

SHOP MANUAL

KOMATSU PC128UU-2

MACHINE MODEL SERIAL NUMBER

PC128UU-2 5001 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.
- PC128UU-2 mounts the S4D102E-1 engine.
For details of the engine, see the 102 Series Engine Shop Manual.

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METHOD OF DISASSEMBLING, CONNECTING PUSH-PULL TYPE COUPLER

! Before carrying out the following work, release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.

! Even if the residual pressure is released from the hydraulic tank, some hydraulic oil flows out when the hose is disconnected. Accordingly, prepare an oil receiving container.

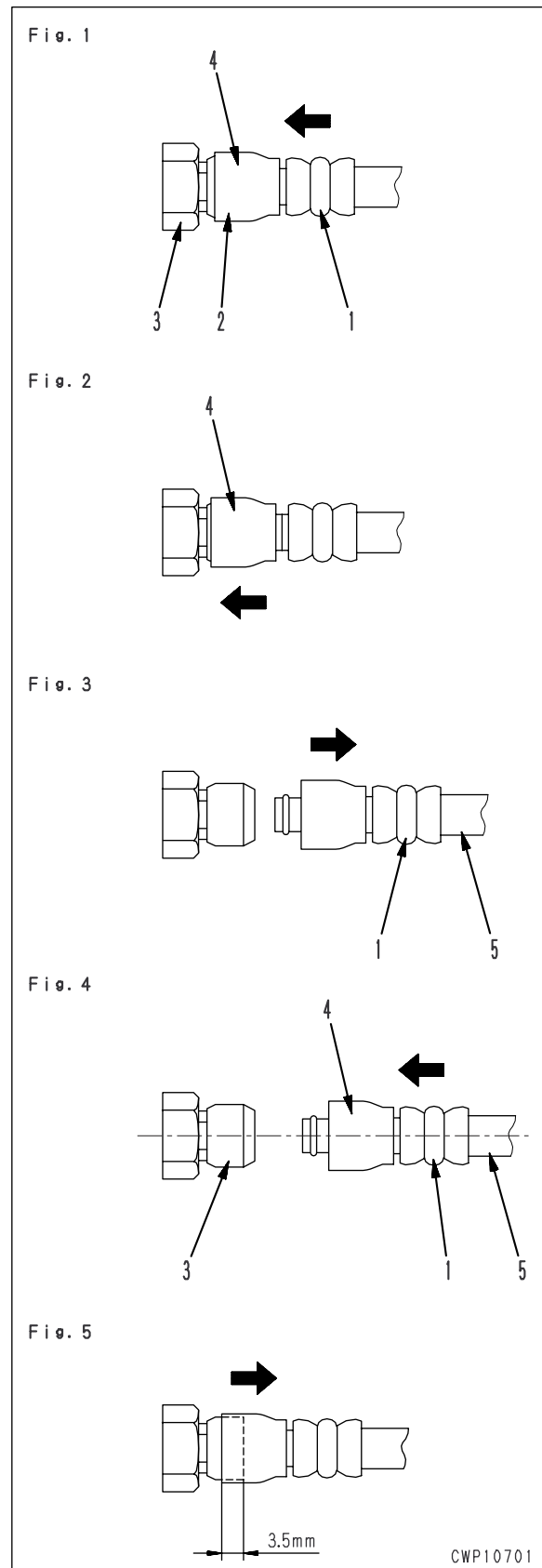
Disconnection

- 1) Release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.
- 2) Hold adapter (1) and push hose joint (2) into mating adapter (3). (See Fig. 1)
 - ★ The adapter can be pushed in about 3.5 mm.
 - ★ Do not hold rubber cap portion (4).
- 3) After hose joint (2) is pushed into adapter (3), press rubber cap portion (4) against (3) until it clicks. (See Fig. 2)
- 4) Hold hose adapter (1) or hose (5) and pull it out. (See Fig. 3)
 - ★ Since some hydraulic oil flows out, prepare an oil receiving container.

Connection

- 1) Hold hose adapter (1) or hose (5) and insert it in mating adapter (3), aligning them with each other. (See Fig. 4)
 - ★ Do not hold rubber cap portion (4).
- 2) After inserting the hose in the mating adapter perfectly, pull it back to check its connecting condition. (See Fig. 5)
 - ★ When the hose is pulled back, the rubber cap portion moves toward the hose about 3.5 mm. This does not indicate abnormality, however.

Type 1



Liter to U.S. Gallon

1ℓ = 0.2642 U.S. Gal

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

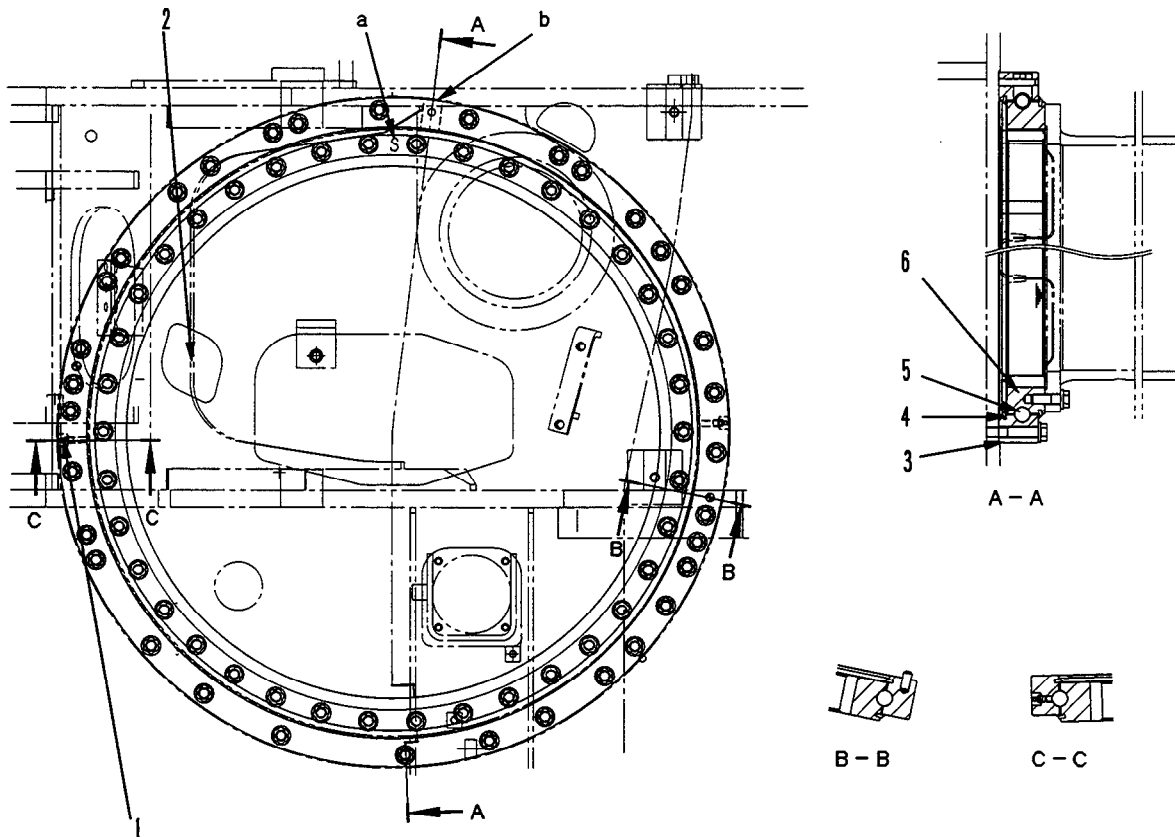
Liter to U.K. Gallon

1ℓ = 0.21997 U.K. Gal

	0	1	2	3	4	5	6	7	8	9
0	0	0.220	0.440	0.660	0.880	1.100	1.320	1.540	1.760	1.980
10	2.200	2.420	2.640	2.860	3.080	3.300	3.520	3.740	3.950	4.179
20	4.399	4.619	4.839	5.059	5.279	5.499	5.719	5.939	6.159	6.379
30	6.599	6.819	7.039	7.259	7.479	7.699	7.919	8.139	8.359	8.579
40	8.799	9.019	9.239	9.459	9.679	9.899	10.119	10.339	10.559	10.778
50	10.998	11.281	11.438	11.658	11.878	12.098	12.318	12.528	12.758	12.978
60	13.198	13.418	13.638	13.858	14.078	14.298	14.518	14.738	14.958	15.178
70	15.398	15.618	15.838	16.058	16.278	16.498	16.718	16.938	17.158	17.378
80	17.598	17.818	18.037	18.257	18.477	18.697	18.917	19.137	19.357	19.577
90	19.797	20.017	20.237	20.457	20.677	20.897	21.117	21.337	21.557	21.777

Machine model				PC128UU-2	
Serial No.				5001 and up	
Hydraulic system	Work equipment cylinder	Boom cylinder	Type	Reciprocating piston	
			Cylinder (inside diameter)	mm	105
			Diameter of pistonrod	mm	70
			Stroke	mm	1,055
			Max. distance between pins	mm	2,555
			Min. distance between pins	mm	1,500
		Arm cylinder	Type	Reciprocating piston	
			Cylinder (inside diameter)	mm	115
			Diameter of pistonrod	mm	75
			Stroke	mm	272.5
	Max. distance between pins		mm	1,230.5	
	Bucket cylinder	Type	Reciprocating piston		
		Cylinder (inside diameter)	mm	90	
		Diameter of pistonrod	mm	60	
		Stroke	mm	885	
		Max. distance between pins	mm	2,263	
	Offset cylinder	Type	Reciprocating piston		
		Cylinder (inside diameter)	mm	130	
		Diameter of pistonrod	mm	70	
		Stroke	mm	346	
Max. distance between pins		mm	1,818		
Blade cylinder	Type	Reciprocating piston			
	Cylinder (inside diameter)	mm	115		
	Diameter of pistonrod	mm	75		
	Stroke	mm	181		
	Max. distance between pins	mm	870		
		Min. distance between pins	mm	689	

SWING CIRCLE



9JA01330

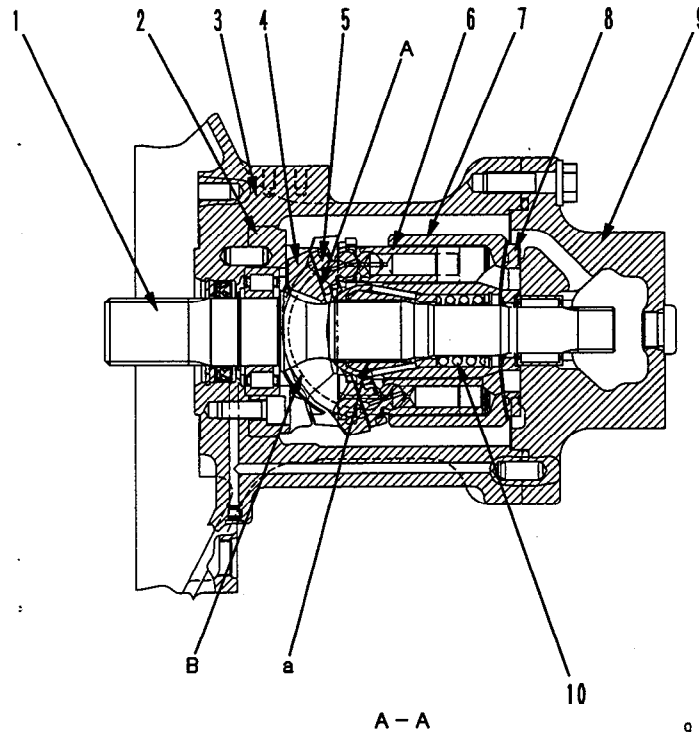
- 1. Greasing to swing circle bearing
- 2. Greasing to swing circle pinion
- 4. Seal
- 5. Ball
- 6. Inner race

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

Specification
 Reduction ratio : $90/11 = 8.182$
 Grease : G2-LI
 Amount of filled grease : 9.1 ℓ

Function

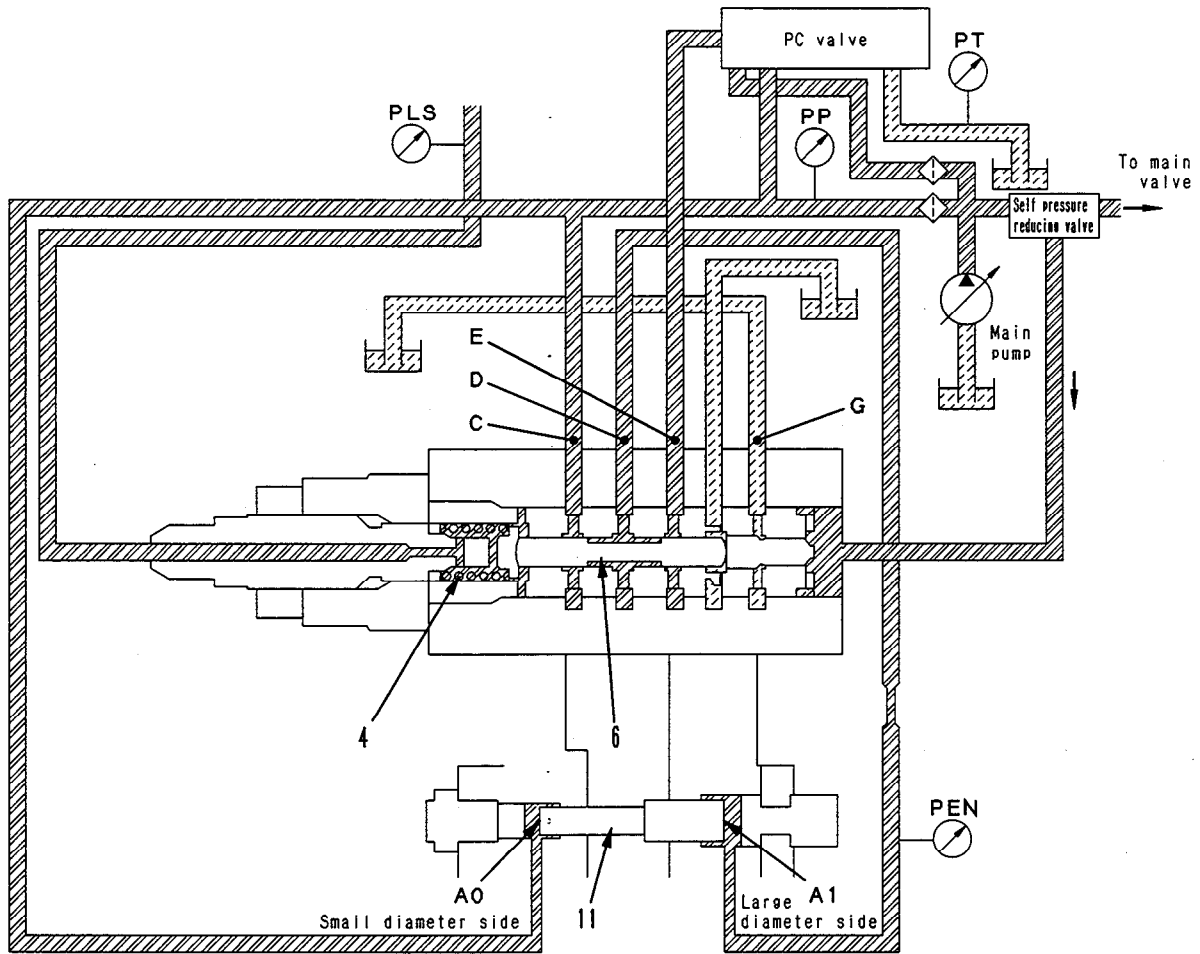
- This pump converts engine rotation and torque transmitted to the pump shaft into hydraulic energy and discharges pressurized oil according to load.
- This pump can change delivery when the swash plate angle is changed.



9JU00077

Structure

- The cylinder block (7) is supported to the shaft (1) with the spline a, and the shaft (1) is supported with the front and rear bearings.
- The shoe (5) is punched to the tip of the piston (6) with a concave ball so that the piston (6) and the shoe (5) form a spherical bearing.
- The shoe (5) is always pressed to the plane A of the rocker cam (4) and slides in a circle. The rocker cam (4) leads highly pressurized oil together with the cylindrical plane B with the cradle (2) fixed to the case, forms a static pressure bearing and slides.
- The piston (6) moves in the axial direction relatively in each cylinder of the cylinder block (7).
- The cylinder block (7) rotates relatively while sealing pressurized oil against the valve plate (8), and the plane is designed to balance the oil pressure properly.
- Oil in each cylinder of the cylinder block (7) is absorbed and discharged through the valve plate (8).

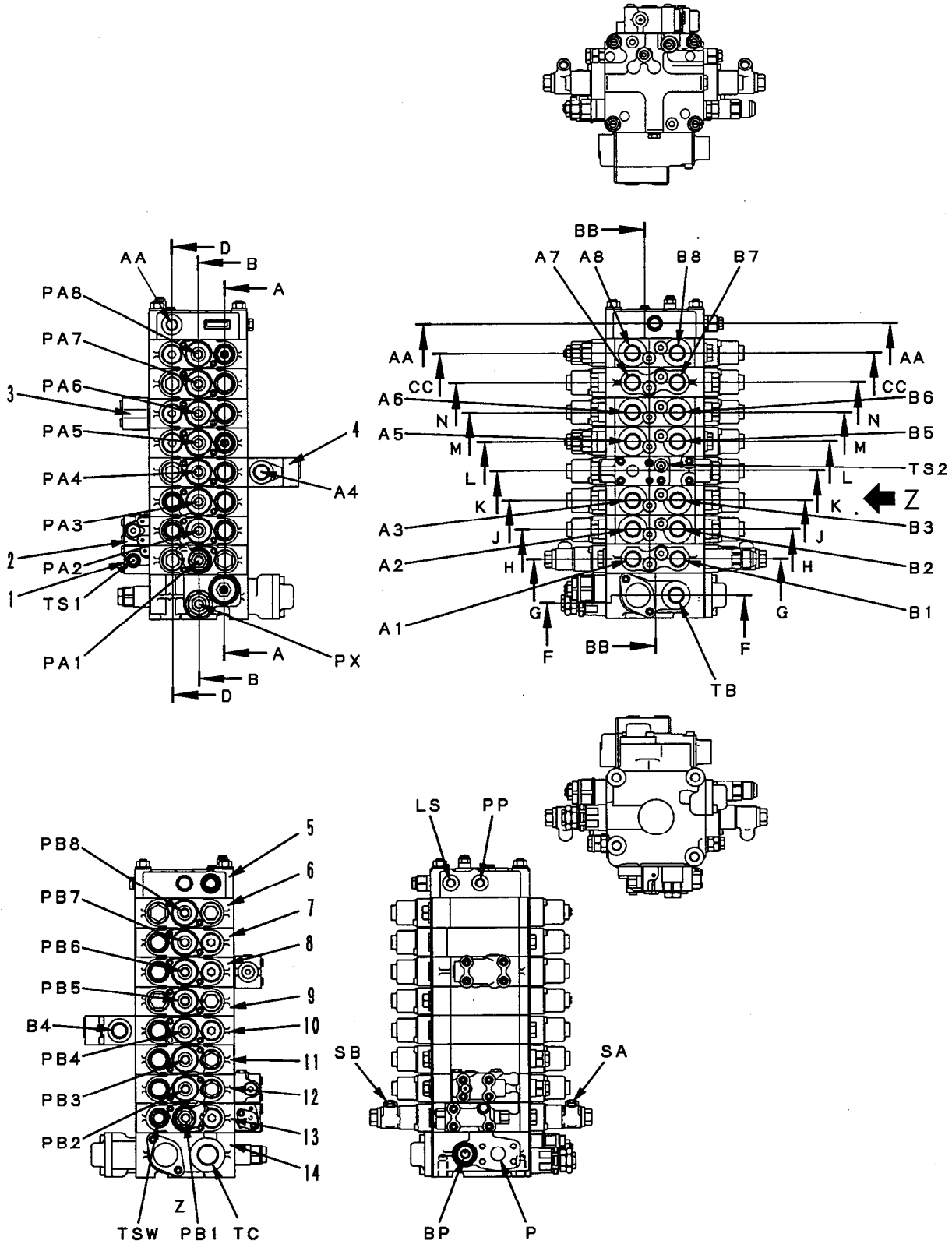


SVP07607

4) When the servo piston balances

- Suppose that the area receiving pressure on the piston large diameter side is **A1**, the area on the piston small diameter side is **A0** and the pressure applied to the piston large diameter side is **PEN**.
- When the pump discharge pressure **PP** of the LS valve balances with the combined force of the LS pressure **PLS** and the spring (4) force **Z** and the relations $A0 \times PP = A1 \times PEN$ hold, the servo piston (12) will stop at the position and the swash plate angle will be held at the intermediate position. (The openings of the D port to the E port and of the C port to the D port of the spool (6) stop almost at the same position.)
- At the time, the relations of the areas receiving pressure at the both ends of the servo piston are $A0 : A1 = 1 : 1.75$. When they balance with each other, the pressures applied to the both ends of the piston are related as follows: $PP : PEN \approx 1.75 : 1$.
- The spring (4) force has been adjusted so that the spool (6) balance stop position is determined at the center of the standard when $PP - PLS = 2.21 \text{ MPa} (22.5 \text{ kg/cm}^2)$.

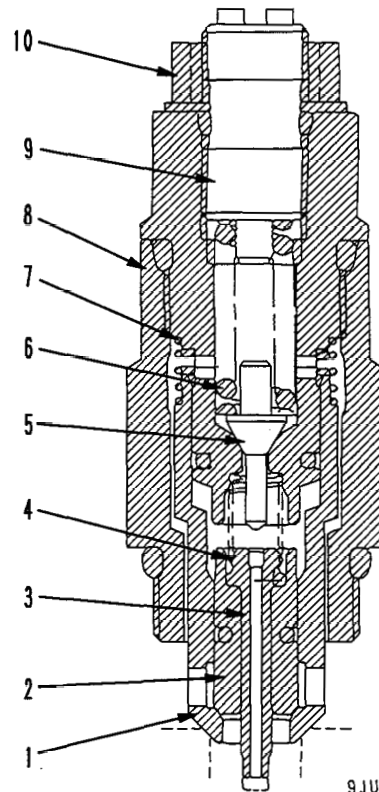
8-spool valve (without service valve)



9JY00291

SUCTION SAFETY VALVE
(SAFETY VALVE WITH SUCTION FOR SERVICE PORT)

- 1. Suction valve
- 2. Main valve
- 3. Piston
- 4. Piston spring
- 5. Poppet
- 6. Poppet spring
- 7. Suction valve
- 8. Sleeve
- 9. Adjustment screw
- 10. Lock nut

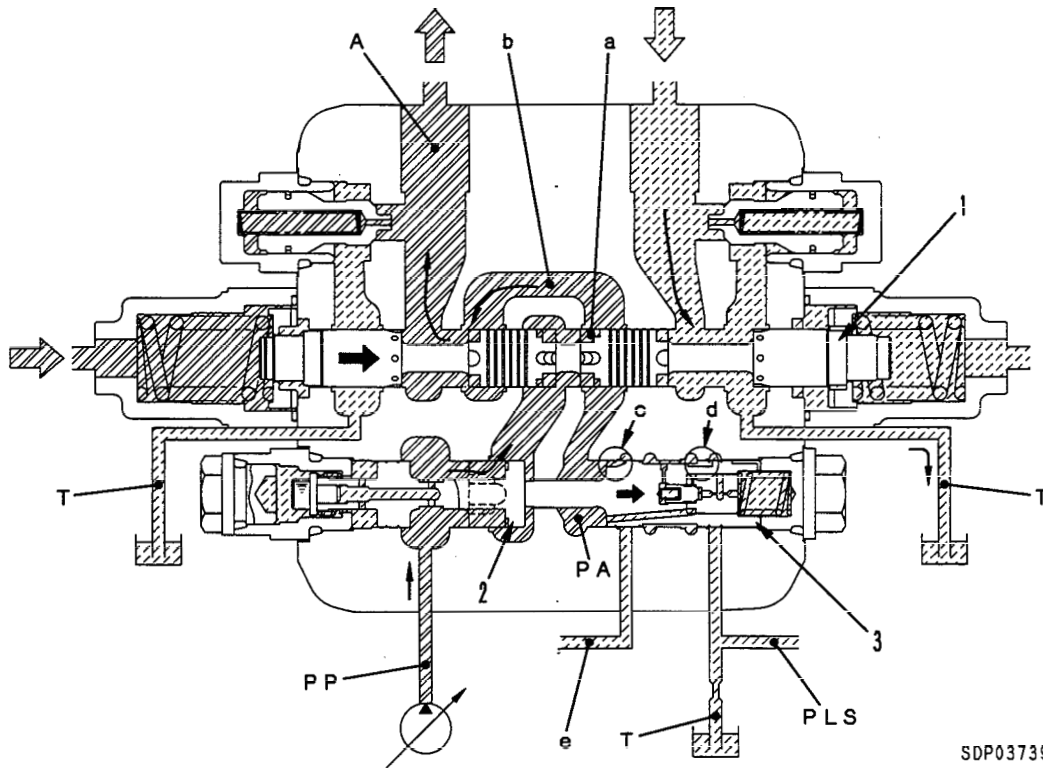


9JU00112

Specification

Part No. (Reference)	Set pressure	Use
709-70-74600	24.5 MPa {250 kg/cm ² } (at the time of 5ℓ/min.)	For crusher
709-70-74700	17.2 MPa {175 kg/cm ² } (at the time of 5ℓ/min.)	

2. Travel valve



SDP03739

Operation

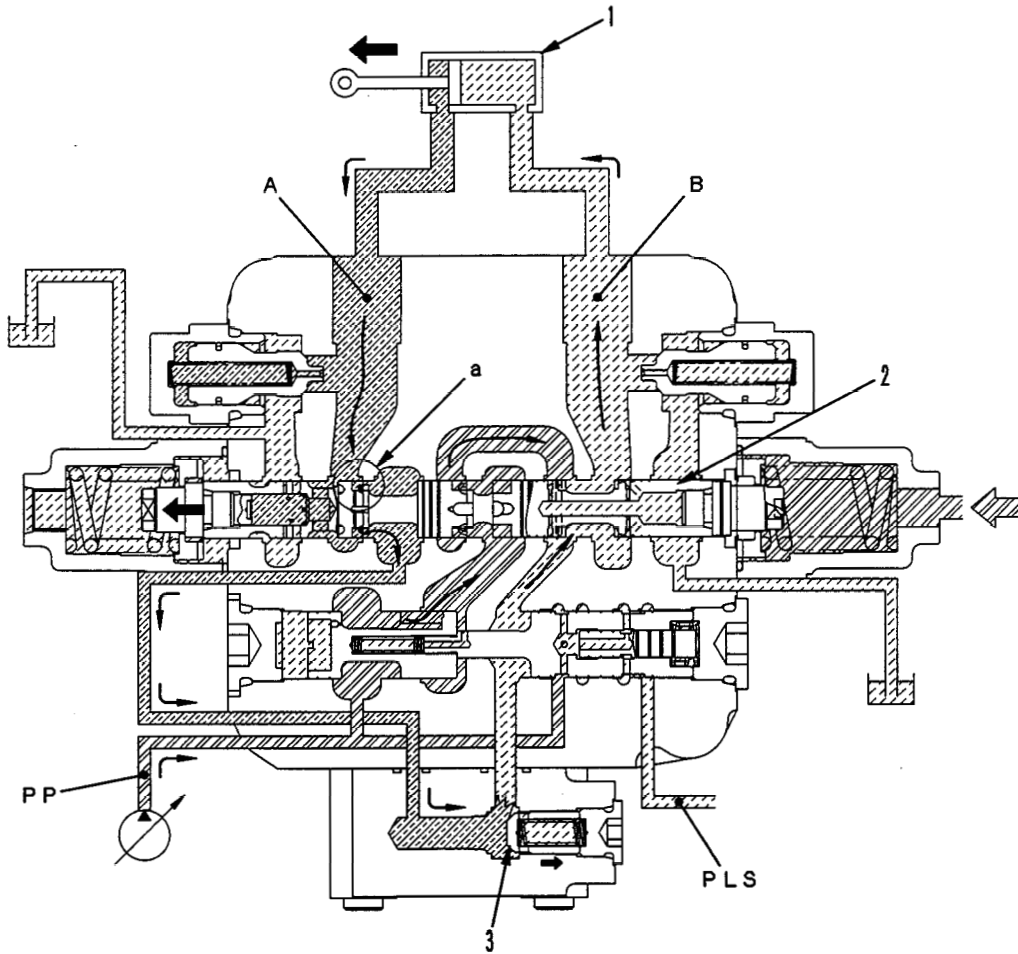
- When the spool (1) is operated, the pump discharge pressure **PP** will be led to the actuator circuit **A** through the bridge passage **b** from the flow control valve (2) and the spool notch **a**.
- At the same time, the actuator circuit pressure **PA** moves the pressure reducing valve (3) to the right side, and the notches **c** and **d** interconnect to the travel junction circuit **e** and the LS circuit **PLS** respectively.
- So, the actuator circuit pressure **PA (= A)** is led from the notch **c** to the LS circuit **PLS** through the notch **d**.
- ★ The travel circuit is different from the work equipment circuit, the actuator circuit pressure **PA** is directly led to the LS circuit **PLS**.

ARM REGENERATION CIRCUIT

1. At arm in and own weight fall

Function

- When the arm falls due to its own weight because the head pressure **A** in the arm cylinder (1) is higher than the bottom pressure **B** during arm digging, this circuit brings the return flow on the head side to the bottom side to increase the cylinder speed.



9JY00300

Operation

- When the arm falls for digging due to its own weight, the head side pressure **A** in the arm cylinder (1) will rise above the bottom side pressure **B**.
- At the time, part of the return flow on the head side passes through the regeneration passage **a** of the arm spool (2), pushes the check valve (3) to open it and flows to the bottom side.
- This increases the arm digging speed.

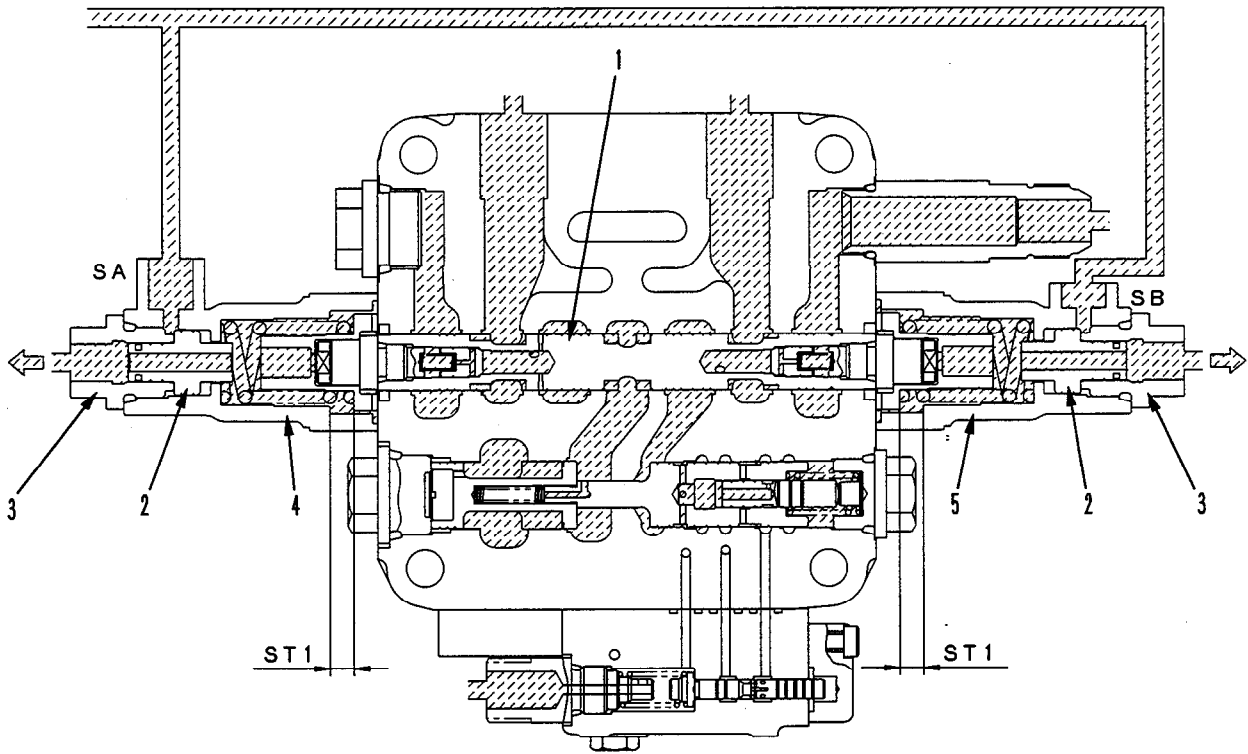
1. Arm cylinder
2. Arm spool
3. Check valve

- A : Head circuit (pressure)
- B : Bottom circuit (pressure)
- PP : Pump circuit (pressure)

3. At simultaneous operation of boom + swing Function

- When the boom is raised at the time of swinging, the swing pool stroke will be controlled and the flow to the boom will be distributed more to raise the boom more.

1) When the boom is not raised



9JY00024

Operation

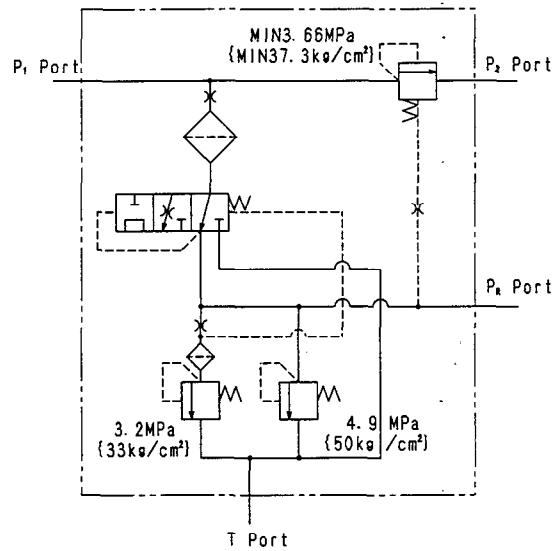
- Since the **SA** and **SB** ports are interconnected to the drain and no force is given to the piston (2), the stroke of the spool (1) is not controlled. So, the spool (1) comes to the cases (4) and (5) and the stroke increases by **ST1**. This increases the filtering oil flow.

1. Spool (swing)
2. Piston
3. Plug
4. Case
5. Case

ST1 : Spool stroke

Function

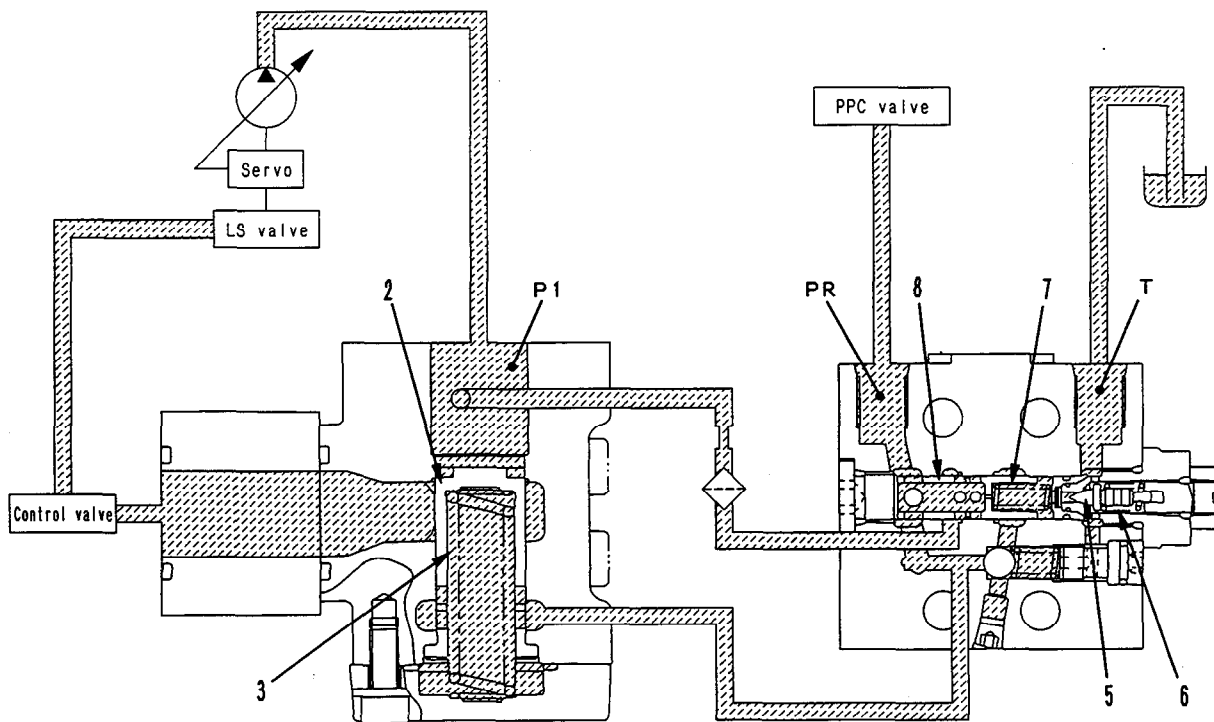
- The self pressure reducing valves reduces the discharge pressure of the main pump and supplies it to the solenoid valve, the PPC valve, etc. as the control pressure.



Hydraulic circuit

SVP07622

1. At engine stop (total low pressure)



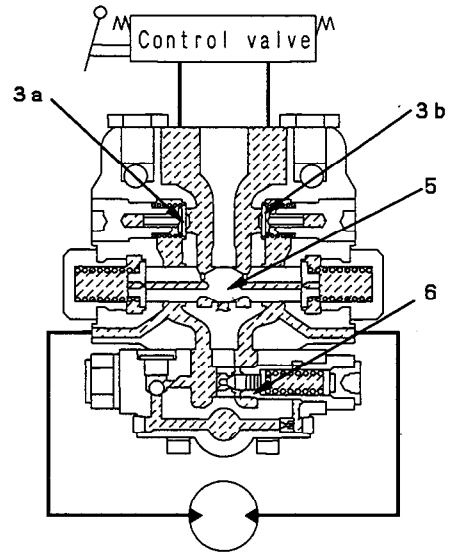
SVP07623

Operation

- The spring (6) pushes the poppet (5) to the seat, and the circuit between the ports PR and T is closed.
- The spring (7) pushes the valve (8) to the left side, and the circuit between the ports P_1 and PR is open.
- The spring (3) pushes the valve (2) to the left side, and the circuit between the ports P_1 and P_2 is closed.

Operation of brake valve

- The brake valve consists of the check valves (3a) and (3b), the counterbalance valve (5) and the safety valve (6), and the circuit configuration is as per the right figure.
- Functions and operations of these components are as follows :



SJP07627

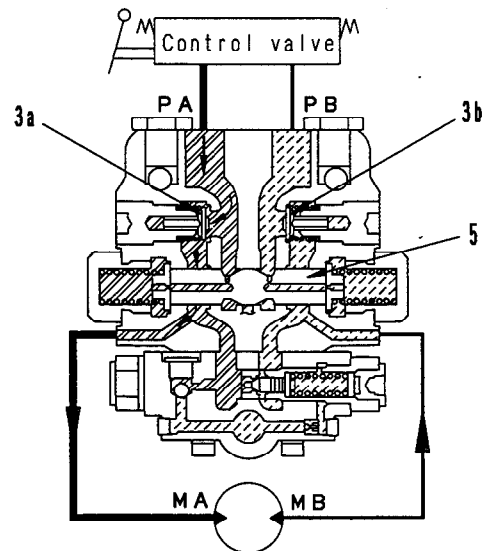
Counterbalance valve, check valve

Function

- When traveling down a slope, the own weight falling force will make the machine travel faster than the motor rotation. So, traveling with reduced engine speed is very dangerous because the motor idles and runs away. These valves let the machine travel at a speed appropriate for the engine speed (pump delivery) to prevent this danger.

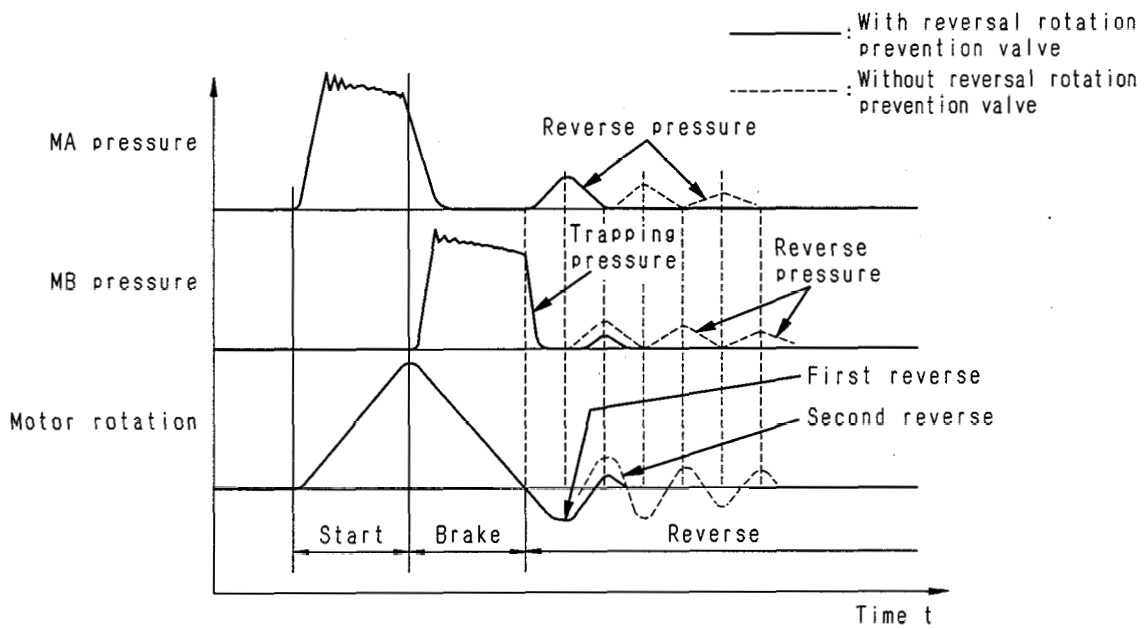
Operation at oil supply

- When the travel lever is operated, the pressurized oil from the control valve will be supplied to the PA port, push and open the check valve (3a) and flow from the MA port on the motor inlet side to the MB port on the motor outlet side. Since the motor outlet circuit is closed with the check valve (3b) and the counterbalance valve (5), however, the supply-side pressure will rise.



SJP07628

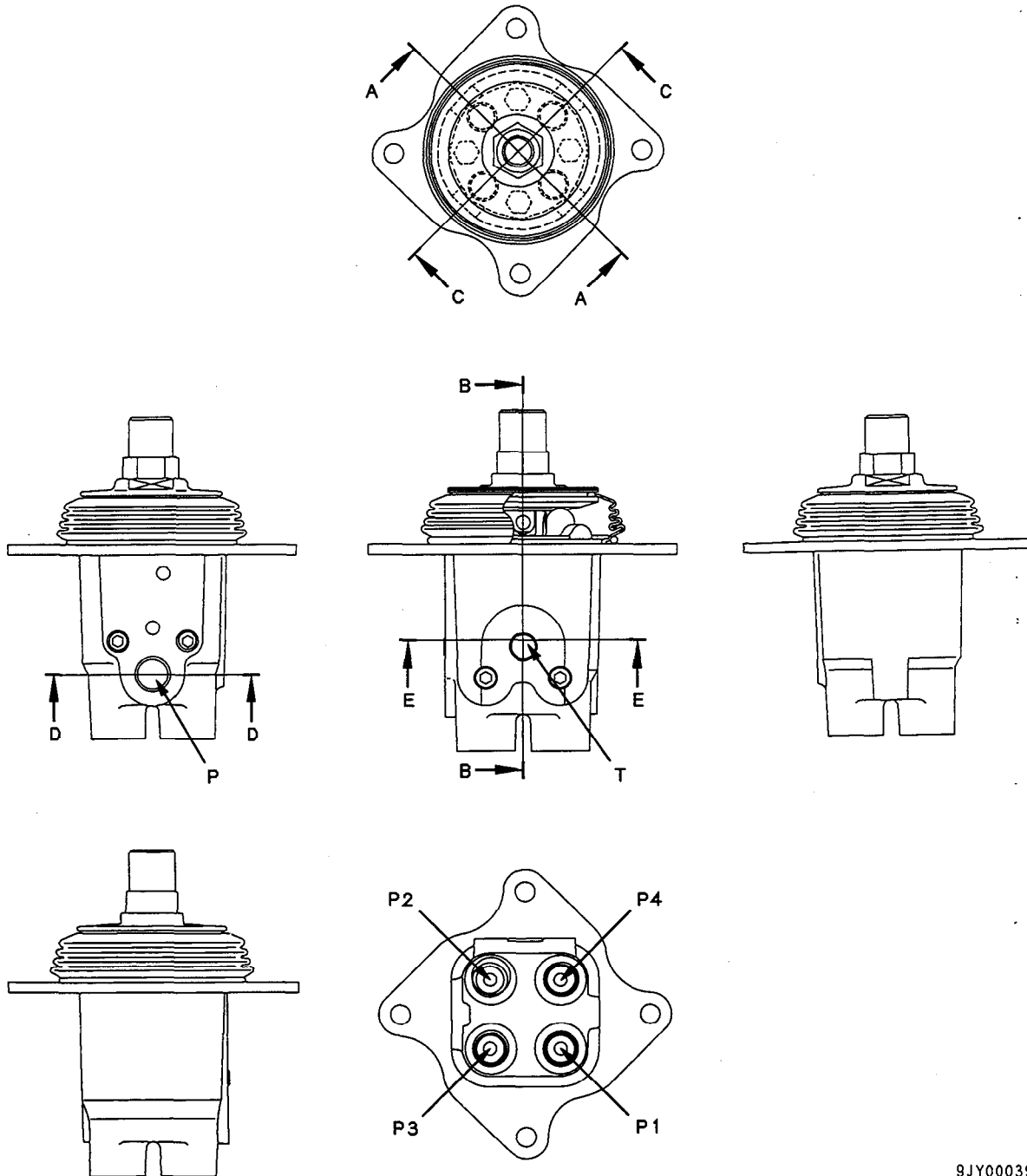
Effect explanation drawing



SJP07637

PPC VALVE

FOR SWING OF WORK EQUIPMENT



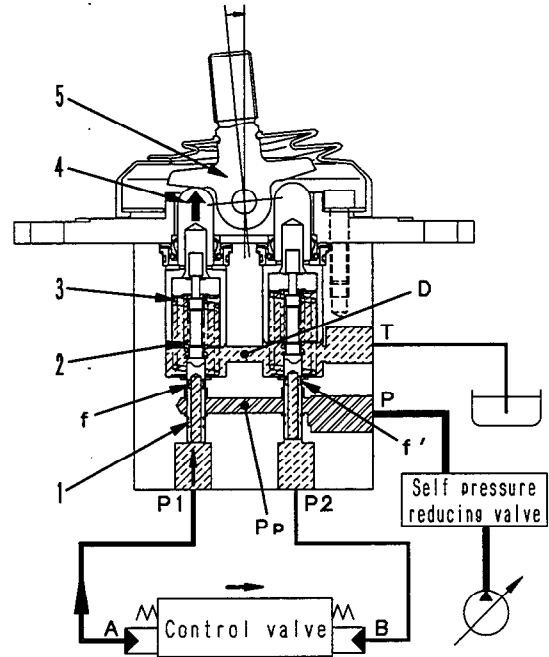
9JY00039

P : From main pump
 P1 : Left : Arm for dump/Right : Boom down
 P2 : Left : Arm for digging/Right : Boom up

P3 : Left : Swing right/Right : Bucket for digging
 P4 : Left : Swing left/Right : Arm for dump
 T : To tank

3. In the fine control mode (when the operation lever is shifted back to its original position)

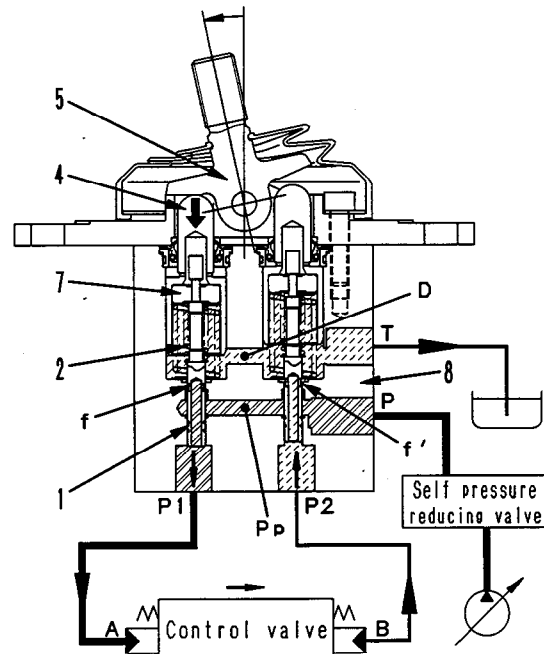
- As the lever (5) starts returning, the spool (1) is pushed up by force of the centering spring (3) and P1 port pressure. By this move, the fine control hole f is connected to the drain room D and relieves pressurized oil of P1 port to it.
- If P1 port pressure goes excessively low, the spool (1) is pushed down by the metering spring (2) and passage between the fine control hole f and the drain room D is shut down. And, almost at the same time, the hole is connected to the pump pressure room PP and starts supplying pump the pressure. This supply continues until the P1 port pressure is recovered to the level equivalent to the lever position.
- When the operation valve spool returns, oil in the drain room D flows in through the fine control hole f' on the not moving side valve. Oil is then conducted via P2 port to the room B to fill it up.



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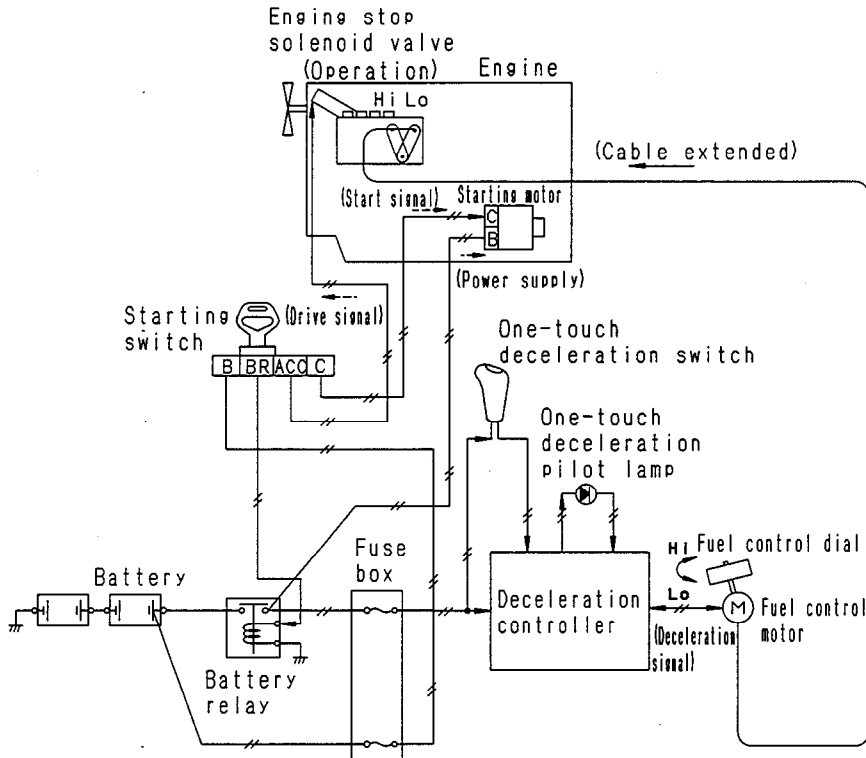
4. In the full stroke mode

- When the disk (5) pushes down the piston (4) and the retainer (7) pushes down the spool (1), connection of the fine control hole f is switched from the drain room D to the pump pressure room PP.
- Thus, pilot pressurized oil from the control pump passes through the fine control hole f and conducted to A room via P1 port to push the operation valve spool.
- Return oil from B room is conducted from P2 port to the drain room D via the fine control hole f'.



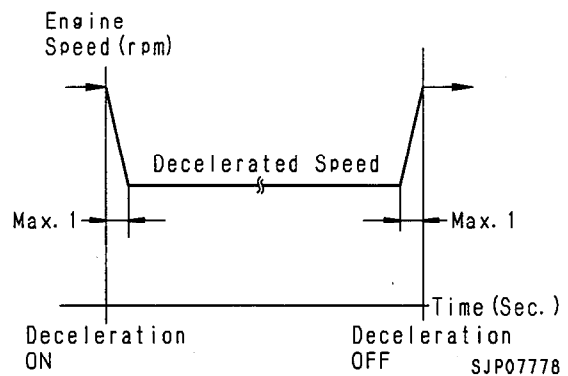
SJP07649

ONE-TOUCH DECELERATION

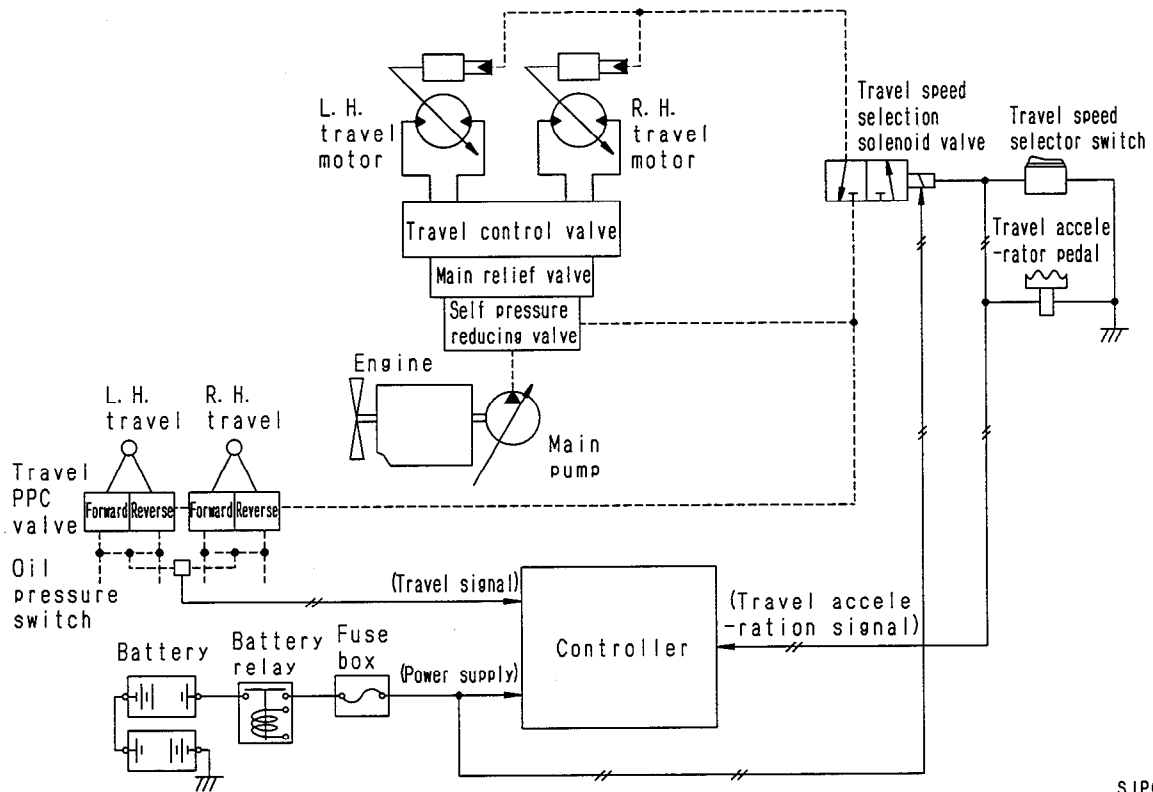


SJP07723

- Pressing the one-touch deceleration switch conducts the deceleration signal to the deceleration controller.
- The deceleration controller turns on the one-touch deceleration pilot lamp and, at the same time, drives the fuel adjust motor to slow down the engine speed to low idling level.
- Pressing the one-touch deceleration switch once turns on low idling and pressing it again restores the speed set on the fuel adjust dial.
- ★ The one-touch deceleration function applied to stop the engine is cancelled at the next start. Namely, when you resume your operation, the engine operation will be driven at the speed set on the fuel adjust dial.
- ★ As long as the one-touch deceleration mode is continued, you cannot change the engine speed from the fuel adjust dial, namely the engine speed remains at the low idling.



TRAVEL CONTROL FUNCTION



SJP07732

Function

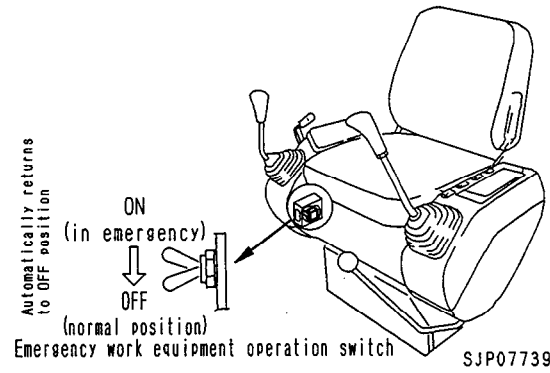
Travel speed selection

- Travel speed is switched according to changes in the motor capacity that you can cause from the travel speed selector switch or acceleration pedal.

		Travel speed selector switch	LOW (low speed)	HIGH (high speed)
Acceleration pedal	Relieve	Motor capacity (cc/rev)	52.7	37.2
		Travel speed (km/h)	3.2	4.6
		Travel motor angle of inclination	Max.	Min.
Step on		Motor capacity (cc/rev)	37.2	37.2
		Travel speed (km/h)	4.6	4.6
		Travel motor angle of inclination	Min.	Min.

4. Cancel function

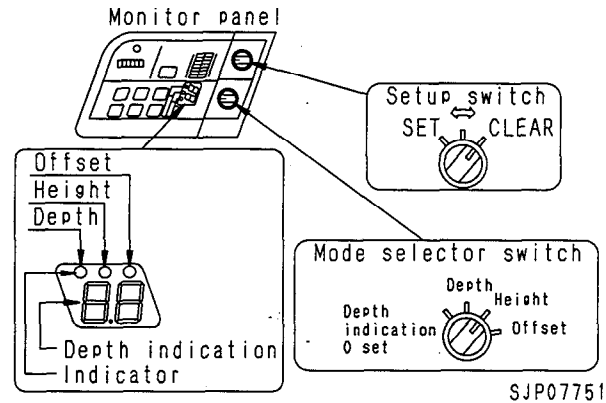
- If the emergency stop function is turned on, or if the controller or any of the potentiometers fails, the controller will stop action of every actuator by cutting off signal current to the solenoid valve and EPC valve.
- This situation requires your immediate checkups. In case the machine must be moved to a safe place before starting the checkups, use the emergency work equipment operation switch situated under the operator seat. Turning this switch on allows you to move the work equipment to any desired location.
- As soon as the emergency work equipment operation switch is turned on, the alarm buzzer will start sounding and the electronic system caution lamp will also start flashing to notify the operator that the cancel function has been turned on.
- ★ When you want to swing the work equipment, turn on the swing/park brake release switch at the same time.
- ★ If any failure is present in the electric system of the solenoid valve or EPC valve, this cancel function is not available.
When the error code "Failure in Solenoid System" is displayed on the monitor panel depth indicator, you must not turn on the emergency work equipment operation switch.
- ★ If you turn on the emergency work equipment operation switch after removing the controller, boom up/down and arm retract (EPC valve system) operation won't be cancelled.
- ★ The emergency work equipment operation switch is an auto-return type. Namely, if you move your hand off the switch in the ON position, it will automatically return to the OFF position.



Stop cancel operation	Every actuator
Alarm buzzer	Sounded for 7 seconds
Electronic system caution lamp	Delayed flashing intervals (once every second)

AUTOMATIC HEIGHT AND DEPTH STOP SYSTEM

- The automatic height stop function is capable of stopping move of the boom when it reaches the predetermined height during operation.
- The automatic depth stop function is capable of stopping move of the boom when it reaches the predetermined depth during operation.
- These functions are helpful in ensuring work safety and efficiency when working in job sites where obstacles such as piping and electric wires are present.



1. Height setup function [height mode]

- You can stop move of the boom during operation at any height you have previously set.
 - You can limit height of the work equipment by setting limit on the boom lift height.
 - This function reduces speed of the boom prior to the forced stop to minimize resulting shocks or impacts.
- ★ Note that this function is not usable for limiting the bucket height.

[Setup procedures]

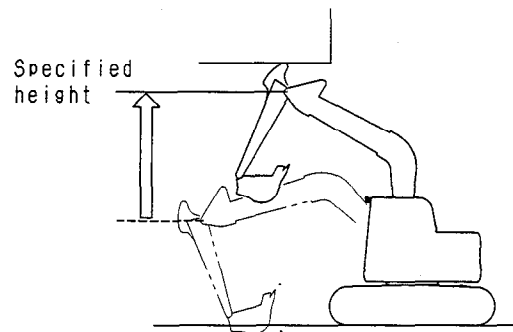
- Shift the mode select switch to the "Height".
- Lift the boom up to the height where you want to set the limit.
- Turn the setup switch to the "SET" position to make sure that the buzzer is sounded three times and the indicator lamp comes on.

[Operation]

- When the above setting is complete, lower the boom once. Now, whenever the boom reaches the specified height during operation, its move will be stopped there.
- This stop is caused by reducing and then shutting down the output pressure from the PPC valve to the boom operation valve (UP side) at the EPC valve.

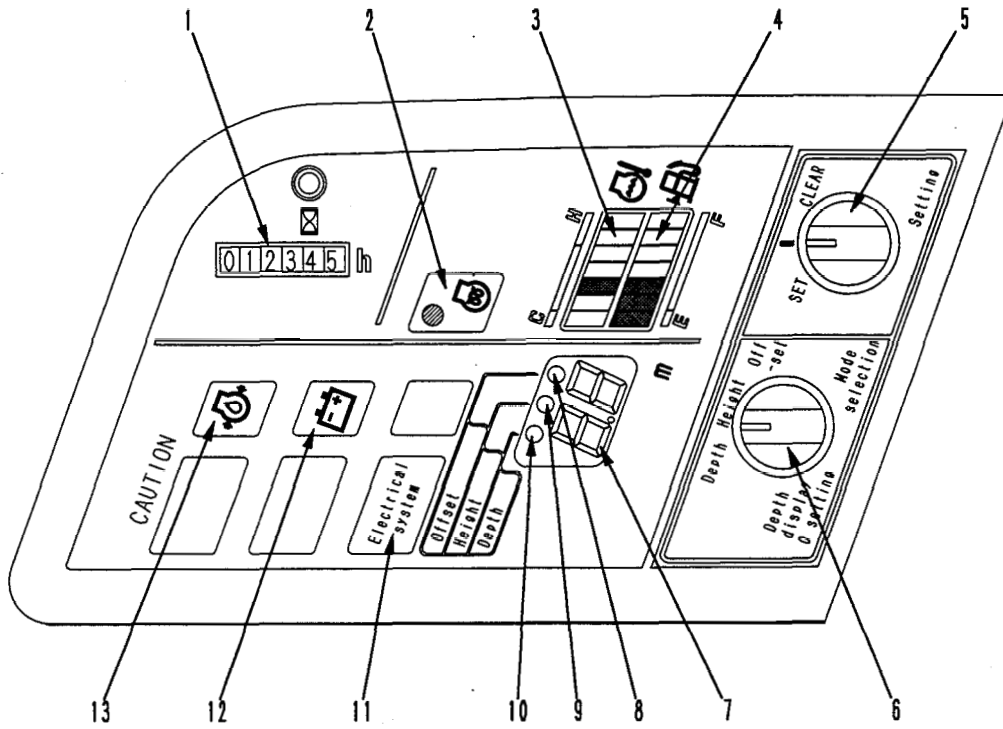
[Canceling procedures]

- Shift the mode switch to the "Height".
- Turn the setup switch to the "CLEAR" position, then make sure that the indicator lamp is turned off.



SJP07757

Operation



SJP07765

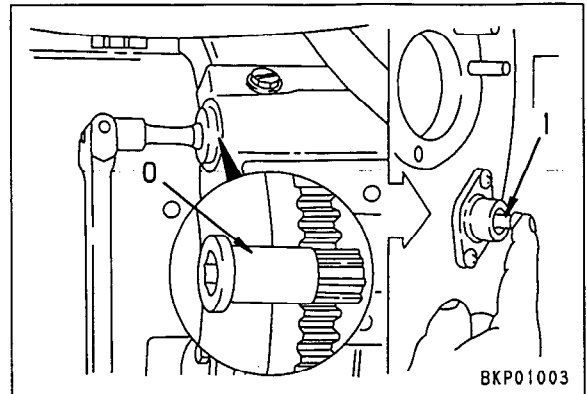
Machine model				PC128UU-2		
Category	Item	Measurement conditions	Unit	Standard value for new machine	Service limit value	
Work equipment	Hydraulic drift of work equipment	Refer to figure G. <ul style="list-style-type: none"> Place in posture and measure extension or retraction of each cylinder and downward movement at tip of bucket teeth. Horizontal, flat ground Bucket: Rated load (720 kg) Levers at HOLD Engine stopped Hydraulic oil temperature: 45 – 55°C Start measuring immediately after setting. Measure hydraulic drift every 5 minutes, and judge from results for 15 minutes. 	mm	Max. 500	700	
				Boom cylinder (amount of retraction of cylinder)	Max. 15	23
				Arm cylinder (amount of extension of cylinder)	Max. 50	75
				Bucket cylinder (amount of retraction of cylinder)	Max. 40	60
		Blade (hydraulic drift at tip of blade)		Refer to figure G. <ul style="list-style-type: none"> Engine stopped Hydraulic oil temperature: 45 – 55°C Set blade at maximum lifting height and measure downward movement at edge of blade for 15 minutes. 	Max. 31	47

System	Name of component	Connector No.	Inspection method	Judgment table	Measurement conditions														
Controller	(PPC oil pressure switch)																		
	Travel	S01	Measure resistance	If the condition is as shown in the table below, it is normal Boom, arm, bucket, and other levers	1) Start engine. 2) Disconnect connector.														
	Boom RAISE	S02				<table border="1"> <tr> <td>Between (1) - (2)</td> <td>All levers at neutral</td> <td>Min. 1 MΩ</td> </tr> <tr> <td></td> <td>One or more levers operated</td> <td>Max. 1 Ω</td> </tr> </table>	Between (1) - (2)	All levers at neutral	Min. 1 MΩ		One or more levers operated	Max. 1 Ω							
	Between (1) - (2)	All levers at neutral					Min. 1 MΩ												
		One or more levers operated				Max. 1 Ω													
Boom LOWER	S10																		
Arm IN	S05																		
Swing left	S08																		
Swing right	S30		<table border="1"> <tr> <td>Between (1), (2) - chassis</td> <td>Min. 1 MΩ</td> </tr> </table>	Between (1), (2) - chassis	Min. 1 MΩ														
Between (1), (2) - chassis	Min. 1 MΩ																		
	Kerosene mode	C02	Measure voltage	If the condition is as shown in the table below, it is normal	1) Turn starting switch ON. 2) Insert T-adapter.														
				<table border="1"> <tr> <td>In standard mode</td> <td rowspan="2">Between (5) - chassis</td> <td>20 - 30 V</td> </tr> <tr> <td>In kerosene mode</td> <td>0 - 1 V</td> </tr> </table>	In standard mode	Between (5) - chassis	20 - 30 V	In kerosene mode	0 - 1 V										
In standard mode	Between (5) - chassis	20 - 30 V																	
In kerosene mode		0 - 1 V																	
	Travel boost	C01	Measure voltage	If the condition is as shown in the table below, it is normal	1) Turn starting switch ON. 2) Insert T-adapter.														
				<table border="1"> <tr> <td>At travel Lo</td> <td rowspan="2">Between (12) - chassis</td> <td>4 - 6 V</td> </tr> <tr> <td>At travel Hi</td> <td>0 - 1 V</td> </tr> </table>	At travel Lo	Between (12) - chassis	4 - 6 V	At travel Hi	0 - 1 V										
At travel Lo	Between (12) - chassis	4 - 6 V																	
At travel Hi		0 - 1 V																	
	Mode SET/CLEAR	C02	Measure voltage	If the condition is as shown in the table below, it is normal	1) Turn starting switch ON. 2) Insert T-adapter.														
				<table border="1"> <tr> <td>At SET</td> <td>Between (3) - chassis</td> <td rowspan="2">0 - 1 V</td> </tr> <tr> <td>At CLEAR</td> <td>Between (4) - chassis</td> </tr> </table> ※ When switch is not operated: 20 - 30 V	At SET	Between (3) - chassis	0 - 1 V	At CLEAR	Between (4) - chassis										
At SET	Between (3) - chassis	0 - 1 V																	
At CLEAR	Between (4) - chassis																		
	Mode selection	C02	Measure voltage	If the condition is as shown in the table below, it is normal	1) Turn starting switch ON. 2) Insert T-adapter.														
				<table border="1"> <tr> <td>Mode</td> <td>Between (1) - chassis</td> <td>Between (2) - chassis</td> </tr> <tr> <td>Depth 0 setting</td> <td>20 - 30 V</td> <td>20 - 30 V</td> </tr> <tr> <td>Depth</td> <td>20 - 30 V</td> <td>0 - 1 V</td> </tr> <tr> <td>Height</td> <td>0 - 1 V</td> <td>20 - 30 V</td> </tr> <tr> <td>Offset</td> <td>0 - 1 V</td> <td>0 - 1 V</td> </tr> </table>	Mode	Between (1) - chassis	Between (2) - chassis	Depth 0 setting	20 - 30 V	20 - 30 V	Depth	20 - 30 V	0 - 1 V	Height	0 - 1 V	20 - 30 V	Offset	0 - 1 V	0 - 1 V
Mode	Between (1) - chassis	Between (2) - chassis																	
Depth 0 setting	20 - 30 V	20 - 30 V																	
Depth	20 - 30 V	0 - 1 V																	
Height	0 - 1 V	20 - 30 V																	
Offset	0 - 1 V	0 - 1 V																	

TESTING AND ADJUSTING FUEL INJECTION TIMING

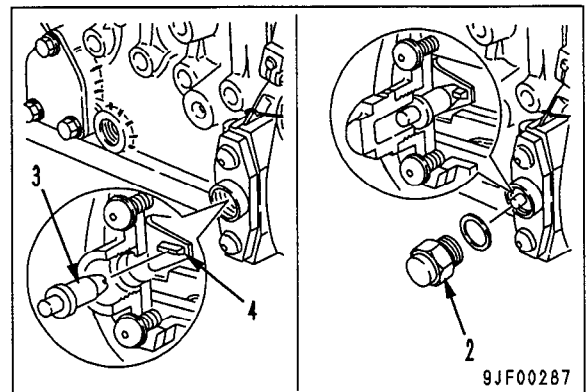
1. Testing

- 1) Using cranking tool **D**, rotate the crankshaft in the normal direction until timing pin (1) enters the hole in the gear.
- 2) Remove plug (2), reverse timing pin (3), and check that pin (3) meshes with timing pointer (4) at the fuel injection pump end.



2. Adjusting

- If the timing pin does not mesh.
 - i) Remove the fuel injection pump. For details, see REMOVAL OF FUEL INJECTION PUMP ASSEMBLY.
 - ii) Rotate the fuel injection pump camshaft and mesh timing pin (3) with timing pointer (4).
 - iii) Install the fuel injection pump assembly. For details, see INSTALLATION OF FUEL INJECTION PUMP ASSEMBLY.



TESTING AND ADJUSTING PC VALVE OUTPUT PRESSURE (SERVO PISTON INPUT PRESSURE)

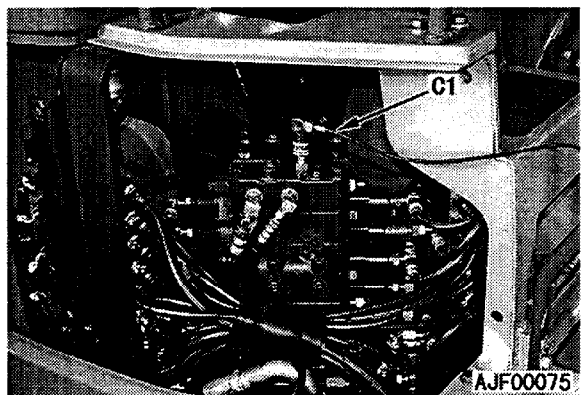
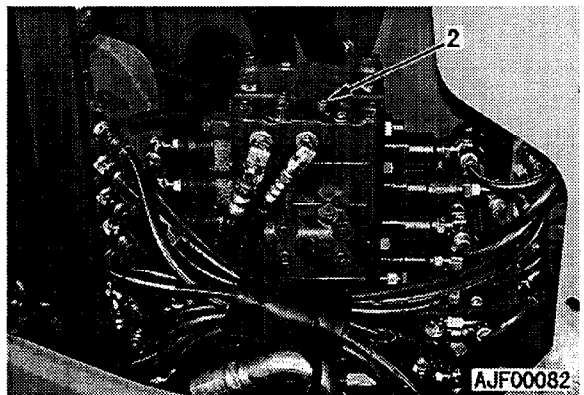
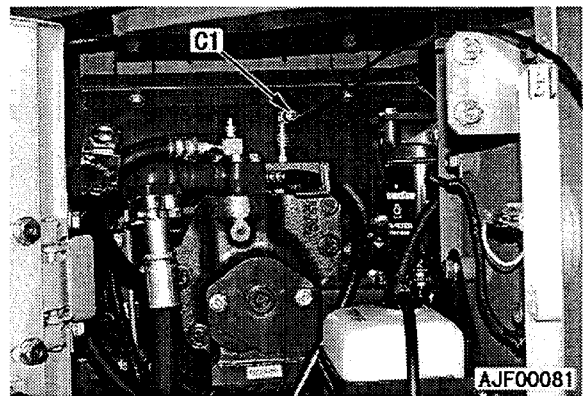
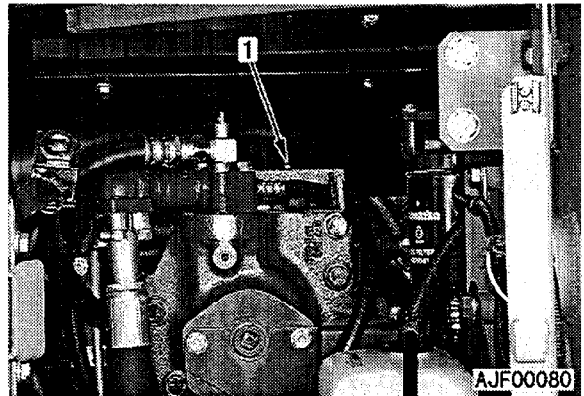
Measuring

★ Oil temperature for measurement : 45 – 55 °C

1. Remove oil pressure pickup plugs (1) and (2) (10 mm, P = 1.25), then install oil pressure gauges C1 (39.2 MPa {400 kg/cm²}).
2. Turn the swing lock switch to the ON position.
3. Run the engine at full throttle and relief the arm cylinder (by IN operation), and measure the pressure at this time.

[Reference]

If the LS valve or servo piston is defective, the servo piston input pressure is "about the same as the pump discharge pressure or almost 0".




ADJUSTING PPC VALVE

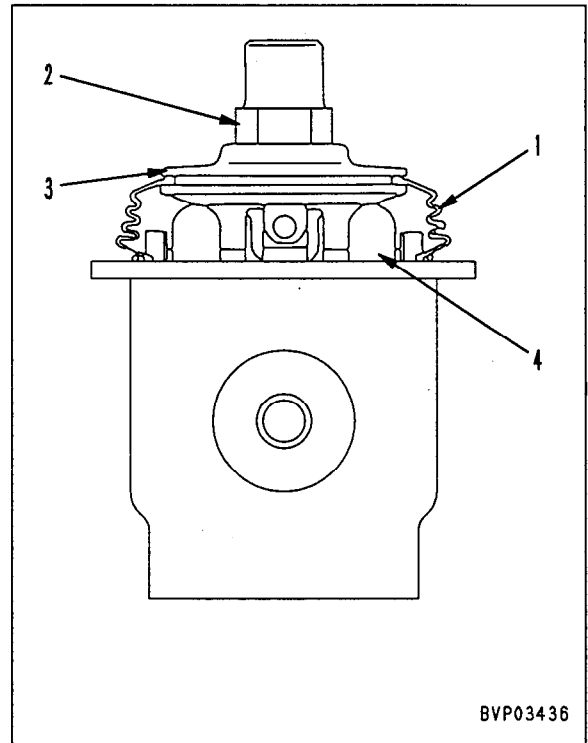
★ If the work equipment control lever or swing lever has excessive play, adjust it according to the following procedure.

⚠ Lower the work equipment to the ground and stop the engine. Then, loosen the oil filler cap slowly to release the internal pressure of the hydraulic tank. Set the safety lock lever to the LOCK position.

1. Remove the PPC valve.
2. Remove boot (1).
3. Loosen locknut (2) and tighten disc (3) until it comes in contact with the heads of 4 pistons (4).
 - ★ Do not move the pistons at this time.
4. Fix disc (3) and tighten locknut (2) to the specified torque.

 Locknut : $107.9 \pm 9.8 \text{ Nm}$ { $11 \pm 1 \text{ kgm}$ }

5. Install boot (1).
 - ★ The clearance between disc (3) and piston (4) is eliminated by the above adjustment.



2. If an abnormality display (error code) was given in Item 1 (reset potentiometer input signal)

- If the potentiometer input signal (voltage) is not within the range in the table below when the work equipment is set to the posture in Item 1, an abnormality display will be given during the resetting operation, and it will be impossible to reset the system.
- ★ If an abnormality display appears during the resetting operation, turn the starting switch OFF with the abnormality display still displayed, then turn the starting switch ON again. This will delete the input signals that are in the memory. Therefore, if an abnormality display is given, remove all the causes and reset the system properly.

1) Potentiometer input signal (when normal) (V)

Boom	Arm		Offset
0.54 – 0.82	STD	0.65 – 1.43	2.99 – 4.11
	Long arm	0.74 – 1.52	

[Measurement]

Boom: Between C21 (2) and (1)

Arm: Between C23 (2) and (3)

Offset: Between C22 (2) and (1)

- ※ The value will change if an option (long arm) is installed.

2) Content of abnormality display
Depending on the nature of the abnormality, one of the displays in Table 1 will be given.

i) Abnormality in one system (inside bold lines)

The display is one of 11, 12, or 14.

ii) Simultaneous abnormality in two or more systems (inside thin lines)

The last digits are added and the total is displayed.

- ★ If the resetting operation has not been carried out properly, when the reset power source terminal and input reset terminal are disconnected, the abnormality display and electrical system caution lamp will flash in a 0.6-second cycle, and the buzzer will also sound in a 0.6-second cycle.

- ★ In Table 1, all the error codes for the reset groups are shown.

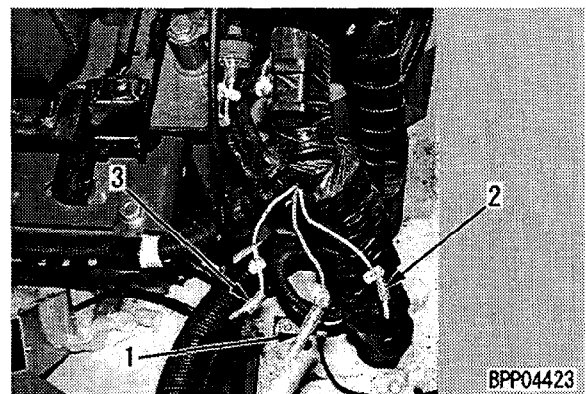
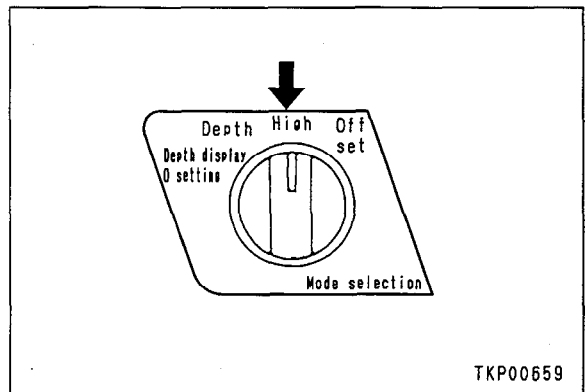
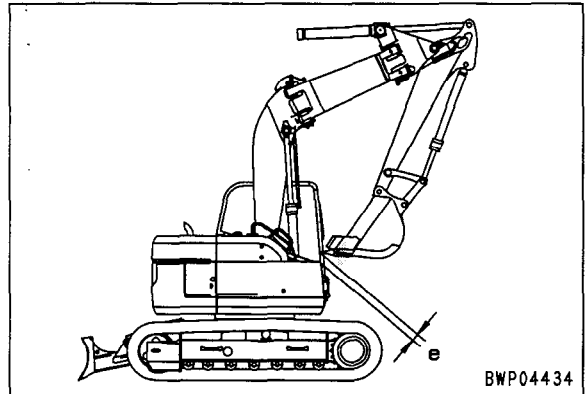
Table 1

Name of group	Abnormal system	Re-enact
	11 Defective resetting of boom angle	<input type="checkbox"/>
	12 Defective resetting of arm angle	<input type="checkbox"/>
	13 Defective resetting of boom angle + arm angle	<input type="checkbox"/>
	14 Defective resetting of offset angle	<input type="checkbox"/>
	15 Defective resetting of boom angle + offset angle	<input type="checkbox"/>
	16 Defective resetting of arm angle + offset angle	<input type="checkbox"/>
	17 Defective resetting of boom angle + arm angle + offset angle	<input type="checkbox"/>
Reset		
	21 Defective resetting of front face stop position	<input type="checkbox"/>
	22 Defective resetting of side face stop position	<input type="checkbox"/>
	23 Defective resetting of front face stop position + side face stop position	<input type="checkbox"/>
	24 Defective compensation of depth display	<input type="checkbox"/>
	25 Defective resetting of front face stop position + defective compensation of depth display	<input type="checkbox"/>
	26 Defective resetting of side face stop position + defective compensation of depth display	<input type="checkbox"/>
	27 Defective resetting of front face stop position + side face stop position + defective compensation of depth display	<input type="checkbox"/>

- ★ The bold lines indicate displays for individual systems.

12. Resetting of right exterior parts interference prevention control (Boom LOWER stop angle)

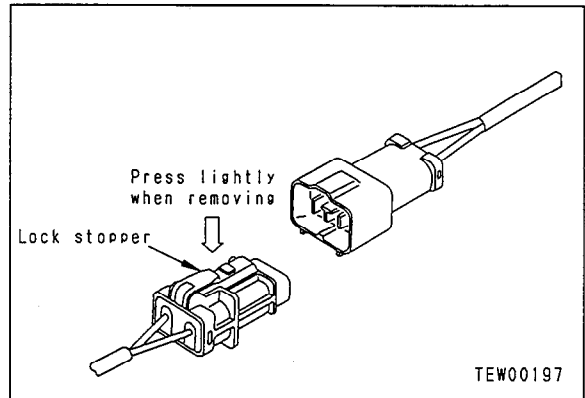
- 1) Set the work equipment in the following position.
Raise the boom to the top (It is not necessary to move the cylinder to the stroke end) and "move the offset to the right end" and "move the arm to the inner end".
※ Operate the emergency work equipment operation switch, and check that the offset cylinder is at the RIGHT stroke end and the arm cylinder is at the IN stroke end.
- 2) Lower the boom or curl or dump the bucket to bring the work equipment to the desired lowering stop position, taking care not to interfere with the right exterior parts.
★ Adjust distance "e" between the right exterior parts and bucket tooth tip to 50 - 150 mm.
★ The bucket moves IN by some distance further than the set position because of its inertia. Count in this distance in advance.
- 3) Turn the starting switch to the OFF position to stop the engine, then turn it to the ON position again.
- 4) Connect reset power terminal (1) and reset terminal (3).
★ Set the mode selector switch to "Height".
★ The reset power terminal (CN-K10) (1) is a plug (green harness) and the reset terminal (CN-K9) (3) is a socket (green harness which is taped).
- 5) Check that the electric system caution lamp of the monitor panel starts flashing at intervals of 1 second after 2 seconds.
★ If error "F1" (Boom angle reset trouble) is displayed, the correction value is out of the adjustment range (+30 degrees, -10 degrees). In this case, perform the above procedures again from 2).
- 6) Disconnect terminal (CN-K10) (1) and (CN-K9) (3), then turn the starting switch to the OFF position.
- 7) Turn the starting switch to the ON position, and the resetting operation is finished.
★ Run the engine at full throttle and have the work equipment stop automatically to check that it stops at the desired position.
- 8) After finishing the resetting operation, tape the reset terminal as before.



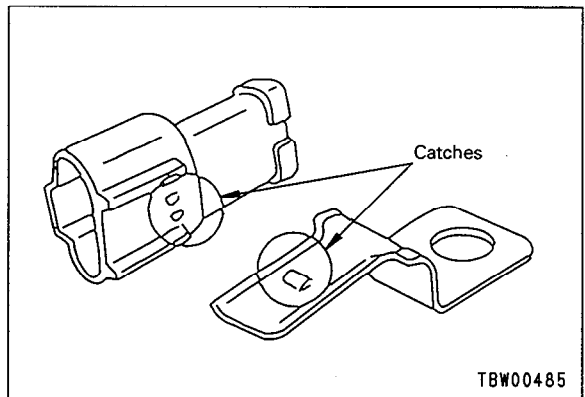
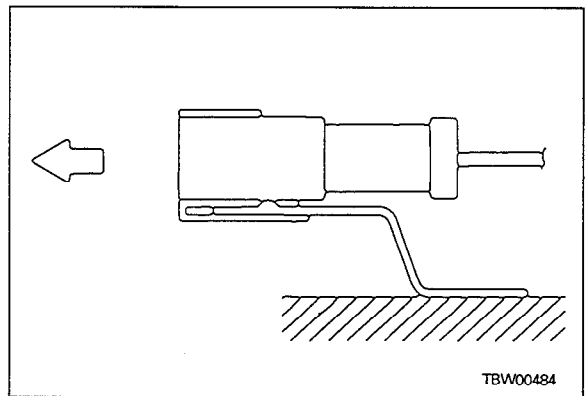
2) Removing, installing, and drying connectors and wiring harnesses

● Disconnecting connectors

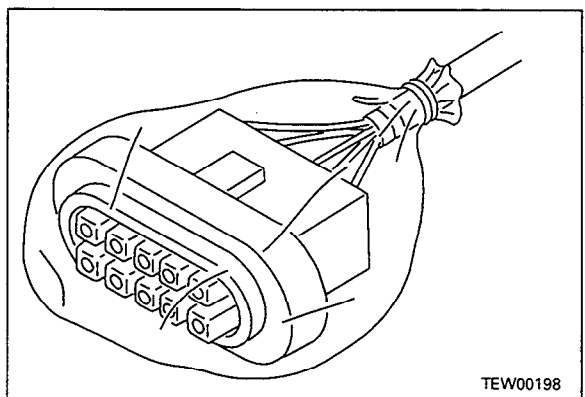
- ① Hold the connectors when disconnecting. When disconnecting the connectors, hold the connectors and not the wires. For connectors held by a screw, loosen the screw fully, then hold the male and female connectors in each hand and pull apart. For connectors which have a lock stopper, press down the stopper with your thumb and pull the connectors apart.
 - ★ Never pull with one hand.



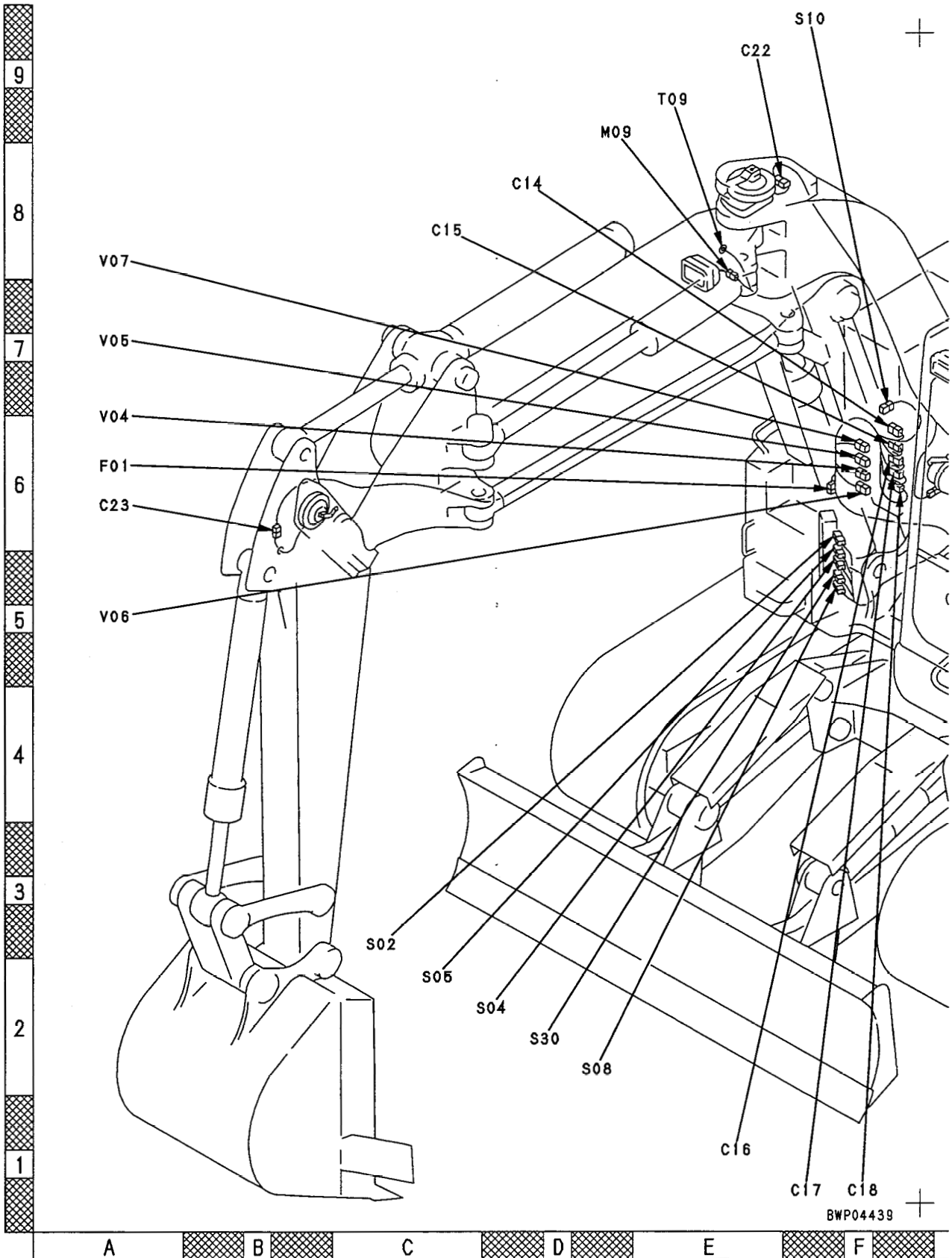
- ② When removing from clips. When removing a connector from a clip, pull the connector in a parallel direction to the clip.
 - ★ If the connector is twisted up and down or to the left or right, the housing may break.



- ③ Action to take after removing connectors. After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.
 - ★ If the machine is left disassembled for a long time, it is particularly easy for improper contact to occur, so always cover the connector.



CONNECTOR ARRANGEMENT DIAGRAM



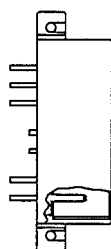
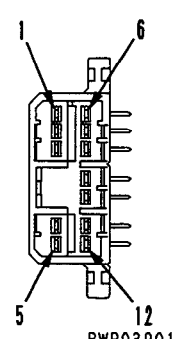
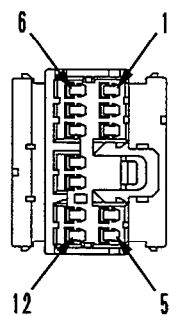
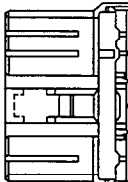
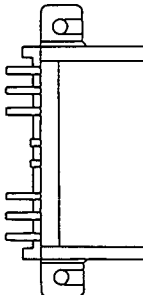
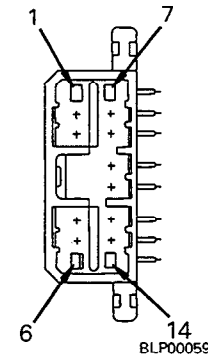
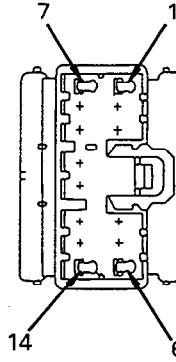
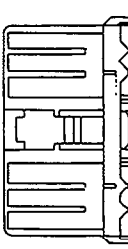
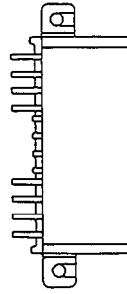
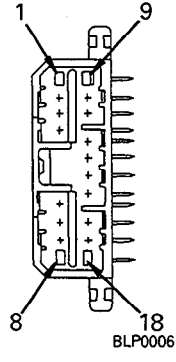
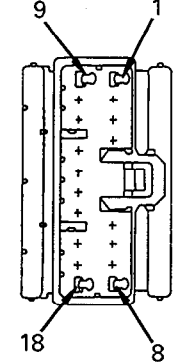
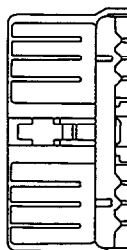

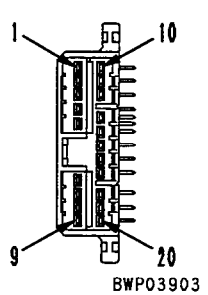
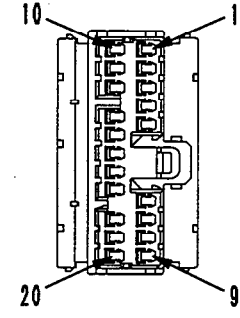
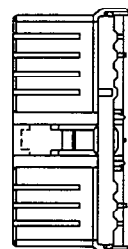
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No. of pins	AMP070 type connector	
	Male (female housing)	Female (male housing)
12	  <p>BWP03901</p>	  <p>BWP03902</p>
14	  <p>BLP00059</p>	  <p>BLP00060</p>
18	  <p>BLP00061</p>	  <p>BLP00062</p>
20	  <p>BWP03903</p>	  <p>BWP03904</p>

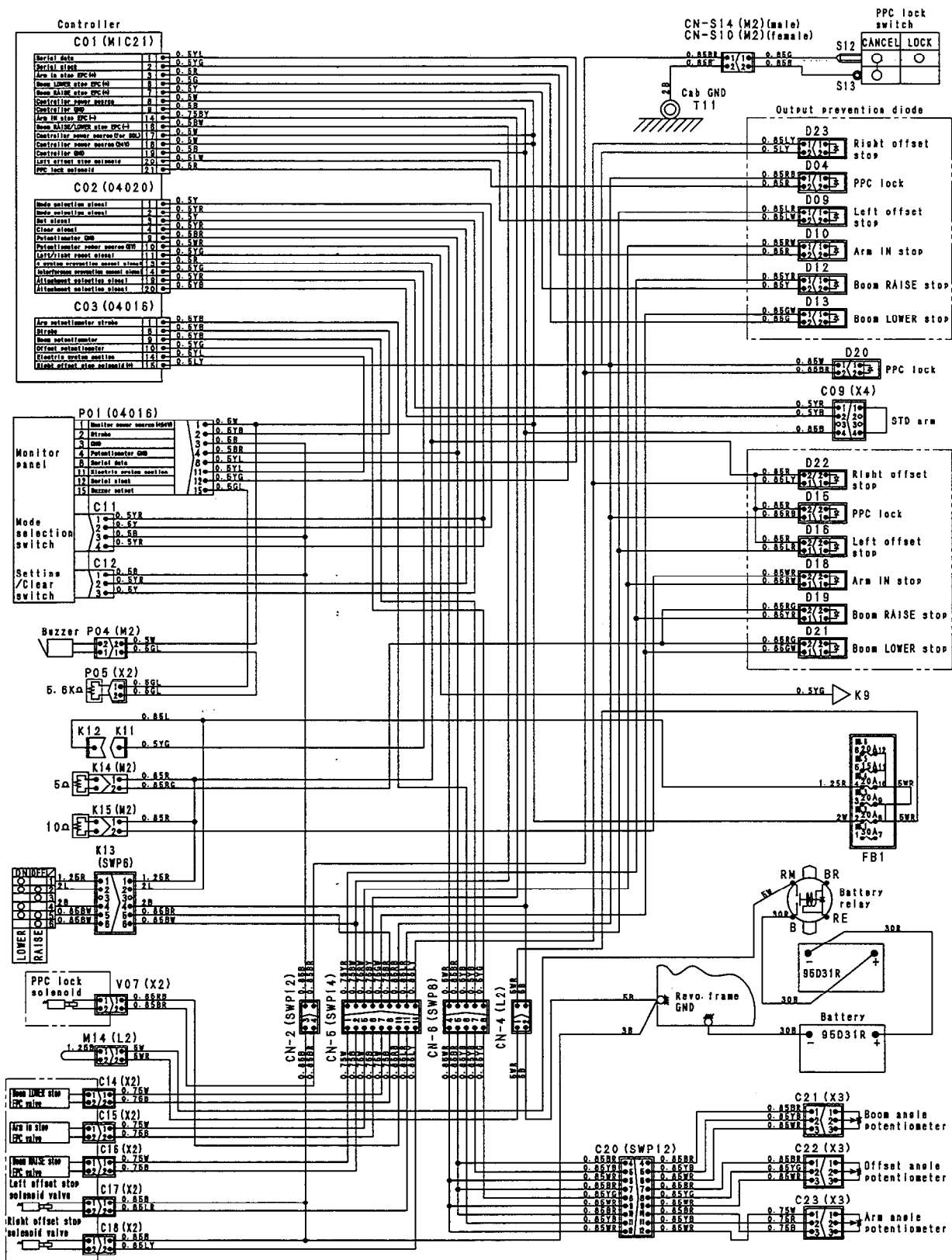
Sequence of operation and condition of machine		Check items (when normal)	
		Monitor panel	Controller
⑩	Turn system cancel switch ON ↓	• Electrical system lamp flashes in approx. 1-second cycle	Buzzer sounds for approx. 7 sec
	Carry out ④ and ⑤ ↓	• Electrical system lamp flashes in approx. 1-second cycle	• Work equipment can be operated freely (but there is no automatic stop)
	Turn system cancel switch OFF	• Electrical system lamp goes OFF	
⑪	Raise work equipment 0.5 m from ground, set mode selection switch to DEPTH, then turn setting switch to SET ↓	• Depth mode indicator lights up	• Buzzer sounds twice • Work equipment stops near set position • Buzzer sounds twice
	Raise boom, then lower it		
⑫	Raise work equipment 1 m from ground, set mode selection switch to HEIGHT, then turn setting switch to SET ↓	• Height mode indicator lights up	• Buzzer sounds twice • Work equipment stops near set position • Buzzer sounds twice
	Lower boom, then raise it.		
⑬	Offset arm to left, set mode selection switch to OFFSET, then turn setting switch to SET ↓	• Offset mode indicator lights up	• Buzzer sounds twice • Arm stops near set position • Buzzer sounds twice
	Offset arm to right, then offset it to left		
⑭	Raise work equipment 1 m from ground, set mode selector switch to DEPTH DISPLAY 0 SET, then turn setting switch to SET ↓	• Depth display shows [0.0]	
	Lower bucket to ground	• Value on depth display increases from [0.1]	
⑮	Turn starting switch OFF	• All OFF	• All OFF

TROUBLESHOOTING OF CONTROLLER, ELECTRICAL SYSTEM (E MODE)

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ELECTRICAL CIRCUIT DIAGRAM FOR CONTROLLER SYSTEM


1. 4 system



TJP02190

E-4 Error code [34] (Abnormality in offset potentiometer system) is displayed

- ★ 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.



34

1

Is voltage between C02 (10) and (12) normal?

- 0.3 – 4.7 V
- Turn starting switch ON.

2 YES

Is [34] displayed under same conditions as when measuring Item 1?

- Turn starting switch ON.

3

Is resistance between C23 (male) (3) - (1), and (2) - (1) as shown in Table 1?

- Disconnect C23.
- Turn starting switch OFF.

4 YES

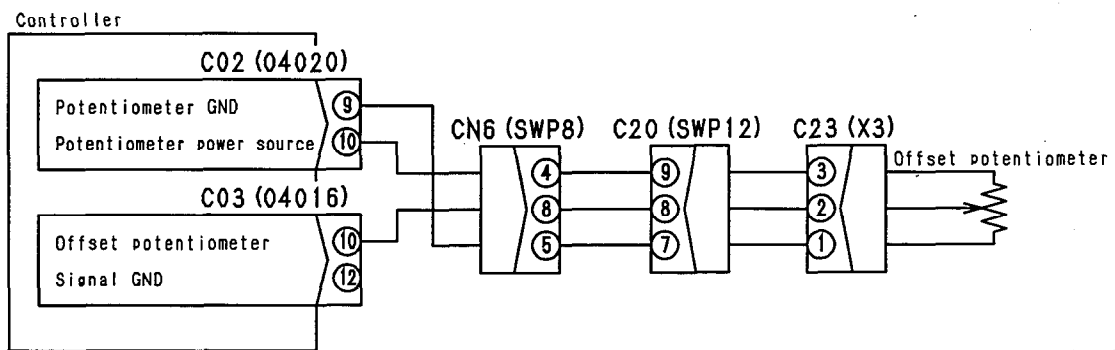
Is resistance in wiring harness between C03 (female) (10) and K52 (female) (2) normal, and is circuit insulated from chassis?

- Disconnect C03 and C23.
- Turn starting switch OFF.
- Resistance value of wiring harness: Max. 1 Ω
- Between wiring harness and chassis: Min. 1 MΩ

C23 (male)	Resistance
Between (3) - (1)	4 - 6 kΩ
Between (2) - (1)	0.2 - 7 kΩ

Cause	Remedy
Defective controller	Replace
System is reset	—
Defective contact, or disconnection in wiring harness between C02 (female) (10), (9) -C23 (female) (1), (3) or wiring harness short circuiting with ground	Repair wiring harness, or replace
Defective contact, or disconnection in wiring harness between C03 (female) (10) - C23 (female) (2), or wiring harness short circuiting with ground	Repair wiring harness, or replace
Defective offset potentiometer	Replace

E-4 Related electric circuit diagram



TJP02198

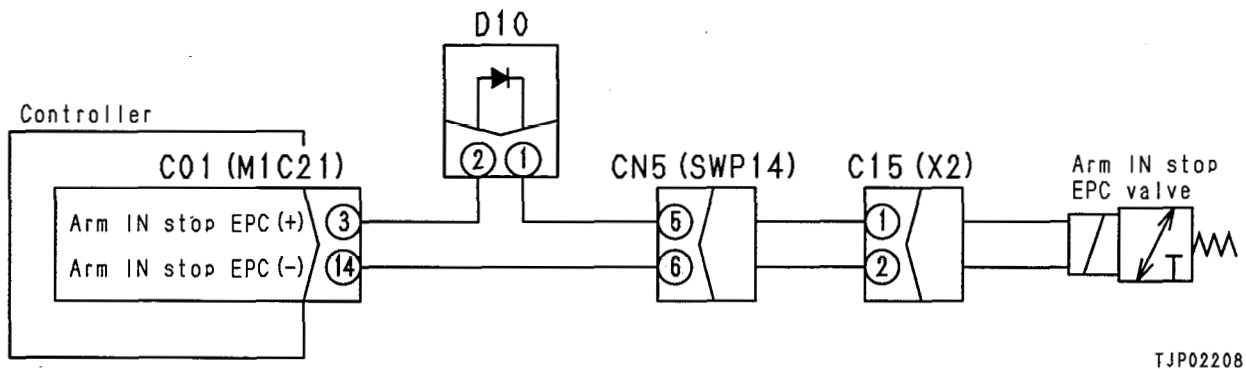
E-14 Error code [81] (Abnormality in arm IN stop solenoid system) is displayed

- ★ 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
<div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px; font-size: 24px; font-weight: bold; text-align: center;">81</div> <div> <p>Is resistance between C15 (male) (1) and (2) normal and are they insulated from chassis?</p> <ul style="list-style-type: none"> • Between C15 (male) (1) and (2): 5 – 25Ω • Between C15 (male) (1), (2) and chassis: Min. 1 MΩ • Disconnect C15. • Turn starting switch OFF. </div> </div> <p>YES</p> <div style="display: flex; align-items: center;"> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p>Is there continuity in harness between C01 (female) (3) and C15 (female) (1)? Is harness insulated from chassis?</p> <ul style="list-style-type: none"> • Disconnect C01 and C15. • Max. 10Ω • Measure on C01 (female) side in diode range (Note). • Turn starting switch OFF. </div> <div> <p>YES</p> <p>2</p> </div> </div> <div style="border: 1px solid black; padding: 5px; margin-right: 10px;"> <p>Is resistance between C01 (female) (14) and C15 (female) (2) normal and are they insulated from chassis?</p> <ul style="list-style-type: none"> • Between harnesses: Max. 1Ω • Between harness and chassis: Min. 1 MΩ • Disconnect C01 and C15. • Turn starting switch OFF. </div> <div> <p>YES</p> <p>3</p> </div>		

Note: If an ordinary tester is set in the diode range, the voltage of the battery in itself is indicated. When a harness containing a diode is checked with this tester, "if this voltage does not change, there is not continuity", and "if this voltage changes, there is continuity".

E-14 Related electric circuit diagram



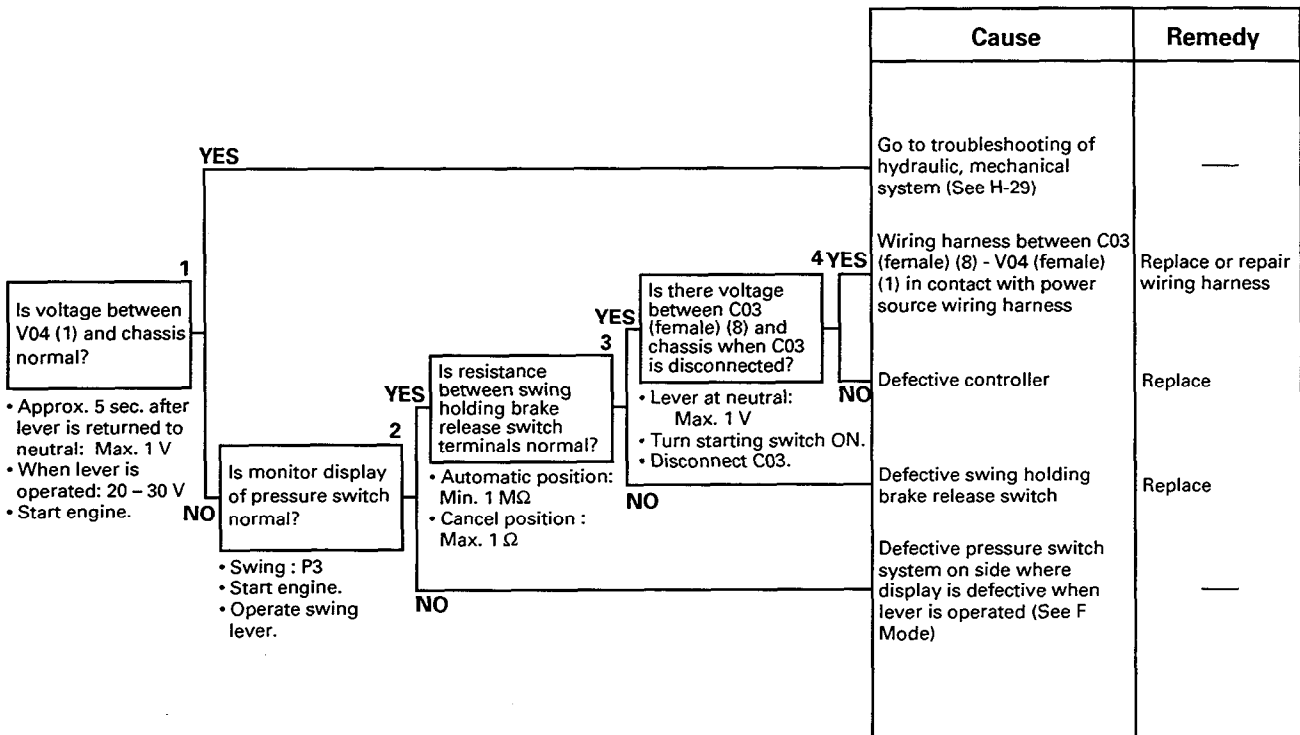
TJP02208

E-15 Error code [C1] (3 seconds passed after boom LOWER and RAISE pressure switches were input simultaneously) is displayed

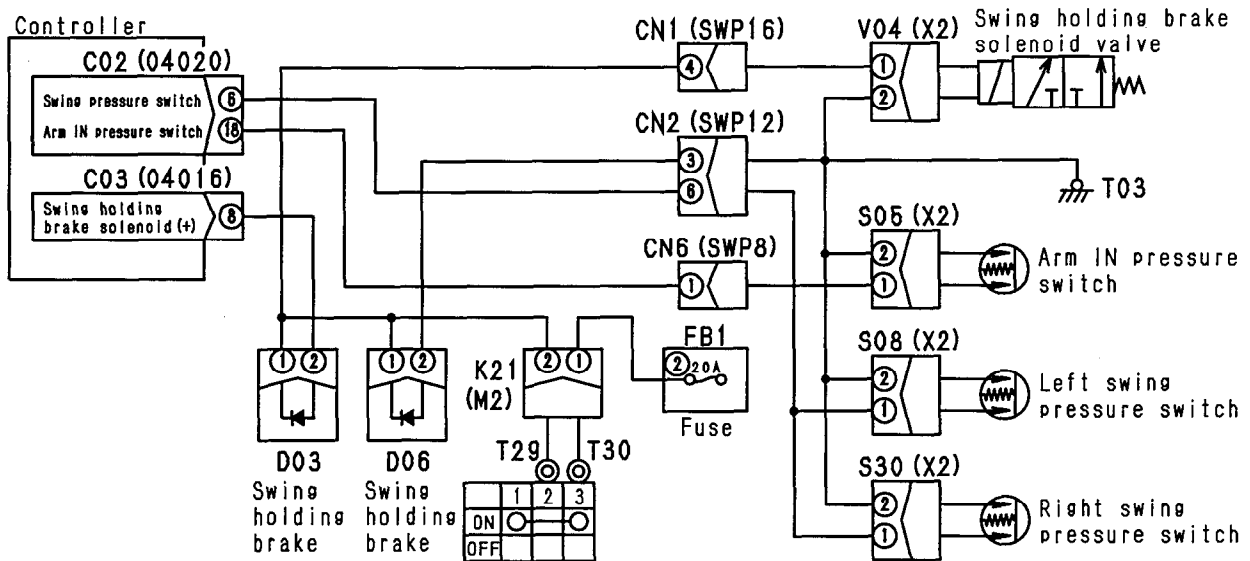
1. For inspection of boom RAISE pressure switch, see F-1.
2. For inspection of boom LOWER pressure switch, see F-2.

E-24 Excessive hydraulic drift of swing

- ★ 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.
- ★ Carry out troubleshooting for the swing holding brake release switch at the CANCEL position.



E-24 Related electric circuit diagram

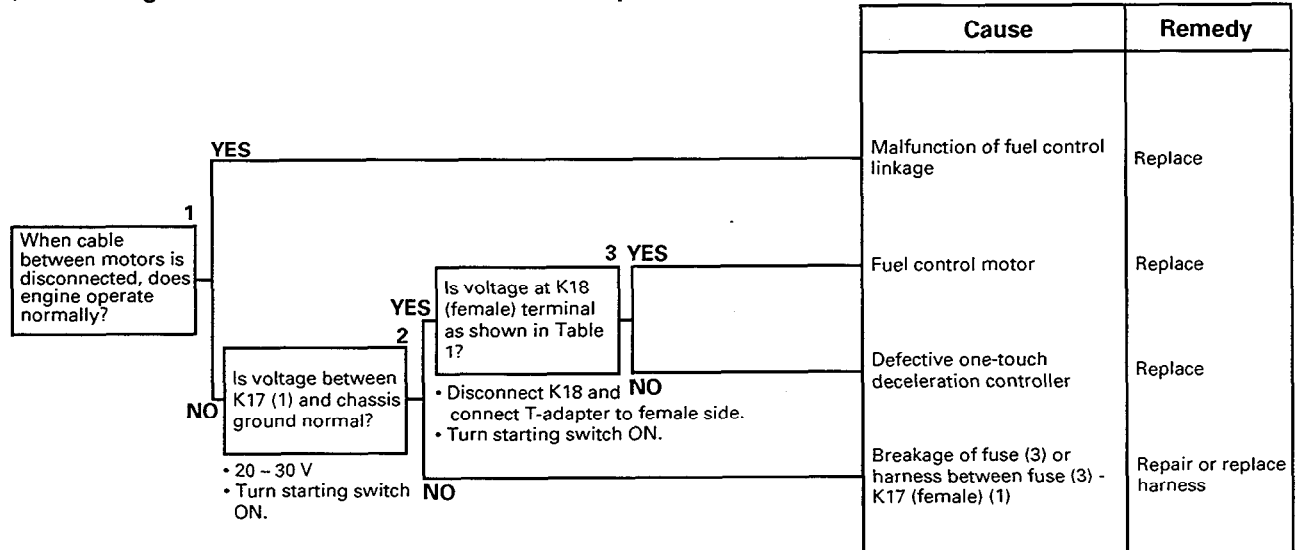


TJP02215

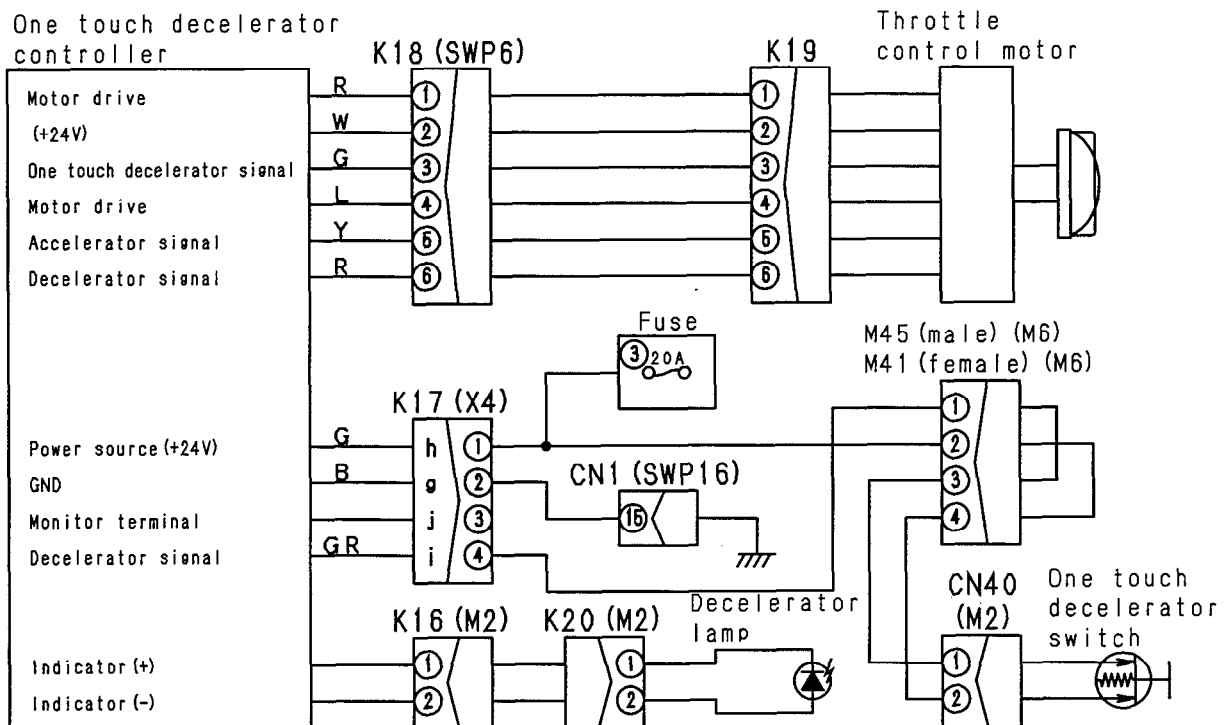
E-30 Engine control is abnormal

- ★ When the controller does not indicate any abnormality
- ★ 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.
- ★ Check that fuel control cable is not damaged or bent sharply.

a) When engine does not start or it starts but stops soon



E-30 a) Related electric circuit diagram



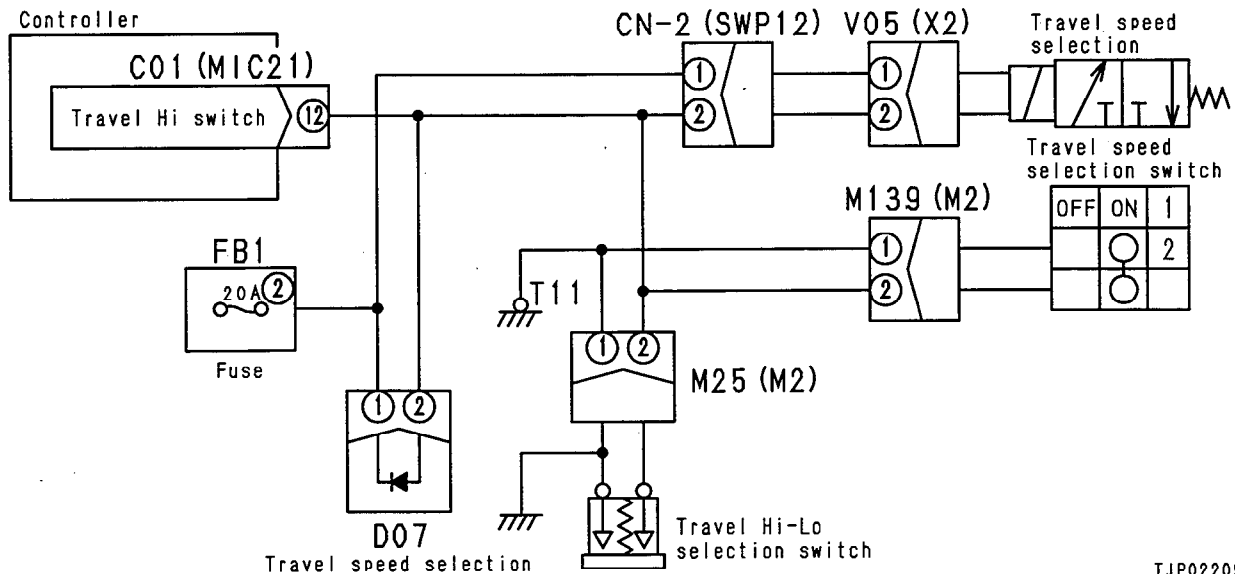
TJP02222

F-6 Monitor does not display [Hi] (Travel speed selector switch)

- ※ Displayed on only the display unit of the controller.
- ★ 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.

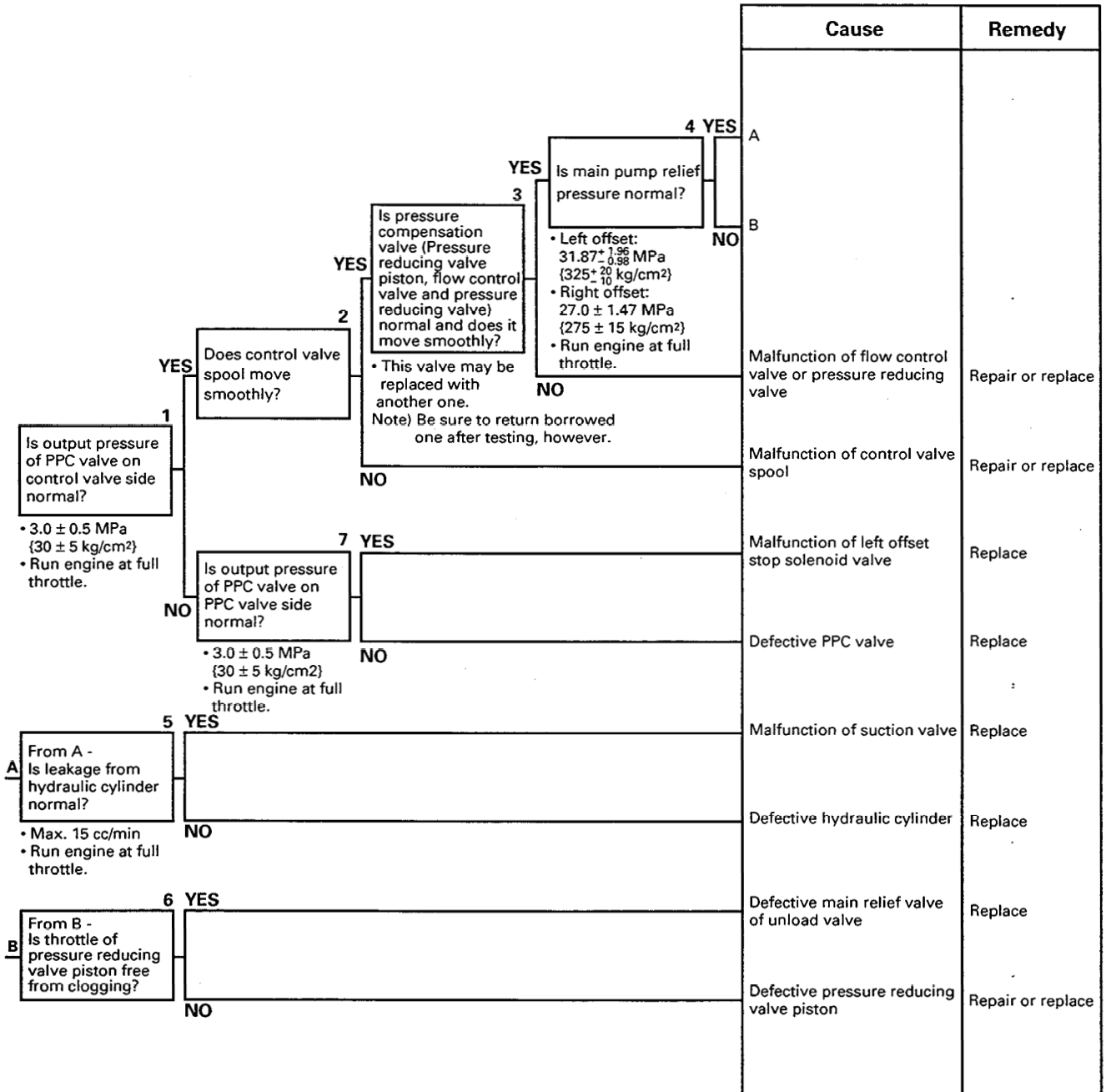
		Cause	Remedy	
<p>1</p> <p>Is voltage between C01 (12) and chassis ground normal?</p> <ul style="list-style-type: none"> • When switch is ON: Max. 1 V • When switch is OFF: Min. 4 V • Turn starting switch ON. 	YES	Defective controller	Replace	
	NO	<p>2</p> <p>Is resistance between M25 or M39 (male) (1) and (2) normal?</p> <ul style="list-style-type: none"> • When switch is ON: Max. 1Ω • When switch is OFF: Min. 1 MΩ • Disconnect M25 (seesaw switch) or M39 (pedal switch). • Turn starting switch OFF. 	<p>Defective contact or disconnection in wiring harness between M25 of M39 (female) (2) - C01 (female) (12)</p> <p>Defective contact, disconnection or short circuit with chassis ground in wiring harness between M25 or M39 (female) (1) - chassis</p>	Replace harness
	NO			Replace harness
	YES	<p>3</p> <p>Is resistance between M25 or M39 (female) (1) chassis normal?</p> <ul style="list-style-type: none"> • Max. 1Ω • Disconnect M25 (seesaw switch) or M39 (pedal switch). • Turn starting switch OFF. 	Defective travel speed selector switch	Replace

F-6 Related electric circuit diagram



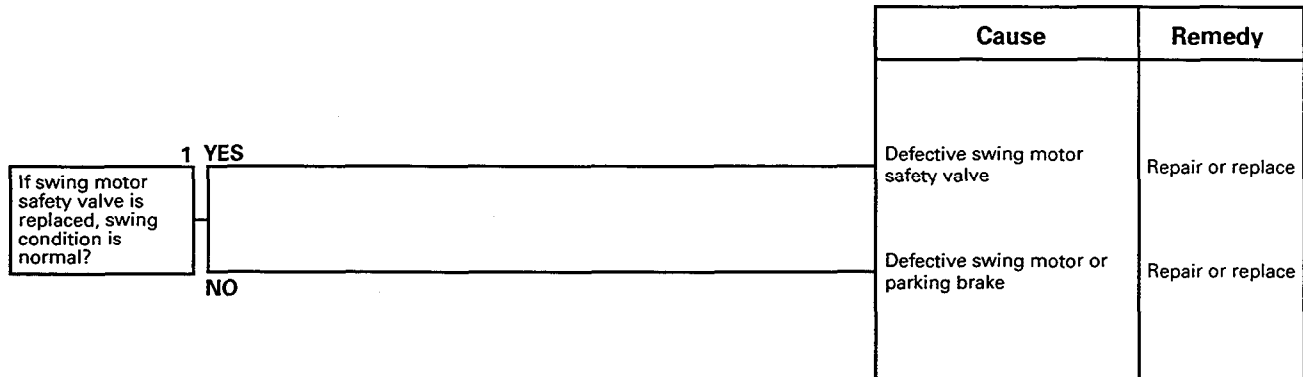
TJP02209

H-10 Offset speed or power is low

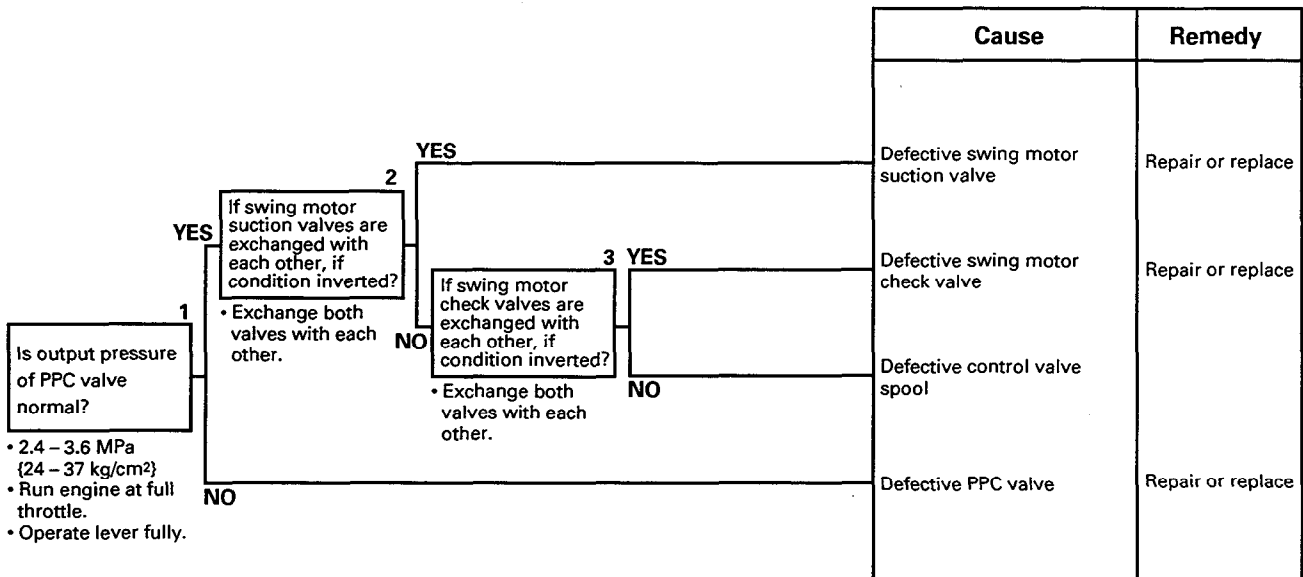


H-24 Swing acceleration or swing speed is low

a) When swing acceleration or swing speed is low in either direction



b) When swing acceleration or swing speed is low in only one direction

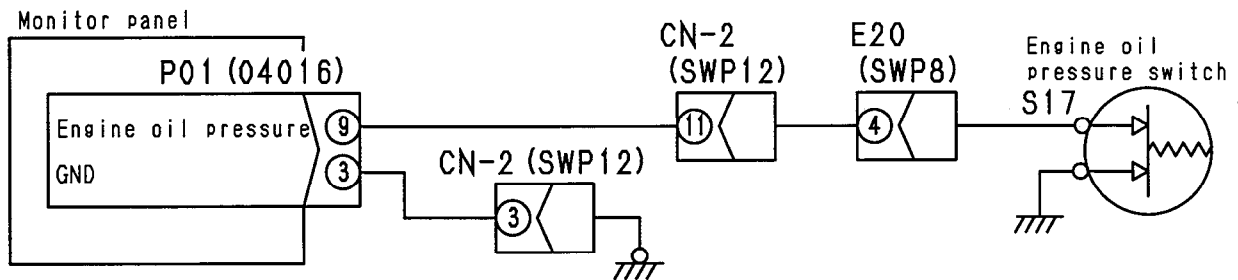


M-5 After starting switch is turned to ON position (before engine is started), engine oil pressure caution lamp does not light up

- ★ 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.

		Cause	Remedy
<p>1</p> <p>Is continuity between pressure switch terminal (S17) and chassis ground normal?</p> <ul style="list-style-type: none"> • Max. 0.5Ω • Disconnect (+) terminal of sensor (S17). • Turn starting switch OFF. 	<p>YES</p> <p>2</p> <p>Is continuity between P01 (female) (9) and (3) normal?</p> <ul style="list-style-type: none"> • Max. 0.5Ω • Disconnect P01. • Turn starting switch OFF. 	Defective monitor panel	Replace
	NO	Defective contact or disconnection in wiring harness between P01 (female) (9) - S17 (Harness side)	Repair or replace harness
	NO	Defective engine oil pressure switch	Replace

M-5 Related electric circuit diagram

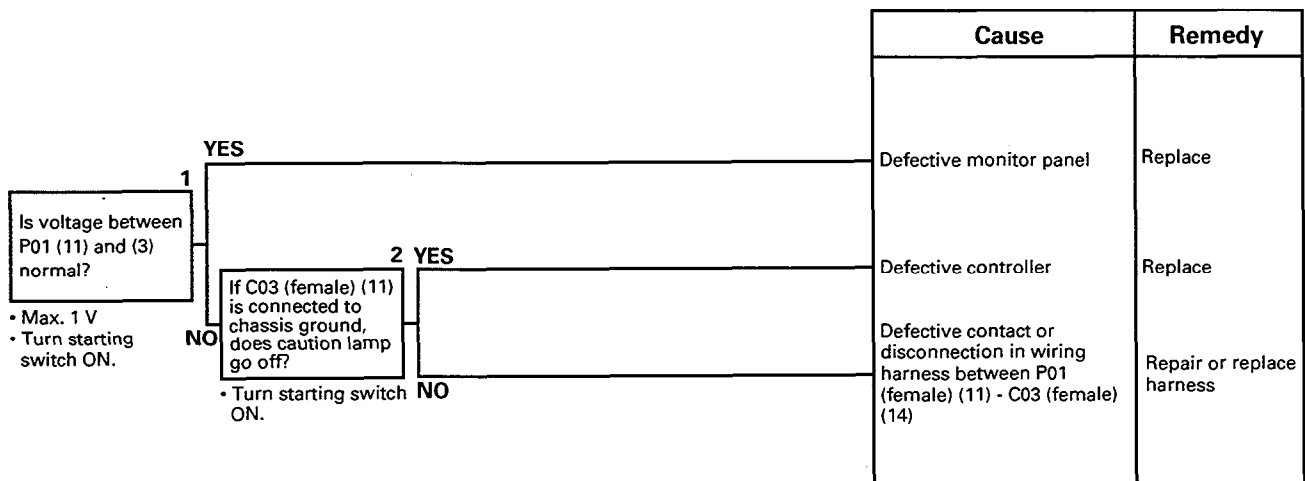


TJP02231

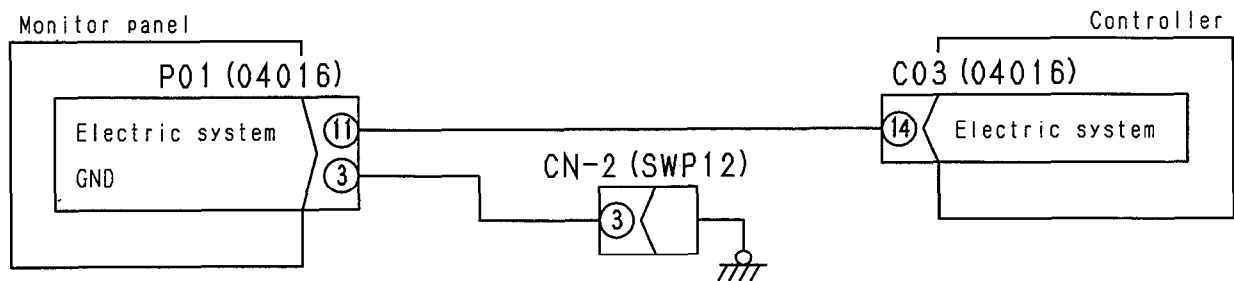
M-14 Electric system caution lamp keeps lighting up

(Controller displays no abnormality and operation is normal)

- ★ 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.



M-14 Related electric circuit diagram



TJP02238

S-2 Engine does not start

(1) Engine does not turn

General causes why engine does not turn

- Internal parts of engine seized
- ★ If internal parts of the engine are seized, carry out troubleshooting for "Engine stops during operations".
- Defective electrical system
- Failure in power train

		Causes								
		Defective wiring of starting circuit	Defective or deteriorated battery	Defective starting motor	Broken ring gear	Defective safety relay	Defective battery relay or safety switch	Defective battery relay	Defective fuel cut solenoid	Defective starting switch
Questions	Confirm recent repair history									
	Degree of use of machine		△		△					
	Condition of horn when starting switch is turned ON	Horn sounds	◎					○		○
		Horn volume is low		◎						
	When starting switch is turned to START, pinion moves out, but	Speed of rotation is low		◎						
		Makes grating noise			◎	◎				
		Soon disengages pinion again					◎			
	Check items	Makes rattling noise and does not turn		○	○		○			
		When starting switch is turned to START, pinion does not move out	◎	○						○
		When starting switch is turned to ON, there is no clicking sound		○				◎		
Battery terminal is loose								◎		
When starting switch is turned ON, linkage is not actuated								◎		
When battery is checked, battery electrolyte is found to be low	◎									
Troubleshooting	Specific gravity of electrolyte, voltage of battery is low		●							
	For the following conditions 1) - 5), turn the starting switch OFF, connect the cord, and carry out troubleshooting									
	1) When terminal B and terminal C of starting switch are connected, engine starts								●	
	2) When terminal B and terminal C of starting motor are connected, engine starts			●						
	3) When terminal B and terminal C of safety relay are connected, engine starts					●				
	4) When terminal of safety switch and terminal B of starting motor are connected, engine starts					●				
	5) There is no 24V between battery relay terminal b and terminal E						●			
When ring gear is inspected directly, tooth surface is found to be chipped			●							
Cannot be moved by hand even when linkage of fuel cut solenoid is disconnected								●		
Remedy	—	Replace	Replace	Replace	Replace	Replace	Replace	Replace	Replace	

S-10 Fuel consumption is excessive

General causes why fuel consumption is excessive

- Leakage of fuel
- Improper condition of fuel injection
- Excessive injection of fuel

		Causes							
		Defective injection pump (excessive injection)	Defective nozzle holder spray	Defective injection pump plunger	External leakage from fuel piping	Leakage of fuel inside head cover	Defective oil seal inside feed pump	Defective adjustment of fuel control linkage	
Questions	Confirm recent repair history								
	Degree of use of machine	Operated for long period	△	△			△		
Condition of fuel consumption	More than for other machines of same model	Gradually increased	○	○					
		Suddenly increased			○	○			
		Exhaust smoke color	Black	◎	○	○			○
Check items		White				○			
	Seal on injection pump has come off	◎							
	There is irregular combustion	◎							
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low	◎	○						
	Match mark on injection pump is misaligned			◎					
	There is external leakage of fuel from engine				◎				
	Engine oil level rises and smells of diesel fuel	○				◎	◎		
	Engine low idling and high idling speeds are high	○						◎	
	Troubleshooting	Injection pump measurement shows that injection amount is excessive	●						
Speed does not change when operation of certain cylinders is stopped			●						
When control rack is pushed, it is found to be heavy, or does not return				●					
When check is made using delivery method, injection timing is found to be incorrect					●				
Remove head cover and inspect directly						●			
Remove feed pump and inspect directly							●		
When engine speed is measured, low idling and high idling speeds are found to be high								●	
	Remedy	Adjust	Replace	Replace	Adjust	Correct	Correct	Correct	Adjust

PRECAUTIONS WHEN CARRYING OUT OPERATION

[When carrying out removal or installation (disassembly or assembly) of units, be sure to follow the general precautions given below when carrying out the operation.]

1. Precautions when carrying out removal work

- If the coolant contains antifreeze, dispose of it correctly.
- After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
- When draining oil, prepare a container of adequate size to catch the oil.
- Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
- To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors. Do not pull the wires.
- Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
- Check the number and thickness of the shims, and keep in a safe place.
- When raising components, be sure to use lifting equipment of ample strength.
- When using forcing screws to remove any components, tighten the forcing screws uniformly in turn.
- Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.

★ Precautions when handling piping during disassembly

Fit the following blind plugs into the piping after disconnecting it during disassembly operations.

Nominal number	Plug (nut end)	Sleeve nut (elbow end) Use the two items below as a set
02	07376-50210	07221-20210 (Nut), 07222-00210 (Plug)
03	07376-50315	07221-20315 (Nut), 07222-00312 (Plug)
04	07376-50422	07221-20422 (Nut), 07222-00414 (Plug)
05	07376-50522	07221-20522 (Nut), 07222-00515 (Plug)
06	07376-50628	07221-20628 (Nut), 07222-00616 (Plug)
10	07376-51034	07221-21034 (Nut), 07222-01018 (Plug)
12	07376-51234	07221-21234 (Nut), 07222-01219 (Plug)

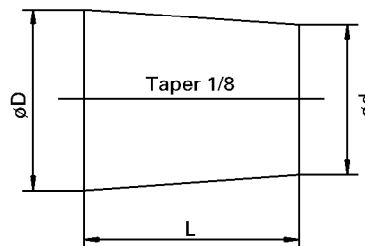
1) Hoses and tubes using sleeve nuts

Nominal number	Flange (hose end)	Sleeve head (tube end)	Split flange
04	07379-00400	07378-10400	07371-30400
05	07379-00500	07378-10500	07371-30500

2) Split flange type hoses and tubes

3) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Part Number	Dimensions		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34

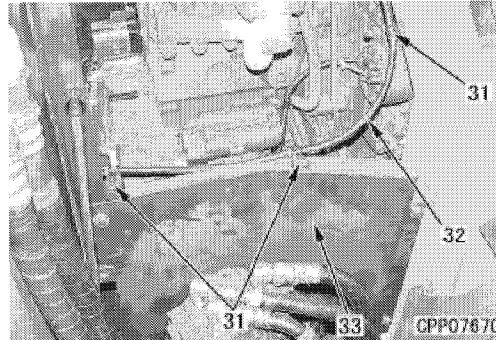


DEW00401

25. Disconnect clamp (31) to remove hose (32).
26. Remove engine side cover (33)
27. Disconnect engine connectors (34) M02 and (35) E17.
28. Disconnect starter wire (36) E13 and safety relay wire (37) E30.
29. Disconnect heater return hose (38).
30. Remove three of four engine mounts (39).
31. Temporarily lift engine main pump assembly (40), remove the remaining mounting bolt and carefully lift the assembly to remove it. ※ 2



Engine main pump assembly : 270 kg



INSTALLATION OF ENGINE MAIN PUMP ASSEMBLY


- Installation is performed in the opposite way to removal.

※ 1

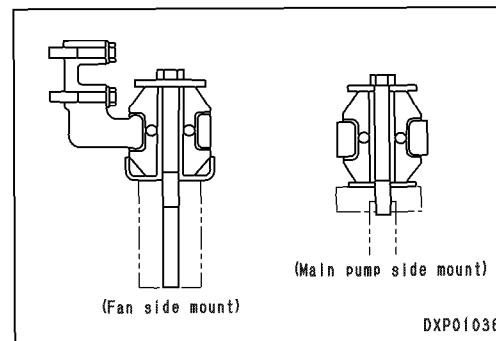
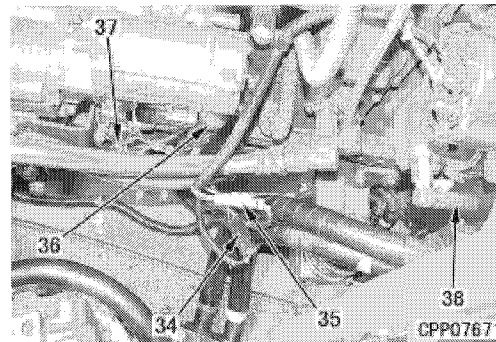
- ★ Adjust the cable length by referring to "ADJUSTMENT OF FUEL CONTROL CABLE".

※ 2

- ★ Install the engine main pump assembly by placing the engine mounting rubber as shown in the figure below.

 Engine mounting tightening bolt :
277.0 ± 31.9 Nm {28.25 ± 3.25 kgm}

- **Supplying water**
Supply water from the water filler port to the specified level, start the engine to circulate coolant and recheck the level.
- **Supplying oil (hydraulic oil tank)**
Supply oil from the oil filler port to the specified level, start the engine to circulate oil in the piping and recheck the oil level.
- **Bleeding air**
Bleed air from the main pump by referring to "BLEEDING AIR FROM EACH PART" in "INSPECTION AND ADJUSTMENT".
- **Filling air conditioning gas**
Fill air conditioning gas (R134a) in the air conditioning circuit using tool X.



ASSEMBLY OF SWING MACHINERY ASSEMBLY

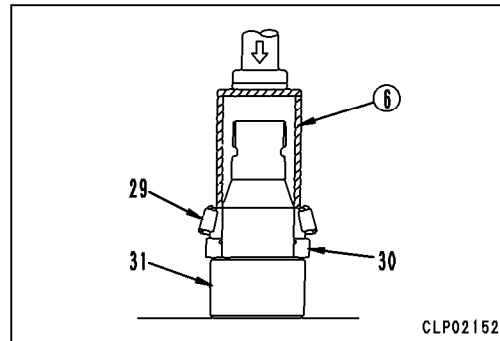
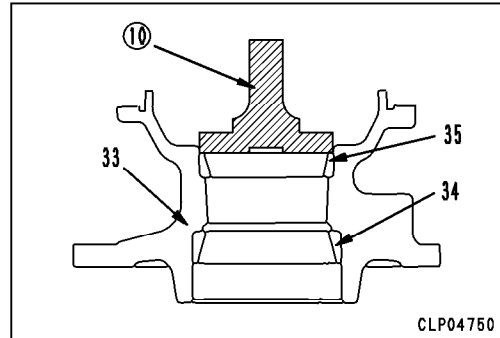
- ★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.

1. Bearing outer races

Using push tool, press fit outer races (34) and (35) to case (33).

2. Shaft assembly

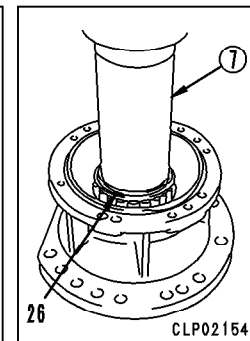
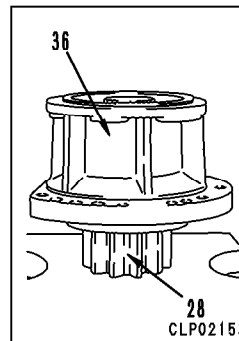
- 1) Fit O-ring to inside of collar (30) and install to shaft (31).
- 2) Using push tool ⑥, press fit bearing (29) with press.



- 3) Set case assembly (36) to shaft assembly (28).

- 4) Using push tool ⑦, press fit bearing (26) with a press to a point where split collar (25) enters.

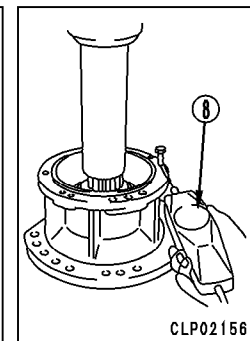
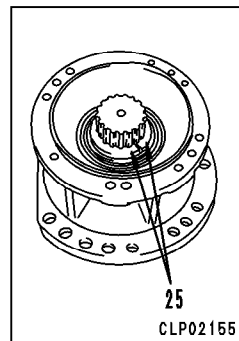
- ★ Press-fitting force : Max. 11.76 kN {1200 kg}
- ★ Press fit the bearing slowly while rotating the case.



- 5) Install split collars (25).

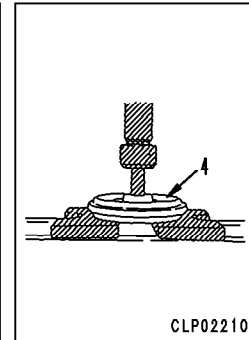
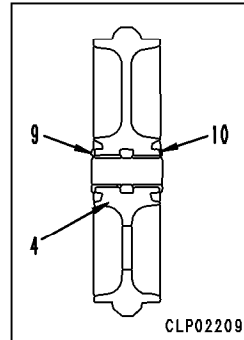
- 6) Screw bolt (12mm, P=1.75mm) into case, then using push- pull scale ⑧, measure tangential force in direction of rotation.

- ★ Tangential force : Max. 176.4 N {18 kg}
- ★ The tangential force is the maximum force at the start of rotation.

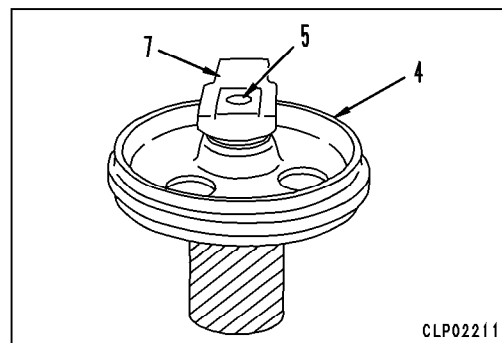
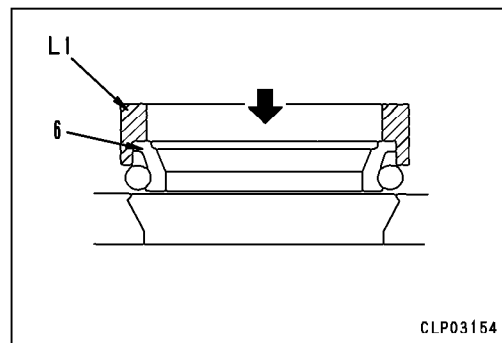
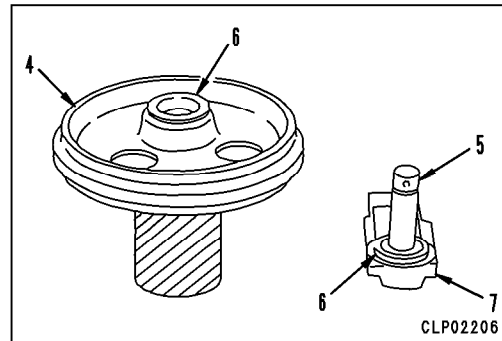


ASSEMBLY OF IDLER ASSEMBLY

1. Press fit bushings (9) and (10) to idler (4).



2. Fit O-ring and install support (7) to shaft (5) with dowel pin (8).
3. Using tool L1, install floating seal (6) to idler (4) and shaft (5) and support assembly (7).
 - ★ Coat the sliding surface of the floating seal with oil, and be careful not to let any dirt or dust get stuck to it.
 - ★ Remove all grease and oil from the contact surface of the O-ring and the floating seal.



INSTALLATION OF MAIN PUMP ASSEMBLY

- Carry out installation in the reverse order to removal.

※ 1



Mating surface of pump case :

Gasket sealant (LG-6)

- **Refilling with oil (PTO gear case)**
Add engine oil through the oil filler to the specified level.
- **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.
- **Bleeding air**
Bleed the air from main pump.
For details, see TESTING AND ADJUSTING, Bleeding air.


- ★ Apply engine oil to the sliding surface of each part before assembly.

1. Combination stud bolt (service valve added)

- ★ Assemble as follows when a service valve is added:

- 1) Temporarily tighten the four stud bolts.
- 2) Install the service valve assembly.
- 3) Install cover (133).
- 4) Engage the four washers and tighten nuts (132).

- ★ Tighten nuts ① to ④ in the above sequence and by following the procedure below.

 Nut :

1st time : 58.8 – 68.6 Nm {6 – 7 kgm}

2nd time : 78.5 – 88.3 Nm {8 – 9 kgm}


3rd time :

98.1 – 113 Nm {10 – 11.5 kgm}

When tightening, make sure that the height from the upper surface of the nut to that of the stud bolt is between 0.5mm and 3mm. If not, loosen the nut and adjust the mounting length of the stud bolt using a flat-head screwdriver.

2. Offset pressure compensation valve

- 1) Mount valve (131), piston (130) and spring (129) to mount valve (128).


 Valve : **196 – 240 Nm {20 – 24.5 kgm}**

- 2) Mount spring (127) and valve (126) to mount plug (125).

 Plug : **147 – 186 Nm {15 – 19 kgm}**

3. Bucket pressure compensation valve

- 1) Mount valve (124), piston (123) and spring (122) to mount plug (121).

 Plug (121) :

147 – 186 Nm {15 – 19 kgm}

- 2) Mount spring (120) and valve (119) to mount plug (118).

 Plug (118) :

196 – 240 Nm {20 – 24.5 kgm}

4. Arm pressure compensation valve

- 1) Mount valve (117), piston (116) and spring (115) to mount plug (114).

 Plug (114) :

147 – 186 Nm {15 – 19 kgm}

- 2) Mount spring (113) and valve (112) to mount plug (111).

 Plug (111) :

147 – 186 Nm {15 – 19 kgm}


5. Blade pressure compensation valve

- 1) Mount valve (110), piston (109) and spring (108) to mount plug (107).

 Plug (107) :

196 – 240 Nm {20 – 24.5 kgm}


- 2) Mount spring (106) and valve (105) to mount plug (104).

 Plug (104) :

147 – 186 Nm {15 – 19 kgm}

6. Boom pressure compensation valve

- 1) Mount valve (103), piston (102) and spring (101) to mount plug (100).

 Plug (100) :

147 – 186 Nm {15 – 19 kgm}


- 2) Mount spring (99) and valve (98) to mount plug (97).

 Plug (97) :

196 – 240 Nm {20 – 24.5 kgm}

7. Right and left travel pressure compensation valves

- 1) Mount valve (96) and spring (95) to mount plug (94).

 Plug (94) :


147 – 186 Nm {15 – 19 kgm}


- 2) Mount valve (93) to mount plug (92).

 Plug (92) :

147 – 186 Nm {15 – 19 kgm}

- 3) Mount spring (91) to mount bolt (90).

 Apply a drop of liquefied adhesive (Loctite 638) to the position 2mm to 3mm away from the end of the plug screw.

 Bolt (90) :

11.8 – 14.7 Nm {1.2 – 1.5 kgm}

- ★ Completely degrease and dry the bolt and the female screw using a drying spray and do not pressurize them for two hours after tightening.


- 4) Mount plug (89).

 Plug (89) :

98 – 123 Nm {10 – 12.5 kgm}


8. Swing pressure compensation valve

- 1) Mount valve (88), piston (87) and spring (86) to mount plug (85).

 Plug (85) :

147 – 186 Nm {15 – 19 kgm}

- 2) Mount spring (84) and valve (83) to mount plug (82).

 Plug (82) :

196 – 240 Nm {20 – 24.5 kgm}

REMOVAL OF ARM CYLINDER ASSEMBLY

⚠ Pull in the bucket, lower the work equipment completely to the ground, and support the arm with stand ①.


1. Sling arm cylinder (1), and remove head pin (2). ※ 1

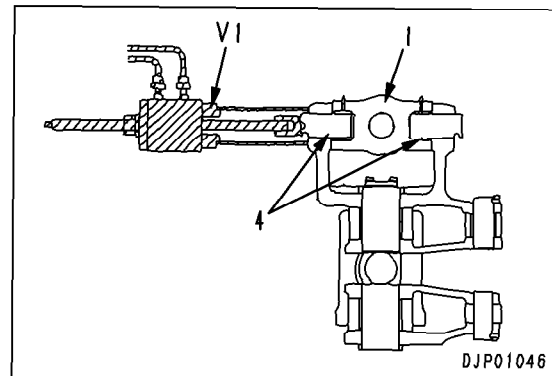
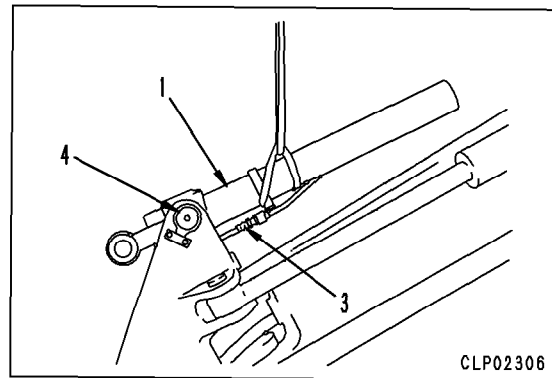
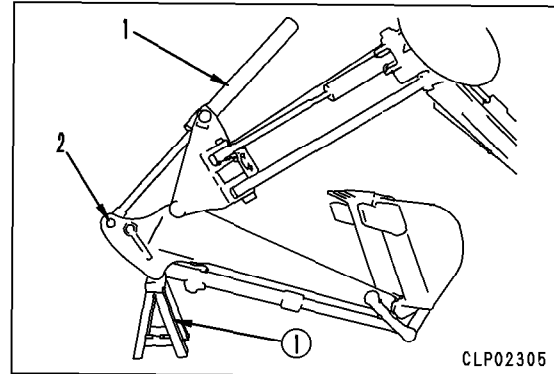
2. Start engine, and retract piston rod, then tie piston rod with wire to prevent it from coming out.

⚠ Loosen the sleeve nut of the hose slowly and check that no oil spurts out, then remove.


3. Disconnect hose (3).

4. Using tool **V1**, pull out cylinder mounting pins (4), then lift off arm cylinder assembly (1). ※ 2
★ There are shims installed, so check the number and thickness, and keep in a safe place.

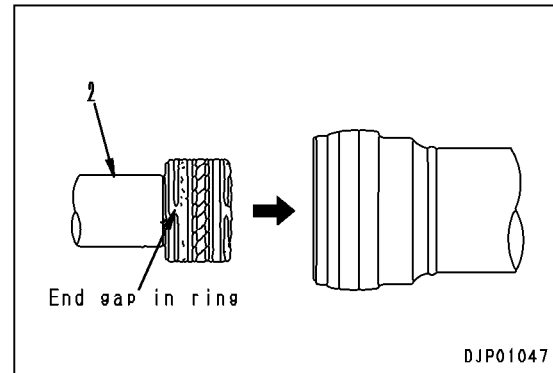
 Arm cylinder assembly : **140 kg**




5) Engage piston rod assembly (2)

 Seal : Grease (G2-LI)

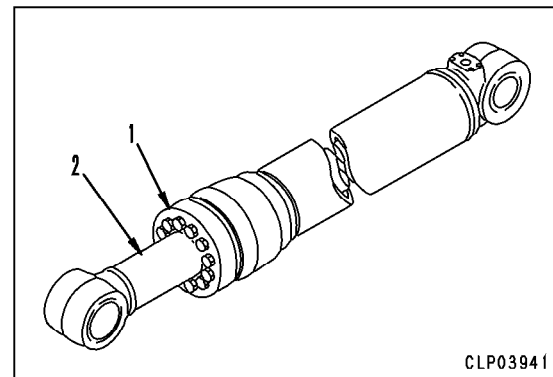
- ★ Set the ring abutment joint horizontally and align the axes of the piston rod assembly and the cylinder tube to insert them.
- ★ After insertion, make sure that the ring is not damaged or dropped and completely push the piston rod.



6) Mount head assembly (1) and tighten it with the mounting bolt.

 Mounting bolt :

Cylinder	Tightening torque
Bucket	172±25 Nm{17.5±2.5 kgm}
Arm	270±39 Nm{27.5±4.0 kgm}
Boom	172±25 Nm{17.5±2.5 kgm}
Blade	270±39 Nm{27.5±4.0 kgm}



7) Mount the piping.

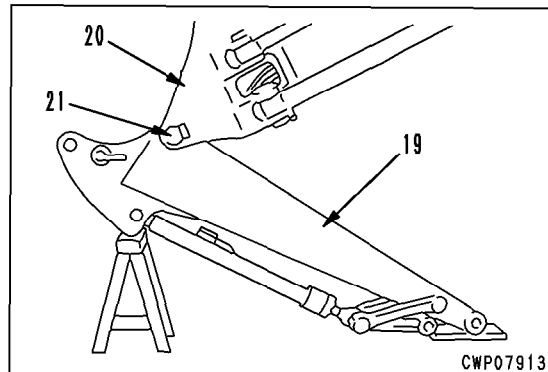
17. Remove connecting pin (21) between arm (19) and offset bracket (20). ※ 4

18. Use cancel switch and raise boom, then swing and remove arm and bucket cylinder assembly (9).

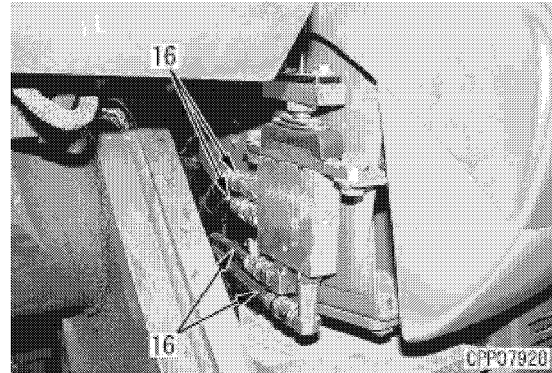
★ There are shims installed, so check the number and thickness, and keep in a safe place.



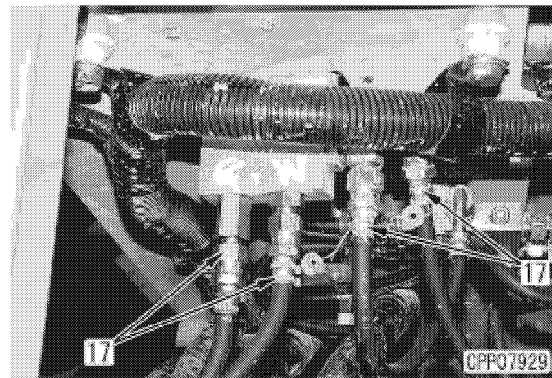
Arm, bucket cylinder assembly : **470 kg**



12. Disconnect four hoses (16) from the blade PPC valve.




13. Disconnect four hoses (17) from the offset PPC valve.

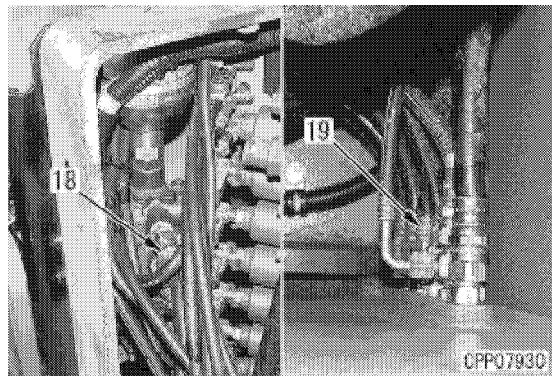


14. Disconnect PPC main pressure hose (18) (A1).

15. Disconnect PPC drain hose (19).

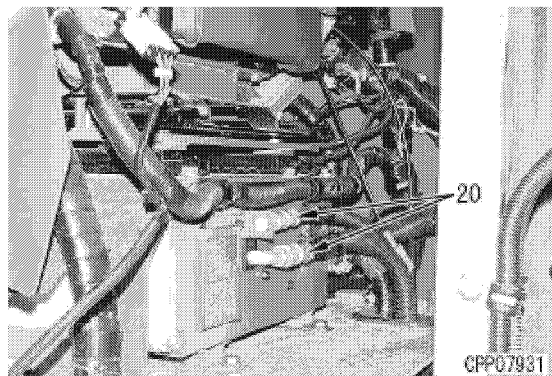
- ★ Drain the hydraulic oil.

 Hydraulic oil : 90 ℓ

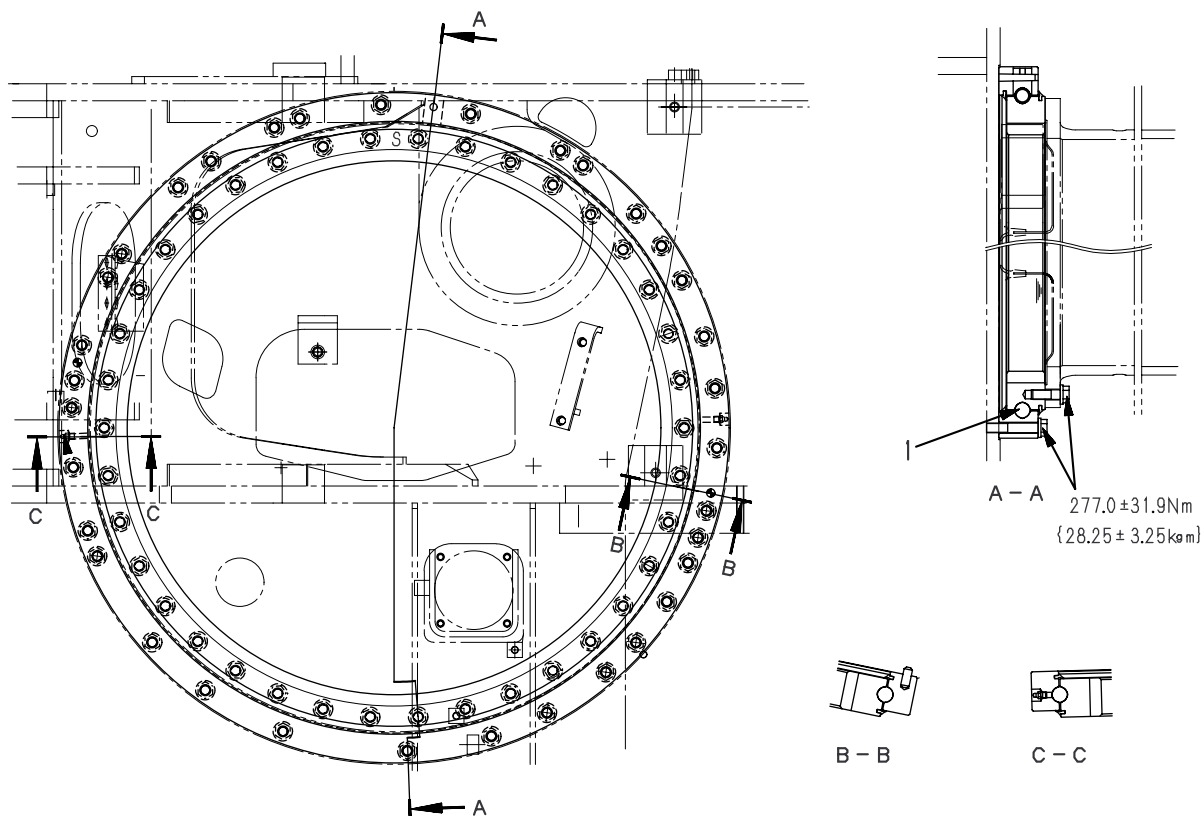


16. Disconnect two air-conditioning pipings (20).

- ★ Disconnect the hoses after completely bleeding the air conditioning gas (R134a) using tool X.
- ★ Apply the blind plug to prevent dust or water from entering the hoses.
- ★ Be careful not to damage or lose the O-ring.



SWING CIRCLE



9JA01382

Unit: mm

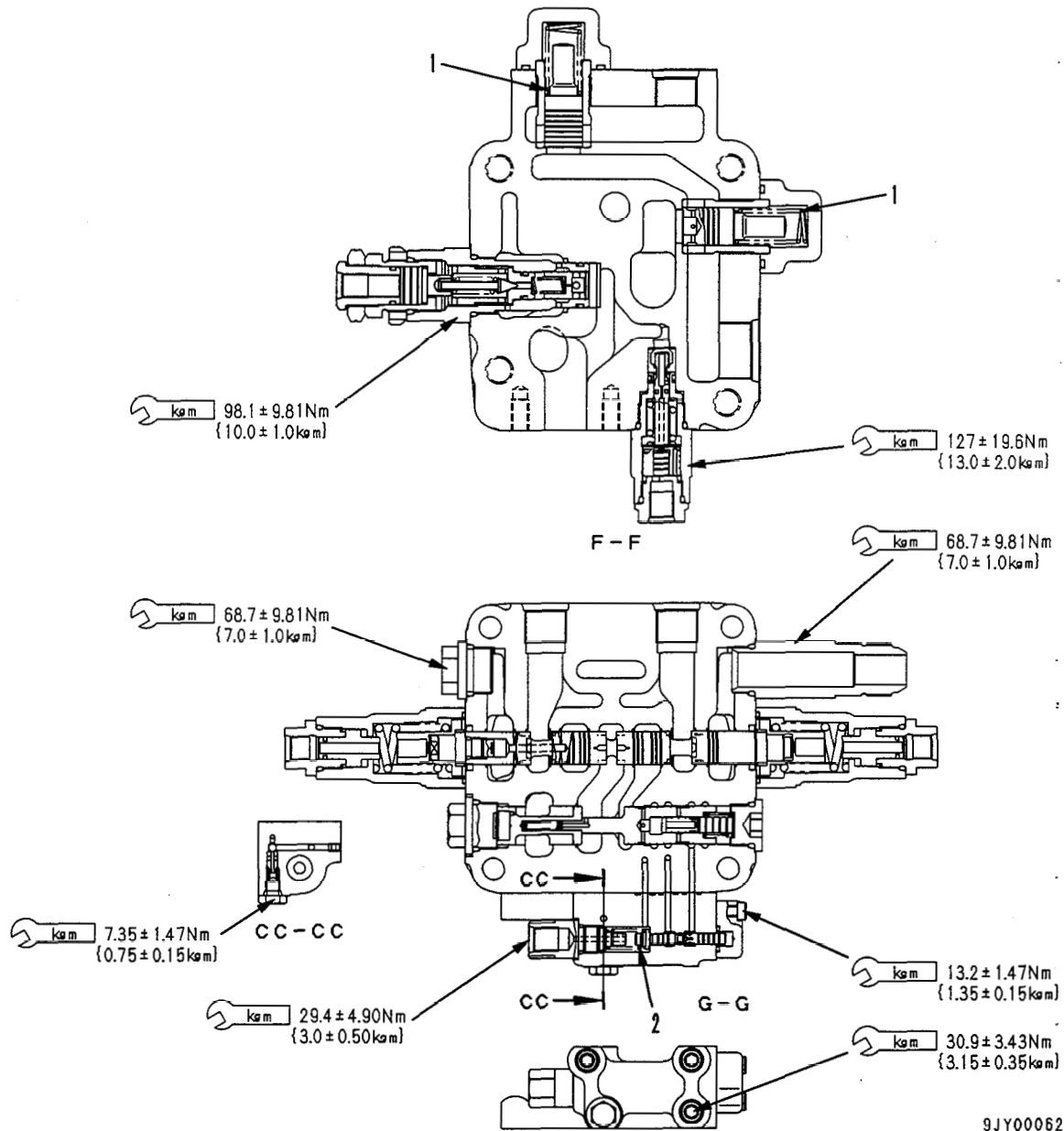
No.	Check item	Criteria		Remedy
		Standard size	Clearance limit	
1	Clearance between bearing and circle	0.5 - 1.6	2.6	Replace

Unit: mm

No.	Check item		Criteria		Remedy
1	Link pitch		Standard size	Repair limit	Reverse or replace
			175.25	178.25	
2	Bushing outer diameter		Standard size	When turned	Reverse or replace
				Normal load	
			46.3	—	42.3
3	Link height		Standard size	Repair limit	Reverse or replace
			86	81	
4	Link wall thickness (at the section where bushing is to be press fit)		24		Replace
5			102.4		
6	Shoe bolt pitch		86.4		
7			57		
8	Link	Inner width	52.4		Reverse or replace
9		Total width	35		
10		Width of tread	30.1		
11	Pin protrusion volume		5.5		Adjust or replace
12	Regular bushing protrusion volume		3.75		
13	Total pin length		173		
14	Total bushing length (master bushing)		86.7		
15	Bushing wall thickness		7.8		
16	Spacer thickness		—		
17	Press fitting force	Bushing	39.2 – 137.3 kN {4 – 14 ton}		—
18		Regular pin	78.5 – 186.3 kN {8 – 19 ton}		
※ 19		Master pin	39.2 – 98.1 kN {4 – 10 ton}		

Items with ※ marking are applicable to the dry type shoe.

(6/10)

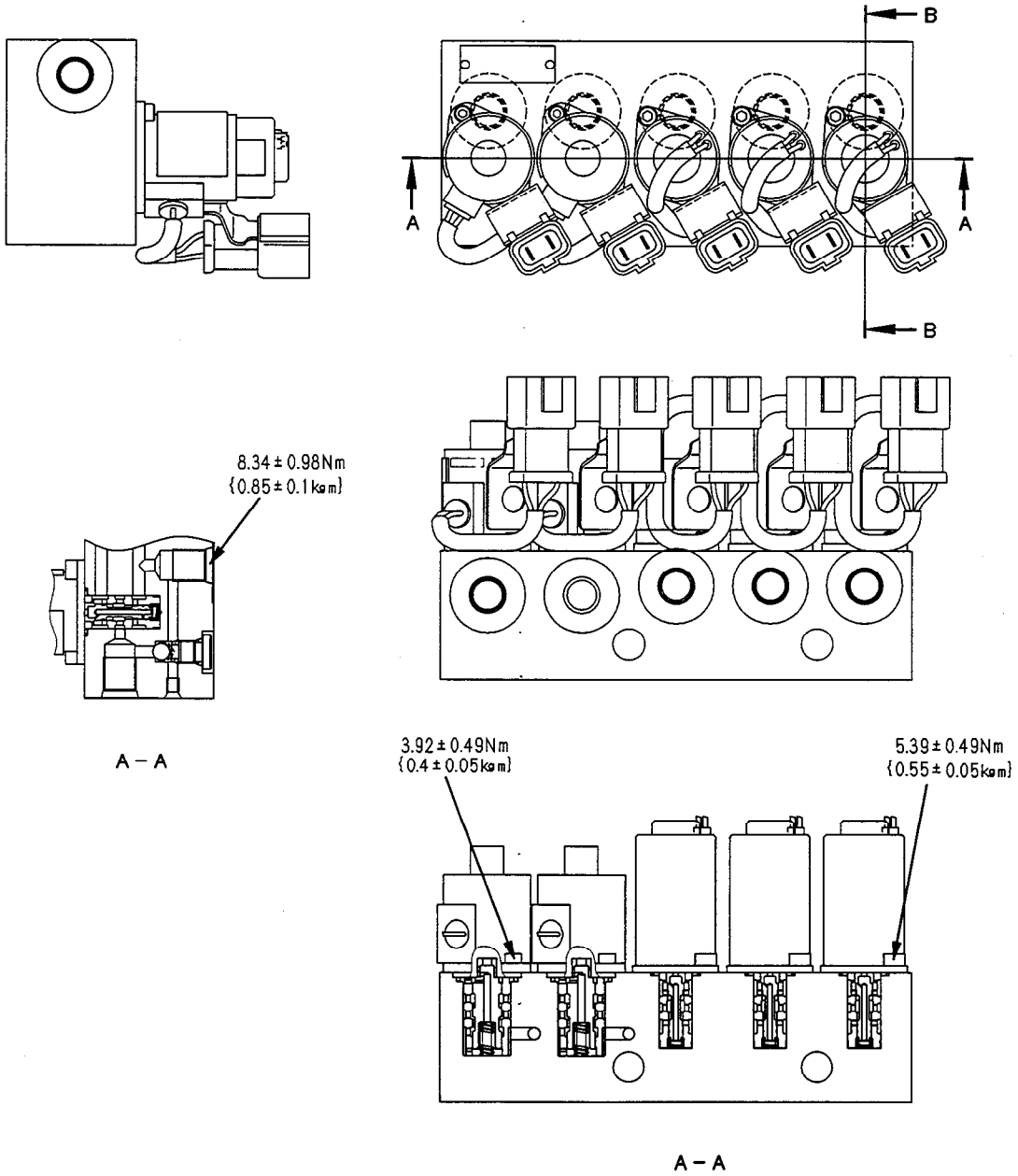


9JY00062

Unit: mm

No.	Check item	Criteria				Remedy
		Standard size		Repair limit		
1	Lift check valve spring Cooler bypass valve spring	Free length × O.D.	Installed length	Installed load	Free length	Replace spring if any damages or deformations are found
		72.7 × 20.6	42.5	135 ± 4.90 N {13.8 ± 0.50 kg}	—	
2	Bleed spool return spring	23.3 × 12.5	23.0	3.92 ± 0.98 N {0.40 ± 0.10 kg}	—	2.94 N {0.30 kg}

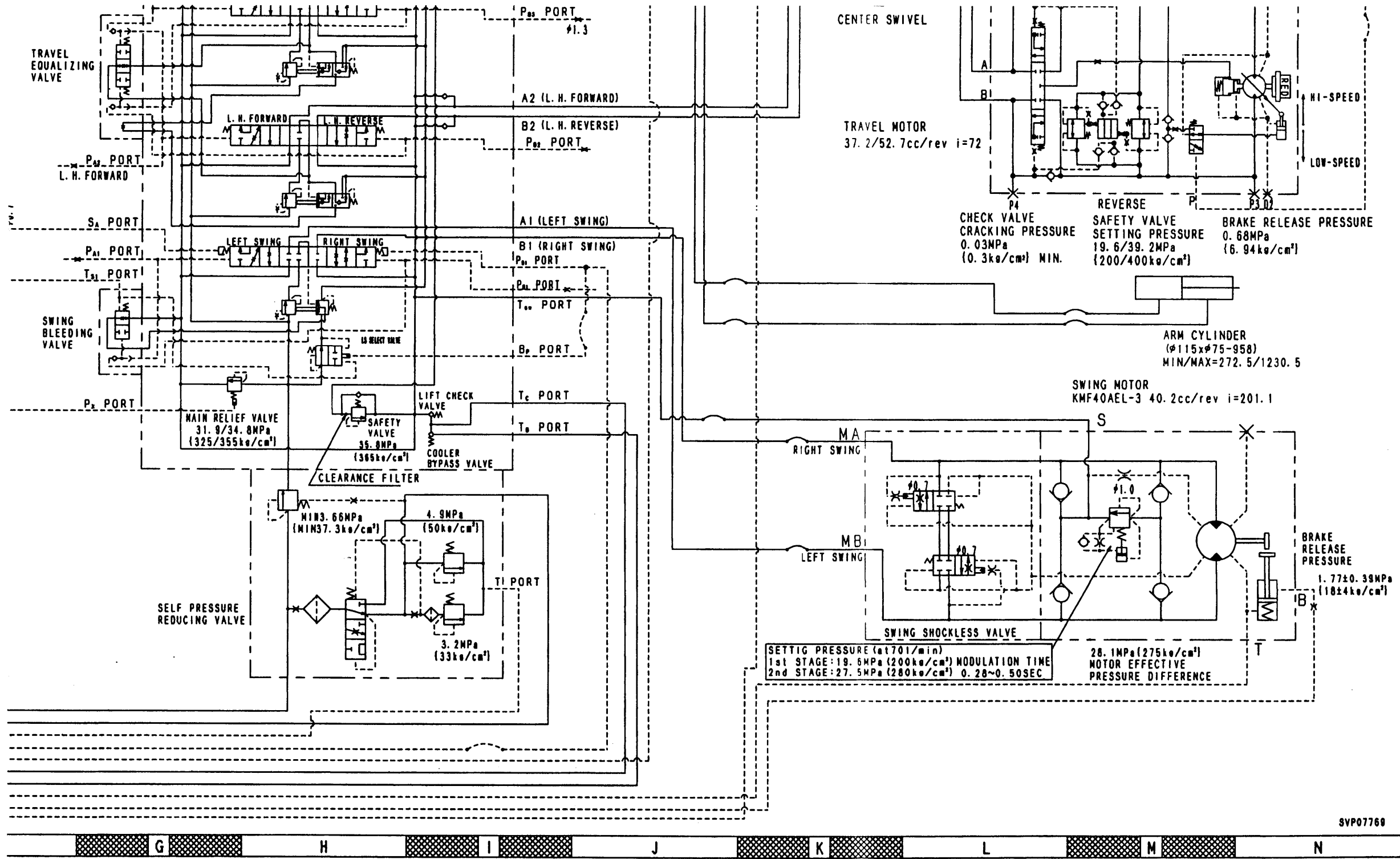
EPC SOLENOID VALVE FOR 4-SYSTEM CONTROL



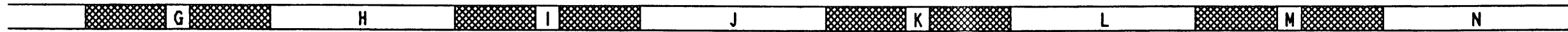
9JB00168

Unit: mm

No.	Check item	Criteria				Remedy	
		Standard size	Tolerance		Standard clearance		Clearance limit
	Shaft		Hole				
1	Clearance between 1st boom and revolving frame mounting pin and bushing	ø 80	-0.030 -0.104	+0.240 +0.174	0.204 – 0.344	0.8	Replace bushing, pin
2	Clearance between 1st boom and 2nd boom mounting pin and bushing	ø 110	-0.036 -0.090	+0.207 +0.120	0.156 – 0.297	0.8	
3	Clearance between 2nd boom and 3rd bracket mounting pin and bushing	ø 110	-0.036 -0.090	+0.207 +0.120	0.156 – 0.297	0.8	
4	Clearance between 1st boom and sub-link mounting pin and bushing	ø 60	-0.030 -0.104	+0.197 +0.137	0.167 – 0.301	0.8	
5	Clearance between 3rd bracket and sub-link mounting pin and bushing	ø 60	-0.030 -0.104	+0.197 +0.137	0.167 – 0.301	0.8	
6	Clearance between 3rd bracket and arm mounting pin and bushing	ø 70	-0.030 -0.100	+0.141 +0.074	0.104 – 0.241	0.8	
7	Clearance between arm and bucket mounting pin and bushing	ø 60	-0.030 -0.080	+0.129 +0.074	0.104 – 0.209	0.8	
8	Clearance between arm and link mounting pin and bushing	ø 60	-0.030 -0.080	+0.135 +0.074	0.104 – 0.215	0.8	
9	Clearance between link and link mounting pin and bushing	ø 65	-0.030 -0.080	+0.133 +0.074	0.104 – 0.213	0.8	
10	Clearance between link and bucket mounting pin and bushing	ø 60	-0.030 -0.080	+0.130 +0.074	0.104 – 0.210	0.8	
11	Clearance between blade and track frame mounting pin and bushing	ø 70	-0.030 -0.100	+0.198 +0.124	0.154 – 0.298	0.8	



SVP07769



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