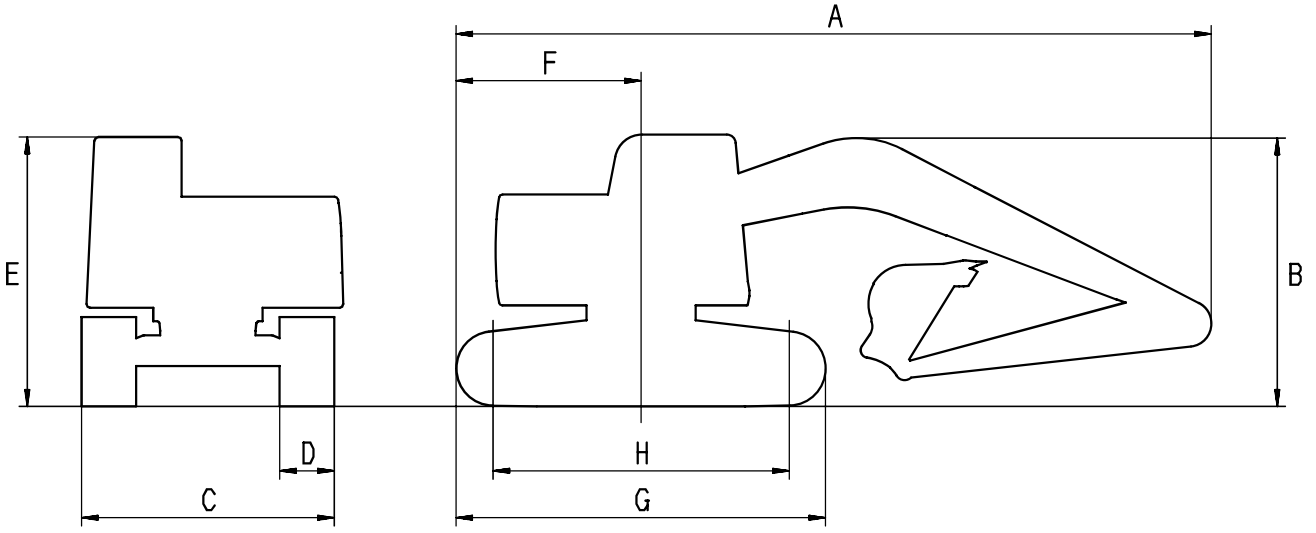
CONTENTS

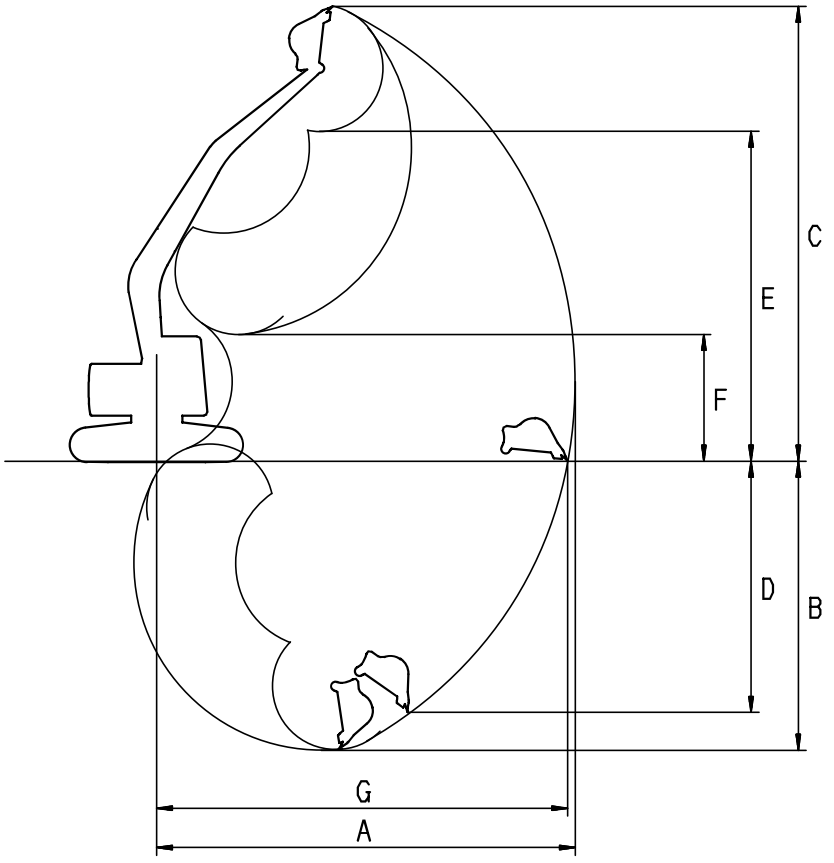
PC240LC-7K, PC240NLC-7K

DIMENSIONS



9JM01330

WORKING RANGES



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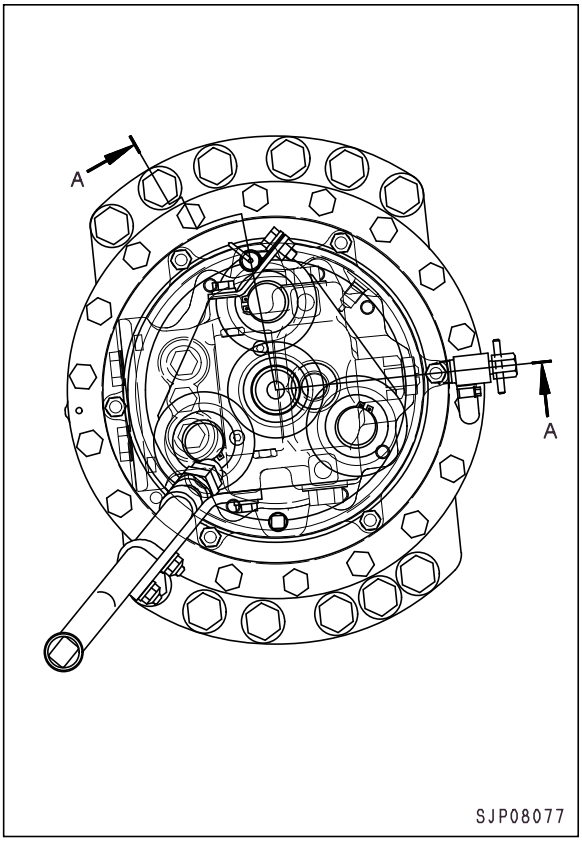


1. Swing pinion (No. of teeth: 13)
2. Spacer
3. Case
4. No. 2 planetary carrier
5. No. 2 sun gear
6. Ring gear
7. No. 1 sun gear
8. Swing motor
9. Oil level gauge
10. No. 1 planetary gear
11. No. 1 planetary carrier
12. No. 2 planetary gear
13. Drain plug

SPECIFICATIONS

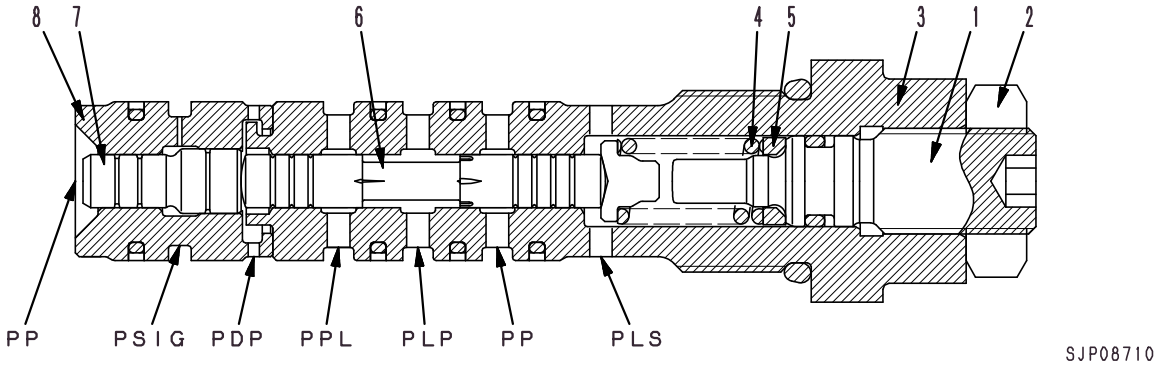
Reduction ratio:

$$\left(\frac{17+58}{17}\right)\times\left(\frac{14+58}{14}\right)=22.689$$

Unit: mm

No.	Check item	Criteria		Remedy
14	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Clearance limit	Replace
		0.18 - 0.28	—	
15	Backlash between No. 1 sun gear and No. 1 planetary gear	0.16 - 0.59	1.00	
16	Backlash between No. 1 planetary gear and ring gear	0.18 - 0.50	1.10	
17	Backlash between No. 1 planetary carrier and No. 2 sun gear	0.39 - 0.64	1.20	
18	Backlash between No. 2 sun gear and No. 2 planetary gear	0.16 - 0.44	0.90	
19	Backlash between No. 2 planetary gear and ring gear	0.18 - 0.56	1.00	
20	Backlash between No. 2 planetary carrier and swing pinion	0.08 - 0.23	—	
21	Backlash between swing pinion and swing circle	0.23 - 1.37	2.00	
22	Clearance between plate and planetary carrier	0.58 - 0.62	—	
23	Wear of swing pinion surface contacting with oil seal	Standard size	Repair limit	Apply hard chrome plating, recondition, or replace
		115 $^{0}_{-0.100}$	—	

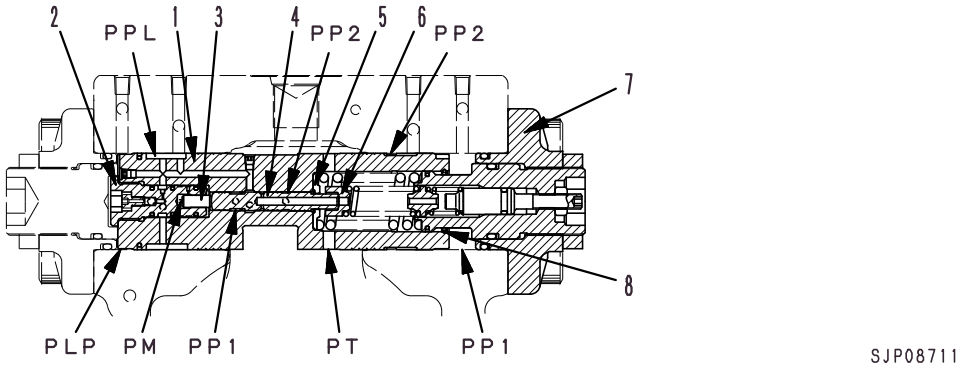
LS VALVE



1. Plug
2. Locknut
3. Sleeve
4. Spring
5. Seat
6. Spool
7. Piston
8. Sleeve

PP : Pump port
PDP : Drain port
PLP : LS control pressure output port
PLS : LS pressure input port
PPL : PC control pressure input port
PSIG : LS mode selection pilot port

PC VALVE

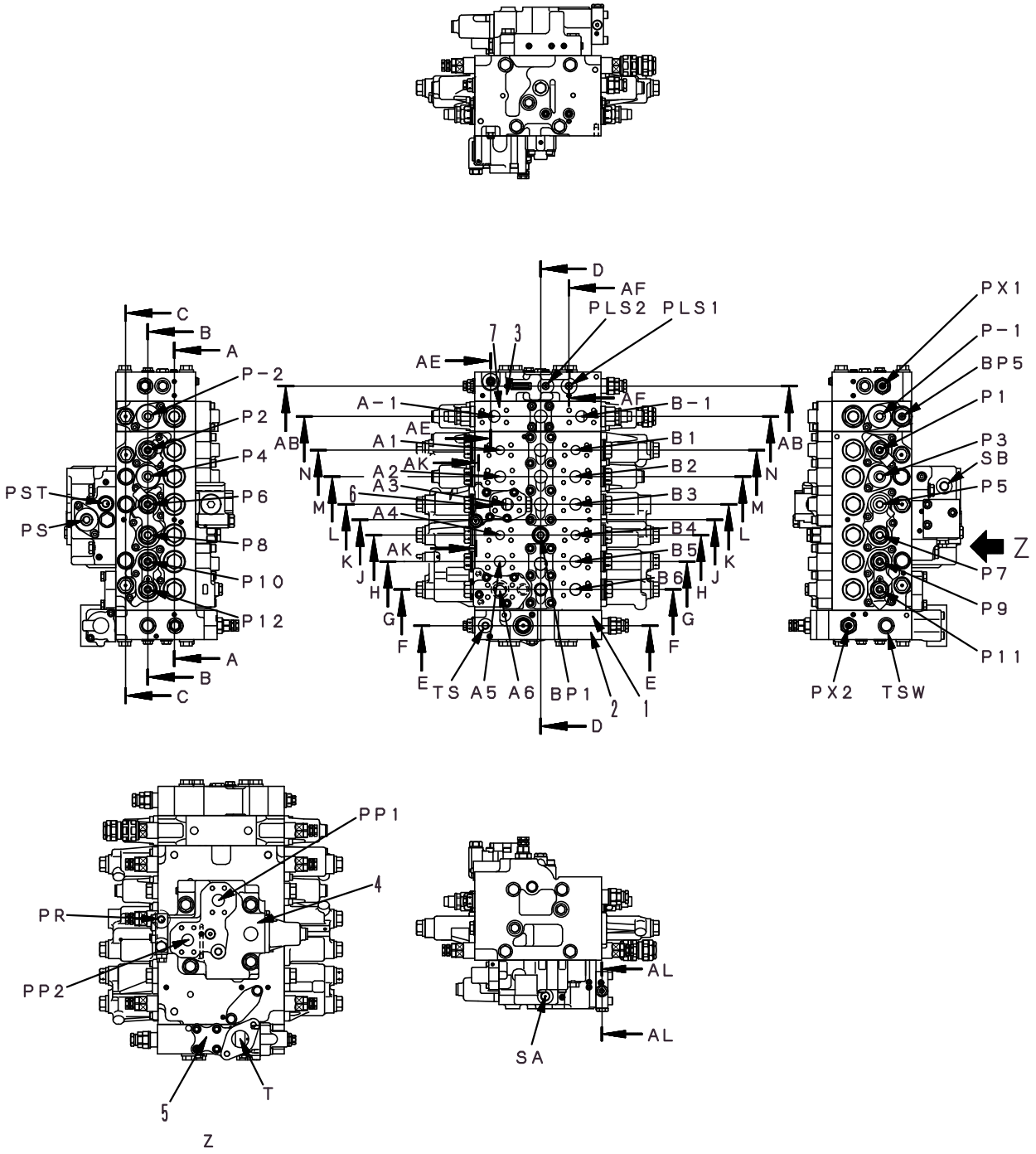


1. Servo piston assembly
2. Plug
3. Pin
4. Spool
5. Retainer
6. Seat
7. Cover
8. Wiring

PP1 : Pump port
PP2 : Pump pressure pilot port
PT : Drain port
PM : PC mode selector pressure pilot port
PPL : PC control pressure output port
PLP : LS control pressure output port

7-spool valve
(6-spool valve + 1 service valves)

(1/9)



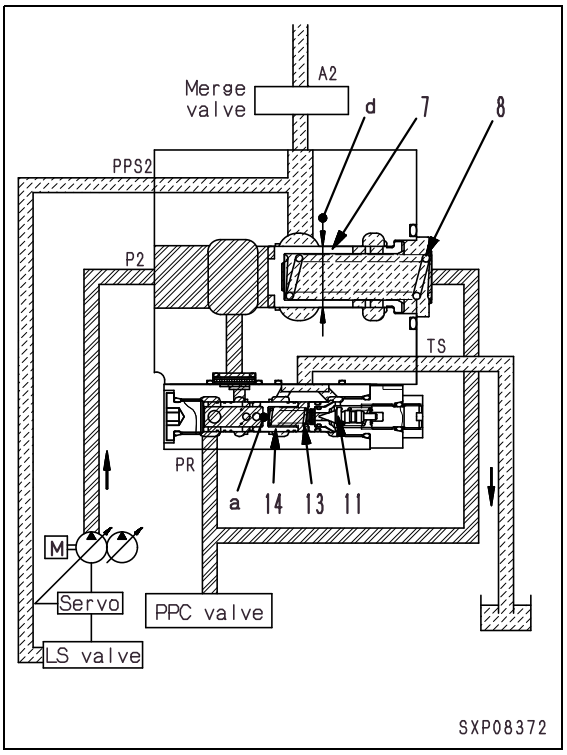
SJP09101

2. When in neutral or load pressure P2 is low (When boom is lowered and arm is in IN position and they are moving down under own weight)

Note: When load pressure A2 is lower than self-pressure reducing valve output pressure PR.

- Valve (7) receives the force of spring (8) and PR pressure (which is 0 MPa {0 kg/cm²} when the engine is stopped) in the direction to close the circuit between ports P2 and A2. If the hydraulic oil flows in port P2, the ϕdx P2 pressure becomes equal to the total of the force of spring (8) and the value of area of ∅d x PR pressure, then the area of the pass between ports P2 and A2 is so adjusted that the P2 pressure will be kept constant above the PR pressure.
- If the PR pressure rises above the set level, puppet (11) opens and the hydraulic oil flows from the PR port through orifice "a" in spool (14) and open part of puppet (11) to seal drain port TS.

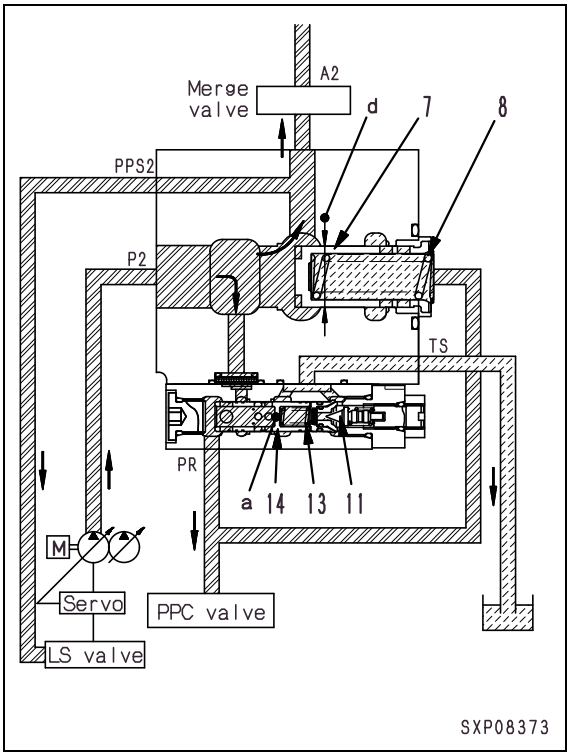
  Accordingly, differential pressure is generated between before and after orifice "a" in spool (14) and then spool (14) moves to close the pass between port P2 and PR. The P2 pressure is controlled constant (at the set pressure) by the area of the oil pass at this time and supplied as the PR pressure. (See Fig. 2.)



3. When load pressure P2 is high

- If load pressure A2 rises and the pump discharge increases because of operation of the work equipment, the ϕdx P2 pressure rises higher than the total of the force of spring (8) and the value of ∅d x PR pressure, and then valve (7) moves to the right stroke end.
- As a result, the area of the pass between ports P2 and A2 increases and the pass resistance lowers and the loss of the engine power is reduced.
- If the PR pressure rises above the set pressure, puppet (11) opens and the hydraulic oil flows from the PR port through orifice "a" in spool (14) and open part of puppet (11) to seal drain port TS.

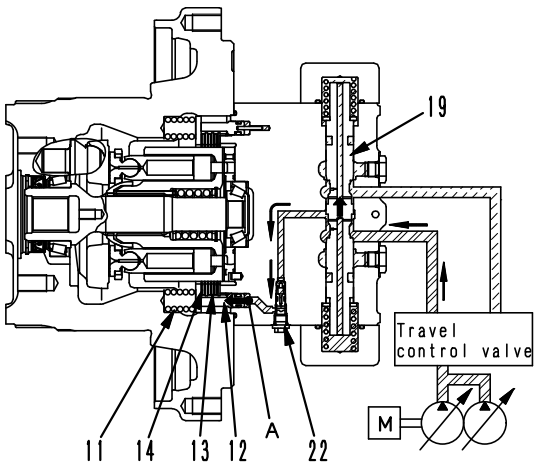
  Accordingly, differential pressure is generated between before and after orifice "a" in spool (14) and then spool (14) moves to close the pass between port P2 and PR. The P2 pressure is controlled constant (at the set pressure) by the area of the oil pass at this time and supplied as the PR pressure. (See Fig. 3.)



OPERATION OF PARKING BRAKE

1) When starting to travel

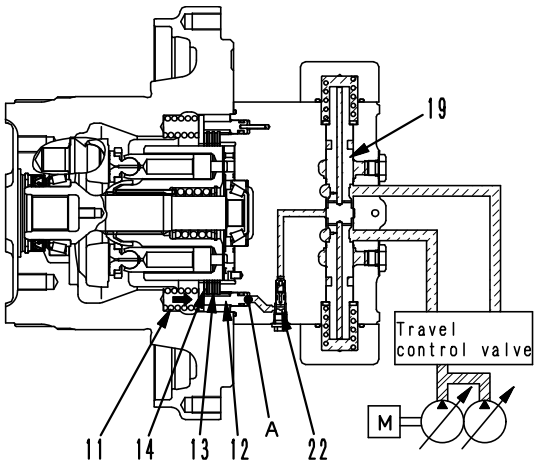
When the travel lever is operated, the pressurized oil from the pump actuates counterbalance valve spool (19), opens the circuit to the parking brake, and flows into chamber **A** of the brake piston (12). It overcomes the force of spring (11), and pushes piston (12) to the left in the direction of the arrow. When this happens, the force pushing plate (13) and disc (14) together is lost, so plate (13) and disc (14) separate and the brake is released.



SJP08895

1. When stopping travel

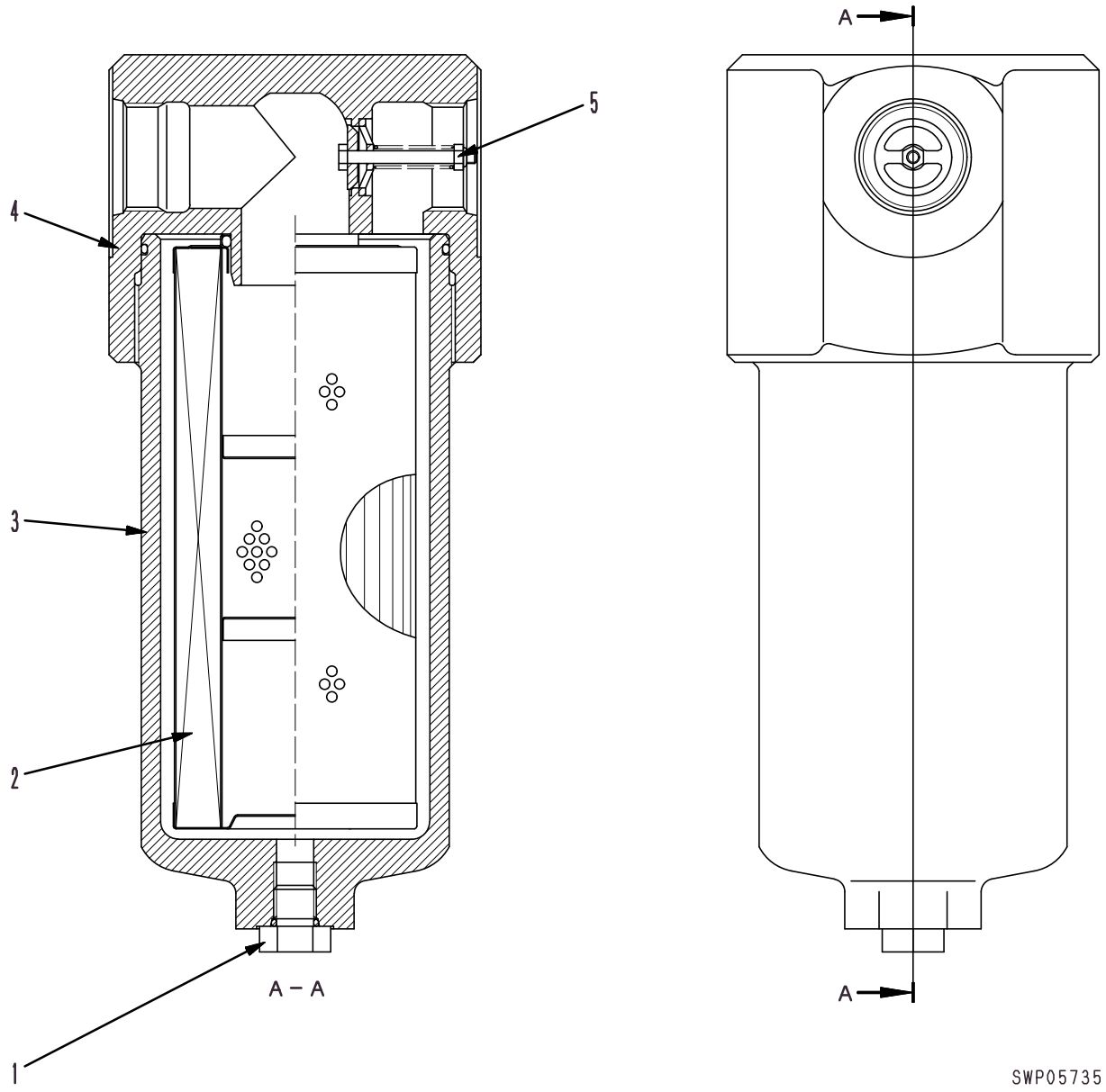
When the travel lever is placed in neutral, counterbalance valve spool (19) returns to the neutral position and the circuit to the parking brake is closed. The pressurized oil in chamber **A** of brake piston (12) is drained to the case from the orifice in the brake piston, and brake piston (12) is pushed to the right in the direction of the arrow by spring (11). As a result, plate (13) and disc (14) are pushed together, and the brake is applied. A time delay is provided by having the pressurized oil pass through a throttle in slow return valve (22) when the brake piston returns, and this ensures that the brake is still effective after the machine stops.



SJP08896

RETURN OIL FILTER

FOR BREAKER



1. Drain plug
2. Element
3. Case
4. Head cover
5. Relief valve

SPECIFICATIONS

Rated pressure:		6.9 MPa {70 kg/cm^2}
Flow	:	200 **l**/min
Relief valve cracking pressure:		
		0.34 ± 0.05 MPa
		{3.5 ± 0.5 kg/cm^2}
Filter mesh size:		6 μm
Filtering area	:	4,570 cm^2

1) Control method in each mode

Mode A

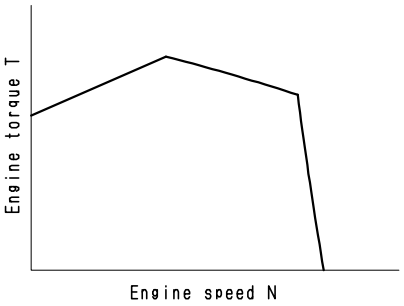
- Matching point in mode A: Rated speed

Model	PC210-7K, PC240-7K
Mode A	106.6 kW/1,900 rpm {143 HP/1,900 rpm}

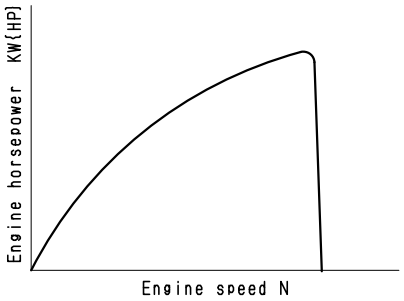
- If the pump load increases and the pressure rises, the engine speed lowers.

  At this time, the controller lowers the pump discharge so that the engine speed will be near the full output point. If the pressure lowers, the controller increases the pump discharge so that the engine speed will be near the full output point.

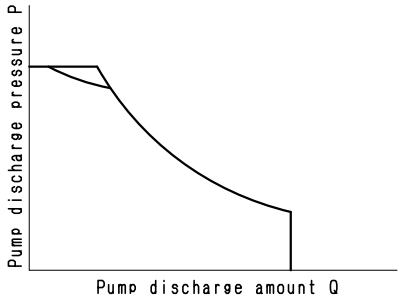
  By repeating these operations, the controller constantly uses the engine near the full output point.



SJP08912



SJP08913

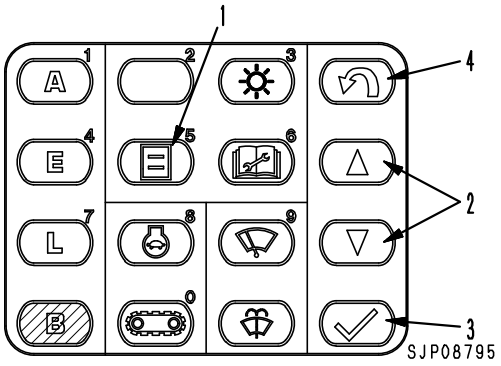


SJP08914

2. B mode

1) Press select switch (1) on the monitor to move to the screen for selecting the 3-stage flow level.

2) Press control switch (2), or input [01] - [03] with the numeral 10-key pad to choose one on the three flow levels.

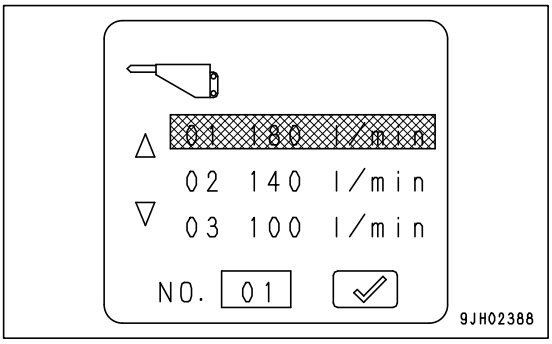


No.	10-key pad operation
01	SJP08791 → SJP08792
02	SJP08791 → SJP08793
03	SJP08791 → SJP08794

3) After completing the level selection, press input confirmation switch (3).
The selected flow level is selected.

★ Before the input confirmation switch is pressed, the flow level is not confirmed, so press return switch (4) to return to the operator screen. This function can be used to return to the previously set flow.

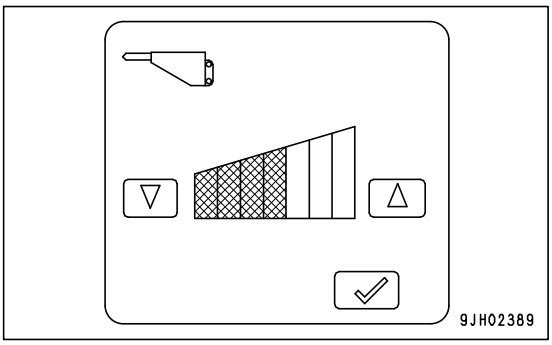
4) After the flow level is confirmed, the screen changes to the screen shown in the diagram on the right.
With this screen, it is possible to make fine adjustment to the flow.



5) Press control switch (2) and select the flow level.

No.	Flow level (L/min.)	Remarks
01	180	❋ Default
02	140	
03	100	

Control switch	Actuation
△ SJP08933	Flow level bar graph extends to the right
▽ SJP08934	Flow level bar graph retracts to the left



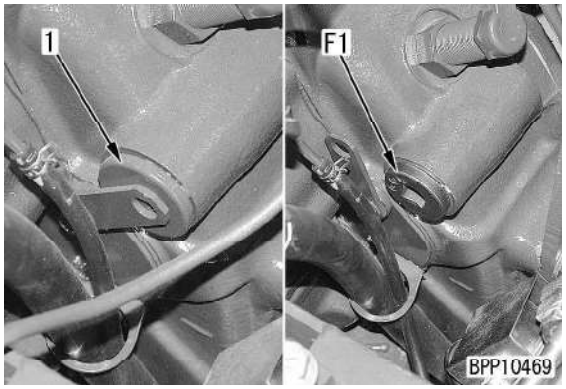
INSPECTION AND ADJUSTMENT OF FUEL INJECTION TIMING

★ Fuel injection timing inspection and adjustment tools

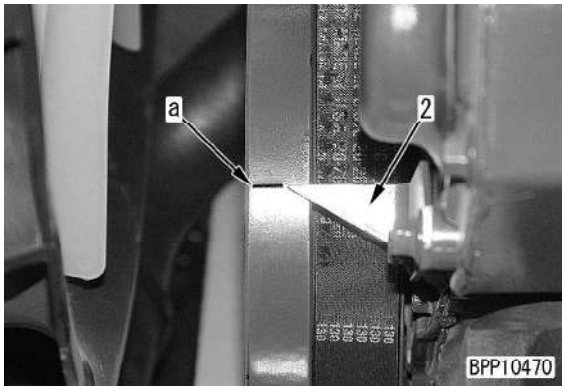
Mark		Part No.	Part Name
F	1	795-799-1131	Gear
	2	795-799-1900	Pin Ass'y
	3	795-799-1950	Lock Pin

Inspection

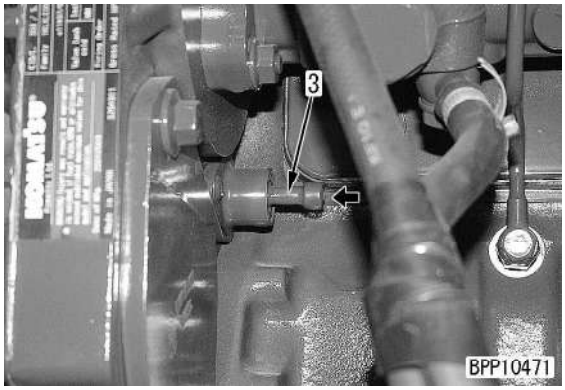
1. Open up the engine hood, and then detach the fan guard on the counterweight side.
2. Take off cover (1) and fit gear **F1**.



3. Turn the crankshaft clockwise with gear **F1**, then match 1.6 TOP notch "**a**" of the crank pulley with pointer (2), and bring up No.1 cylinder to the top dead center.
   ★ Take off the cylinder head cover for No.1 cylinder, and confirm that its rocker arm can be manually moved as much as the valve clearance. If it cannot be moved, that means that No.1 cylinder is not yet at the top dead center. In that case, rotate it by one more turn.

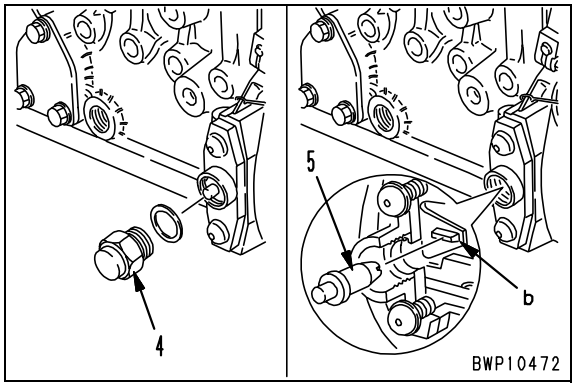


4. Fix the fuel injection pump drive gear to match injection timing by pushing drive gear timing pin (3) in the direction of the front cover.
   ★ Injection timing requires adjustment of high precision. Be sure to fix the drive gear with timing pin (3) so as to match injection timing.
   ★ Push-in depth: 8 mm
   ★ If timing pin (3) cannot be pushed in, turn the crankshaft a bit fore or aft with gear **F1**.
   ★ If it is found difficult to confirm the push-in depth with timing pin (3) as installed in the engine, metallic pin ass'y **F2** may well be used instead.

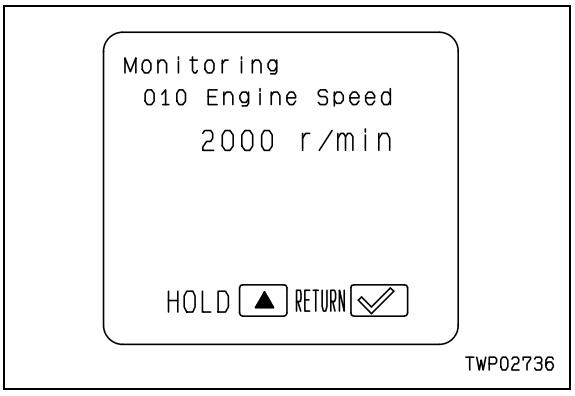


5. Disconnect plug (4) of the fuel injection pump.

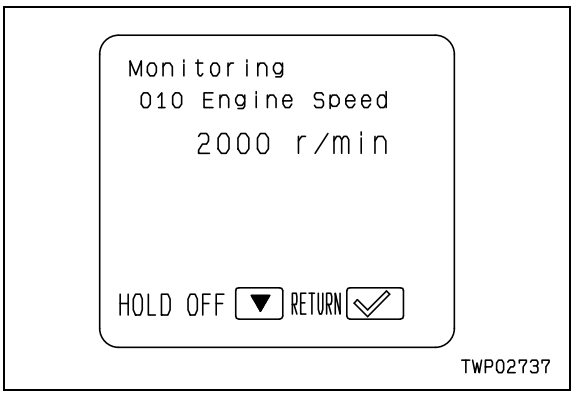
6. Reverse and push in timing pin (5) of the fuel injection pump, and confirm its cut-out portion matches with protruding portion **b** inside the pump.
   ★ If timing pin (5) can be pushed in smoothly, then injection timing is correct.
   ★ If timing pin (5) cannot be pushed in smoothly, injection timing is incorrect and requires adjustment.
   ★ If it is found difficult to confirm the push-in depth with timing pin (5) as installed in the engine, metallic pin ass'y **F3** may well be used instead.



3) Monitoring operation
Call the monitoring information display and confirm the monitored information, while operating the machine.



4) Monitored information holding function
If [△] switch is depressed while monitoring, all the monitored information are put on hold. If [▽] switch is depressed in this condition, information holding is released.

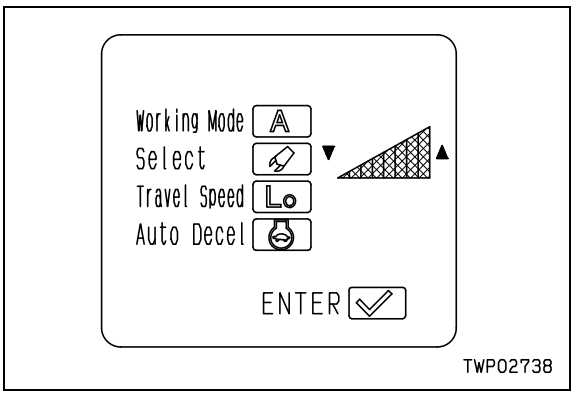


5) Machine setting mode switching function
If it becomes necessary to change settings of working mode, select mode, travel speed and auto-decel while monitoring, depress the corresponding switch, then the mode confirmation display is shown.

★ An illustration at right shows the display in A mode and E mode. Symbol marks are partially different in B mode.

★ When a specific setting is confirmed, depress [✓] switch, then the display returns to that of monitoring.

★ In case a specific setting has been changed while monitoring, the new setting is still maintained when returning from Service Menu to Operator's Menu after the monitoring is finished.



4. Inspection of hydraulic circuit (PC240LC, 240NLC-7)

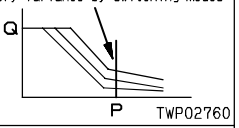
No.	Part to be checked	Condition setting: Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation		① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③ 600 kg/cm² F pump LS	④ 600 kg/cm² R pump LS	⑤ 60 kg/cm² Control circuit pressure	Remarks
1	Self-decompression valve	Full	A	OFF	OFF	Arm dumping relief		■		■	■	►	Circuit pressure 3.2 MPa {33 kg/cm²}
2	Main relief valve							↓	↓	↓	↓	■	34.8 → 37.3 MPa
3	(When power increased)				ON			↓	↓	↓	↓	■	{355 → 380 kg/cm²}
4	LS valve (LS differential pressure valve)				OFF	Neutral						■	Main–LS=3.9 MPa{40 kg/cm²} (LS differential pressure ≒ Unload pressure)
						Travel without load, engine at Hi idling and control lever at half stroke	Right		■		■	■	Main–LS=2.2 MPa{22.0 kg/cm²} (LS pressure)
							Left	■		■		■	
5	Swing safety valve					Swing lock switch ON	(Right relief			■	■	■	30.9 MPa {315 kg/cm²}
							Left relief			■	■	■	
6	Main relief valve, Travel safety valve, Travel interlocking valve					Track shoe locked	Right forward		■	■	■	■	38.7 MPa {395 kg/cm²}
							Right reverse		■	■	■	■	
							Left forward	■		■	■	■	
							Left reverse	■		■	■	■	

■ Connection to be changed to hoses ③ and ④

No.	Part to be checked	Condition setting: Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation	① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③ 600 kg/cm² F pump servo	④ 600 kg/cm² R pump servo	⑤ 60 kg/cm² Control circuit pressure	Remarks
7	Servo	Full	A	OFF	OFF	Arm dumping relief					■	Main servo pressure balance ③ / ① ≒ ④ / ② ≒ 3/5

■ Connection to be changed to hoses ③ and ④, and gauge to be replaced with one with 60 K capacity.

No.	Part to be checked	Condition setting: Fuel dial	Working mode	Auto-decelerator	One-touch power max. switch	Work equipment operation		① 600 kg/cm² F main pump	② 600 kg/cm² R main pump	③ 60 kg/cm² PC EPC	④ 60 kg/cm² LS EPC	⑤ 60 kg/cm² Control circuit pressure	Remarks <Reference value: kg/cm2>
8	PC-EPC valve	Low	A	OFF	OFF	Arm dumping relief		■	■		■	■	<34> Delivery variance by switching modes
		Full	A					■	■		■	■	< 3>
			E					■	■		■	■	<14>
			(※ L)					■	■		■	■	<21>
			B					■	■		■	■	<16>
9	LS-EPC valve	Full	A	OFF	OFF	Neutral				■		■	At neutral: 2.9MPa {30kg/cm²}
						Arm dumping relief				■		■	When 2 pumps relieved: 0MPa {0kg/cm²}
			(※ L)							■		■	When one pump relieved: 1.5MPa {15kg/cm²}



※ : The "L" mode is on the multi-monitor specification machine only.

Connector No.	Type	No. of pin	Name of device	Address			
				Stereo-gram	M circuit	G circuit	P circuit
P01	070	12	Monitor panel	N-6	A-7	K-8	
P02	040	20	Monitor panel	N-5	A-6	K-8	A-9
P03	M	2	Buzzer canceling switch	P-9	D-1		
P05	M	2	Revolving warning lamp switch	W-3			
P15	Y050	2	Air conditioner sun light sensor	N-6			
P70	040	16	Monitor panel	N-4	A-5	K-7	
R10	R	5	Lamp relay	O-8	E-1		
R11	R	5	Engine starting motor cutting relay (PPC lock)	P-8	E-1		
R13	R	5	Engine starting motor cutting relay (personal code)	Q-9	F-1		
R20	R	5	Attachment circuit switching relay	W-6			C-9
R21	–	–	–	W-7			
S01	X	2	Bucket digging oil pressure switch	S-8			K-2
S02	X	2	Boom lowering oil pressure switch	L-7			K-3
S03	X	2	Swing oil pressure switch, left	L-7			K-2
S04	X	2	Arm digging oil pressure switch	L-6			K-3
S05	X	2	Bucket dumping oil pressure switch	L-5			K-2
S06	X	2	Boom raise oil pressure switch	L-5			K-3
S07	X	2	Swing oil pressure switch, right	L-5			K-2
S08	X	2	Arm dumping oil pressure switch	L-4			K-3
S09	X	2	Service oil pressure switch (intermediate connector)	K-3			K-1
S10	X	2	Service oil pressure switch, front	–			K-1
S11	X	2	Service oil pressure switch, rear	–			K-1
S14	M	3	Safety lever lock switch	S-1	K-9		F-8
S21	Terminal	6	Pump emergency driving switch	R-9			E-2
S22	Terminal	6	Swing and parking brake emergency releasing switch	R-9			F-2
S25	S090	16	Intermediate connector	Q-9			E-3
S30	X	2	Travel hydraulic switch	O-1			A-1
S31	X	2	Travel steering hydraulic switch	P-1			A-1
SC	Terminal	1	Engine starting motor (C terminal)	K-8			
SSW	Terminal	5	Engine starting switch	N-7			
T05	Terminal	1	Floor frame grounding	W-3	J-8		
T06	Terminal	1	Radio body grounding	–			
T06A	M	1	Intermediate connector	T-2			
T11	Terminal	1	Operator's cab grounding	AD-3			
T13	D	1	Engine starting motor (C terminal)	L-6	J-3		

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting		
	8	Alternator fault (Internal short-circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position or running during the troubleshooting.		
			E12 (male)	Voltage	
			Between ① and grounding	Below 1 V	
	9	Disconnection of wiring harness (Disconnection or defective contact with connector)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Wiring harness between FB1-18 outlet and H15 (female) ①	Resistance value	Below 1 Ω
			Wiring harness from H15 (female) ④ to J01 to R11 (female) ⑤	Resistance value	Below 1 Ω
			Wiring harness between R11 (female) ③ and A27 (female) ①	Resistance value	Below 1 Ω
			Wiring harness between engine starting motor relay C terminal and engine starting motor C terminal	Resistance value	Below 1 Ω
			Wiring harness between FB1-3 and S14 (female) ①	Resistance value	Below 1 Ω
			Wiring harness between S14 (female) ③ and R11 (female) ①	Resistance value	Below 1 Ω
			Wiring harness between R11 (female) ② and R13 (female) ⑥	Resistance value	Below 1 Ω
			Wiring harness from R13 (female) ③ to J04 to grounding	Resistance value	Below 1 Ω
	10	Grounding fault of wiring harness (Contact with grounding circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			Between wiring harness from battery relay B terminal (A23) to A35 to FB1-18 and grounding	Resistance value	Above 1 MΩ
			Between wiring harness between FB1-18 outlet and H15 (female) ① and grounding	Resistance value	Above 1 MΩ
			Between wiring harness from H15 (female) ④ to J01 to R11 (female) ⑤ and grounding	Resistance value	Above 1 MΩ
			Between wiring harness between R11 (female) ③ and A27 (female) ① and grounding	Resistance value	Above 1 MΩ
			Between wiring harness between engine starting motor relay C terminal and engine starting motor C terminal and grounding	Resistance value	Above 1 MΩ
			Between wiring harness between FB1-3 and S14 (female) ① and grounding	Resistance value	Above 1 MΩ
			Between wiring harness between S14 (female) ③ and R11 (female) ① and grounding	Resistance value	Above 1 MΩ
			Between wiring harness from R13 (female) ② to J05 to P02 (female) ⑭ and grounding	Resistance value	Above 1 MΩ
	11	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Wiring harness between A27 (female) ② and E12 (female) ①, or wiring harness from A27 (female) ② to J02 to D01 (female) ⑥, or between wiring harness between A27 (female) ② and P02 (female) ⑪ and grounding	Voltage	Below 1 V