X	2	PPC oil pressure lock solenoid	A4
M34	X	1	TVC solenoid valve (Rear)	S4
M34	X	1	TVC solenoid valve (Front)	O1
M35	SWP	6	Swing brake solenoid	H7
M36	M	3	Travel speed selection solenoid	C6
M37	Terminal	1	Swing redundancy switch	Q9
V4	X	2	Left forward Right forward	M9
V5	X	2	GND (Left swing flasher)	N9
X3	Terminal	1	Optional electric power outlet	F6
X4	Terminal	1		E7
X5	M	4		F5

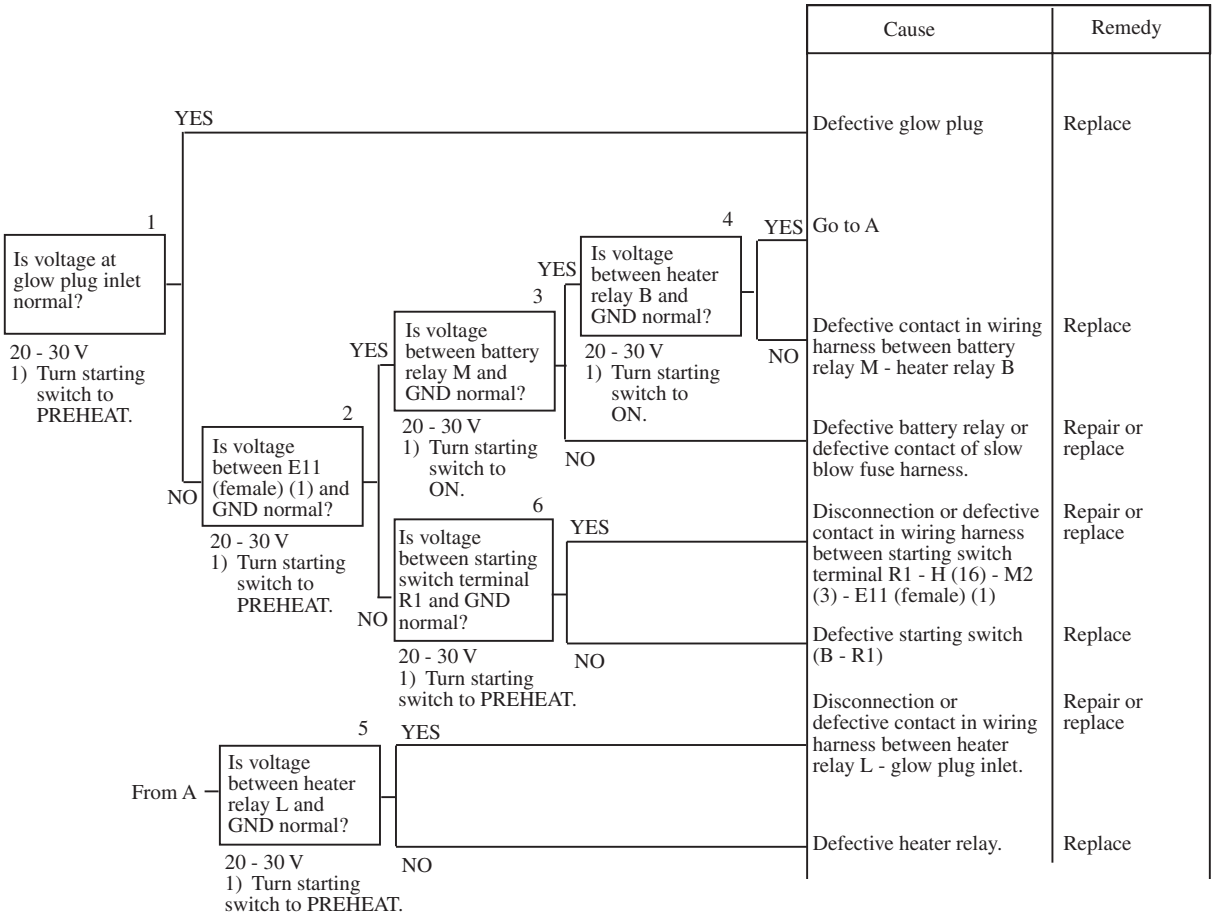
No. of pins	AMP040 type connector	
	Male (female housing)	Female (male housing)
8	 BLP00053	 BLP00054
12	 BLP00055	 BLP00056
16	 BLP00057	 TEW00232
20	 BLP00058	 TEW00234

TROUBLESHOOTING FOR ELECTRIC SYSTEM (E MODE)

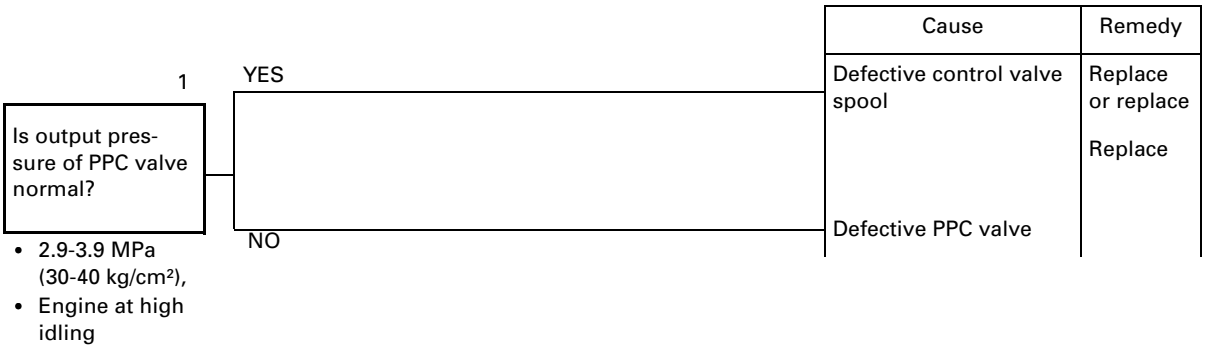
* Before carrying out troubleshooting, check that all the related connectors are properly inserted.
* Always connect any disconnected connectors before going on to the next step.

Cause	Remedy
See H21	-
Defective controller	Replace
Defective swing holding brake release switch	Repair or replace
Defective controller	Replace
Defective swing holding brake release switch	Replace
Short circuit with chassis ground in wiring harness between S1 (female) (1) - H3 (2) - C1 (female) (3)	Repair or replace
Defective swing holding break release switch	Replace

E-6 Preheating does not work

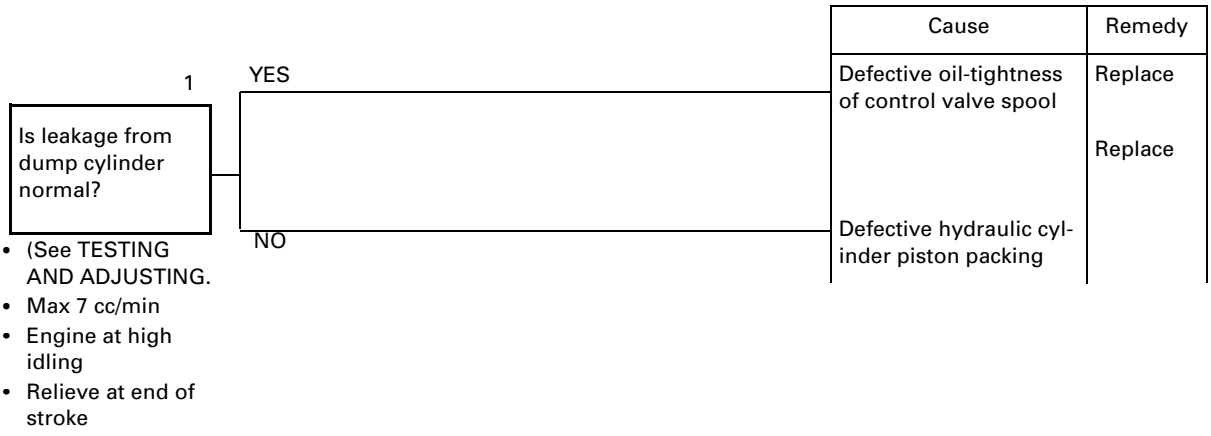


H-8 Dumping body does not move (but travel and swing are normal)



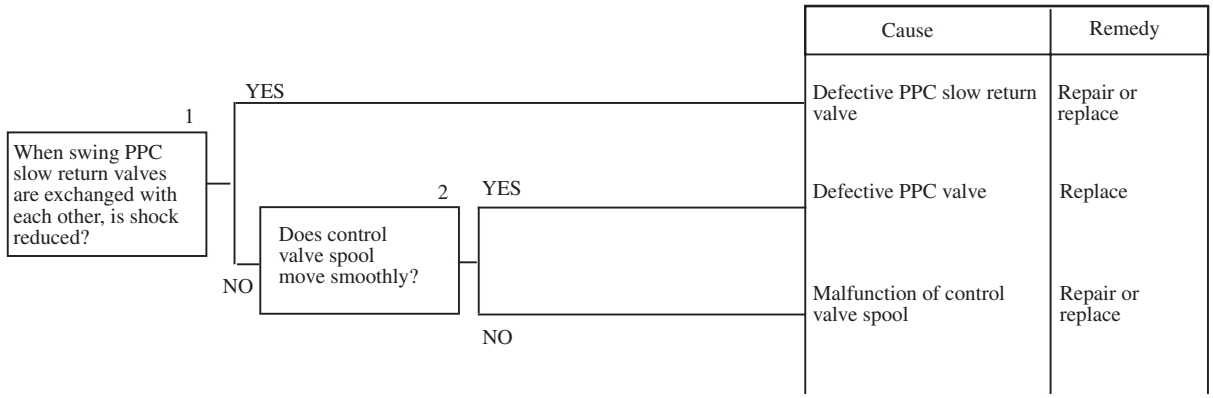
Cause	Remedy
Defective control valve spool	Replace or replace
Defective PPC valve	Replace

H-9 Excessive hydraulic drift (dumping body)

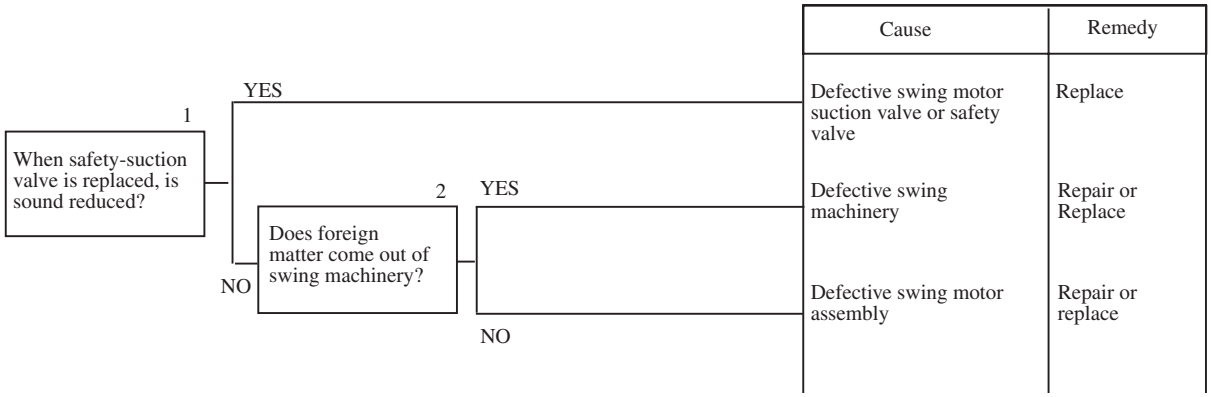


Cause	Remedy
Defective oil-tightness of control valve spool	Replace
Defective hydraulic cylinder piston packing	Replace

H-19 Excessive shock when stopping swing (Either side)

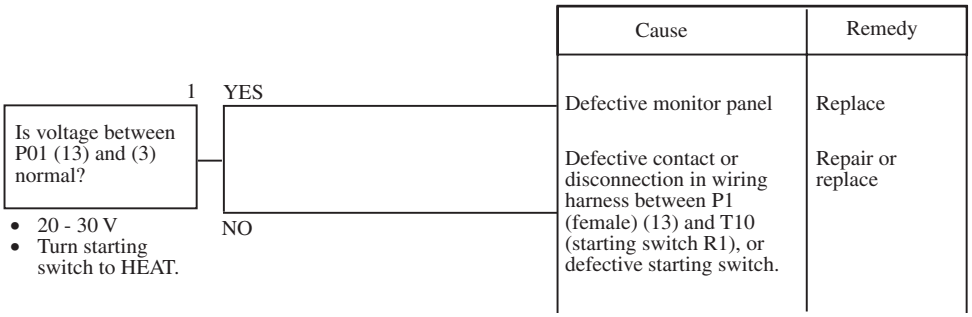


H-20 Excessive abnormal noise when stopping swing



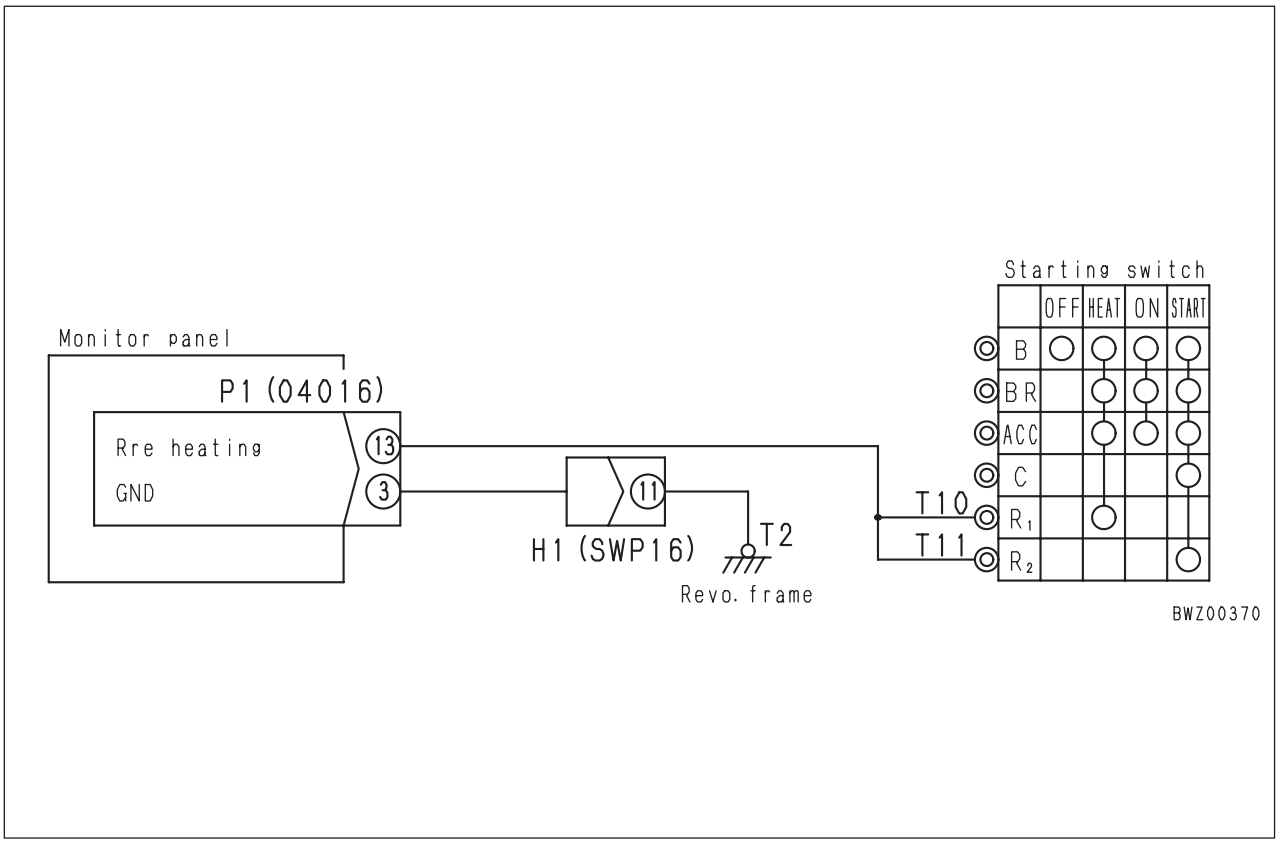
M-6 When starting switch is turned to HEAT, preheating pilot lamp does not light up

* Before carrying out troubleshooting, check that all the related connectors are properly inserted.
* Always connect any disconnected connectors before going on to the next step.
* If the lamp does not light up during the self check when the power is turned ON, go to M-2.



Cause	Remedy
Defective monitor panel	Replace
Defective contact or disconnection in wiring harness between P1 (female) (13) and T10 (starting switch R1), or defective starting switch.	Repair or replace

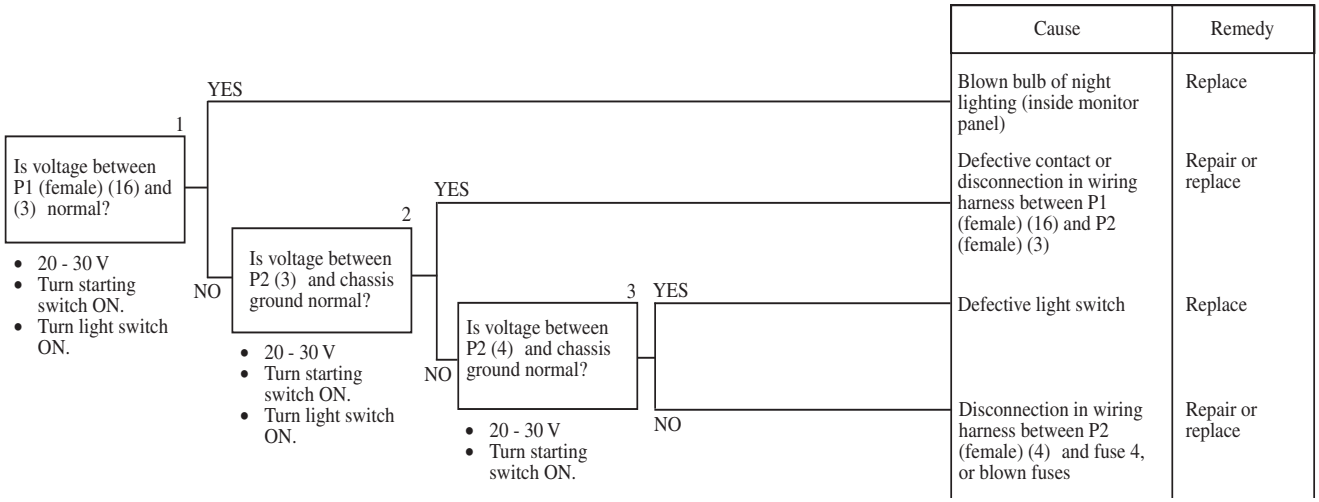
M-6 Related electrical circuit diagram



M-14 Night lighting does not light up

* Before carrying out troubleshooting, check that all the related connectors are properly inserted.
* Always connect any disconnected connectors before going on to the next step.

a) Gauge lighting does not light up

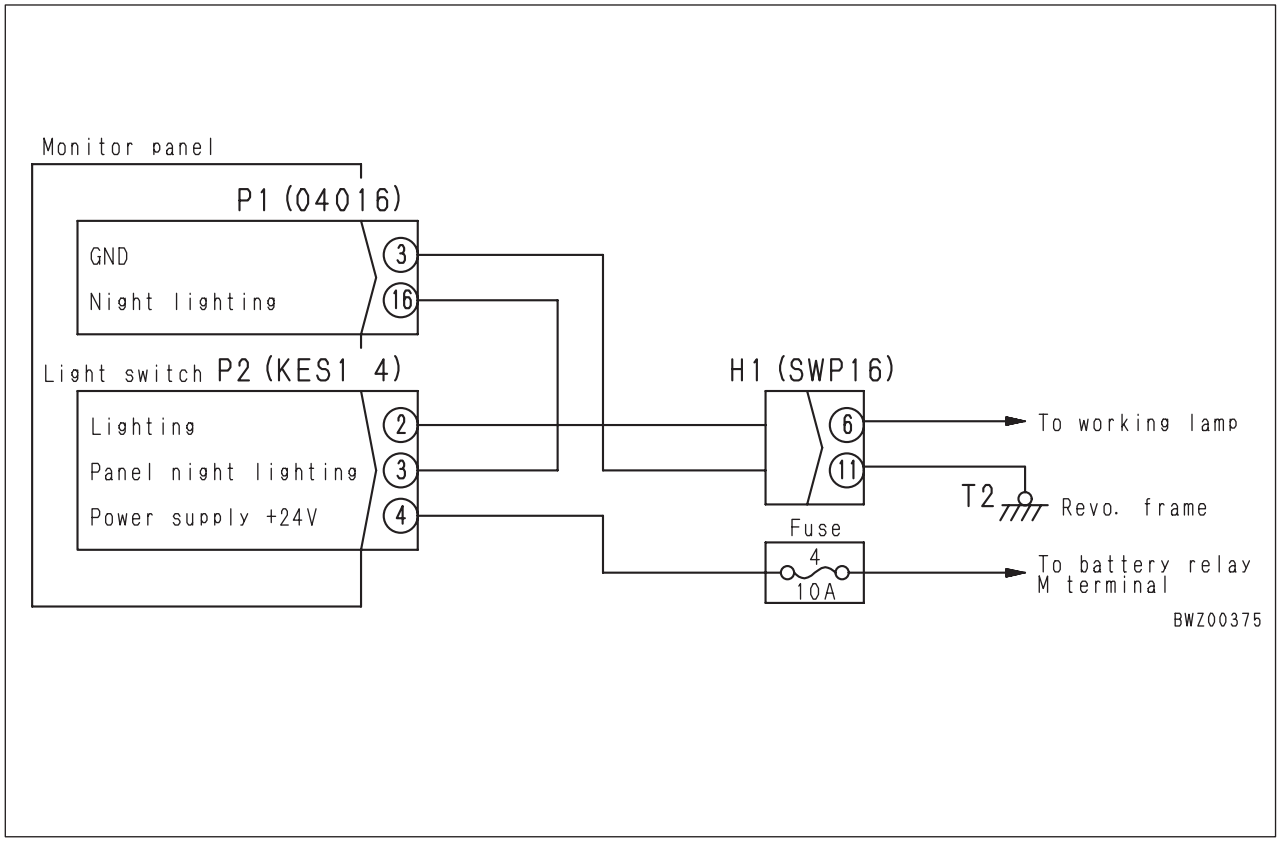


Cause	Remedy
Blown bulb of night lighting (inside monitor panel)	Replace
Defective contact or disconnection in wiring harness between P1 (female) (16) and P2 (female) (3)	Repair or replace
Defective light switch	Replace
Disconnection in wiring harness between P2 (female) (4) and fuse 4, or blown fuses	Repair or replace

b) Service meter lighting does not light up
(Service meter works normally)

Cause	Remedy
Defective monitor panel	Replace

M-14 Related electrical circuit diagram



Component	Symbol		Part No.	Part Name	Necessity	Qty.	New/ remodeled	Sketch	Nature of work, remarks
Disassembly, assembly of Idler	L	1	790-201-1702	Push tool kit	■	1			Press fit of idler bushing
			790-201-1791	Push tool		1			
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
		2	790-434-1630	Installer	■	1			Setting of idler floating seal
Disassembly, assembly of track roller		3	790-201-1702	Push tool kit	■	1			Press fit of track roller bushing
			790-201-1781	Push tool		1			
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
		4	796-670-1010	Installer	■	1			Setting of track roller floating seal
		5	791-601-1000	Hydraulic pump assembly	■	1			Supply of idler track roller oil
Disassembly, assembly of Center Swivel Joint	T		790-101-2501	Push tool kit	●	1			Fitting of center swivel joint
			790-101-2510	Block		1			
			790-101-2520	Screw		1			
			790-101-2540	Washer		1			
			790-112-1180	Nut		1			
			790-101-2630	Leg		2			
			790-101-2570	Plate		4			
			790-101-2560	Nut		2			
			790-101-2650	Adapter		2			
Disassembly, assembly of Dump Cylinder	U	1	790-502-1003	Repair stand	■	1			Disassembly and assembly of dump cylinder
		2	790-101-1102	Hydraulic pump	■	1			
		3	790-102-3802	Wrench ass'y	■	1			Removal and installation of round head
		4	790-201-1702	Push tool kit	■	1			Press fit of roll bushing
			790-201-1811	Push tool		1			
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
		5	790-201-1500	Push tool kit	●	1			Press fit of dust seal
			790-201-1620	Push tool		1			
			790-101-5021	Grip		1			
			01010-50816	Bolt		1			
		6	790-720-1000	Extension	■	1			Fitting of piston ring
		7	796-720-1670	Ring	■	1			
			07281-01279	Clamp	■	1			
		9	790-302-1340	Socket (width across flats = 80 mm)	■	1			Removal and installation of nylon nut
Recovering, reusing new freon gad	X	1	799-703-1200	Service tool kit	■	1			Charging air conditioner with gas
		2	799-703-1100	Vacuum pump	■	1			
		3	799-703-1400	Gas leak tester	■	1			

ENGINE AND MAIN PUMP

REMOVAL

Lift the dump body and set the safety rod.

Disconnect the (-) terminal of the battery.

1. See Steps 1 ~ 21 of "Removal of Radiator Assembly" and remove the radiator.

2. See the paragraph of "Removal of Main Pump Assembly" and disconnect the hoses from the main pump.

3. Remove the exhaust muffler assembly (1).
   - Disconnect the drain hose of the exhaust pipe beforehand.

kg Exhaust muffler assembly : 50 kg

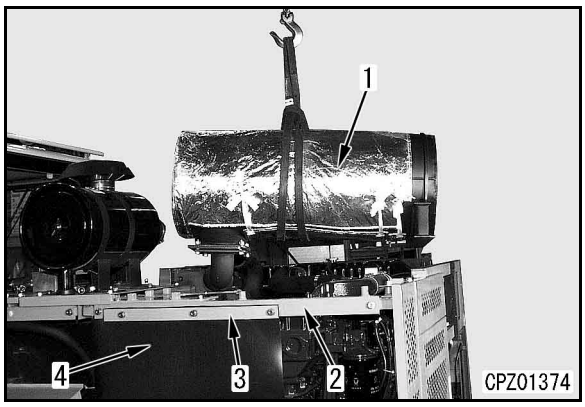
4. Remove the stay (2) and plate (3) and move the rubber cover (4) to the hydraulic tank side

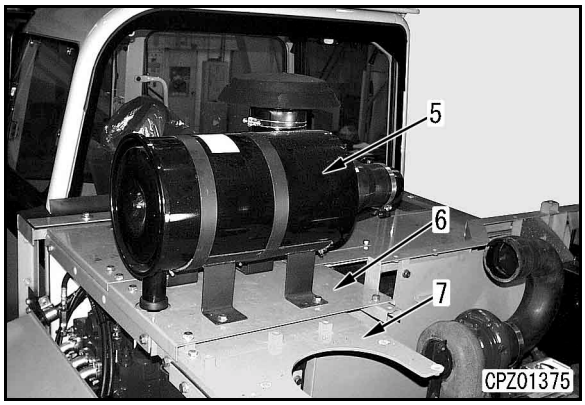
5. Remove the air cleaner assembly (5) and the covers (6) and (7).

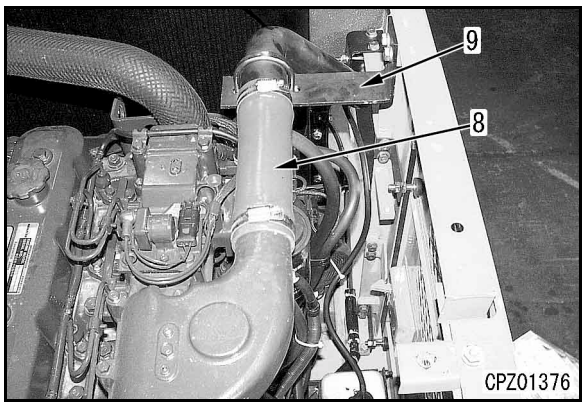
kg Air cleaner assembly : 25 kg

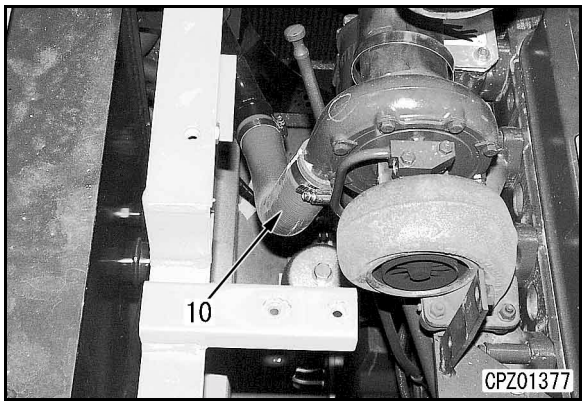
6. Disconnect the hose (8) and remove the bracket (9) (from the right side) of the aftercooler. ※1

7. Disconnect the hose (10) (from the left side) of the aftercooler.
   - Disconnect the turbo side. ※2

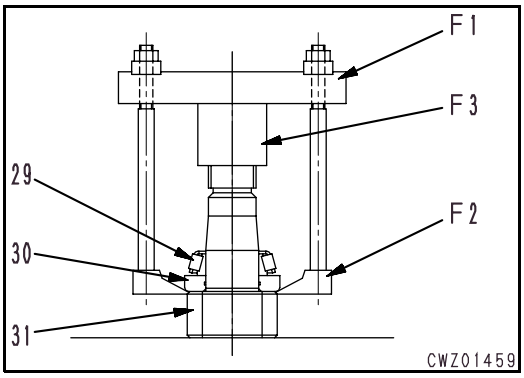






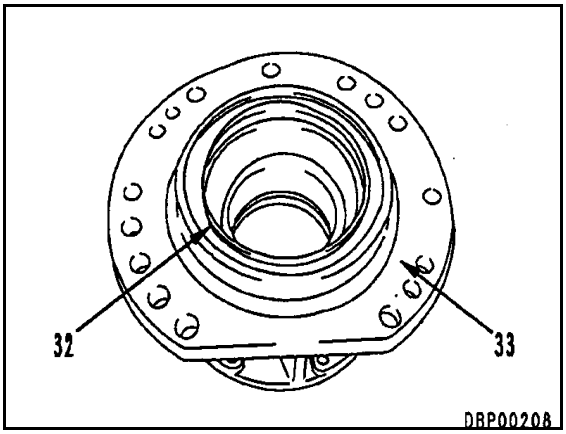


C. Set shaft assembly to press, then using tools F1, F2 and F3, remove bearing (29) and collar (30) from shaft (31).

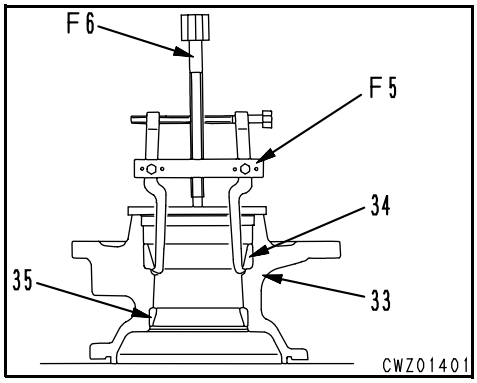


8. Oil seal, bearing outer races

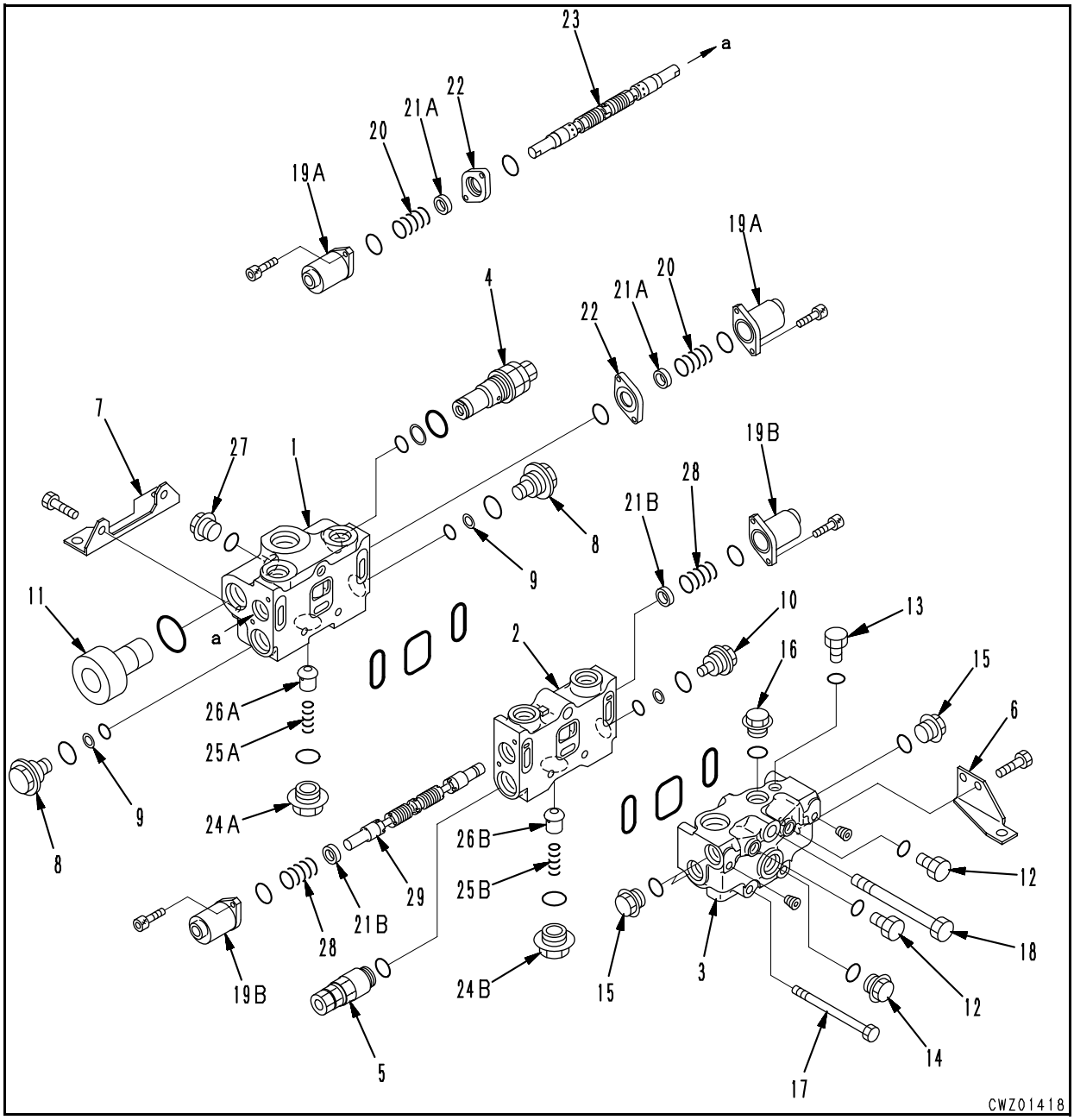
A. Remove oil seal (32) from case (33).

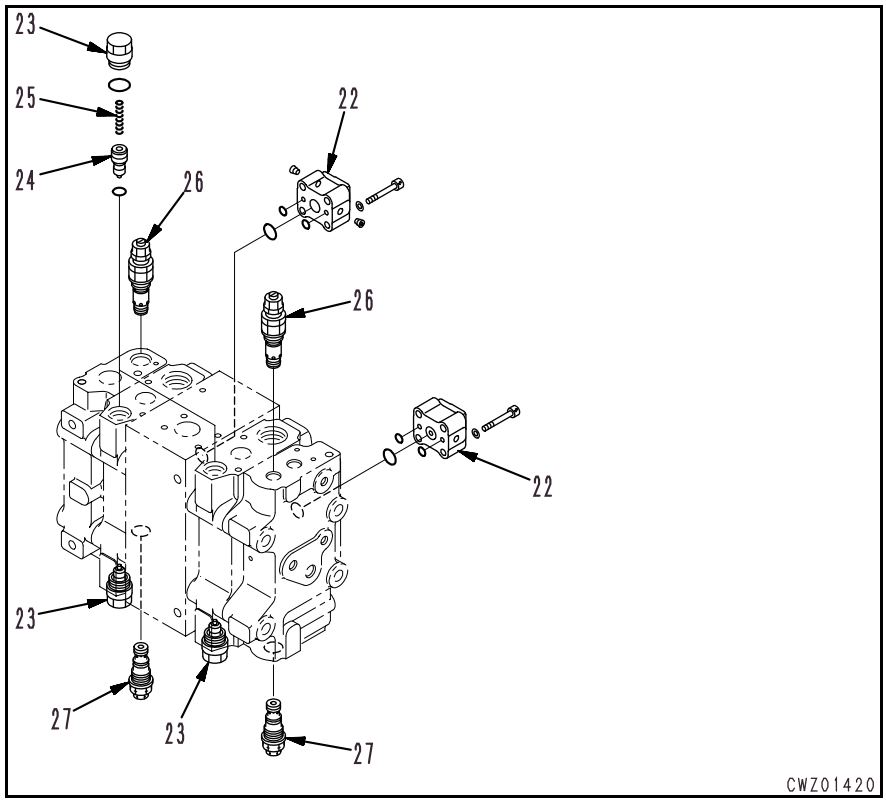


B. Using tools F5 and F6, remove bearing outer races (34) and (35) from case (33).



WORK EQUIPMENT CONTROL VALVE





13. Install the unload valve assembly (27).

N·m Unload valve ass'y: 147 - 186.2 Nm
(15.0 - 19.0 kgm)

14. Install the main relief valve assembly (26).

N·m Main relief valve ass'y : 49 - 58.8 Nm
(5.0 - 6.0 kgm)

15. Suction Valve Assembly

A. Sub-assembly of Suction Valve Assembly

i. Assembly the valve (24) and spring (25).

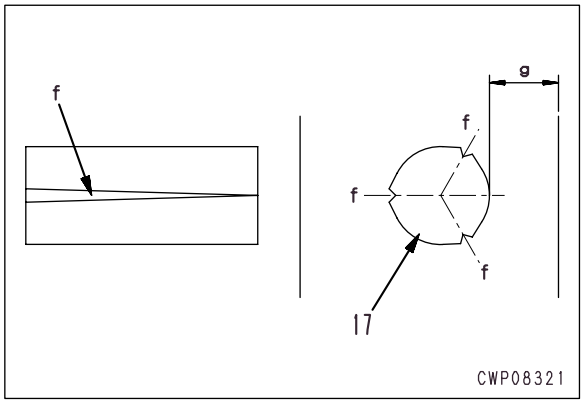
B. Set the O-ring and install the section valve assembly (23).

N·m Suction valve ass'y: 137.3 - 156.9 Nm
(14.0 - 16.0 kgm)

16. Set the O-ring and mount the shuttle valve assembly (22).

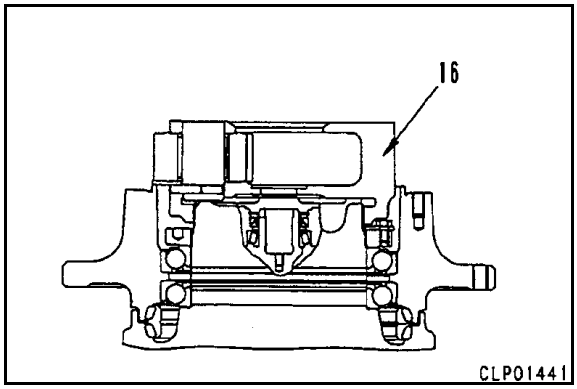
N·m Mounting bolt : 27.5 - 34.3 Nm
(2.8 - 3.5 kgm)

★ After assembly the carrier assembly, check that gear (21) rotates smoothly.



B. Install No. 2 carrier assembly (16).

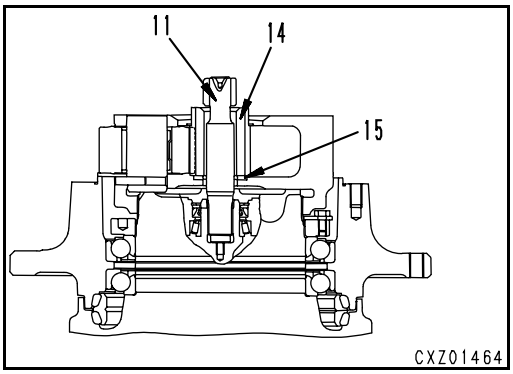
★ Align the position so that the three tips of the gear shafts of carrier assembly (16) enter the three hollows in the end face of the motor case, then install.



4. Thrust washer.
Install thrust washer (15).

5. No. 2 sun gear.
Install No. 2 sun gear (14).

6. No. 1 sun gear shaft.
Install No. 1 sun gear shaft (11).

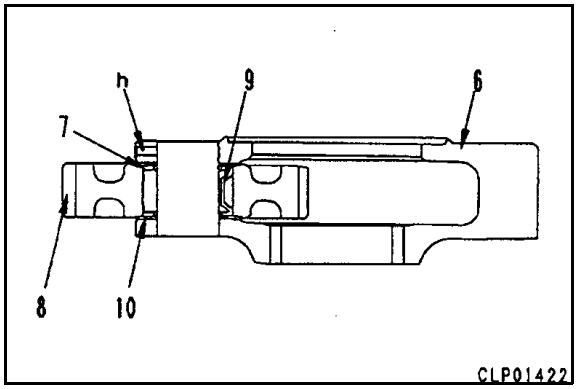


7. No. 1 carrier assembly

A. Assemble No. 1 carrier assembly as follows.

★ Replace thrust washers (7) and (10) and pin (4) with new parts.

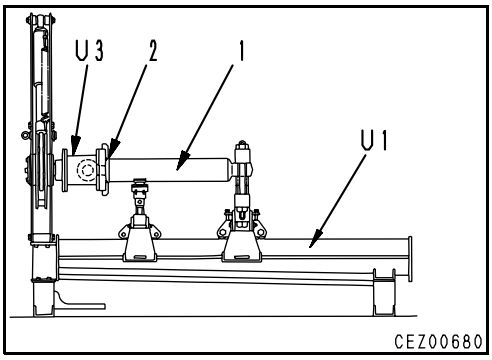
★ There are the remains of the caulking when the pin is inserted at the end face of hole h at the side of the carrier, so remove the caulked metal from the inside diameter of the hole before starting to assembly.



8. Install cylinder head (2) to cylinder (4) with tool U3

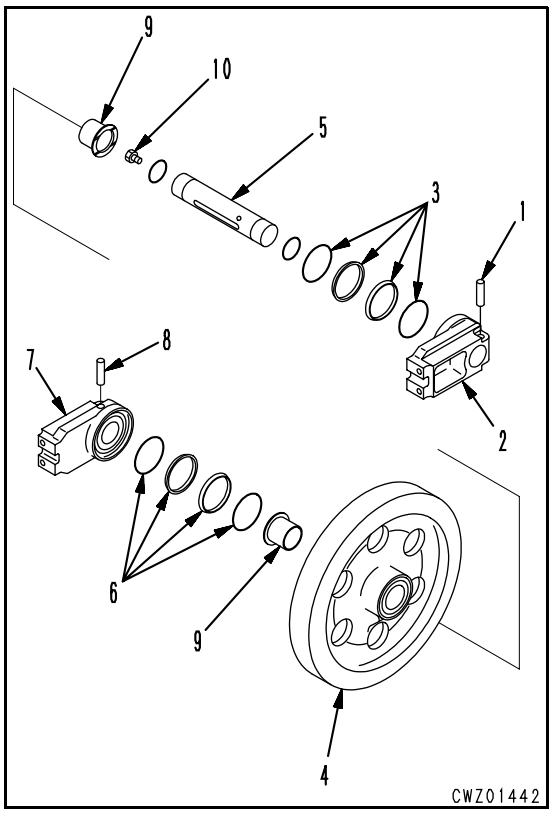
N·m Cylinder head: 1030 ± 100 Nm
(105 ± 10.5 kgm)

9. Remove cylinder (1) from tool U1.



IDLER ASSEMBLY

DISASSEMBLY



1. Remove the dowel pin (1) to remove the support (2).
2. Remove the floating seal (3) from the support (2) and th4e idler (4).
3. Pull out the idler (4) from the shaft (5) and the support assembly (7).
   ★ Since the idler is filled with 230 - 240 cc of oil, drain oil or lay waste cloth below the idler to prevent possible contamination.
4. Remove the floating seal on the opposite side from the idler (4), shaft (5) and support assembly (7).
5. Remove the dowel pin (8) to remove the support assembly (7) from the shaft (5).
6. Remove the bushing (9) from the idler (4).