SHOP MANUAL

KOMATSU

PC600-7K
PC600LC-7K

MACHINE MODEL	SERIAL No.
PC600-7K	**K40001 and up**
PC600LC-7K	**K40001 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.
- PC600, 600LC-7K mount the KOMATSU SA6D140E-3 engine.
  For details of the engine, see the 140-3 Series Engine Shop Manual.

Category	Komatsu code	Part No.	Q'ty	Container	Main applications, featuresr
Adhesives	LG-7	790-129-9070	1 g	Tube	• Ftures: Silicon based, quick hardening type • Used as sealant for flywheel housing, intake manifold, oil an, thermostat housing, etc.
	Three bond 1211	790-129-9090	100 g	Tube	• Used as heat-resisting sealant for repairing engine.
Molybdenum disulphide lubricant	LM-G	09940-00051	60 g	Can	• Used as lubricant for sliding portion (to prevent from squeaking).
	LM-P	09940-00040	200 g	Tube	• Used to prevent seizure or scuffling of the thread when press fitting or shrink fitting. • Used as lubricant for linkage, bearings, etc.
Grease	G2-LI	SYG2-400LI SYG2-350LI SYG2-400LI-A SYG2-160LI SYGA-160CNLI	Various	Various	• General purpose type
	G2-CA	SYG2-400CA SYG2-350CA SYG2-400CA-A SYG2-160CA SYGA-160CNCA	Various	Various	• Used for normal temperature, light load bearing at places in contact with water or steam.
	Molybdenum disulphide lubricant	SYG2-400M	400 g (10 per case)	Belows type	• Used for places with heavy load

Temperature

Fahrenheit-Centigrade Conversion ; a simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

If it is desired to convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

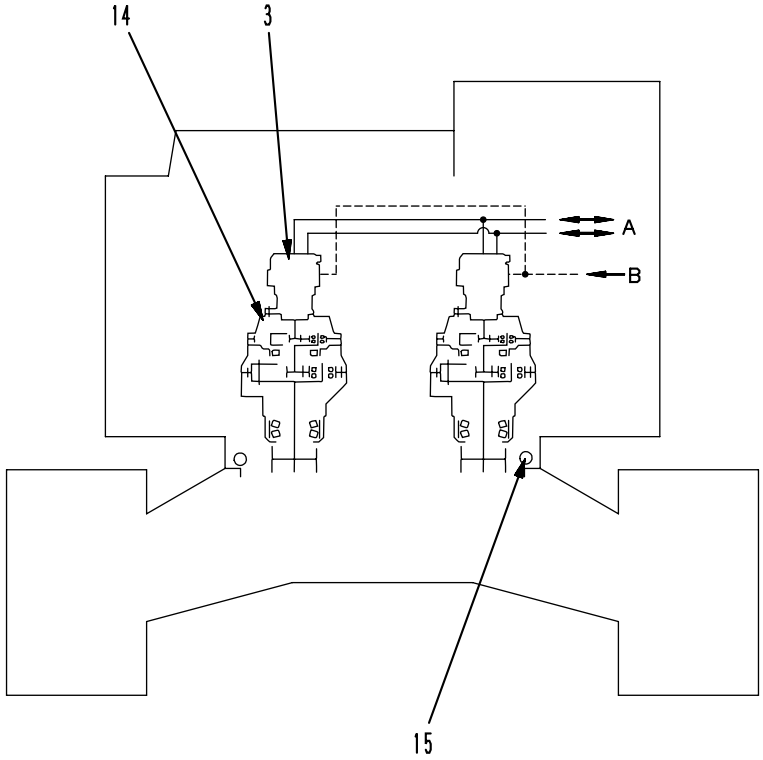
If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

1°C = 33.8°F

°C		°F	°C		°F	°C		°F	°C		°F
–40.4	**–40**	–40.0	–11.7	**11**	51.8	7.8	**46**	114.8	27.2	**81**	117.8
–37.2	**–35**	–31.0	–11.1	**12**	53.6	8.3	**47**	116.6	27.8	**82**	179.6
–34.4	**–30**	–22.0	–10.6	**13**	55.4	8.9	**48**	118.4	28.3	**83**	181.4
–31.7	**–25**	–13.0	–10.0	**14**	57.2	9.4	**49**	120.2	28.9	**84**	183.2
–28.9	**–20**	–4.0	–9.4	**15**	59.0	10.0	**50**	122.0	29.4	**85**	185.0
–28.3	**–19**	–2.2	–8.9	**16**	60.8	10.6	**51**	123.8	30.0	**86**	186.8
–27.8	**–18**	–0.4	–8.3	**17**	62.6	11.1	**52**	125.6	30.6	**87**	188.6
–27.2	**–17**	1.4	–7.8	**18**	64.4	11.7	**53**	127.4	31.1	**88**	190.4
–26.7	**–16**	3.2	–7.2	**19**	66.2	12.2	**54**	129.2	31.7	**89**	192.2
–26.1	**–15**	5.0	–6.7	**20**	68.0	12.8	**55**	131.0	32.2	**90**	194.0
–25.6	**–14**	6.8	–6.1	**21**	69.8	13.3	**56**	132.8	32.8	**91**	195.8
–25.0	**–13**	8.6	–5.6	**22**	71.6	13.9	**57**	134.6	33.3	**92**	197.6
–24.4	**–12**	10.4	–5.0	**23**	73.4	14.4	**58**	136.4	33.9	**93**	199.4
–23.9	**–11**	12.2	–4.4	**24**	75.2	15.0	**59**	138.2	34.4	**94**	201.2
–23.3	**–10**	14.0	–3.9	**25**	77.0	15.6	**0**	140.0	35.0	**95**	203.0
–22.8	**–9**	15.8	–3.3	**26**	78.8	16.1	**61**	141.8	35.6	**96**	204.8
–22.2	**–8**	17.6	–2.8	**27**	80.6	16.7	**62**	143.6	36.1	**97**	206.6
–21.7	**–7**	19.4	–2.2	**28**	82.4	17.2	**63**	145.4	36.7	**98**	208.4
–21.1	**–6**	21.2	–1.7	**29**	84.2	17.8	**64**	147.2	37.2	**99**	210.2
–20.6	**–5**	23.0	–1.1	**30**	86.0	18.3	**65**	149.0	37.8	**100**	212.0
–20.0	**–4**	24.8	–0.6	**31**	87.8	18.9	**66**	150.8	40.6	**105**	221.0
–19.4	**–3**	26.6	0	**32**	89.6	19.4	**67**	152.6	43.3	**110**	230.0
–18.9	**–2**	28.4	0.6	**33**	91.4	20.0	**68**	154.4	46.1	**115**	239.0
–18.3	**–1**	30.2	1.1	**34**	93.2	20.6	**69**	156.2	48.9	**120**	248.0
–17.8	**0**	32.0	1.7	**35**	95.0	21.1	**70**	158.0	51.7	**125**	257.0
–17.2	**1**	33.8	2.2	**36**	96.8	21.7	**71**	159.8	54.4	**130**	266.0
–16.7	**2**	35.6	2.8	**37**	98.6	22.2	**72**	161.6	57.2	**135**	275.0
–16.1	**3**	37.4	3.3	**38**	100.4	22.8	**73**	163.4	60.0	**140**	284.0
–15.6	**4**	39.2	3.9	**39**	102.2	23.3	**74**	165.2	62.7	**145**	293.0
–15.0	**5**	41.0	4.4	**40**	104.0	23.9	**75**	167.0	65.6	**150**	302.0
–14.4	**6**	42.8	5.0	**41**	105.8	24.4	**76**	168.8	68.3	**155**	311.0
–13.9	**7**	44.6	5.6	**42**	107.6	25.0	**77**	170.6	71.1	**160**	320.0
–13.3	**8**	46.4	6.1	**43**	109.4	25.6	**78**	172.4	73.9	**165**	329.0
–12.8	**9**	48.2	6.7	**44**	111.2	26.1	**79**	174.2	76.7	**170**	338.0
–12.2	**10**	50.0	7.2	**45**	113.0	26.7	**80**	176.0	79.4	**175**	347.0

Unit: kg

Machine model	PC600-7K	PC600LC-7K
Serial Number	K40001 and up	K40001 and up
Track shoe assembly		
• Standard triple grouser shoe (600 mm)	5,930	6,290
• Wide triple grouser shoe (750 mm)	6,750	7,170
Boom assembly	4,820	4,820
Arm assembly	3,240	3,240
Bucket assembly	2,510	2,510
Boom cylinder assembly	522 × 2	522 × 2
Arm cylinder assembly	770	770
Bucket cylinder assembly	469	469
Link assembly (large)	584	584
Link assembly (small)	—	—
Boom pin	149 + 26 × 2 + 76 + 104 + 36	149 + 26 × 2 + 76 + 104 + 36
Arm pin	32 + 55	32 + 55
Bucket pin	55 + 62	55 + 62
Link pin	45 × 2	45 × 2



SUP06717

1. Idler
2. Center swivel joint
3. Swing motor (KMF90ABE-3)
4. Control valve
5. Final drive, sprocket
6. Travel motor (KMV335ADT)
7. Engine
8. PTO
9. No. 1 pump (HPV95+95)
10. No. 2 pump (HPV95+95)
11. Control pump (SAL56)
12. Swing brake solenoid valve
13. Travel speed solenoid valve
14. Swing machinery
15. Swing circle
16. PTO lubrication pump

A. Control valve
B. Swing brake solenoid valve

Unit: mm

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Check item</th><th colspan="5">Criteria</th><th rowspan="2">Remedy</th></tr>
<tr><td colspan="3">Standard size</td><td colspan="2">Repair limit</td></tr>
<tr><td rowspan="2">9</td><td rowspan="2">Recoil spring</td><td>Free length x OD</td><td>Installed length</td><td>Installed load</td><td>Free length</td><td>Installed load</td><td rowspan="2">Replace</td></tr>
<tr><td>859 x 299</td><td>715</td><td>292 kN {29,770 kg}</td><td>—</td><td>233.6 kN {23,816 kg}</td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Top-to-bottom width of idler guide</td><td colspan="2"></td><td>Standard size</td><td>Tolerance</td><td>Repair limit</td><td rowspan="5">Rebuild or replace</td></tr>
<tr><td colspan="2">Track frame</td><td>163.5</td><td>163.5^{+4}_{0}</td><td>167.5</td></tr>
<tr><td colspan="2">Idler support</td><td>161</td><td>161^{+1}_{0}</td><td>159</td></tr>
<tr><td rowspan="2">11</td><td rowspan="2">Left-to-right width of idler guide</td><td colspan="2">Track frame</td><td>329</td><td>329^{+4}_{0}</td><td>334</td></tr>
<tr><td colspan="2">Idler support</td><td>324</td><td>—</td><td>322</td></tr>
</table>

Standard shoe

Item \ Model	PC600-7K	PC600LC-7K
Shoe width (mm) (triple shoe)	600	600
Link pitch (mm)	228.6	228.6
No. of shoes (each side)	49	52

Selection of track shoe

- Select the most suitable track shoe from the following table

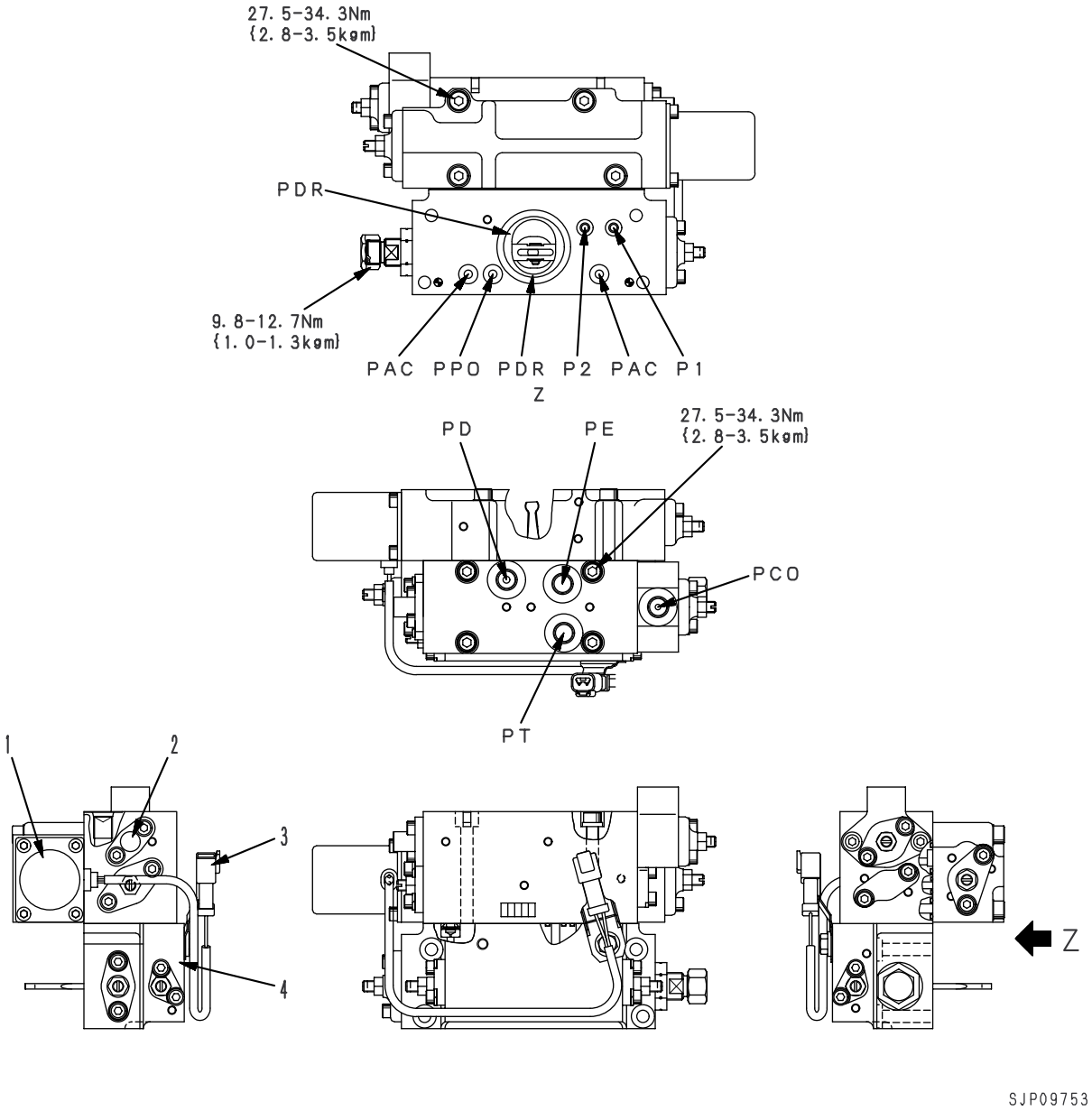
	PC600-7K		PC600LC-7K	
	Specifications	Category	Specifications	Category
Standard	600 mm triple	A	600 mm triple	A
If equipped	700 mm triple	B	—	—
If equipped	750 mm triple	B	750 mm triple	B
If equipped	900 mm triple	B	900 mm triple	B

Category	Use	Precautions when using
A	Rocky ground, normal river soil	• Travel in Lo speed when traveling on rough ground with obstacles such as large boulders and fallen trees.
B	Normal soil, soft land	• Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees. • Travel in Hi speed only on flat ground; when it is impossible to avoid traveling over obstacles, lower the travel speed to approx. half of Lo speed.
C	Extremely soft ground (swampy ground)	• Use only for ground where “A” and “B” sink and are impossible to use. • Cannot be used on rough ground where there are large obstacles such as boulders and fallen trees • Travel in Hi speed only on flat ground; when it is impossible to avoid traveling over obstacles, lower the travel speed to approx. half of Lo speed.
D	Paved surface	• The shoes are flat, so they have low gradeability
E	Paved surface	• The shoes are made of rubber, so be careful when traveling on rough ground

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

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

3. Servo valve assembly (No. 1 rear)

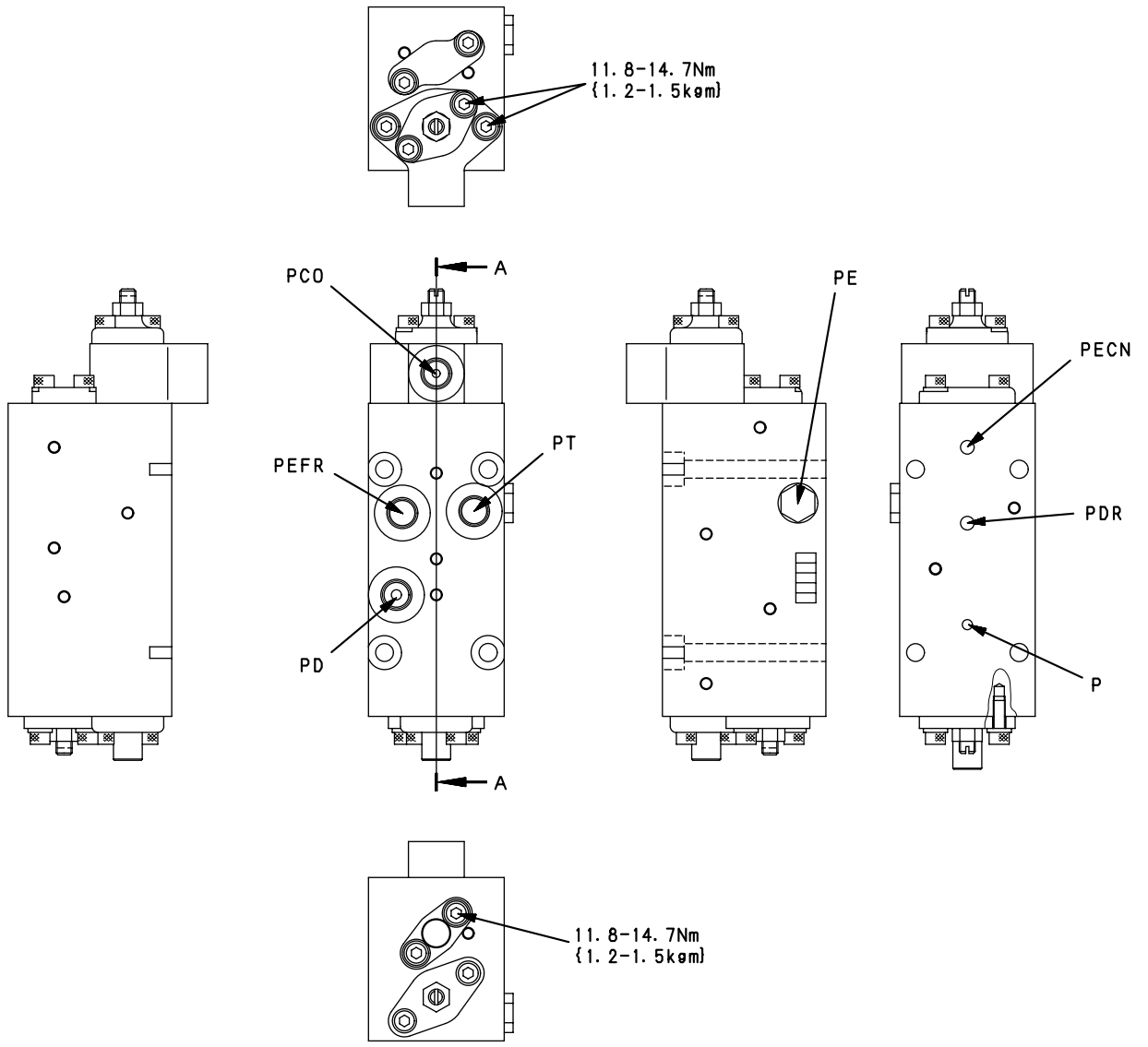


P1 : Main pump pressure IN port
P2 : Main pump pressure IN port
PCO : CO selector pilot port
PAC : Servo actuator port
PDR : Servo valve drain OUT port
PPO : Servo basic pressure IN port
PD : Jet sensor downstream pressure IN port
PE : TVC valve output pressure front, rear interconnection port
PT : Jet sensor upstream pressure IN port

1. TVC valve
2. CO+NC valve
3. Connector
4. Servo valve

CO+NC VALVE

1. CO+NC valve (No. 1 front)



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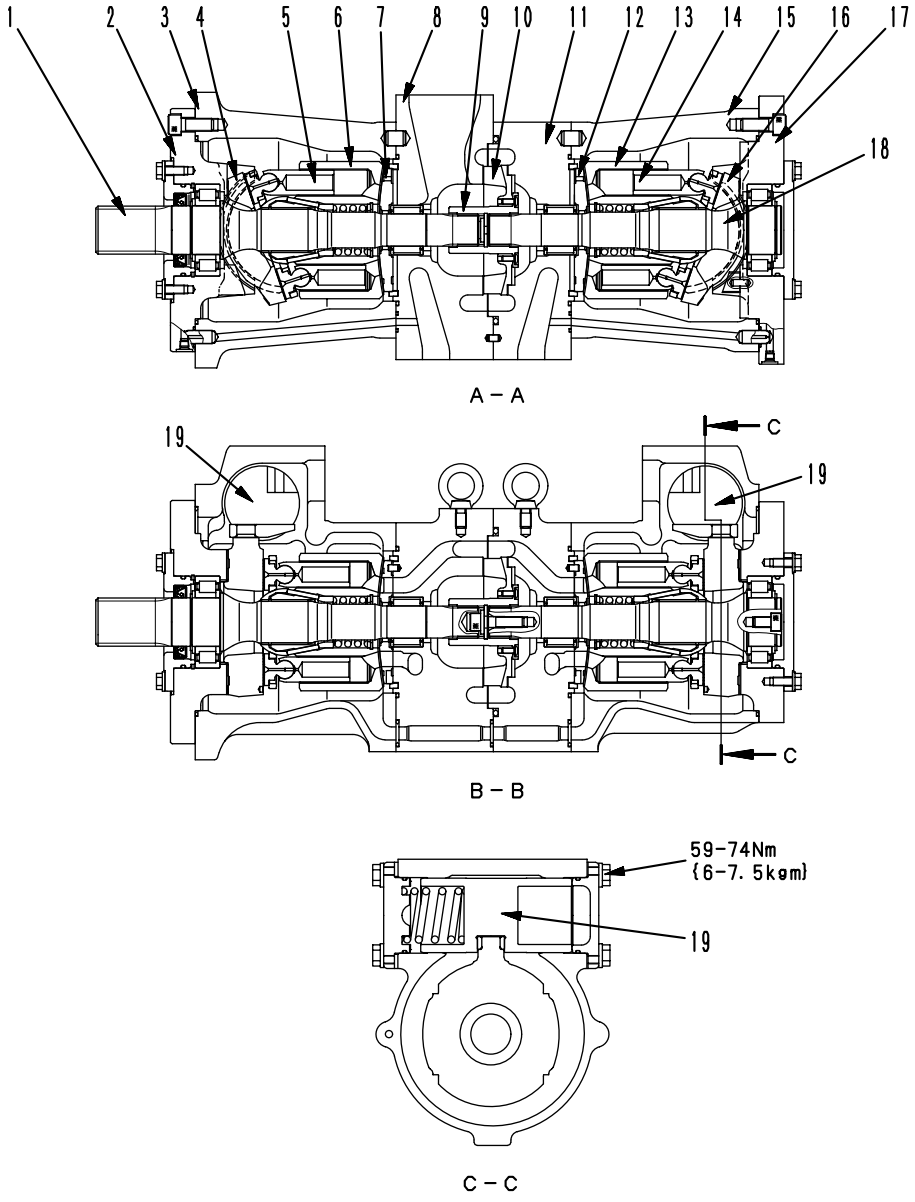
P : Main pump pressure IN port
PEFR : TVC valve output pressure front, rear interconnection port
PE : TVC valve output pressure detection port
PCO : CO selector pilot port
PD : Jet sensor downstream pressure IN port
PT : Jet sensor upstream pressure IN port
PDR : CO+NC valve drain OUT port
PECN : CO+NC valve output pressure OUT port



1. Front shaft
2. Front cradle
3. Front case
4. Rocker cam
5. Piston
6. Cylinder block
7. Valve plate
8. Front end cap
9. Coupling
10. Impeller
11. Rear end cap
12. Valve plate
13. Cylinder block
14. Piston
15. Rear case
16. Rocker cam
17. Rear cradle
18. Rear shaft
19. Servo piston

Unit: mm

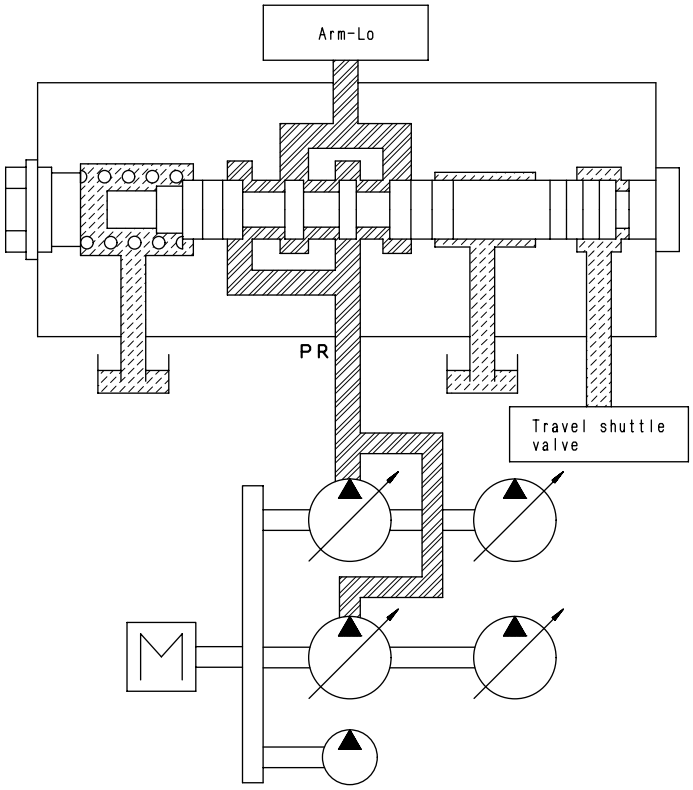
No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Spool return spring	Free length x OD	Installed length	Installed load	Free length	Installed load	Replace spring if damaged or deformed
		53.8 x 26.5	52.5	104 N {10.6 kg}	—	83.4 N {8.50 kg}	

SWING PRIORITY VALVE

Function

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

1) When swing is at HOLD



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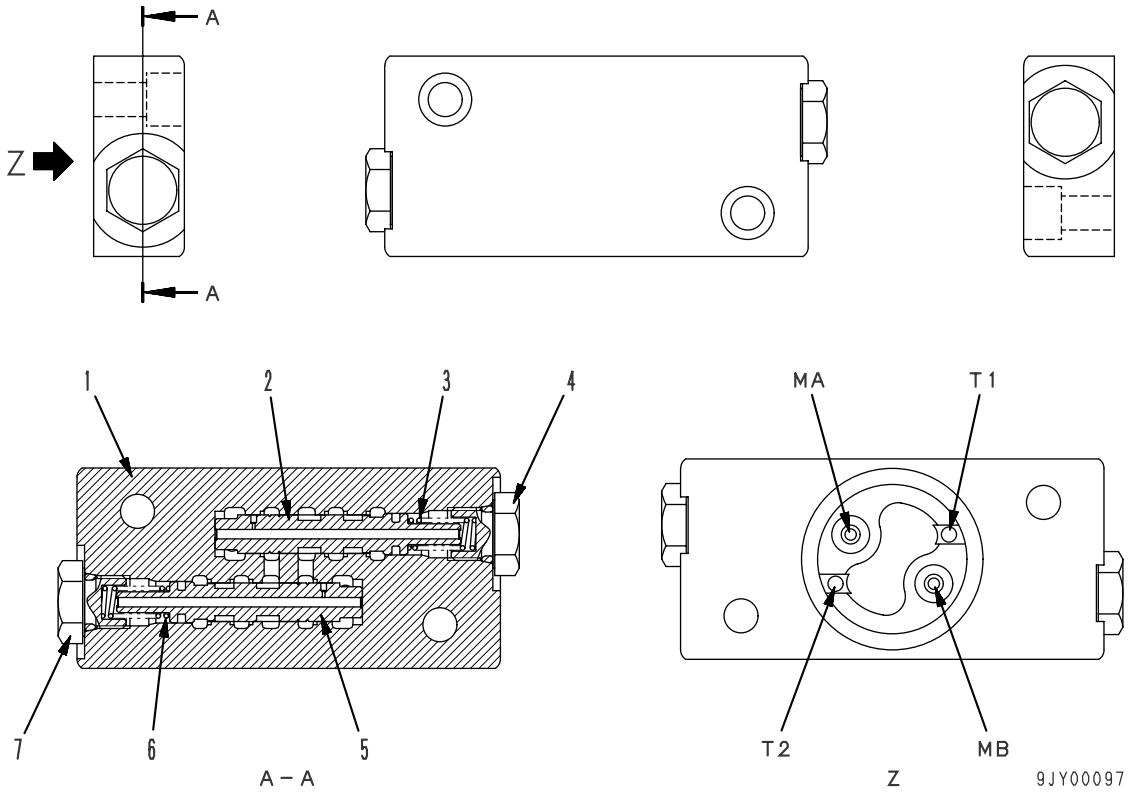
Operation

- No pilot pressure oil flows from the travel shuttle valve, so the swing priority valve is not actuated.
- For this reason, all the pressure oil from the front main pump passes through port **PR** and flows to the arm Lo control valve.

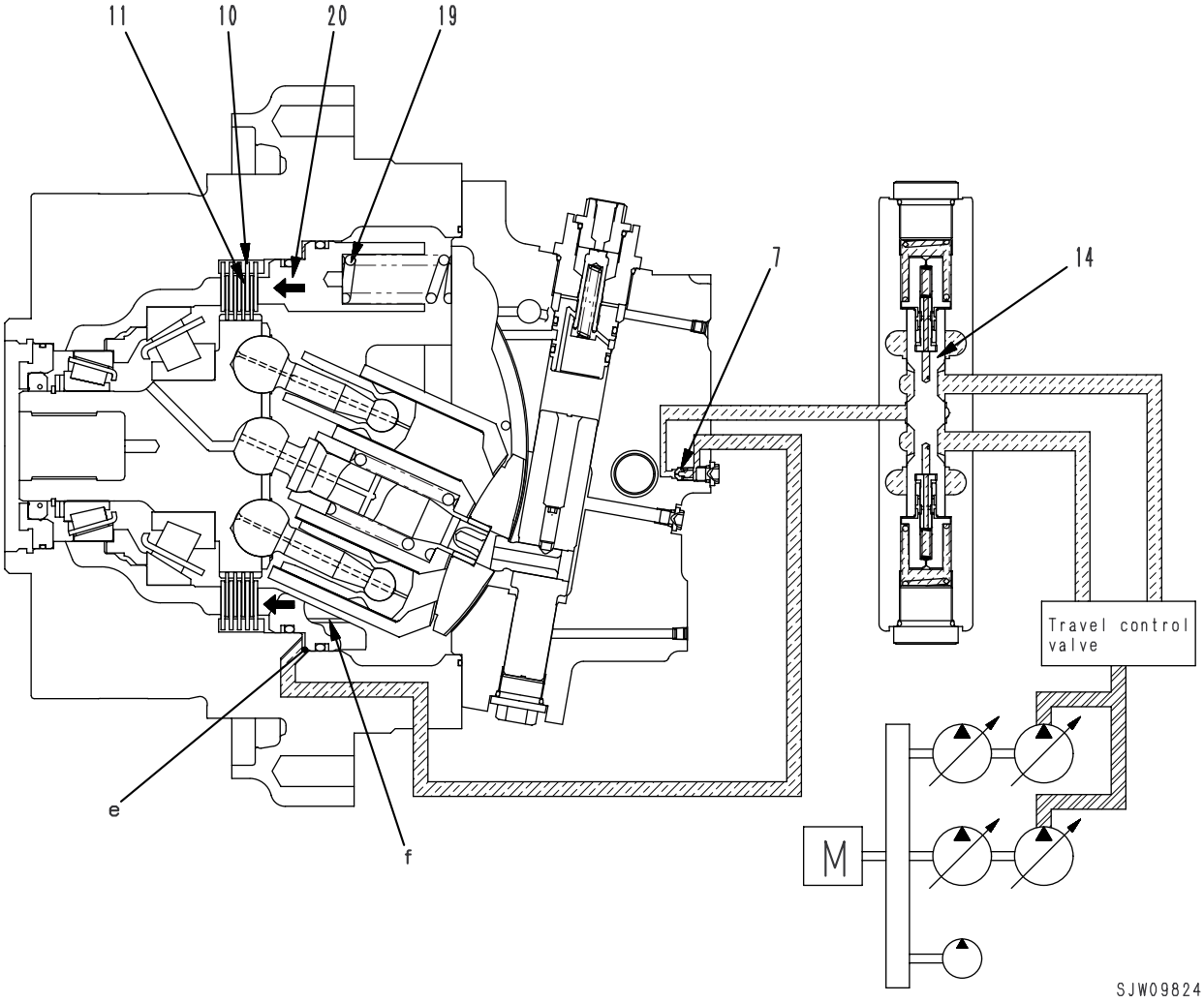
REVERSE PREVENTION VALVE



MA : Port
T1 : Port
MB : Port
T2 : Port

1. Valve body
2. Spool (**MA** side)
3. Spring (**MA** side)
4. Plug (**MA** side)
5. Spool (**MB** side)
6. Spring (**MB** side)
7. Plug (**MB** side)

2. When stopping travel



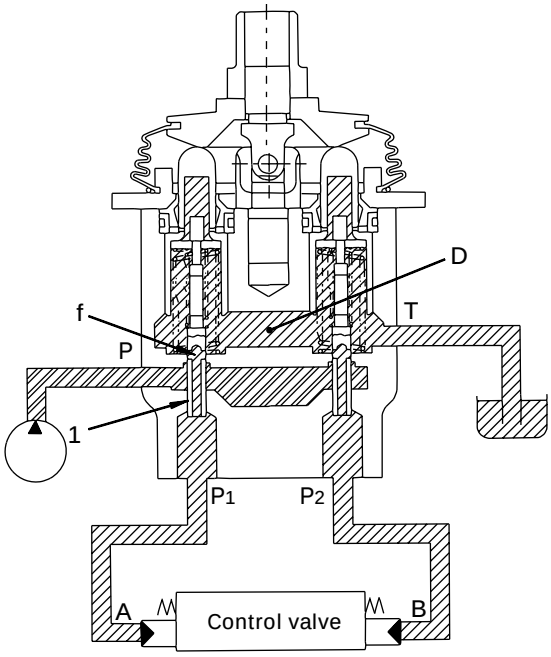
Operation

- When the travel lever is placed in neutral, counterbalance valve spool (14) returns to the neutral position and the circuit to the parking brake is closed.
- The pressurized oil in chamber **e** of brake piston (20) passes through the throttle of slow return valve (7) until spool (14) of the counterbalance valve returns to neutral.
- When spool (14) of the counterbalance valve returns to the neutral position, the oil is drained inside the case from the throttle **f** of brake piston (20) and brake piston (20) is pushed fully to the left by spring (19).
- As a result, plate (10) and disc (11) 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 (7) when the brake piston returns, and this ensures that the brake is applied after the machine stops.

Operation

1. At neutral

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



(Fig. 1)

SBP00275

2. Fine control (neutral → fine control)

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

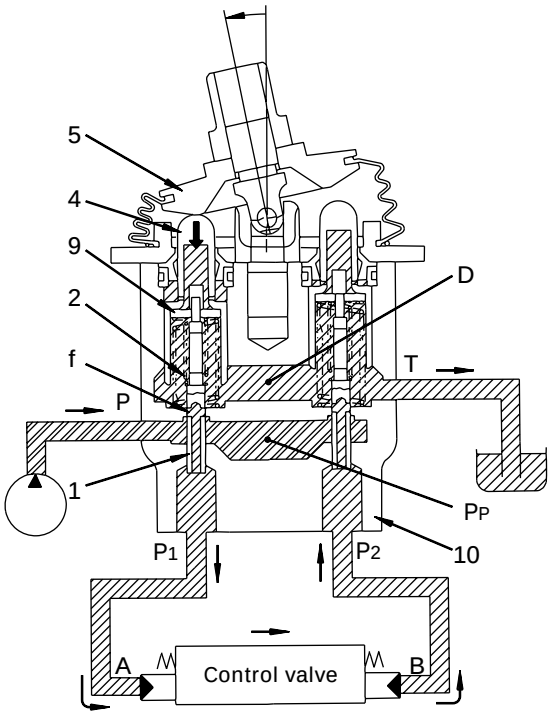
When this happens, fine control hole **f** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, and the pilot pressure of the control pump is sent from port **A** through fine control hole **f** to port **P1**.

When the pressure at port **P1** rises, spool (1) is pushed back. Fine control hole **f** is shut off from pump pressure chamber **PP**. At almost the same time, it is connected to drain chamber **D**, so the pressure at port **P1** escapes. As a result, spool (1) moves up and down until the force of metering spring (2) is balanced with the pressure of port **P1**.

The relationship of the positions of spool (1) and body (10) (fine control hole **f** is in the middle between drain chamber **D** and pump pressure chamber **PP**) does not change until retainer (9) contacts spool (1).

Therefore, metering spring (2) is compressed in proportion to the travel of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever.

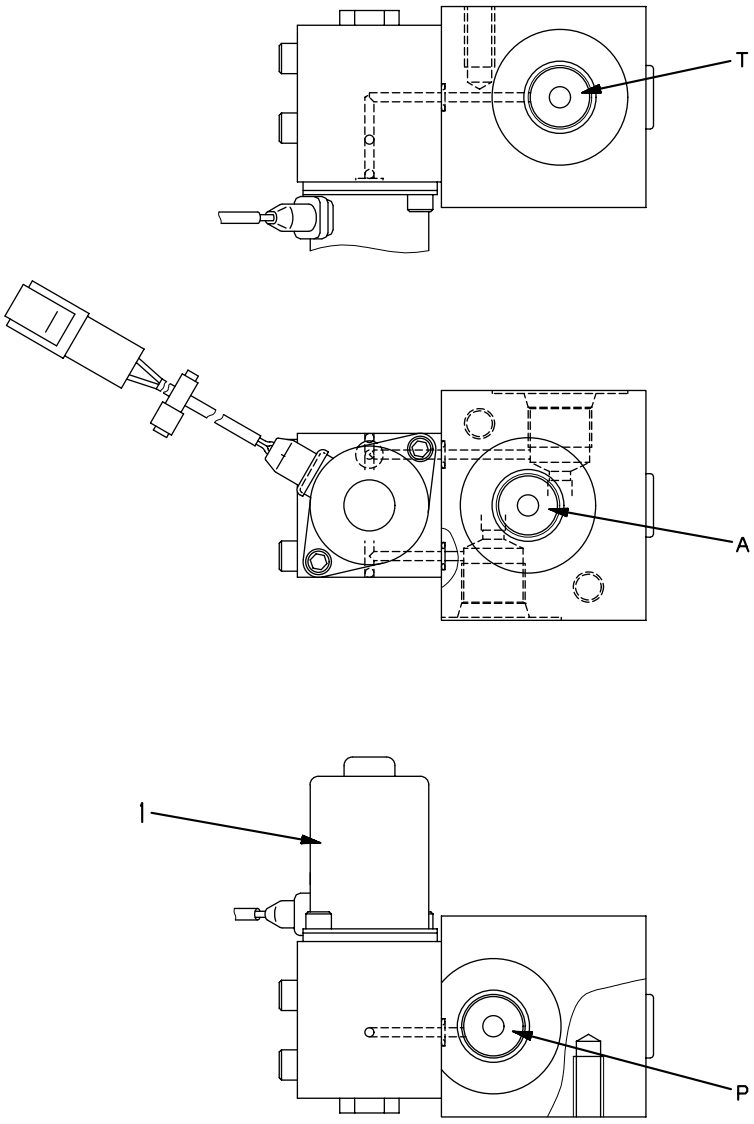
In this way, the spool of the control valve moves to a position where the pressure of chamber **A** (same as pressure at port **P1**) and the force of the return spring of the control valve spool are balanced. (Fig. 2)



(Fig. 2)

SBP00276

For safety lock (under cab)



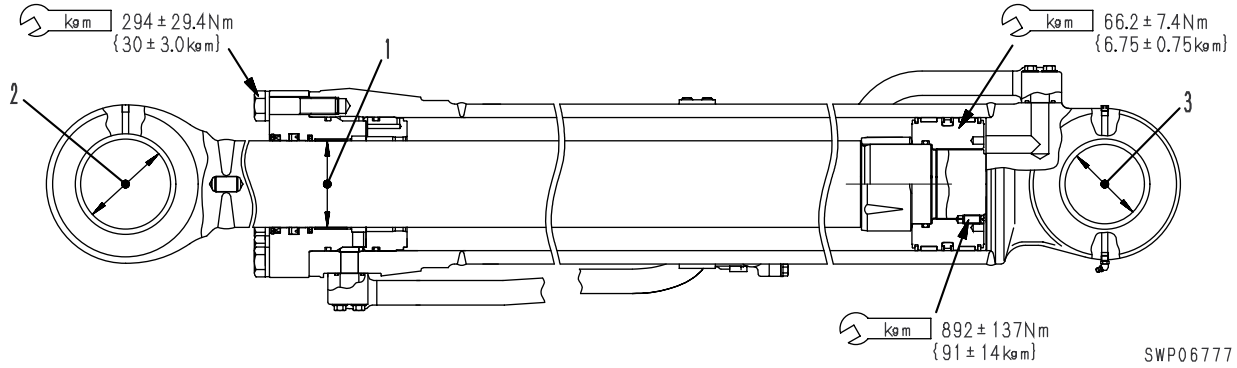
SWP08602

1. Safety lock solenoid valve

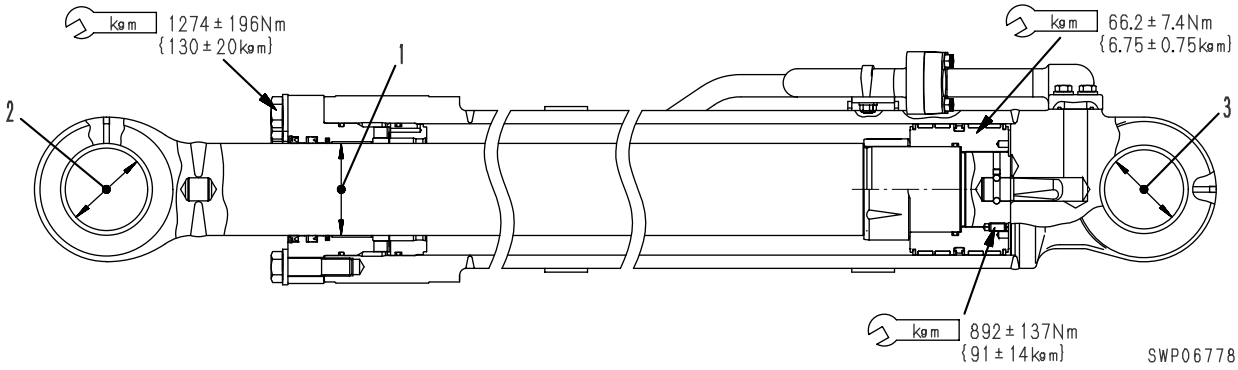
T : To tank
A : To port P of work equipment PPC valve
To port P of travel PPC valve
P : From control pump

HYDRAULIC CYLINDER

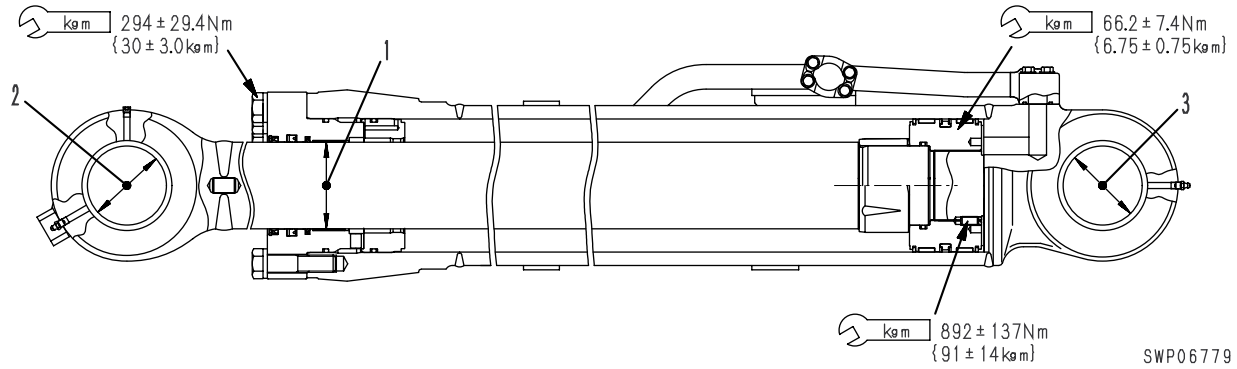
BACKHOE SPECIFICATION
BOOM CYLINDER



ARM CYLINDER



BUCKET CYLINDER

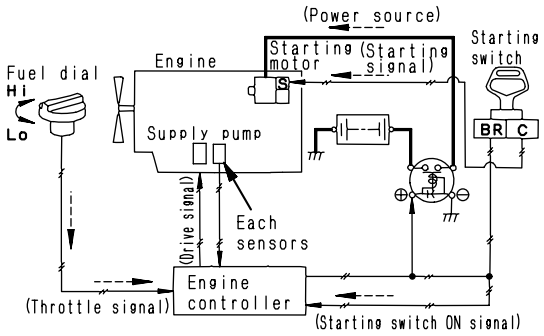


ENGINE CONTROL

1. Operation of system

Starting engine

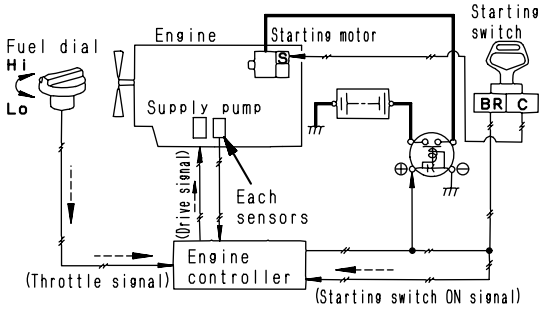
- When the starting switch is turned to the START position, the starting signal flows to the starting motor, and the starting motor turns to start the engine.
  When this happens, the engine controller checks the signal from the fuel control dial and sets the engine speed to the speed set by the fuel control dial.



SJP09417

Engine speed control

- The fuel control dial sends signal voltages to the engine controller according to its angle.
  The engine controller sends drive signals to the supply pump according to the signal voltages received from the fuel control dial and controls the fuel injection pump to control the engine speed.



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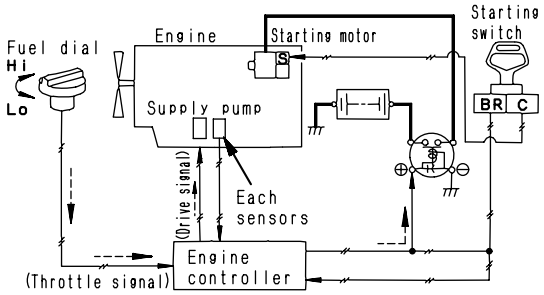
Stopping engine

- When the engine controller detects that the starting switch is at the STOP position, it cuts the signal to the supply pump drive solenoid to stop the engine.



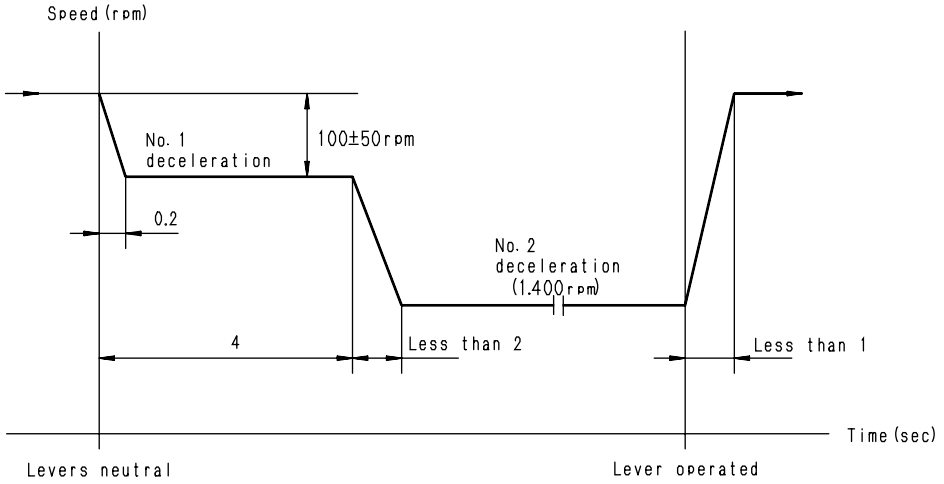
SJP09419

Operation

1. When auto-deceleration switch is turned ON

Control levers at neutral
- If the engine is running at above the deceleration actuation speed (approx. 1400 rpm), and all the control levers are returned to neutral, the engine speed drops immediately to approx. 100 rpm below the set speed to the No. 1 deceleration position.
- If another 4 seconds passes, the engine speed is reduced to the No. 2 deceleration position (approx. 1400 rpm), and is kept at that speed until a lever is operated.

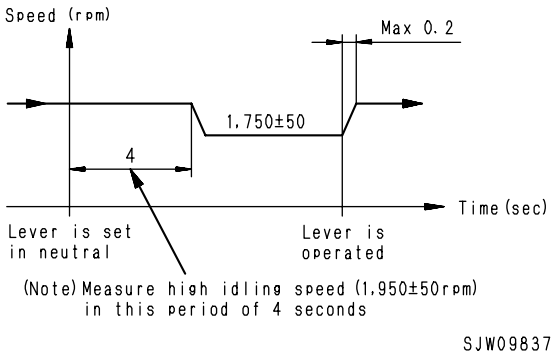
When control lever is operated
- If any control lever is operated when the engine speed is at No. 2 deceleration, the engine speed will immediately rise to the speed set by the fuel control dial.



2. When auto-deceleration switch is turned OFF

Control lever at neutral
- If the engine is running at a speed above 1,750 rpm and all the control levers are returned to neutral, the engine speed drops to approx. 1,750 rpm after 4 seconds and is kept at that speed until a lever is operated.

When control lever is operated
- If any control lever is operated under the condition shown at left (after the engine speed drops to approx. 1,750 rpm), the engine speed will immediately rise to the speed set by the fuel control dial.



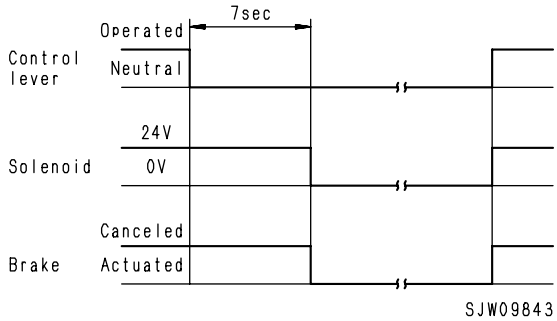
Swing lock, swing holding brake function

- The swing lock (manual) can be locked at any desired position, and the swing lock and swing holding brake (automatic) are interconnected with the swing, so they prevent any hydraulic drift after the swing is stopped.

★ Swing brake solenoid valve
For details of the structure and function, see SOLENOID VALVE.

★ Swing motor
For details of the structure and function, see SWING MOTOR.

Actuation

Mode	Swing lock switch	Swing lock monitor	Swing brake solenoid valve	Actuation
Swing holding brake	OFF	OFF	See diagram on right	When swing and work equipment levers are placed at neutral, swing brake is applied after approx. 7 sec; when any swing or work equipment lever is operated, brake is canceled and swing can be operated freely. • Time chart  SJW09843
Swing brake	ON	ON	De-energized	Swing lock is actuated and swing is held in position. Even when swing lever is operated, swing lock is not canceled and swing does not move.

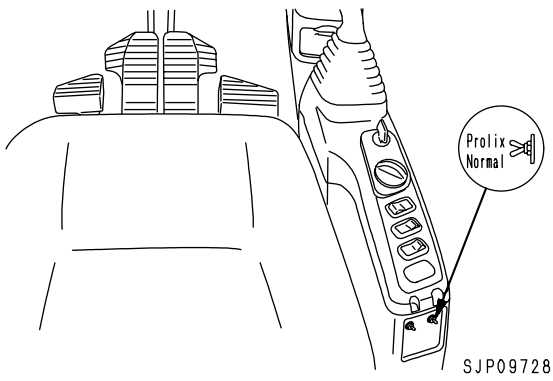
Operation of swing lock prolix switch

- If any abnormality should occur in the controller, and the swing holding brake is not actuated normally and the swing cannot be operated, the swing lock prolix switch can be operated to cancel the swing lock and allow the swing to be operated.

★ Even when the swing lock prolix switch is turned ON, the swing lock switch stays ON and the swing brake is not canceled.

★ When the swing brake is canceled, the swing has only a hydraulic brake operated by the safety valve, so if the swing is stopped on a slope, there may be hydraulic drift.

Swing lock prolix switch	ON (when controller is abnormal)		OFF (when controller is normal)	
Swing lock switch	ON	OFF	ON	OFF
Swing brake	Swing lock applied	Swing lock canceled	Swing lock applied	Swing holding brake applied



SJP09728

Input and output signals

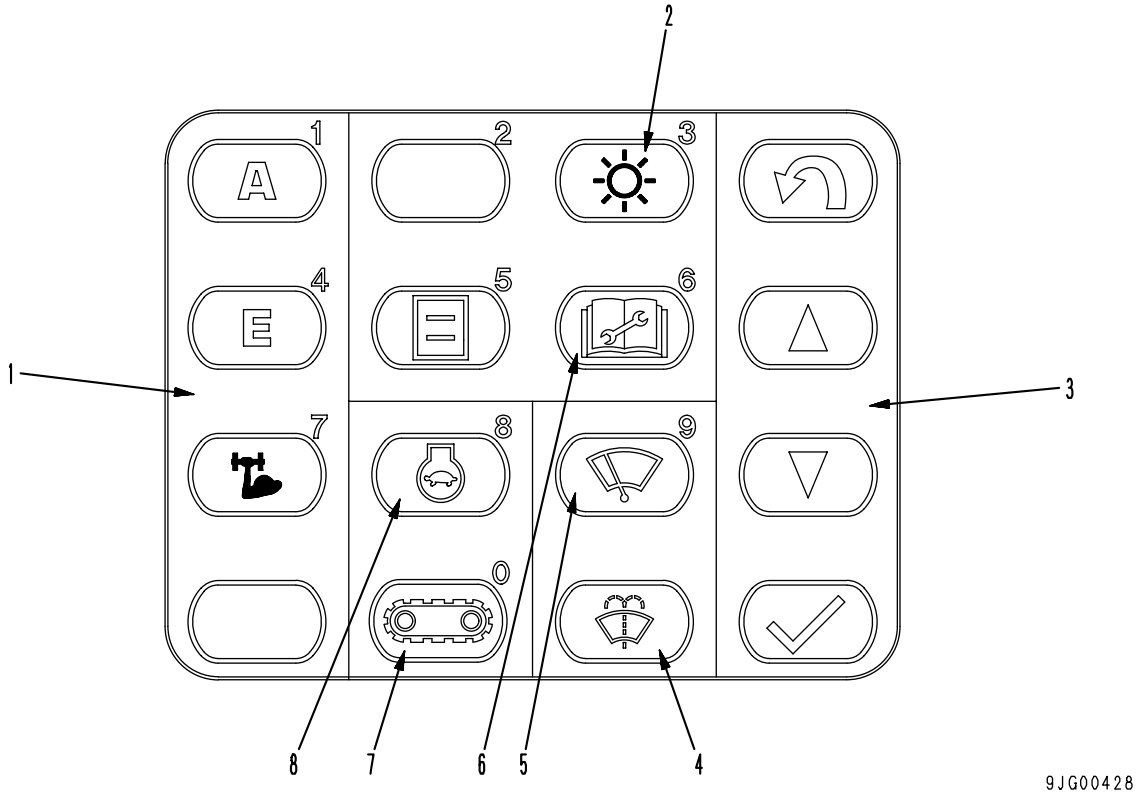
CN1 [CN-C01]

Pin No.	Signal name	Input/ Output
CN1-1	NC	Input
CN1-2	R pump pressure sensor	Input
CN1-3	NC	Input
CN1-4	GND (SIG)	
CN1-5	(Auto grease controller trouble)	Input
CN1-6	NC	Input
CN1-7	NC	Input
CN1-8	F pump pressure sensor	Input
CN1-9	NC	Input
CN1-10	GND (SIG)	
CN1-11	Knob switch	Input
CN1-12	NC	Input
CN1-13	NC	Input
CN1-14	NC	Input
CN1-15	Power Supply (+24V)	Input
CN1-16	NC	Output
CN1-17	Key switch (Terminal C)	Input
CN1-18	NC	Input
CN1-19	NC	Input
CN1-20	NC	Input
CN1-21	GND (Analog)	
CN1-22	Sensor power supply (+5V)	Output
CN1-23	Key switch (Terminal Acc)	Input
CN1-24	Step light switch	Input

CN2 [CN-C02]

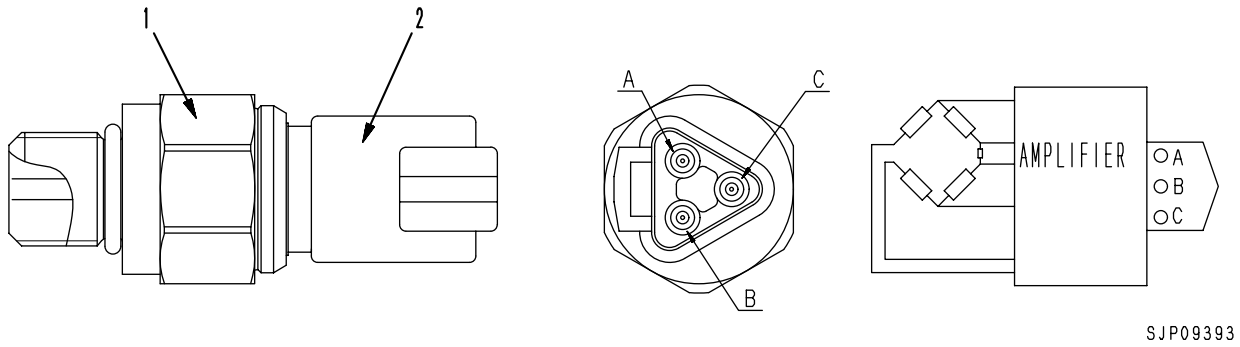
Pin No.	Signal name	Input/ Output
CN2-1	NC	Output
CN2-2	Swing prolix switch	Input
CN2-3	NC	Input
CN2-4	RS232C-R × D	Input
CN2-5	(Overload sensor (ON/OFF))	Input
CN2-6	NC	Input
CN2-7	Model selection 4	Input
CN2-8	NC	Output
CN2-9	NC	Output
CN2-10	NC	Input
CN2-11	NC	Output
CN2-12	CAN_SH	
CN2-13	Model Selection 5	Input
CN2-14	RS232C-T × D	Output
CN2-15	NC	Input
CN2-16	Travel left switch	Input
CN2-17	Model selection 3	Input
CN2-18	NC	Output
CN2-19	NC	Output
CN2-20	NC	Input
CN2-21	S_NET	Input/ Output
CN2-22	CAN0_L	Input/ Output
CN2-23	CAN1_L	Input/ Output
CN2-24	FWE switch	Input
CN2-25	Horn switch	Input
CN2-26	NC	Input
CN2-27	Model selection 2	Input
CN2-28	NC	Input
CN2-29	GND (PULSE)	
CN2-30	NC	Input
CN2-31	GND (S_NET_GND)	
CN2-32	CAN0_H	Input/ Output
CN2-33	CAN1_H	Input/ Output
CN2-34	GND (RS232C)	
CN2-35	Service valve pressure switch	Input
CN2-36	NC	Input
CN2-37	Model selection 1	Input
CN2-38	Swing lock switch	Input
CN2-39	(GND)(PULSE)	
CN2-40	Engine speed sensor	Input

SWITCHES



1. Working mode selector switch
2. Display brightness, contrast adjustment switch
3. Control switch
4. Window washer switch
5. Wiper switch
6. Maintenance switch
7. Travel speed selector switch
8. Auto-deceleration switch

Main pump oil pressure sensor (0 – 49.0 MPa {0 – 500 kg/cm²})



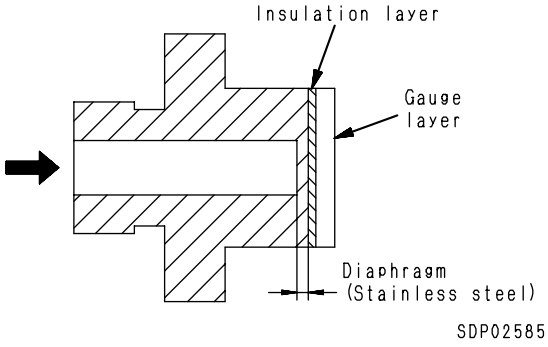
1. Sensor
2. Connector

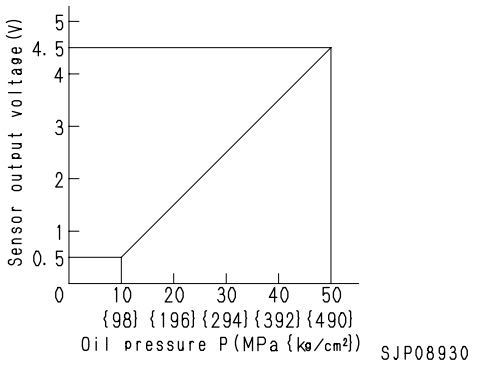
FUNCTION

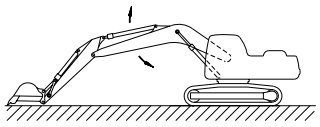
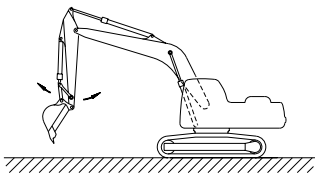
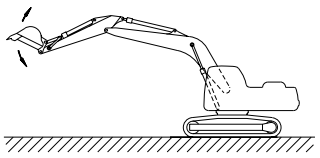
- The pump pressure sensor is installed to the inlet circuit of the control valve. It converts the pump discharge pressure into a voltage and transmits it to the pump controller.

OPERATION

- The oil pressure applied from the pressure intake part presses the diaphragm of the oil pressure sensor, the diaphragm is deformed.
- The gauge layer facing the diaphragm measures the deformation of the diaphragm by the change of its resistance, then converts the change of the resistance into a voltage and transmits it to the amplifier (voltage amplifier).
- The amplifier amplifies the received voltage and transmits it to the pump controller.
- Relationship between pressure **P** (MPa {kg/cm²}) and output voltage (V) is as follows.
  V = 0.08 {0.008} x P + 0.5





Applicable model						PC600, 600LC-7K	
Cate-gory	Item		Measurement conditions		Unit	Standard value	Permissible value
Work equipment	Work equipment speed	Boom speed	 9JF00665 • Hydraulic oil temperature: Within operating range • Engine: High idling • Working mode: A • Measure time taken to move bucket between RAISE stroke end and ground touch point of bucket (including operating time of cylinder cushion).	RAISE	sec.	4.9 ± 0.5	Max. 5.9
				LOWER		3.6 ± 0.4	Max. 4.4
		Arm speed	 9JF00666 • Hydraulic oil temperature: Within operating range • Engine: High idling • Working mode: A • Measure time taken to move arm between OUT stroke end and IN stroke end (including operating time of cylinder cushion).	IN		5.3 ± 0.5	Max. 6.3
				OUT		3.9 ± 0.4	Max. 4.7
		Bucket speed	 9JF00667 • Hydraulic oil temperature: Within operating range • Engine: High idling • Working mode: A • Measure time taken to move bucket between DUMP stroke end and CURL stroke end (including operating time of cylinder cushion).	CURL		3.2 ± 0.4	Max. 4.0
				DUMP		3.5 ± 0.4	Max. 4.3

MEASURING EXHAUST GAS COLOR

★ Tools for measuring exhaust gas color

Symbol		Part Number	Part name
C	1	799-201-9000	Handy smoke checker
	2	Commercially available	Smoke meter

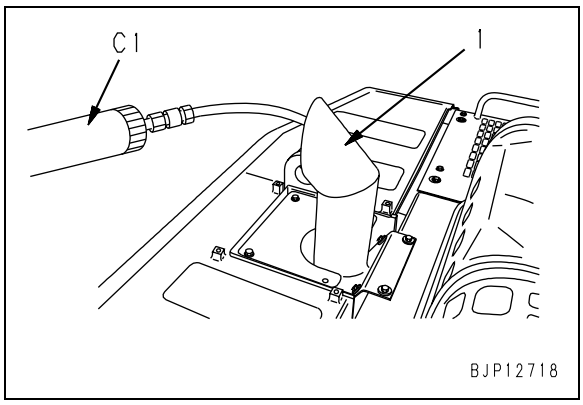
⚠ Be careful not to touch hot areas when installing and removing the measuring tools.

★ When air source or electric power supply is not available in field, use **C1** handy smoke checker, but use **C2** smoke meter, when recording official data.

★ Measure exhaust gas color under the following conditions:
- Engine water temperature:Within the operating range.

1. Measurement with C1, Handy Smoke Checker

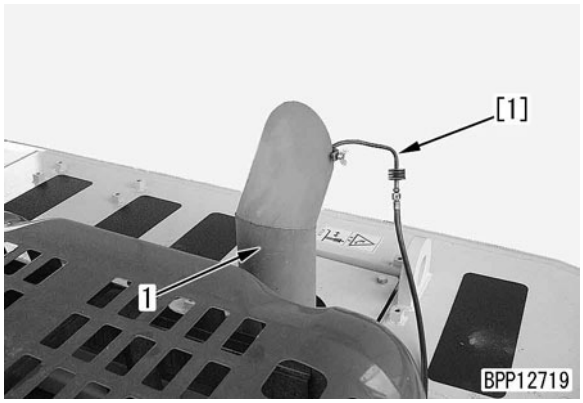
1) Set a filter paper in the handy smoke checker **C1**.
2) Insert the exhaust gas suction port in the exhaust pipe (1).
3) Start the engine.
4) Operate the handle of the smoke checker **C1**, and adhere exhaust gas to the filter paper when accelerating the engine quickly or at a high idling.



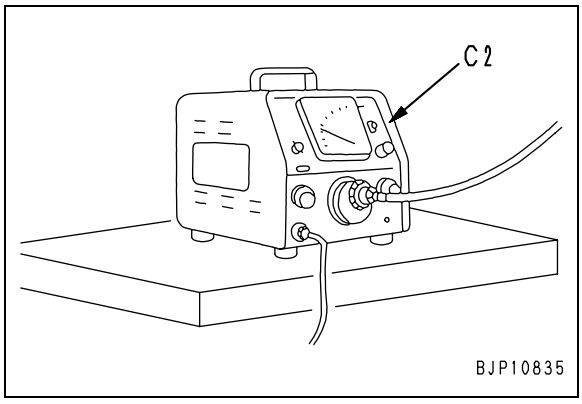
5) Remove the filter paper and compare the color on the filter paper with the accessory scale.
6) After the measurement, remove the measuring tools and return the engine to the original state.

2. Measurement with Smoke Meter C2

1) Insert the probe [1] of the smoke meter **C2**, in the outlet of the exhaust pipe (1) and fix it to the exhaust pipe with clip.



2) Connect the prove hose, the receptacle of the accelerator switch and the air hose to the smoke meter **C2**.
   ★ The supply air pressure shall be less than 1.5 MPa {15 kg/cm^2}
3) Connect the power cord to an AC100V receptacle.
   ★ Before connecting the power cord, make sure that the power switch of the smoke meter is turned off.
4) Loosen the cap nut of the suction pump and set a filter paper there.
   ★ Set the filter paper accurately so that exhaust gas does not leak out.
5) Turn on the power switch of the smoke meter **C2**.



6) Start the engine.
7) When accelerating the engine quickly or at a high idling, step down the accelerator pedal of the smoke meter **C2**, and collect exhaust gas in the filter paper.
8) Place the filter paper contaminated with exhaust gas on new filter papers (more than 10 sheets) in the filter paper holder and read the indicated value.
9) After completing the measurement, remove the measuring tools and set to the original condition.

CHECK FOR LEAKAGE IN FUEL SYSTEM

⚠ Since very high pressures are generated in the high pressure fuel circuit, there is a danger of getting fire if fuel leaks while the engine is running.
After inspecting the fuel circuit or removing and installing equipment to or from the fuel circuit, execute the following procedures to check if fuel is leaking.

★ Clean and degrease the engine body and the area around before inspection so that fuel leakage can be checked easily.

1. Spray color checker (developer) to the connections of the fuel supply pump, the common rail, the fuel injector and the high pressure pipe.

2. Start the engine, keep the speed below 1,000 rpm and stop the engine when the rotation became stable.

3. Check if fuel is leaking from the fuel pipe and equipment.
   ★ Check if fuel is leaking from the high pressure circuit, mainly from the area where color checker was sprayed.
   ★ When finding fuel leakage, repair the relevant portions. Then, repeat the procedures from Step 2 to check that there is no leakage from the relevant portions.

4. Start the engine and keep low idling.

5. Check if fuel is leaking from the fuel pipe and equipment.
   ★ Check if fuel is leaking from the high pressure circuit, mainly from the area where color checker was sprayed.
   ★ When finding fuel leakage, repair the relevant portions. Then, repeat the procedures from Step 2 to check that there is no leakage from the relevant portions.

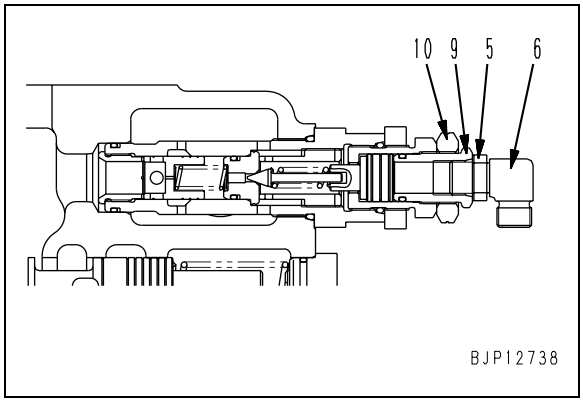
6. Start the engine and keep high idling.

7. Check if fuel is leaking from the fuel pipe and equipment.
   ★ Check if fuel is leaking from the high pressure circuit, mainly from the area where color checker was sprayed.
   ★ When finding fuel leakage, repair the relevant portions. Then, repeat the procedures from Step 2 to check that there is no leakage from the relevant portions.

8. Start the engine and keep low idling. Apply any load to the engine.
   ★ Relieve the arm IN.

9. Check if fuel is leaking from the fuel pipe and equipment.
   ★ Check if fuel is leaking from the high pressure circuit, mainly from the area where color checker was sprayed.
   ★ When finding fuel leakage, repair the relevant portions. Then, repeat the procedures from Step 2 to check that there is no leakage from the relevant portions.
   ★ When no leakage is found, end the inspection.

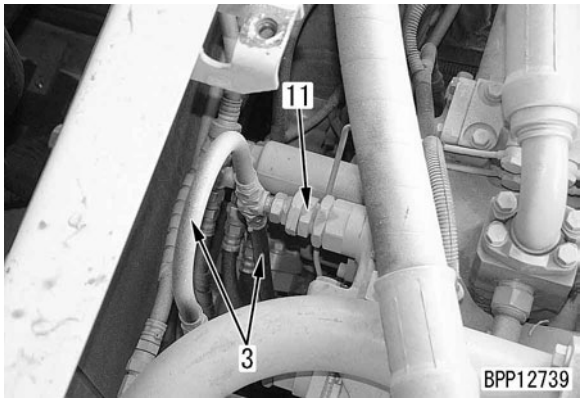
5) Fix union (9) and tighten locknut (10).
Locknut:
39.2 – 49.0 Nm {4.0 – 5.0 kgm}



6) Fix elbow (6) and tighten locknut (5).
7) Connect hose (4).
8) After completing the adjustment, check the oil pressure again according to the above described measurement procedure.

3. Adjusting main relief valve (high-pressure setting) of left side 4-spool control valve

★ If the work equipment oil pressure in the rear pump circuit (during heavy lift and power max. operation) and the R.H. travel oil pressure are abnormal, adjust the high-pressure setting side of main relief valve (11) of the left side 4-spool control valve according to the following procedure.



★ Adjust the left side 4-spool control valve similarly to the right side 5-spool control valve.

4. Adjusting main relief valve (low-pressure setting) of left side 4-spool control valve

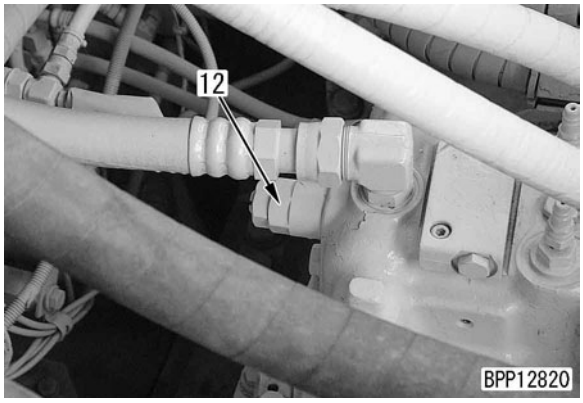
★ If the work equipment oil pressure in the rear pump circuit (during normal relief operation) is abnormal or the high-pressure setting side was adjusted, adjust the low-pressure setting side of main relief valve (11) of the left 4-spool control valve according to the following procedure.

★ Adjust the left side 4-spool control valve similarly to the right side 5-spool control valve.

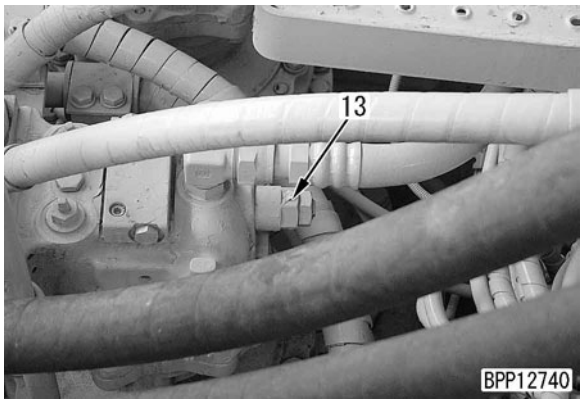
5. Adjusting swing motor safety valve

★ If the relief pressure of the swing motor is abnormal, adjust safety valves (12) and (13) of the swing motor according to the following procedure.

• (12): Safety valve of left swing motor



• (13): Safety valve of right swing motor



1) Fix adjustment screw (14) and loosen locknut (15).

2) Turn adjustment screw (14) to adjust the pressure.
★ If the adjustment screw is:
• Turned to the right, the pressure rises.
• Turned to the left, the pressure lowers.
★ Pressure changed by 1 turn of adjustment screw: 3.87 MPa {39.5 kg/cm^2}

TESTING SERVO PISTON STROKE

★ Tools for testing servo piston stroke

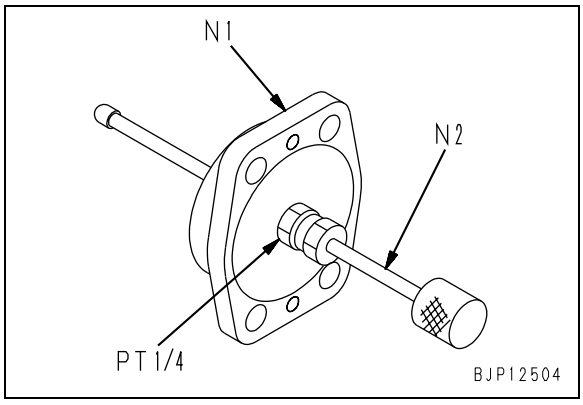
Symbol		Part No.	Part name
N	1	708-25-14140	Cap
		07000-B2065	O-ring
	2	566-98-41120	Disc gauge

★ When the NC valve output pressure is normal but the pump performance is considered inappropriate, inspect the acceptability of the servo valve and piston according to the following procedures:

1. Preparation of tool

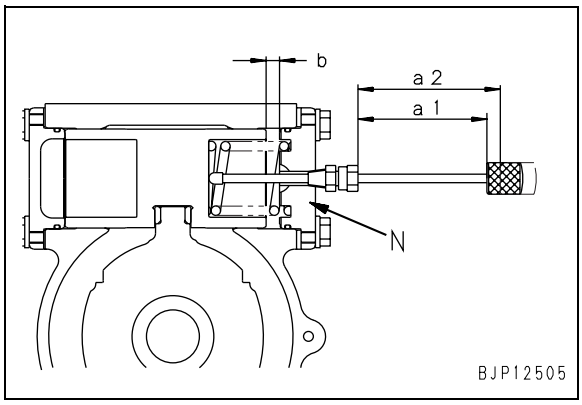
Drill a through hole PT1/4 in the center of the cap **N1** and screw the disc gauge **N2** in the hole.

★ Prepare the cap for the side where the spring of the hydraulic pump servo piston is fitted.



2. Measurement of stroke

1) Remove the cap and the shim of the servo valve on the measuring side.
   ★ Since the cap is pressed with the spring, remove the cap carefully with the long bolt (01016-31070, etc.) and the nut so that the cap does not jump out.
2) Mount the measuring tools **N**, on the servo piston together with the removed shim.
   ★ Be careful so that the shim is not caught in the bolt threads.
3) Push in the rods of the measuring tools **N**, fully and measure the size of the protrusion (a1).
4) Start the engine, keep it at full throttle and move the track shoe under no load.
   ★ Operate the lever to the full stroke.
   ★ During the measurement, press the rod with hand and check at the same time that the rod moves smoothly as the control lever changes the stroke.
   ★ After checking that the rod moves smoothly, keep it at the position where it is most protruded.
5) Stop the engine and measure the size of the rod protrusion (a2).
6) Calculate the servo piston stroke **b** from the measured size.
   ★ Servo piston stroke (b) = (a2) – (a1)
   ★ Standard stroke (b): 9.37 mm



7) After completing the testing, remove the testing tools and set to the original condition.

3. Judgment of servo valve

★ If the servo piston stroke is abnormal, remove the servo valve, servo piston cap, and spring, and check that you can move the servo piston smoothly before judging the condition of the servo valve.

1) When servo piston stroke is normal:
   Servo valve is normal.
2) When servo piston stroke is abnormal:
   - Servo piston moves smoothly;
     Servo valve is abnormal.
   - Servo piston does not move smoothly;
     Servo valve is normal.

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

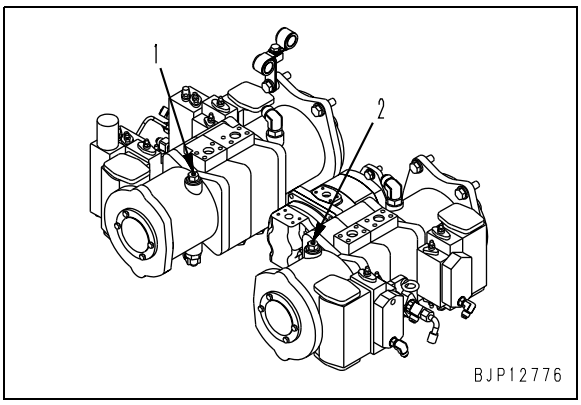
BLEEDING AIR FROM EACH PART

Contents of work \ Air bleeding item	Air bleeding procedure					
	1	2	3	4	5	6
	Bleeding air from hydraulic pump	Starting engine	Bleeding air from cylinder	Bleeding air from swing motor	Bleeding air from travel motor	Checking oil level and starting work
• Replacement of hydraulic oil • Cleaning of strainer	●	●	●	● (see Note)	● (see Note)	●
• Replacement of return filter element		●	→	→	→	●
• Replacement or repair of hydraulic pump • Removal of suction piping	●	●	●	→	→	●
• Replacement or repair of control valve • Removal of control valve piping		●	●	→	→	●
• Replacement or repair of cylinder • Removal of cylinder piping		●	●	→	→	●
• Replacement or repair of swing motor • Removal of swing motor piping		●	→	●	→	●
• Replacement or repair of travel motor • Removal of travel motor piping		●	→	→	●	●
• Replacement or repair of swivel joint • Removal of swivel joint piping		●	→	→	→	●

Note: Bleed air from the swing motor and travel motor only when the oil was drained from the motor cases.

1. Bleeding air from hydraulic pump

1) Loosen air bleeders (1) and (2) by 4 turns and remove the oil filler cap of the hydraulic tank.
   ★ Leave the machine under the above condition for 10 minutes or more.
2) After oil flows out of bleeders (1) and (2), run the engine at low idling.
   ★ If the engine water temperature is low and the automatic warm-up operation is started, stop the engine temporarily and reset the automatic warm-up operation with the fuel control dial (Set the starting switch in the ON position and hold the fuel control dial in the MAX position for 3 seconds, and the automatic warm-up operation is reset).
   ★ Set the safety lock lever in the LOCK position so that you will not operate a lever by mistake.
3) After clear oil flows out of bleeders (1) and (2), tighten the bleeders.
   Bleeder:
   7.8 – 9.8 Nm {0.8 – 1.0 kgm}



13. Function for showing error code No. and failure code No.

If the following switching operation is made while the user code No. is shown, a phone symbol (if registered), phone numbers (if registered), error code No. and failure code No. are shown in turn.

- Switching operation: [✓]

★ The following display is repeated in order according to the operation of the switch.

[1] Telephone symbol mark

⇩

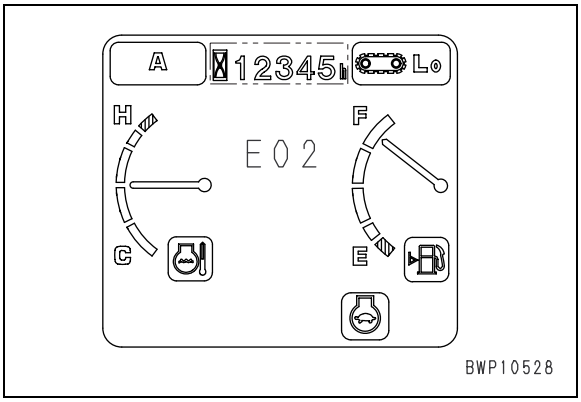
[2] Telephone No.

⇩

[3] Error code No. and failure code No.

★ The telephone symbol mark and telephone No. are shown only when they are registered in the monitor panel.
For registration, correction and deletion of telephone No., use Service Menu.

★ For details on the displayed error code No. and failure code No., refer to the Table for error code No. and failure code No.



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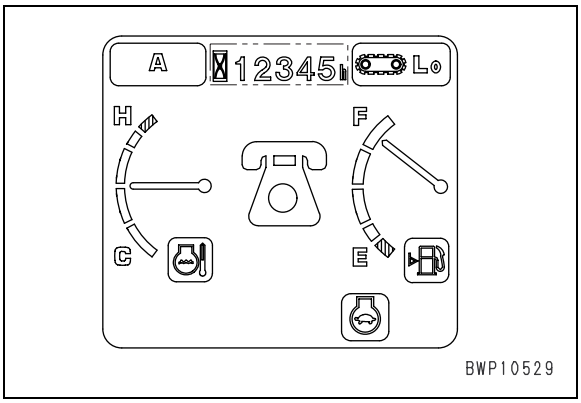
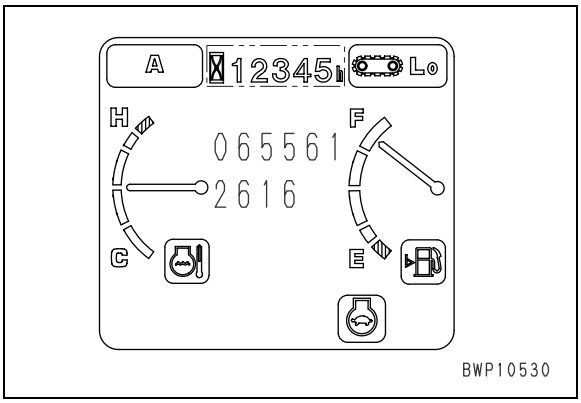
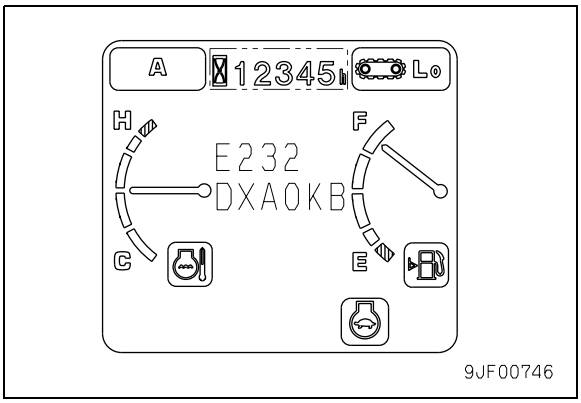


BWP10529



BWP10530

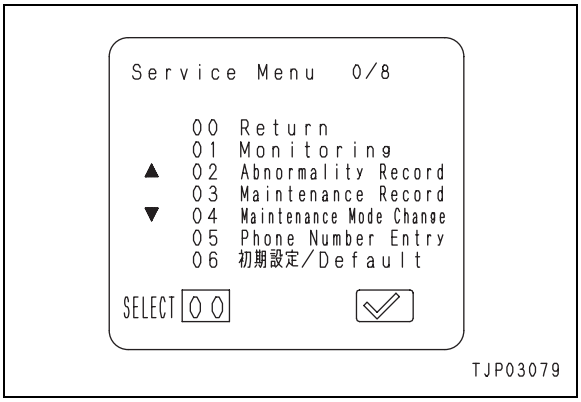


9JF00746

15. Function for Abnormality Record [02]

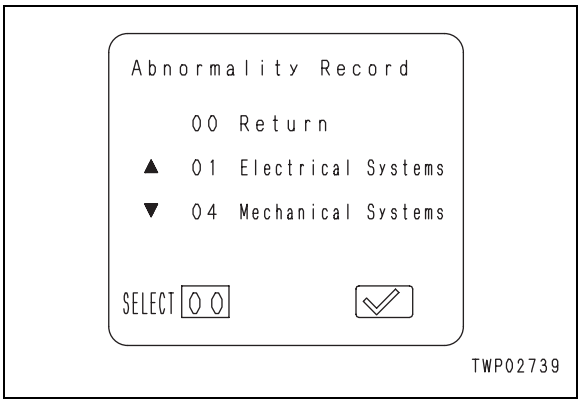
The monitor panel records failures that occurred on the machines in the past after classifying them into failures in the electric system and those in the mechanical system. Information on them can be displayed through the following operation.

1) Selection of menu
Select “02 Abnormality Record” in the initial display of Service Menu and depress [✓] switch.

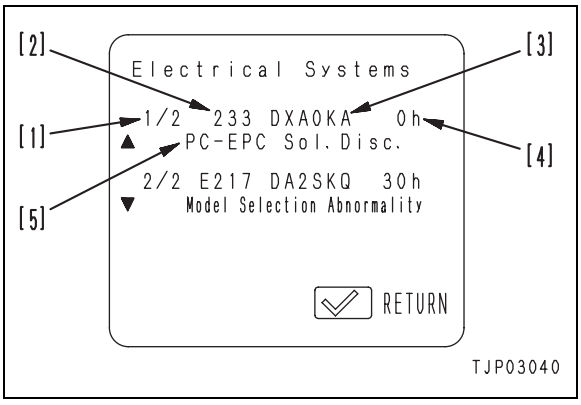


2) Selection of Submenu
Select an appropriate item from Submenu in the Abnormality Record display and depress [✓] switch.

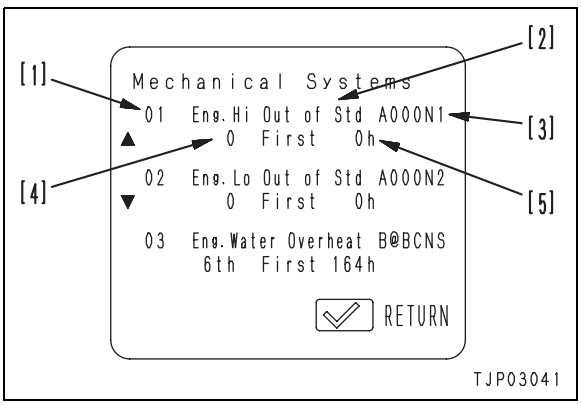
No.	Abnormality Record Submenu
00	Return (termination of Abnormality Record)
01	Electrical Systems
02	Mechanical Systems



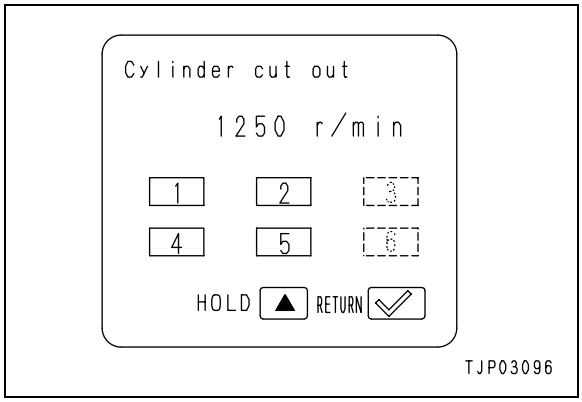
3) Information shown in display of Abnormality Record in the electrical system
[1]: The numerator expresses sequence of failure occurrence, counting from the latest one. The denominator expresses the total number of a specific failure recorded.
[2]: Error Code
[3]: Failure Code (section in 4 digits and phenomenon in 2 digits)
[4]: Time elapsed since the occurrence of the first failure
[5]: Contents of failure
★ Refer to "Table for error code No. and failure code No." in Operator's Menu.

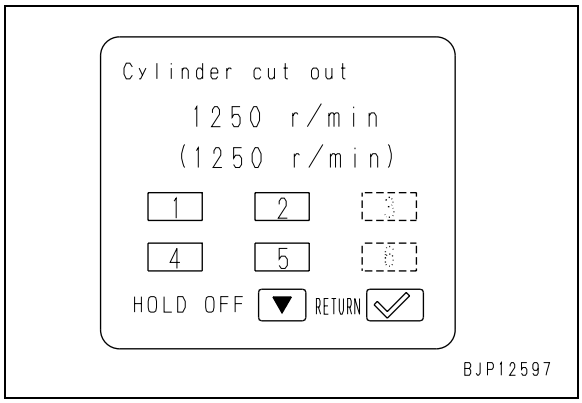


4) Information shown in display of Abnormality Record in the mechanical systems
[1]: Record No.
[2]: Contents of Abnormality
[3]: Failure Code (section in 4 digits and phenomenon in 2 digits)
[4]: Total number of occurrence
[5]: Service meter reading at the initial occurrence
★ Refer to "Table for error code No. and failure code No." in Operator's Menu.



4) Function of holding engine speed
If the [△] switch is pressed while the Cylinder Cut Out operation screen is used, the engine speed is held and displayed on the lower line.
If the [▽] switch is pressed while the engine speed is held, holding of the engine speed is cancelled and the engine speed displayed on the lower line goes off.
★ If the holding function is used, the held engine speed is displayed in ( ) on the lower line and the current engine speed is displayed on the upper line.
★ The holding function can be used both in and out of the Cylinder Cut Out operation.

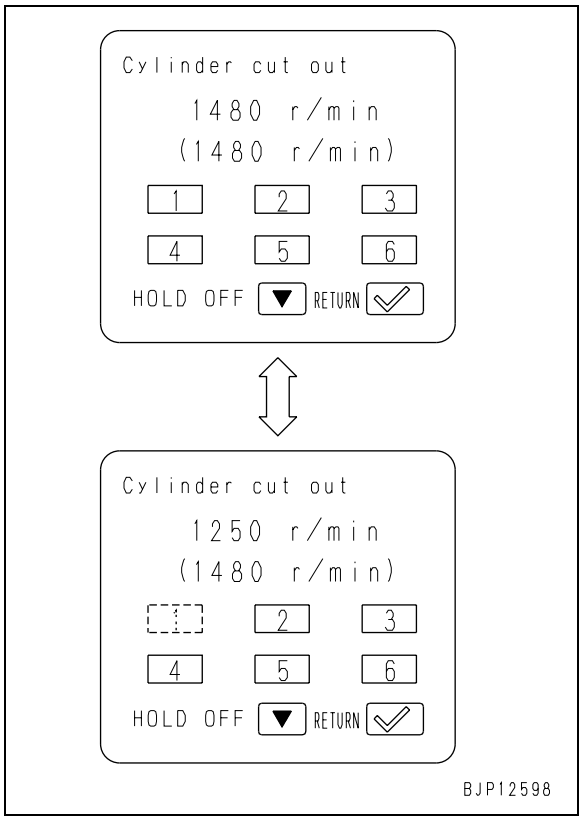




[Reference]: How to use holding function effectively

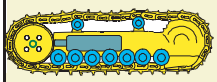
The engine speed displayed by the holding function is held on the screen until the holding function is cancelled, regardless of setting and cancellation of the Cylinder Cut Out operation. Accordingly, a defective cylinder can be found out effectively according to the following procedure.

(1) Run the engine normally (without disabling any cylinder) and hold the engine speed.
(2) Disable a cylinder to be checked.
(3) Run the engine under the same condition as the normal operation in step (1) and compare the engine speed at this time with the held engine speed.
(4) Check the cylinder once, regardless of change of the engine speed.
(5) Repeat steps (2) - (4) to check the other cylinders.
★ If the engine speed does not lower at all or lower less when a cylinder is selected for the Cylinder Cut Out operation, combustion in that cylinder must be abnormal.



(Program form No.: SELA195001)

KUC

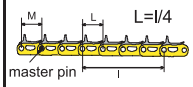
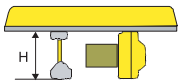
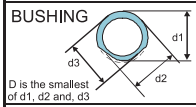
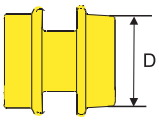
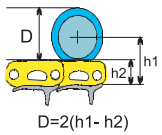


Komatsu
Undercarriage Inspection

Customer name:

Address:

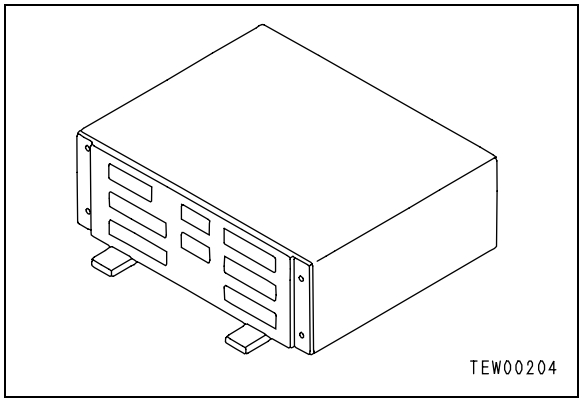
Model	PC600-7	Serial#		Equip#		Work Order No	
Location		SMR				Wet, AR, HD or Dry	DRY
Soil condition		Dealer				Shoe width (mm)	
Working condition		Inspector				Shoe type	DOUBLE
		Insp.Date(yyyy/mm/dd)			(yyyy/m/d)	Wear type	NORMAL

			New	100% Wear	Measured mm	Wear %	SMR New	SMR Rebuilt	Hours on Parts:	Comments/Observation
LINK PITCH 	R	LH	914.4	926.4						
		RH	914.4	926.4						
	M	LH	228.60	231.60						
		RH	228.60	231.60						
	H	LH	133.0	123.0						
		RH	133.0	123.0						
BUSHING 	D	LH	7.25	67.5			New	Turned		
		RH	7.25	67.5			New	Turned		
GROUSER HIGHT 	H	LH	46.0	25.0						
		RH	46.0	25.0						
CARRIER ROLLER 	Front	LH	180.0	170.0						
		RH	180.0	170.0						
	Rear	LH	180.0	170.0						
		RH	180.0	170.0						
IDLER 	Front	LH	22.5	28.5						
		RH	22.5	28.5						
	Rear	LH	22.5	28.5						
		RH	22.5	28.5						
TRACK ROLLER 	1	LH	220.0	208.0						
	2	LH	220.0	208.0						
	3	LH	220.0	208.0						
	4	LH	220.0	208.0						
	5	LH	220.0	208.0						
	6	LH	220.0	208.0						
	7	LH	220.0	208.0						
	8	LH	220.0	208.0						
	9	LH	220.0	208.0						
	10	LH	220.0	208.0						
	1	RH	220.0	208.0						
	2	RH	220.0	208.0						
	3	RH	220.0	208.0						
	4	RH	220.0	208.0						
	5	RH	220.0	208.0						
	6	RH	220.0	208.0						
	7	RH	220.0	208.0						
	8	RH	220.0	208.0						
	9	RH	220.0	208.0						
	10	RH	220.0	208.0						
SPROCKET H is the smallest of h1, h2, h3 	H	LH	0.0	6.0						
		RH	0.0	6.0						

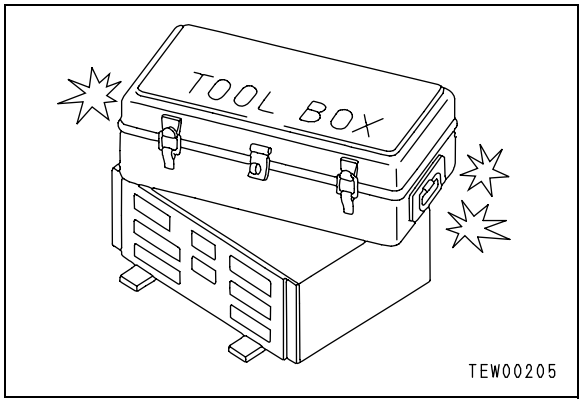
Remarks:

3) Handling control box

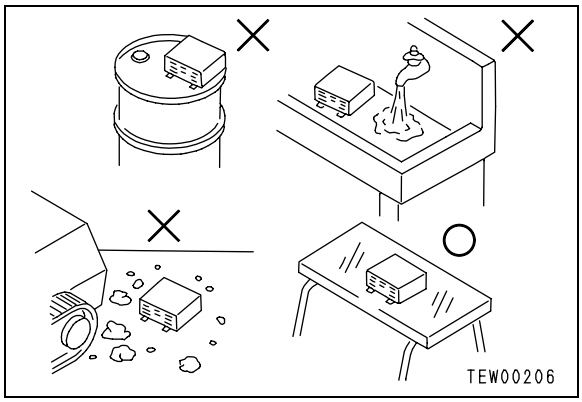
1) The control box contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine, so be extremely careful when handling the control box.
2) Do not open the cover of the control box unless necessary.



3) Do not place objects on top of the control box.
4) Cover the control connectors with tape or a vinyl bag.
   Never touch the connector contacts with your hand.
5) During rainy weather, do not leave the control box in a place where it is exposed to rain.



6) Do not place the control box on oil, water, or soil, or in any hot place, even for a short time.
   (Place it on a suitable dry stand).
7) Precautions when carrying out arc welding
   When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the control box. Fit an arc welding ground close to the welding point.

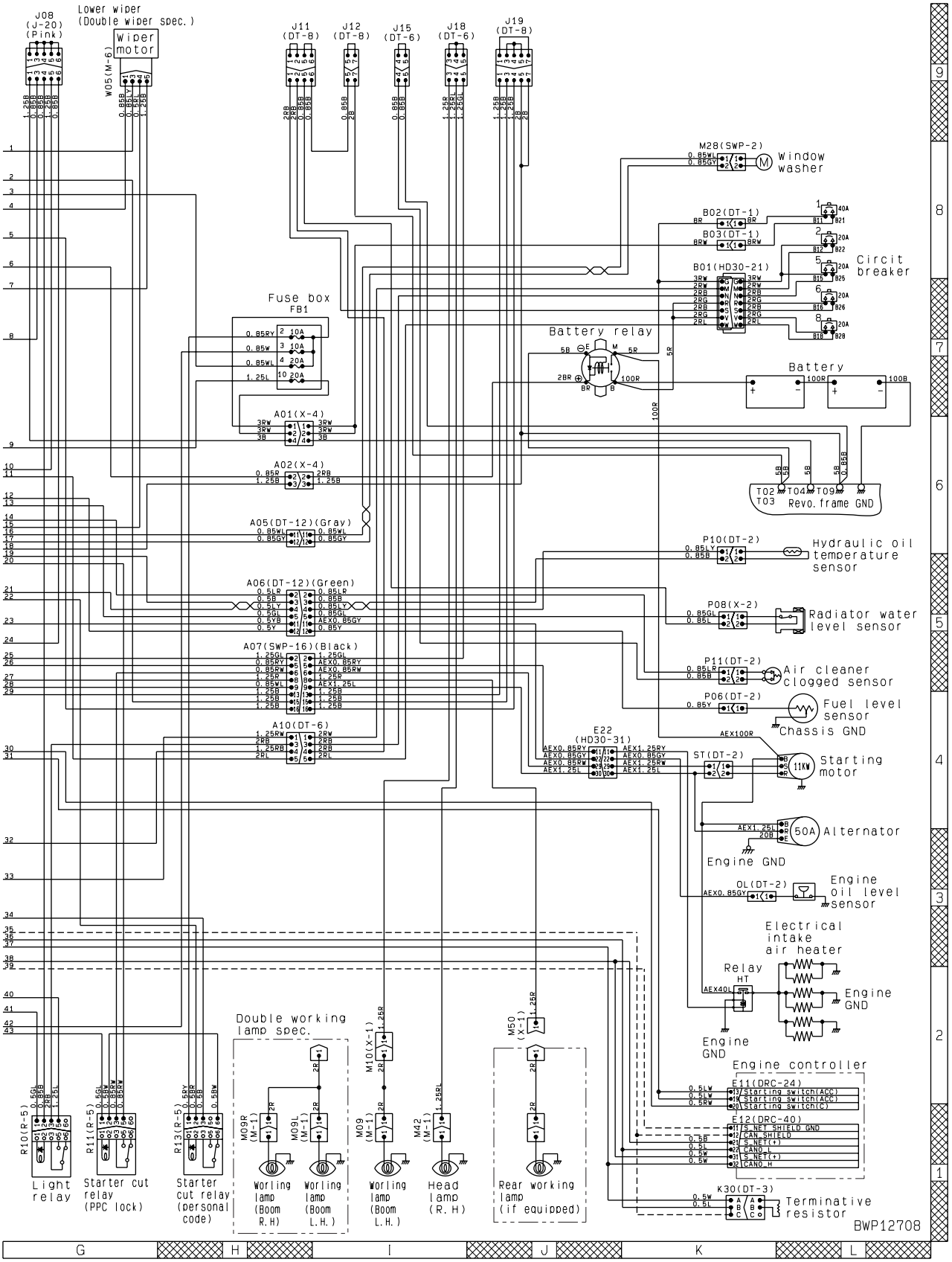


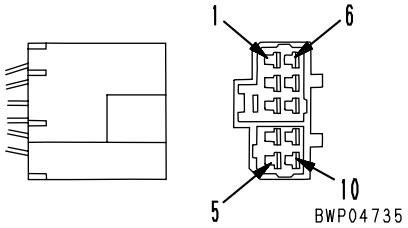
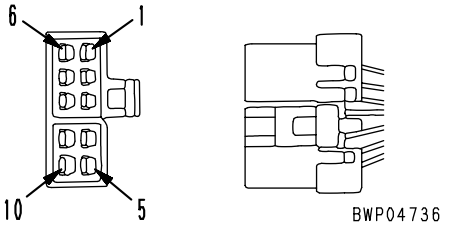
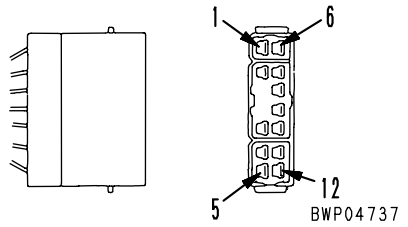
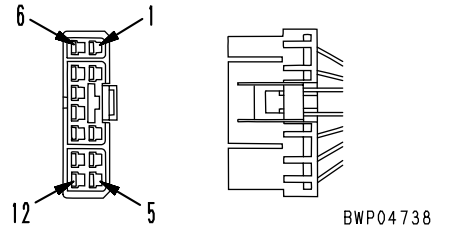
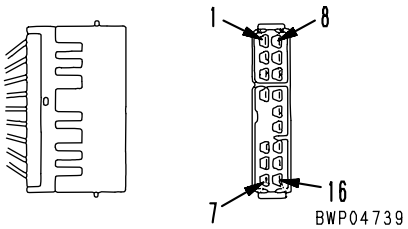
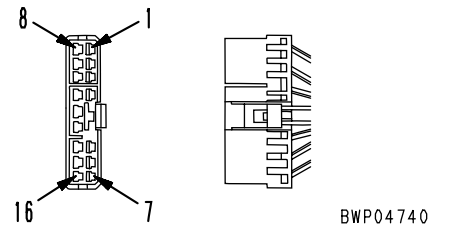
2. Points to remember when troubleshooting electric circuits

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

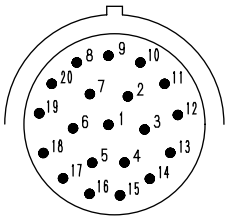
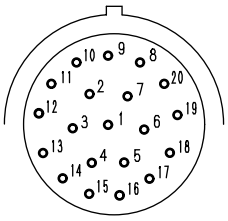
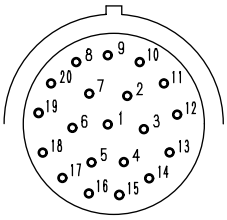
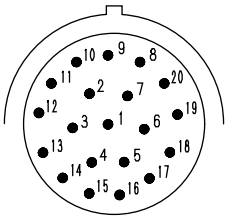
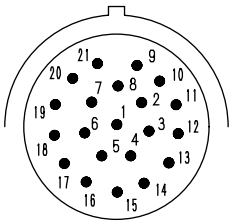
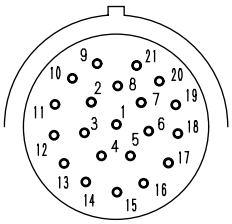
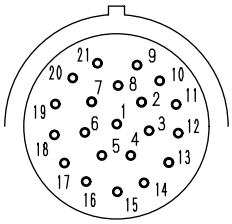
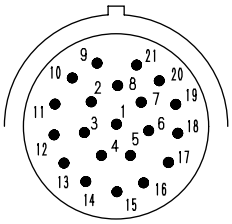
Connector No.	Connector Type	No. of pin	Place of use	Address			
				Stereo-gram	M circuit	E circuit	P circuit
J19	DT	8	Joint connector	C-1	J-9		J-9
K19	M	2	Pump resistor (for emergency pump drive)	U-2			B-1
K30	DT	3	CAN terminal resistor	W-2	K-1	A-1	F-3
K31	DT	3	CAN terminal resistor	N-4	A-4	K-7	E-1
M	Terminal	1	Battery relay terminal M	J-7	J-7	I-2	L-8
M07	M	3	Light switch	P-8	D-1		
M09	M	1	Working lamp (Boom)	A-9	I-1		
M09L	M	1	Working lamp (Boom left)	A-9	H-1		
M09R	M	1	Working lamp (Boom right)	A-8	H-1		
M10	X	1	Intermediate connector	B-9	I-2		
M13	KES0	2	Speaker (Right)	AC-8			
M16	Terminal	1	Horn (High tone)	A-3			H-9
M17	Terminal	1	Horn (Low tone)	A-3			H-9
M19	YAZAKI	2	Cigarette lighter	N-3			
M21	PA	9	Radio	U-2			
M22	Y090	2	Horn switch	N-7			B-1
M23	Y090	2	Power max. switch	S-1			G-9
M26	S	12	Air conditioner unit	W-5			
M28	SWP	2	Windshield washer motor	F-1	K-8		
M31	M	2	Optional power supply (2)	U-2			
M32	M	2	Optional power supply (1)	S-9			
M33	M	2	Optional power supply (3)	W-3			
M34	X	1	Air conditioner compressor electromagnetic clutch	AE-8			
M37	Terminal	1	Horn (High tone)	A-7			H-9
M38	Terminal	1	Horn (Low tone)	A-6			H-9
M38	M	2	Machine push-up switch	R-9			
M40	YAZAKI	2	Headlamp	Z-7	A-8		A-1
M41	YAZAKI	2	Headlamp	Y-7	A-8		
M42	M	1	Right headlamp	A-4	I-1		
M45	DT	12	Intermediate connector	U-2			
M46	X	4	RS232C junction connector	N-2			A-4
M50	X	1	Rear working lamp	H-8	J-2		
M57	Terminal	1	Engine compartment lamp	D-9			
M71	M	2	Room lamp	AA-8			
M72	M	4	DC/DC converter	U-2			
M73	KES0	2	Speaker (Left)	AD-8			
M75	YAZAKI	2	Step light	Z-8			D-1
M79	YAZAKI	2	12V accessory socket	V-9			
M80	X	1	Intermediate connector	D-1			G-9
M81	M	2	Step light switch	AD-2			F-1
M82	M	1	Flash light	D-1			
NE	YAZAKI	2	Engine Ne sensor	AI-5		K-5	
OL	DT	2	Engine oil level sensor	AG-5	K-3		
P01	070	12	Monitor panel	N-6	A-7 A-1	K-8	E-1
P02	040	20	Monitor panel	N-5	A-6 A-1	K-8	E-1
P03	M	2	Alarm buzzer stop switch	P-9	D-1		
P05	M	2	Rotary lamp switch	W-4			
P06	DT	2	Fuel level sensor	A-9	K-4		
P08	X	2	Radiator water level switch	E-9	K-5		

★ This circuit diagram is made by extracting the monitor panel system, engine preheating/starting/charging system, light system, and communication network system from the general electric circuit diagram.



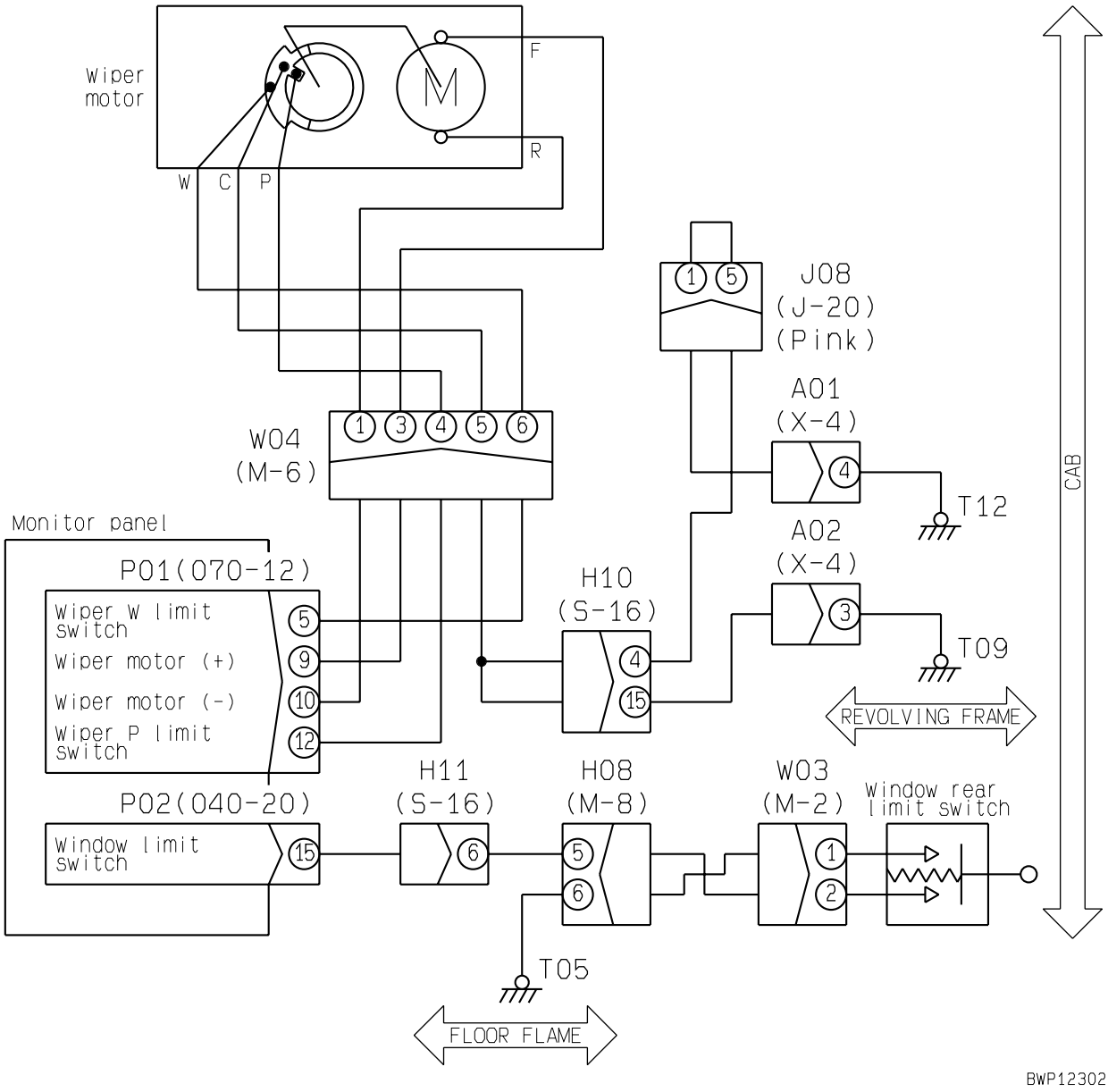
No.of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10 (Blue)			—
	—	—	
12 (Blue)			799-601-7160
	Part No.: 08056-11272	Part No.: 08056-11282	
16 (Blue)			799-601-7170
	Part No.: 08056-11672	Part No.: 08056-11682	

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

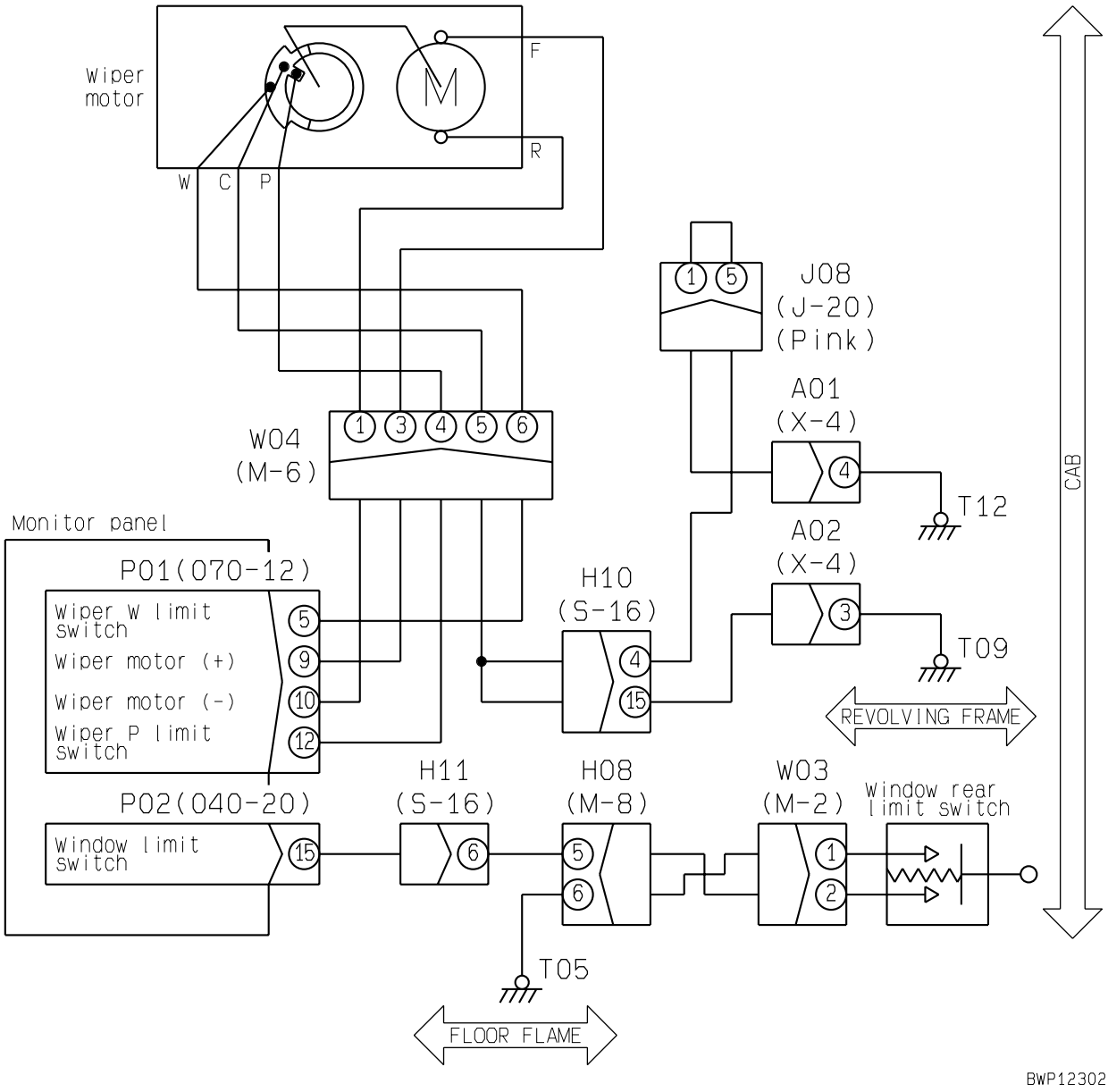
<table>
<tr><td rowspan="2">Type (shell size code)</td><td colspan="2">HD30 Series connector</td><td rowspan="2">T-adapter Part No.</td></tr>
<tr><td>Body (plug)</td><td>Body (receptacle)</td></tr>
<tr><td rowspan="4">18-20 (3)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="2">799-601-9230</td></tr>
<tr><td>  BWP05009</td><td>  BWP05010</td></tr>
<tr><td>Part No.:08191-31201, 08191-31202</td><td>Part No.:08191-34101, 08191-34102</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="3">799-601-9230</td></tr>
<tr><td>  BWP05011</td><td>  BWP05012</td></tr>
<tr><td>Part No.:08191-32201, 08191-32202</td><td>Part No.:08191-33101, 08191-33102</td></tr>
<tr><td rowspan="4">18-21 (4)</td><td>Pin (male terminal)</td><td>Pin (female termial)</td><td rowspan="3">799-601-9240</td></tr>
<tr><td>  BWP05013</td><td>  BWP05014</td></tr>
<tr><td>Part No.:08191-41201, 08191-42202</td><td>Part No.:08191-44101, 08191-44102</td></tr>
<tr><td>Pin (female terminal)</td><td>Pin (male termial)</td><td rowspan="3">799-601-9240</td></tr>
<tr><td>  BWP05015</td><td>  BWP05016</td></tr>
<tr><td>Part No.:08191-42201, 08191-42202</td><td>Part No.:08191-43101, 08191-43102</td></tr>
</table>

TROUBLESHOOTING WHEN ERROR CODE (ELECTRICAL SYSTEM) AND FAILURE CODE (MECHANICAL SYSTEM) ARE DISPLAYED (DISPLAYED CODE)

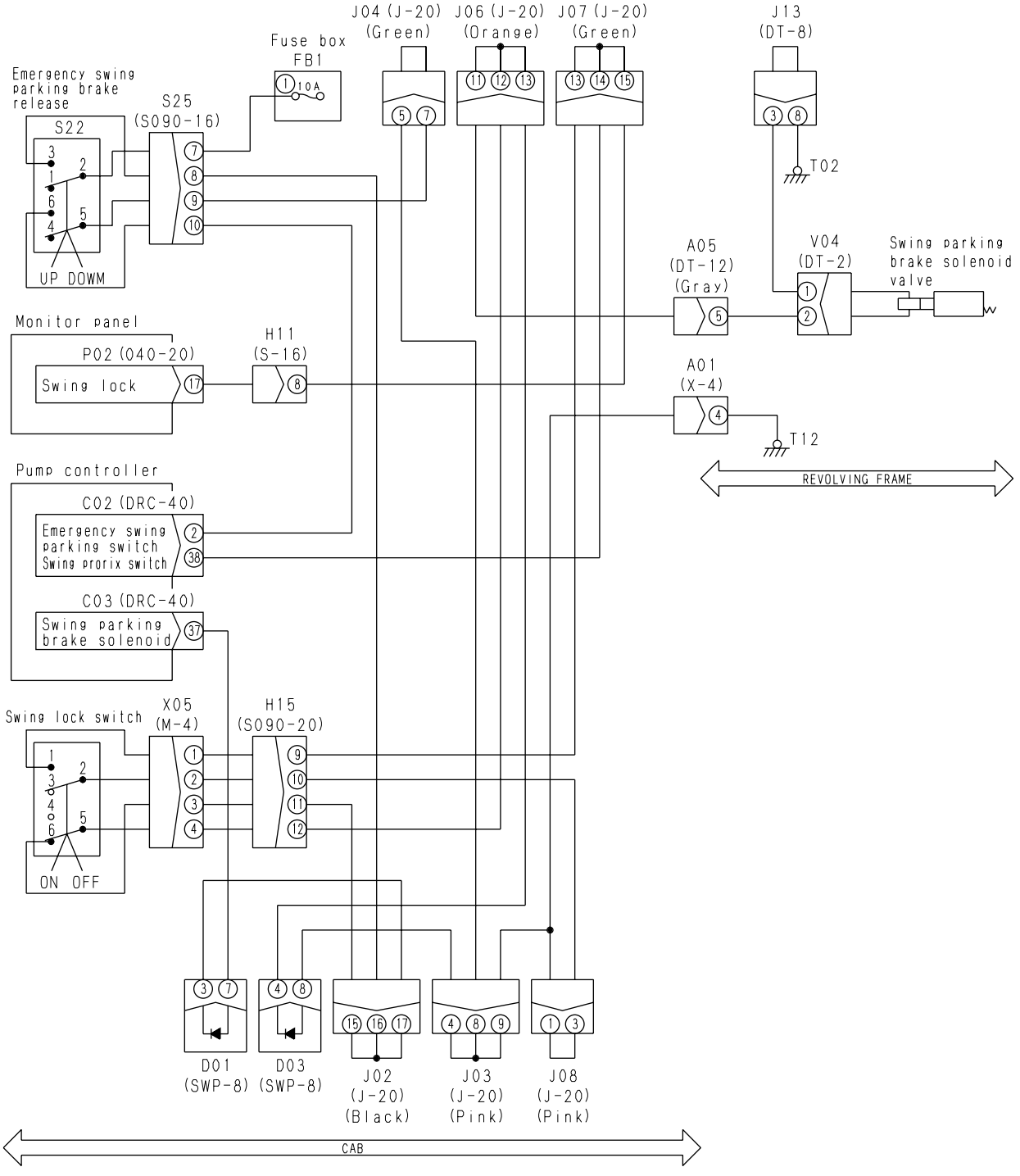
Electric circuit diagram related to wiper motor (Single wiper specification.)



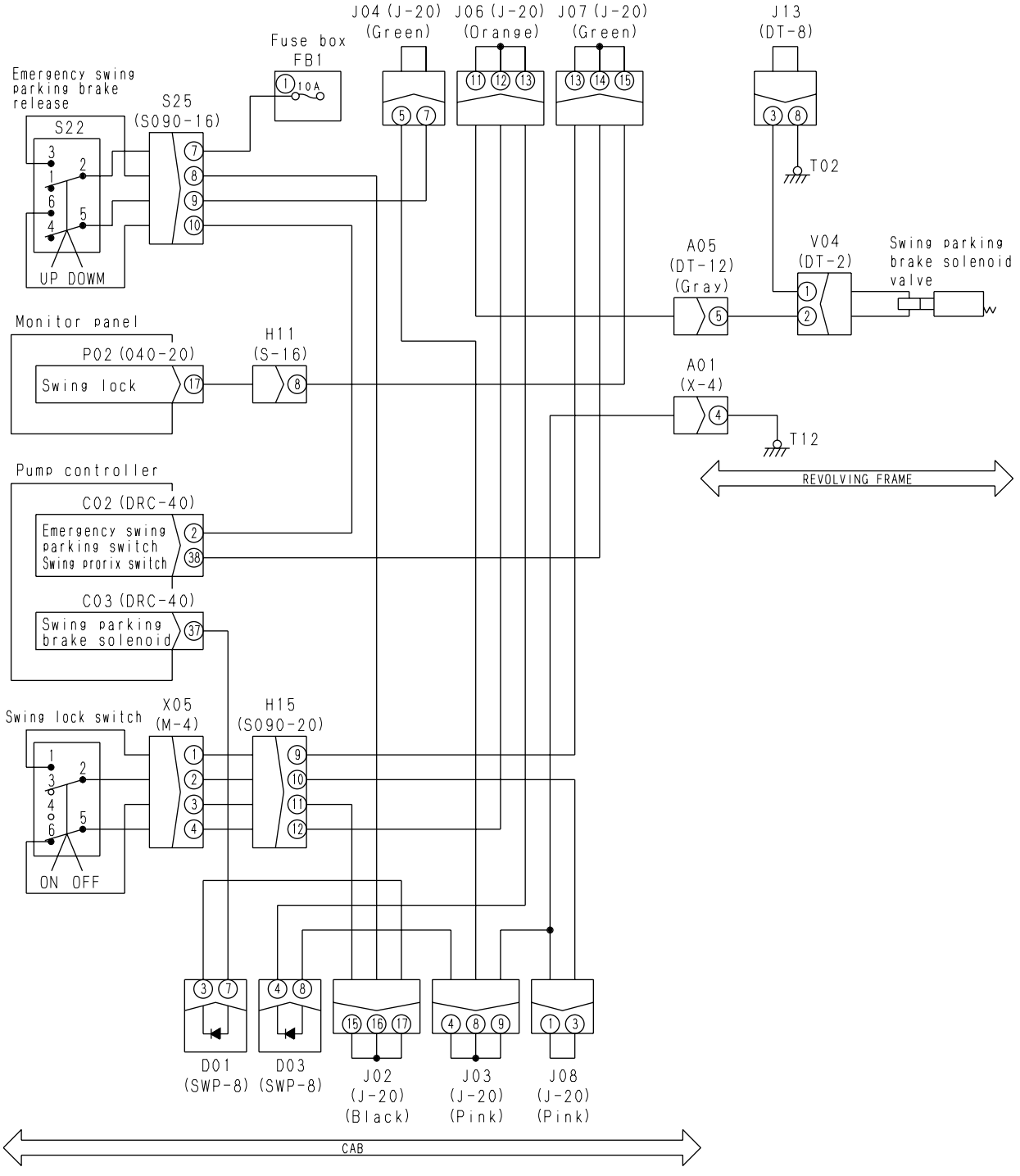
Electrical circuit diagram related to wiper motor (Single wiper specification.)



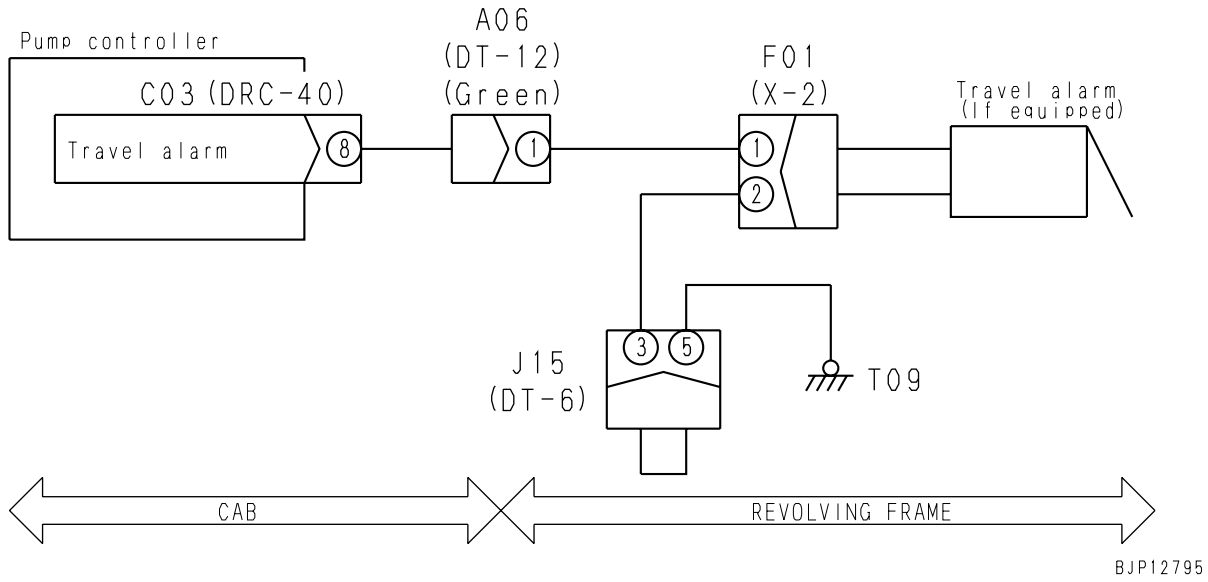
Electrical circuit diagram related to swing holding brake solenoid



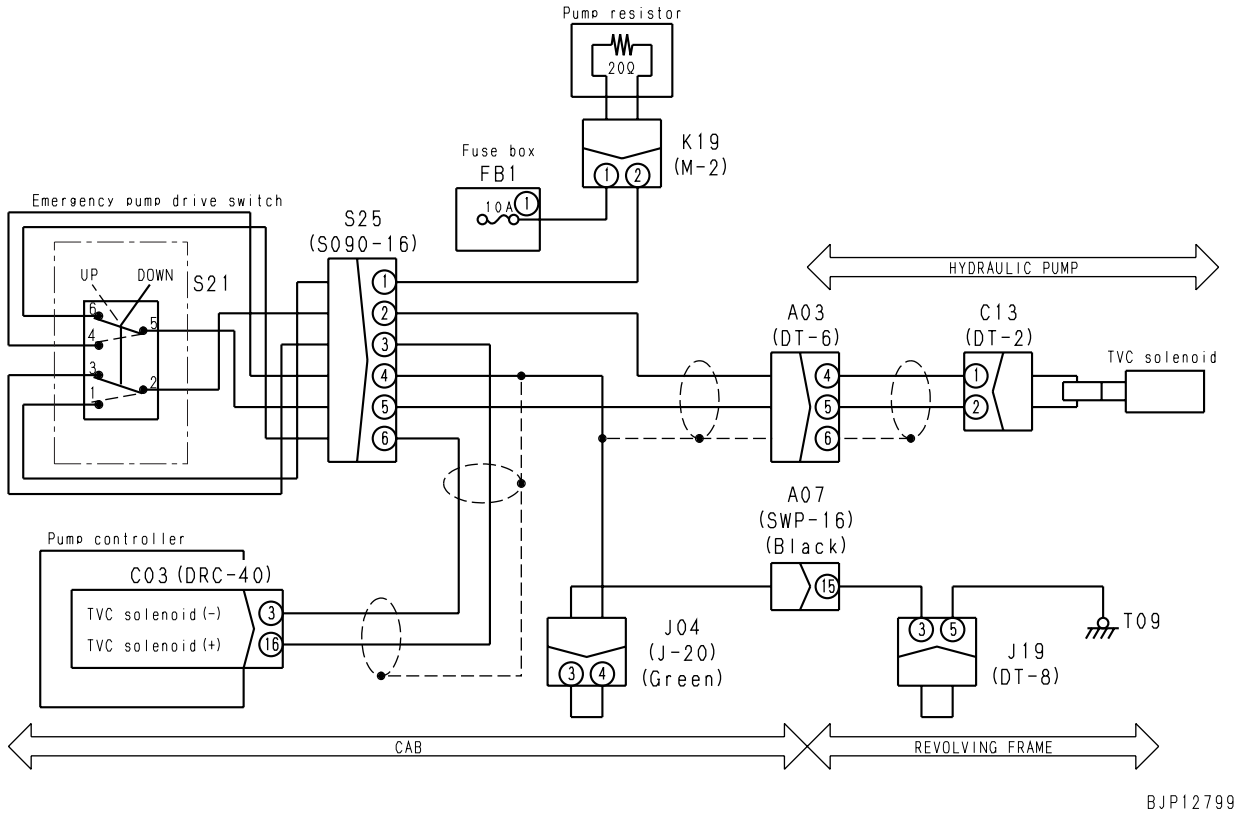
Electrical circuit diagram related to swing holding brake solenoid



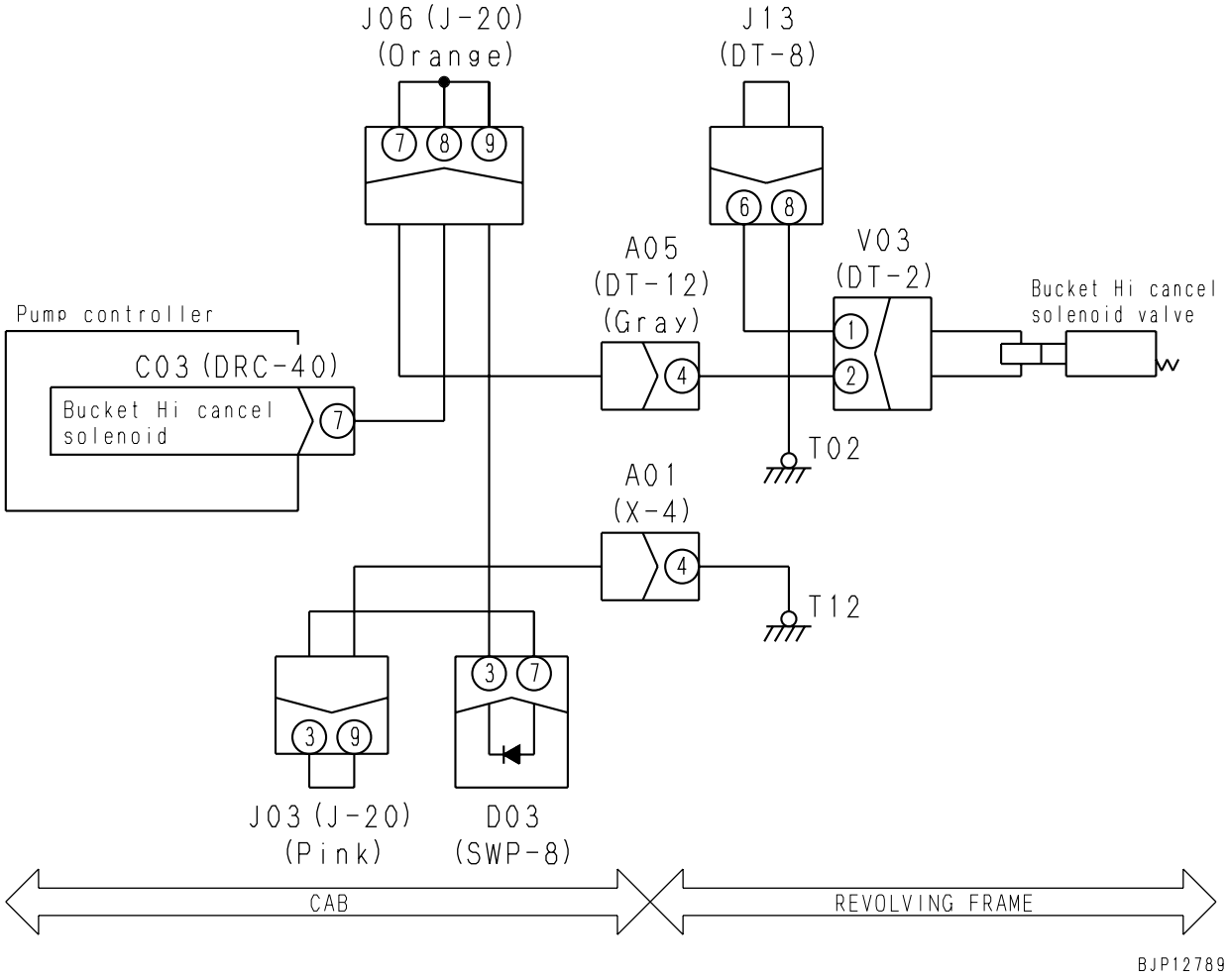
Circuit diagram related to travel alarm



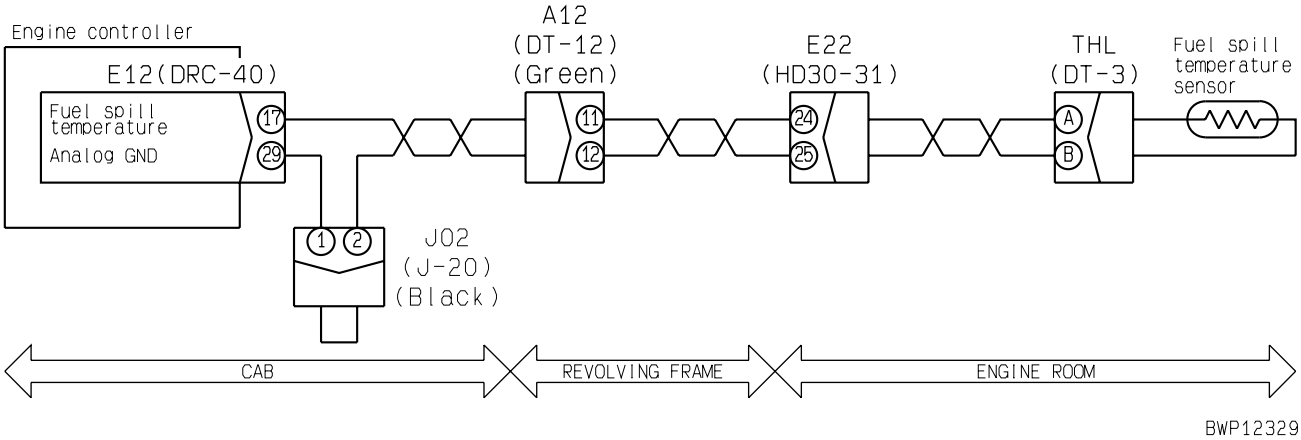
Electrical circuit diagram related to TVC solenoid



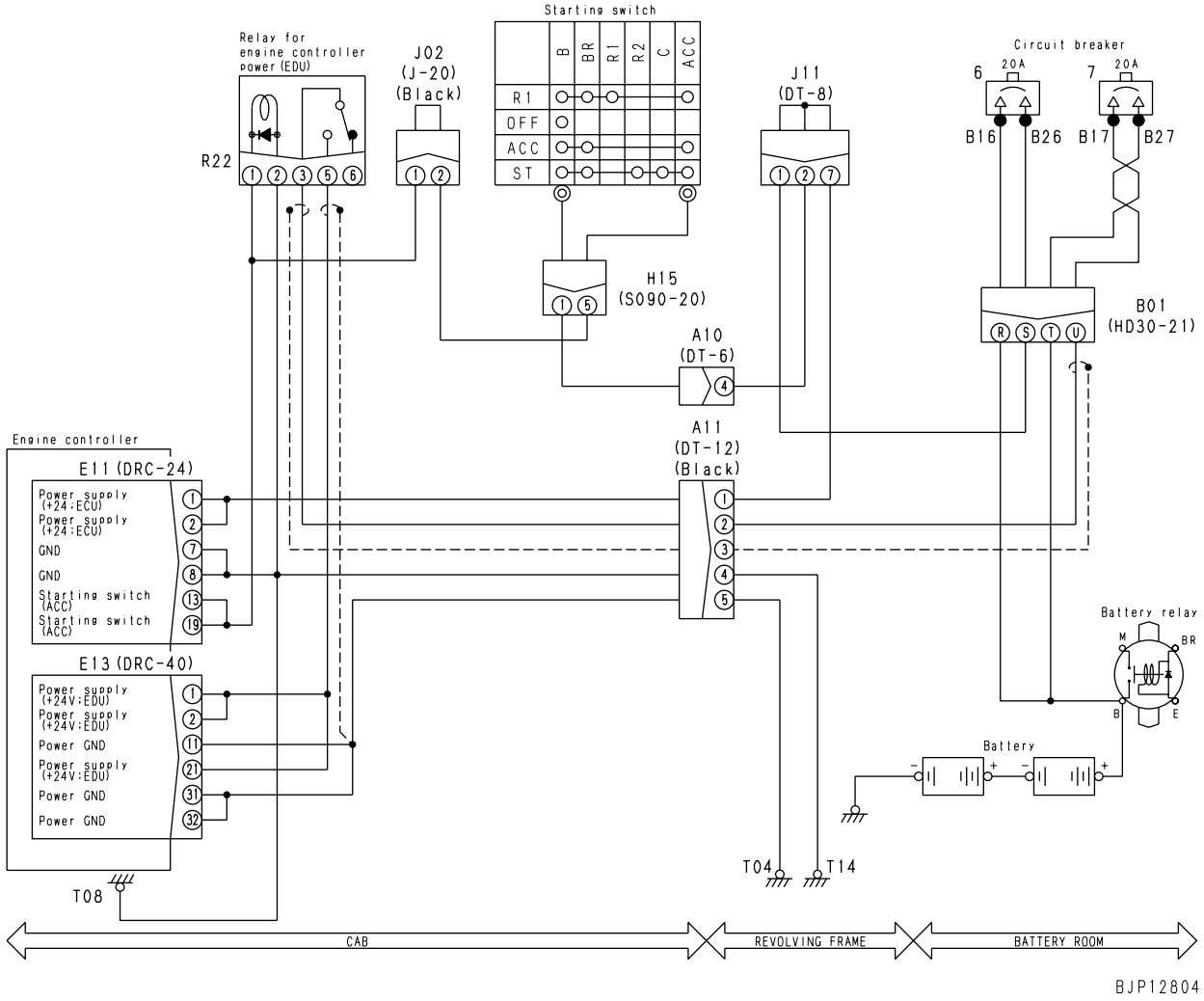
Electrical circuit diagram related to bucket curl Hi cancel solenoid



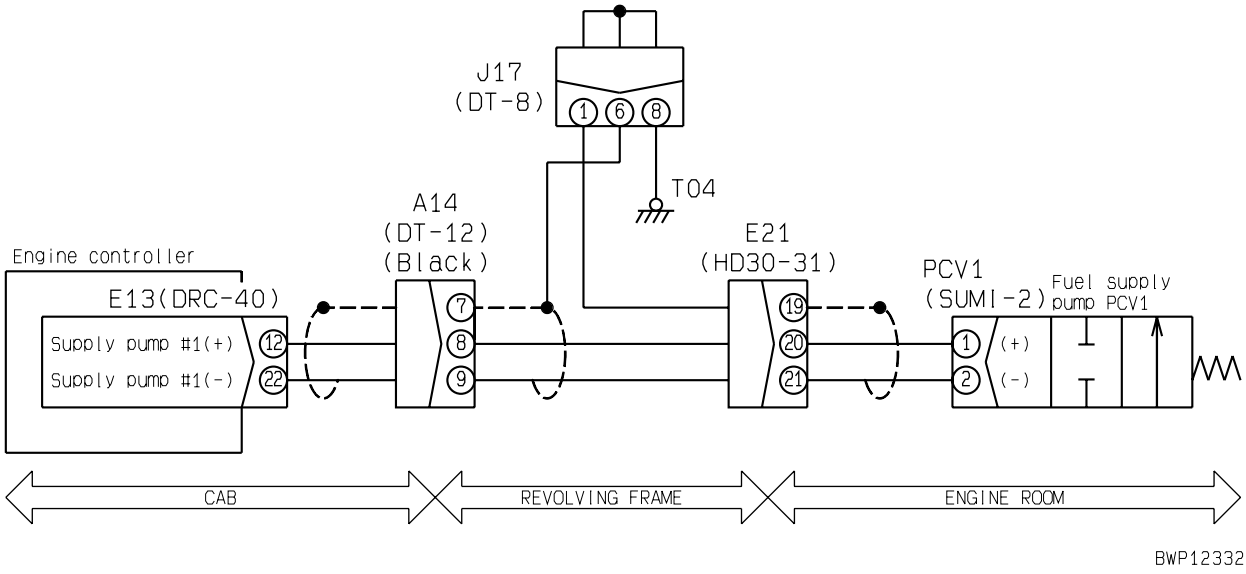
Electrical circuit diagram related to fuel temperature sensor



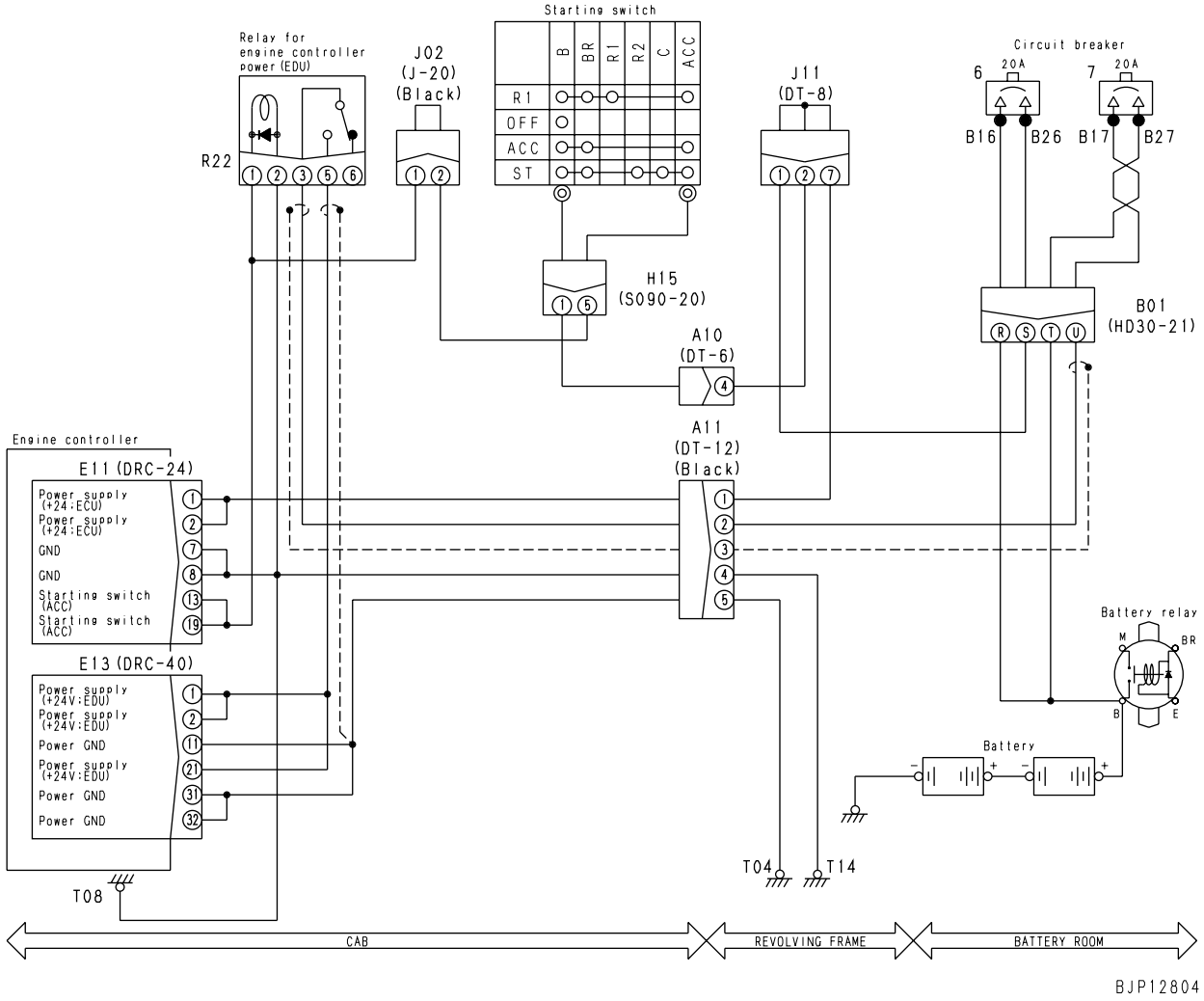
Electrical circuit diagram related to engine controller power supply



Electrical circuit diagram related to fuel supply pump PCV1

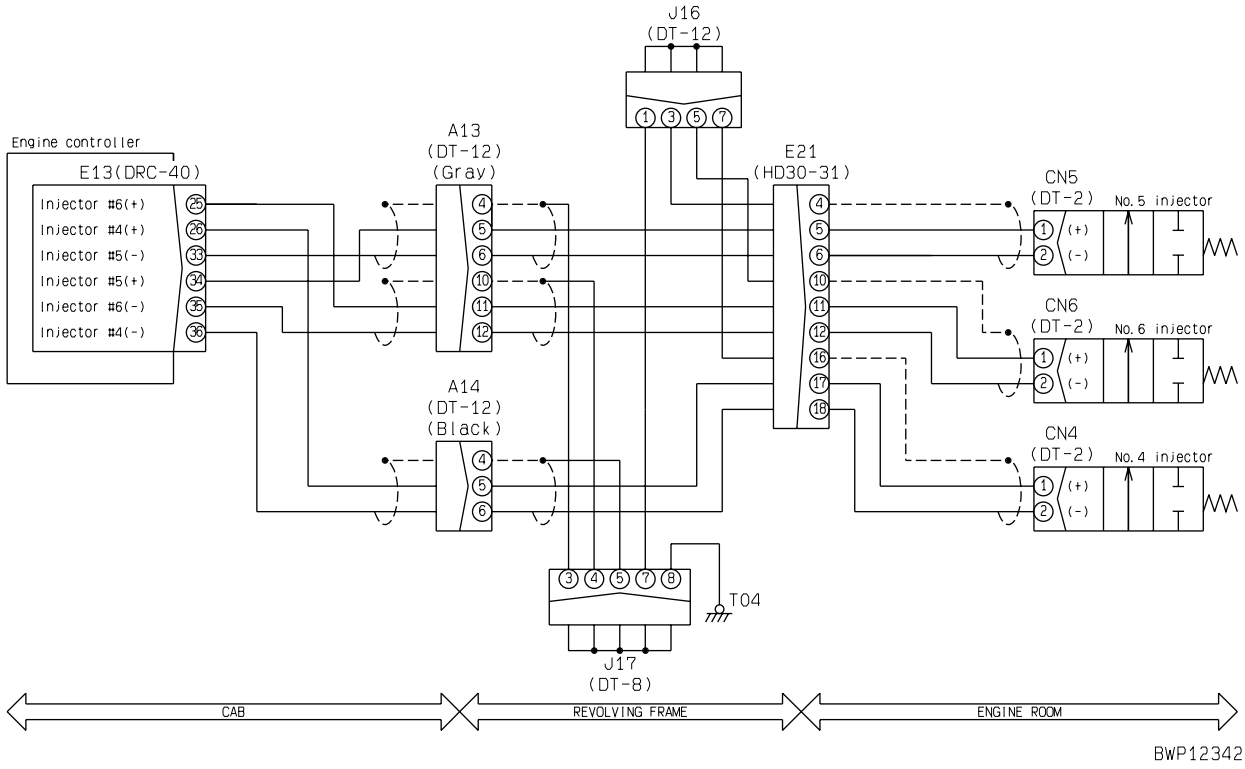


Electrical circuit diagram related to engine controller power supply



Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting		
	5	Short-circuiting of wiring harness (Contact with 24 V circuit)	★ Turn the engine starting switch OFF for the preparations, and hold it in the ON position during the troubleshooting.		
			Between wiring harness between E13 (female) (26) and CN4 (female) (1) and grounding	Voltage	Below 1 V
			Between wiring harness between E13 (female) (36) and CN4 (female) (2) and grounding	Voltage	Below 1 V
			Between wiring harness between E13 (female) (34) and CN5 (female) (1) and grounding	Voltage	Below 1 V
			Between wiring harness between E13 (female) (33) and CN5 (female) (2) and grounding	Voltage	Below 1 V
			Between wiring harness between E13 (female) (25) and CN6 (female) (1) and grounding	Voltage	Below 1 V
			Between wiring harness between E13 (female) (35) and CN6 (female) (2) and grounding	Voltage	Below 1 V
	6	Engine controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			E13 (female)	Resistance value	
			Between (26) and (36)	0.4 – 1.1 Ω	
			Between (34) and (33)	0.4 – 1.1 Ω	
			Between (25) and (35)	0.4 – 1.1 Ω	
			Between (25), (26), (33), (34), (35), (36) and grounding	Above 1 MΩ	

Electrical circuit diagram related to fuel injectors 4, 5, and 6

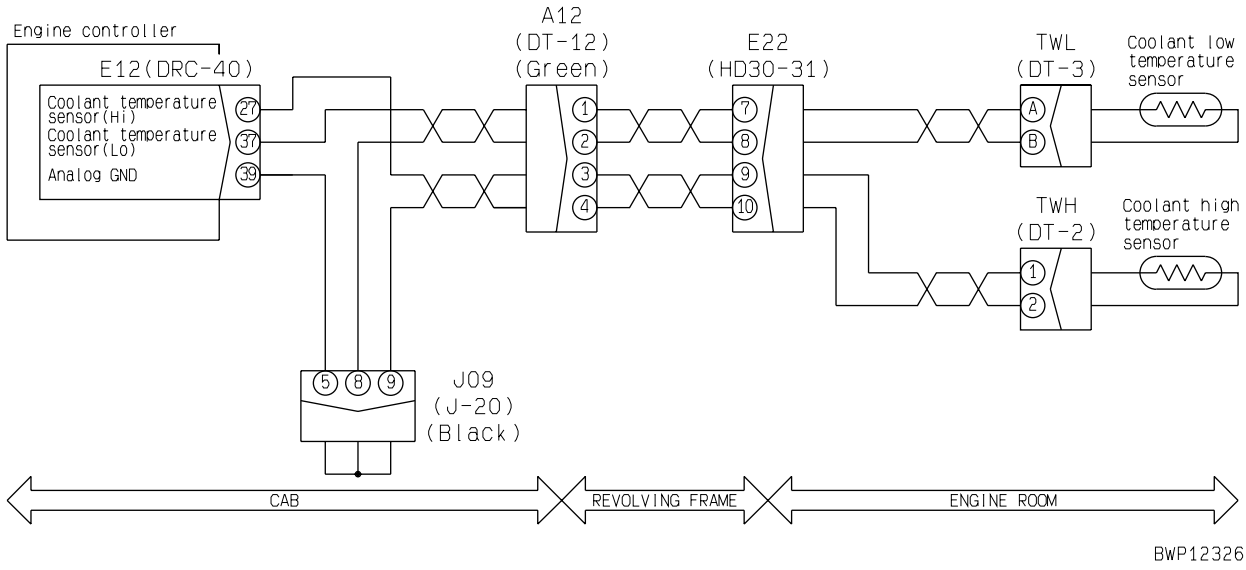


Failure Code in Mechanical System B@BCNS (Eng. Water Overheat)

User Code	Error Code	Failure Code	Failure phenomenon	Eng. Water Overheat (Mechanical system)
—	—	**B@BCNS**		
Failure content	• The signal circuit of the engine water high temperature sensor detected temperature above 105°C.			
Response from controller	• None in particular.			
Phenomenon occurring on machine	• If the machine is used as it is, the engine may be damaged.			
Relative information	• If the engine water temperature monitor on the monitor panel lights up in red while the engine is running, this failure code is recorded. • Input from the engine water high temperature sensor (water temperature and voltage) can be checked in the monitoring function. (Code No. 04102: Engine water temperature (High), 04106: Engine water temperature sensor voltage Hi)			

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting		
	1	Engine overheated (While system is normal)	Check the engine for overheating. If it has been overheated, find out the cause and check the engine for damage, then repair.		
	2	Engine water high temperature sensor system defective	Carry out troubleshooting for "Display of engine water temperature gauge on monitor panel is abnormal" in E mode.		
	3	Engine controller defective	★ Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.		
			E12 (female)	Engine water temperature	Resistance value
			Between (27) and (39)	105°C	3.28 kΩ

Electrical circuit diagram related to engine water temperature sensor (for low temperature and high temperature)



E-1 Engine does not start (Engine does not rotate)

Failure information	• The engine does not start. (Engine does not rotate)
Relative information	• The engine starting circuit is equipped with the start lock mechanism of safety lock lever type.

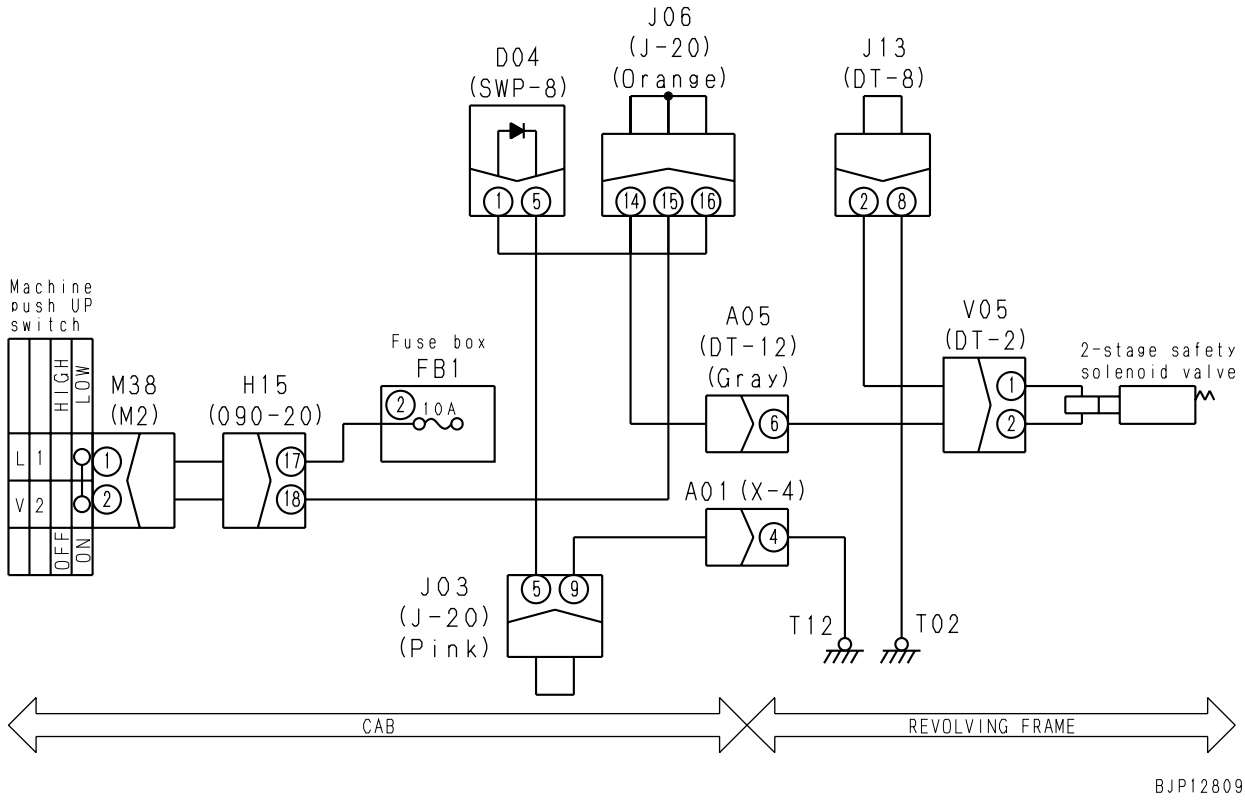
<table>
<tr><td rowspan="19">Presumed cause and standard value in normalcy</td><td colspan="2">Cause</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Battery capacity insufficient</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">Battery voltage</td><td colspan="2">Electrolyte specific gravity</td></tr>
<tr><td colspan="2">Above 24 V</td><td colspan="2">Above 1.26</td></tr>
<tr><td>2</td><td>Circuit breakers No. 1 or 6 or fuse 3 defective</td><td colspan="4">If a circuit breaker is turned OFF or a fuse is broken, the circuit probably has grounding fault (See cause 9).</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Starting switch defective (Internal disconnection)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the ON position or start the engine during the troubleshooting.</td></tr>
<tr><td>H15 (male)</td><td>Starting switch</td><td colspan="2">Resistance value</td></tr>
<tr><td rowspan="2">Between (1) and (4)</td><td>OFF</td><td colspan="2">Above 1 MΩ</td></tr>
<tr><td>ON</td><td colspan="2">Below 1 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Safety lock switch defective (Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td>S14 (female)</td><td>Safety lock lever</td><td colspan="2">Resistance value</td></tr>
<tr><td rowspan="2">Between (1) and (3)</td><td>FREE</td><td colspan="2">Above 1 MΩ</td></tr>
<tr><td>LOCK</td><td colspan="2">Below 1 Ω</td></tr>
<tr><td rowspan="5">5</td><td rowspan="5">Starting motor cut-out relay defective (Internal defect)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.</td></tr>
<tr><td colspan="2">R11 (female) and R13 (female)</td><td colspan="2">Resistance value</td></tr>
<tr><td colspan="2">Between (1) and (2)</td><td colspan="2">100 – 500 Ω</td></tr>
<tr><td colspan="2">Between (3) and (5)</td><td colspan="2">Above 1 MΩ</td></tr>
<tr><td colspan="2">Between (3) and (6)</td><td colspan="2">Below 1 Ω</td></tr>
<tr><td rowspan="5">6</td><td rowspan="5">Starting motor defective (Internal defect)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations (with the wiring harness connected), and start the engine for troubleshooting.</td></tr>
<tr><td colspan="2">Starting motor</td><td colspan="2">Voltage</td></tr>
<tr><td>Between B and grounding</td><td>B (Power supply)</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Between ST (1) and grounding</td><td>S (Start)</td><td colspan="2">20 – 30 V</td></tr>
<tr><td>Between ST (2) and grounding</td><td>R (Charge)</td><td colspan="2">Below 1 V</td></tr>
<tr><td colspan="5">If the above voltages are normal and the starting motor does not rotate, the starting motor has a defect in it or the engine is defective.</td></tr>
<tr><td rowspan="3">7</td><td rowspan="3">Alternator defective (Internal short-circuiting)</td><td colspan="4">★Turn the engine starting switch OFF for the preparations (with only wiring harness R disconnected), and hold it in the ON position during the troubleshooting.</td></tr>
<tr><td colspan="3">Alternator</td><td>Voltage</td></tr>
<tr><td colspan="3">Between terminal R and grounding</td><td>Below 1 V</td></tr>
</table>

E-7 Machine push-up function does not operate normally

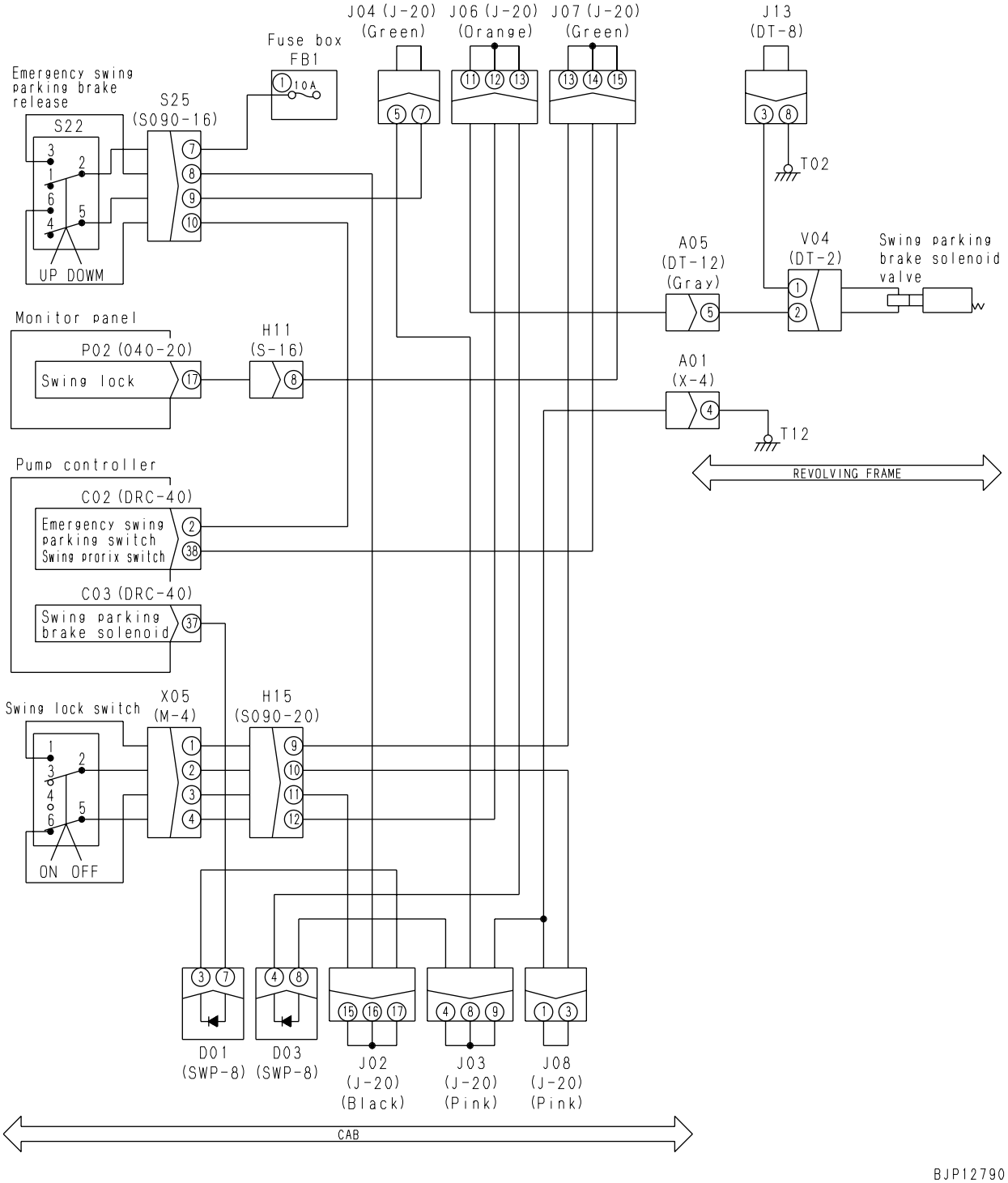
Failure information	• Machine push-up function does not operate normally.	(1) The machine push-up function does not operate.
Relative information	• When the machine push-up function is set in the high pressure position, the solenoid is turned OFF.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting			
	1	Machine push-up switch defective (Internal short-circuiting)	★Turn the engine starting switch OFF for the preparations, and hold it in the OFF position during the troubleshooting.			
			M38 (female)	Machine push-up switch	Resistance value	
			Between (1) and (2)	Low pressure position	Below 1 Ω	
				High pressure position	Above 1 MΩ	
	2	Short-circuiting of wiring harness (Contact with 24 V circuit)	★Turn the engine starting switch OFF for the preparations, and hold it in the ON position during troubleshooting.			
			Between wiring harness between M38 (female) (2), J06 and V05 (female) (2) or between M38 (female) (2) and D04 (female) (1) and grounding		Voltage	Below 1 V

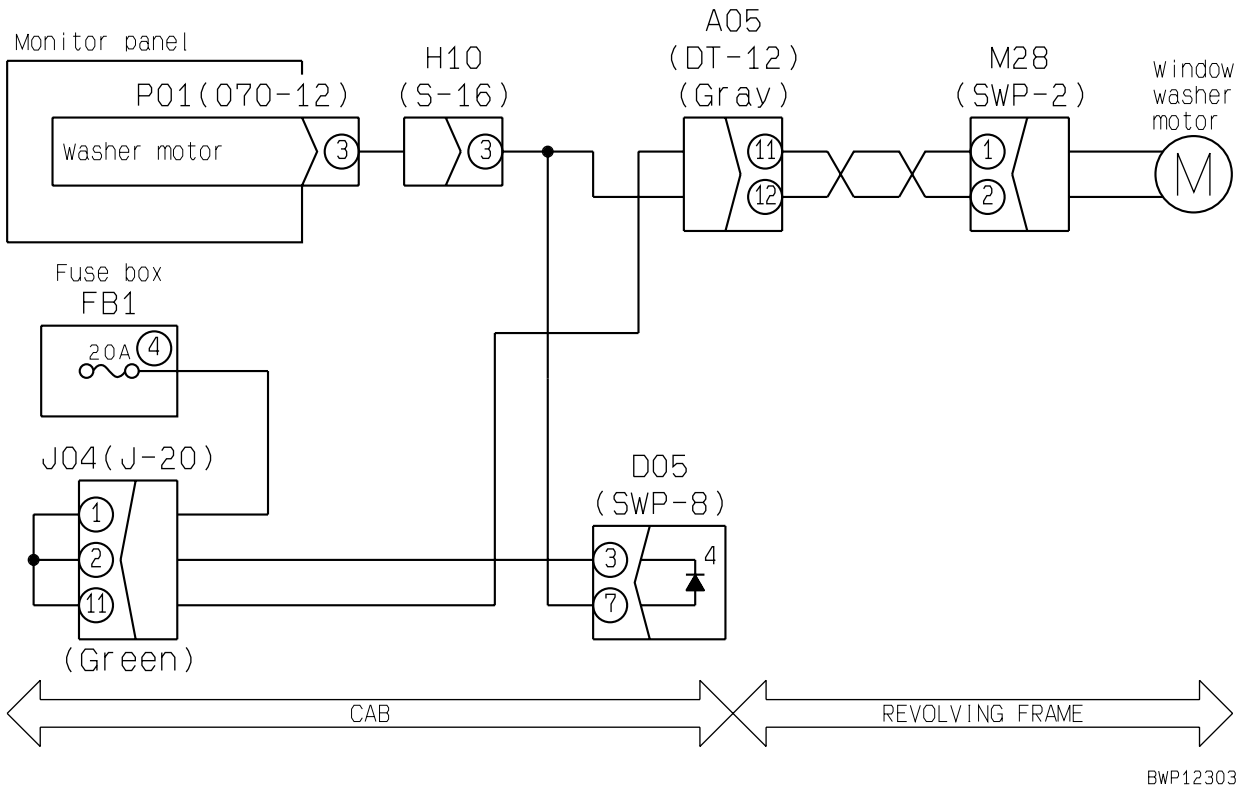
Electrical circuit diagram related to machine push-up solenoid



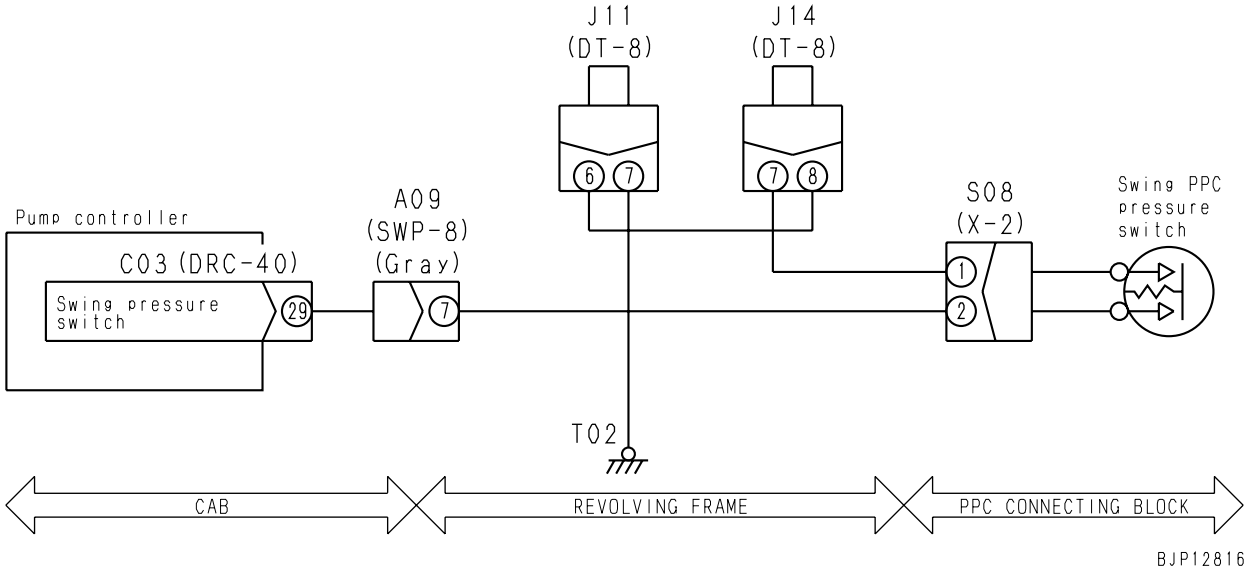
Electrical circuit diagram related to swing holding brake



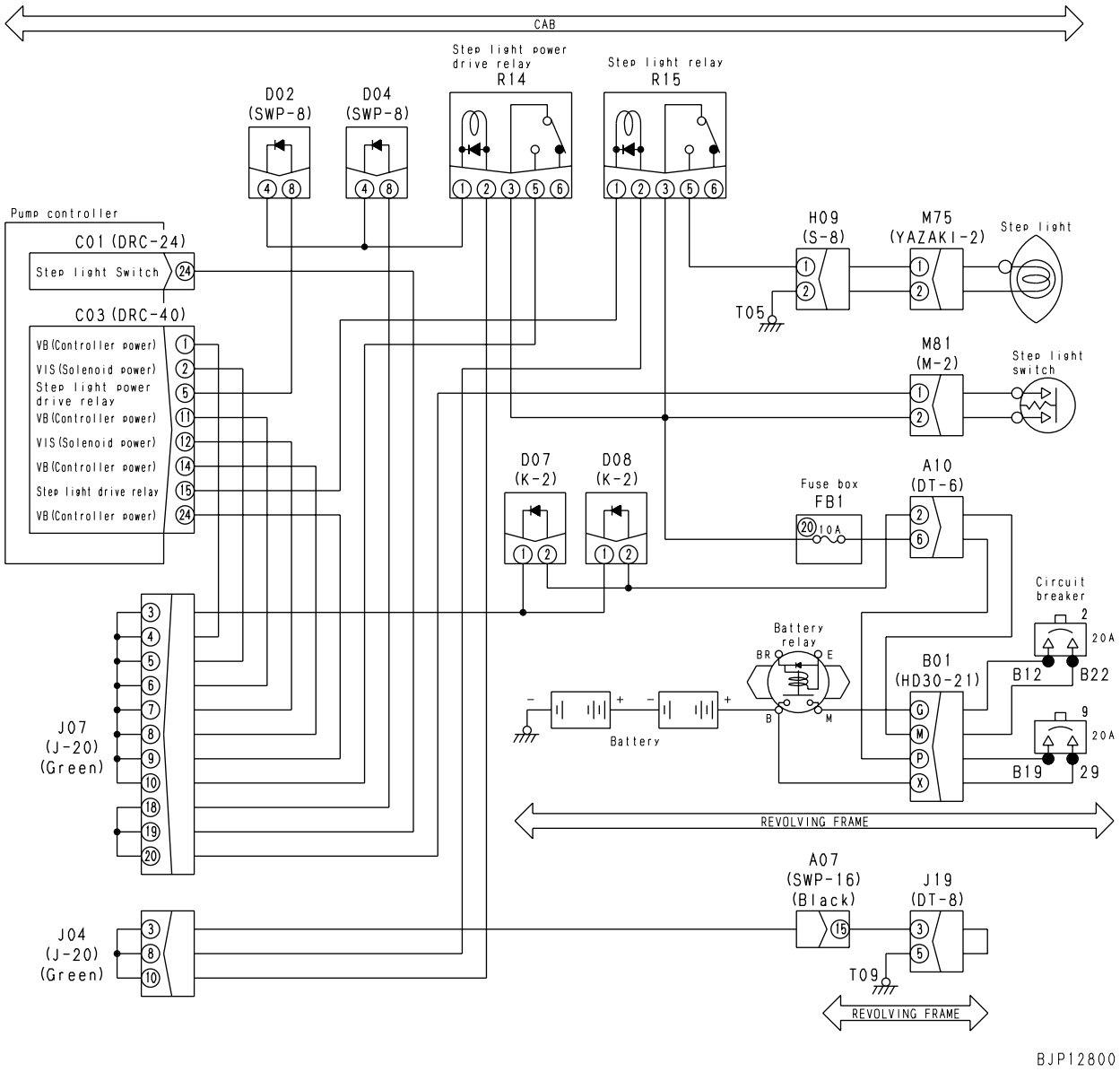
Electrical circuit diagram related to window washer motor



Electrical circuit diagram related to swing PPC pressure switch



Electrical circuit diagram related to step light



Remedy A: Adjust
X: Repair or replace

No.	Diagnosis \ Remedy		Causes: No. 1 pump, Front pump: CO•NC valve defective	Servo valve defective	Pump unit defective	No. 1 pump, Rear pump: CO•NC valve defective	Servo valve defective	Pump unit defective	No. 2 pump, Front pump: Servo valve defective	Pump unit defective	No. 2 pump, Rear pump: Servo valve defective	Pump unit defective	Left 4-spool valve: Main relief valve defective	Jet sensor defective	Right 5-spool valve: Main relief valve defective	Jet sensor defective	L.H. travel motor	R.H. travel motor
			A X	X	X	A X	X	X	X	X	X	X	A X	A X	A X	A X	X	X
1	Machine "deviates to right"	Machine "deviates to right" and work equipment speed and swing speed are low.	●	●	●				●	●					●	●		
2		Machine "deviates to right" and single swing speed is particularly low.	●	●	●				●	●						●		
3		Machine "deviates to right" and single swing speed is normal.																●
4		Travel relief pressure of front pump circuit is low.													●			
5		When result of 4 is normal, exchange front and rear outlet hoses of No. 2 pump. Machine "deviates to right" (Deviation does not change).		●	●													●
6		When result of 4 is normal, exchange front and rear outlet hoses of No. 2 pump. Machine "deviates to left" (Deviation changes).							●	●								
7		When result of 4 is normal, exchange front and rear outlet hoses of No. 2 pump. Speed of both travel motors is low.	●													●		
8		When phenomenon of 5 occurs, servo valve of No. 1 front pump is normal.			●													
9		When phenomenon of 6 occurs, servo valve of No. 2 front pump is normal.								●								
10		When phenomenon of 7 occurs, jet sensor differential pressure of right side 5-spool valve is abnormal.														●		
11		When result of 10 is normal, No. 1 front NC valve output pressure is abnormal.	●															
12	Machine "deviates to left"	Machine "deviates to left" and work equipment speed is low.				●	●	●			●	●	●	●				
13		Machine "deviates to left" and bucket dump speed is particularly low.				●	●	●			●	●		●				
14		Machine "deviates to left" and bucket dump speed is normal.															●	
15		Travel relief pressure of rear pump circuit is low.											●					
16		When result of 15 is normal, exchange front and rear outlet hoses of No. 2 pump. Machine "deviates to left" (Deviation does not change).					●	●									●	
17		When result of 15 is normal, exchange front and rear outlet hoses of No. 2 pump. Machine "deviates to right" (Deviation changes).									●	●						
18		When result of 15 is normal, exchange front and rear outlet hoses of No. 2 pump. Speed of both travel motors is low.				●												
19		When phenomenon of 16 occurs, servo valve of No. 1 rear pump is normal.						●										
20		When phenomenon of 17 occurs, servo valve of No. 2 rear pump is normal.										●						
21		When phenomenon of 18 occurs, jet sensor differential pressure of left side 4-spool valve is abnormal.												●				
22		When result of 18 is normal, No. 1 front NC valve output pressure is abnormal.				●												

Failure information	• Boom speed or power is low	(2) Boom raise speed or power is low in the heavy lift mode.
Relative information	• The heavy lift mode is the state that the heavy lift switch is turned ON. • Check that the other work equipment, travel, and swing are normal. (If any of them is abnormal, carry out troubleshooting related to it.) • Check that the machine does not deviate. (If it deviates, carry out troubleshooting related to deviation.) • Carry out all the troubleshooting in working mode A.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of CO cancel solenoid valve	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			R.H. work equipment control lever	Solenoid valve outlet pressure
			Neutral	0 MPa {0 kg/cm^2}
			Single boom RAISE operation	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of 2-stage relief solenoid valve	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			R.H. work equipment control lever	Solenoid valve outlet pressure
			Neutral	0 MPa {0 kg/cm^2}
			Single boom RAISE operation	Min. 2.74 MPa {Min. 28 kg/cm^2}
	3	Wrong adjustment or malfunction of main relief valve	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			R.H. work equipment control lever	Main relief pressure
			Single boom RAISE operation	$34.32^{+1.47}_{-0.98}$ MPa {350^{+15}_{-10} kg/cm^2}
			If the main relief valve is still abnormal after adjustment, its operation (on the high pressure set side) may be defective. Check it directly.	

Failure information	• Boom speed or power is low	(3) Boom lower speed or power is low in the machine push-up mode.
Relative information	• The heavy lift mode is the state that the machine push-up switch is turned ON. • Check that the other work equipment, travel, and swing are normal. (If any of them is abnormal, carry out troubleshooting related to it.) • Check that the machine does not deviate. (If it deviates, carry out troubleshooting related to deviation.) • Carry out all the troubleshooting in working mode A.	

Presumed cause and standard value in normalcy	Cause		Standard value in normalcy and references for troubleshooting	
	1	Malfunction of machine push-up solenoid valve	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			Machine push-up switch	Solenoid valve outlet pressure
			OFF	Min. 2.74 MPa {Min. 28 kg/cm^2}
			ON	0 MPa {0 kg/cm^2}
	2	Malfunction of boom regeneration valve (safety & suction valve)	The safety & suction valve of the boom regeneration valve (on the high pressure set side) may malfunction. Check it directly.	

H-28 Upper structure overruns excessively when it stops swinging

Failure Phenomenon	• Upper structure overruns excessively when it stops swinging	(1) Upper structure overruns excessively when it stops swinging in both directions.
Related Information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting	
	1	Wrong adjustment or malfunction of swing motor (safety valve)	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			L.H. work equipment control lever	Swing relief pressure
			Swing relief (in either direction)	29.91 ± 0.98 MPa {305 ± 10 kg/cm^2}
			If the oil pressure is still abnormal after adjustment, the safety valve may malfunction. check the safety valve directly.	
	2	Leakage in swing motor	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			L.H. work equipment control lever	Leakage from swing motor
			Swing relief (in either direction)	Max. 10 ℓ/min

Failure Phenomenon	• Upper structure overruns excessively when it stops swinging	(2) Upper structure overruns excessively when it stops swinging in only one direction.
Related Information		

Presumed cause and standard value in normalcy		Cause	Standard value in normalcy and references for troubleshooting	
	1	Malfunction of left PPC valve (swing circuit)	★Keep the engine stopped for the preparations, and run it at high idling during troubleshooting.	
			L.H. work equipment control lever	PPC valve output pressure
			Swing RIGHT • LEFT full stroke	Min. 2.74 MPa {Min. 28 kg/cm^2}
	2	Malfunction of swing control valve (spool)	The spool of the swing control valve may malfunction. Check it directly.	
	3	Malfunction of swing control valve (suction valve)	The suction valve of the swing control valve may malfunction. Check it directly. (The suction valves of the right and left swing control valves can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	4	Malfunction of swing motor (suction valve)	The suction valve of the swing motor may malfunction. Check it directly. (The suction valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	
	5	Malfunction of swing motor (check valve)	The check valve of the swing motor may malfunction. Check it directly. (The check valves of the right and left swing motors can be checked by exchanging them with each other and seeing the change of the phenomenon.)	

S-2 Engine does not start

a) Engine does not turn

General causes why engine does not turn

- Internal parts of engine seized
  - ★ See "Engine stops during operations".
- Defective electrical system
- Failure on chassis side

			Causes							
			Broken flywheel ring gear	Defective or deteriorated battery	Defective battery terminal connection	Defective battery relay	Defective starting switch	Defective starting motor	Defective safety relay or safety switch	Defective wiring of starting circuit
Check items (Questions)	Confirm recent repair history									
	Degree of use of machine	Operated for long period	△	△						
	Condition of horn when starting switch is turned ON	Horn does not sound			◎		○			◎
		Horn volume is low		◎						
	When battery is checked, battery electrolyte is found to be low			◎						
	Battery terminal is loose				◎					
	When starting switch is turned to ON, there is no actuation sound from battery relay			○		◎				
	When starting switch is turned to START, pinion does not move out			○			○			◎
	When starting switch is turned to START, pinion moves out, but	Speed of rotation is low		◎						
		Makes grating noise	◎					◎		
		Soon disengages again							◎	
		Makes rattling noise and does not turn		○				○	○	
Troubleshooting	Check flywheel ring gear directly		●							Carry out troubleshooting for machine mounting the system.
	When specific gravity of electrolyte or voltage of battery is measured, it is found to be low			●						
	Turn the starting switch OFF, connect the cord, and carry out troubleshooting at ON	There is no voltage (20 – 30 V) between battery relay terminal B and terminal E				●				
		When terminal B and terminal C of starting switch are connected, engine starts					●			
		When terminal B and terminal C of starting motor are connected, engine starts						●		
		When terminal B and terminal C of safety relay are connected, engine starts							●	
		When terminal of safety switch and terminal B of starting motor are connected, engine starts							●	
		Remedy	Replace	Replace	Correct	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 (injection pressure, injection timing)
- Excessive injection of fuel

			Causes								
			Leakage of fuel inside head cover	External leakage from fuel piping, fuel filter	Defective fuel feed pump oil seal	Defective supply pump plunger	Defective common rail fuel pressure	Defective fuel injector spray	Defective actuation of fuel injector	Defective fuel injection timing	Defective water temperature low-temperature sensor
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	○	○							
Check items	There is external leakage of fuel from engine			◎							
	There is irregular combustion							◎			
	Engine oil level rises and smells of diesel fuel		◎		◎						
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low							◎			
	Engine low idling speed is high										
	Engine relief speed is high								○		
	Exhaust gas color	Black					○	○		○	○
		White	○								
Troubleshooting	Remove head cover and check directly		●								
	Check fuel feed pump oil seal directly				●						
	Carry out troubleshooting for codes "E97B" and "E97C".					●					
	Engine speed does not change when operation of certain cylinders is stopped in reduced cylinder mode							●			
	When flow of oil from fuel injector at spill return collection portion is measured, it is found to be excessive								●		
	Carry out troubleshooting for code "E96A".										●
	Check with monitoring function on machine						●			●	
		Remedy	Correct	Correct	Replace	Replace	—	Replace	Replace	—	—

HYDRAULIC CIRCUIT DIAGRAM