SHOP MANUAL

KOMATSU

PC1800-6

MACHINE MODEL	SERIAL No.
PC1800-6	**10011, 11002 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.
- PC1800-6 mounts the SAA6D140E-3 engine.
  For details of the engine, see the 140-3 Series Engine Shop Manual.

Printed in Japan 09-07 (01)

FOREWORD
GENERAL

This shop manual has been prepared as an aid to improve the quality of repairs by giving the serviceman an accurate understanding of the product and by showing him the correct way to perform repairs and make judgements. Make sure you understand the contents of this manual and use it to full effect at every opportunity.

This shop manual mainly contains the necessary technical information for operations performed in a service workshop. For ease of understanding, the manual is divided into the following chapters; these chapters are further divided into the each main group of components.

STRUCTURE AND FUNCTION

This section explains the structure and function of each component. It serves not only to give an understanding of the structure, but also serves as reference material for troubleshooting.
In addition, this section may contain hydraulic circuit diagrams, electric circuit diagrams, and maintenance standards.

TESTING AND ADJUSTING

This section explains checks to be made before and after performing repairs, as well as adjustments to be made at completion of the checks and repairs.
Troubleshooting charts correlating "Problems" with "Causes" are also included in this section.

DISASSEMBLY AND ASSEMBLY

This section explains the procedures for removing, installing, disassembling and assembling each component, as well as precautions for them.

MAINTENANCE STANDARD

This section gives the judgment standards for inspection of disassembled parts.
The contents of this section may be described in STRUCTURE AND FUNCTION.

OTHERS

This section mainly gives hydraulic circuit diagrams and electric circuit diagrams.
In addition, this section may give the specifications of attachments and options together.

NOTICE

The specifications contained in this shop manual are subject to change at any time and without any advance notice. Use the specifications given in the book with the latest date.

TABLE OF TIGHTENING TORQUES FOR SPLIT FLANGE BOLTS

★ In the case of split flange bolts for which there is no special instruction, tighten to the torque given in the table below.

Thread diameter	Width across flat	Tightening torque	
mm	mm	Nm	kgm
10	14	59 – 74	6 – 7.5
12	17	98 – 123	10 – 12.5
16	22	235 – 285	23.5 – 29.5

TABLE OF TIGHTENING TORQUES FOR O-RING BOSS PIPING JOINTS

★ Unless there are special instructions, tighten the O-ring boss piping joints to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque (Nm {kgm})	
	mm	mm	Range	Target
02	14	Varies depending on type of connector.	35 – 63 {3.5 – 6.5}	44 {4.5}
03, 04	20		84 – 132 {8.5 – 13.5}	103 {10.5}
05, 06	24		128 – 186 {13.0 – 19.0}	157 {16.0}
10, 12	33		363 – 480 {37.0 – 49.0}	422 {43.0}
14	42		746 – 1010 {76.0 – 103}	883 {90.0}

TABLE OF TIGHTENING TORQUES FOR O-RING BOSS PLUGS

★ Unless there are special instructions, tighten the O-ring boss plugs to the torque below.

Norminal No.	Thread diameter	Width across flat	Tightening torque (Nm {kgm})	
	mm	mm	Range	Target
08	08	14	5.88 – 8.82 {0.6 – 0.9}	7.35 {0.75}
10	10	17	9.8 – 12.74 {1.0 – 1.3}	11.27 {1.15}
12	12	19	14.7 – 19.6 {1.5 – 2.0}	17.64 {1.8}
14	14	22	19.6 – 24.5 {2.0 – 2.5}	22.54 {2.3}
16	16	24	24.5 – 34.3 {2.5 – 3.5}	29.4 {3.0}
18	18	27	34.3 – 44.1 {3.5 – 4.5}	39.2 {4.0}
20	20	30	44.1 – 53.9 {4.5 – 5.5}	49.0 {5.0}
24	24	32	58.8 – 78.4 {6.0 – 8.0}	68.6 {7.0}
30	30	32	93.1 – 122.5 {9.5 – 12.5}	107.8 {11.0}
33	33	—	107.8 – 147.0 {11.0 – 15.0}	124.4 {13.0}
36	36	36	127.4 – 176.4 {13.0 – 18.0}	151.9 {15.5}
42	42	—	181.3 – 240.1 {18.5 – 24.5}	210.7 {21.5}
52	52	—	274.4 – 367.5 {28.0 – 37.5}	323.4 {33.0}

01 GENERAL

Unit: kg

Machine model	PC1800-6 loading shovel
Serial Number	10011, 11002 and up
Track shoe assembly	
• Standard shoe (810 mm)	17,020
• Optional wide shoe (1,010 mm)	21,040
Boom assembly (Excluding piping)	13,200
Arm assembly (Excluding piping)	6,850
Bucket assembly	14,315
Boom cylinder assembly	2,330
Arm cylinder assembly	1,100
Bucket cylinder assembly	1,496
Bottom dump cylinder assembly	309
Front and rear bucket connecting pin	41 x 2
Bottom dump cylinder rod pin	41 x 2
Bottom dump cylinder bottom pin	26 x 2
Boom top pin	99 x 2
Boom foot pin	110 x 2
Boom cylinder rod pin	61 x 2
Boom cylinder bottom pin	87 x 2
Arm top pin	105 x 2
Arm cylinder rod pin	28 x 2
Arm cylinder bottom pin	28 x 2
Bucket cylinder rod pin	51 x 2
Bucket cylinder bottom pin	68 x 2

1. Swing pinion (No. of teeth: 16)
2. Cover
3. Case
4. Coupling
5. No. 2 planetary gear (No. of teeth: 32)
6. No. 2 ring gear (No. of teeth: 83)
7. No. 1 ring gear (No. of teeth: 83)
8. Cover
9. Dipstick
10. Swing motor
11. No. 1 sun gear (No. of teeth: 23)
12. No. 1 planetary carrier
13. No. 2 sun gear (No. of teeth: 17)
14. No. 2 planetary carrier
15. Drain plug

Specifications

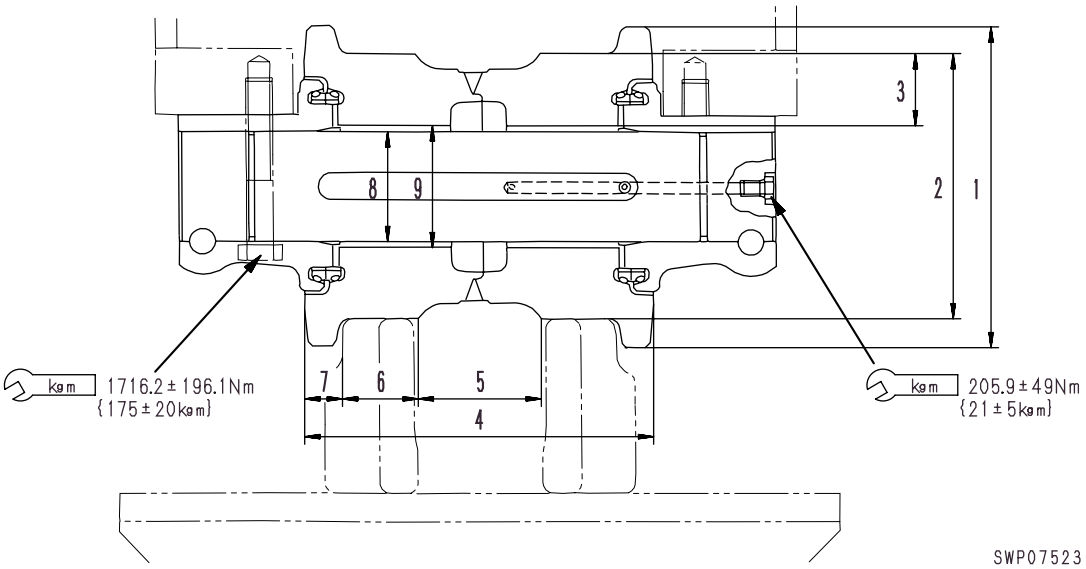
Reduction ratio: $\frac{23 + 190}{23} \times \frac{17 + 83}{17}$

$= 54.4757$

Unit: mm

No.	Check item	Criteria		Remedy
16	Backlash between swing motor shaft and No. 1 sun gear	Standard clearance	Clearance limit	Replace
		0.07 – 0.18	—	
17	Backlash between No. 1 sun gear and No. 1 planet gear	0.15 – 0.38	—	
18	Backlash between No. 1 planet gear and ring gear	0.21 – 0.58	—	
19	Backlash between No. 2 planet gear and coupling	0.06 – 0.24	—	
20	Backlash between No. 1 planet carrier and No. 2 sun gear	0.47 – 0.72	—	
21	Backlash between No. 2 sun gear and No. 2 planet gear	0.15 – 0.38	—	
22	Backlash between No. 2 planet gear and ring gear	0.23 – 0.67	—	
23	Backlash between coupling and swing pinion	0.09 – 0.25	—	
24	Backlash between swing pinion and swing circle	0.41 – 2.02	—	
25	Clearance between plate and coupling	0.15 – 1.0	—	
26	Wear of swing pinion oil seal contact surface	Standard size	Repair limit	Repair hard chrome plating or replace
		185	—	

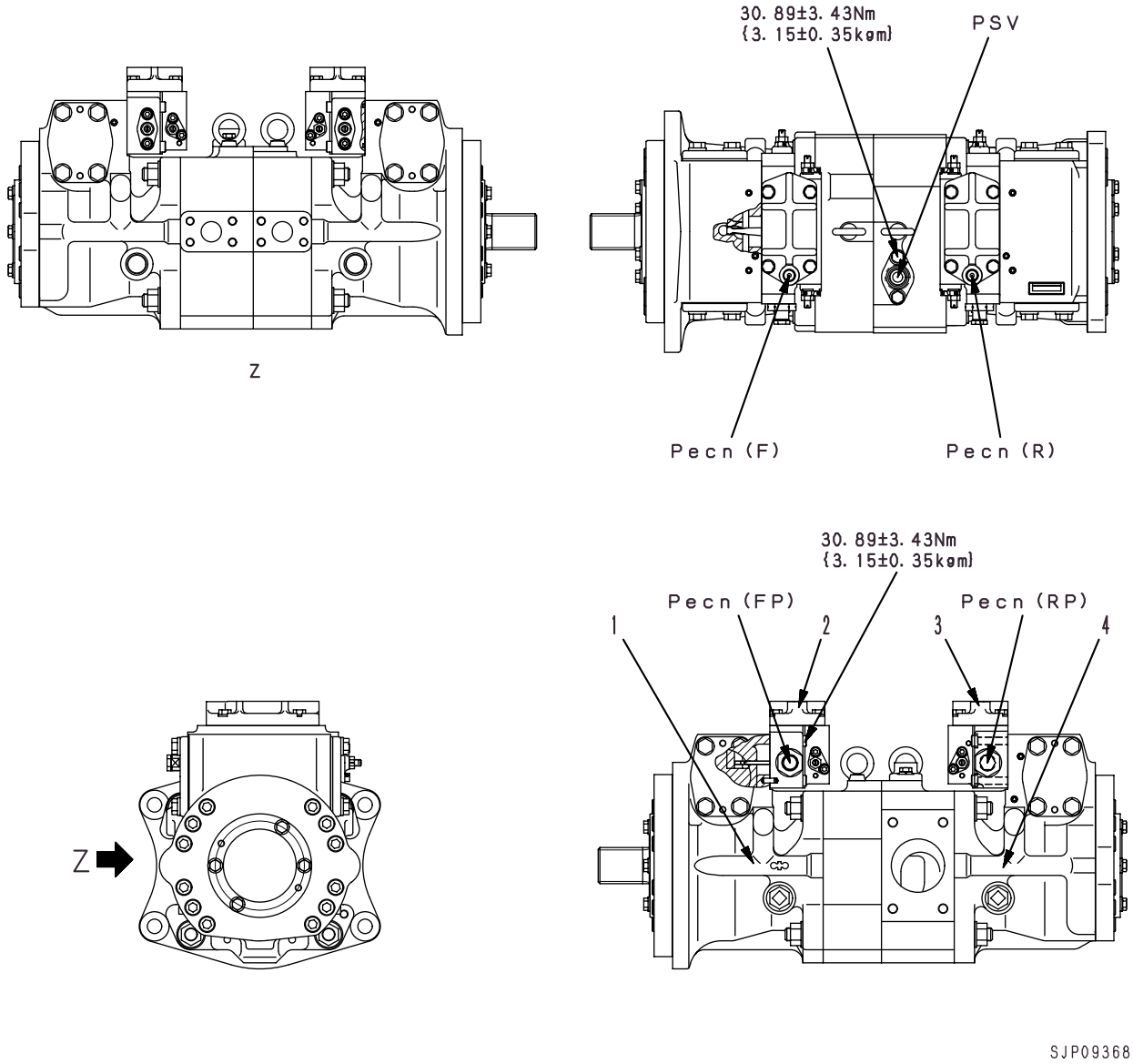
TRACK ROLLER



Unit: mm

No.	Check item	Criteria					Remedy
1	Outside diameter of flange	Standard size		Repair limit			Rebuild or replace
		360		—			
2	Outside diameter of tread surface	300		288			
3	Thickness of tread	82.5		—			
4	Overall width	394		—			
5	Inside width	141		—			
6	Width of tread	85		—			
7	Width of flange	41.5		—			
8	Clearance between shaft and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	Replace bushing
			Shaft	Hole			
		125	–0.060 –0.120	+0.460 +0.240	0.300 – 0.580	—	
9	Interference between roller and bushing	Standard size	Tolerance		Standard interference	Interference limit	
			Shaft	Hole			
		135	+0.090 +0.042	+0.025 –0.015	0.017 – 0.105	—	

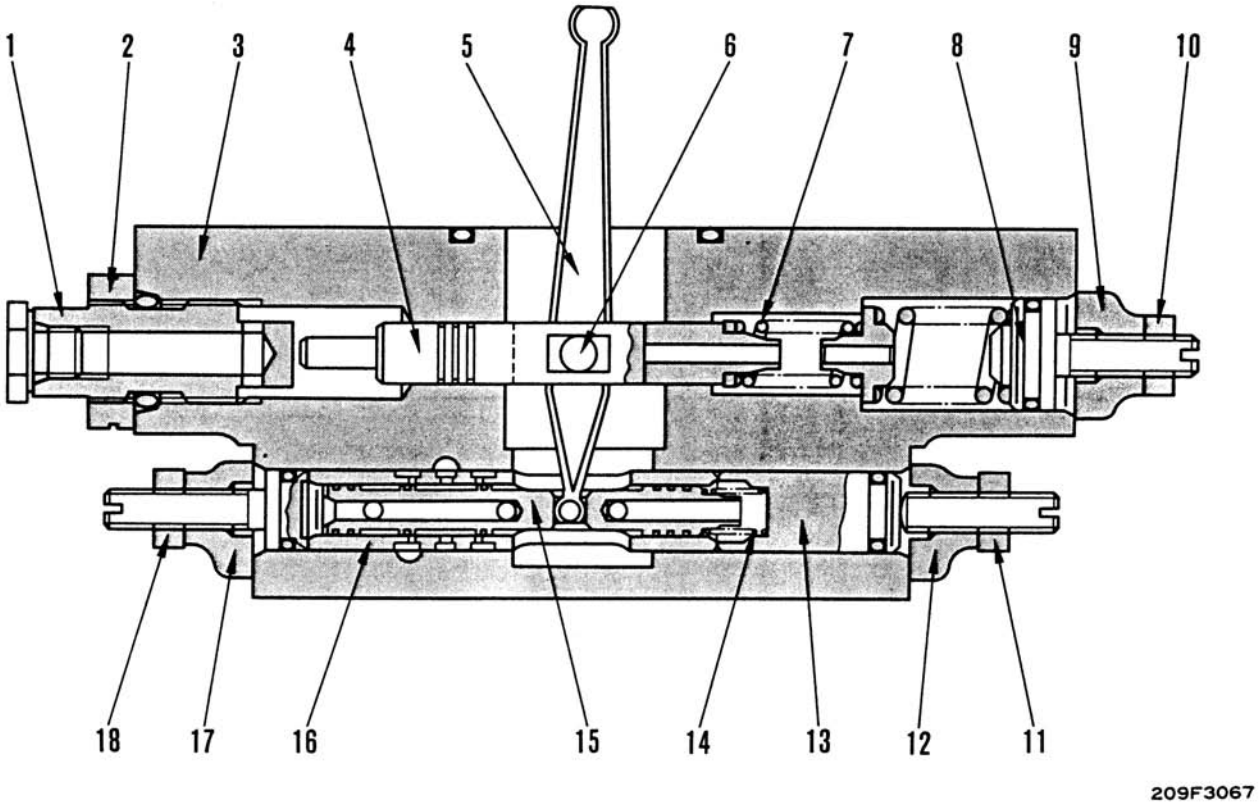
2. No. 1, 3 PUMP ASSEMBLY
(HPV95 + 95 WITHOUT TVC VALVE AND CO•NC VALVE ASSEMBLY)



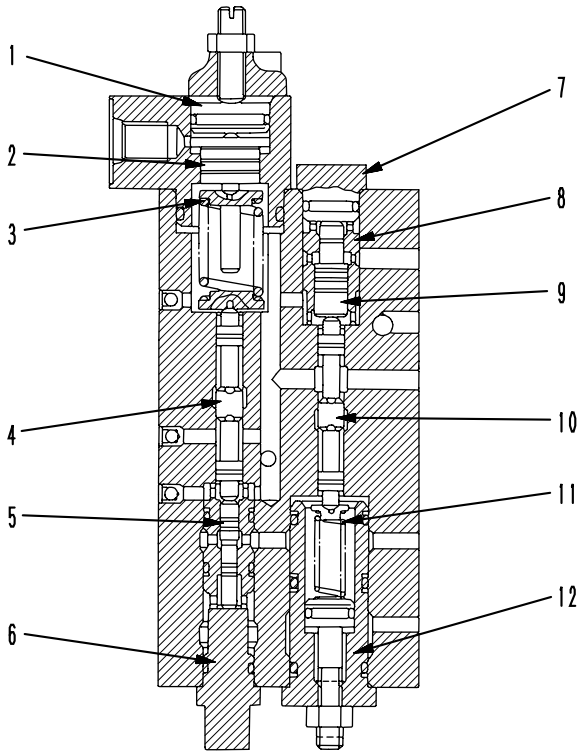
SJP09368

1. Front pump
2. Front pump servo valve
3. Rear pump servo valve
4. Rear pump

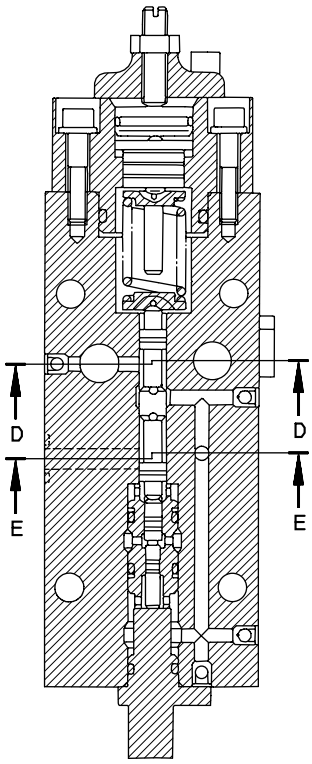
Pecn (F). CO•NC valve output pressure IN port
Pecn (R). CO•NC valve output pressure IN port
Pecn (FP). CO•NC valve output pressure pick-up port
Pecn (RP). CO•NC valve output pressure pick-up port
PSV. Pilot pressure port



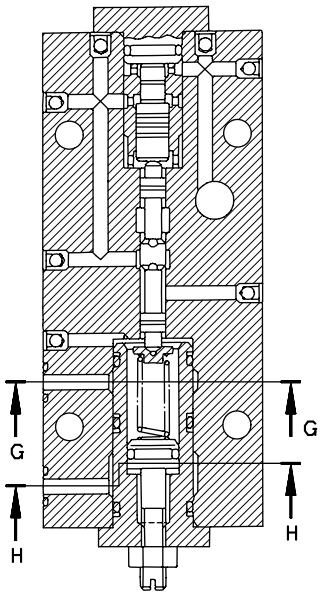
1. Plug
2. Locknut
3. Body
4. Control piston
5. Arm
6. Pin
7. Spring
8. Plug
9. Cover
10. Locknut
11. Locknut
12. Cover
13. Plug
14. Spring
15. Guide spool
16. Sleeve
17. Cover
18. Locknut



A – A



C – C

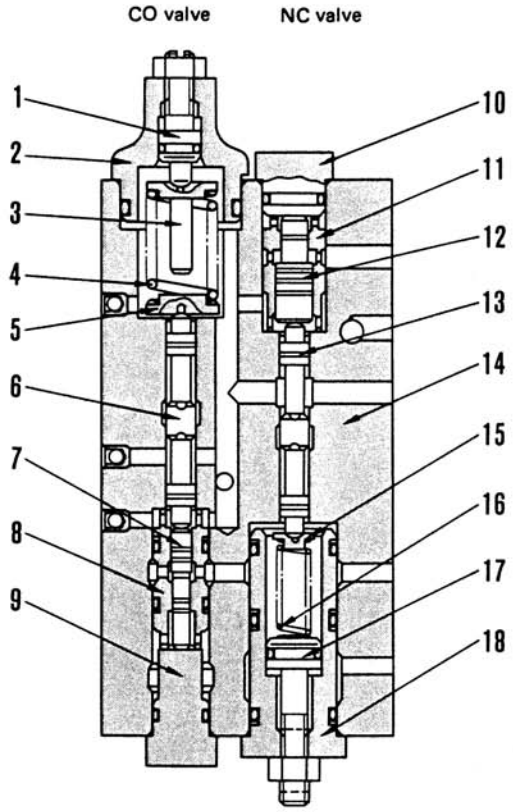


B – B

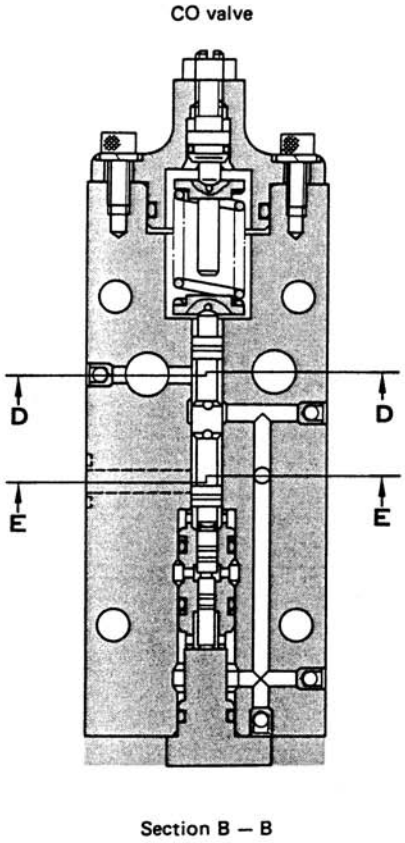
CO valve
1. Plug
2. Piston
3. Spring
4. Spool
5. Piston
6. Plug

NC valve
7. Plug
8. Sleeve
9. Piston
10. Spool
11. Spring
12. Plug

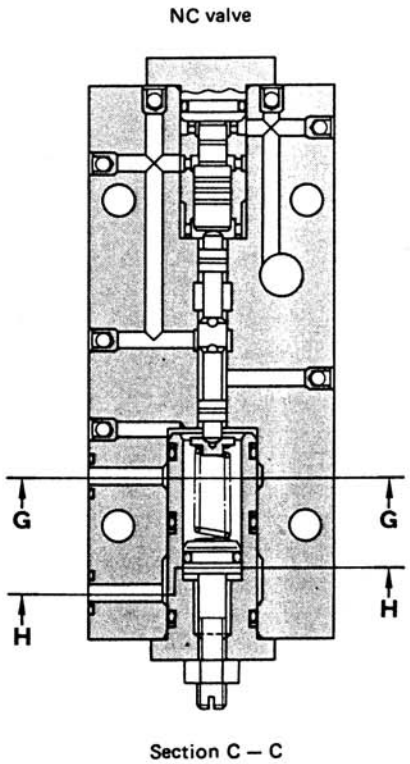
SEP01563



Section A — A



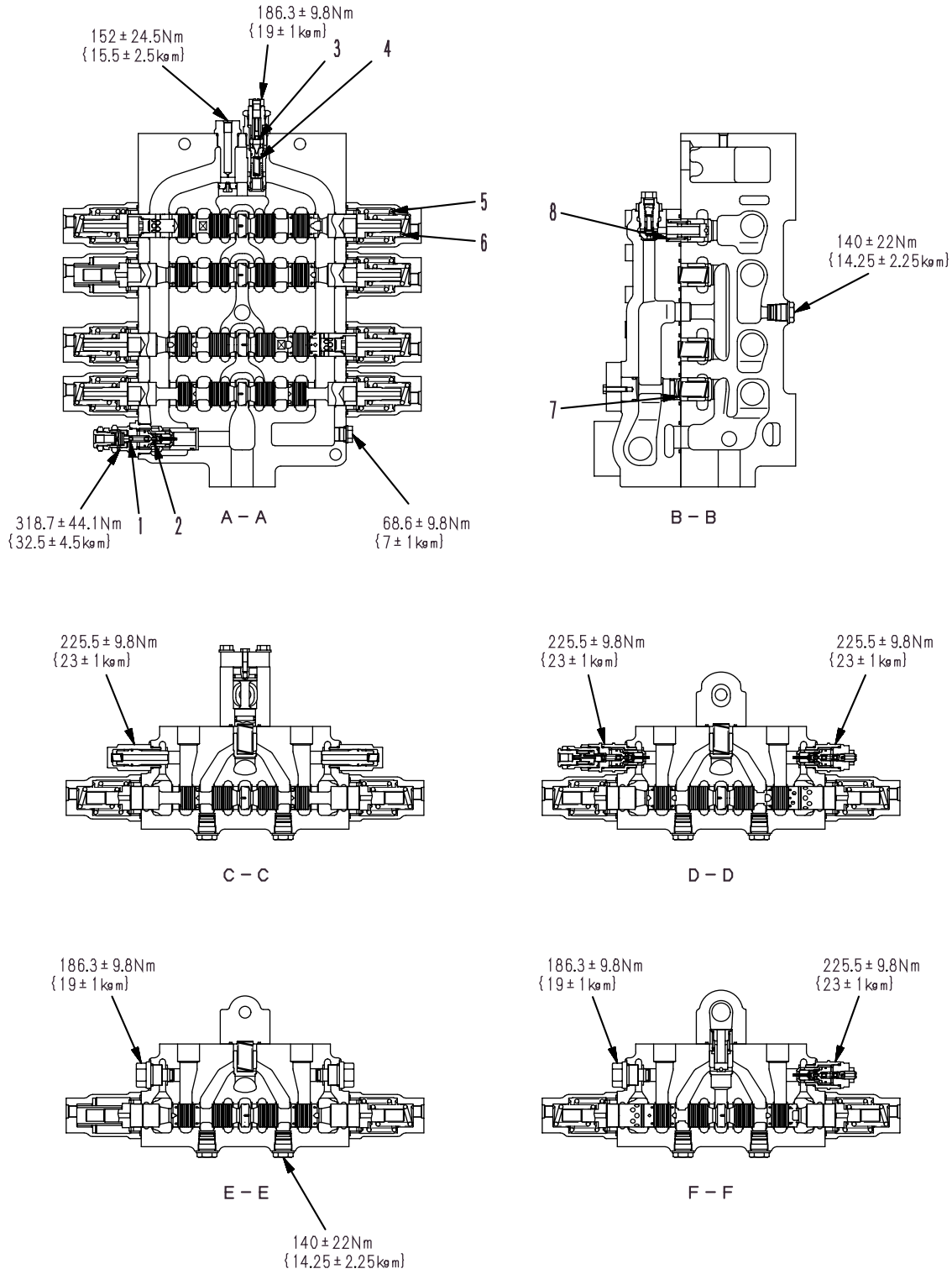
Section B — B



Section C — C

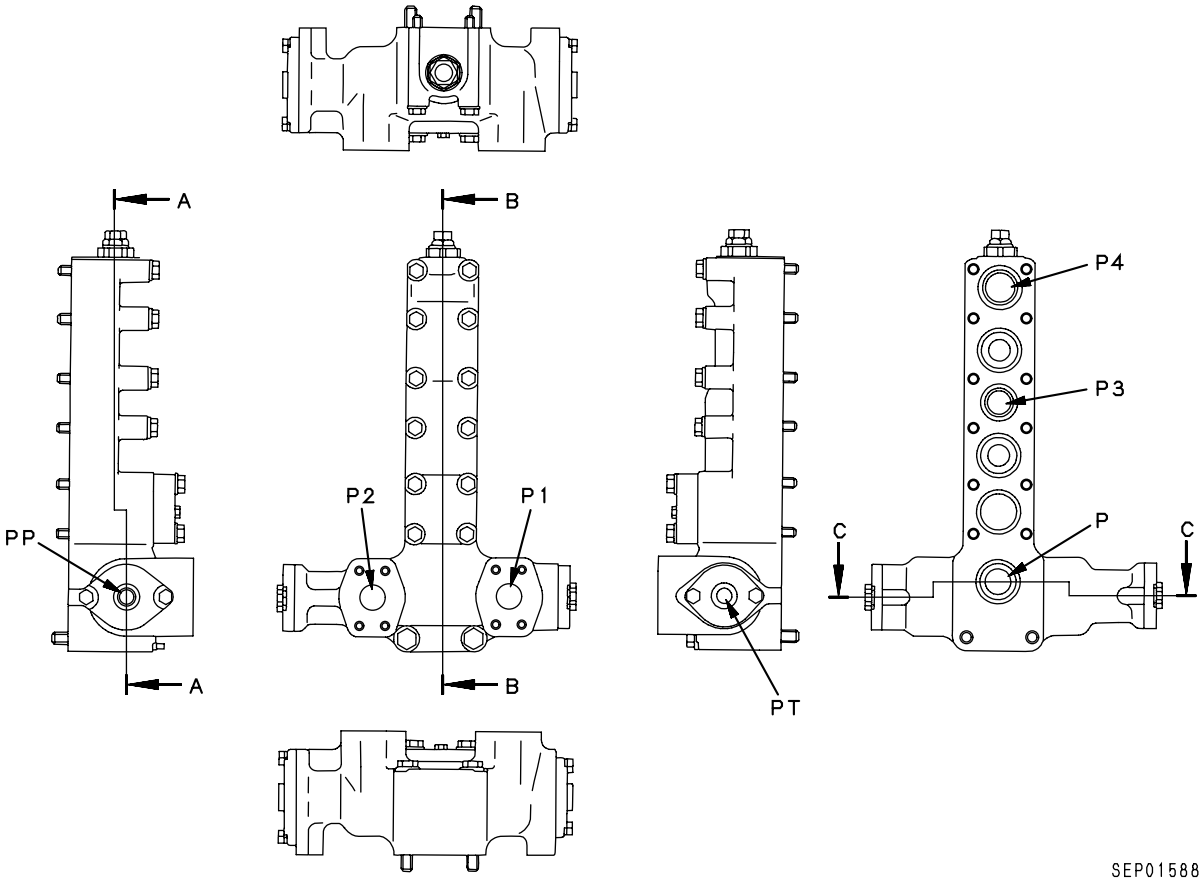
209F3070

CO valve	NC valve
1. Plug	10. Plug
2. Cover	11. Sleeve
3. Seat	12. Piston
4. Spring	13. Spool
5. Seat	14. Body
6. Spool	15. Seat
7. Piston	16. Spring
8. Sleeve	17. Plug
9. Plug	18. Cover


186.3±9.8Nm
{19±1kgm}
152±24.5Nm
{15.5±2.5kgm}
3
4
5
6
318.7±44.1Nm
{32.5±4.5kgm}
1
2
A−A
68.6±9.8Nm
{7±1kgm}
8
140±22Nm
{14.25±2.25kgm}
7
B−B
225.5±9.8Nm
{23±1kgm}
C−C
225.5±9.8Nm
{23±1kgm}
225.5±9.8Nm
{23±1kgm}
D−D
186.3±9.8Nm
{19±1kgm}
E−E
140±22Nm
{14.25±2.25kgm}
186.3±9.8Nm
{19±1kgm}
225.5±9.8Nm
{23±1kgm}
F−F

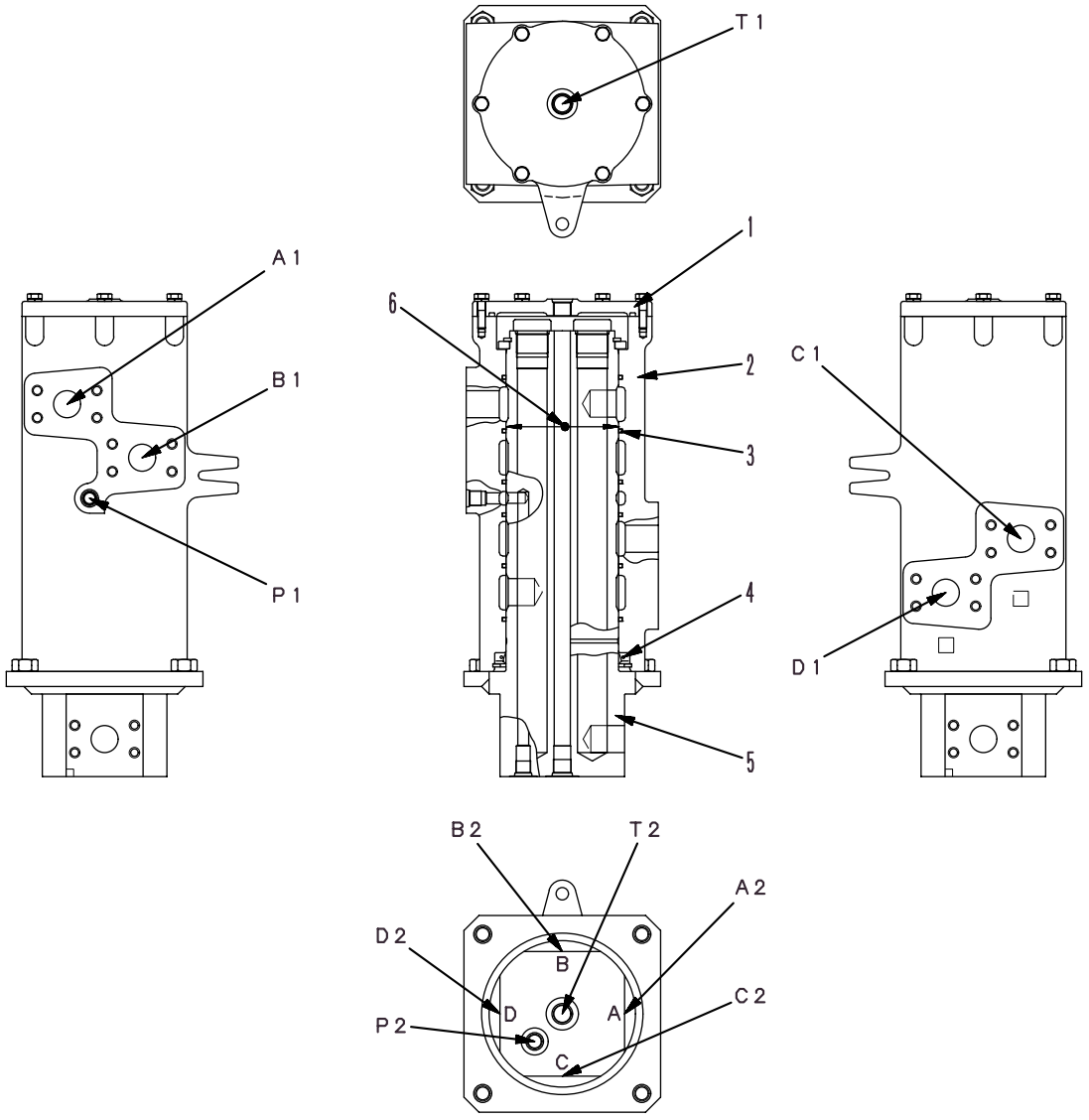
SJP07529

STRAIGHT-TRAVEL VALVE



P. From port PF
PP. From pump
PT. Drain
P1. From port PR
P2. To L.H. travel
P3. To bucket, boom
P4. To arm

CENTER SWIVEL JOINT



SJP09373

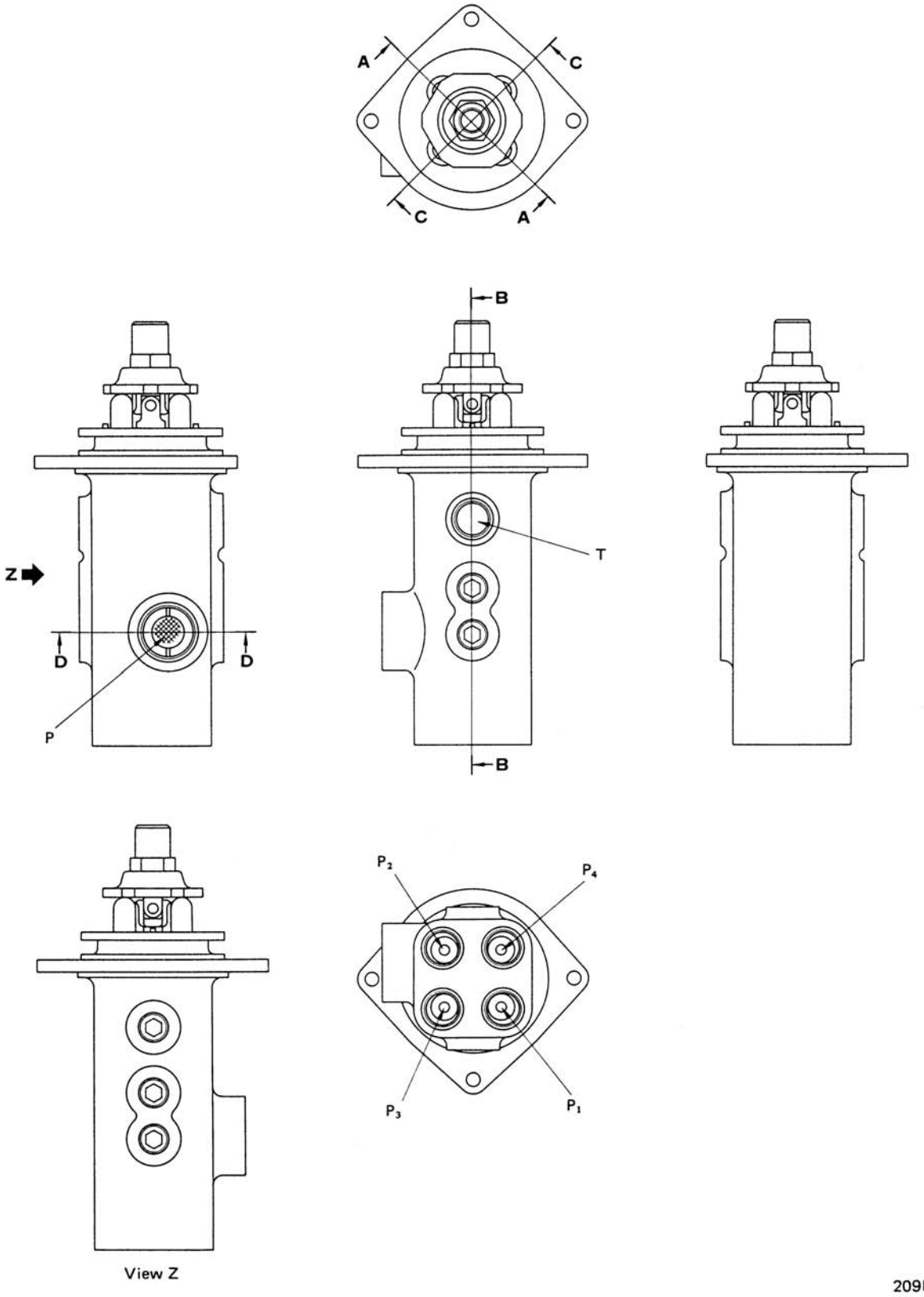
1. Cover
2. Body
3. Slipper seal
4. Oil seal
5. Shaft

Unit: mm

No.	Check item	Criteria			Remedy
1	Clearance between rotor and shaft	Standard size	Standard clearance	Clearance limit	Replace
		110	0.056 – 0.105	0.111	

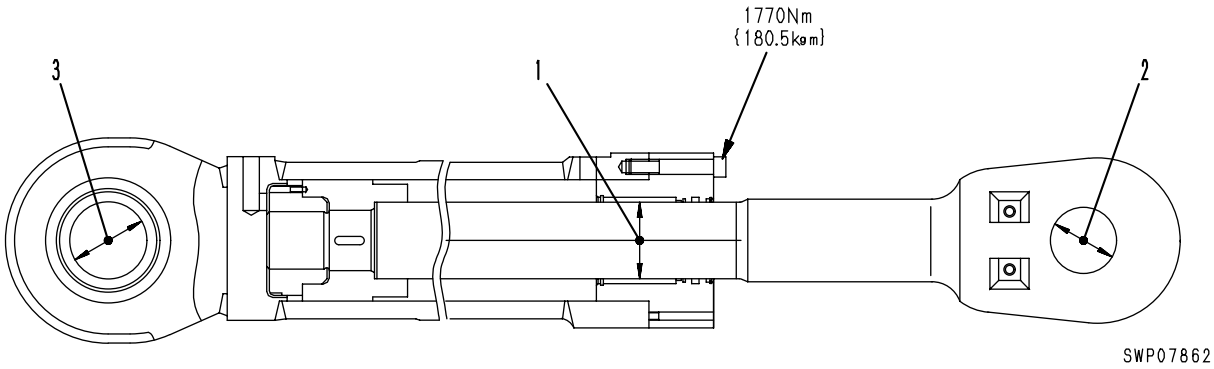
PPC VALVE

FOR WORK EQUIPMENT AND SWING CONTROL

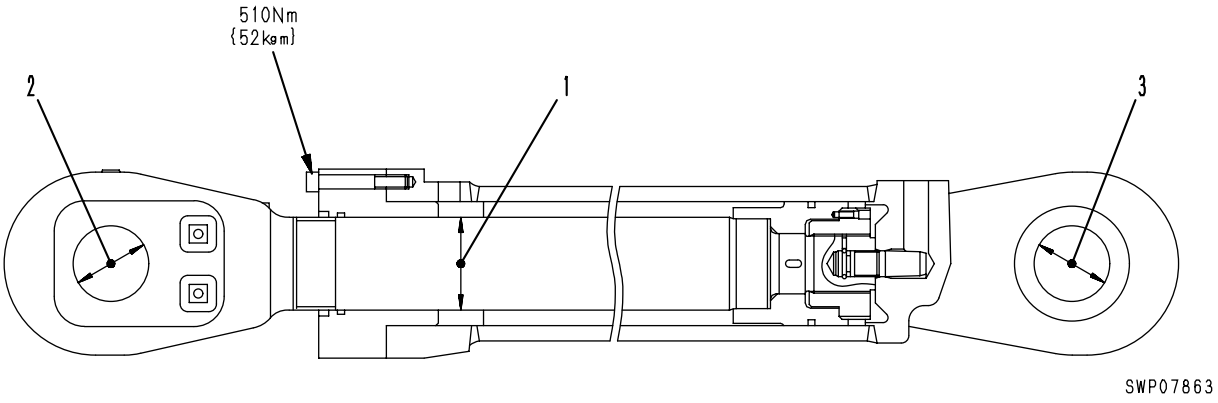


LOADING SHOVEL

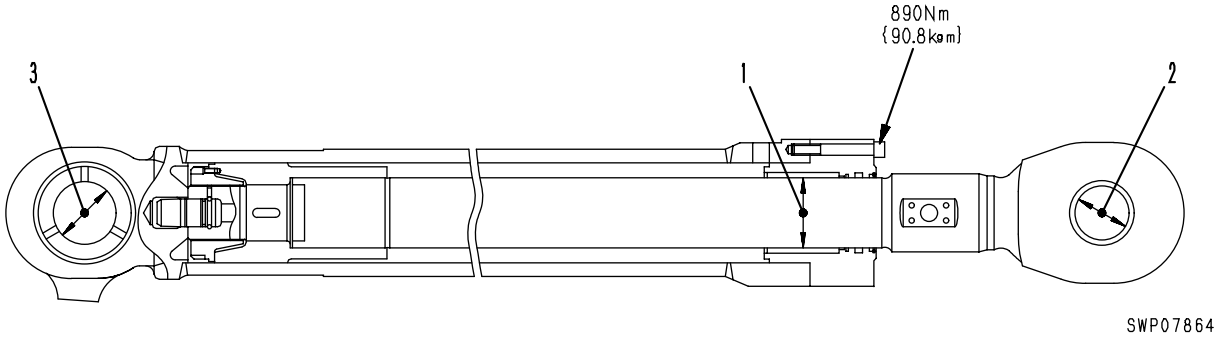
BOOM CYLINDER

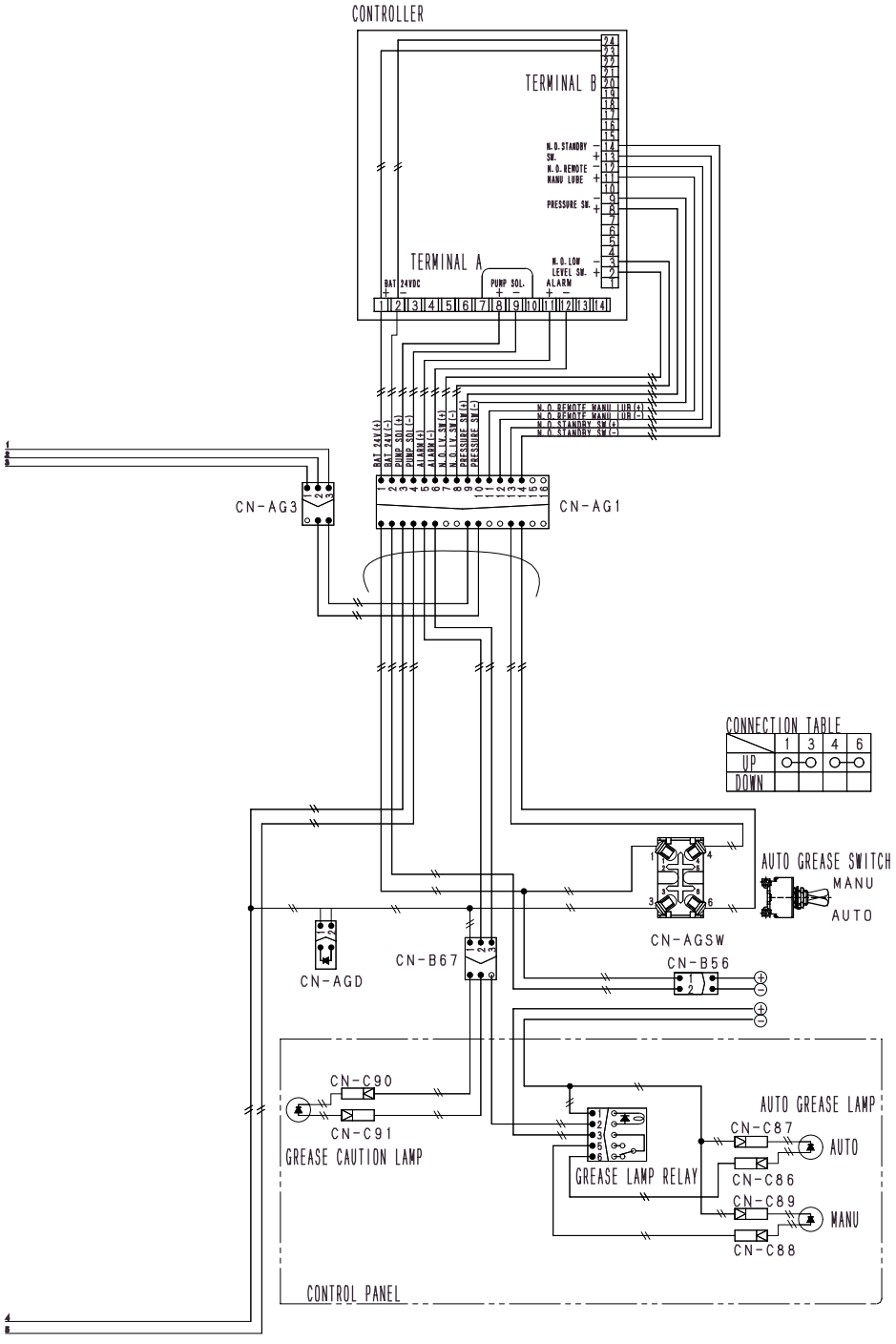


ARM CYLINDER



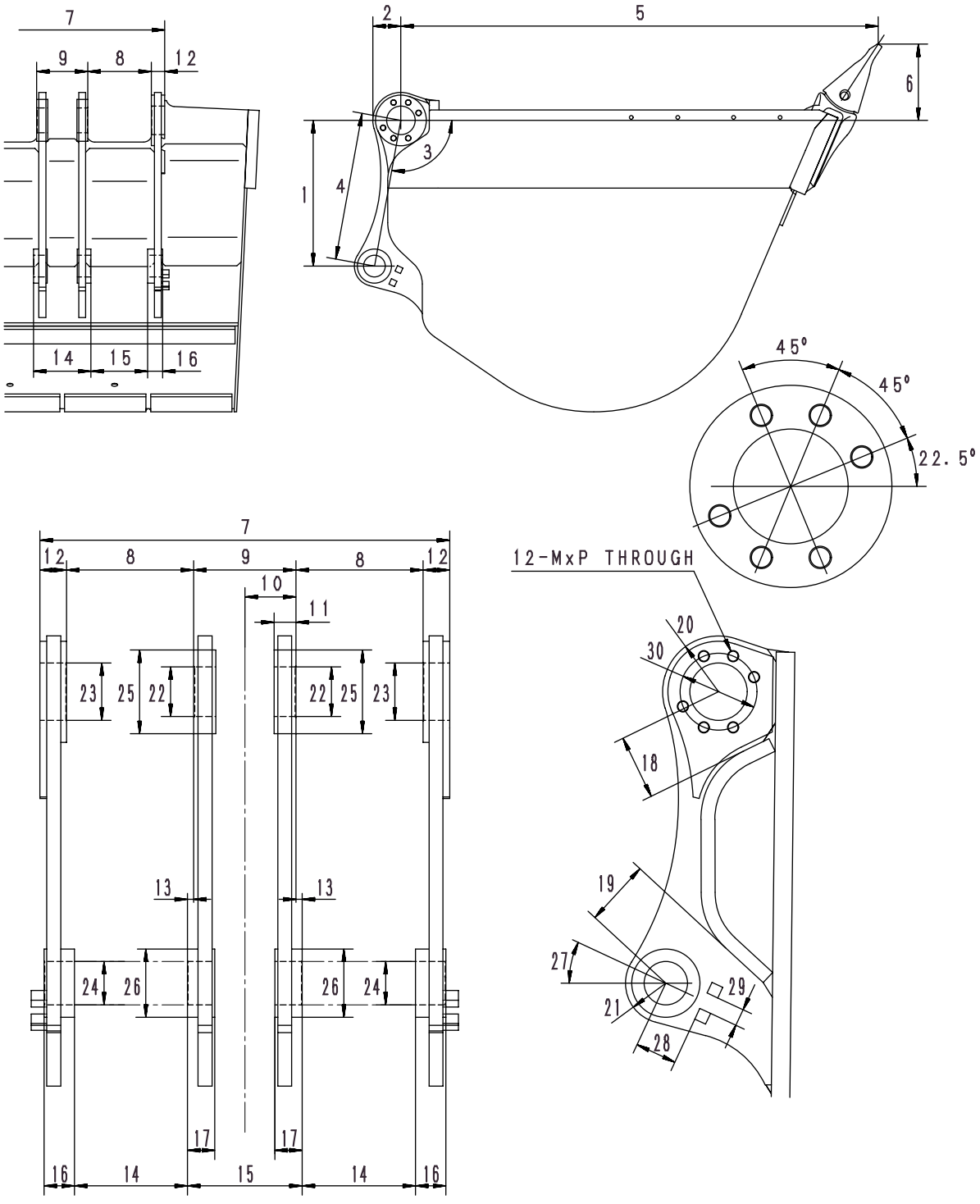
BUCKET CYLINDER




CONTROLLER
TERMINAL B
TERMINAL A
N.O. STANDBY SW.
N.O. REMOTE MANU LUBE
PRESSURE SW.
N.O. LOW LEVEL SW.
BAT 24VDC
PUMP SOL.
ALARM
CN-AG3
CN-AG1
CONNECTION TABLE
UP
DOWN
AUTO GREASE SWITCH
MANU
AUTO
CN-AGSW
CN-B56
CN-B67
CN-AGD
CN-C90
CN-C91
GREASE CAUTION LAMP
GREASE LAMP RELAY
AUTO GREASE LAMP
CN-C87
AUTO
CN-C86
CN-C89
MANU
CN-C88
CONTROL PANEL

SXP07561

2. BUCKET



SJP07869

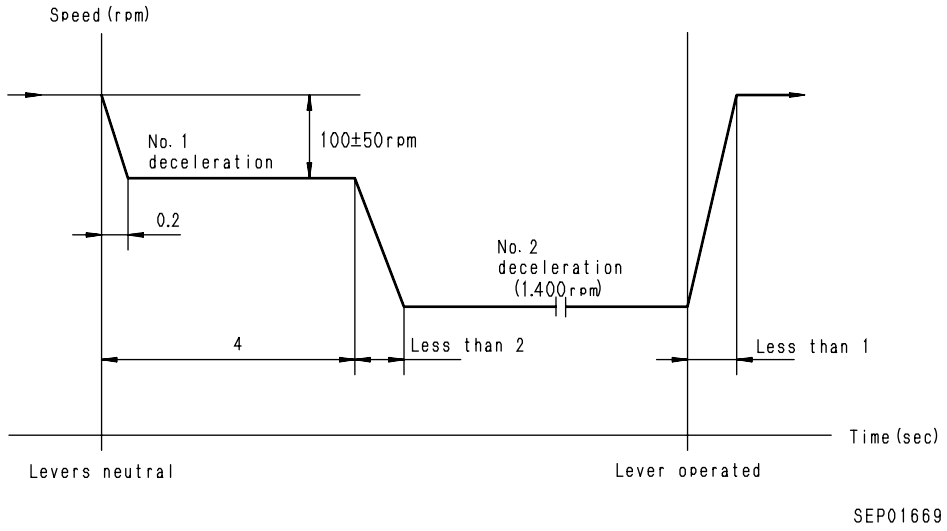
Operation

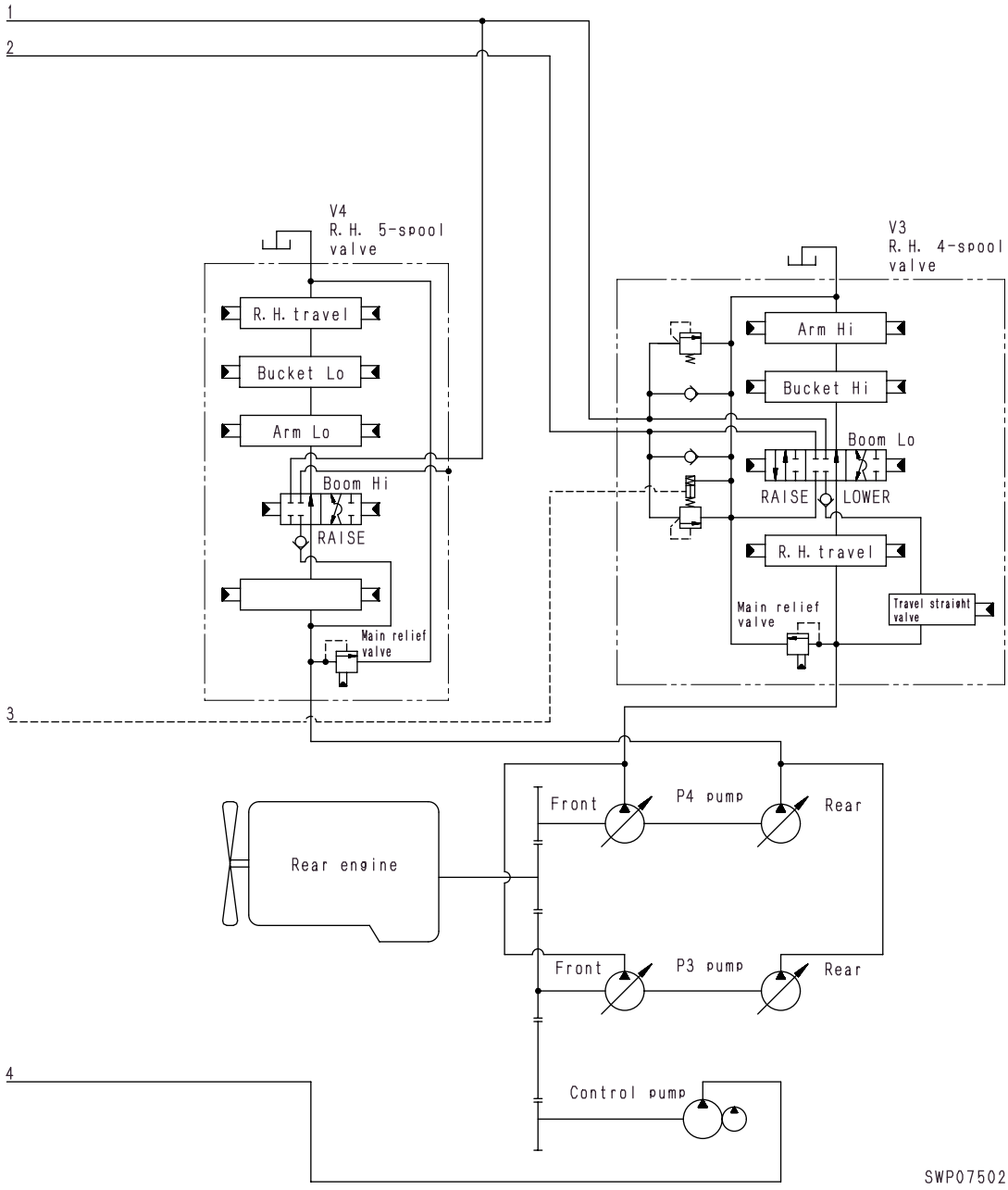
Control levers at neutral

- 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.

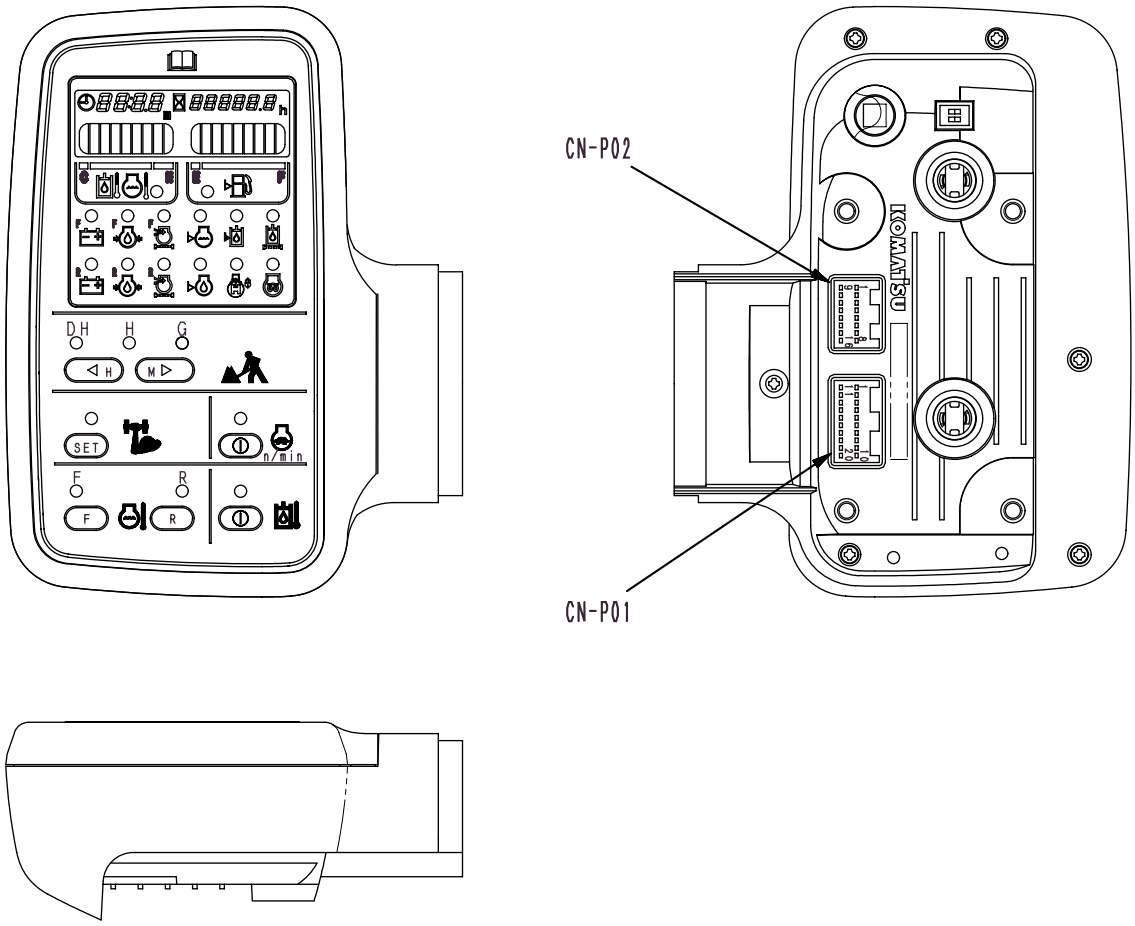



1
2
V4
R. H. 5-spool
valve
R. H. travel
Bucket Lo
Arm Lo
Boom Hi
RAISE
Main relief
valve
V3
R. H. 4-spool
valve
Arm Hi
Bucket Hi
Boom Lo
RAISE
LOWER
R. H. travel
Main relief
valve
Travel straight
valve
3
Front
P4 pump
Rear
Rear engine
Front
P3 pump
Rear
4
Control pump
SWP07502

Operation

Left and right travel levers	Work equipment control lever, swing lever	Straight-travel solenoid valve	Straight-travel valve	Remarks
Operation	Neutral	De-energized	Not actuated	Left and right travel motor circuits independent
	Operated	Excited	Actuated	Left and right travel motor circuits actuated

1. Monitor panel



SXP07509

Outline

- The monitor panel consists of the switches for the monitor display functions, mode selector, and electrical components.
- It has a built-in CPU (Central Processing Unit), and processes, displays, and outputs the information.
- The monitor display panel uses a liquid crystal display (LCD). The mode switches are flat sheet switches.

Input and output signals

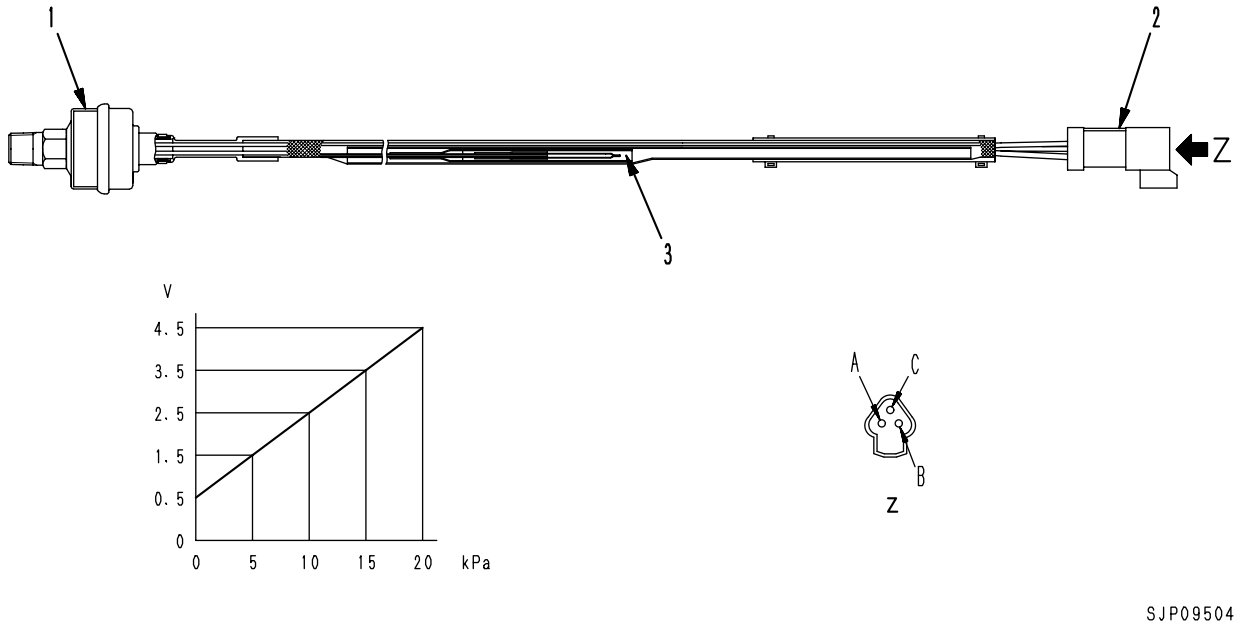
CN-P01

Pin No.	Name of signal
1	NC
2	NC
3	NC
4	N/W signal
5	Swing lock
6	Buzzer stop
7	Buzzer output
8	Lamp
9	Key ON signal
10	Terminal BR
11	N/W signal
12	N/W GND
13	NC
14	N/W GND
15	NC
16	NC
17	NC
18	Preheating
19	Start signal
20	NC

CN-P02

Pin No.	Name of signal
1	GND
2	NC
3	NC
4	NC
5	NC
6	NC
7	NC
8	+VB
9	GND
10	NC
11	NC
12	NC
13	NC
14	+VB
15	NC
16	NC

Engine blow-by pressure sensor

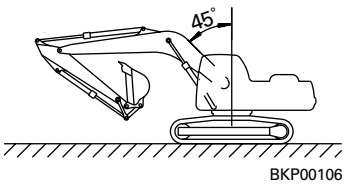
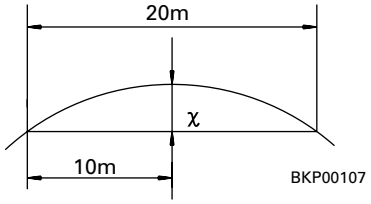
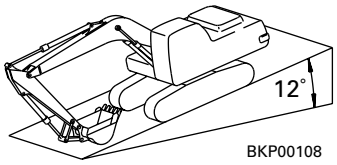
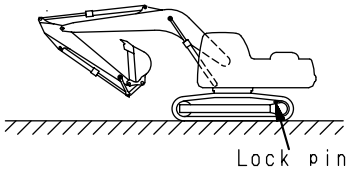


1. Sensor
2. Connector
3. Atmospheric pressure intake tube

A. GND (Black)
B. Power source (Red)
C. Output (White)

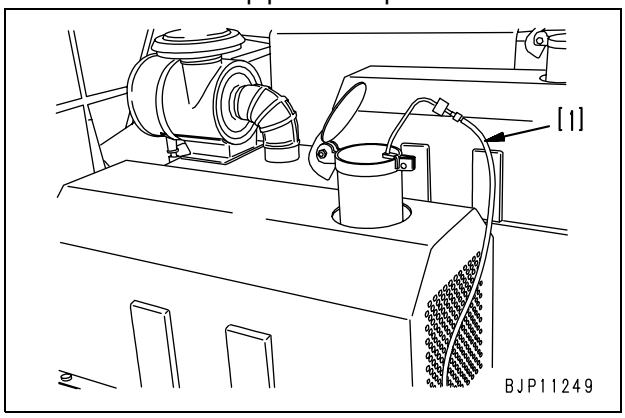
Specifications and function

- Pressure range: 0 – 20 kPa {0 – 2,040 mmH_2O}
- Allowable pressure:
  –20 – 100 kPa {–2,040 – 10,200 mmH_2O}
- Source voltage: 5 ± 0.25 V
- Main characteristics: See graph.
- The blow-by pressure sensor is a fine relative pressure sensor which measures the difference between the pressure in the crankcase and atmospheric pressure.
- The pressure in the crankcase is introduced from the sensor tip side and atmospheric pressure is introduced from the wiring harness side.

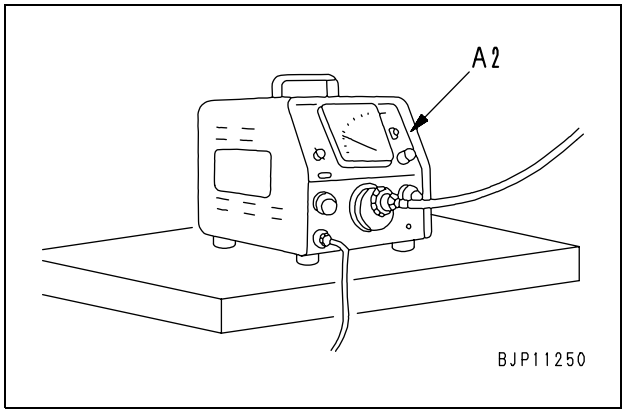
Applicable Model				PC1800-6	
Category	Item	Measuring Conditions	Unit	Standard value for new machine	Service limit value
Travel	Travel deviation	Work equipment posture  BKP00106 • Engine at high idling • Hydraulic oil temperature: Within operating range • In DH mode • Run up for at least 10 m, and measure deviation when traveling next 20 m on hard flat ground.  BKP00107 • Measure dimension χ.	mm	Max. 200	Max. 220
	Hydraulic drift of travel	 BKP00108 • Engine stopped • Hydraulic oil temperature: Within operating range • Stop machine on 12° slope with sprocket at uphill end of machine. • Measure the distance the machine moves in 5 minutes.		0	0
	Leakage of travel motor	 TDP00317 • Engine at high idling • Hydraulic oil temperature: Within operating range • Lock shoes and relieve travel circuit.	ℓ/min	Max. 25	Max. 30

2. Measurement with Smoke Meter A2

1) Insert the probe (1) of the smoke meter **A2**, in the outlet of the exhaust pipe and fix it to the exhaust pipe with clip.

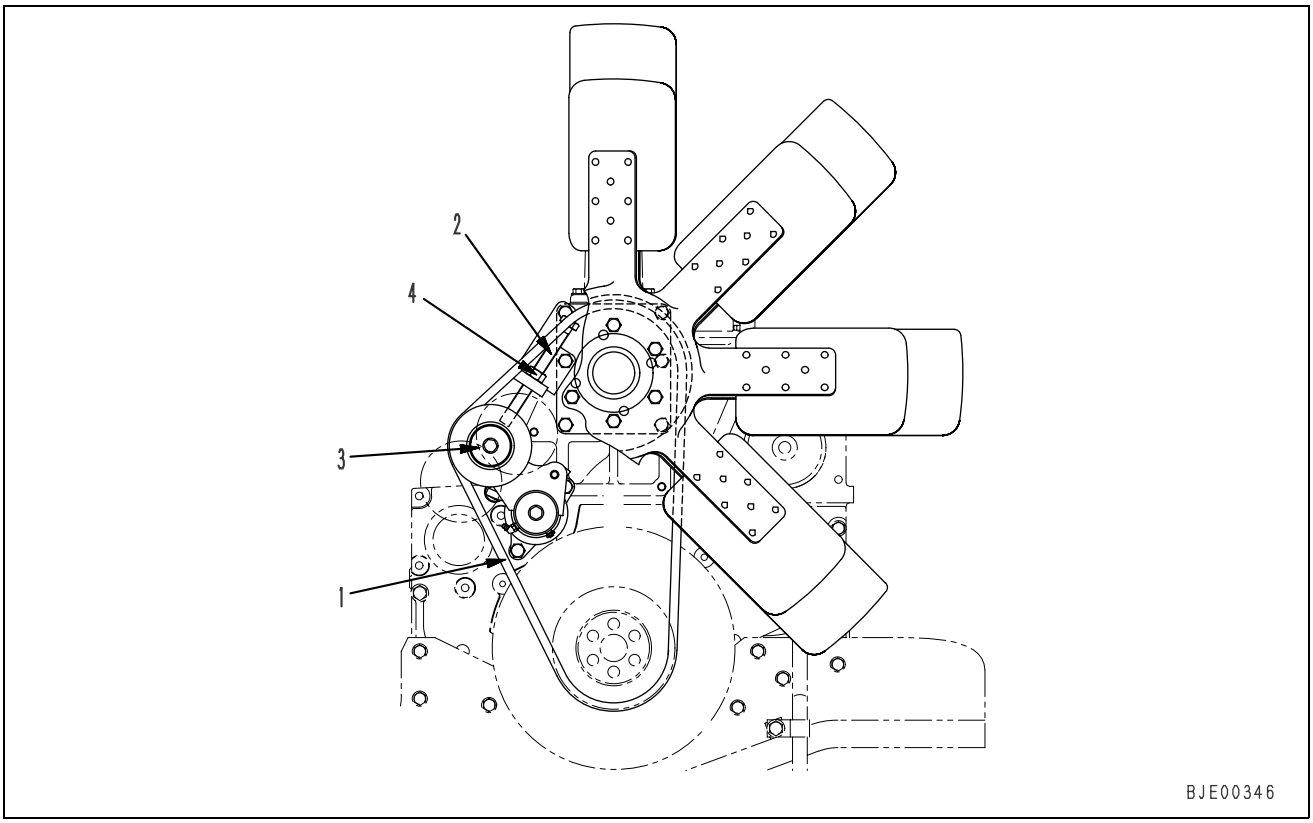


2) Connect the probe hose, the receptacle of the accelerator switch and the air hose to the smoke meter **A2**.
   ★ The supply air pressure shall be less than 1.5MPa (15kg/cm^2).
3) Connect the power cord to an AC100V receptacle.
   ★ Before connect the power cord, make sure that the power switch of 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 **A2**.



6) Start the engine.
7) When accelerating the engine quickly or at a high idling, step down the accelerator pedal of the smoke meter **A2**, 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 the measurement, remove the measuring instrument and return the engine to the original state.

INSPECTION AND ADJUSTMENT OF FAN BELT TENSION



Inspection
You need not inspect this fan belt tension until the belt is replaced.

Adjustment

1. Set 2 pieces of the belt (1).
   ★ Loosen the stopper bolt before setting the belt.

2. Screw in the stopper bolt (2) until it comes in contact with the bracket (3).

3. Screw in the stopper bolt (2) 2 turns more from the present position and fix it with the lock nut (4).
   Lock nut :
   245.0 – 308.7Nm {25.0 – 31.5kgm}

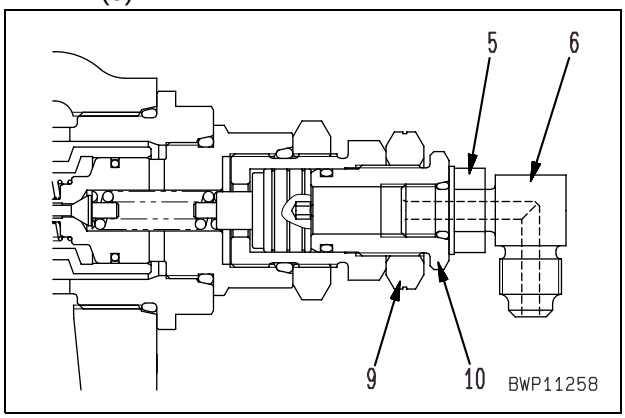
2. Adjustment of Main Relief Valve (Low Pressure Set) of Control Valves V1, V2, V3 and V4

★ When the work equipment relief oil pressure (normal relief) is abnormal, adjust the low pressure set side of the main relief valves (1), (2), (3) and (4) of each control valve according to the following procedures:

★ Low Pressure Set is the state that the 2-stage relief solenoid valve is OFF and that a pilot pressure is not applied to the changeover port.

1) Loosen the lock nut (5) and make the elbow (6) free.
2) Loosen the lock nut (9) and turn the holder (10) for adjustment.
   - Turn the holder to the right, and the pressure will rise.
   - Turn the holder to the left, and the pressure will lower.
   - ★ Pressure adjusted by a turn of the holder: about 21.8MPa {222kg/cm^2}

   Lock nut :
   78 – 93Nm {8.0 – 9.5kgm}
3) Fix the elbow (6) and tighten the lock nut (5).

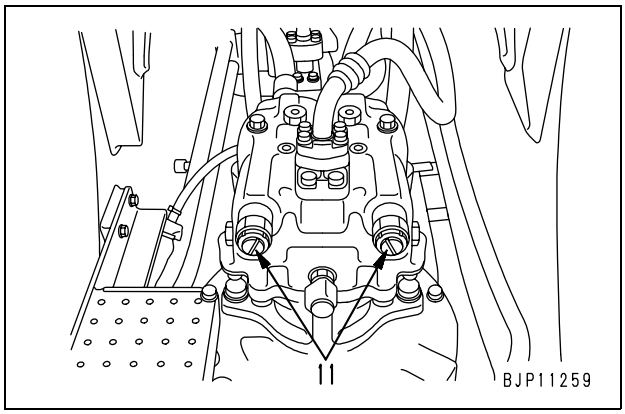


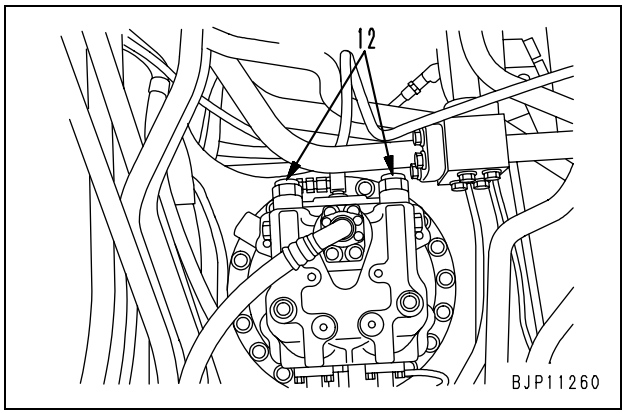
4) After the adjustment, check the oil pressure again according to the above measurement procedures.

3. Adjustment of Swing Motor Safety Valve

★ When the swing oil pressure is abnormal, adjust the swing motor safety valves (11) and (12) according to the following procedures:

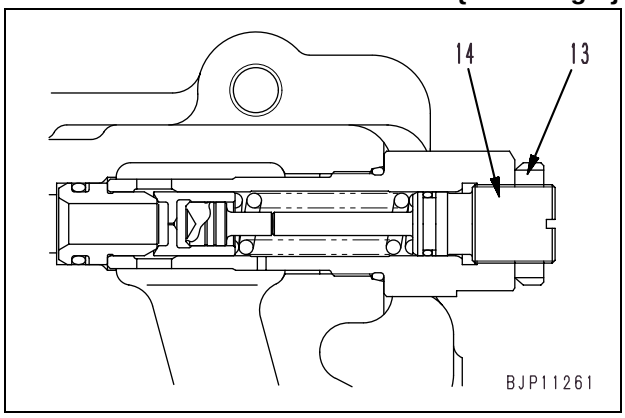
- (11) : For the front swing motor
- (12) : For the rear swing motor





1) Loosen the lock nut (13) and turn the adjustment screw (14) for adjustment.
   - Turn the adjustment screw to the right, and the pressure will rise.
   - Turn the adjustment screw to the left, and the pressure will lower.
   - ★ Pressure adjusted by a turn of the adjustment screw :
     about 4.70MPa {47.9kg/cm^2}

   Lock nut :
   147 – 196Nm {15 – 20kgm}



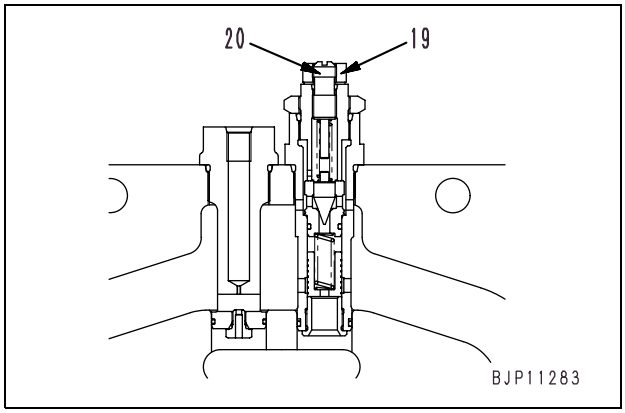
2) After the adjustment, check the oil pressure again according to the above measurement procedures.

1) Loosen the lock nut (19) and turn the adjustment screw (20) for adjustment.
   - Turn the adjustment screw to the right, and the pressure will rise.
   - Turn the adjustment screw to the left, and the pressure will lower.

   ★ Pressure adjusted per a turn of the holder : 0.29MPa {2.96kg/cm^2}

   Lock nut : **59 – 78Nm {6 – 8kgm}**

   ★ The figure shows the jet sensor for V1, V2, V3 and V4 control valves.



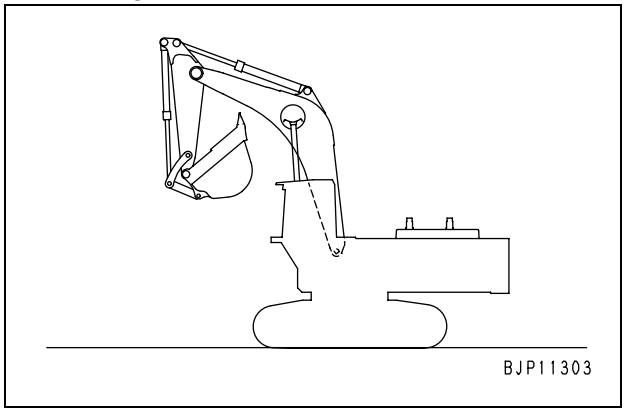
2) After the adjustment, check the oil pressure again according to the above measurement procedures.

INSPECTION OF OIL LEAKAGE

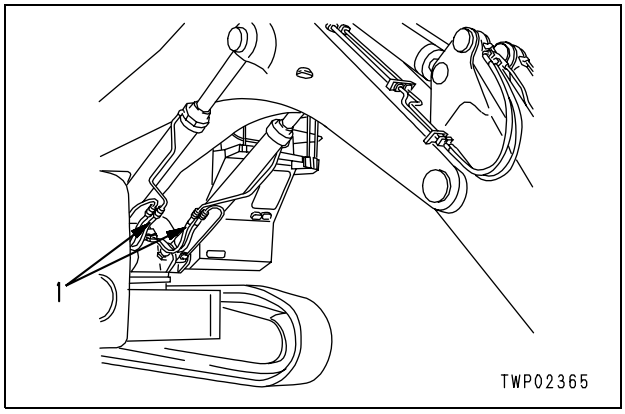
★ Measure oil leakage under the following conditions:
- Hydraulic oil temperature : within operating temperature range

1. Measurement of Leakage from Boom Cylinder

1) Extend the cylinder fully and stop the engine.



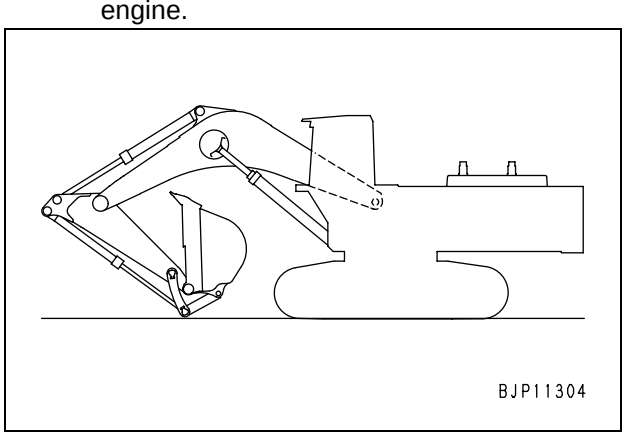
2) Disconnect the pipes (1) from the head side and block the pipe on the control valve side with flange.
⚠ Be careful not to disconnect the pipe on the bottom side.



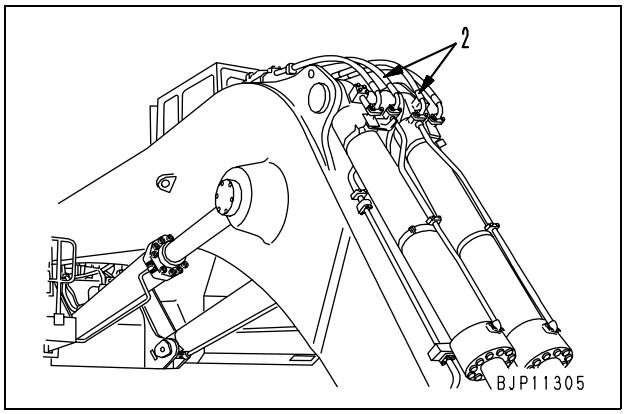
3) Start the engine, operate the left control lever to the "Boom RAISE" side at high idling and apply the relief oil pressure to the cylinder bottom side.
⚠ Be careful not to operate the control lever to the "Boom LOWER" side.
4) After 30 seconds elapsed, measure oil leakage for 1 minute.

2. Measurement of Leakage from Arm Cylinder

1) Extend the cylinder fully and stop the engine.



2) Disconnect the pipes (2) from the head side and block the pipe on the control valve side with flange.
⚠ Be careful not to disconnect the pipe on the bottom side.

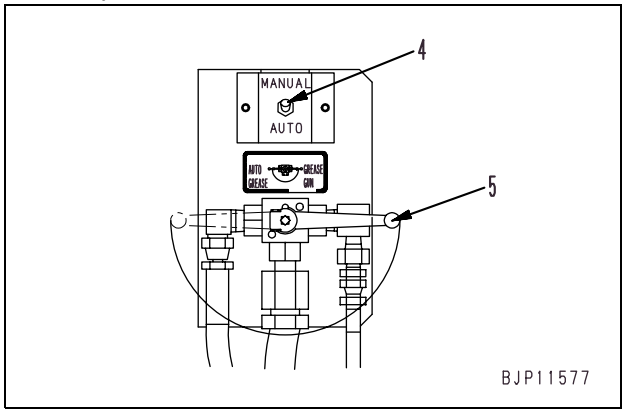


3) Start the engine, operate the right control lever to the "Arm IN" side at high idling and apply the relief oil pressure to the cylinder bottom side.
⚠ Be careful not to operate the control lever to the "Arm OUT" side.
4) After 30 seconds elapsed, measure oil leakage for 1 minute.

3. Bleeding air from grease pump line

★ When a new machine is delivered or transported disassembled or when the grease can becomes empty or when the hose, pump, or injector is replaced, bleed air from the grease pump line according to the following procedure.

1) Set the auto grease selector switch (4) to the MANUAL position and set grease circuit selector switch (5) to the GREASE GUN position.



2) Operate the grease gun to bleed air from the grease pump line.

★ Check that the grease discharged from the grease gun does not contain air.

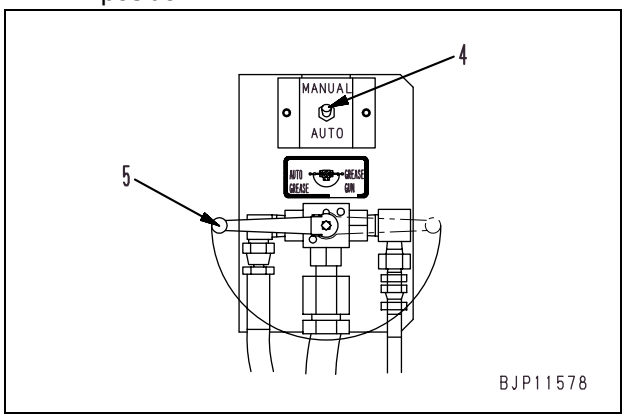
4. Bleeding air from distributor line

★ When a new machine is delivered or transported disassembled or when the grease can becomes empty or when the hose, pump, or injector is replaced, bleed air from the grease pump line according to the following procedure.

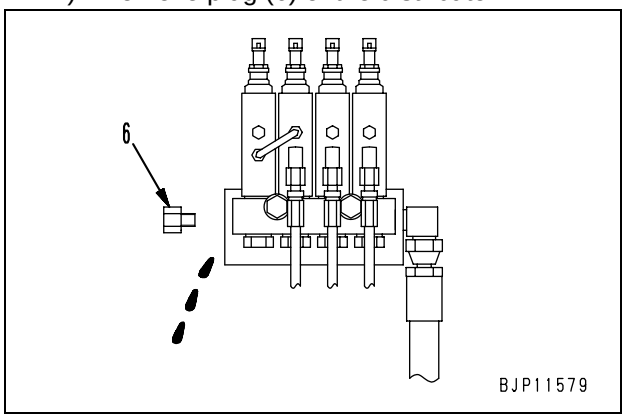
★ Perform this work after "Bleeding air from grease pump line" is finished.

★ Perform this work on the all distributor lines in order from the one nearest to the grease pump (Swing circle → Boom cylinder bottom → Boom → Arm).

1) Set the auto grease selector switch (4) to the MANUAL position and set grease circuit selector switch (5) to the AUTO GREASE position.



2) Remove plug (6) of the distributor.

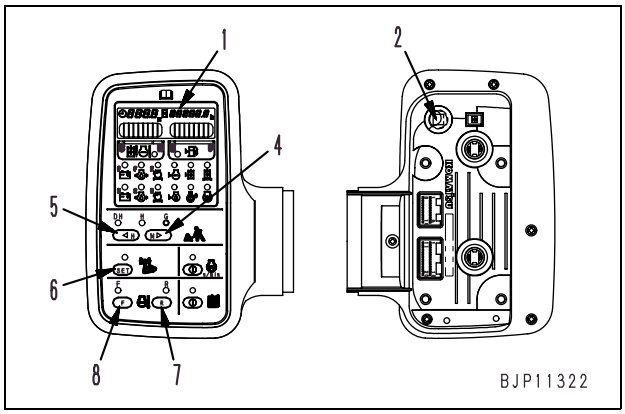


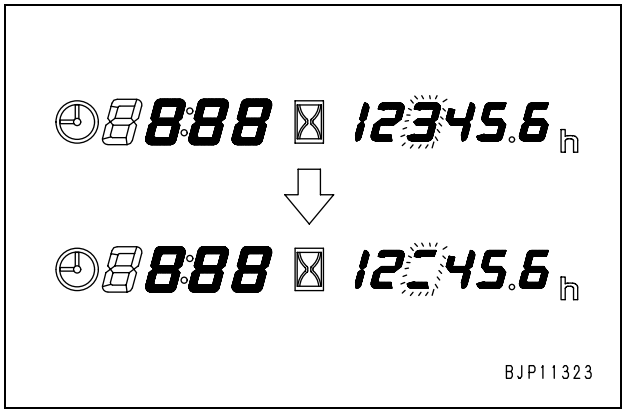
No.	User code (Machine monitor)	Error code (Machine monitor)	Failure code (CGC monitor)	Description
70		EA81	aDA1KA	R. TWV#1 line cut
71		EA82	aDB1KA	R. TWV#2 line cut
72		EA83	aDC1KA	R. TWV#3 line cut
73		EA84	aDD1KA	R. TWV#4 line cut
74		EA85	aDE1KA	R. TWV#5 line cut
75		EA86	aDF1KA	R. TWV#6 line cut
76		EA8A	aDAZKB	R. TWV#1,2,3 line short
77		EA8b	aDDZKB	R. TWV#4,5,6 line short
78			6014NX	Hydraulic oil filter clogging
79			7@HAKA	Break F. pump 1,2 press. sensor failure
80			7@HAKB	Short F. pump 1,2 press. sensor failure
81			7@HAZL	High relief press. F. pump 1,2
82			7@HBKA	Break R. pump 1,2 press. sensor failure
83			7@HBKB	Short R. pump 1,2 press. sensor failure
84			7@HBZL	High relief press. R. pump 1,2
85			7@HCKA	Break F. pump 3,4 press. sensor failure
86			7@HCKB	Short F .pump 3,4 press. sensor failure
87			7@HCZL	High relief press. F. pump 3,4
88			7@HDKA	Break R. pump 3,4 press. sensor failure
89			7@HDKB	Short R .pump 3,4 press. sensor failure
90			7@HDZL	High relief press. R. pump 3,4
91			aB00KE	Low R. charge voltage
92			AB00KE	Low F. charge voltage
93			b@BAZK	Low R. engine oil level
94			B@BAZK	Low F. engine oil level
95			b@BCZK	Low R. coolant level
96			B@BCZK	Low F. coolant level
97			b@CBNS	High R. PTO temp.
98			B@CBNS	High F. PTO temp.
99			B@HAZK	Low Hydraulic oil level
100	E05		D110KB	Short in F. battery relay drive sys.
101			D163KB	Short in flash light relay sys.
102			D194KZ	Break in step light power keep
103			D195KB	Short in step light relay sys.
104	E0E		DA2SKA	Network overtime error

5. Operating on reduced cylinders

Operates the engine on reduced cylinders by putting a specific cylinder in non-injection condition and measuring engine rpm at that time to specify the cylinder with abnormality.

1) Changing over to operating on reduced cylinders
   Simultaneously press time switch (2), working mode right switch (4), and R engine water temperature display switch (7) at least 2.5 seconds to display condition of front engine on time/service meter display (1).
   ★ Carry out this operation with engine running since this function specifies the cylinder with abnormality based on change in engine rpm at operating it on reduced cylinders.
2) Changing over engine to operate on reduced cylinders
   Press F engine water temperature display switch (8) or R engine water temperature display switch (7) to turn on lamp.
   • F engine water temperature display lamp: Front engine
   • R engine water temperature display lamp: Rear engine
3) Information displayed
   Engine rpm is displayed on the left side of time/service meter display (1) and cylinder No. is displayed on the right.
   ★ The display unit of the engine rpm is 10 rpm.
4) Setting cylinder to reduce
   i) While pressing time switch (2), press working mode right switch (4) or working mode left switch (5) to flash cylinder number to reduce.
   ii) While pressing time switch (2), press heavy lift switch (6) to put cylinder to reduce on non-injection condition.





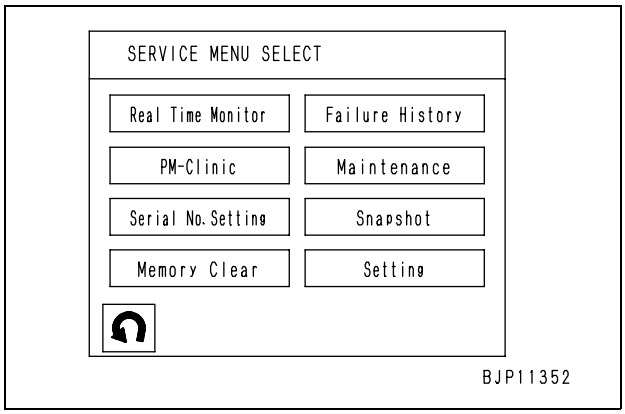
List of Items Monitored

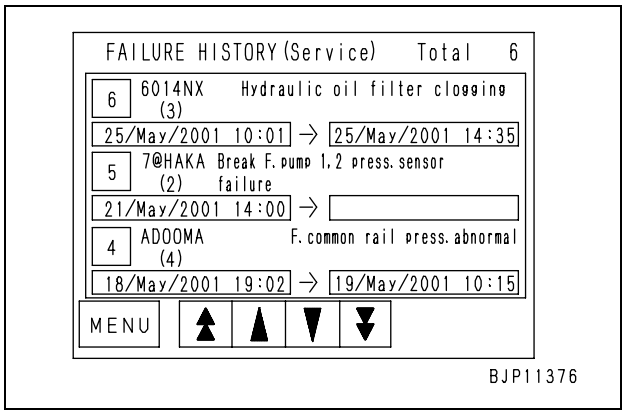
REAL TIME MONITOR (1/6)		Contents	Unit(SI)	Unit (METRIC)	Range of display	Remarks
1	F. engine speed	Rpm of front engine	rpm	rpm	0 – 3000	Temperature of engine coolant is monitored on the machine monitor side.
2	F. engine fuel temp	Fuel temperature of front engine	degC	°C	-30 – 100	
3	F. fuel injection	Fuel injection volume of front engine	mm^3/st	mm^3/st	0 – 600	
4	F. rail press.	Common rail pressure of front engine	MPa	kg/cm^2	0 – 200	
5	F. PCV ACT timing	Common rail angle of front engine	deg	deg	0 – 180	
6	F. TVC amp.	Current of front TVC	mA	mA	0 – 1000	
REAL TIME MONITOR (2/6)		Contents	Unit(SI)	Unit (METRIC)	Range of display	Remarks
1	R. engine speed	Rpm of rear engine	rpm	rpm	0 – 3000	Temperature of engine coolant is monitored on the machine monitor side.
2	R. engine fuel temp	Fuel temperature of rear engine	degC	°C	-30 – 100	
3	R. fuel injection	Fuel injection volume of rear engine	mm^3/st	mm^3/st	0 – 600	
4	R. rail press.	Common rail pressure of rear engine	MPa	kg/cm^2	0 – 200	
5	R. PCV ACT timing	Common rail cam angle of rear engine	deg	deg	0 – 180	
6	R. TVC amp.	Current of rear TVC	mA	mA	0 – 1000	
REAL TIME MONITOR (3/6)		Contents	Unit(SI)	Unit (METRIC)	Range of display	Remarks
1	F. engine speed	Rpm of front engine	rpm	rpm	0 – 3000	Temperature of engine coolant is monitored on the machine monitor side.
2	No.1,2 F. pump press.	Pressure of No.1 and No.2 front pumps	MPa	kg/cm^2	0 – 50.0	
3	No.3,4 F. pump press.	Pressure of No.3 and No.4 front pumps	MPa	kg/cm^2	0 – 50.0	
4	swing pump press.	Pressure of swing pump	MPa	kg/cm^2	0 – 50.0	
5	F. TVC amp.	Current of front TVC	mA	mA	0 – 1000	
6	F. NC press.	Pressure of front NC	MPa	kg/cm^2	0 – 5.0	

15. Failure History Function

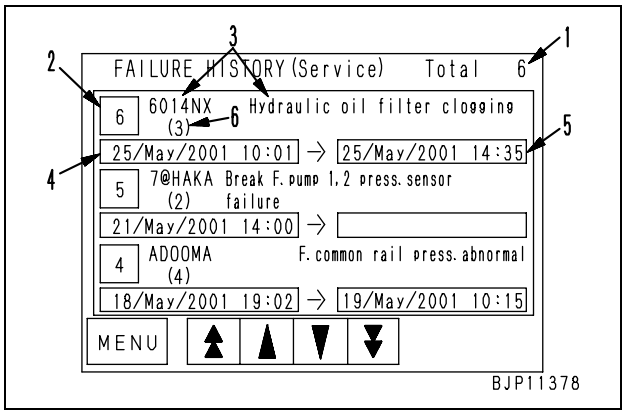
This function allows to check a failure code of abnormality which has occurred in the machine and the contents of the failure, time of occurrence, time of restoration, number of times of occurrence, etc.

1) Selection of failure-history function
Press [Failure History] button on the Service Menu selection screen, and Failure-history screen is displayed.

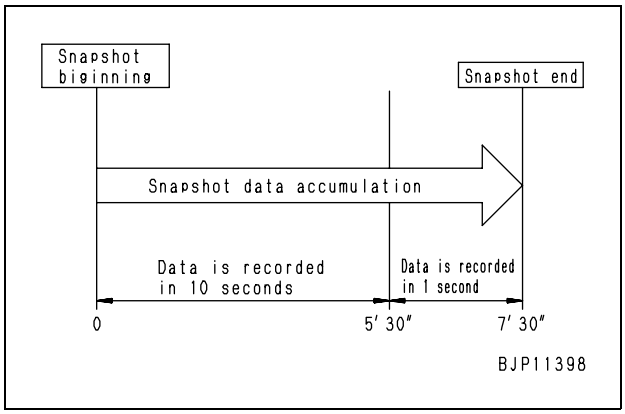




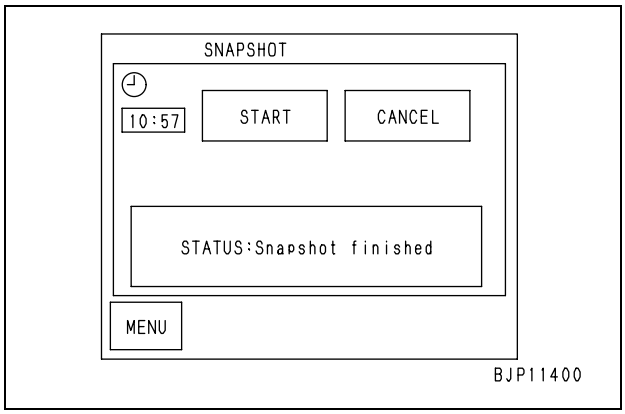
2) Information shown on Failure-history screen
   (1) Number of total items recorded
   Number of total failure-history items recorded is displayed.
   (2) Number of failure history
   This number represents the sequence of failures which has occurred. On the screen, it is displayed in the descending order (i.e. the newest failure first).
   (3) Failure codes and failure phenomena
   The failure codes with six digits and their phenomena are shown.
   (4) Time of occurrence
   The time and date when the failure occurred first are shown.
   (5) Time of restoration
   The time and date when the failure were fixed are shown. If they are not shown, the failure has not been fixed.
   (6) Number of times of occurrence
   Shows how many time the code occurred in a period from the first occurrence of the failure to the restoration from it (information of history of restoration), or from the first occurrence to the present time (information of history of unfixed failures before restoration).



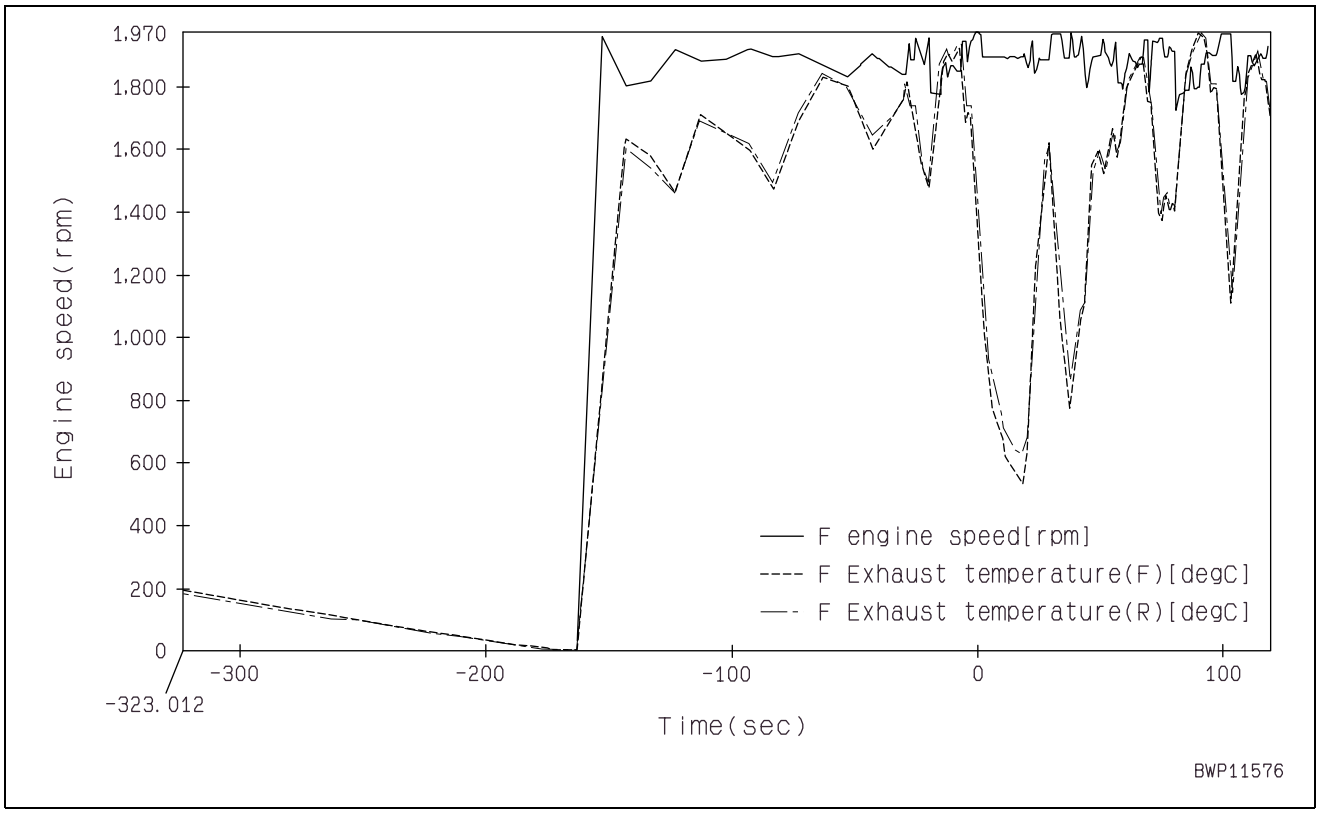
★ Data of 53 items are recorded and accumulated for seven and a half minutes after you pressed [Yes] button.
★ Data is recorded at a ten seconds' step for the first five and a half minutes; then data is recorded at one second's step for two minutes.
★ If you cancel snapshot, press [Cancel] button.



4) Exit from snapshot operation
The screen shown right appears seven and a half minutes after snapshot operation started, and the operation completes.
★ After the snapshot operation was over, the screen goes back to the initial Snapshot screen automatically.



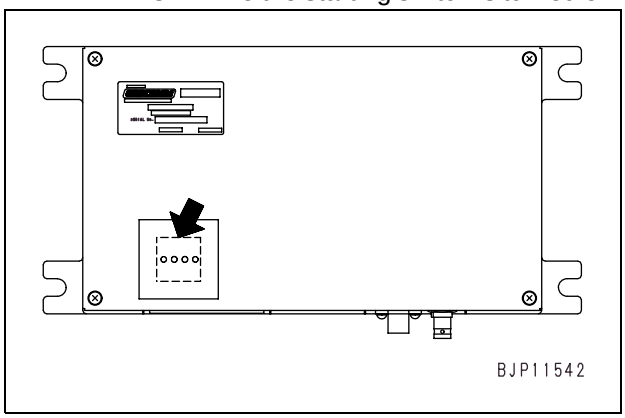
5) Example of snapshot data
The figure shows the example data for front engine rotation speed and exhaust temperature (front, rear)



2. Operation Check of ORBCOMM Controller (ORBCOMM Specification only)

★ This step applies to works in the cab and the cab under room.

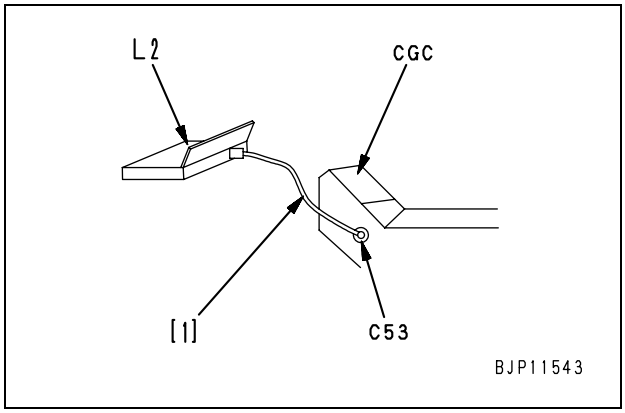
1) Make sure that the starting switch is set to the OFF position.
2) Check that the ORBCOMM controller green LED is ON, and make sure that the controller is operating.
   ★ Since the power is supplied to the ORBCOMM controller all the time, the controller is normal when the green LED is ON while the starting switch is turned off.



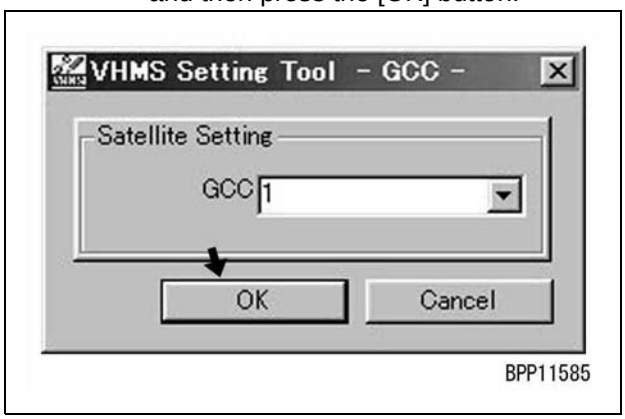
3. Connection of Personal Computer

★ This step applies works in the cab.

1) Make sure that the starting switch is set to the OFF position.
   ⚠ Be sure to connect and disconnect the personal computer when the starting switch is set to the OFF position.
2) Connect the personal computer **L2** and the download connector **C53** with the wiring harness [1] of the service kit **L1**.
   ★ The download connector **C53** is connected to the left side face of CGC monitor.
   ★ Connect the personal computer to the RS232C terminal.



4) To change the setting of [Satellite Setting], follow the procedures below:
   i) Press the [Edit] button in the [Satellite Setting] block to display the setting screen.
   ii) Bring GCC Code to the applicable area and then press the [OK] button.

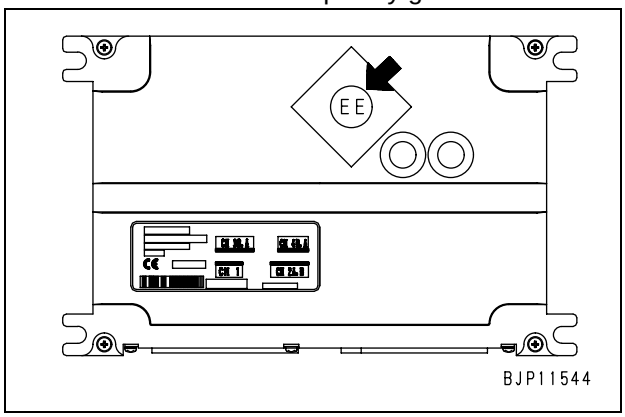


GCC Code and Application Area	
Code	Applicable Area
1	U.S.A.
120	Italy
121	Malaysia
122	Korea
123	Brazil
130	Japan

14. Check of Storage Operation of VHMS Controller

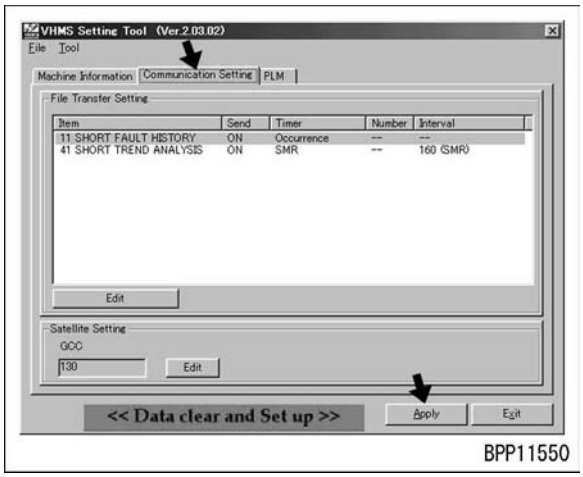
★ This step applies to works in the cab and the cab under room

1) Set the starting switch to the OFF position.
2) Check the 7-segment LED of the VHMS controller and make sure that the controller power has been completely cut off.
   ★ The VHMS controller records and updates data when the starting switch is turned off.
   ★ The controller power is retained for storage operation for several seconds after the starting switch is turned off. So, confirm that the 7-segment LED of the controller has completely gone out.

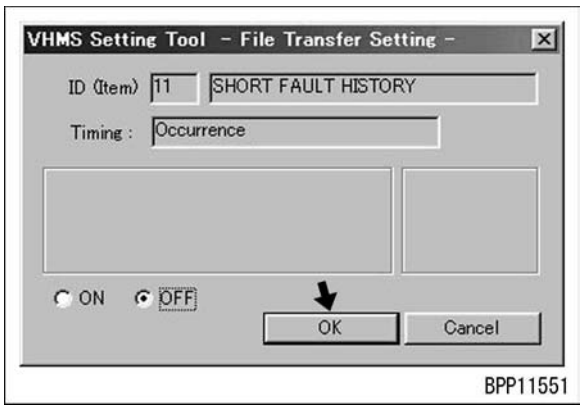


[Communication Setting]
(ORBCOMM specification only)

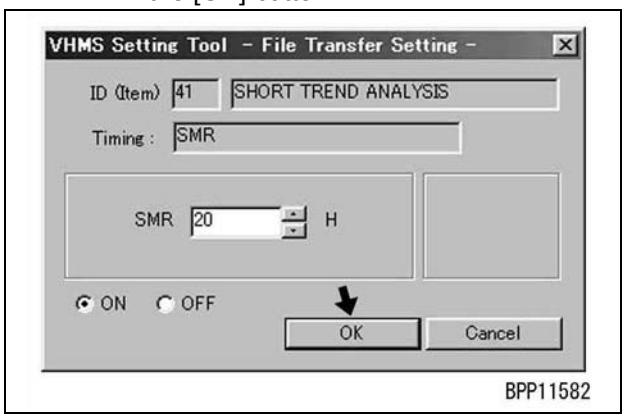
7) Open the [Communication Setting] tab.
8) Change all the data to the one recorded before the replacement.



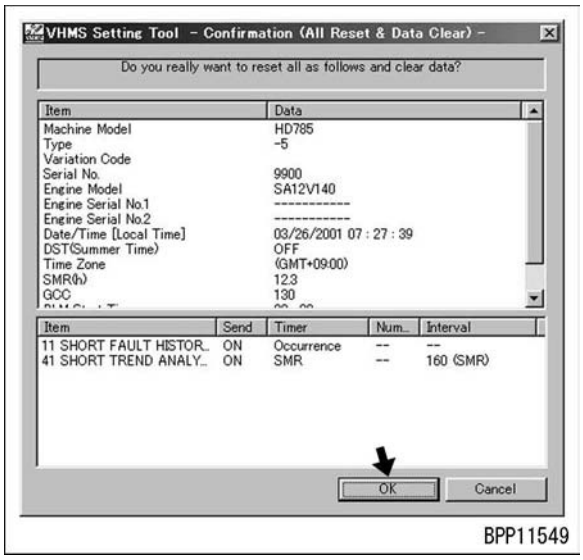
9) To change setting in [SHORT FAULT HISTRY], follow the procedures below:
   i) Select [SHORT FAULT HISTRY] on the screen and press the [Edit] button on the left lower part of the [File Transfer Setting] block to display the setting screen.
   ii) Change the setting to the one recorded before the replacement and then press the [OK] button.



10) To change setting in [SHORT TREND ANALYSIS], follow the procedures below:
   i) Select [SHORT TREND ANALYSIS] on the screen and press the [Edit] button on the left lower part of the [File Transfer Setting] block to display the setting screen.
   ii) Change the setting to the one recorded before the replacement and then press the [OK] button.

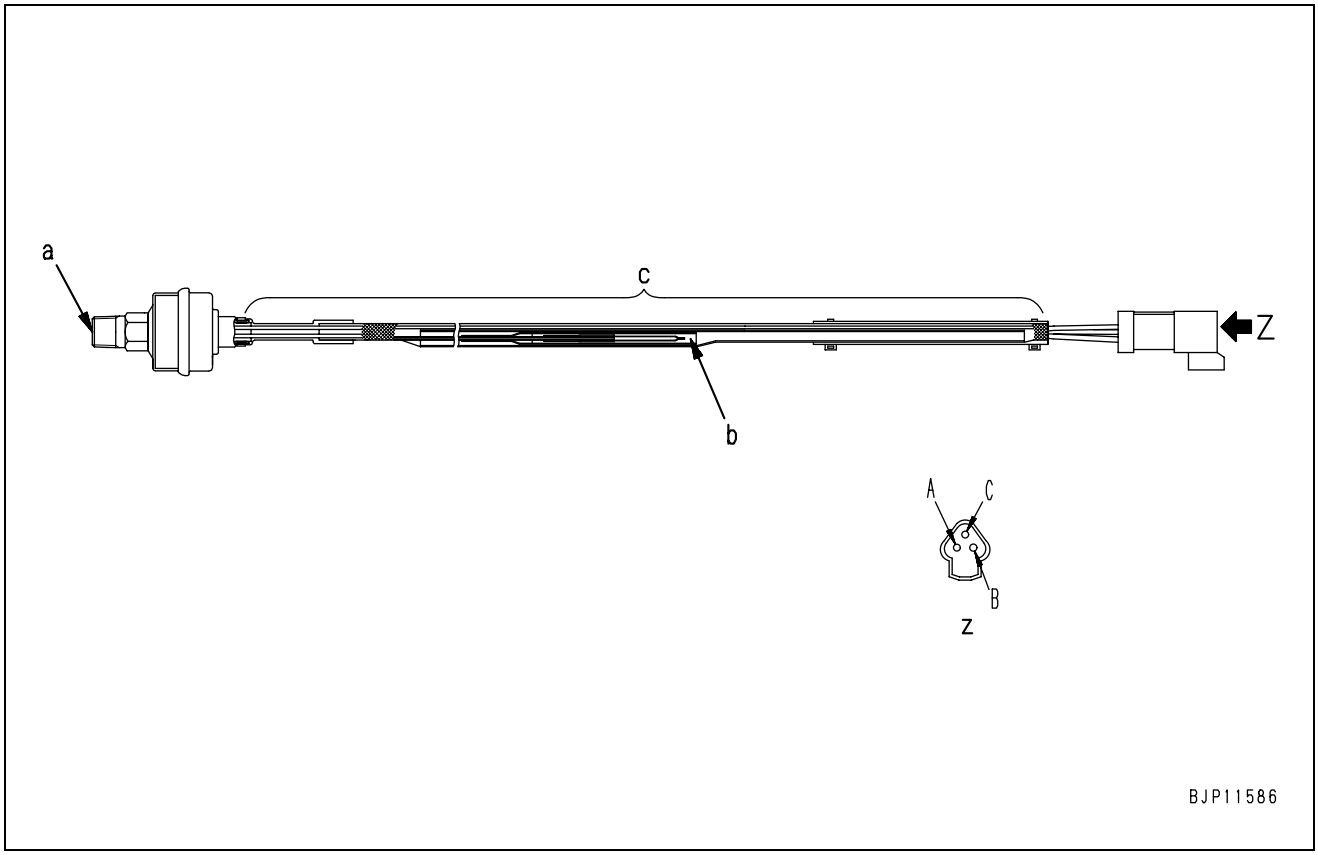


11) After having checked and changed all data in [Communication Setting], press the [Apply] button to settle the setting.
   ★ Press the [Apply] button, and the screen for checking the setting will appear. Check the setting again and then press the [OK] button when the setting is correct.



TESTING AND ADJUSTING DEVICES RELATED TO VHMS

1. Testing engine blow-by pressure sensor

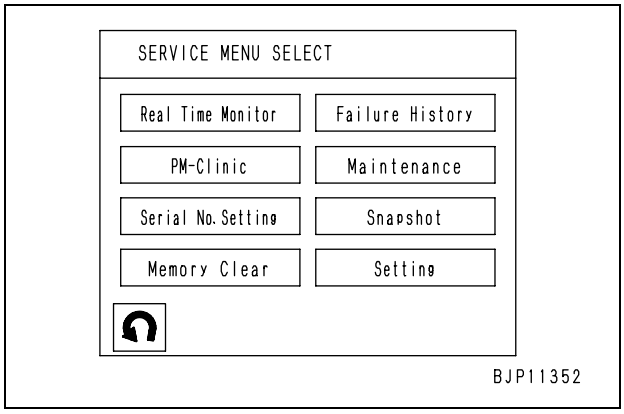


★ The engine blow-by pressure sensor is a fine relative pressure sensor which introduces the engine crankcase pressure from its end "**a**" and atmospheric pressure from intermediate part "**b**" of the wiring harness to measure the difference between those pressures.
★ Accordingly, if oil, dust, water, etc. sticks to part "**b**" to introduce atmospheric pressure, the atmospheric pressure cannot be introduced stably. As a result, the atmospheric pressure cannot be measured normally.
★ If VHMS detects abnormal blow-by pressure and the sensor seems to be defective, check whole wiring harness "**c**" including part "**b**" to introduce atmospheric pressure for oil, dust, water, etc. before replacing the sensor. If part "**b**" or "**c**" is not clear, clean it.

PREPARATORY WORK FOR PM CLINIC MEASUREMENT

1. Check safety around and start the front engine and the rear engine.

2. Set the CGC monitor to Service Menu, select the "PM Clinic" menu and display "PM Clinic (1/6)".
★ For the operating method, see the paragraph of Function and Operation of CGC monitor.

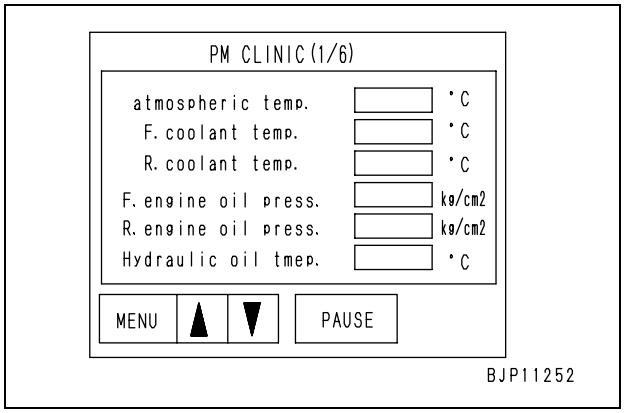


3. Warm up the engine and raise engine water temperature and hydraulic oil temperature.
- Engine water temperature : 40°C min.
- Hydraulic oil temperature : 40°C min.

4. Park the machine on a level ground.

5. Prepare to lock travel.
⚠ When measuring travel relief oil pressure, fix the sprocket on the measuring side.
⚠ When measuring traveling speed without load, push up the track shoe on the measuring side.

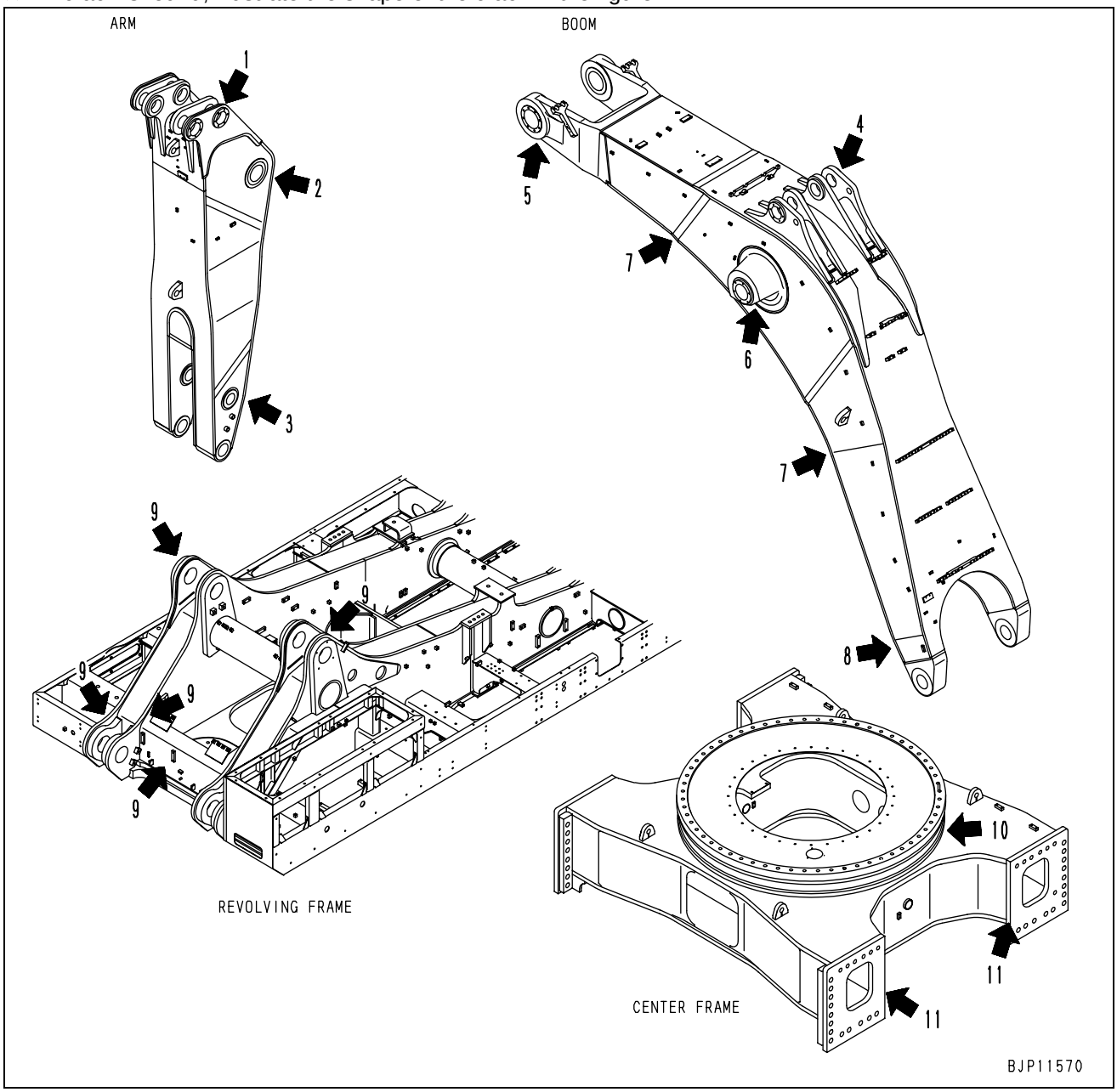
6. Lower the work equipment completely to the ground and stop the engine.



Pm-CLINIC SERVICE

Sight check of welded structural part

★ If crack is found, illustrate the shape of the crack in the figure.



1. Arm cylinder bracket
☐ Left ☐ Right

2. Arm foot
☐ Left ☐ Right ☐ Top plate

3. Top boss
☐ Left ☐ Right

4. Arm cylinder bracket
☐ Left ☐ Right

5. Boom top bracket
☐ Left ☐ Right

6. Boom cylinder bracket
☐ Left ☐ Right

7. Boom lower plate
☐ Left ☐ Right

8. Boom foot
☐ Left ☐ Right

9. Boom bracket
☐ Left ☐ Right

10. Circle bracket
☐ Front ☐ Rear
☐ Left ☐ Right

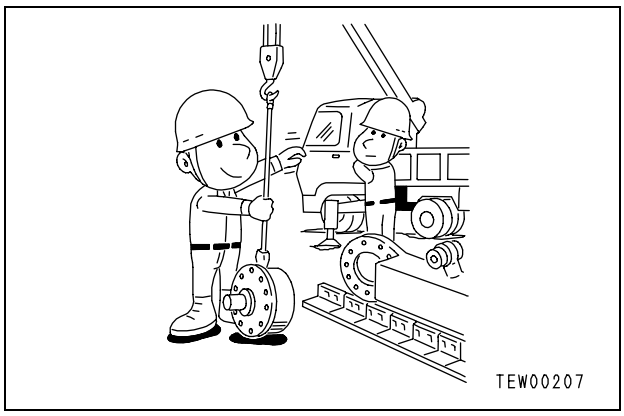
11. Leg mount
☐ Front ☐ Rear
☐ Left ☐ Right

3. Points to remember when handling hydraulic equipment

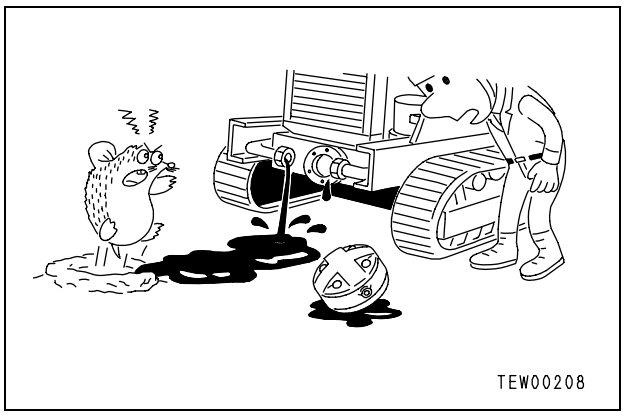
With the increase in pressure and precision of hydraulic equipment, the most common cause of failure is dirt (foreign material) in the hydraulic circuit. When adding hydraulic oil, or when disassembling or assembling hydraulic equipment, it is necessary to be particularly careful.

1) Be careful of the operating environment.
Avoid adding hydraulic oil, replacing filters, or repairing the machine in rain or high winds, or places where there is a lot of dust.

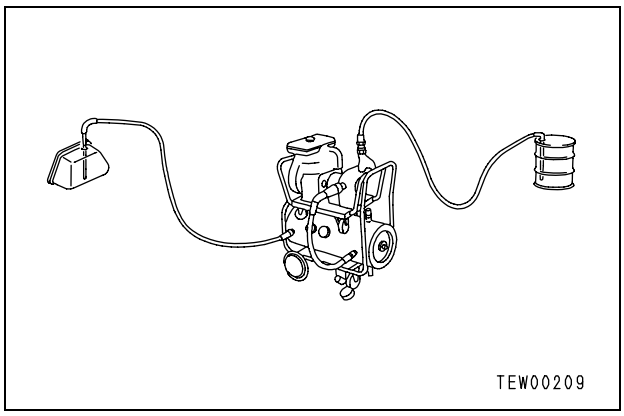
2) Disassembly and maintenance work in the field
If disassembly or maintenance work is carried out on hydraulic equipment in the field, there is danger of dust entering the equipment. It is also difficult to confirm the performance after repairs, so it is desirable to use unit exchange. Disassembly and main-tenance of hydraulic equipment should be carried out in a specially prepared dustproof workshop, and the performance should be confirmed with special test equipment.



3) Sealing openings
After any piping or equipment is removed, the openings should be sealed with caps, tapes, or vinyl bags to prevent any dirt or dust from entering. If the opening is left open or is blocked with a rag, there is danger of dirt entering or of the surrounding area being made dirty by leaking oil so never do this.
Do not simply drain oil out on to the ground, collect it and ask the customer to dispose of it, or take it back with you for disposal.



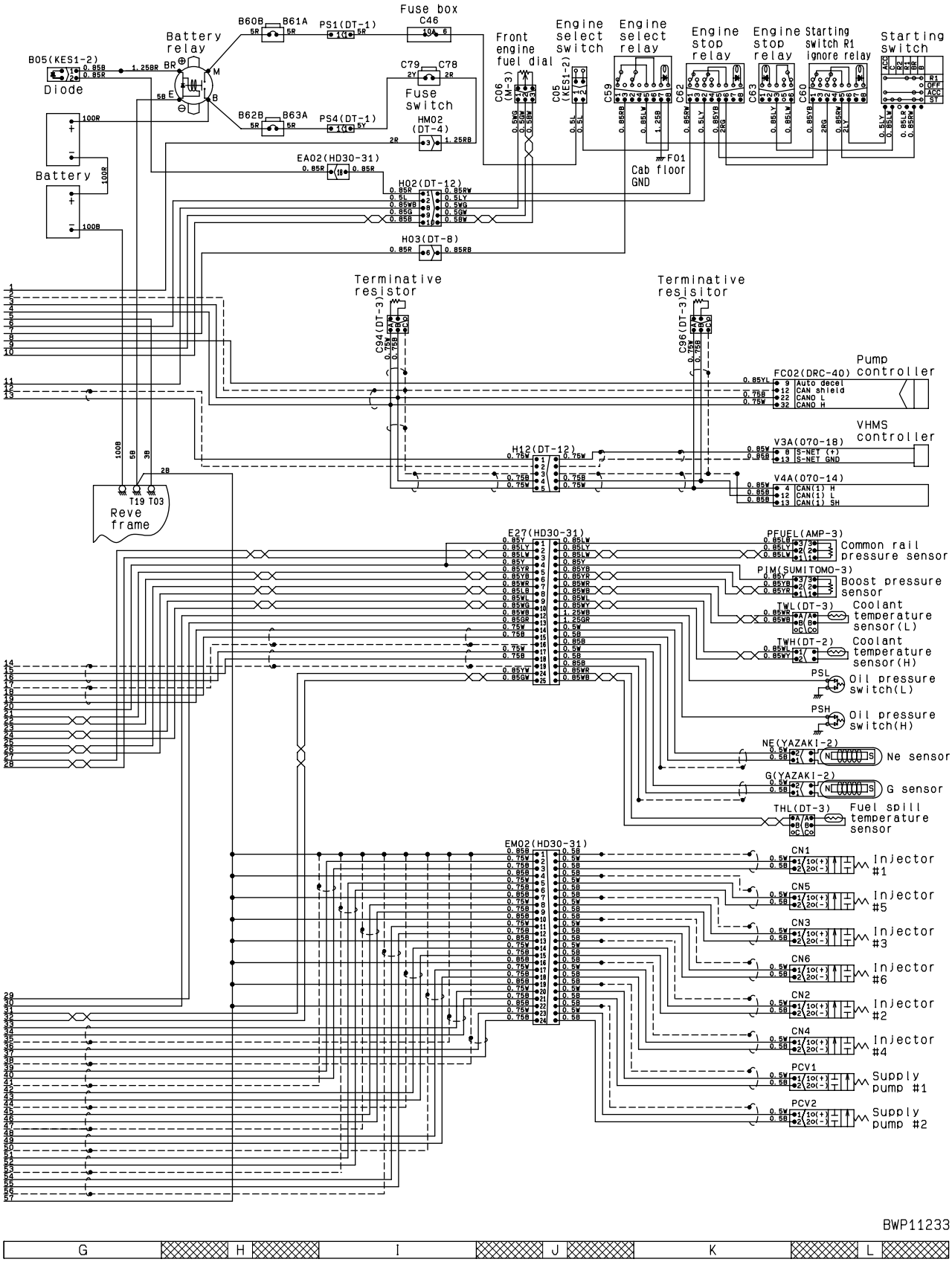
4) Do not let any dirt or dust get in during refilling operations.
Be careful not to let any dirt or dust get in when refilling with hydraulic oil. Always keep the oil filler and the area around it clean, and also use clean pumps and oil containers. If an oil cleaning device is used, it is possible to filter out the dirt that has collected during storage, so this is an even more effective method.

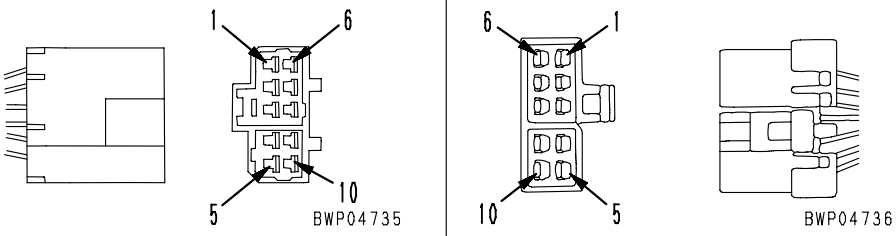
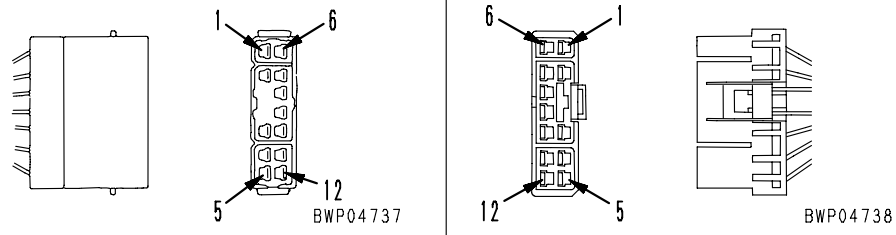
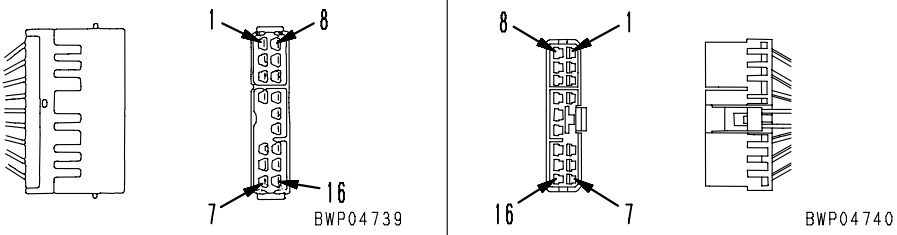


Connector No.	Type	Number of pins	Device name	Location (See Section 90)			M circuit	C circuit	FE circuit	RE circuit	P circuit	G circuit	W circuit
C08	Plug connector	2	Left speaker	A10-6	A11-6	B12-1							
C09	Plug connector	3	Right speaker	A10-5	A11-5	A11-6							
				B13-9									
C11	Plug connector	2	Cigarette lighter	A6-8	B9-7								
C12		2	Working lamp switch	A6-8	B9-9		A-3						
C14		2	Working lamp and headlamp relay	A6-5									
C15		2	Right and left headlamp relay	A6-6									
C16	Relay	2	Boom right lamp relay	A7-5									
C17	M	2	Swing lock switch	A7-8	B9-9		A-3				L-7		
C18	M	2	Resistor	A12-1							L-7		
C19	M	2	Machine pushup switch	A7-8	B10-9						L-9		
C20	M	2	Fog lamp switch	A7-8	B10-9								
C21		6	Fog lamp relay	A7-6									
C22	250	3	Boom shockless switch	A7-8	B10-9						L-9		
C23	M	2	Rotary lamp switch	A8-8	B10-9								
C24	M	2	Buzzer cancel switch	A8-8	B11-9		A-2						
C25	M	2	Step lamp switch	A7-8	B9-9						L-9		
C27	Relay	5	Rear lamp relay (Step lamp relay)	A7-5							I-9		
C28	KES1	4	Wiper and washer switch	A8-8	B11-9								
C29	Relay	5	Wiper relay	A8-5									
C30	Relay	5	Wiper relay	A7-6									
C31	S	10	Greasing switch	A8-8	B11-9								
C32	M	6	Auto grease timer	A7-5									
C33	M	2	Automatic level digging switch [Loading shovel specification]	A9-8	B11-9								E-5
C34	M	2	Bucket angle correction switch [Loading shovel specification]	A9-8	B11-9								E-4
C37	M	2	Cab room lamp switch	A7-8	B9-9								
C40	Plug connector	1	Intermediate connector [Loading shovel specification]										
C41	Plug connector	1	Intermediate connector [Loading shovel specification]										
C42	KES1	2	Diode	A8-5									
C43	Plug connector	1	Intermediate connector [Loading shovel specification]										
C44	Plug connector	1	Intermediate connector [Loading shovel specification]										
C45	KES1	2	Diode	A7-5									
C46	—	—	Fuse box	A10-7	A13-7	B13-8	D-7		I-9	I-9	G-8		D-3
C48	BENDIX	10	Machine control monitor (CGC)	B2-5	B2-9		A-1	I-1					
C50	Relay	5	Rotary lamp relay	A7-6									
C51	Relay	5	Boom shockless relay	A7-5							I-9		

Connector No.	Type	Number of pins	Device name	Location (See Section 90)				M circuit	C circuit	FE circuit	RE circuit	P circuit	G circuit	W circuit
T11	DT	2	Travel alarm	E10-5	F10-1	K14-5						I-2		
				L12-1										
T12	DT	2	Fuel level sensor	E9-5	E10-9	F11-7		I-8				J-2		
				K14-9	L12-7									
T13	M	2	Engine compartment lamp switch	E2-4	F9-9	K13-6								
				L10-9										
T15	DT	2	Air conditioner compressor (Rear engine)	E8-7	F8-8	H6-3								
				K12-7	L10-8									
T16	DT	2	Hydraulic oil temperature sensor	E5-9	F5-7	F14-6		H-8				J-2		
				K8-9	L6-7									
T17	DT	2	Hydraulic oil filter clogging switch	E5-8	F5-8			H-8				J-2		
T18	DT	2	Low hydraulic oil temperature switch	E5-8	F5-9			H-8				I-2		
T19	terminal	3	Revolving frame GND	E14-2	K1-3			E-5	H-3	G-7	G-7	E-8		F-1
T20	terminal		Revolving frame GND	E14-2	K1-3									
THL	DT	2	Fuel temperature sensor (Front engine)	R3-2						K-4				
THL	DT	2	Fuel temperature sensor (Rear engine)	S3-2							K-4			
TWH	DT	2	High engine coolant temperature sensor (Front engine)	R10-4				J-8	K-8	K-5				
TWH	DT	2	High engine coolant temperature sensor (Rear engine)	S10-4				J-2	K-8		K-5			
TWL	DT	2	Low engine coolant temperature sensor (Front engine)	R10-4						K-5				
TWL	DT	2	Low engine coolant temperature sensor (Rear engine)	S10-4							K-5			
V01	DT	3	V1 control valve pressure sensor	E6-5					F-2					
V02	DT	3	V2 control valve pressure sensor	E6-5	F6-1				E-2					
V03	DT	3	V3 control valve pressure sensor	E8-5	I3-2	I10-3			E-2					
V04	DT	3	V4 control valve pressure sensor	E8-4	I1-3	I10-4			E-2					
V05	DT	3	Swing control valve pressure sensor	E6-5	F7-1				E-2					
V1	70	20	VHMS controller	D13-9					A-7					
V2A	70	18	VHMS controller	D13-9				E-1	A-6					
V2B	70	12	VHMS controller	D13-9					A-5					
V3A	70	18	VHMS controller	D13-8				E-1	A-4		K-6			
V3B	70	12	VHMS controller	D13-8					A-3					
V4A	70	14	VHMS controller	D13-9				E-1	A-3	K-6	K-6	D-1		
V4B	70	10	VHMS controller	D13-9					A-2					
W01	DT	8	Intermediate connector	C3-5	D3-7							B-8		
W02	X	2	Air conditioner condenser (Front engine)	C1-7	D1-9	G5-6								
W03	X	2	Air conditioner condenser (Rear engine)	C1-6	G6-6									
W04	M	1	Lower lamp	C4-6	C8-5	D3-6								

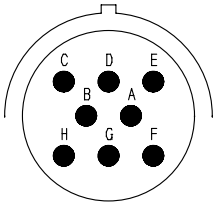
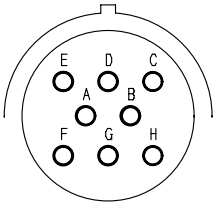
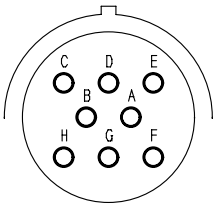
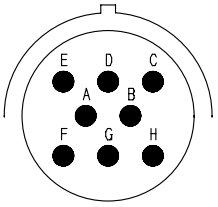
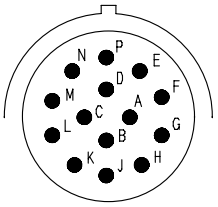
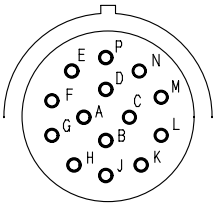
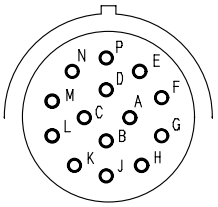
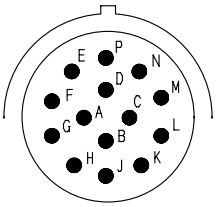
★ This circuit diagram is created by extracting the rear engine controller system from the general electric circuit diagram.



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	

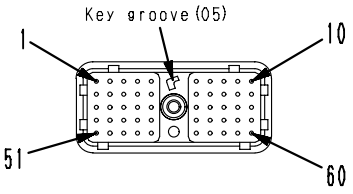
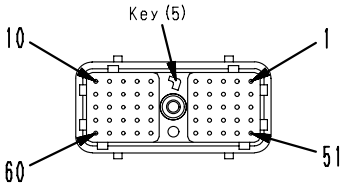
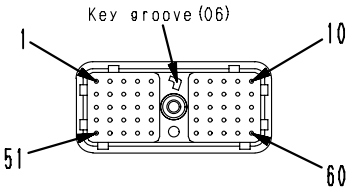
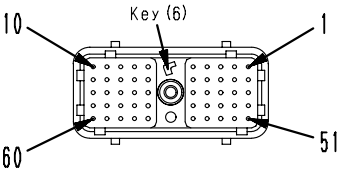
9JS04895

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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
18-8 (1)	Pin (male terminal)	Socket (female terminal)	799-601-9210
	 BWP05001	 BWP05002	
	Part No. :08191-11201, 08191-11202, 08191-11205, 08191-11206	Part No. :08191-14101, 08191-14102, 08191-14105, 08191-14106	
	Socket (female terminal)	Pin (male termial)	799-601-9210
	 BWP05003	 BWP05004	
	Part No. :08191-12201, 08191-12202, 08191-12205, 08191-12206	Part No. :08191-13101, 08191-13102, 08191-13105, 08191-13106	
18-14 (2)	Pin (male terminal)	Socket (female terminal)	799-601-9220
	 BWP05005	 BWP05006	
	Part No. :08191-21201, 08191-12202, 08191-21205, 08191-12206	Part No. :08191-24101, 08191-24102, 08191-24105, 08191-24106	
	Socket (female terminal)	Pin (male termial)	799-601-9220
	 BWP05007	 BWP05008	
	Part No. :08191-22201, 08191-22202, 08191-22205, 08191-22206	Part No. :08191-23101, 08191-23102, 08191-23105, 08191-23106	

9JS04904

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

No. of pins	DRC26 Series connector		
	Male pin (female housing)	Female pin (male housing)	T-adapter Part No.
60 -05※	 BJD14063	 BJD14064	799-601-4220 (Kit:799-601-4101)
	–	Part No. 08194-04104	
	※-05:Key position		
60 -06※			Socket Part No. 799-601-4390
	–	–	
	※-06:Key position		

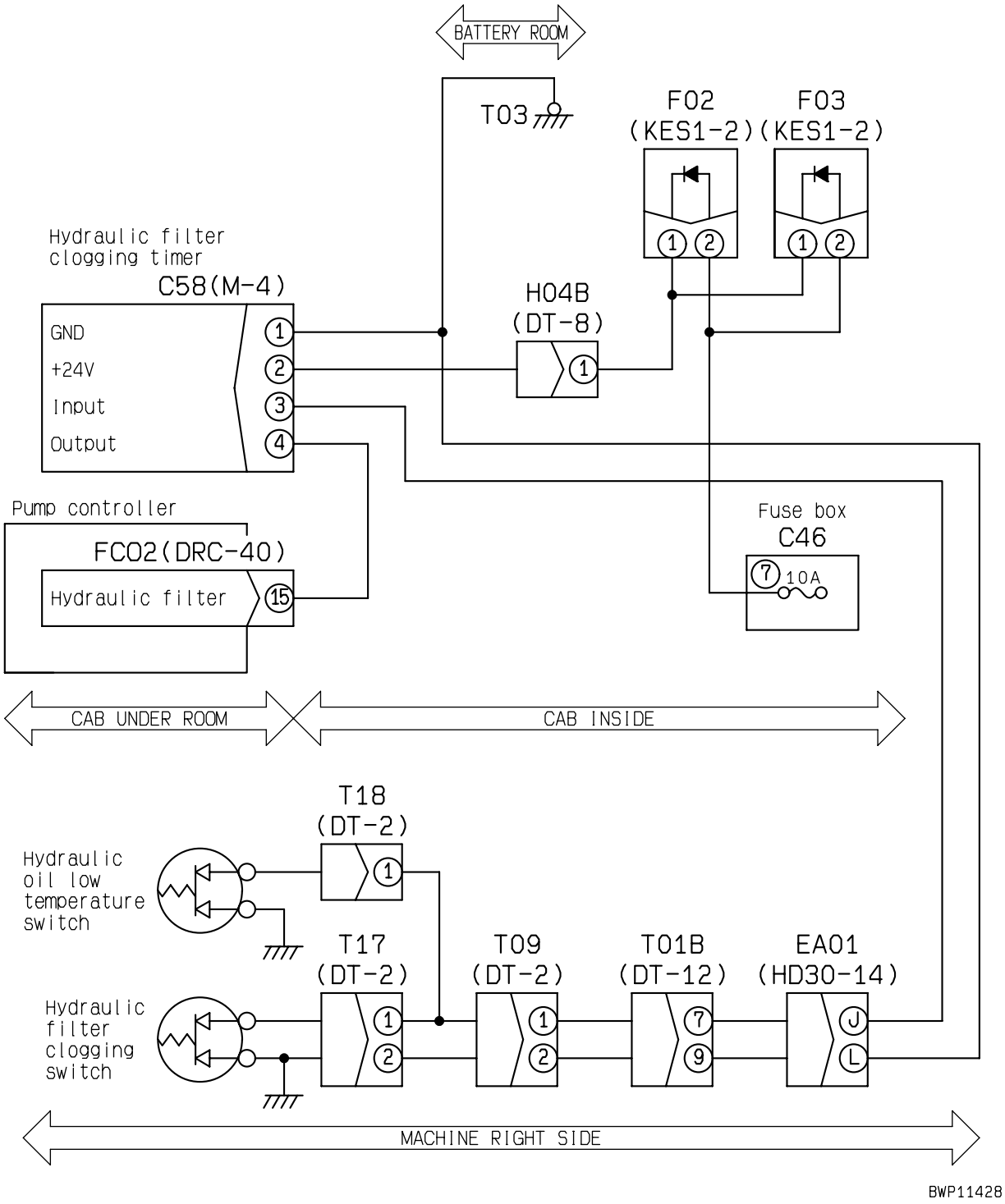
BJH13185

T- BRANCH BOX AND T- BRANCH ADAPTER TABLE (Rev. 2007.8)

★ The vertical column indicates a part number of T-branch box or T-branch adapter while the horizontal column indicates a part number of harness checker assembly.

Part No.	Part name	Number of pins	Identification symbol	T-adapter kit														Out of kit
				799-601-2500	799-601-2700	799-601-2800	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	799-601-4101	799-601-4201	
799-601-2600	T-box (for ECONO)	21		●		●		●	●		●							
799-601-3100	T-box (for MS)	37																●
799-601-3200	T-box (for MS)	37																●
799-601-3380	• Plate for MS (14-pin)																	●
799-601-3410	Adapter for BENDIX (MS)	24	MS-24P															●
799-601-3420	Adapter for BENDIX (MS)	24	MS-24P															●
799-601-3430	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3440	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3450	Adapter for BENDIX (MS)	5	MS-5P															●
799-601-3460	Adapter for BENDIX (MS)	10	MS-10P															●
799-601-3510	Adapter for BENDIX (MS)	5	MS-5S															●
799-601-3520	Adapter for BENDIX (MS)	17	MS-17P															●
799-601-3530	Adapter for BENDIX (MS)	19	MS-19P															●
799-601-2910	Adapter for BENDIX (MS)	14	MS-14P															●
799-601-3470	Case																	●
799-601-2710	Adapter for MIC	5	MIC-5P	●	●				●									
799-601-2720	Adapter for MIC	13	MIC-13P	●	●				●									
799-601-2730	Adapter for MIC	17	MIC-17P	●	●	●		●	●		●							
799-601-2740	Adapter for MIC	21	MIC-21P	●	●	●		●	●		●							
799-601-2950	Adapter for MIC	9	MIC-9P				●	●	●		●							
799-601-2750	Adapter for ECONO	2	ECONO2P	●	●													
799-601-2760	Adapter for ECONO	3	ECONO3P	●	●													
799-601-2770	Adapter for ECONO	4	ECONO4P	●	●													
799-601-2780	Adapter for ECONO	8	ECONO8P	●	●													
799-601-2790	Adapter for ECONO	12	ECONO12P	●	●													
799-601-2810	Adapter for DLI	8	DLI-8P	●	●													
799-601-2820	Adapter for DLI	12	DLI-12P	●	●													
799-601-2830	Adapter for DLI	16	DLI-16P	●	●													
799-601-2840	Extension cable (ECONO type)	12	ECONO12P	●	●				●									
799-601-2850	Case			●														
799-601-4350	T-box (for DRC 60, ECONO)	60														●		
799-601-4360	Case															●		
799-601-7010	Adapter for X (T-adapter)	1							●		●							
799-601-7020	Adapter for X	2	X2P				●	●	●		●							
799-601-7030	Adapter for X	3	X3P				●	●	●		●							
799-601-7040	Adapter for X	4	X4P				●	●	●		●							
799-601-7050	Adapter for SWP	6	SW6P				●	●	●									
799-601-7060	Adapter for SWP	8	SW8P				●	●	●									
799-601-7310	Adapter for SWP	12	SW12P															●
799-601-7070	Adapter for SWP	14	SW14P						●		●							
799-601-7320	Adapter for SWP	16	SW16P															●
799-601-7080	Adapter for M (T-adapter)	1							●		●							
799-601-7090	Adapter for M	2	M2P				●	●	●		●							
799-601-7110	Adapter for M	3	M3P				●	●	●		●							
799-601-7120	Adapter for M	4	M4P				●	●	●		●							

Related electrical circuit of hydraulic oil filter clogging switch and timer

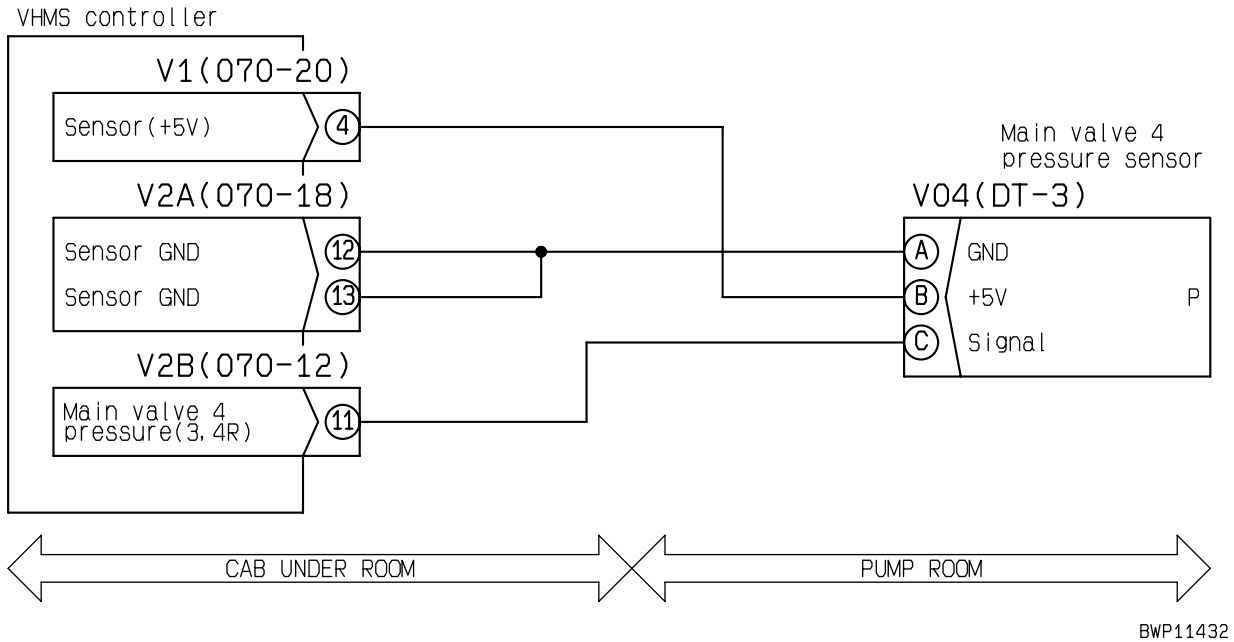


Failure Code 7@HDKA

Failure Code	Error Code	Failure Phenomenon	Break R. pump 3,4 press. sensor failure (VHMS controller system)
7@HDKA	—		
Failure Content	• Signal voltages of No. 3 and No. 4 rear pump pressure sensors dropped below 0.3V.		
Controller Reaction	• No action is taken.		
Phenomenon on Machine	• Pressures of No. 3 and 4 rear pumps cannot be monitored on the CGC monitor.		
Related Information	• Pressures of No. 3 and 4 rear pumps can be monitored on the CGC monitor. Monitoring screen : Real time monitor (4/6), PM clinic (5/6) & (6/6)		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Defective sensor 5V power system	Check if the failure code (DBB0KP) is displayed. If displayed, troubleshoot it.		
	2	Defective pressure sensors of No. 3 and 4 rear pumps (Internal defect)	★Turn off the starting switch for preparation, and turn it on or start the engine for troubleshooting.		
			V04	Voltage	
			Between Ⓑ and Ⓐ	4.5 – 5.5V	
			Between Ⓒ and Ⓐ	0.3 – 4.7V	
	3	Disconnection of wiring harness (Disconnection or defective contact of connector)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.		
			Wiring harnesses between V1 (female) ④ and V04 (female) Ⓑ	Resistance value	1Ω max.
			Wiring harnesses between V2B (female) ⑪ and V04 (female) Ⓒ	Resistance value	1Ω max.
	4	Short circuit with ground in wiring harness (Contact with GND circuit)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.		
			Wiring harness between V2B (female) ⑪ and V04 (female) Ⓒ and ground	Resistance value	1MΩ min.
	5	Defective VHMS controller	★Turn off the starting switch for preparation and turn it on or start the engine for troubleshooting.		
			V2A, V2B	Voltage	
			Between V2B⑪ and V2A⑫⑬	0.3 – 4.7V	

Circuit Diagram related to Pressure Sensors of No. 3 and 4 Rear Pumps



Failure Code aD00L2 or Error Code EA79

Failure Code	Error Code	Failure Phenomenon	R. common rail press. high (Rear engine controller system)
aD00L2	**EA79**		
Failure Content	• The signal circuit of the rear engine common rail pressure sensor detected a high pressure (Level 1).		
Controller Reaction	• Operate the machine by limiting the rear engine output.		
Phenomenon on Machine	• The rear engine output drops.		
Related Information	• The rear engine common rail pressure can be checked on the machine monitor and the CGC monitor. Monitoring code : 95 Monitoring screen : Real time monitor (2/6)		

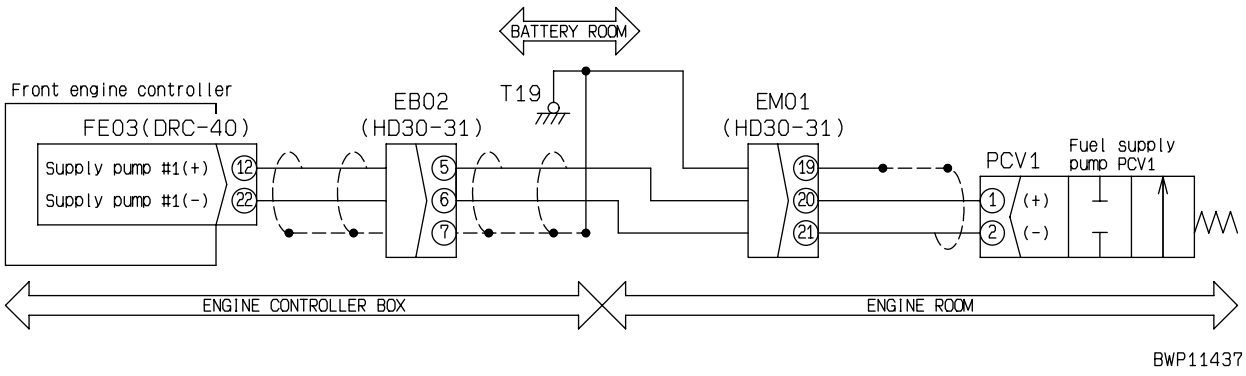
Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting
	1	Defective system concerned	Check if any failure code or error code is displayed. When any other code is displayed, troubleshoot it first.
	2	Use of improper fuel	The fuel in use is supposed to be improper. Check it directly.
	3	Defective electrical system of rear engine common rail pressure sensor	Troubleshoot Failure Code (dH40KX).
	4	Defective mechanical system of rear engine common rail pressure sensor	The common rail pressure sensor is supposed to be mechanically defective. Check it directly.
	5	Defective rear engine overflow valve	The spring, the seat and the ball of the overflow valve are supposed to be damaged, worn or adhered respectively. Check them directly.
	6	Clogging of rear engine overflow pipe	The overflow pipe is supposed to be clogged. Check it directly.
	7	Defective rear engine pressure limiter	The pressure limiter is supposed to be mechanically defective. Check it directly.

Failure Code AD11KB or Error Code E970

Failure Code	Error Code	Failure Phenomenon	F. PCV1 over current (Front engine controller system)
AD11KB	**E970**		
Failure Content	• Any abnormal current flew through the F. PCV1 (Front Engine Fuel Supply Pump No.1) circuit.		
Controller Reaction	• Stop outputting to the F. PCV1 circuit.		
Phenomenon on Machine	• F. PCV2 keeps controlling but the engine stops when the following failures occurred at the same time: ① Failure Code (AD51KA) (or) Error Code (E975) ② Failure Code (AD51KB) (or) Error Code (E971)		
Related Information	• For troubleshooting F. PVC1, the special adapter (799-601-9430) is necessary.		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	F. PCV1 is defective. (Internal disconnection)	★Turn off the starting switch for preparation, and troubleshoot while keeping it off.		
			PVC1 (Male)	Resistance value	
			Between ① and ②	2.3 – 5.3Ω	
			Between ① and ground	1MΩ min.	
	2	Short circuit with ground in wiring harness (Contact with GND circuit)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.		
			Wiring harnesses between FE03 (female) ⑫ and PCV1 (female) ①, and ground.	Resistance value	1MΩ min.
	3	Hot short-circuit of wiring harness (contact with 24V circuit)	★Turn off the starting switch for preparation and turn it on for troubleshooting.		
			Wiring harness between FE03 (female) ⑫ and PCV1 (female) ① and ground	Voltage	1V max.
			Wiring harness between FE01 (female) ㉒ and PCV1 (female) ② and ground	Voltage	1V max.
	4	Defective front engine controller	★Turn off the starting switch for preparation, and troubleshoot while keeping it off.		
			FE03 (Female)	Resistance value	
			Between ⑫ and ㉒	2.3 – 5.3Ω	
			Between ⑫㉒ and ground	1MΩ min.	

Circuit Diagram related to F. PCV1 (Front Engine Fuel Supply Pump No.1)



Failure Code aDAZKB or Error Code EA8A

Failure Code	Error Code	Failure Phenomenon	R. TWV#1,2,3 line short (rear engine controller system)
aDAZKB	**EA8A**		
Failure Content	• Abnormal current flew into R.TWV No. 1, 2, or 3 (injector No. 1, 2, or 3, respectively) circuit.		
Controller Reaction	• Stops output to the circuit of R.TWV No. 1, 2, or 3.		
Phenomenon on Machine	• Output from rear engine drops greatly.		
Related Information			

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Defective R.TWV No. 1 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN1 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	2	Defective R.TWV No. 2 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN2 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	3	Defective R.TWV No. 3 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN3 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	4	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Between harness (RE03 (female) ⑭ - CN1 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㉔ - CN1 (female) ②) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ⑥ - CN2 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ⑯ - CN2 (female) ②) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ⑤ - CN3 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ⑮ - CN3 (female) ②) and GND	Resistance	1MΩ min.
	5	Defective harness caused by hot-short-circuit (contact with 24V circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.		
			Between harness (RE03 (female) ⑭ - CN1 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㉔ - CN1 (female) ②) and GND	Voltage	1V max.
			Between harness (RE03 (female) ⑥ - CN2 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ⑯ - CN2 (female) ②) and GND	Voltage	1V max.
			Between harness (RE03 (female) ⑤ - CN3 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ⑮ - CN3 (female) ②) and GND	Voltage	1V max.

Failure Code aDDZKB or Error Code EA8b

Failure Code	Error Code	Failure Phenomenon	R. TWV#4,5,6 line short (rear engine controller system)
aDDZKB	**EA8b**		
Failure Content	• Abnormal current flew into R.TWV No. 4, 5, or 6 (injector No. 4, 5, or 6, respectively) circuit.		
Controller Reaction	• Stops output to the circuit of R.TWV No. 4, 5, or 6.		
Phenomenon on Machine	• Output from rear engine drops greatly.		
Related Information			

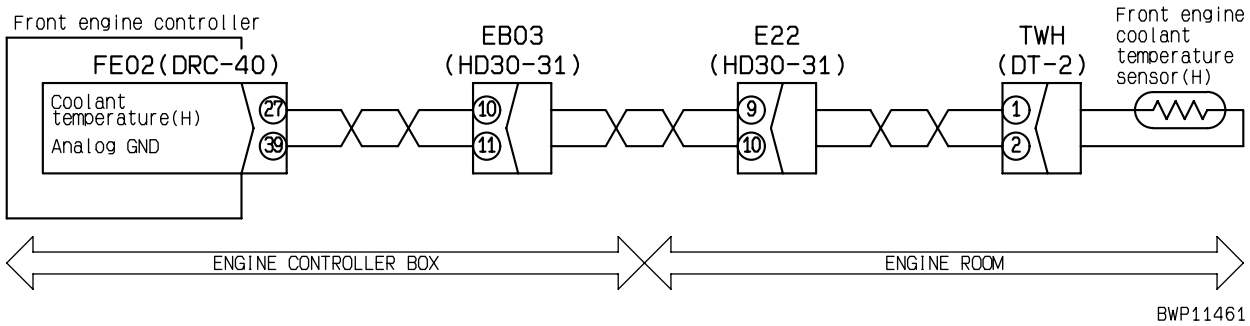
Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Defective R.TWV No. 4 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN4 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	2	Defective R.TWV No. 5 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN5 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	3	Defective R.TWV No. 6 (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			CN6 (male)	Resistance	
			① - ②	0.4 – 1.1Ω	
			①② - GND	1MΩ min.	
	4	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Between harness (RE03 (female) ㉖ - CN4 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㊱ - CN4 (female) ②) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㉞ - CN6 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㉝ - CN6 (female) ②) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㉕ - CN5 (female) ①) and GND	Resistance	1MΩ min.
			Between harness (RE03 (female) ㉟ - CN5 (female) ②) and GND	Resistance	1MΩ min.
	5	Defective harness caused by hot-short-circuit (contact with 24V circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.		
			Between harness (RE03 (female) ㉖ - CN4 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㊱ - CN4 (female) ②) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㉞ - CN6 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㉝ - CN6 (female) ②) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㉕ - CN5 (female) ①) and GND	Voltage	1V max.
			Between harness (RE03 (female) ㉟ - CN5 (female) ②) and GND	Voltage	1V max.

Failure Code B@BCNS or Error Code 108

Failure Code	Error Code	Failure Phenomenon	Abnormal F. coolant temp. (front engine controller system)
B@BCNS	**108**		
Failure Content	• Signal circuit of front engine coolant high-temperature sensor detected 105°C or higher.		
Controller Reaction	• Displays Abnormality screen (red) on the CGC monitor, warning operator of abnormality.		
Phenomenon on Machine	• If the machine is run with the abnormality unfixed, front engine may be damaged.		
Related Information	• Front engine coolant temperature can be monitored on the machine monitor or CGC monitor. Monitoring code: 77 Monitoring screen: PM Clinic (1/6)		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Overheated front engine (when system is normal)	Check front engine cooling system; if abnormal, correct it.		
	2	Defective front engine coolant high-temperature sensor system	Diagnose according to "Abnormal reading of engine coolant thermometer displayed on machine monitor" in E mode.		
	3	Defective front engine controller	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			FE02 (female)	F. engine coolant temperature	Resistance
			㉗ - ㊴	105°C	About 3.28kΩ

Circuit diagram for front engine coolant high-temperature sensor

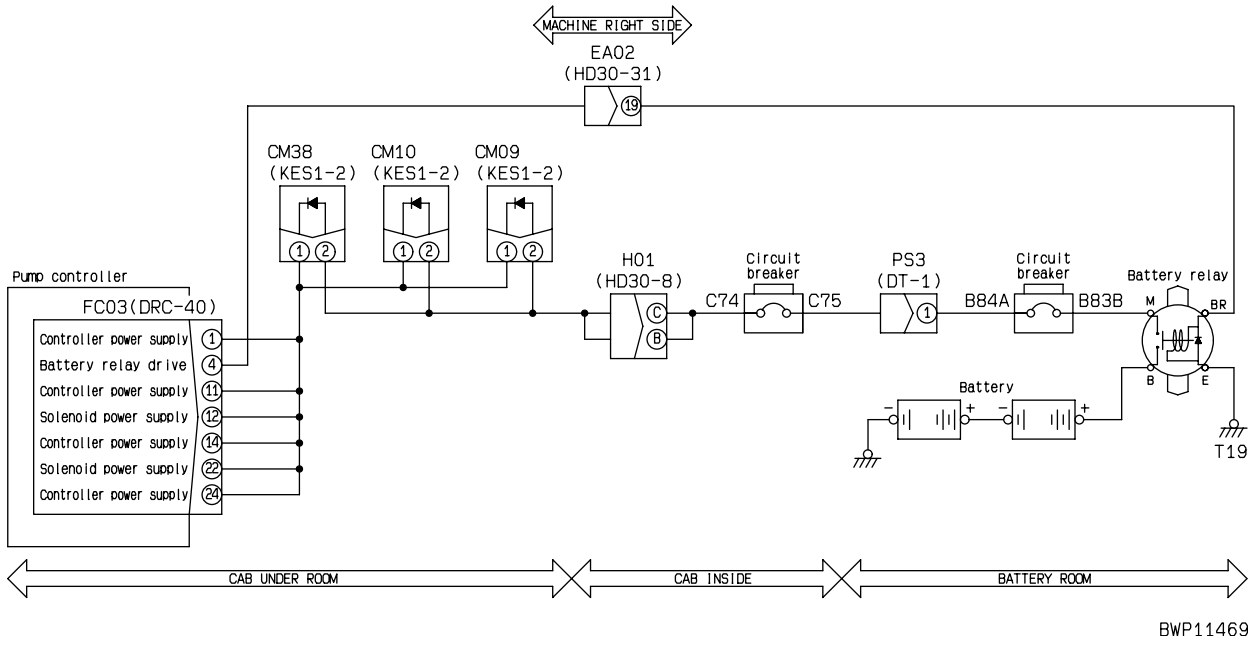


Failure Code D110KB

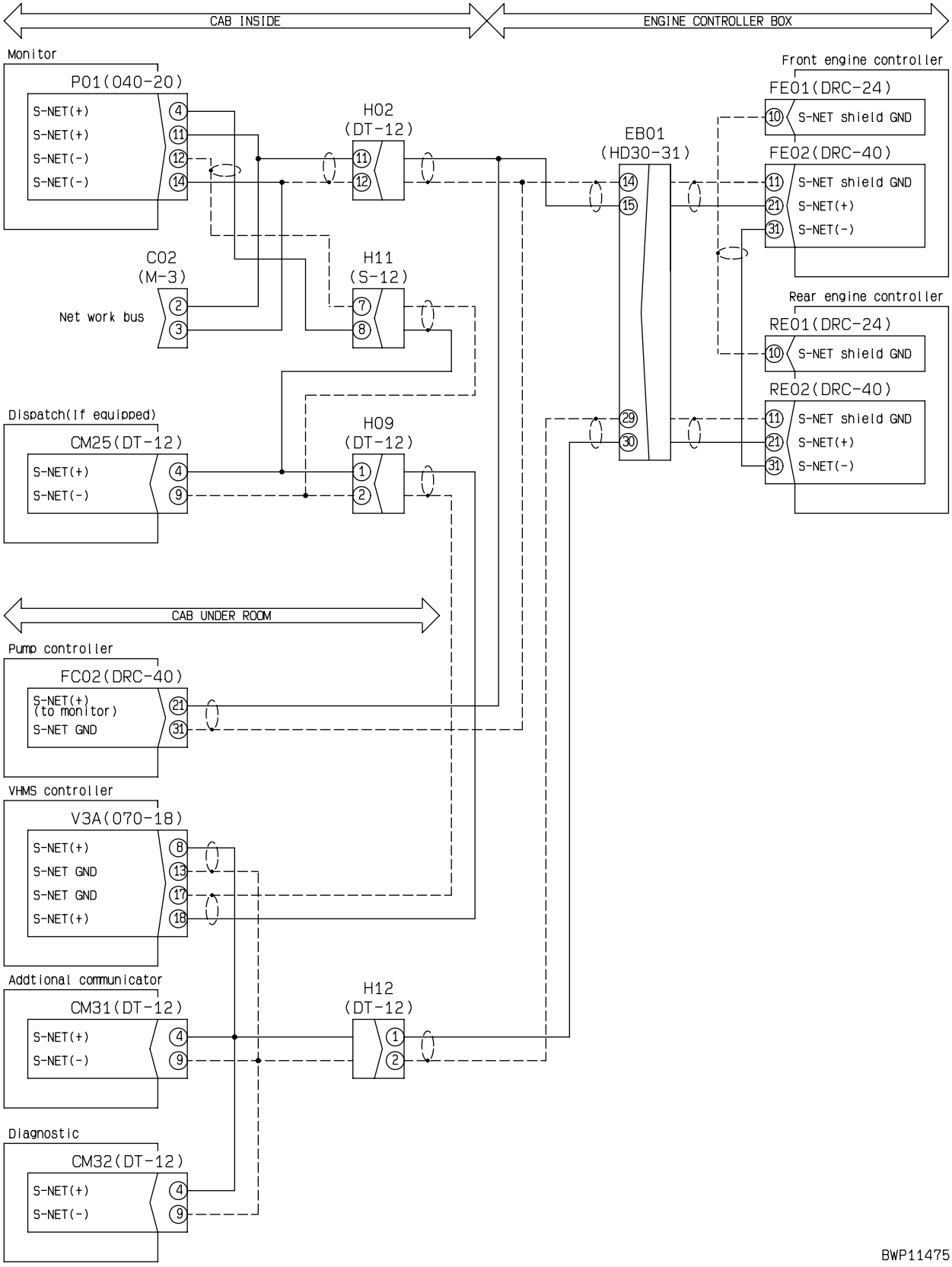
Failure Code	Error Code	Failure Phenomenon	Short in F. battery relay drive sys. (pump controller system)
D110KB	—		
Failure Content	• Feedback voltage (controller's source voltage) dropped to 5.7 V or lower during output to battery-relay drive circuit.		
Controller Reaction	• Stops output to battery-relay drive circuit.		
Phenomenon on Machine	• Data may not be written into each controller normally.		
Related Information	• Operational status of battery relay can be monitored on the machine monitor. Monitoring code: 23		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Defective battery relay (internal disconnection, short circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Battery relay	Continuity, resistance	
			Terminal BR - terminal E	Continued	
			Terminal BR - GND	1MΩ min.	
	2	Defective harness caused by disconnection (disconnection, defective contact of connector)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Harness (FC03 (female) ④ - terminal BR of battery relay)	Resistance	1Ω max.
	3	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Between harness (FC03 (female) ④ - terminal BR of battery relay) and GND	Resistance	1MΩ min.
	4	Defective pump controller	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON or OFF.		
			FC03	Starting switch	Voltage
			④ - GND	When ON	1V max.
				When ON to OFF	20 – 30V (for a few seconds)

Circuit diagram for battery-relay drive



Related electrical circuit of S-NET communication

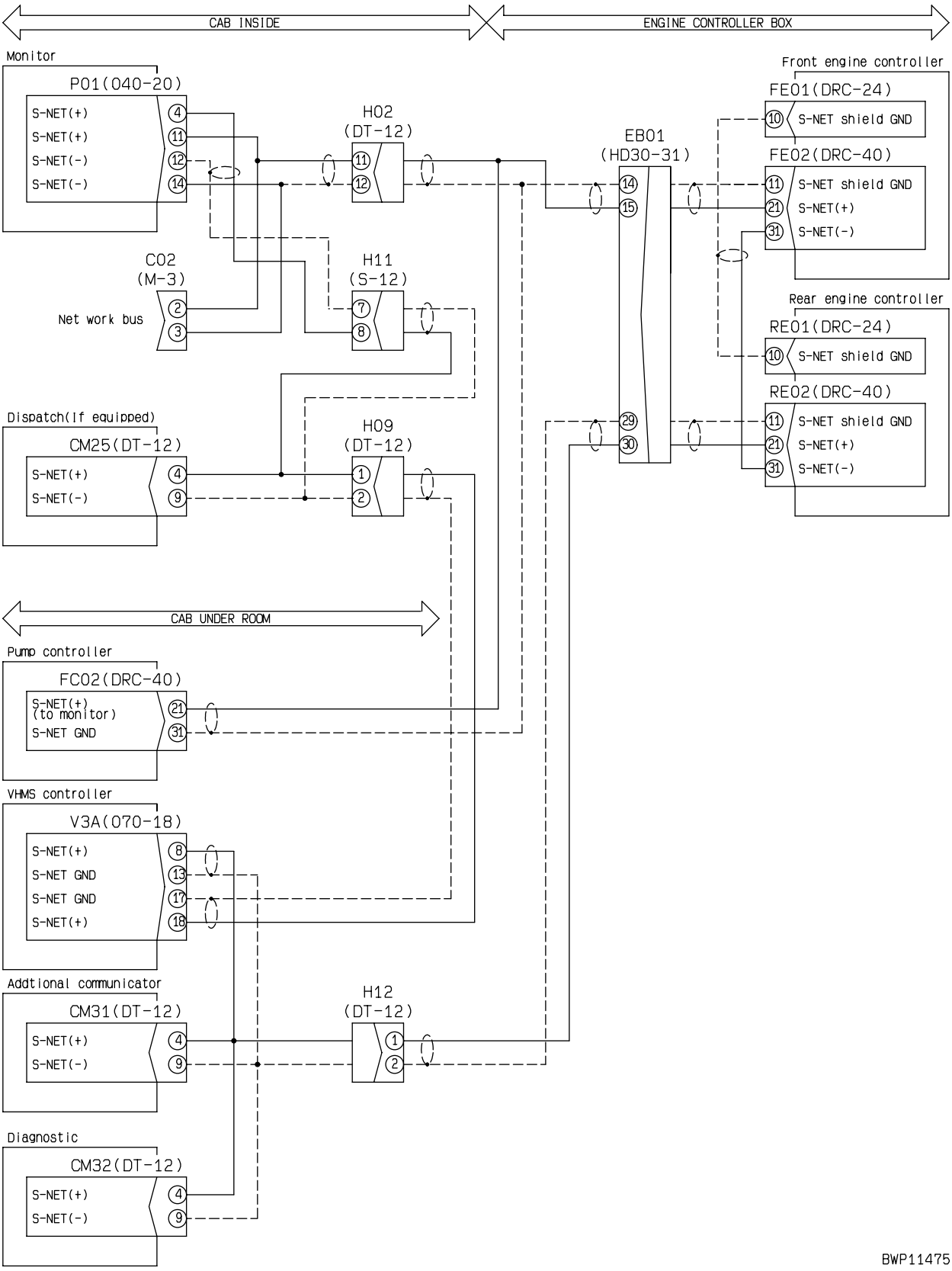


Failure Code dB22KK or Error Code EA56

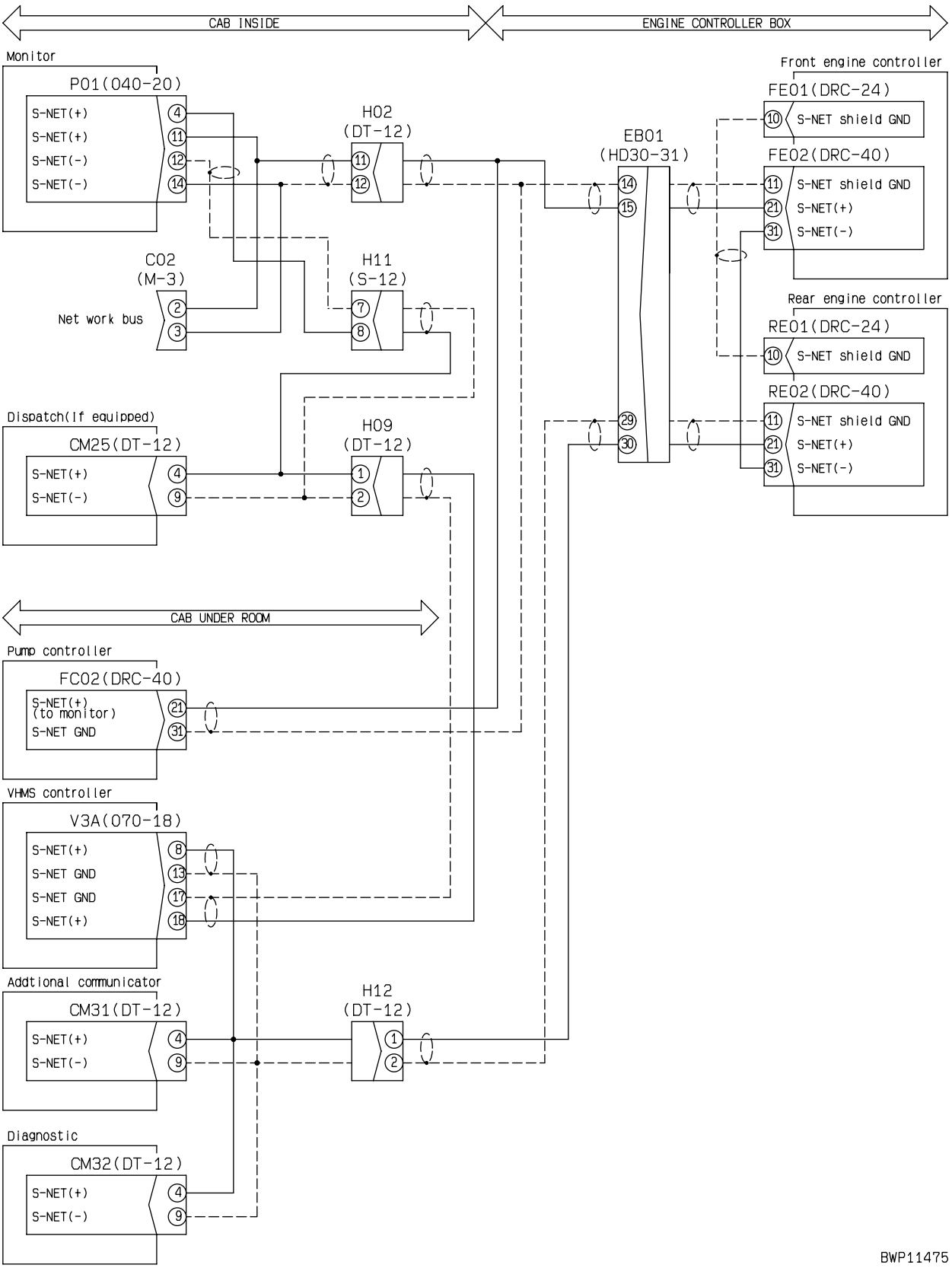
Failure Code	Error Code	Failure Phenomenon	R. engine power failure (1) (rear engine controller system)
dB22KK	**EA56**		
Failure Content	• Load source voltage of rear engine controller dropped to 10 V or lower when Starting switch is ON.		
Controller Reaction	• No response in particular		
Phenomenon on Machine			
Related Information			

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	Defective circuit breaker	If circuit breaker has been shut-down, a circuit is likely to be defective caused by grounding, etc. (refer to possible cause 4).		
	2	Defective load power-source relay of rear engine controller	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Try to replace the right-side relay with another; if engine becomes normal, load power-source relay of engine controller is defective.		CM12
	3	Defective harness caused by disconnection (disconnection, defective contact of connector)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Harness (RE03 (female) ①②㉑ - CM13 (female) ⑤)	Resistance	1Ω max.
			Harness (CM13 (female) ③ - CM21)	Resistance	1Ω max.
			Harness (CM13 (female) ① - branched point of circuit)	Resistance	1Ω max.
			Harness (CM13 (female) ② - branched point of circuit)	Resistance	1Ω max.
	4	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
			Between harness (RE03 (female) ①②㉑ - CM13 (female) ⑤) and GND	Resistance	1MΩ min.
			Between harness (CM13 (female) ③ - CM21) and GND	Resistance	1MΩ min.
			Between harness (CM13 (female) ① - branched point of circuit) and GND	Resistance	1MΩ min.
	5	Defective rear engine controller	★Prepare by turning Starting switch OFF, and diagnose with the switch turned OFF or ON.		
			RE03	Starting switch	Voltage
			①②㉑ - GND	When OFF	1V max.
				When ON	20 – 30V

Related electrical circuit of S-NET communication



Related electrical circuit of S-NET communication



Failure Code dDE2L6 or Error Code EA36

Failure Code	Error Code	Failure Phenomenon	R. engine oil press. sw. error (rear engine controller system)
dDE2L6	**EA36**		
Failure Content	• Signal circuit of low-pressure switch closed (connected to GND) and that of high-pressure switch opened (disconnected from GND) when rear engine is running at 600 rpm or more. • Signal circuit of low-pressure switch opened (disconnected from GND) when rear engine was stopped (start signal = OFF). • Signal circuit of high-pressure switch opened (disconnected from GND) when rear engine was stopped (start signal = OFF).		
Controller Reaction	• No response in particular		
Phenomenon on Machine			
Related Information	• Oil-pressure of rear engine can be monitored on the machine monitor. Monitoring screen: PM Clinic (1/6)		

Possible Cause and Standard value

	Cause	Standard value, Remarks for Troubleshooting		
1	Defective rear-engine oil low-pressure switch	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF or engine started.		
		PSL	Engine	Resistance
		Terminal - GND	Stop	1Ω max.
			Low idling	1MΩ min.
2	Defective rear-engine oil high-pressure switch	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF or engine started.		
		PSH	Engine	Resistance
		Terminal - GND	Stop	1Ω max.
			1,300 rpm min.	1MΩ min.
3	Defective harness caused by disconnection (disconnection, defective contact of connector)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
		Harness (RE01 (female) ㉑ - PSL)	Resistance	1Ω max.
		Harness (RE01 (female) ⑮ - PSH)	Resistance	1Ω max.
4	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
		Between harness (RE01 (female) ㉑ - PSL) and GND	Resistance	1MΩ min.
		Between harness (RE01 (female) ⑮ - PSH) and GND	Resistance	1MΩ min.
5	Defective rear engine controller	★Prepare by turning Starting switch OFF, and diagnose with the switch ON or engine started.		
		RE01	Engine	Voltage
		㉑ - GND (low-pressure switch signal)	Stop	1V max.
			Low idling	20 – 30V
		⑮ - GND (high-pressure switch signal)	Stop	1V max.
			1,300 rpm min.	20 – 30V
		If you diagnose while engine is running, do it more than 15 seconds after engine was started.		

Failure Code dGT4KB

Failure Code	Error Code	Failure Phenomenon	Exhaust temp. sensor R-F failure (VHMS controller system)
dGT4KB	**—**		
Failure Content	• Signal voltage of front exhaust temperature sensor of rear engine rose to 4.9 V or higher.		
Controller Reaction	• No response in particular		
Phenomenon on Machine	• Front exhaust temperature of rear engine cannot be monitored on CGC monitor.		
Related Information	• Rear exhaust temperature of front engine can be monitored on CGC monitor. Monitoring screen: PM Clinic (3/6)		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting			
	1	Defective 24 V power-source system of sensor	Check if a failure code [DBB0KP] is displayed; if either is, diagnose according to it.			
	2	Defective front exhaust temperature sensor of rear engine (internal short-circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.			
			P30.1 (male)	Resistance		
			① - ②			
			①② - GND	1MΩ min.		
	3	Defective amplifier for front-side exhaust temperature sensor of rear engine (internal defect)	★Prepare by turning Starting switch OFF, and diagnose with the switch ON or engine started.			
			B59.1	Voltage		
			Ⓐ - Ⓒ	20 – 30V		
			Ⓑ - Ⓒ	0.3 – 4.7V		
	4	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.			
			Between harness (P28.1 (female) ① - P30.1 (female) ①) and GND	Resistance	1MΩ min.	
	5	Defective harness caused by hot-short-circuit (contact with 24V circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.			
			Harness (V2A (female) ⑯ - B59.1 (female) Ⓑ) and GND	Voltage	1V max.	
	6	Defective VHMS controller	★Prepare by turning Starting switch OFF, and diagnose with the switch ON or engine started.			
			V2A	Voltage		
			⑯ - ⑫⑬	0.3 – 4.7V		

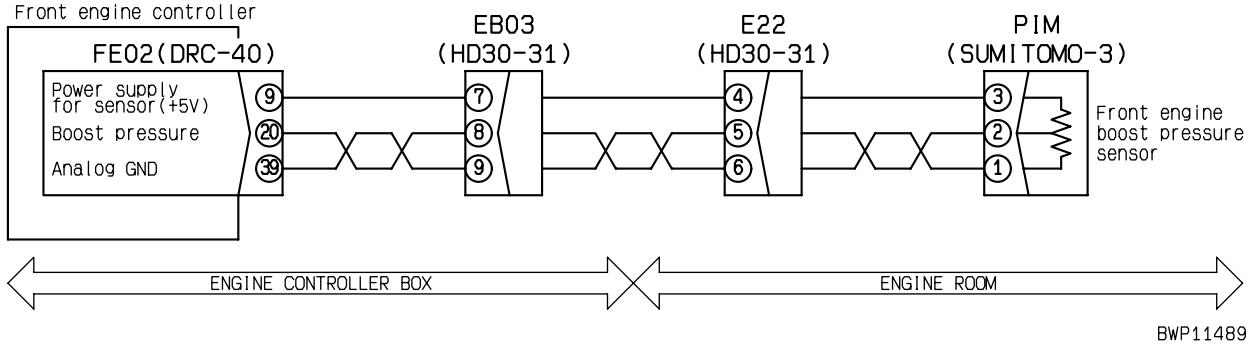
Failure Code DH30KX or Error Code E93C

Failure Code	Error Code	Failure Phenomenon	F. engine boost press. sensor error (front engine controller system)
DH30KX	**E93C**		
Failure Content	• Signal voltage of front engine boost-pressure sensor dropped to 0.5 V or lower or rose to 4.5 V or higher.		
Controller Reaction	• No response in particular		
Phenomenon on Machine	• Front engine boost-pressure cannot be monitored on machine monitor or CGC monitor.		
Related Information	• Diagnosing boost-pressure sensor requires a special adapter (799-601-9420). • Front engine boost-pressure can be monitored on machine monitor or CGC monitor. Monitoring code: 76 Monitoring screen: PM Clinic (2/6)		

Possible Cause and Standard value

	Cause	Standard value, Remarks for Troubleshooting		
1	Defective front engine boost-pressure sensor (internal defect)	★Prepare by turning Starting switch OFF, and diagnose with the switch ON.		
		PIM	Resistance	
		③ - ①	4.6 – 5.4V	
		② - ①	0.5 – 4.5V	
2	Defective harness caused by disconnection (disconnection, defective contact of connector)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
		Harness (FE02 (female) ⑨ - PIM (female) ③)	Resistance	1Ω max.
		Harness (FE02 (female) ⑳ - PIM (female) ②)	Resistance	1Ω max.
		Harness (FE02 (female) ㊴ - PIM (female) ①)	Resistance	1Ω max.
3	Defective harness caused by grounding (contact with GND circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch OFF.		
		Between harness (FE02 (female) ⑨ - PIM (female) ③) and GND	Resistance	1MΩ min.
		Between harness (FE02 (female) ⑳ - PIM (female) ②) and GND	Resistance	1MΩ min.
4	Defective harness caused by hot-short-circuit (contact with 24V circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.		
		Harness (FE02 (female) ⑳ - PIM (female) ②) and GND	Voltage	1V max.
5	Defective front engine controller	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.		
		FE02	Voltage	
		⑨ - ㊴	4.6 – 5.4V	
		⑳ - ㊴	0.5 – 4.5V	

Related electrical circuit of front engine boost pressure sensor

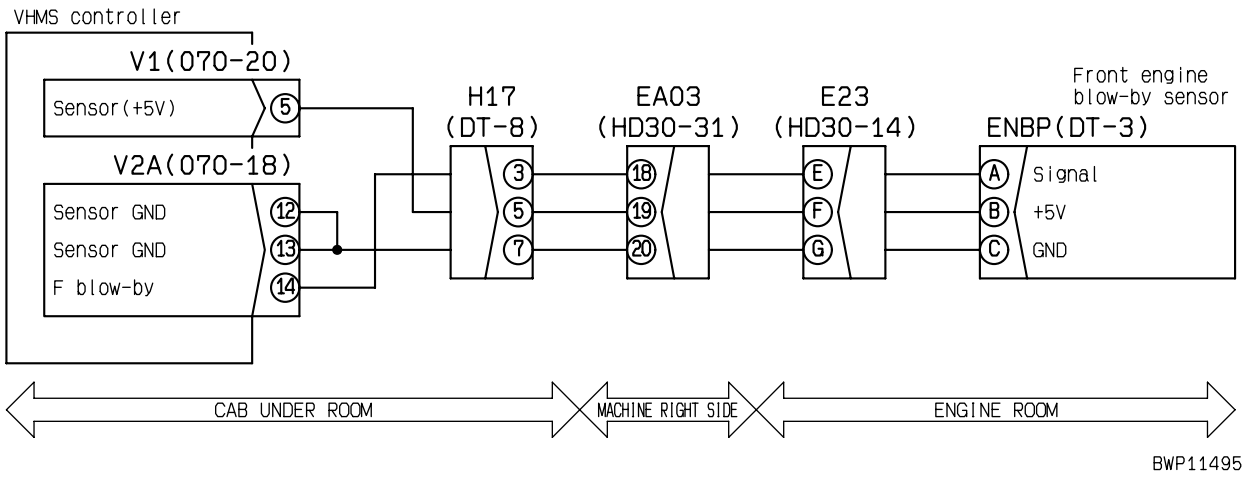


Failure Code DHE5KY

Failure Code	Error Code	Failure Phenomenon	F. engine blowby Press. sensor failure (VHMS controller system)
DHE5KY	—		
Failure Content	• Signal voltage of front engine blow-by pressure sensor rose to 4.7 V or higher.		
Controller Reaction	• No response in particular		
Phenomenon on Machine	• Front engine blow-by pressure cannot be monitored on CGC monitor.		
Related Information	• Front engine blow-by pressure can be monitored on CGC monitor. Monitoring screen: PM Clinic (2/6)		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting			
	1	Defective 5 V power-source system of sensor	Check if a failure code [DBB0KP] is displayed; if either is, diagnose according to it.			
	2	Defective front engine blow-by pressure sensor (internal defect)	★Prepare by turning Starting switch OFF, and diagnose with the switch ON or engine started.			
			ENBP	Voltage		
			Ⓑ - Ⓒ	4.5 – 5.5V		
			Ⓐ - Ⓒ	0.1 – 4.7V		
	3	Defective front engine blow-by pressure sensor (external defect)	Since oil, dust, water, etc. may be sticking to the sensor, check and clean the sensor. For details, see TESTING AND ADJUSTING.			
	4	Defective front engine blow-by pressure sensor (defect installation)	Since installation of the sensor may be defective, check and correct it. For details, see TESTING AND ADJUSTING.			
	5	Defective harness caused by hot-short-circuit (contact with 24V circuit)	★Prepare by turning Starting switch OFF, and diagnose with the switch turned ON.			
			Between harness (V2A (female) ⑭ - ENBP (female) Ⓐ) and GND	Voltage	1V max.	
	6	Defective VHMS controller	★Prepare by turning Starting switch OFF, and diagnose with the switch ON or engine started.			
			V2A	Voltage		
			⑭ - ⑫⑬	0.1 – 4.7V		

Circuit diagram for front engine blow-by pressure sensor



Failure Code DPA0KR

Failure Code	Error Code	Failure Phenomenon	Monitor network overtime error (entire S-NET communication system)
DPA0KR	—		
Failure Content	• Abnormality occurred in the entire S-NET communication system.		
Controller Reaction	• Displays Abnormality screen (red) on the CGC monitor, warning operator of abnormality.		
Phenomenon on Machine	• Machine may not run normally.		
Related Information	• Status of connection for communication on S-NET can be monitored on the machine monitor. Monitoring code: 08		

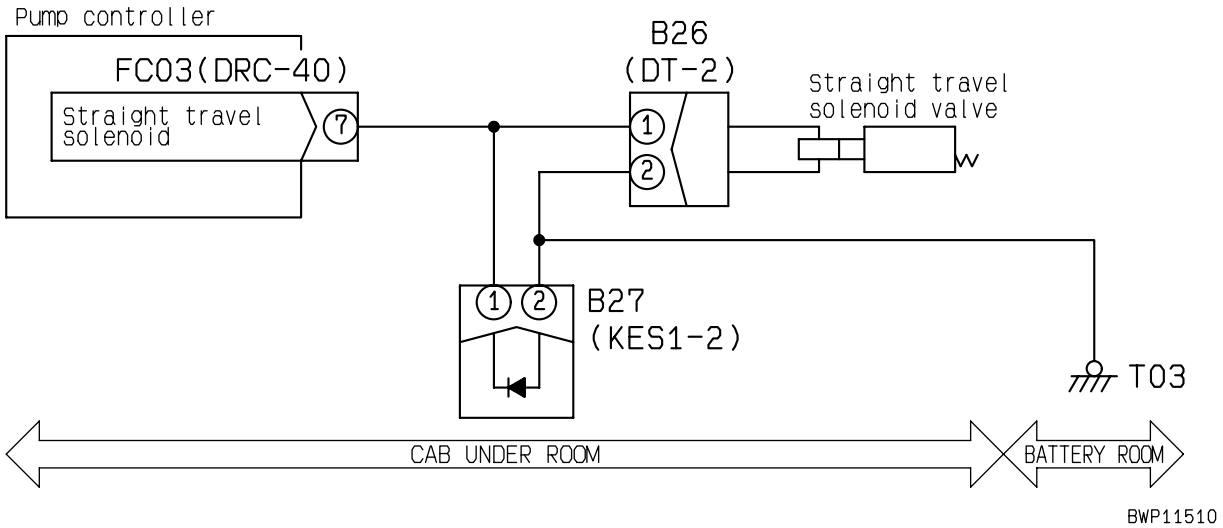
Possible Cause and Standard value	Cause		Standard value, Remarks for Troubleshooting
	1	Defective communication on S-NET of pump controller system	Diagnose according to "Failure code [DA2SKA]".
	2	Defective communication on S-NET of pump controller system	Diagnose according to "Failure code [DAB0KR] or error code [118]".
	3	Defective communication on S-NET of front engine controller system	Diagnose according to "Failure code [DB2SMC] or error code [E955]".
	4	Defective communication on S-NET of rear engine controller system	Diagnose according to "Failure code [dB2SMC] or error code [EA55]".
	5	Defective communication on S-NET of VHMS controller system	Diagnose according to "Failure code [DBB0KR] or error code [116]".

Failure Code DW91KA

Failure Code	Error Code	Failure Phenomenon	Break in straight travel sol. sys. (Pump Controller System)
DW91KA	—		
Failure Content	• No current flows at the time of output to the straight-travel solenoid circuit.		
Controller Reaction	• No action is taken. (No current flows and the solenoid does not work.)		
Phenomenon on Machine	• Some travel deviation may occur when travel and work equipment or swing are operated at the same time.		
Related Information	• The operating state of the straight-travel solenoid can be monitored on the machine monitor. Monitoring code : 23		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting			
	1	Defective straight-travel solenoid (Internal disconnection)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.			
			B26 (Male)	Resistance value		
			Between ① and ②	20 – 60Ω		
	2	Disconnection of wiring harness (Disconnection, defective contact of connector)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.			
			Wiring harnesses between FC03 (female) ⑦ and B26 (female) ①	Resistance value	1Ω max.	
			Wiring harnesses between B26 (female) ② and ground	Resistance value	1Ω max.	
	3	Defective pump controller	★Turn off the starting switch for preparation and troubleshoot while keeping it off.			
			FC03 (female)	Resistance value		
			Between ⑦ and ground	20 – 60Ω		

Circuit Diagram related to Straight-travel Solenoid



Failure Code dXA0KB

Failure Code	Error Code	Failure Phenomenon	Short in R. TVC sol. sys. (Pump controller system)
dXA0KB	—		
Failure Content	• Some abnormal current flew to the rear TVC solenoid circuit.		
Controller Reaction	• Stop outputting to the rear TVC solenoid circuit.		
Phenomenon on Machine	• Abnormality (red) is displayed on the CGC monitor to warn the operator of abnormality. • The engine speed drops as the load increases, and the engine comes to stop some times.		
Related Information	• The output state of the rear TVC solenoid can be monitored on the machine monitor and the CGC monitor. Monitoring code : 14 Monitoring screen : Real time monitor (2/6) & (4/6)		

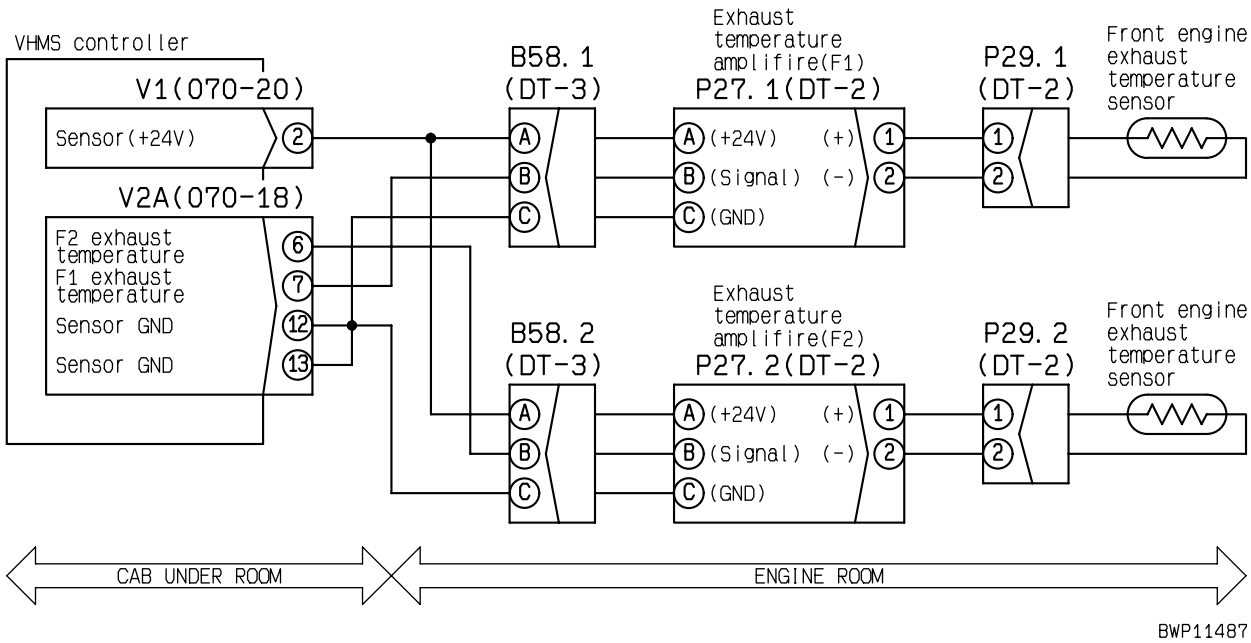
Possible Cause and Standard value	Cause		Standard value, Remarks for Troubleshooting			
	1	Defective rear TVC solenoid (Internal short-circuit, ground failure)	★Turn off the starting switch for preparation, and troubleshoot while keeping it off.			
			P04 (Male)		Resistance value	
			Between ① and ②		10 – 22Ω	
			Between ① and ground		1MΩ min.	
	2	Defective pump drive switch in an emergency (Internal short-circuit)	★Turn off the starting switch for preparation, and troubleshoot while keeping it off.			
			B07 (male)	Pump drive switch	Resistance value	
			Between ⑦ and ⑩	OFF	1MΩ min.	
	3	Short circuit with ground in wiring harness (Contact with GND circuit)	★Turn off the starting switch for preparation and troubleshoot while keeping it off.			
			Wiring harnesses between FC03 (female) ⑯ and B07 (female) ⑦, and ground		Resistance value	1MΩ min.
			Wiring harnesses between B07 (female) ⑨ and P04 (female) ①, and ground		Resistance value	1MΩ min.
	4	Defective pump controller	★Turn off the starting switch for preparation and troubleshoot while keeping it off.			
			FC03 (female)		Resistance value	
			Between ⑯ and ⑬		10 – 22Ω	
			Between ⑯ and ground		1MΩ min.	

Failure Code F@BZNS

Failure Code	Error Code	Failure Phenomenon	High F-R cyl. exhaust temp. 1 (VHMS Controller System)
F@BZNS	—		
Failure Content	• The signal circuit of the exhaust gas temperature sensor in rear of the front engine detected exhaust gas temperatures over the limit line 1 for more than 10 seconds. (Exhaust gas temperature limit line 1 : A straight line between 700°C at the rated output speed or more and 750°C at the maximum torque speed or more)		
Controller Reaction	• No action is taken.		
Phenomenon on Machine	• The front engine will probably be damaged if used continuously as it is.		
Related Information	• Front engine rear exhaust gas temperatures can be monitored on the CGC monitor. Monitoring screen : PM clinic (2/6)		

Possible Cause and Standard value		Cause	Standard value, Remarks for Troubleshooting		
	1	The font engine exhaust gas temperature rises abnormally (when the system is normal).	Check the front engine, and repair it if it is out of order.		
	2	Defective exhaust gas temperature sensor system in rear of front engine	Check if the failure code (DGT5KA) is displayed. Troubleshoot it if displayed.		
			Check if the failure code (DHT5KB) is displayed. Troubleshoot it if displayed.		
	3	Defective VHMS controller	★Turn off the starting switch for preparation and start the engine for troubleshooting.		
			V2A	Exhaust gas temperature	Voltage
			Between ⑥ and ⑫⑬	700 – 800°C	3.89 – 4.31V

Circuit Diagram related to Front Engine Exhaust Gas Temperature Sensor (Front Side, Rear Side)



E-1 Engine doesn't start up

Nature of trouble (1)	• Both the front and rear engines don't start up
Relevant information	• When the "Machine monitor doesn't come on" or "MDC (multiple display and control) does not display" as the starting switch is turned ON, failure in the main power system is suspected. Check this system.

Possible cause and Standard value

	Cause	Standard value, Remarks for Troubleshooting		
1	Failure on the fuse/ circuit breaker	When the fuse is burnt out or the circuit breaker is shut down, troubles such as ground failure must be present on the circuit (see the cause 10).		
2	Low battery	★Prepare by turning the starting switch off and then start troubleshooting with the switch been turned off.		
		Battery voltage	Specific gravity of battery	
		24 V min.	1.26 min.	
3	Failure on starting switch (internal disconnection)	★Prepare by turning the starting switch off and then start troubleshooting with the switch been turned off or engine started.		
		C04	Starting switch	Resistance value
		Across pin B and pin C	When turned off	1 MΩ min.
			When turned START	1 Ω max.
4	Failure on engine-stop relay	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.		
		If you can start up the engine by swapping the right side relay with another one, a failure exists on the engine stop relay.		C62
				C63
5	Failure on the starting switch R1 signal canceling relay (internal disconnection)	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.		
		If you can start up the engine by swapping the right side relay with another one, a failure exists on the starting switch R1 signal canceling relay.		C60
6	Failure on the engine-stop switch of the catwalk (internal short circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch been turned off.		
		P22 (male)	Stop switch	Resistance value
		Across ① and ②	When turned off (in operation)	1 MΩ min.
			When turned ON (stopped)	1 Ω max.
7	Failure on the engine-stop switch in the engine room (internal short circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch been turned off.		
		P22 (male)	Stop switch	Resistance value
		Across ① and ②	When turned off (in operation)	1 MΩ min.
			When turned ON (stopped)	1 Ω max.
8	Failure on the engine-selection relay (internal disconnection)	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.		
		If you can start up the engine by swapping the right side relay with another one, a failure exists on the engine-selection relay.		C59

Nature of trouble (2)	• Cancellation of the boom shock-less function is not available
Relevant information	

Possible cause and Standard value	Cause		Standard value, Remarks for Troubleshooting			
	1	Failure on the boom shock-less switch (internal short circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
			C22 (male)	Switch	Resistance value	
			Across ① and ③	When turned off	1 MΩ min.	
				When turned ON	1 Ω max.	
	2	Failure on the boom shock-less relay (internal short circuit)	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.			
			If you can restore the normal operation by swapping the right side relay with another one, a failure exists on the boom shock-less relay.			C51
	3	Failure on the boom shock-less solenoid (internal disconnection/short circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
			B13 (male), B15 (male)	Resistance value		
			Across ① and ②	20 – 30 Ω		
			Across ① and ground	1 MΩ min.		
	4	Hot short on the wiring harness (contact with 24V circuit)	★Prepare by turning the starting switch off and then start troubleshooting by turning the switch on.			
			Across the wiring harness and ground between C51 (female) ⑤ and B13 (female) ①, B15 (female) ① and B14 (female) ①		Voltage	1 V max.
			Across the wiring harness and ground between C22 (female) ③ and C51 (female) ①		Voltage	1 V max.

Nature of trouble (5)	• Rear engine air cleaner clogging monitor flashes
Relevant information	• If clogging occurs on the rear engine air cleaner, the CGC monitor also displays the trouble (yellow screen).

Possible cause and Standard value	Cause		Standard value, Remarks for Troubleshooting
	1	Failure in the rear engine air cleaner pressure switch system	Check the display on the CGC monitor, too, to implement the troubleshooting procedures applicable to the failure code [**aA10NX**].
	2	Failure on the machine monitor	If the above cause is innocent, there must be a failure on the machine monitor.

Nature of trouble (6)	• Hydraulic oil filter clogging monitor flashes
Relevant information	• If clogging occurs on the hydraulic oil filter, the CGC monitor also displays the trouble (red screen).

Possible cause and Standard value	Cause		Standard value, Remarks for Troubleshooting
	1	Failure in the hydraulic oil clogging detection system	Check the display on the CGC monitor, too, to implement the troubleshooting procedures applicable to the failure code [**6014NX**].
	2	Failure on the machine monitor	If the above cause is innocent, there must be a failure on the machine monitor.

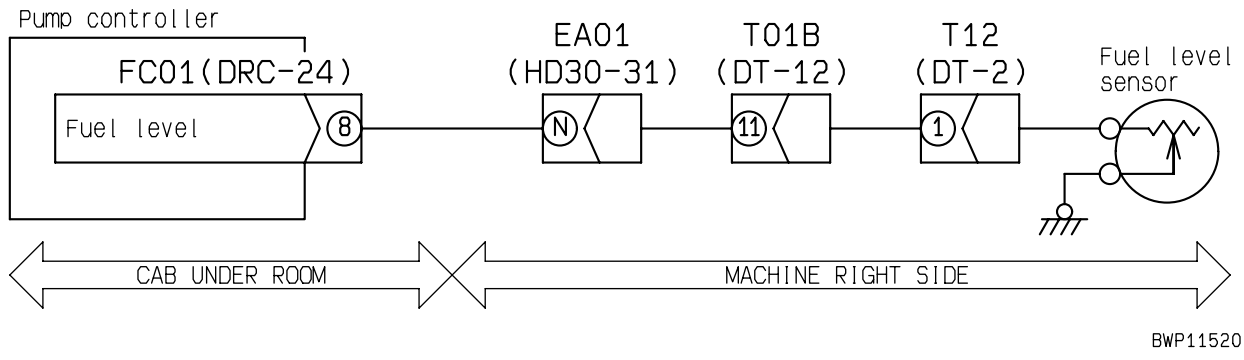
E-17 Display of fuel gauge is not correct

Nature of trouble	• Display of the fuel gauge is not correct
Relevant information	• Signal from the fuel level sensor is received from the pump controller.

Possible cause and Standard value

Cause		Standard value, Remarks for Troubleshooting			
1	Failure on the fuel level sensor (internal disconnection/ short circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
		T12 (male)	Remaining fuel volume	Resistance value	
		Across ① and sensor body	Filled up with fuel	Approximately 12 Ω max.	
			Vacant	Approximately 85 to 110 Ω	
2	Disconnection in the wiring harness (disconnection/improper connector contact)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
		Across the wiring harnesses between FC01 (female) ⑧ and T12 (female) ①		Resistance value	1 Ω max.
3	Ground failure in the wiring harness (contact with GND circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
		Across the wiring harness and ground between FC01 (female) ⑧ and T12 (female) ①		Resistance value	1 MΩ min.
4	Hot short in the wiring harness (contact with 24V circuit)	★Prepare by turning the starting switch off and then start troubleshooting by turning the switch on.			
		Across the wiring harness and ground between FC01 (female) ⑧ and T12 (female) ①		Voltage	1 V max.
5	Failure on the pump controller	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
		FC01 (female)	Remaining fuel volume	Resistance value	
		Across ⑧ and ground	Filled up with fuel	Approximately 12 Ω max.	
			Vacant	Approximately 85 to 110 Ω	
6	Failure on the machine monitor	If potential causes 1 to 5 are innocent, there must be a failure on the machine monitor.			

Circuit diagram relevant to the fuel level sensor

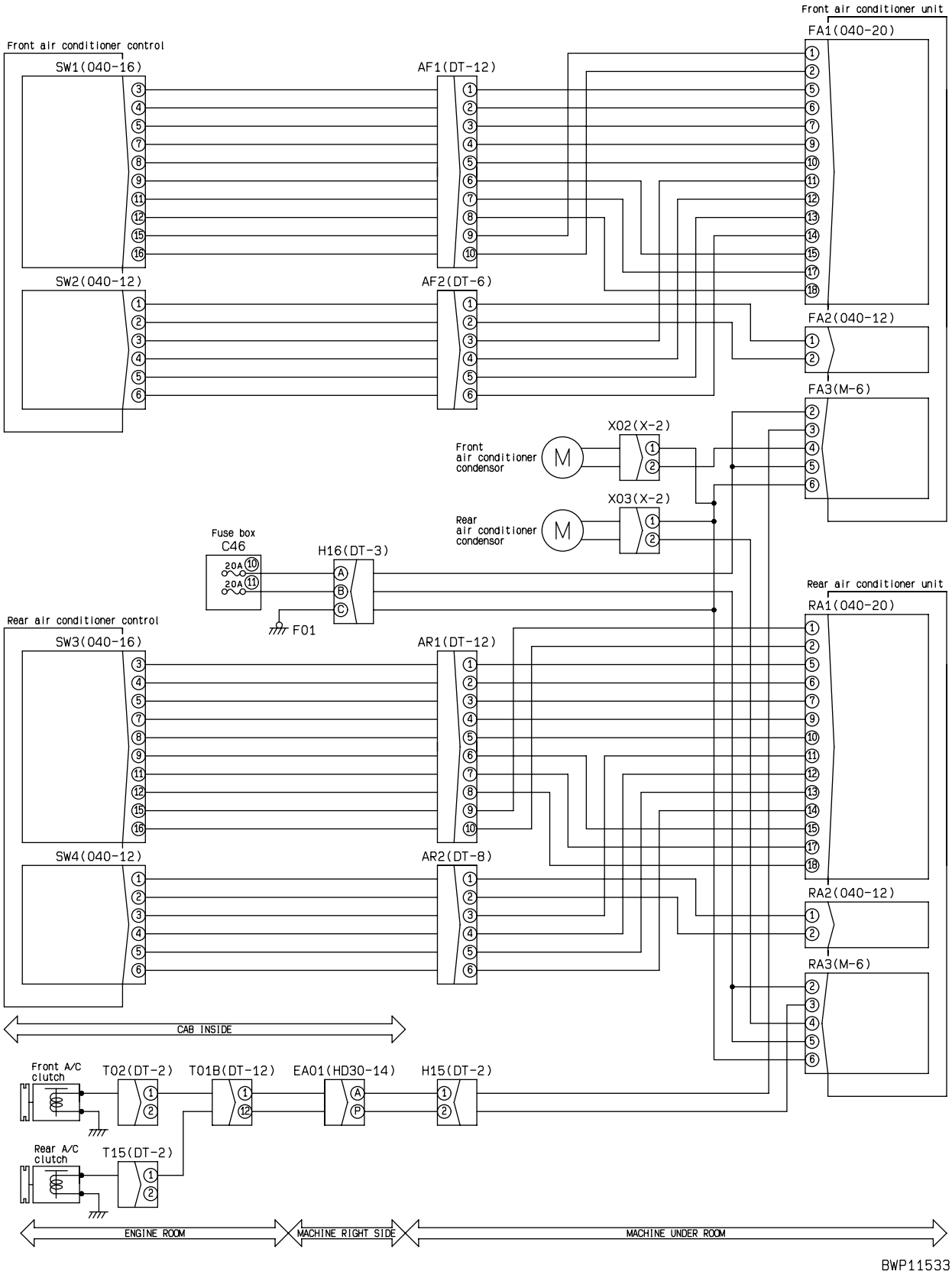


E-26 Bit display for swing is not correctly displayed

Nature of trouble	• Among the monitoring functions, bit display of the swing oil pressure switch is not correctly displayed.
Relevant information	• Swing oil pressure switch: Monitoring code 20-bit [1]

Possible cause and Standard value	Cause		Standard value, Remarks for Troubleshooting			
	1	Failure in the swing left oil pressure switch (internal disconnection/short circuit)	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.			
			B42 (male)	Swing lever	Resistance value	
			Across ① and ②	At neutral	1 MΩ min.	
				In swing left operation	1 Ω max.	
	2	Failure in the swing right oil pressure switch (internal disconnection/short circuit)	★Prepare by turning the starting switch off and then start troubleshooting by starting the engine.			
			B43 (male)	Swing lever	Resistance value	
			Across ① and ②	At neutral	1 MΩ min.	
				In swing right operation	1 Ω max.	
	3	Disconnection in the wiring harness (disconnection/improper connector contact)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
			Across the wiring harnesses between FC03 (female) ㉙ and B42 (female) ② as well as B43 (female) ②		Resistance value	1 Ω max.
			Across the harnesses between B42 (female) ① and ground as well as B43 (female) ① and ground.		Resistance value	1 Ω max.
	4	Ground failure in the wiring harness (contact with GND circuit)	★Prepare by turning the starting switch off and then start troubleshooting with the switch being turned off.			
			Across the wiring harness and ground between FC03 (female) ㉙ and B42 (female) ② as well as B43 (female) ②		Resistance value	1 MΩ min.
	5	Hot short in the wiring harness (contact with 24V circuit)	★Prepare by turning the starting switch off and then start troubleshooting by turning the switch on.			
			Across the wiring harness and ground between FC03 (female) ㉙ and B42 (female) ② as well as B43 (female) ②		Voltage	1 V max.
	6	Failure on the pump controller	★Prepare by turning the starting switch off and then start troubleshooting by starting engine.			
			FC03	Swing lever	Voltage	
			Across ㉙ and ground	At neutral	20 – 30 V	
				In left/right operation	1 V max.	

Related electrical circuit of air conditioner unit power source



H-1. Speeds of all work equipment, swing, travel are slow or lack power

★ Carry out troubleshooting in the DH mode.
★ Check that no abnormal noise is being generated from the main pump before carrying out troubleshooting. (If there is any abnormal noise, carry out troubleshooting for H-4.)

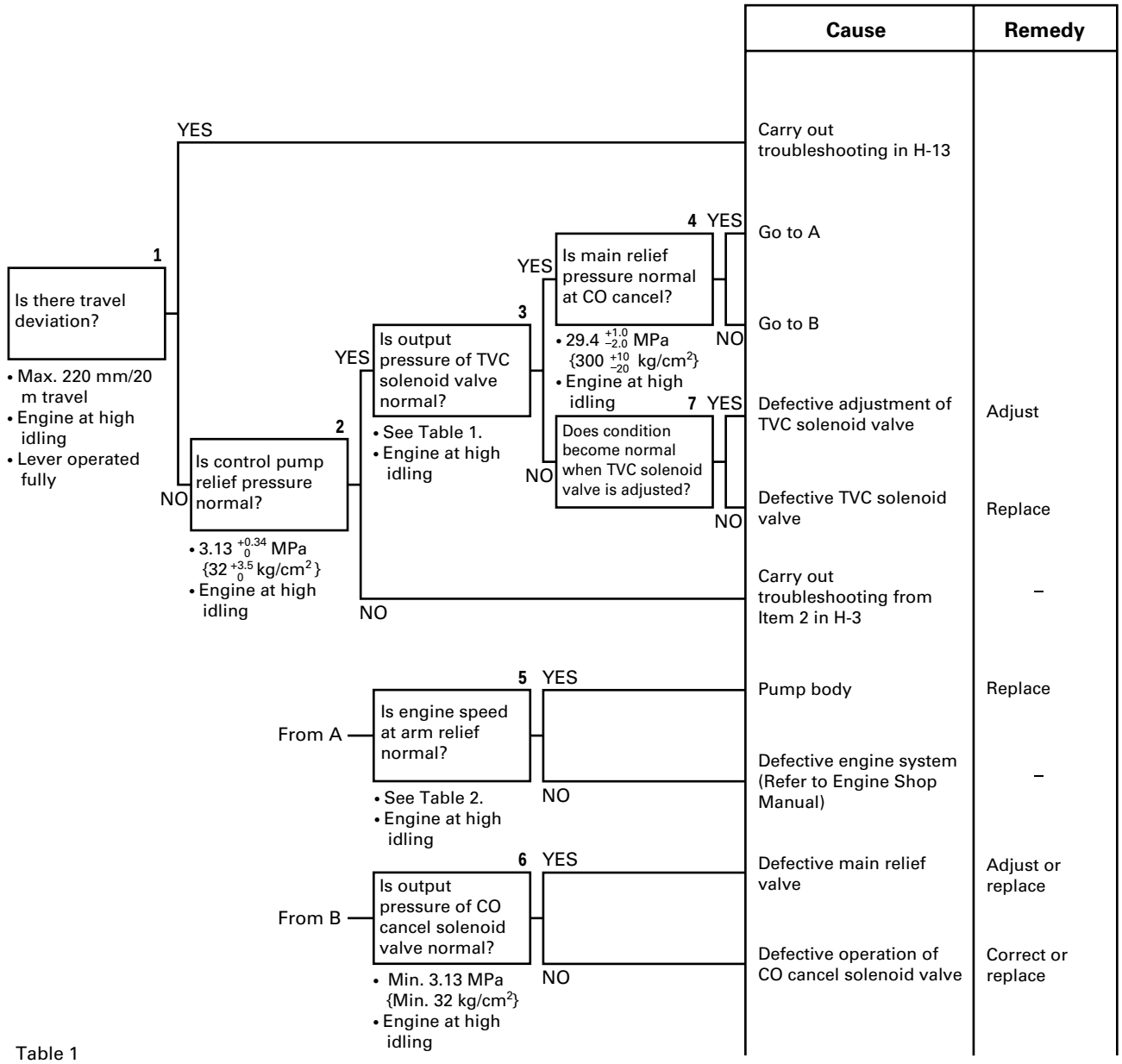


Table 1

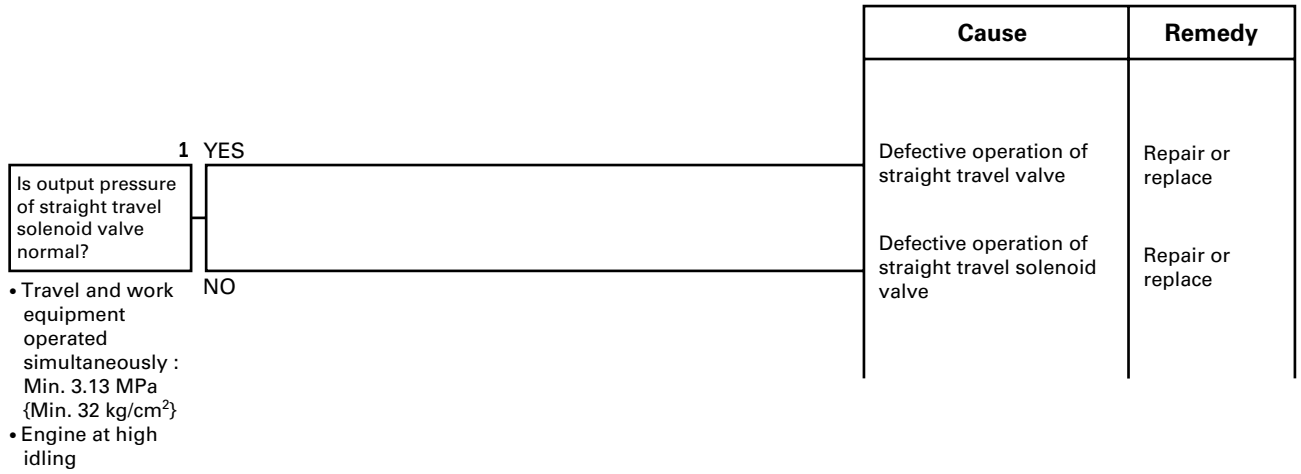
Control lever at neutral	Min. 1.76 MPa {18 kg/cm^2}
H mode, boom RAISE relief	1.48 ± 0.2 MPa {15 ± 2 kg/cm^2}
Heavy lift ON, boom RAISE relief	1.41 ± 0.2 MPa {14.3 ± 2 kg/cm^2}

Table 2

Heavy lift	1,750± 100 rpm
DH mode	1,750± 100 rpm

H-12. Travel deviation is excessive during compound operations

★ When independent operation of travel is normal.
★ Carry out troubleshooting in the DH mode.



H-20. Excessive shock when stopping swing

★ When swing speed is normal.

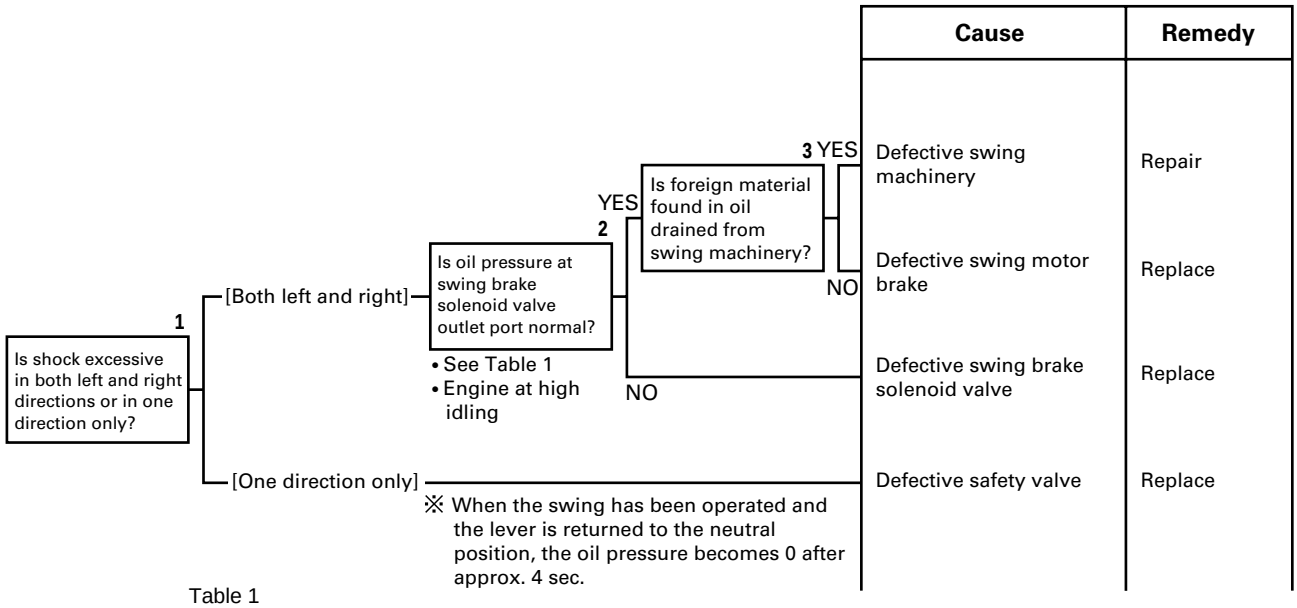
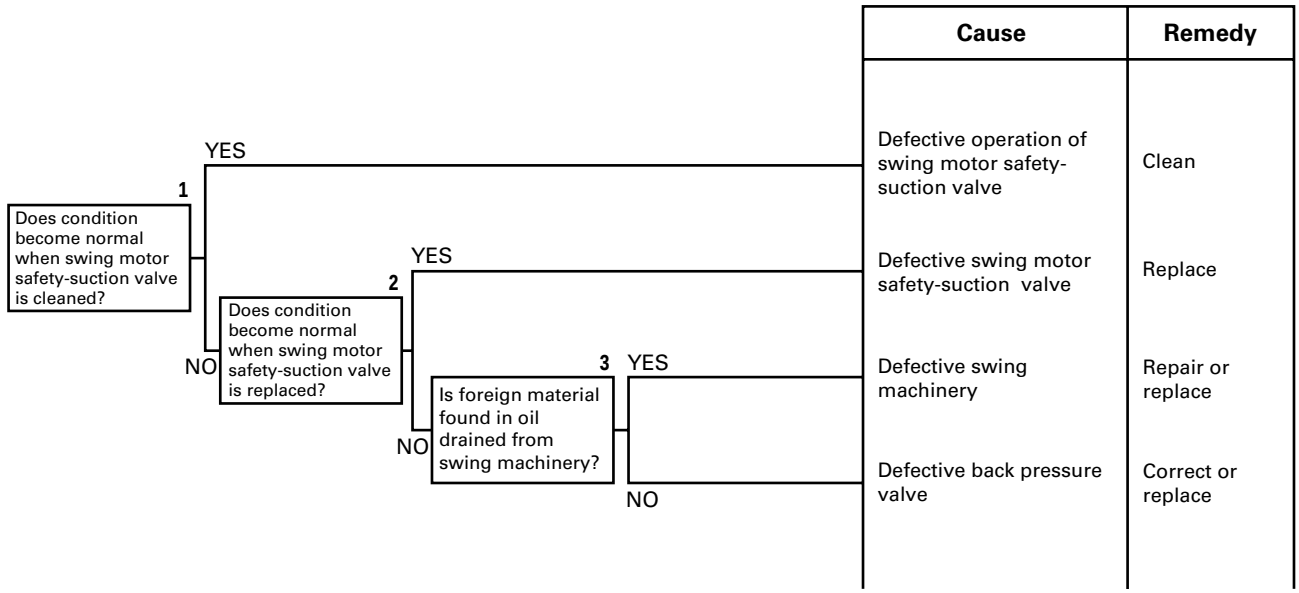


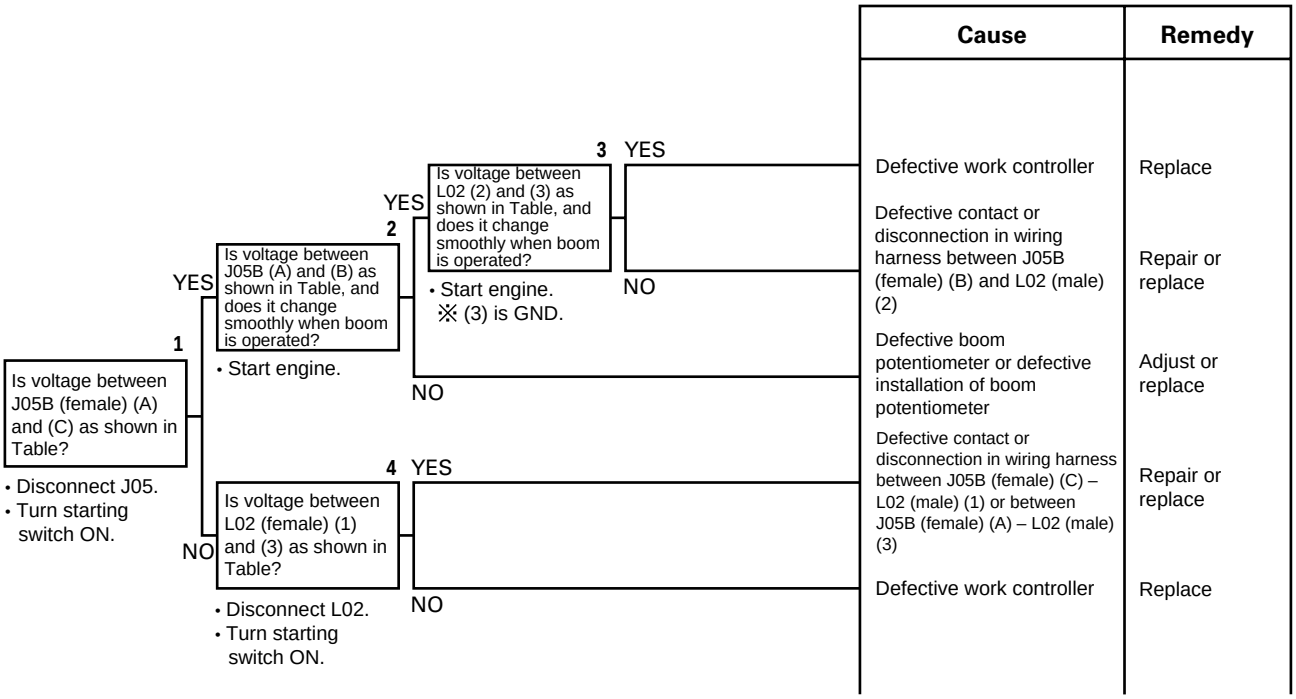
Table 1

Measuring condition	Solenoid valve outlet pressure
9 sec after switching lever to neutral position	0 MPa {0 kg/cm^2}
When lever is operated	Min. 3.13 MPa {Min. 32 kg/cm^2}

H-21. Excessive abnormal noise when stopping swing



a)-(4) Abnormality in boom potentiometer system

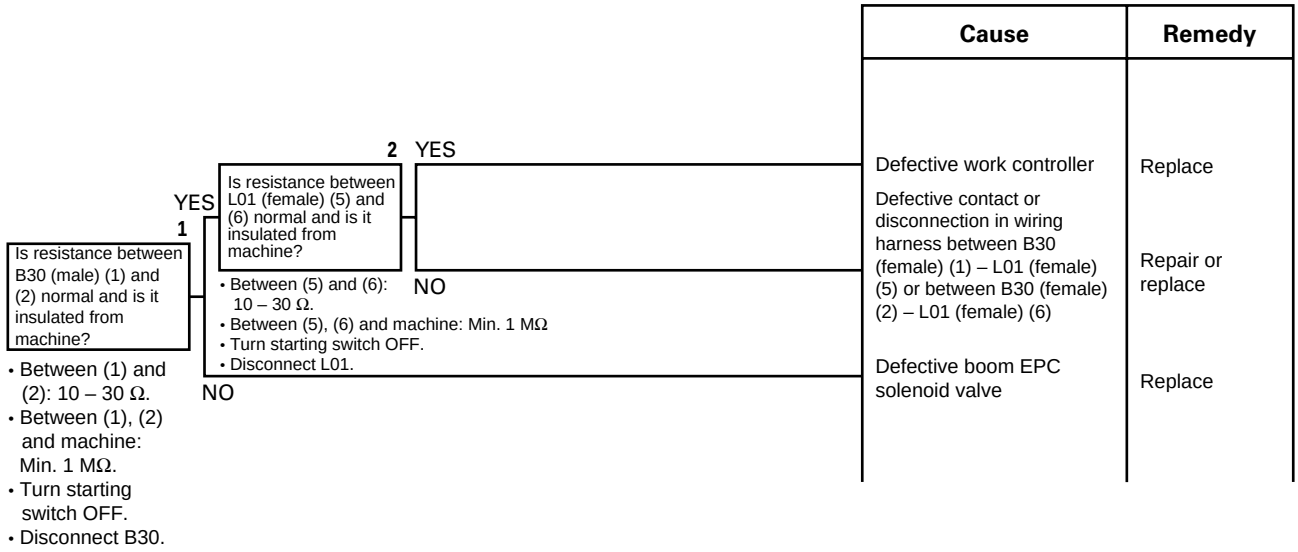


Table

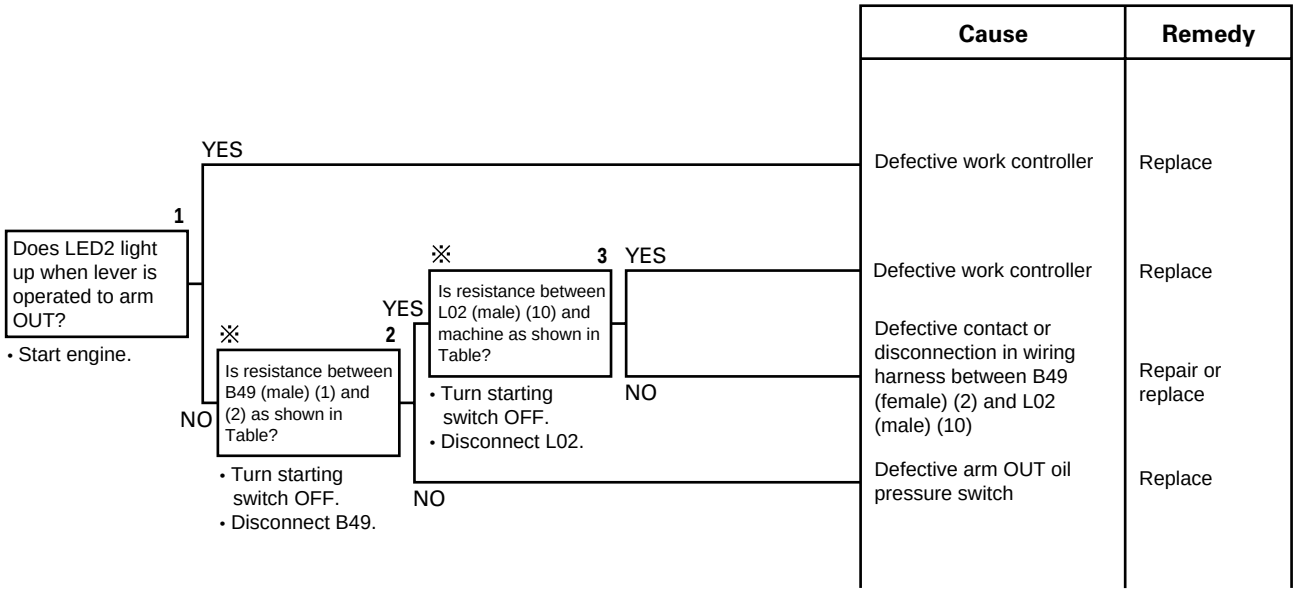
J05	L02	Voltage (V)
(A) - (C)	(1) - (3)	7.3 - 7.35
(A) - (B)	(2) - (3)	0.5 - 4.7

W-5. In horizontal digging + bucket angle compensation mode, carries out bucket angle compensation but does not carry out horizontal digging

a. When self-diagnostic display is giving "abnormal display"



b. When self-diagnostic display is giving "normal display"



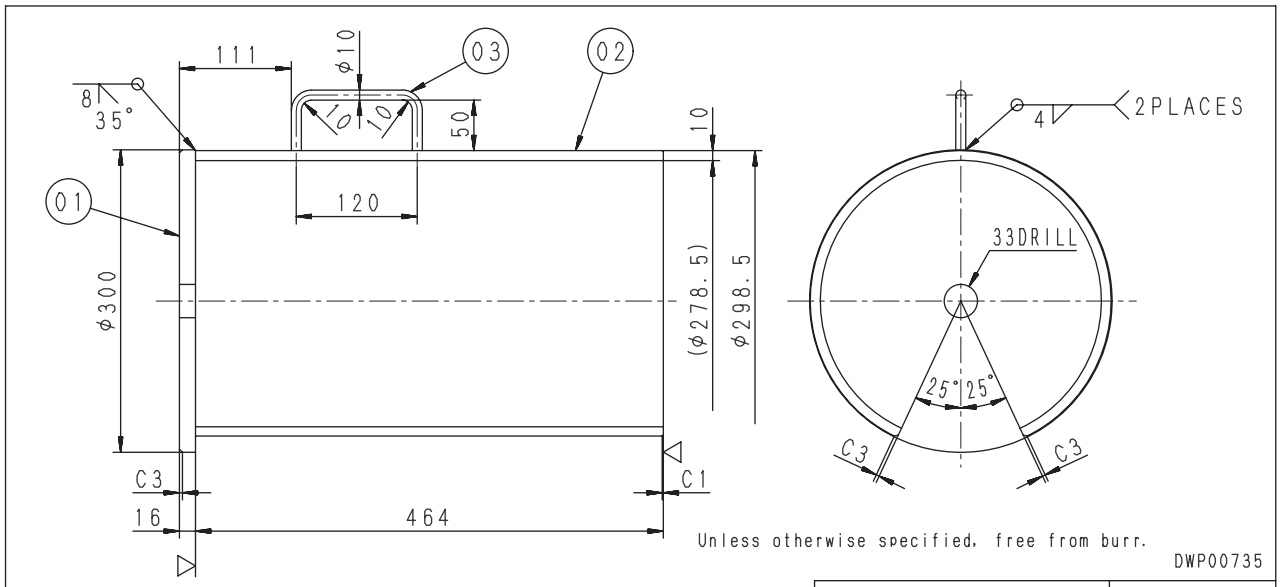
Table

Arm lever at OUT	Max. 10 Ω
Arm lever at neutral	Min. 100 kΩ

For the items marked ※, run the engine for approx. 10 seconds to charge the accumulator, then stop the engine and carry out the check.

30 DISASSEMBLY AND ASSEMBLY

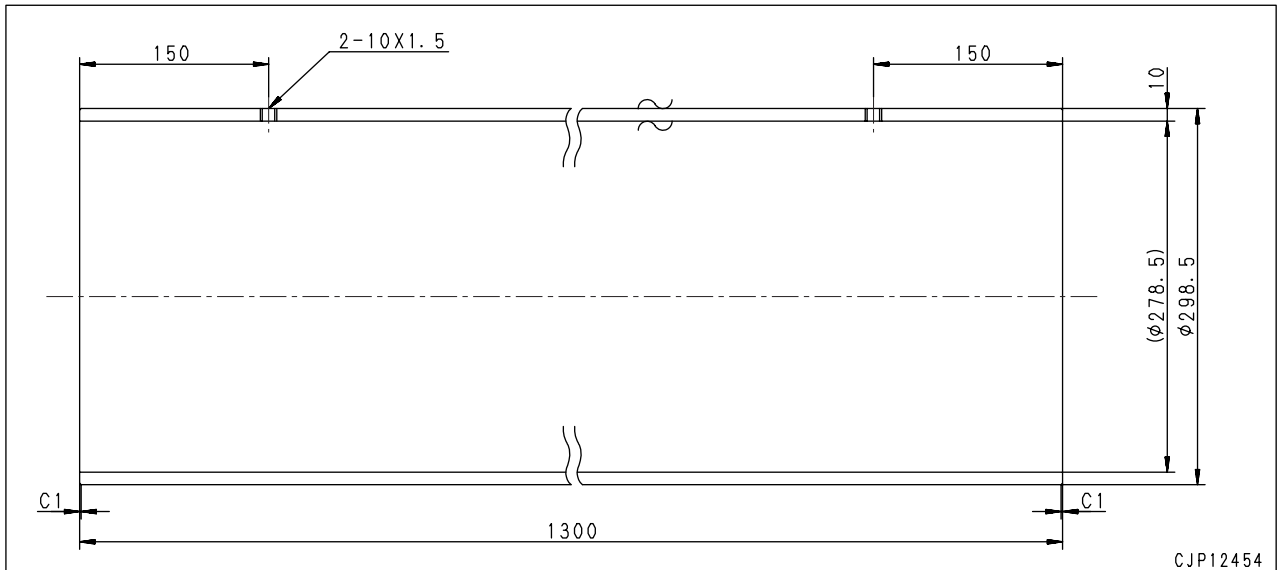
V Sleeve



SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKES
03	BAR	SS400B	1	0.14	φ10
02	TUBE	STKM13A	1	28.4	φ298.5xt10
01	PLATE	SS400P	1	8.8	t16

HEAT TREATMENT	MATERIAL
----	----
PART NAME	QTY
SLEEVE	----
796T-870-1150 △	

V Sleeve



HEAT TREATMENT	MATERIAL
----	STKM13A
PART NAME	Q'TY
SLEEVE	1
796T-870-1170 △	

REMOVAL AND INSTALLATION OF ENGINE FRONT SEAL

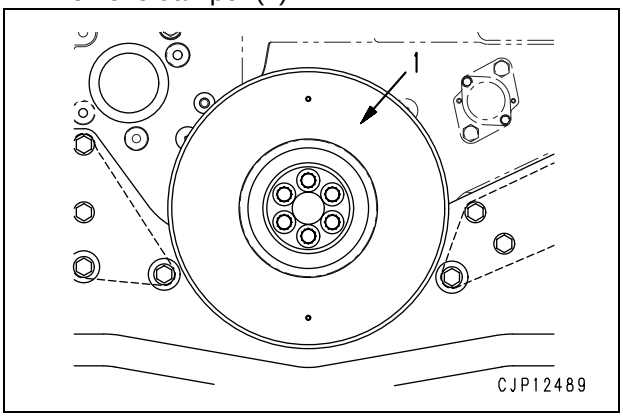
SPECIAL TOOLS

Symbol	Part No.	Part Name	Necessity	Q'ty	New/Remodel	Sketch
C	795-521-1110	Push tool	■	1		
	790-101-5221	Grip	■	1		
	01010-51225	Bolt	■	1		
	01050-31640	Bolt	■	3		

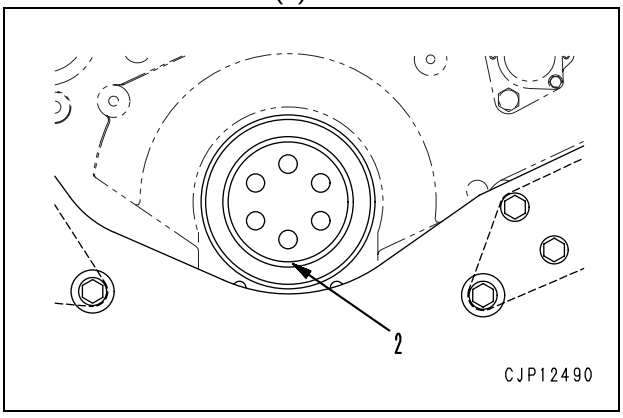
REMOVAL

1. Remove the radiator assembly. For details, see REMOVAL OF RADIATOR ASSEMBLY.

2. Remove damper (1).



3. Remove front seal (2).



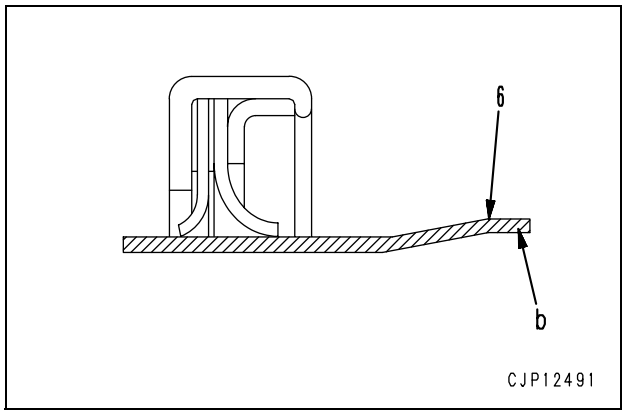
INSTALLATION

1. Installation of front seal (2)

★ Before assembling the seal, check that there are no scratches, burrs, flashes, or rust on the housing, lip sliding surface, or at the corner of the end face of the crankshaft.

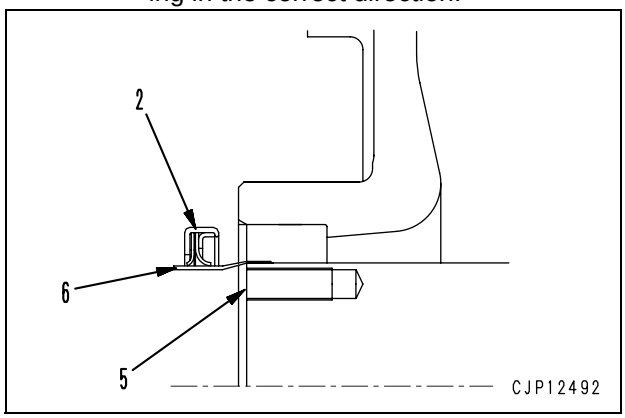
★ When assembling the seal, do not coat the shaft and seal lip with oil or grease. Wipe off all oil from the shaft.

★ Do not remove the internal plastic tube (6) from the standard seal until the seal is assembled.



1) Put large inside diameter (b) end of internal plastic tube (6) in contact with end of crankshaft (5).

★ Be particularly careful to assemble facing in the correct direction.



※ 7

- Assembly procedure for common rail injection pipe (Between common rail and injector).

1. Install high-pressure pipe (61).
Sleeve nut:
39.2 – 49 Nm {4 – 5 kgm}
★ Precautions for installing sleeve nut on injector side
1) Insert the sleeve nut in the head hole from outside.
★ Check that the O-rings are fitted to both injector side and sleeve nut side.
2) After sleeve nut catches the threads of the injector, turn it 2 turns with fingers, then tighten it with a spanner.
★ Control the tightening torque with a torque wrench of spanner type.
Sleeve nut:
39.2 – 49 Nm {4 – 5 kgm}
★ If the sleeve nut does not catch the threads, push its end with a small spanner and turn its hexagonal part with the torque wrench.
★ After tightening the sleeve nut, check that the O-ring is not projected from the sleeve nut end.

2. Tighten the stay and upper and lower clamps of high-pressure pipe clamp (57) with fingers.

3. Tighten upper and lower clamps (57) securely.
★ Bend the rubber first.
Clamp bolt:
9.8 ± 1 Nm {1 ± 0.1 kgm}

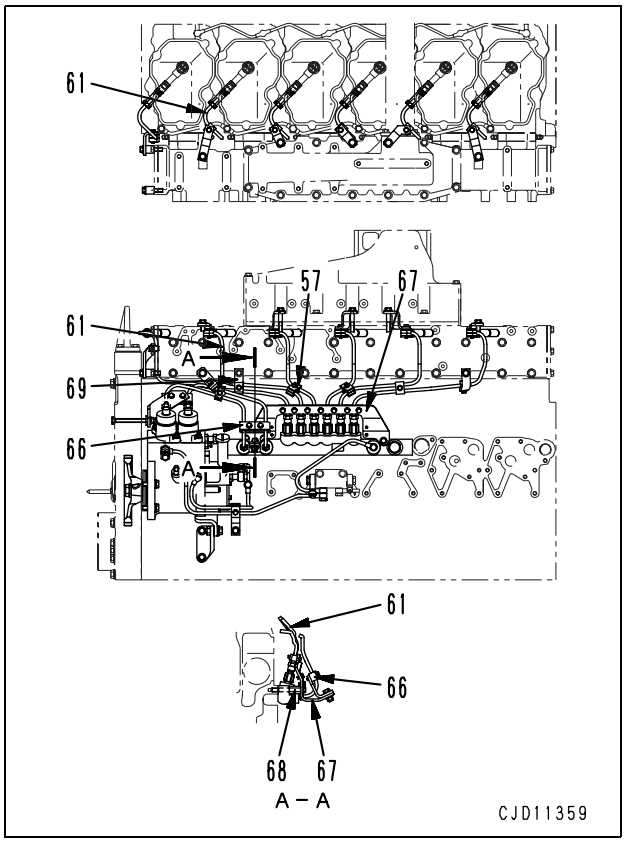
4. Tighten the stay securely.

5. Tighten the stay and upper and lower clamps of high-pressure pipe side clamp (57) with fingers.

6. Install high-pressure pipe clamp (66) and gate frame (67) temporarily.
1) Tighten high-pressure pipe clamp (66) securely first.
2) Install gate frame (67) to special bolt (68) securely.
Clamp bolt:
9.8 ± 1 Nm {1 ± 0.1 kgm}

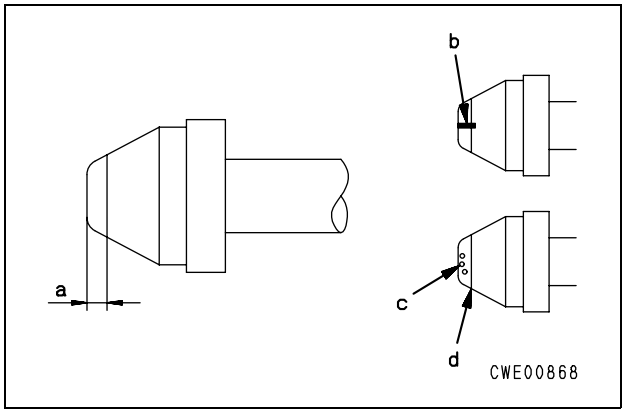
7. Tighten high-pressure pipe side clamp (57) securely.
Clamp bolt:
9.8 ± 1 Nm {1 ± 0.1 kgm}

8. Tighten stay (69) securely.



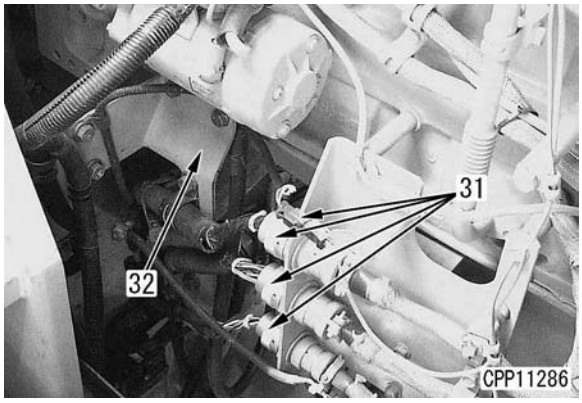
※ 8
Eye-joint bolt of coolant water tube:
9.8 – 12.7 Nm {1.0 – 1.3 kgm}
Eye-joint bolt of fuel spill tube (38):
9.8 – 12.7 Nm {1.0 – 1.3 kgm}

※ 9
⚠ Check high pressure pipe as following items. If there is any of those defects, it can cause fuel leakage. In this case, replace the high-pressure pipe.
- Check the taper seal of its joint (Part "**a**": Part of 2 mm from the end) for visible lengthwise slit "**b**" and spot "**c**".
- Check part "**d**" (End of taper seal: Part at 2 mm from the end) for stepped-type wear caused by fatigue which your nail can feel.

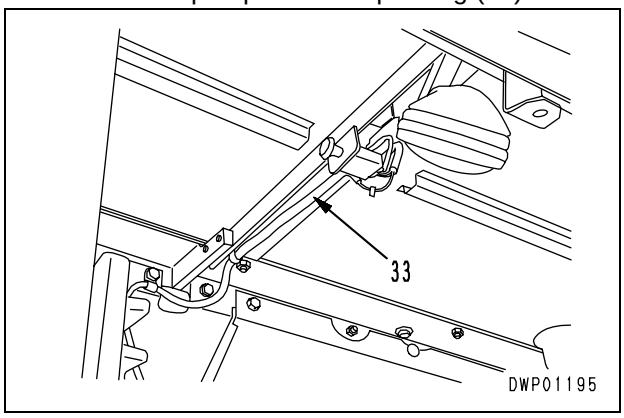


19. Disconnect wiring connectors (31) and remove bracket (32).

★ Remove the parts from the front engine similarly to the above procedure. Air compressors are not installed to the front engine, however.

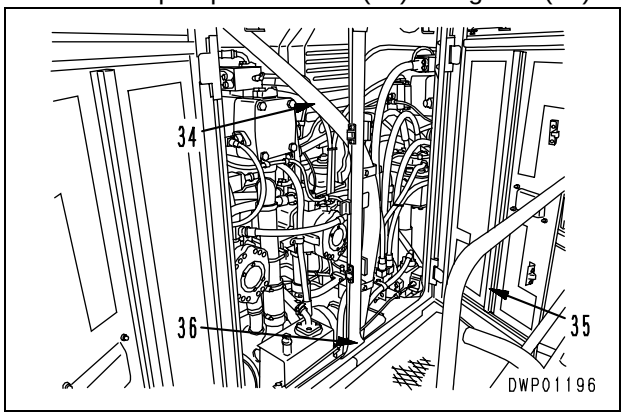


20. Disconnect pump room lamp wiring (33).

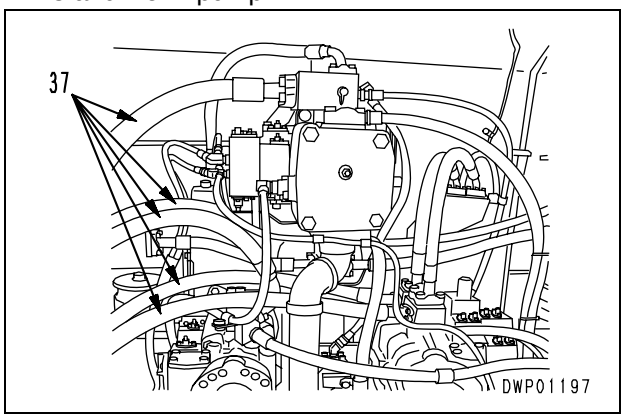


21. Remove clamp, then disconnect hose (34).

22. Remove pump room door (35) and guard (36).



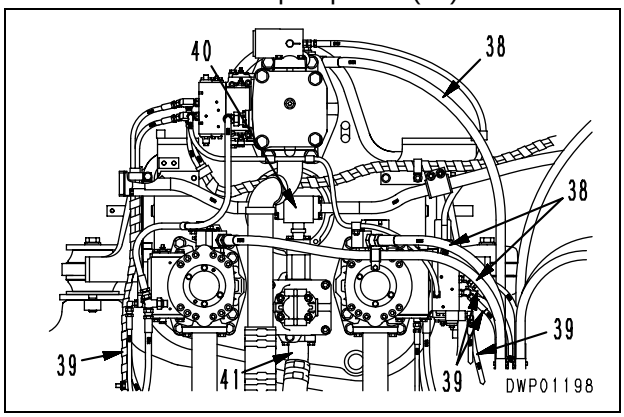
23. Disconnect outlet hoses (37) of swing, No. 1, 2, 3 and No. 4 pump.



24. Disconnect drain hoses (38) of swing, No. 1, 2, 3 and No. 4 pump.

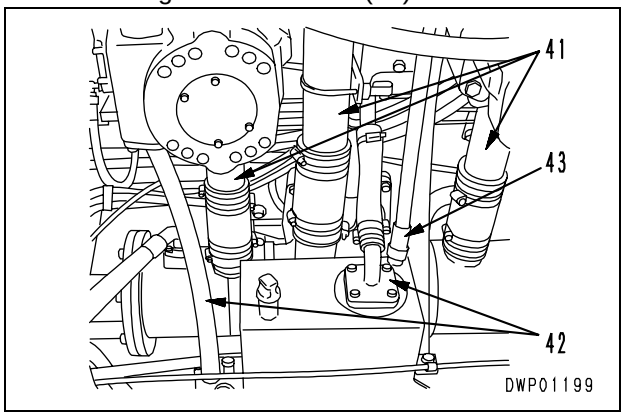
25. Disconnect control hoses (39).

26. Disconnect control pump tube (40).



27. Disconnect inlet tubes (41) of swing, No. 1, 2, 3, 4 and control • PTO lubrication pump.

28. Disconnect outlet and inlet tubes (42) for PTO lubricating and drain hose (43).



REMOVAL AND INSTALLATION OF TRAVEL MOTOR ASSEMBLY

REMOVAL

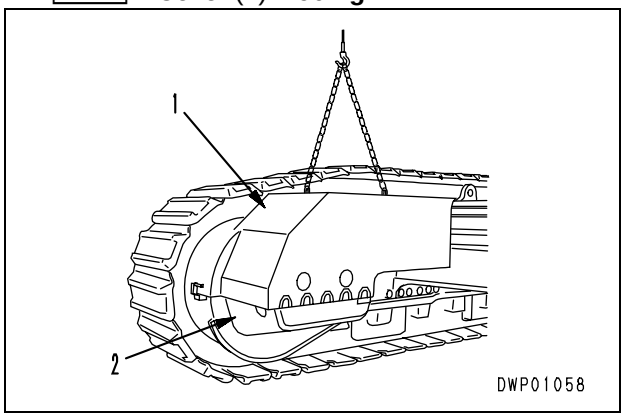
⚠ Swing the work equipment 90°, then lower it completely to the ground.

⚠ Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.

1. Lift off covers (1) and (2).

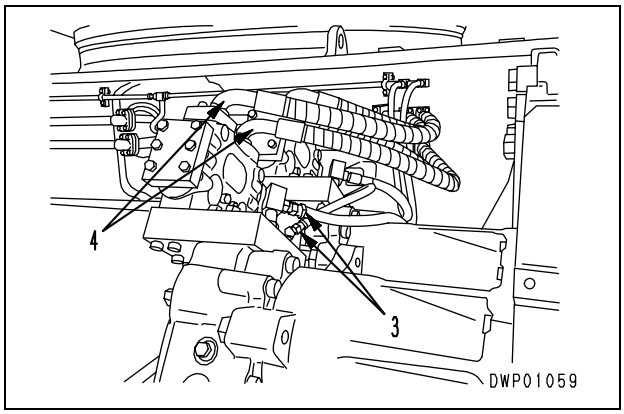
kg Cover (1): **180 kg**

kg Cover (2): **490 kg**



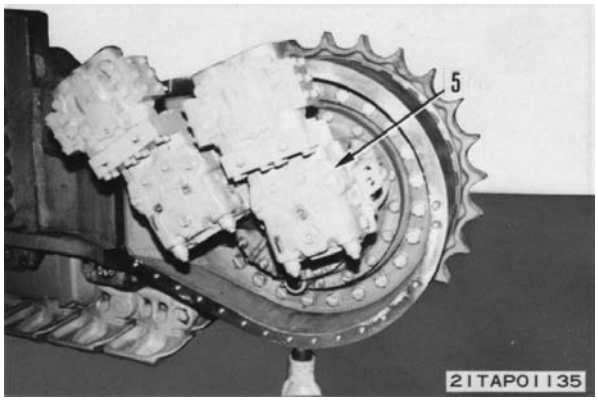
2. Disconnect hoses (3) and (4).

★ Fit oil stoppers in the hoses after disconnecting them. Prepare an oil pan to catch the oil that flows out.



3. Sling travel motor assembly (5), and remove mounting bolts, then remove travel motor assembly. ※1

kg Travel motor assembly: **180 kg**



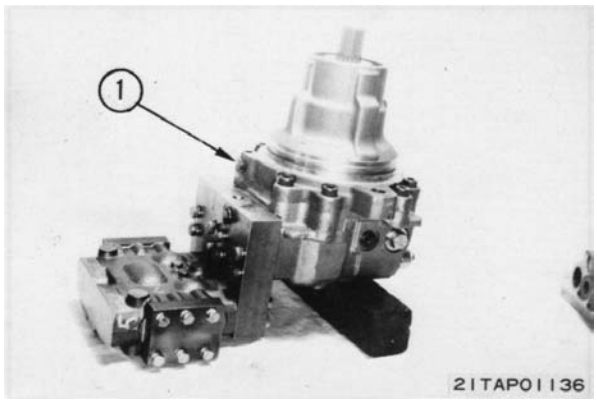
INSTALLATION

- Carry out installation in the reverse order to removal.

※1

Mounting bolt:
926.7 ± 103 Nm {94.5 ± 10.5 kgm}

★ If the mounting bolt holes for the motor cannot be aligned, release the brake. Remove plug ① (Thread dia. = 14 mm, Pitch = 2.0 mm) and apply hydraulic pressure.



★ After running the engine to circulate the oil in the piping, add engine oil to the hydraulic tank to the specified level. Then bleed the air. For details, see TESTING AND ADJUSTING, Air bleeding from each component.

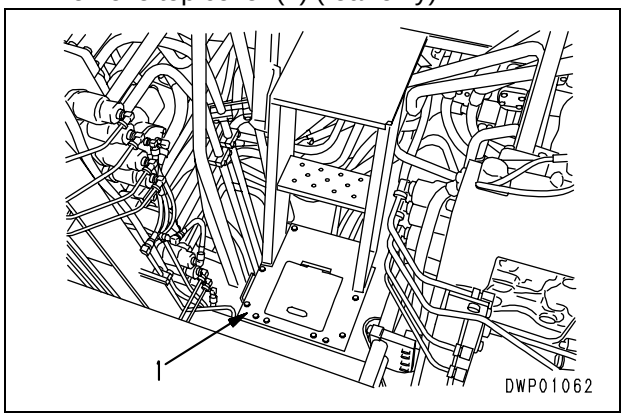
REMOVAL AND INSTALLATION OF SWING MOTOR ASSEMBLY

REMOVAL

⚠ Lower the work equipment completely to the ground and stop the engine.

⚠ Loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.

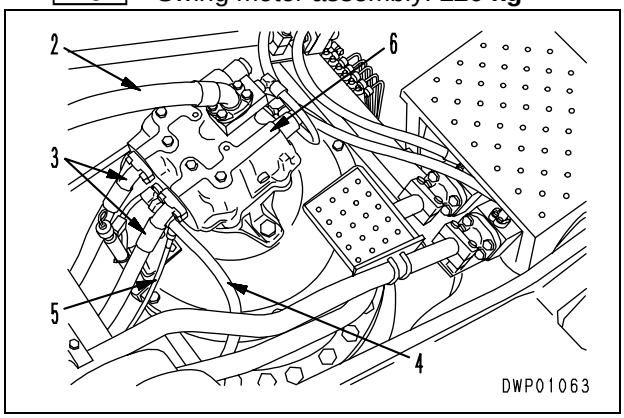
1. Remove top cover (1) (rear only).



2. Disconnect hoses (2), (3), (4), and (5).

3. Lift off swing motor assembly (6). ※ 1

kg Swing motor assembly: **120 kg**

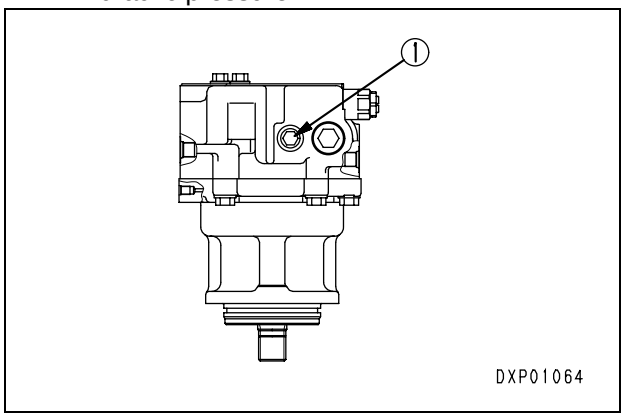


INSTALLATION

- Carry out installation in the reverse order to removal.

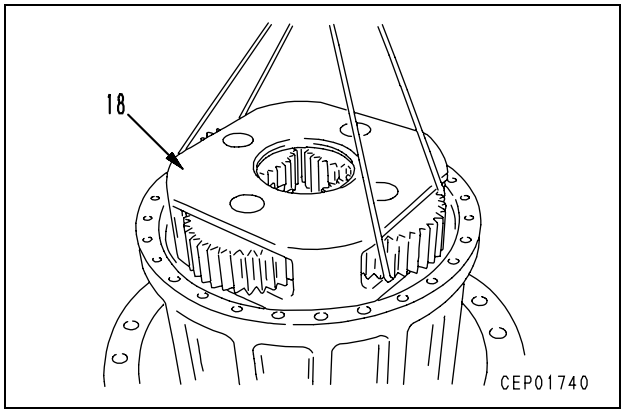
※ 1

★ When installing the motor from the rear, if the mounting bolt holes cannot be aligned, release the brake. Remove plug ① (Thread dia. = 14 mm, Pitch = 2.0 mm) and apply hydraulic pressure.



- **Refilling with oil**
  - ★ Add oil through oil filler to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
  - ★ Add oil to replace the oil that leaked out when the motor assembly was removed.

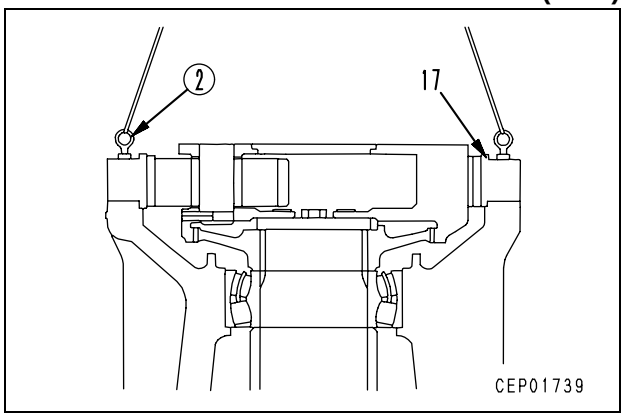
2) Fit wires at 2 places at gears, raise No. 2 carrier assembly (18), align hub gear, then install.



6. No. 2 ring gear

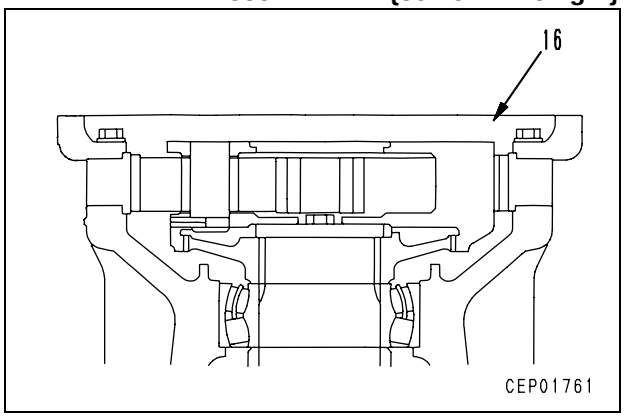
Using eyebolts ②, install No. 2 ring gear (17).

Mounting surface with case:
Gasket sealant (LG-6)



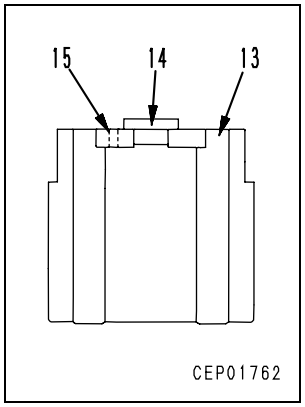
7. Cover

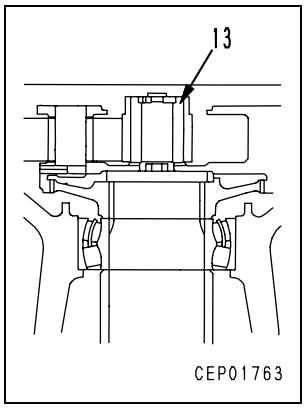
1) Align oil groove of oil filler port with protrusion of case, and install cover (16).
   Mounting surface with No. 2 ring gear: **Gasket sealant (LG-6)**
2) Tighten mounting bolts.
   Bolt:
   385 ± 42 Nm {39.25 ± 4.25 kgm}



8. No. 2 sun gear

1) Install collar (15) and button (14) to sun gear (13).
2) Install No. 2 sun gear (13).



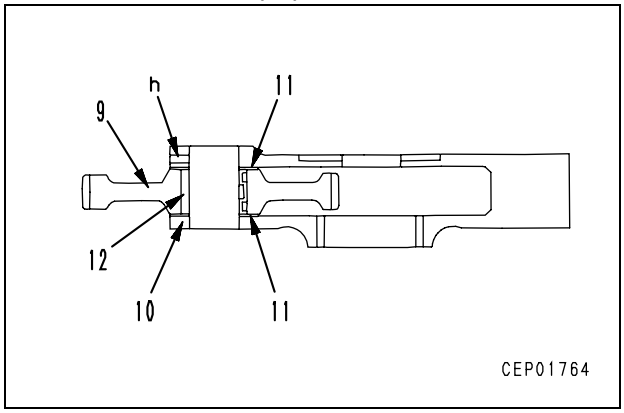


9. No. 1 carrier assembly

Assemble No. 1 carrier assembly as follows.

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

1) Assemble bearing (12) to gear (9), put thrust washer (11) in contact with both ends, then set to carrier (10).



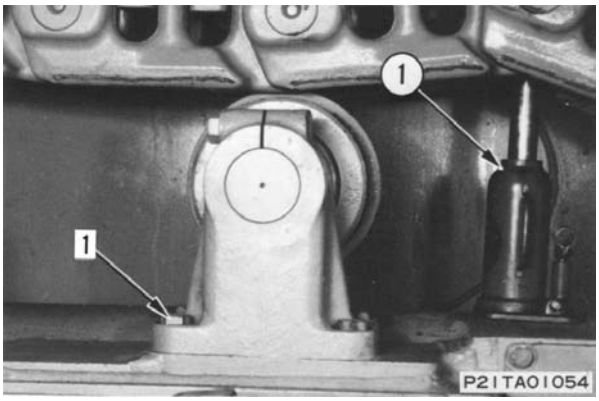
2) Align position of pin holes of carrier and shaft, then tap with a plastic hammer to install shaft (8).
   ★ When installing the shaft, rotate the planetary gear, and be careful not to damage the thrust washer.
3) Insert pin (7).
   ★ Check that the pin groove and protruding part of the pin are not fatigued. If the pin is defective, replace it with a new part.
   ★ When assembling the pin again, avoid the position previously used for caulking.

REMOVAL AND INSTALLATION OF CARRIER ROLLER ASSEMBLY

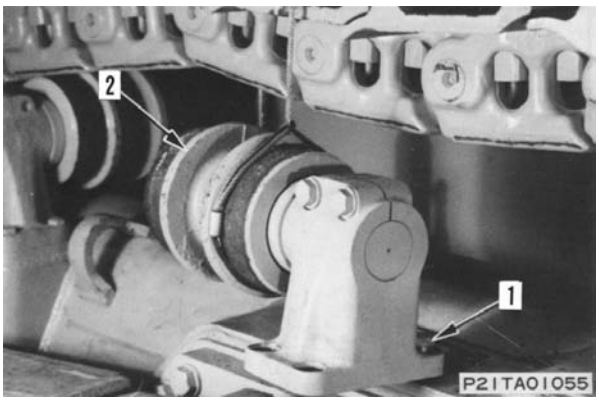
REMOVAL

1. Loosen the track shoe. For details, see REMOVAL OF TRACK SHOE ASSEMBLY.

2. Using hydraulic jack ①, push up track shoe assembly.



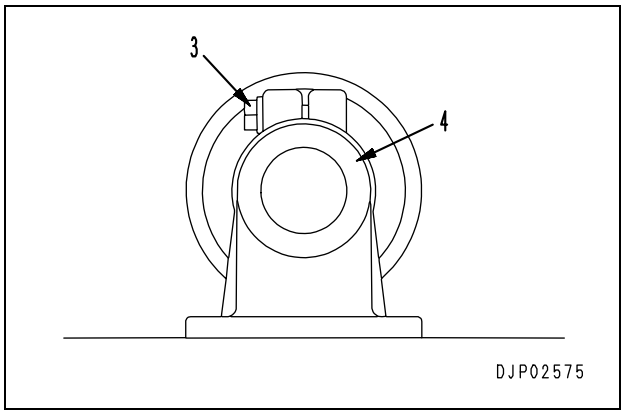
3. Sling carrier roller assembly (2) and loosen mounting bolts (1). ※ 1



4. Lift off the carrier roller assembly.

5. Remove shaft clamp bolt (3), open bracket (4) with a screwdriver, and pull the roller out of the bracket.

kg Carrier roller assembly (incl. bracket): **70 kg**



INSTALLATION

- Carry out installation in the reverse order to removal.

※ 1

Mounting bolt: **Thread tightener (LT-2)**

Mounting bolt:
1,720 ± 196 Nm {175 ± 20 kgm}

REMOVAL AND INSTALLATION OF HYDRAULIC TANK ASSEMBLY

REMOVAL

⚠ Swing the frame to bring the hydraulic tank to between both track shoes.

⚠ Lower the work equipment to the ground, stop the engine, and loosen the hydraulic tank cap slowly to release the internal pressure of the hydraulic tank.

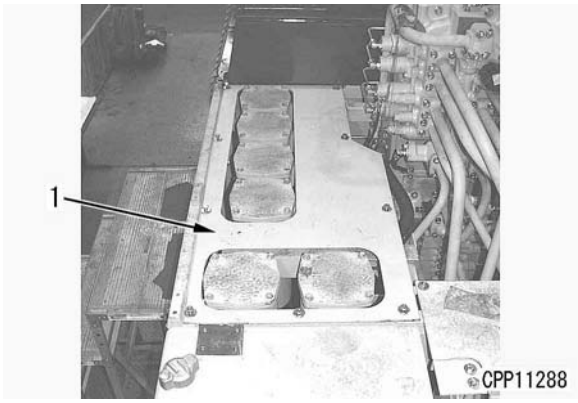
★ Make match marks on the hoses before disconnecting them.

★ Plug the disconnected tubes and hoses.

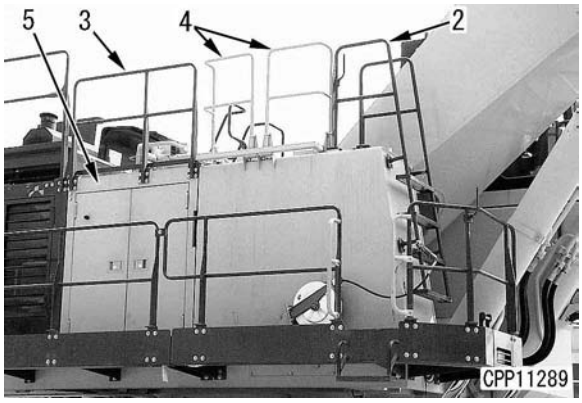
1. Drain the oil from the hydraulic tank.

Hydraulic tank: **1500 ℓ**

2. Remove cover (1).

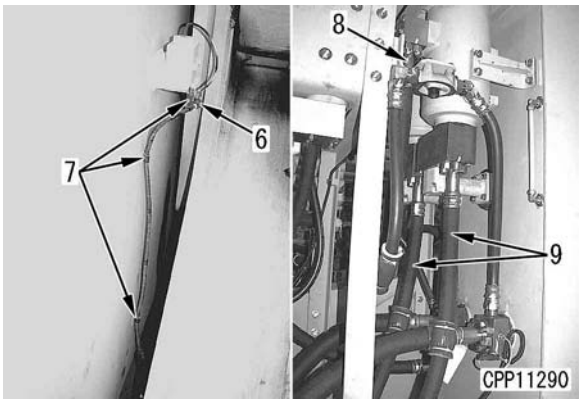


3. Remove ladder (2), handrails (3) and (4), and side cover assembly (5).



4. Disconnect oil level sensor connector (6) and remove clamps (7).

5. Disconnect 2 hoses (8) of the return filter coming from the control valve and 2 hoses (9) between the main filters.

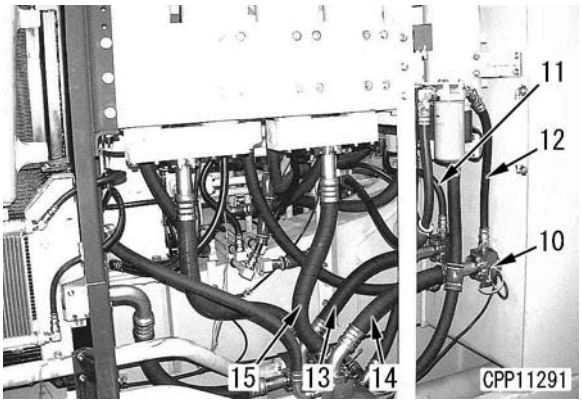


6. Disconnect hydraulic oil temperature sensor (10).

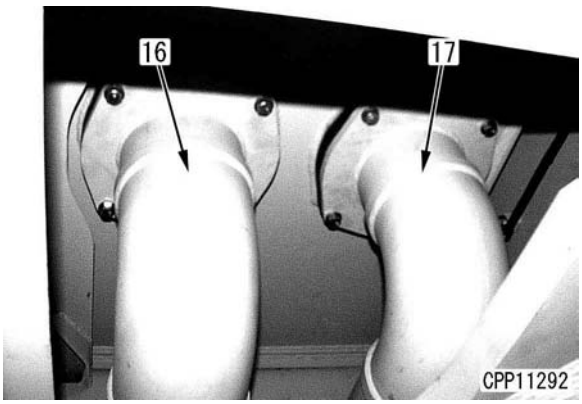
7. Disconnect drain filter hoses (11) and (12).

8. Disconnect hoses (13) and (14) between the tank and block.

9. Disconnect drain hose (15).



10. Disconnect suction tubes (16) and (17) under the hydraulic tank.



ASSEMBLY

★ The operation for the L.H. 4-spool control valve (with straight-travel valve) is basically the same as for the R.H. 4-spool control valve and 5-spool control valve.
★ Coat the sliding surfaces of all parts with engine oil before installing.

1. Fit O-ring and install main relief valve (34).
Main relief valve:
318.7 ± 44.1 Nm {32.5 ± 4.5 kgm}

2. Fit O-ring and install suction valve (33).
Suction valve:
225.5 ± 9.8 Nm {23 ± 1 kgm}

3. Fit O-ring and install safety-suction valves (32) and (31).
Safety-suction valve:
225.5 ± 9.8 Nm {23 ± 1 kgm}

4. Fit O-ring and install jet sensor relief valve (30) and jet sensor orifice (29).
Jet sensor relief valve:
186.3 ± 9.8 Nm {19 ± 1.0 kgm}
Jet sensor orifice:
152 ± 24.5 Nm {15.5 ± 2.5 kgm}

5. Install spool to valve body as follows.
i) Assemble spool (28) in valve body.
ii) Assemble retainer (27) and tube (26), then fit O-ring and install case (25).
★ Only L.H. 4-spool control valve.

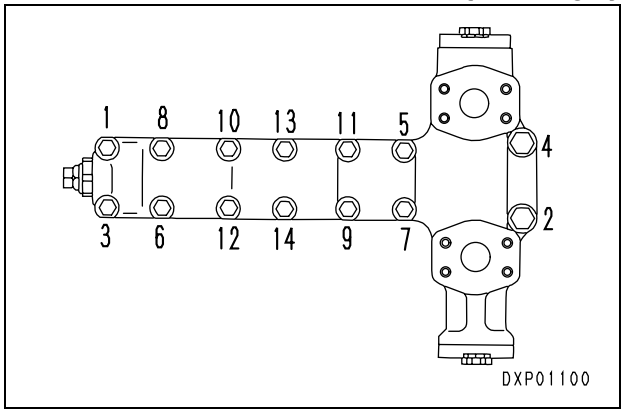
6. Install spool to valve body as follows.
i) Assemble spool (24) in valve body.
ii) Assemble retainer (23) and springs (22) and (21), then fit O-ring and install case (20).

7. Assemble check valve (19), spring (18), and seat (17) in valve body.

8. Install check valve (16) and spring (15).

9. Assemble straight-travel valve as follows.
i) Fit O-ring and backup ring (35), install sleeve (14), then tighten nut (13).
ii) Assemble check valve (12) and spring (11), then fit O-ring and backup ring (36) and install plug (10).
iii) Assemble spring (9), spool (8), and piston (7) in valve body, then fit O-ring and install sleeve (6).
iv) Fit backup ring (5) and install plug (4).
v) Install cover (3).

10. Fit O-ring and straight-travel valve assembly (2), then tighten mounting bolts (1).
★ Tighten in the numerical order as indicated.
Bolt ①, ③, ⑤ – ⑭:
88.3 ± 9.8 Nm {9 ± 1 kgm}
Bolt ②, ④:
166.7 ± 9.8 Nm {17 ± 1 kgm}



INSTALLATION

- Carry out installation in the reverse order to removal.

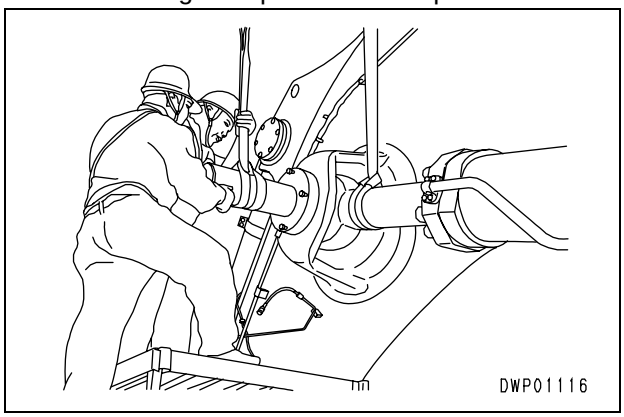
※ 1

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

Grease after assembling pin:
Grease (LM-G)

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

★ Sling at 2 places (pin and piston rod portion) and align the position of the pin hole.



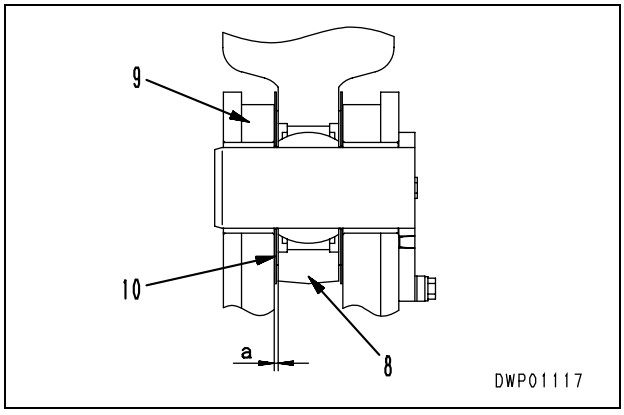
※ 2

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

Grease after assembling pin:
Grease (LM-G)

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

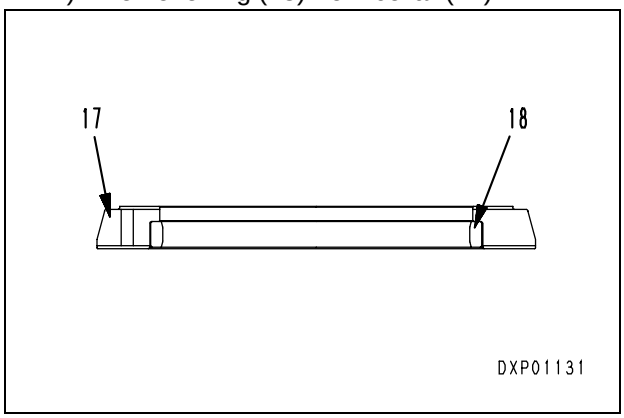
★ Adjust with shims (10) so that the clearance **a** between bracket (9) and the bottom end face of boom cylinder (8) is less than 1 mm.
  - Shim thickness: 1.0, 1.5 mm



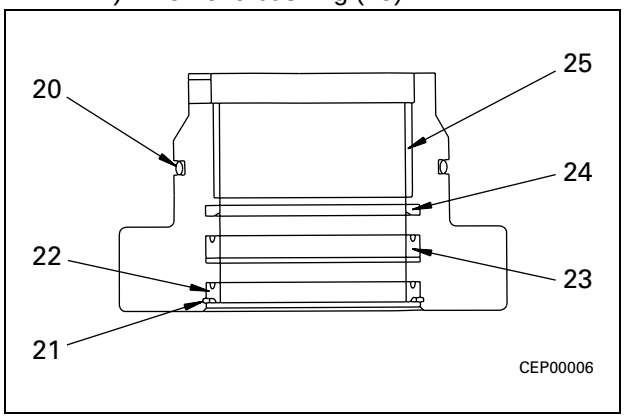
- **Bleeding air**
  ★ Bleed the air.
  For details, see TESTING AND ADJUSTING, Air bleeding from each component.

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

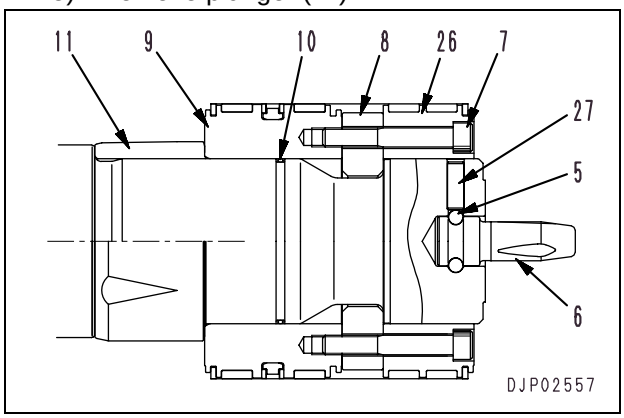
7) Remove ring (18) from collar (17).



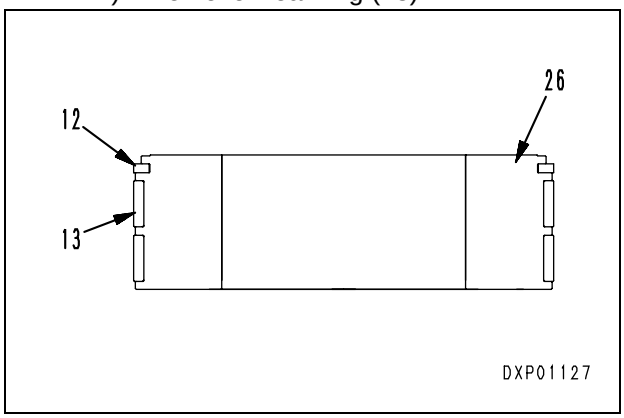
8) Disassembly of head assembly
   i) Remove the O-ring and backup ring (20).
   ii) Remove snap ring (21) and dust seal (22).
   iii) Remove rod packing (23).
   iv) Remove backup ring (24).
   v) Remove bushing (25).



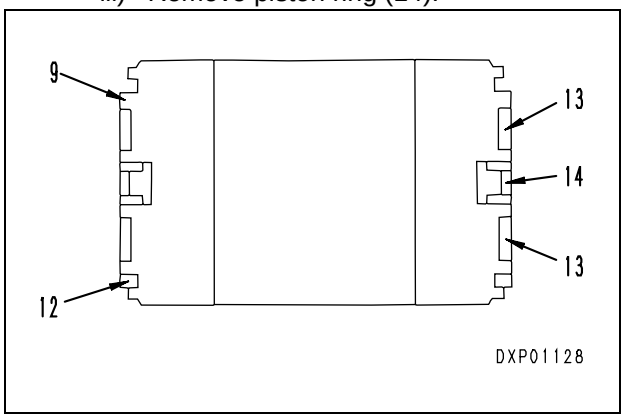
- **Arm cylinder**
  1) Fix the head side of piston rod assembly (3) with tool **U1** or a press.
  2) Remove bolts (7), piston assembly 1 (26), and spacer (8).
  3) Remove pin (27), 10 balls (5), and plunger (6).
  4) Remove piston assembly 2 (9), O-ring, and backup ring (10).
  5) Remove plunger (11).



6) Disassembly of piston assembly 1
   i) Remove ring (12).
   ii) Remove wear ring (13).



7) Disassembly of piston assembly 2
   i) Remove ring (12).
   ii) Remove wearing rings (13).
   iii) Remove piston ring (14).



REMOVAL AND INSTALLATION OF BUCKET ASSEMBLY

BACK HOE
REMOVAL

⚠ Set the back of the bucket facing down, lower the work equipment completely to the ground, then set the safety lock lever to the LOCK position.

1. Remove 3 pin lock bolts (1), then remove stopper (2).

2. Using forcing screws, remove connecting pin (3) of link and bucket. ※ 1

3. Start engine, and retract piston rod, then tie link to arm with wire to prevent piston rod from coming out.

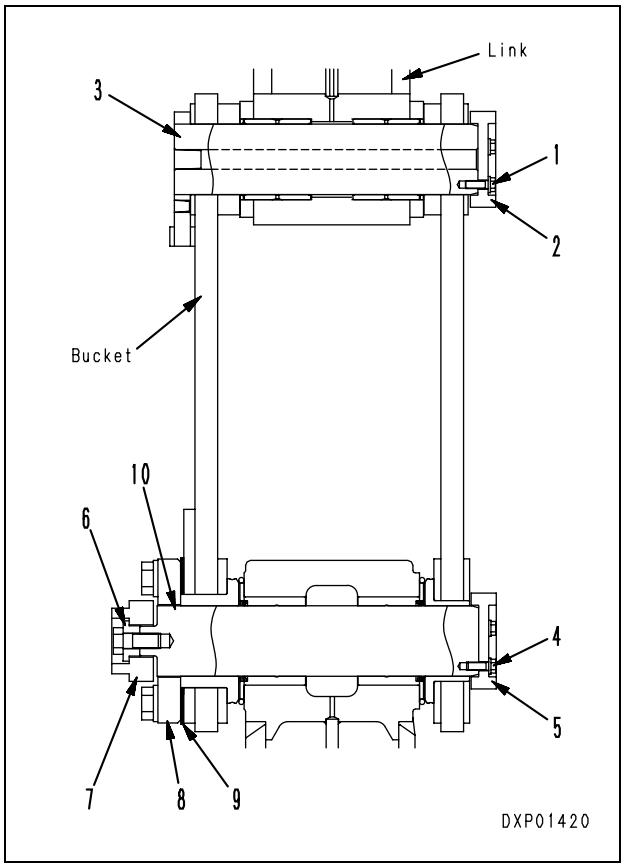
4. Remove 3 pin lock bolts (4), then remove stopper (5).

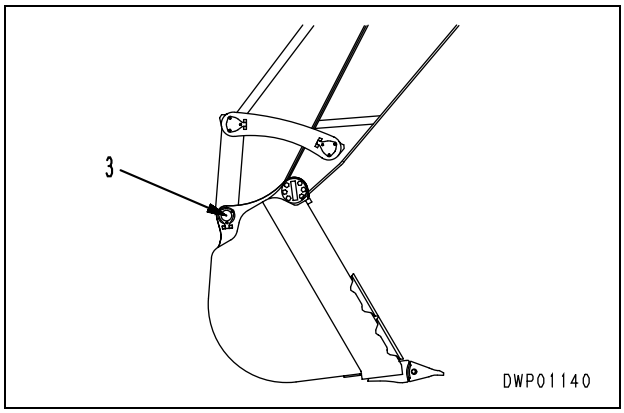
5. Remove collar (6), covers (7) and (8), then remove shims (9).

6. Remove arm connecting pin (10). ※ 2

7. Start engine and raise work equipment, disconnect arm from bucket, then remove bucket assembly.

kg Bucket assembly: **10,000 kg**





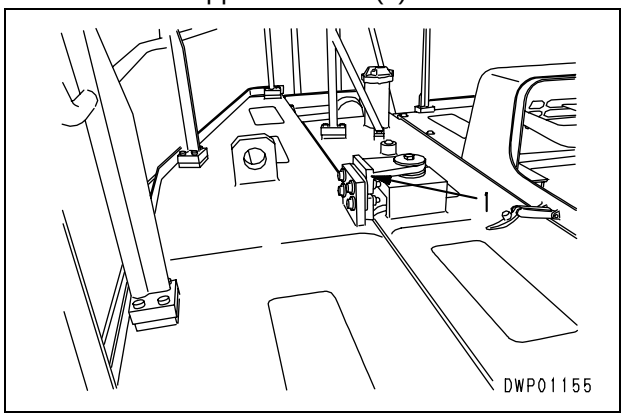
REMOVAL AND INSTALLATION OF COUNTERWEIGHT ASSEMBLY

REMOVAL

⚠ Stop the machine on level ground, and lower the work equipment completely to the ground.

1. Sling counterweight assembly.

2. Disconnect upper brackets (1).

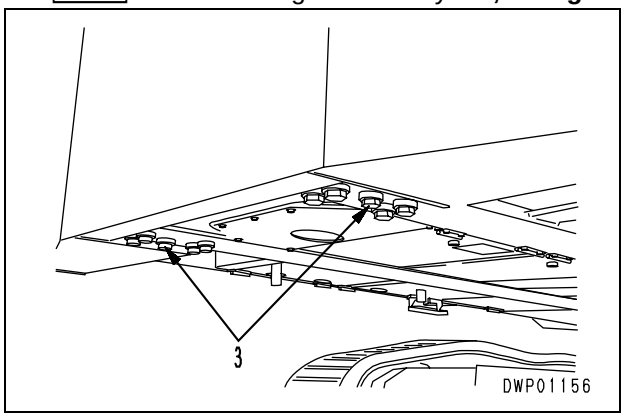


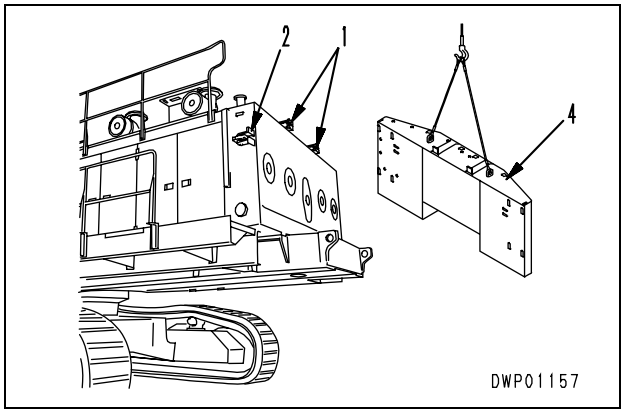
3. Disconnect left and right brackets (2).

4. Remove mounting bolts (3).

5. Lift off counterweight assembly (4). ※ 1

kg Counterweight assembly: **22,000 kg**





INSTALLATION

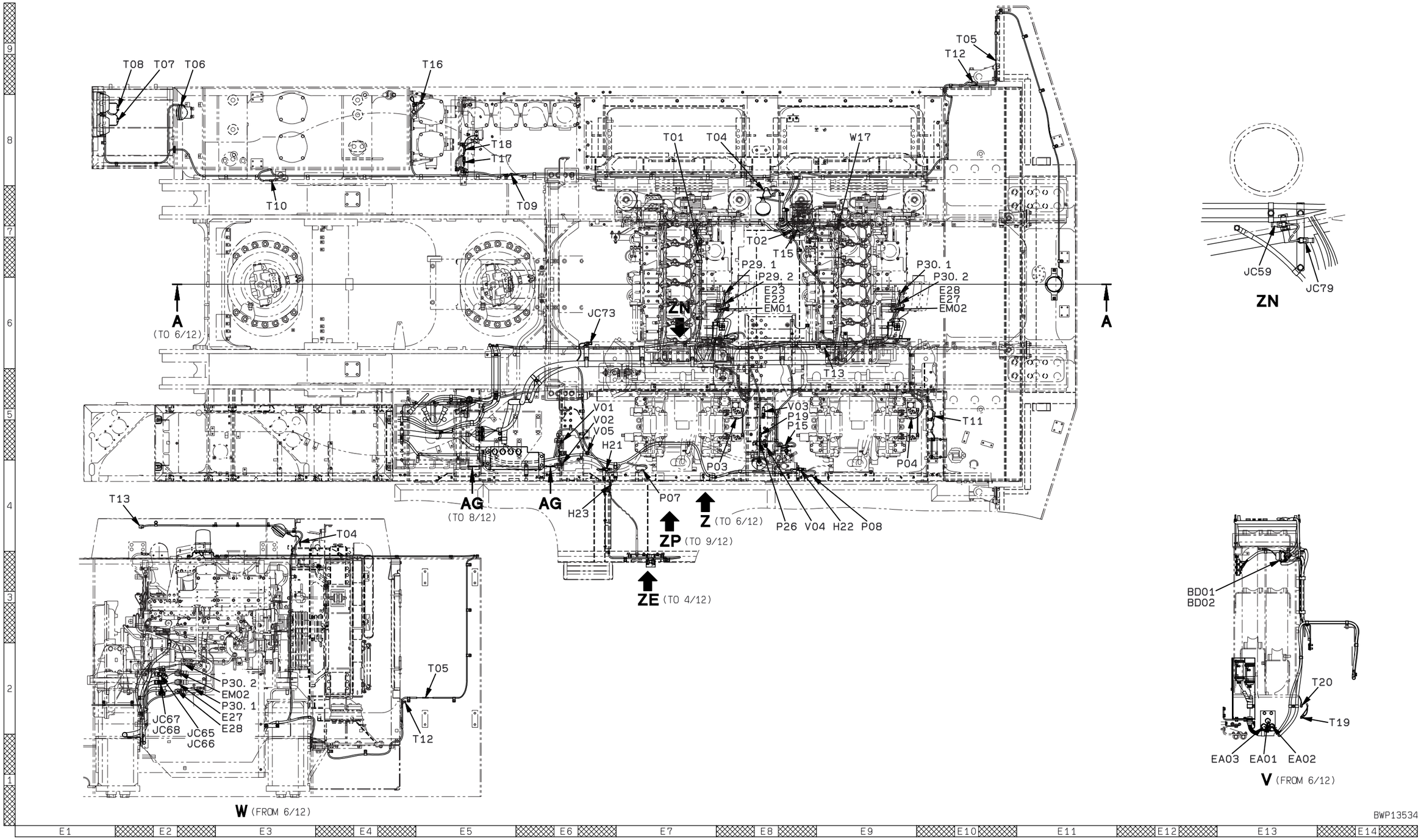
- Carry out installation in the reverse order to removal.

※ 1

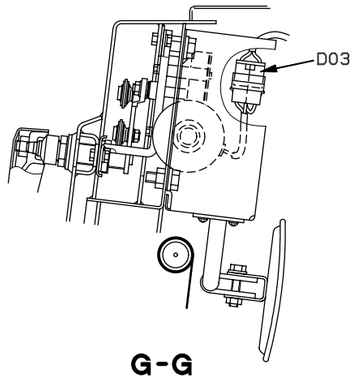
★ Install so that the clearance between the counterweight and the fuel tank is uniform on the left and right.

Counterweight mounting bolt:
3923 ± 490 Nm {400 ± 50 kgm}

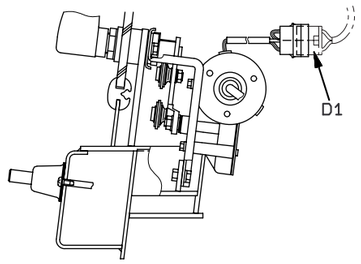
LOCATIONS OF CONNECTORS (WHOLE MACHINE – 5/12)



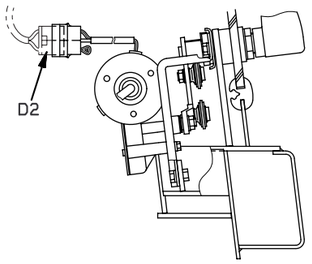
LOCATIONS OF CONNECTORS (OPERATOR'S CAB – 2/2)



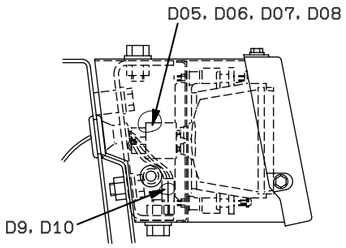
G-G
(FROM 1/2)



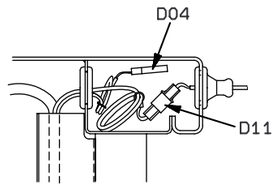
H-H
(FROM 1/2)



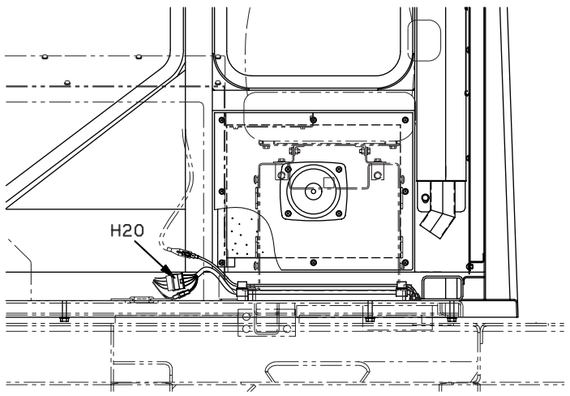
J-J
(FROM 1/2)



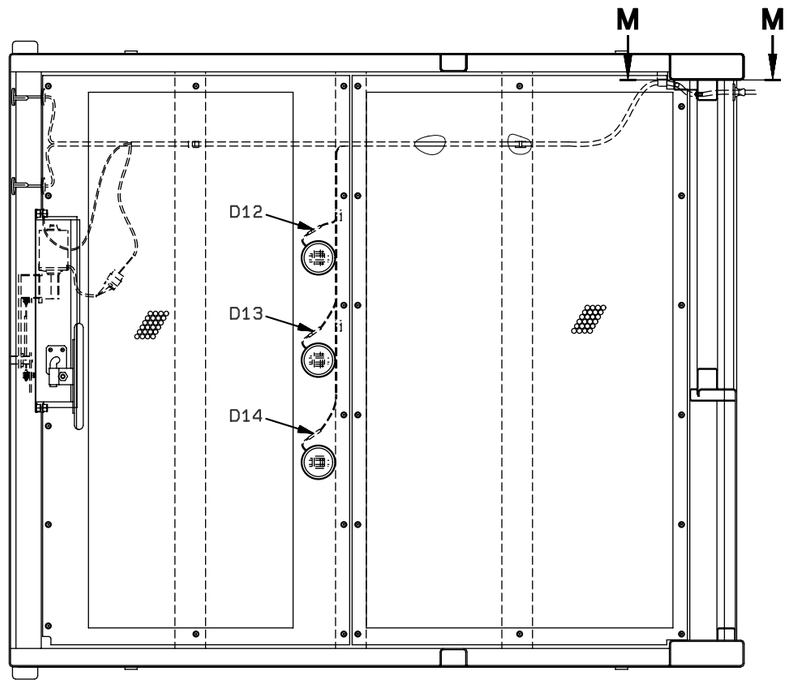
L-L (FROM 1/2)



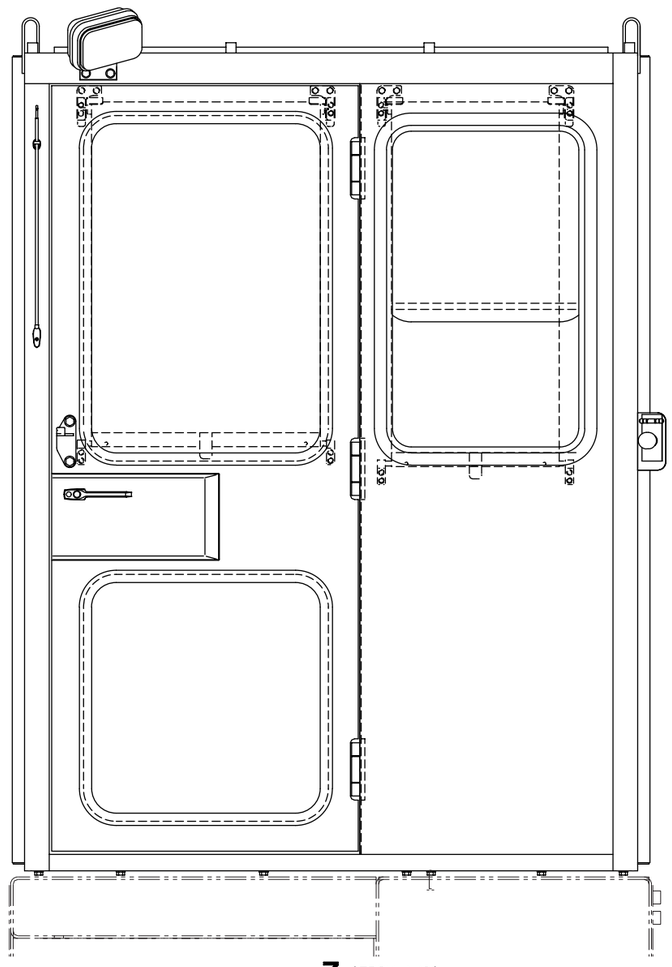
M-M



W (FROM 1/2)



Y (FROM 1/2)



Z (FROM 1/2)

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