

Shop Manual

WA470-7

WHEEL LOADER

SERIAL NUMBERS WA470-7 A47001 and up

ENGINE 6D125E-6

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00 Index and foreword

Foreword, safety and general information

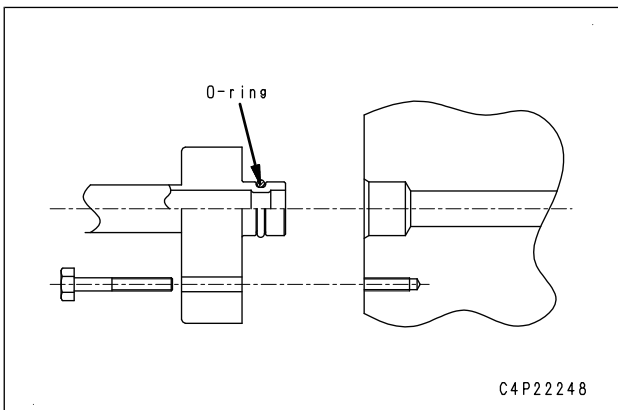
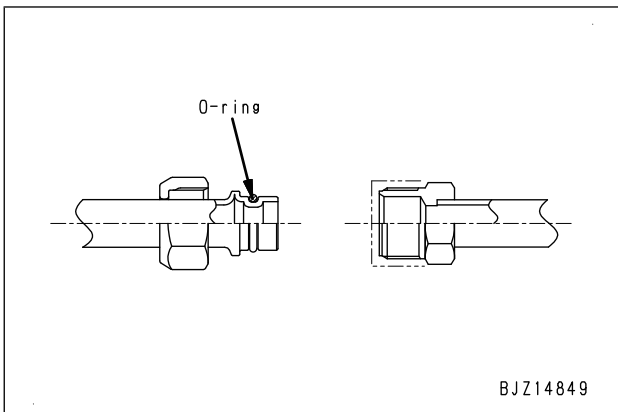
- Check that the O-ring is not damaged or deteriorated.
- Apply compressor oil for refrigerant (R134a) to the O-ring.
 - ★ However, do not apply oil to the threaded portion of a bolt, nut or union.

Manufacturer	Part name
DENSO	ND-OIL8
VALEO THERMAL SYSTEMS	ZXL100PG (equivalent to PAG46)
SANDEN	SP-10

- When tightening nuts of the air conditioner hoses and tubes, be sure to use two wrenches. Use one wrench to fix and tighten the nut with the other wrench to the specified torque (Use a torque wrench for tightening).

★ Example of fitting of O-ring

- An O-ring is fitted to every joint of the air conditioner piping.



**For tightening torques, see "Others",
"Precautions for disconnection and connection
of air conditioner piping".**

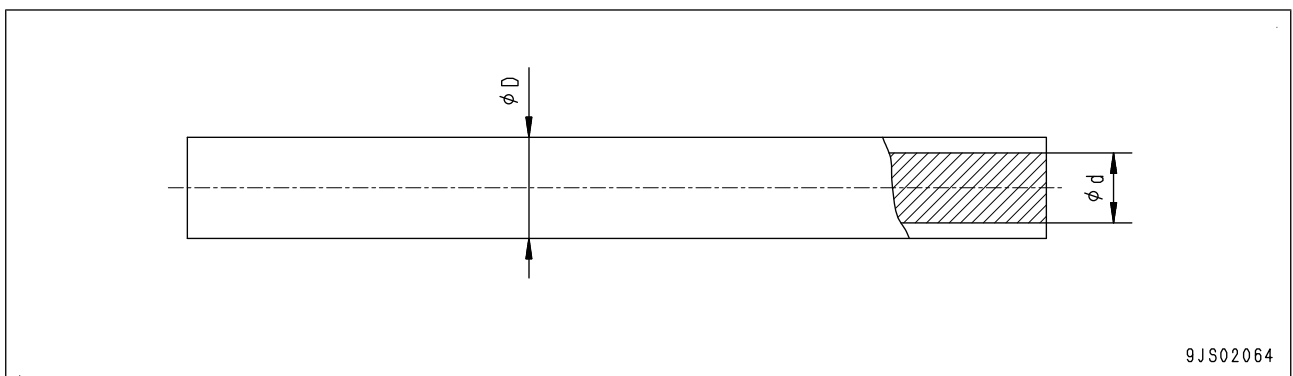
Dimension
(Table 2)

Nominal No.		0.5f	(0.5)	0.75f	(0.85)	1.25f	(1.25)	2f	2	3f	3	5	
Conductor	Number of strands/ Diameter of strand	20/ 0.18	7/0.32	30/ 0.18	11/ 0.32	50/ 0.18	16/ 0.32	37/ 0.26	26/ 0.32	58/ 0.26	41/ 0.32	65/ 0.32	
	Cross-sectional area (mm ²)	0.51	0.56	0.76	0.88	1.27	1.29	1.96	2.09	3.08	3.30	5.23	
	d (approx.)	1.0		1.2		1.5		1.9	1.9	2.3	2.4	3.0	
Coating D	AVS	Standard	2.0	2.2	2.5	2.9	2.9	3.5	3.6	—			
	AV	Standard	—			—		—	—	—	4.6		
	AEX	Standard	2.0	2.2	2.7	3.0	3.1	—	3.8	4.6			

Nominal No.		8	15	20	30	40	50	60	85	100	
Conductor	Number of strands/ Diameter of strand	50/0.45	84/0.45	41/0.80	70/0.80	85/0.80	108/ 0.80	127/ 0.80	169/ 0.80	217/ 0.80	
	Cross-sectional area (mm ²)	7.95	13.36	20.61	35.19	42.73	54.29	63.84	84.96	109.1	
	d (approx.)	3.7	4.8	6.0	8.0	8.6	9.8	10.4	12.0	13.6	
Coating D	AVS	Standard									
	AV	Standard	5.5	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6
	AEX	Standard	5.3	7.0	8.2	10.8	11.4	13.0	13.6	16.0	17.6

Nominal No.		0.5f	0.5	0.75f	0.85	1.25f	1.25	
Conductor	Number of strands/ Diameter of strand	—	7/round compression	—	11/round compression	—	16/round compression	
	Cross-sectional area (mm ²)	—	0.56	—	0.88	—	1.29	
	d (approx.)	—	0.9	—	1.1	—	1.4	
Coating D	CAVS	Standard	—	1.6	—	1.8	—	2.1

★ "f" of nominal No. denotes "flexible".



01 Specification

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- 3. KVTG
- 4. KVTG speed sensor
- 5. KVTG position sensor
- 6. Hydraulic actuator
- 7. Engine controller
- 8. EPC valve (for KVTG)
- 9. KDPF
- 10. EGR system (EGR cooler and EGR valve)
- 11. EGR valve lift sensor
- C. Blower impeller
- T. Turbine impeller

KVTG control system

- Based on information from KVTG position sensor (5), mass air flow and temperature sensor (2), and KVTG speed sensor (4), etc., the engine controller (7) moves hydraulic actuator (6) by using the oil pressure controlled by EPC valve (8), and then move the piston.
- A good response at high altitudes is maintained by sensing high elevations with the ambient pressure sensor, and automatically controlling the fuel injection and the KVTG.
- The KVTG is protected by controlling its speed to prevent overspeed.

Lubrication

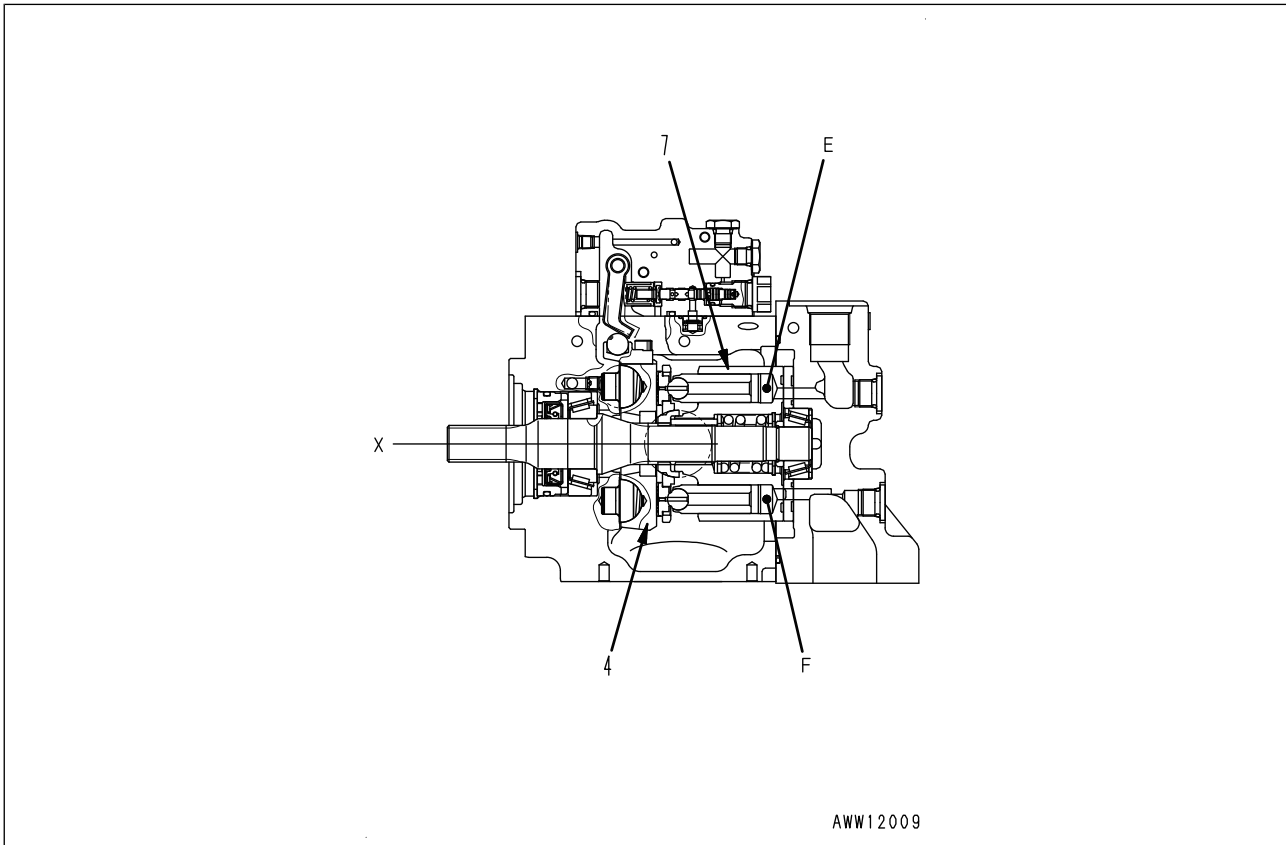
- Cooled oil from the engine oil cooler is sent through the supply pipe to the KVTG for lubrication
- Oil is sent to the bearing housing to lubricate the shaft bearing and thrust bearing.
- Return oil is drained from the return pipe connected to the bottom of the bearing housing and falls to the oil pan.

Cooling

- Coolant from the cylinder block enters the center housing to cool the KVTG.
- Returning coolant flows from the center housing to the radiator.

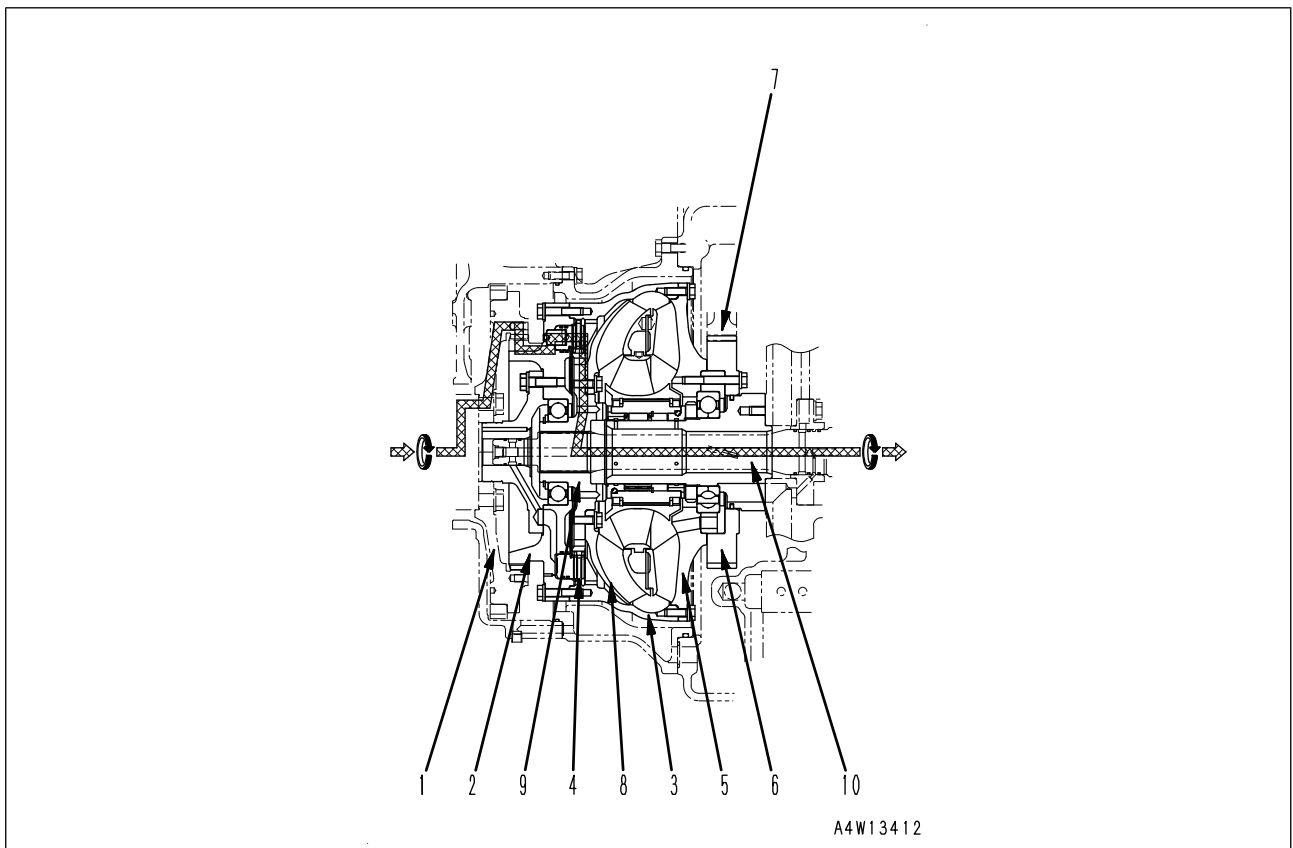
10 Structure and function

Cooling fan pump



- When center line (X) of rocker cam (4) matches the axis of cylinder block (7) (the swash plate angle is zero), the difference between volumes (E) and (F) inside cylinder block (7) is zero.
- Pressurized oil is not sucked or discharged, namely pumping action is not performed. (Actually, however, the swash plate angle does not become 0 deg.)
- The pump delivery is in proportion to swash plate angle (a).

When lockup clutch is "engaged"



Drive case (3), boss (9), and turbine (8) are connected and the torque converter is locked up.

Power from engine

↓

Flywheel (1)

↓

Clutch housing (2)

↓

Drive case (3), pump (5), and PTO drive gear (6) rotate as one unit

↓

Lockup clutch (4)

↓

Boss (9)

↓

Transmission input shaft (10)

- The power transmitted to PTO drive gear (6) is then transmitted through PTO gear (7) to drive the pump.

10 Structure and function

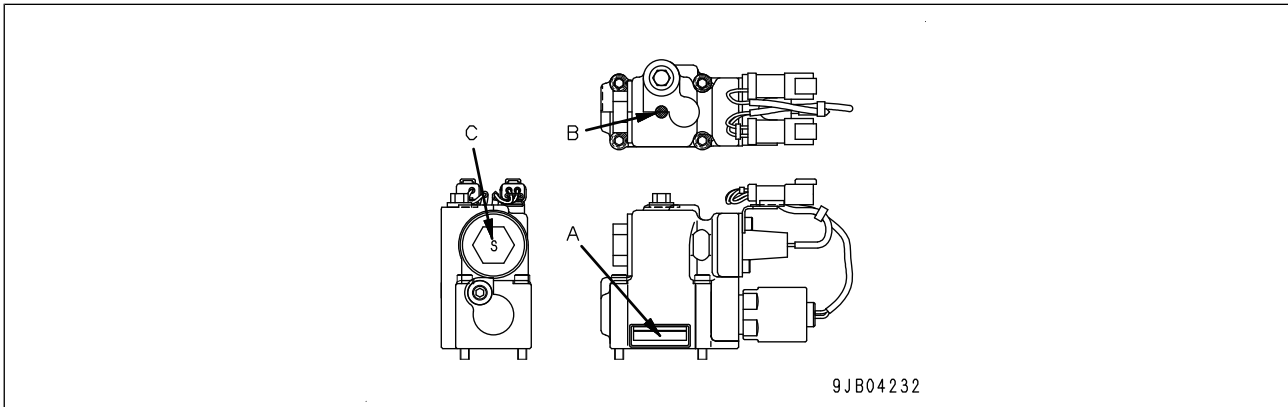
Transmission control valve

Function (WA470-CJA0-042-K-00-A)

- The oil from the pump flows through the oil filter into the transmission control valve assembly and then is divided into the main relief circuit and clutch actuation circuit.
- The oil regulated its pressure by the main relief valve and flowed into the clutch operating circuit goes through the last chance filter, then operates the clutch and parking brake. The oil relieved from the main relief valve is supplied to the torque converter.
- When the transmission gear is shifted, the ECMV increases the clutch oil pressure smoothly according to the command current from the transmission controller to reduce the gear shifting shocks. The ECMV also keeps the clutch pressure constant during travel.
- If the F or R, and one of the 1st to 4th clutch ECMVs are selected, the regulated oil pressure is supplied to the selected clutches and the desired gear speed is obtained.
- The lockup ECMV is actuated when the machine travels in the 2nd, 3rd, or 4th gear speed and its travel speed exceeds the travel speed set by the transmission controller.
- This machine uses three types of the ECMVs, which have the following identifications and differences.

Stamp on name plate (A)	Identification color (B)	Mark (C)	Flow detection valve	Fill switch (operating pressure: MPa {kg/cm ² })	Clutches to be used
L*****	—	—	Not installed	Installed (0.20 {2.0})	F, R, 1st, 2nd
Q*****	Pink	S	Installed	Installed (0.24 {2.45})	3rd, 4th
K*****	—	—	Not installed	Not installed	L/U

L/U: Indicates lockup clutch ECMV.



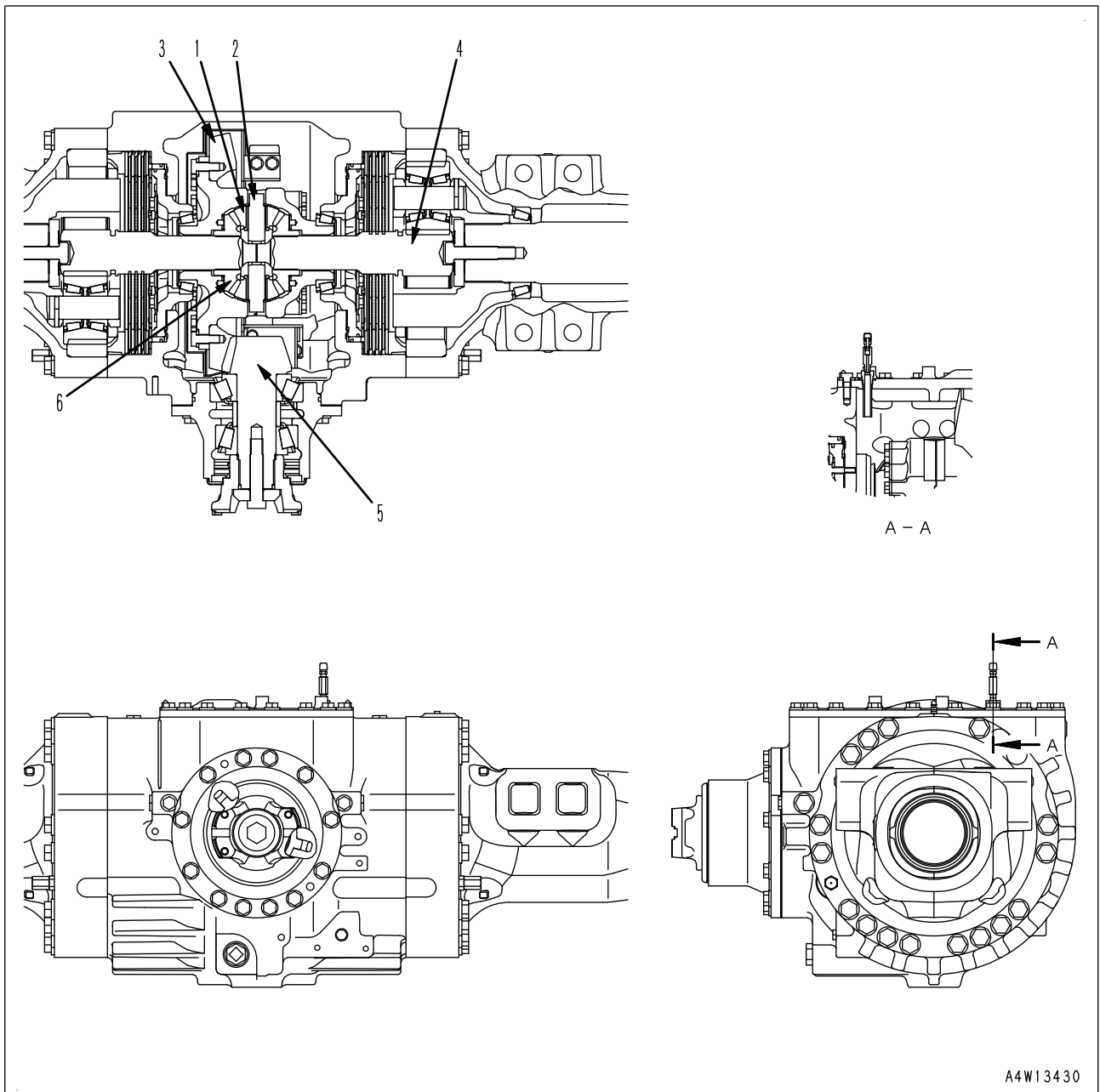
- Table of ECMV operation

		ECMV						
		F	R	1st	2nd	3rd	4th	L/U
Gear speed	F1	○		○				
	F2	○			○			○
	F3	○				○		○
	F4	○					○	○
	R1		○	○				
	R2		○		○			○
	R3		○			○		○
	R4		○				○	○

L/U: Indicates lockup clutch ECMV.

Differential (HM300-DC10-001-K-00-A)

Front conventional differential (WA470-DC70-041-K-00-A)



- 1. Pinion
- 2. Shaft
- 3. Bevel gear
- 4. Sun gear shaft
- 5. Bevel pinion
- 6. Side gear

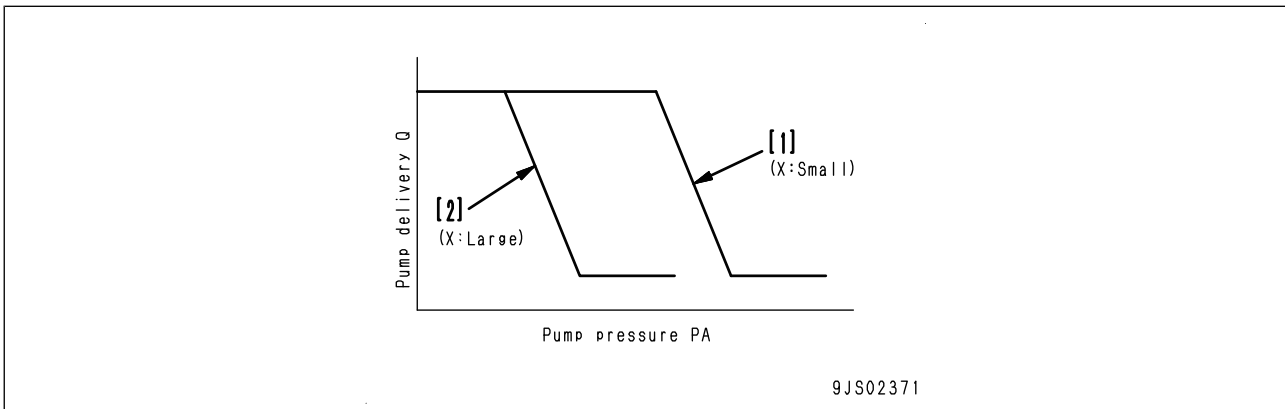
10 Structure and function

Steering pump

PC valve (WA380-F2S0-001-K-00-A)

Function (WA380-F2S0-042-K-00-A)

- The PC valve limits the oil flow to a certain level (depending on the delivery pressure) even if the travel of the control valve is increased extremely so that the horsepower absorbed by the pump does not exceed the engine horsepower, when pump delivery pressure (PA) is high.
- In other words, the PC valve decreases the pump delivery when the actuator load is increased and the pump delivery pressure rises, and increases it when the pump delivery pressure lowers.
- If command current (X) sent to EPC valve increases further, the relationship between pump pressure (PP) and pump delivery (Q) is shifted parallel in proportion to the thrust of EPC valve solenoid.
- That is, since the thrust of the EPC valve solenoid is added to the left-hand thrust caused by the pump pressure applied to spool (6), the relationship between pump pressure (PA) and (Q) is shifted from [1] to [2] as (X) increases.



Operation (WA380-F2S0-044-K-00-A)

Action of spring

- The spring force of spring (3) in the PC valve is determined by the angle of the swash plate.
- When servo piston (9) moves to the right, spring (3) is compressed through lever (2) and the spring force changes.

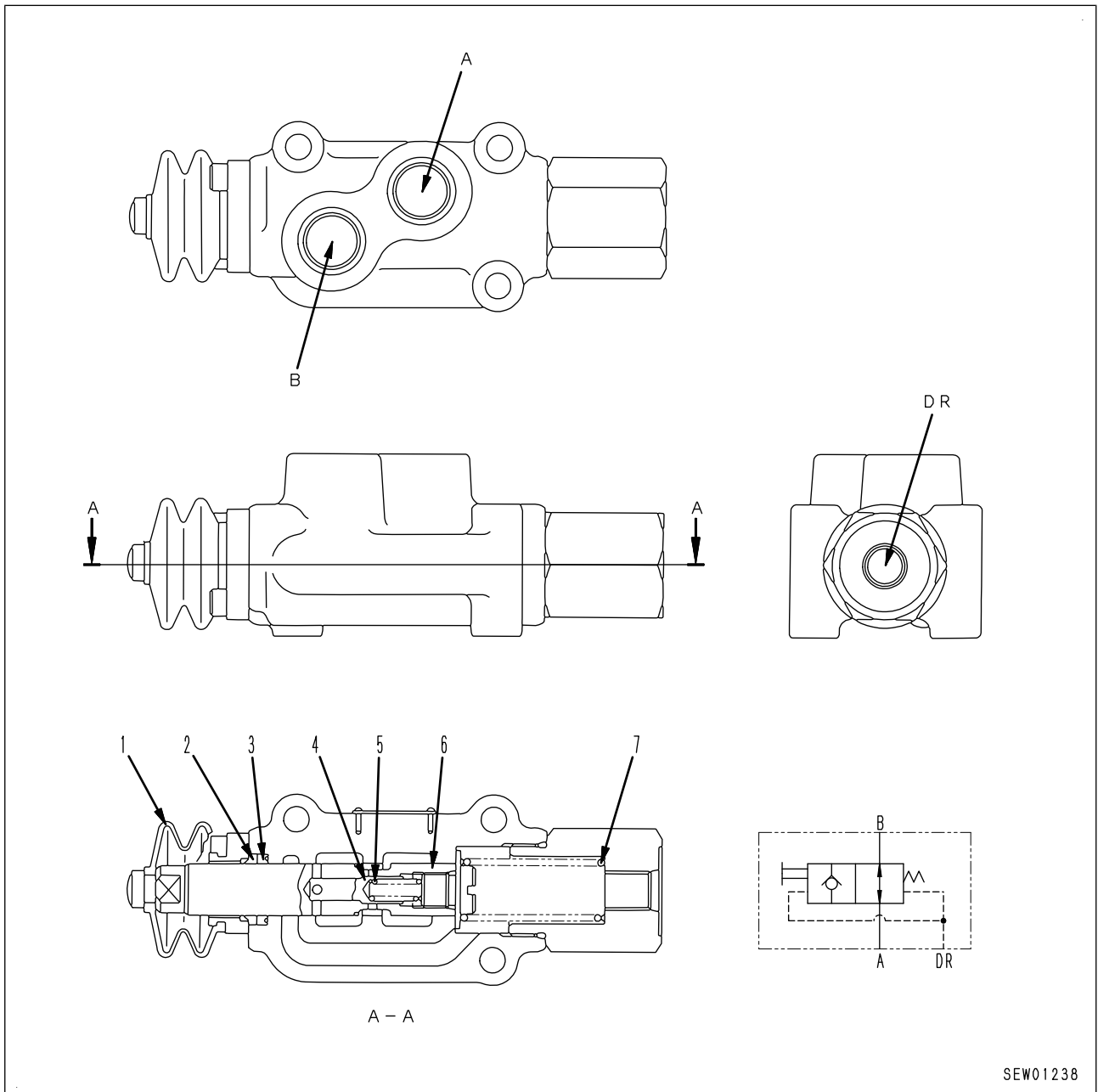
When pump pressure (PA) is low

- The pressing force of piston (10) is decreased and spool (6) is a little closer to the right (Fig. 1). At this time, port (C) is connected to port (D) and the pressure transmitted to the LS valve becomes drain pressure (PT).
- When port (F) is connected to port (G) of the LS valve, the pressure in port (J) becomes drain pressure (PT) and servo piston (9) moves to the left.
- Consequently, the pump delivery is increased.
- As servo piston (9) moves, lever (2) moves to the left and spring (3) expands and the spring force is decreased. Consequently, spool (6) moves to the left and port (C) is disconnected from port (D) and connected to pump discharge port (B).
- As a result, the pressure in port (C) rises and the piston pressure is increased and servo piston (9) stops moving to the left.

When pump pressure (PA) is high

- The pressing force of piston (10) is increased and spool (6) is a little closer to the left (Fig. 2). At this time, port (C) is connected to port (B) and the pressure transmitted to the LS valve becomes pump pressure (PA).
- When port (F) is connected to port (G) of the LS valve, the pressure in port (J) becomes pump pressure (PA) and servo piston (9) moves to the right.
- Consequently, the pump delivery is decreased.
- As servo piston (9) moves, lever (2) moves to the right and spring (3) is compressed and spring force is increased. Consequently, spool (6) moves to the right and port (C) is disconnected from port (B) and connected to drain pressure port (D).
- As a result, the pressure in port (C) lowers and the piston pressure is decreased and servo piston (9) stops moving to the right.

Stop valve (WA380-F5U0-041-K-00-A)



SEW01238

A: From orbit-roll valve

B: To steering valve

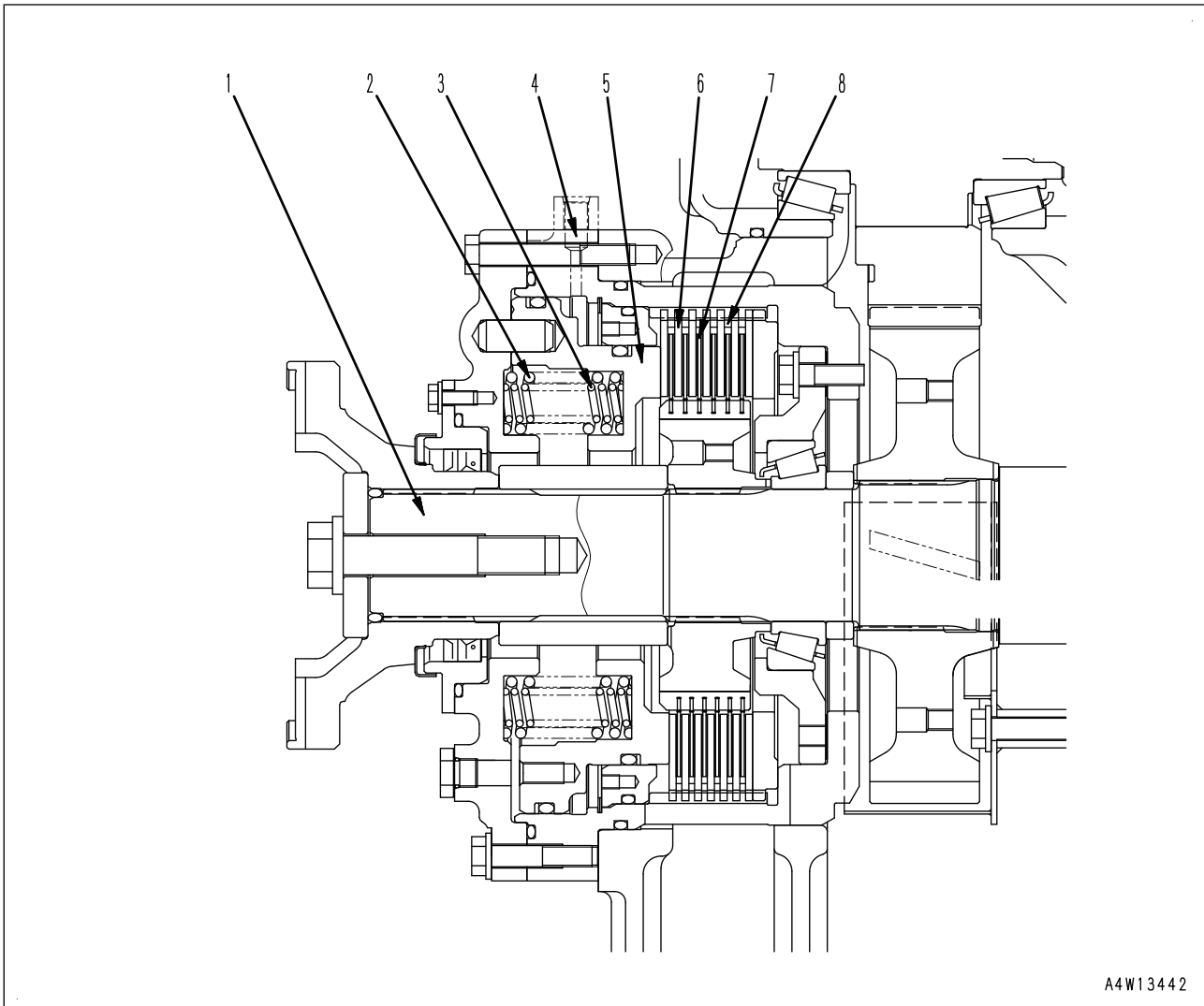
DR: Drain

1. Boot
2. Wiper
3. Seal
4. Poppet
5. Spring
6. Spool
7. Spring

10 Structure and function

Parking brake

Parking brake (WA470-GJ20-041-K-00-A)



A4W13442

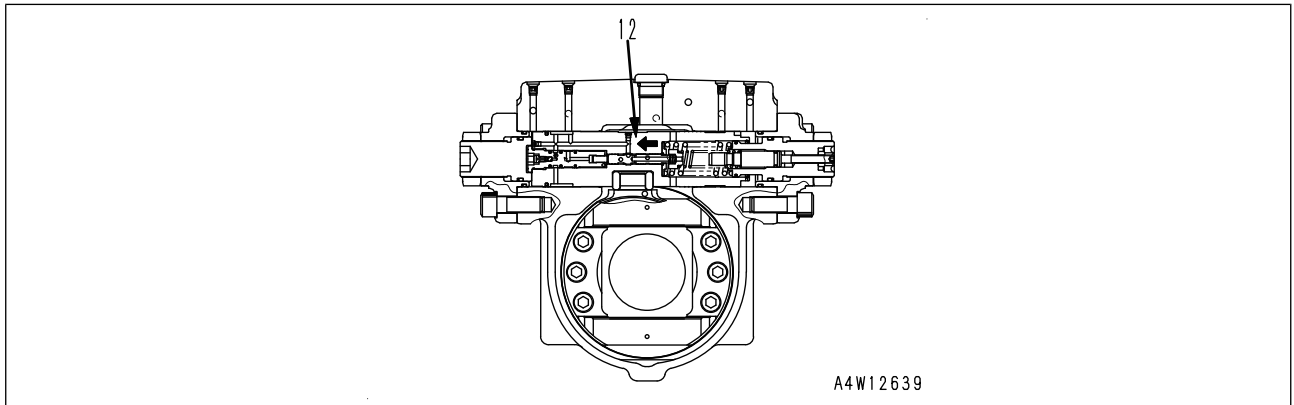
1. Output shaft
2. Spring (outside)
3. Spring (inside)
4. Parking brake oil port
5. Piston
6. Plate
7. Disc
8. Wave spring

Structure

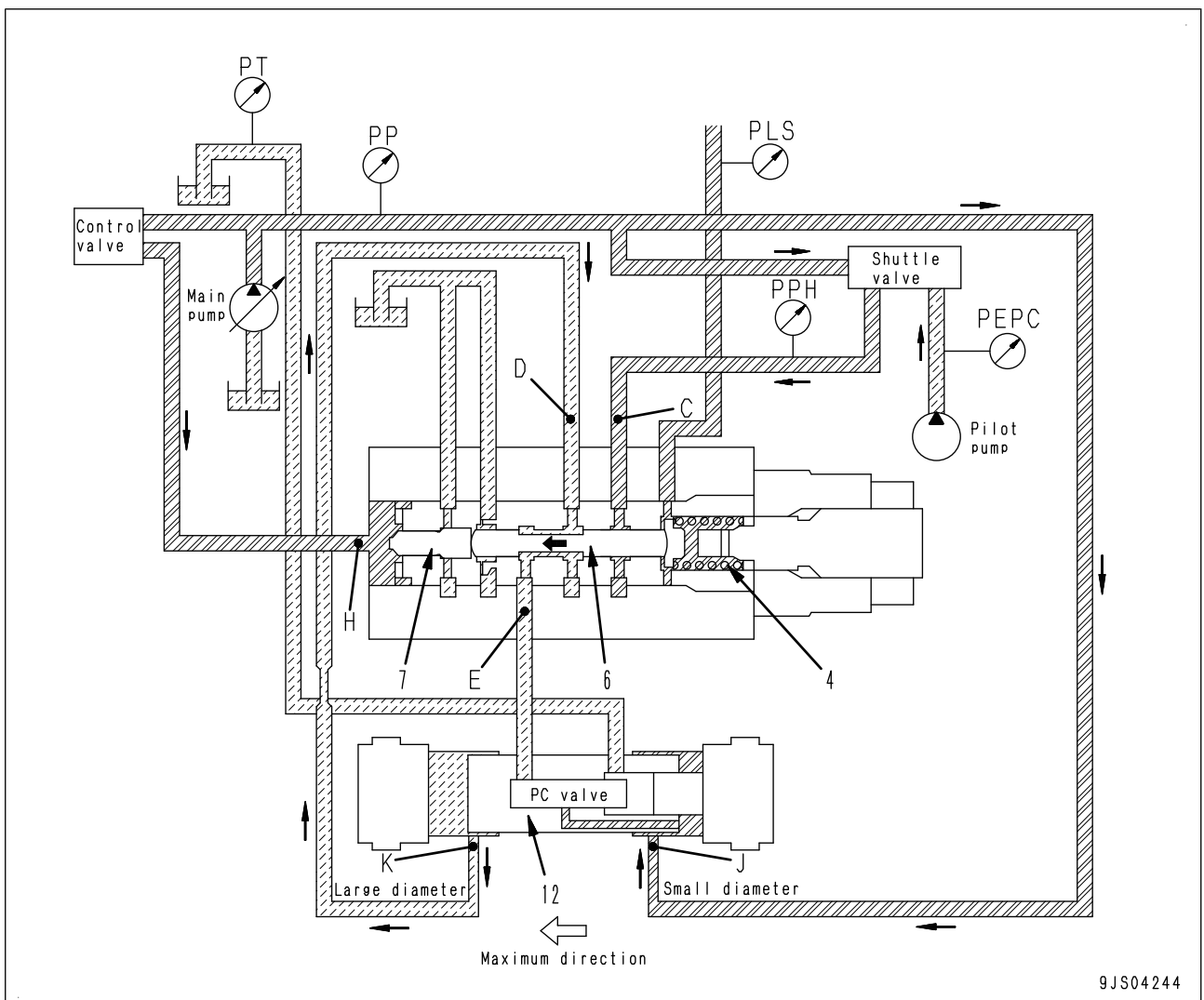
- The parking brake is a wet-type multiple-disc brake, which is operated mechanically by springs (2) and (3) to brake output shaft (1).

Operation (WA380-GJ20-044-K-00-A)

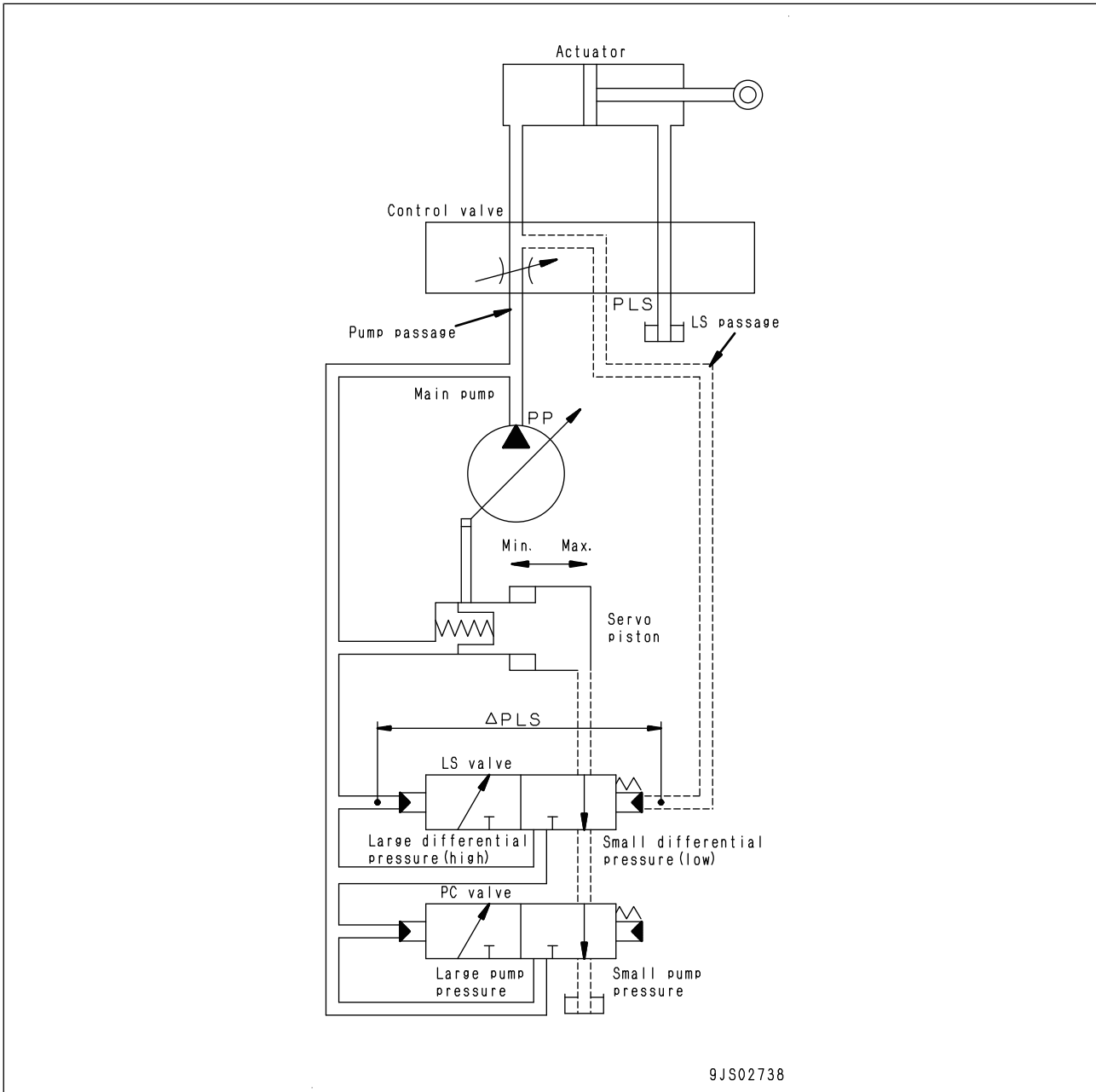
- When the brake is applied, piston (5) presses plates (6) and discs (7) against each other with the tension of springs (2) and (3) to lock output shaft (1).
- When the brake is released, the oil pressure from parking brake oil port (4) moves piston (5) to release the pressing force on discs (7) and plates (6).



Operation in direction to increase pump discharge

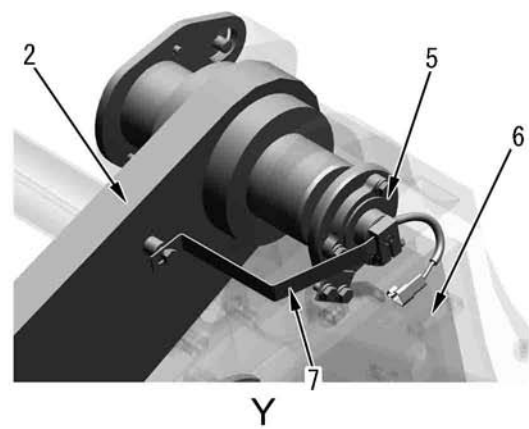
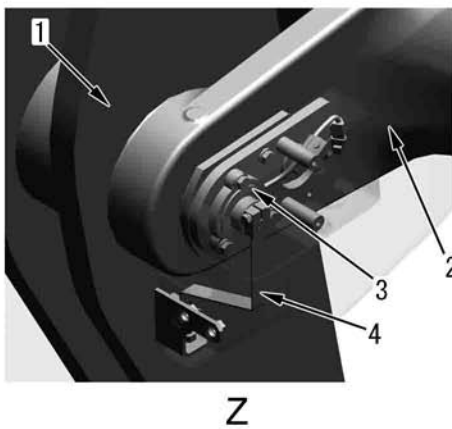
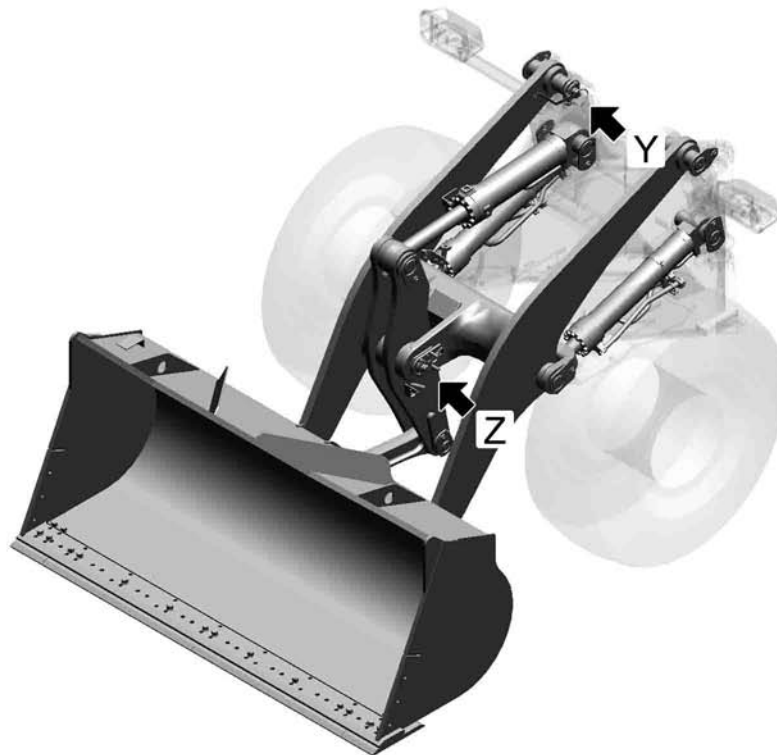


- When the difference between pump discharge pressure (PP) and LS pressure (PLS), in other words, LS differential pressure (ΔPLS) becomes smaller [for example, when the area of opening of the control valve becomes larger and pump discharge pressure (PP) drops], spool (6) is pushed to the left by the combined force of LS pressure (PLS) and the force of spring (4).
- As spool (6) moves, ports (D) and (E) are interconnected and also connected to the PC valve.
- Since the PC valve is connected to the drain port, the pressure between circuits (D) and (K) becomes drain pressure (PT). (The operation of the PC valve is described later.)



- The pump swash plate shifts toward the maximum angle position if LS differential pressure (ΔPLS) is lower than the set pressure of the LS valve.
- The pump swash plate shifts toward the minimum angle position if LS differential pressure is higher than the set pressure.

Bucket positioner and boom positioner (WA470-LEE0-041-K-00-A)



APW13465

1. Bell crank
2. Boom
3. Bucket potentiometer
4. Bucket potentiometer lever
5. Boom potentiometer
6. Front frame
7. Boom potentiometer lever

10 Structure and function
Transmission controller system

Downshift target gear speed	Transmission output shaft speed [rpm] (Reference: Actual travel speed [km/h])	
	Protection condition	Protection cancelation condition
To 3rd speed	Min. 2,227 (30.2)	Below 2,005 (27.2)
To 2nd speed	Min. 1,470 (19.9)	Below 1,322 (17.9)
To 1st speed	Min. 1,061 (14.4)	Below 951 (12.9)

Engine overrun prevention function (WA380-CV34-042-K-00-A)

- If the engine speed rises above 2,425 rpm, the alarm buzzer sounds for notice of operation of engine overrun prevention function. The alarm buzzer stops when the engine speed lowers below 2,325 rpm.
- If the engine speed rises above 2,500 rpm, the lockup is cancelled automatically to prevent overrun of the engine.
- The alarm buzzer sounds while the engine overrun prevention function is in operation.
- Once the lockup is cancelled, the lockup condition is maintained for 5 seconds. When the transmission output shaft speed decreases to a level corresponding to below 2,350 rpm of the engine speed after 5 or more seconds, the lockup is applied again.
- While the lockup is not in operation, the buzzer sounds for notice or warning at the above engine speeds, but no special remedy is performed.

Speed limiting function (WA470-CV35-042-K-00-A)

- If the travel speed exceeds the specified maximum travel speed, the alarm buzzer sounds.

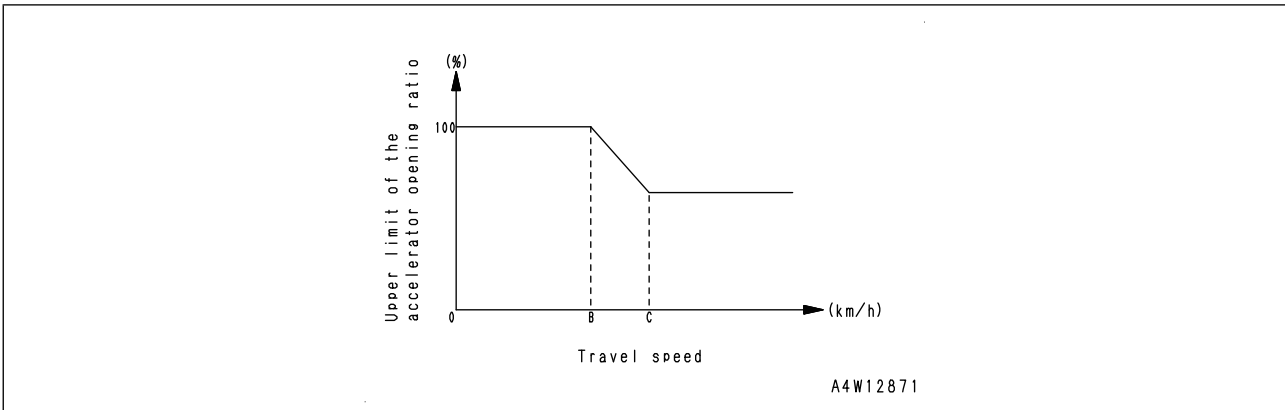
Unit: km/h

Model	WA470-7
Alarm activation specified value (actual travel speed)	40.0
Alarm cancellation specified value (actual travel speed)	39.5

- If the travel speed exceeds the threshold value in the 4th lockup mode, the upper limit of the accelerator pedal position is restricted to limit the maximum travel speed.

Unit: km/h

Model	WA470-7	
Shift range	F4	R4
Actual travel speed (B)	37.0	
Actual travel speed (C)	38.0	



Neutralizer function (WA380-CV36-042-K-00-A)

- While the parking brake switch is turned "ON", the transmission is kept in neutral to prevent dragging of the parking brake, regardless of the positions of the directional lever and gear shift lever.
- Since the parking brake circuit employs the safety mechanism, the parking brake is kept applied even if the starting switch is turned from the "OFF" position to the "ON" position. Accordingly, when the starting switch is turned to the "ON" position, the transmission is always set in neutral, regardless of the positions of the directional lever and gear shift lever.

★ The floating detent does not operate at around the setting stop position. However, the floating detent operates when the boom angle is below -37 degrees for the grading work.

1. Setting stop position

- The boom stop position when the positioner is operated is changed with the boom positioner switch.

Setting and cancelation of raising stop position

Condition for enabling	Boom lever travel: Neutral and boom position is flat or above
Method of setting raising stop	(1) Raise the boom to a position to set.
	(2) Press the remote positioner raising position set switch (less than 1 second).
	(3) If the position in which the switch is pressed is within the set range, the boom angle is saved, the setting completion buzzer (pip, pip) sounds, and the pilot lamp on the monitor lights up.
	(4) If the position is out of the range (boom angle is below 0 degrees) or the sensor has an error, setting is not performed again. (The buzzer does not sound and set position is not changed)
	(5) If the setting switch is operated less than 1 second, the set position is always changed. (The set position is maintained even after the key is turned to the OFF position.)
Method of canceling setting of raising stop	(1) Press the remote positioner raising position set switch for 1 second or more.
	(2) If the position is within the set range when the switch is pressed, it is set temporarily. If the switch is held down for 1 second or more in (3) above, the setting cancel buzzer sounds (peep) when 1 second elapses and the raising selection is canceled and the pilot lamp of the monitor goes off. ★ The setting can be canceled when the boom is in the range above the flat position.
	(3) Leave the remote positioner raising stop control unexecuted. Perform only the boom kick-out control.
	(4) In this operation, the lowering stop setting is not canceled.









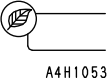
Setting and cancelation of lowering stop position

Condition for enabling	Boom lever stroke: Neutral and boom position is flat or below
Method of setting lowering stop	(1) Lower the boom to a position to set.
	(2) Press the remote positioner lowering position set switch. (less than 1 second)
	(3) If the position in which the switch is pressed is within the set range, the boom angle is saved, the setting completion buzzer (pip, pip) sounds, and the pilot lamp on the monitor lights up.
	(4) If the position is out of the range (boom angle is out of the range between -37 degrees and 0 degrees) or the sensor has an error, setting is not performed again. (The buzzer does not sound and set position is not changed)
	(5) If the setting switch is operated less than 1 second, the set position is always changed. (The set position is maintained even after the key is turned to the OFF position.)
Method of canceling setting of lowering stop	(1) Press the remote positioner lowering position set switch for 1 second or more.
	(2) If the position is within the set range when the switch is pressed, it is set temporarily. If the switch is held down for 1 second or more in (3) above, the setting cancel buzzer sounds (peep) when 1 second elapses and the lowering selection is canceled and the pilot lamp of the monitor goes off. ★ The setting can be canceled when the boom is in the range below the flat position.
	(3) Leave the remote positioner lowering stop control unexecuted. Perform only the float detent control.
	(4) In this operation, the lowering stop setting is not canceled.

Remote positioner stop position settable range
[Raising/Lowering stop position settable range]

10 Structure and function

Machine monitor system

Monitor display	Item displayed	Display color	Contents	Remarks
 A4H10449	Emergency steering (if equipped)	Green	Lights up when emergency steering operates.	
 9JC01439	P mode	Green	Lights up when P mode is selected with power mode selector switch.	
 A4H10450	E mode		Lights up when E mode is selected with power mode selector switch.	
 A4H10451	Shift hold	Green	Lights up when shift hold operates.	
 A4H10452	Lockup	Green	Lights up when lockup is engaged.	
 A4W12241	Fan reverse rotation	Yellow	<ul style="list-style-type: none"> Lights up when fan rotates in reverse. Flashes while rotation direction is being changed. 	
 A4W12242		Red	Lights up while rotation direction change condition is being waited to meet.	
 9JC01177	Preheating	Yellow	Lights up when engine electric preheater operates.	
 A4H10530	ECO guidance	Background: Green Characters: White	<ul style="list-style-type: none"> Guidance on excessive engine idling Guidance on deterrence of hydraulic relief Guidance on deterrence of brake dragging Guidance on deterrence of accelerator pedal depressing Guidance on recommendation of 4th gear Guidance on recommend of lockup Guidance on deterrence of long-period digging 	

DEUTSCH-40P (2) [CN-L63]

Pin No.	Signal name	Input/output signal
1	Continuous power supply (24 V)	Input
2	Power supply (24 V)	Input
3	GND (solenoid)	—
4	Battery relay	Output
5	ECMV R	Output
6	ECMV 3rd	Output
7	(*1)	—
8	Neutral safety relay	Output
9	Kickdown switch	Input
10	(*1)	—
11	Continuous power supply (24 V)	Input
12	Power supply (24 V)	Input
13	GND (solenoid)	—
14	Starting switch ACC signal	Input
15	E.C.S.S. solenoid	Output
16	ECMV 4th	Output
17	(*1)	—
18	Parking brake relay	Output
19	Shift hold switch	Input
20	Transmission cut-off switch	Input
21	GND (controller)	—
22	Power supply (24 V)	Input
23	GND (solenoid)	—
24	Starting switch ACC signal	Input
25	Cooling fan EPC	Output
26	ECMV F	Output
27	ECMV 1st	Output
28	(*1)	—
29	(*1)	—
30	Transmission cut-off set switch	Input
31	GND (controller)	—
32	GND (controller)	—
33	GND (controller)	—
34	System operating lamp	Input
35	Cooling fan reverse rotation solenoid	Output
36	ECMV L/U	Output
37	ECMV 2nd	Output
38	(*1)	—
39	(*1)	—
40	(*1)	—

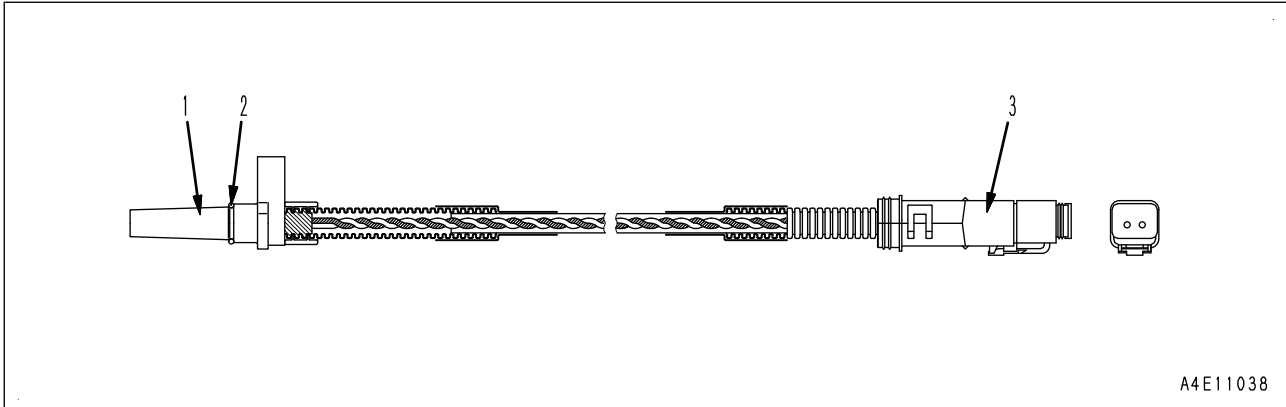
*1: Never connect these pins. Malfunctions or failures may occur.

10 Structure and function

Sensor

KVGT speed sensor (ENG125-AAQ4-041-K-00-A)

KVGT: Abbreviation for KOMATSU Variable Geometry Turbocharger



1. Sensor
2. O-ring
3. Connector

Function (ENG125-AAQ4-042-K-00-A)

- This sensor, installed to KVGT in the engine, outputs the pulse voltage by means of the rotation of KVGT turbine.

WHEEL LOADER

WA470-7

Model	Serial Number
WA470-7	A47001- and up

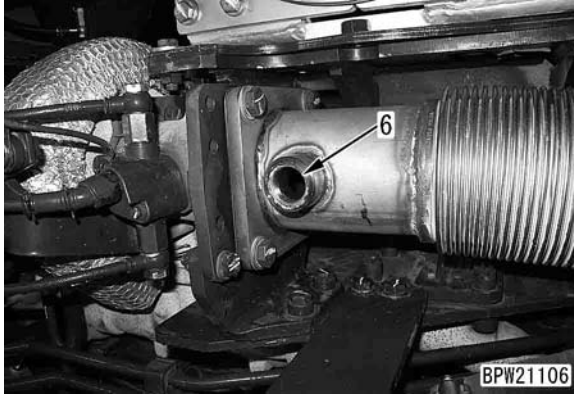
20 Standard value tables

20 Standard value tables

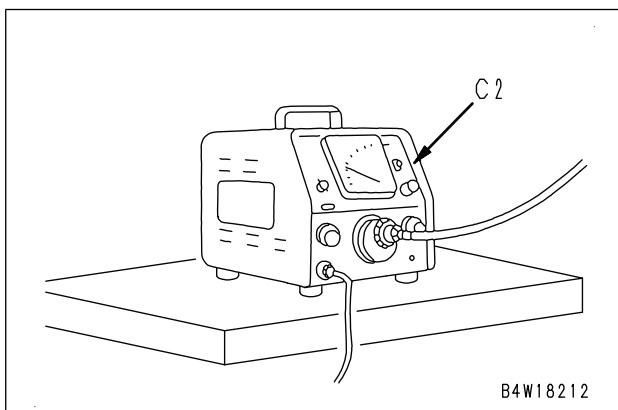
Standard value table for electrical system

Equipment name	Procedure, measuring location, criteria and remarks		
		Between ground and each of R71 (male) (1) and (2)	Min. 1 MΩ
Lockup clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector LC.PS, and connect T-adaptor to male side.		
	Resistance	Between LC.PS (male) (1) and (2)	5 to 15 Ω
1st clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 1.PS, and connect T-adaptor to male side.		
	Resistance	Between 1.PS (male) (1) and (2)	5 to 15 Ω
2nd clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 2.PS, and connect T-adaptor to male side.		
	Resistance	Between 2.PS (male) (1) and (2)	5 to 15 Ω
3rd clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 3.PS, and connect T-adaptor to male side.		
	Resistance	Between 3.PS (male) (1) and (2)	5 to 15 Ω
R clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector R.PS and connect T-adaptor to male side.		
	Resistance	Between R.PS (male) (1) and (2)	5 to 15 Ω
F clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector F.PS, and connect T-adaptor to male side.		
	Resistance	Between F.PS (male) (1) and (2)	5 to 15 Ω
4th clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 4.PS, and connect T-adaptor to male side.		
	Resistance	Between 4.PS (male) (1) and (2)	5 to 15 Ω
3rd valve (attachment) EXTEND EPC solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector F25, and connect T-adaptor to male side.		
	Resistance	Between F25 (male) (1) and (2)	5 to 15 Ω
3rd valve (attachment) RETRACT EPC solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector F26, and connect T-adaptor to male side.		
	Resistance	Between F26 (male) (1) and (2)	5 to 15 Ω
Transmission oil temperature sensor	1. Turn starting switch to OFF position. 2. Disconnect connector TM.T and connect T-adaptor to male side.		
	Resistance	Between TM.T (male) (1) and (2)	Oil temperature: 25°C (normal temperature) 35 to 50 kΩ
Hydraulic oil temperature sensor	1. Turn starting switch to OFF position. 2. Disconnect connector R47 and connect T-adaptor to male side.		
	Resistance	Between R47 (male) (1) and (2)	Oil temperature: 25°C (normal temperature) 35 to 50 kΩ
Brake oil temperature sensor (rear)	1. Turn starting switch to OFF position. 2. Disconnect connector R60, and connect T-adaptor to male side.		
			Oil temperature: 100°C 3.1 to 4.5 kΩ

- ★ Before connecting the power cable, make sure that the power switch of the smoke meter is turned OFF.
- 3) Insert probe [1] of the smoke meter C2 into port (6) for the removed plug.
- ★ Set the probe end so that it is in parallel with the direction of the pipe at its center.



- 4) Loosen the cap nut of the suction pump and place the filter paper.
- ★ Place the filter paper securely so that the exhaust gas does not leak.
- 5) Turn the power switch of smoke meter C2 ON.



- 6) Start the engine, put the torque converter in the stalled condition, and then depress the accelerator pedal of smoke meter C2 to collect the exhaust gas impurities on the filter paper.
- 7) Place the contaminated filter paper on the clean filter paper (at least 10 sheets) in the filter paper holder and read the indicated value.
- 8) After finishing the test, remove the testing tools and restore the machine.

Testing engine piping for damage and looseness (WA380-A000-280-K-00-A)

Air intake and exhaust systems: Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for air suction and exhaust gas leakage. If any part is loosened or damaged, retighten or repair it.

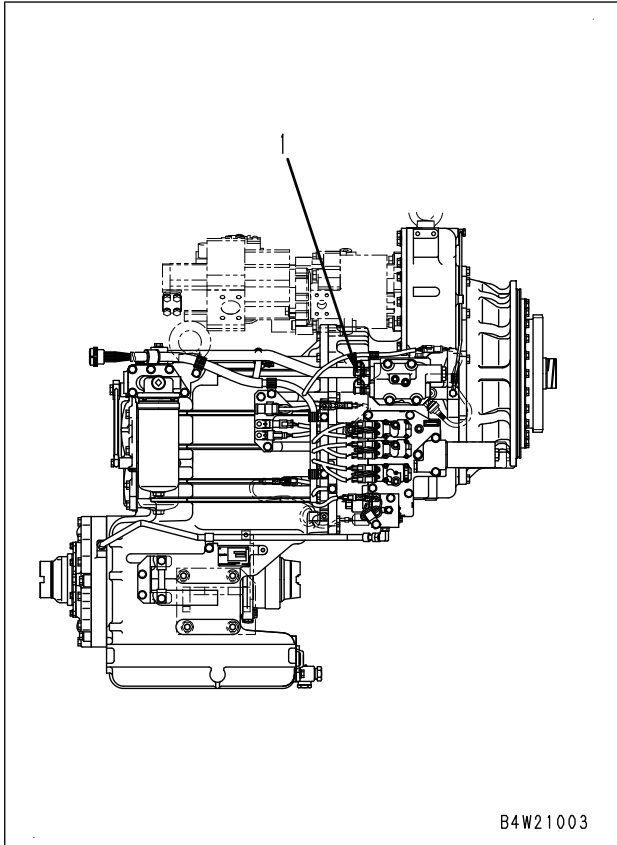
Cooling system: Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for water leakage. If any part is loosened or damaged, retighten or repair it.

Fuel system: Check the piping for damage, the mounting bolts and nuts for looseness, and the joints for fuel leakage. If any part is loosened or damaged, retighten or repair it.

Testing (WA470-C100-362-K-00-A)

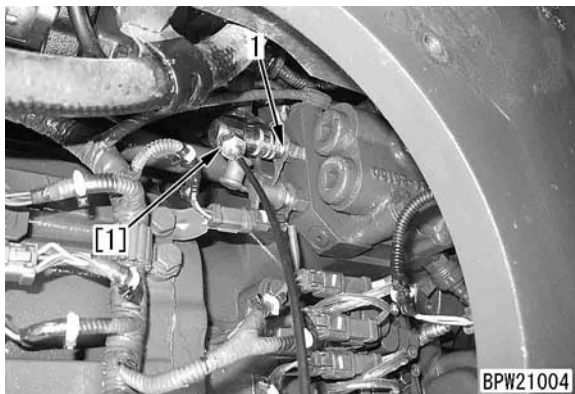
Testing transmission main relief pressure

- ★ Transmission main relief pressure pickup port (1)



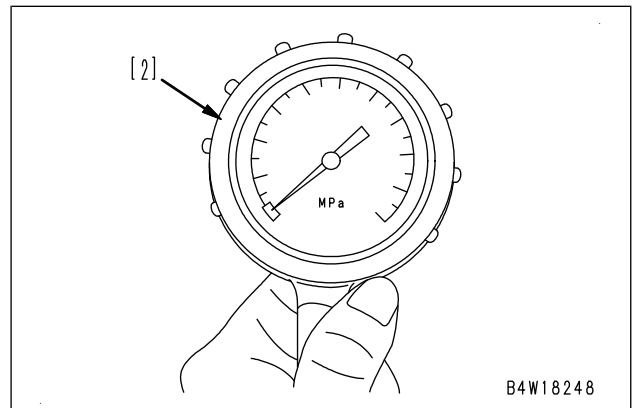
1. Install hose [1] of hydraulic tester N1 to transmission main relief pressure pickup nipple (1). Connect gauge [2] to the hose.

- ★ The hose of digital hydraulic tester N2 can also be used.
- ★ Use an oil pressure gauge of 6 MPa {60 kg/cm²}.



2. Start the engine with power mode, and keep the directional lever or directional selector switch in N (NEUTRAL).

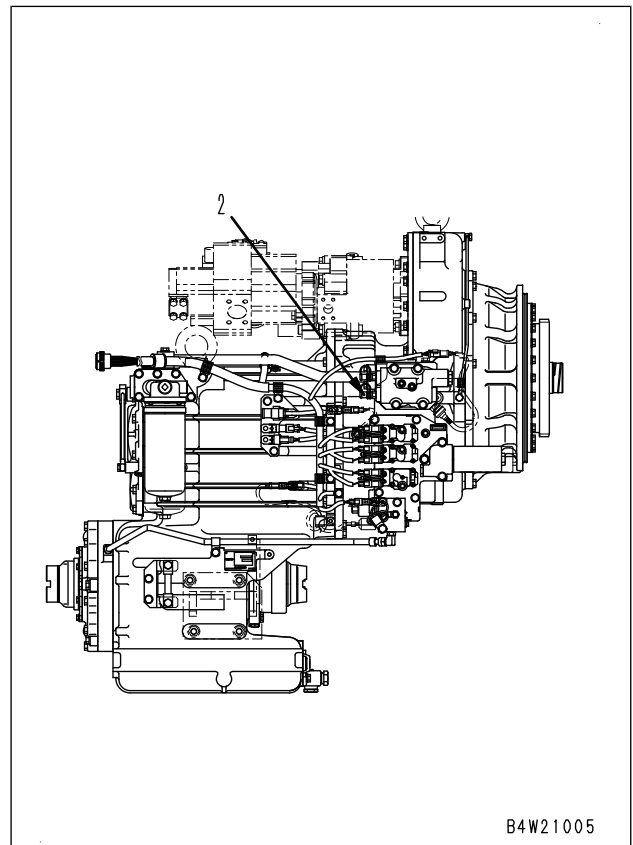
3. While running the engine at low idle and at 2,000 rpm, measure the transmission main relief pressure.



4. After finishing test, remove the testing tools and restore the machine.

Testing torque converter relief pressure (inlet pressure)

- ★ Torque converter relief pressure (inlet pressure) pickup port (nipple) (2)



Testing by use of testing tools

1. Install hose [1] of the hydraulic tester N1 to torque converter relief pressure (inlet pressure) pickup nipple (2). Connect gauge [2] to the hose.

- ★ The hose of digital hydraulic tester N2 can also be used.

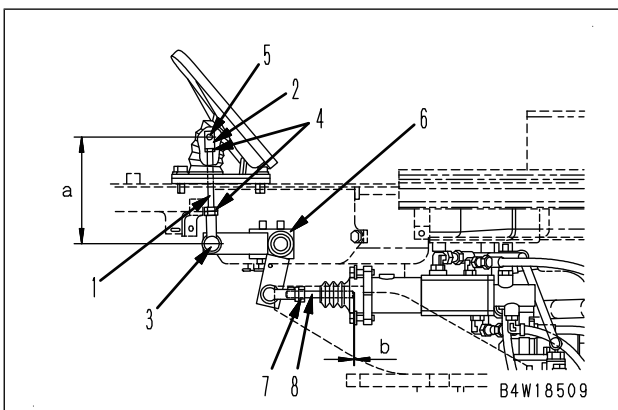
Testing and adjusting brake pedal linkage (WA380-G4C0-001-K-00-A)

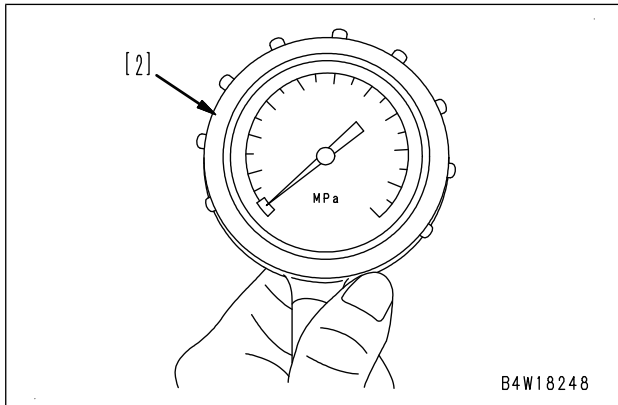
Testing (WA380-G4C0-361-K-00-A)

1. Check linkage mounting pin (5), pinhole of lever (6), and lever bushing for play. Make adjustments as necessary.
2. Measure the length of the link ($a = 213$ mm), and check that it is within the standard value.
 - ★ Measure the length between the center of pin (5) and the center of ball joint (3).
3. Measure the distance of movement of rod (8) and check that clearance (b) is within the standard value.
 - ★ When doing this, check that the brake pedal hits the stopper.
4. Check bolts and nuts at each part and retighten them if loosened.

Adjustment (WA380-G4C0-270-K-00-A)

1. Adjusting link length (a)
 - 1) Remove pin (5) and ball joint (3), then remove rod (1).
 - 2) Loosen lock nut (4), then turn yoke (2) and ball joint (3) to adjust the length.
 - 3) After adjusting the length of link (a), connect it to the brake pedal.
 - ★ Standard length (a): 213 mm
2. Adjusting play of rod (b)
 - 1) Loosen locknut (7), turn rod (8) so that the tip of the rod contacts the booster cylinder piston, then turn rod (8) back 1/4 turn.
 - ★ Moving distance in 1/2 turn of rod: 0.75 mm
 - 2) Turn back by 1/4 turn and tighten lock nut (7).
 - ★ Standard value (b): 0 to 0.3 mm





6. After finishing test, remove the testing tools and restore the machine.

Testing cooling fan reverse solenoid output pressure

1. Open radiator grille (1).

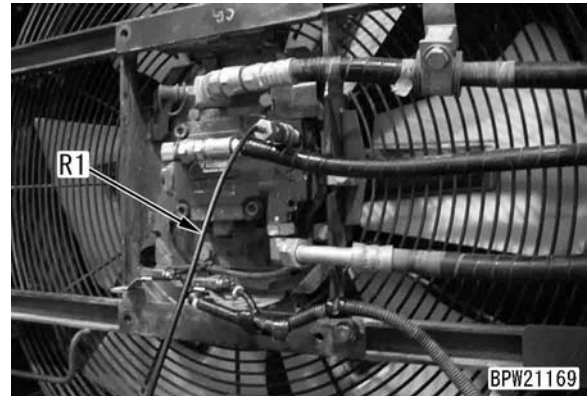


2. Remove cover (2).



3. Remove pickup port plug (4) and connect oil pressure gauge [2] of hydraulic tester R to it.

- ★ Use the oil pressure gauge of 6 MPa {60 kg/cm²}.



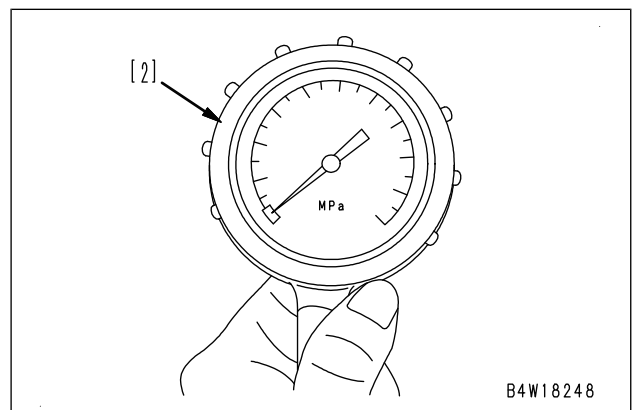
4. Select "Manual Fan Reverse Mode" by operating the machine monitor.

- ★ For the selection procedure, see the Operation and Maintenance Manual.

5. Run the engine at high idle and measure the cooling fan reverse solenoid output pressure.

- ★ Measure the pressure in both fan reverse mode and fan normal rotation mode and confirm that the solenoid operates and the specified oil pressure is generated in the fan reverse mode.

Cooling fan reverse solenoid output pressure	See standard value table
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6. After finishing the measurement, remove the testing tools and restore the machine.

-  **Pickup port plug (4):**
9.8 to 12.7 Nm {1.0 to 1.3 kgm}

30 Testing and adjusting

Electrical system

Operator mode (outline) (WA470-Q193-042-K-01-A)

- ★ Only outline of the operator mode is described in this section.

For details of each function and display, and their operation, see "Structure and function", or the "Operation and Maintenance Manual".

- ★ In this section, the following displays or functions of the operator mode are explained (including some items which need special operations).

Operator mode (outline)
KOMATSU logo screen(PAGE 30-130)
Password input screen(PAGE 30-130)
Display of standard screen(PAGE 30-130)
Display of end screen(PAGE 30-131)
Display of operation screen for engine shutdown secondary switch(PAGE 30-131)
Operation of air conditioner(PAGE 30-131)
Displaying and setting user menu(PAGE 30-132)
Display of ECO guidance(PAGE 30-132)
Display of warning (caution and action level)(PAGE 30-135)
Overdue replacement item screen(PAGE 30-137)
Display of KDPF Regeneration(PAGE 30-137)

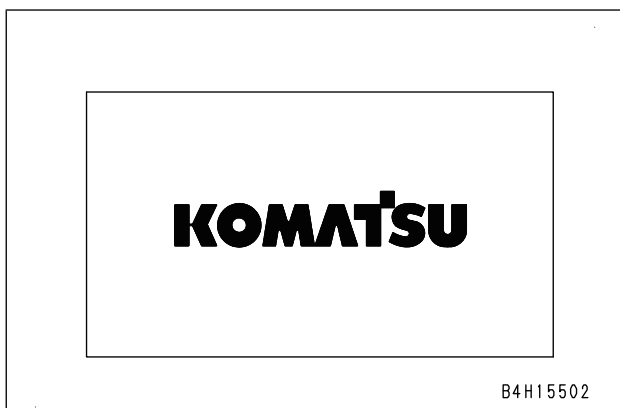
↓ (Special operation)

LCD (Liquid Crystal Display) check function(PAGE 30-139)
Function of checking service meter and odometer (PAGE 30-139)
Function of usage limitation setting/ changing password(PAGE 30-140)

KOMATSU logo screen (HM300-Q180-044-K-00-A)

When starting switch is turned to ON position, KOMATSU logo is displayed for 2 seconds.

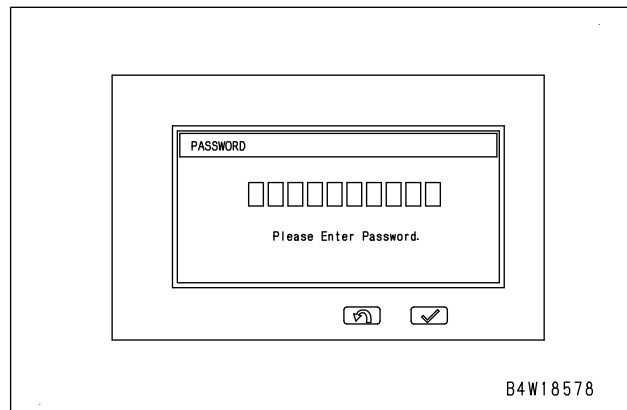
- ★ After the 2-seconds display, the screen changes to "Password Input (if password is set)" screen or "standard screen".



Password input screen (WA380-Q180-044-K-06-A)

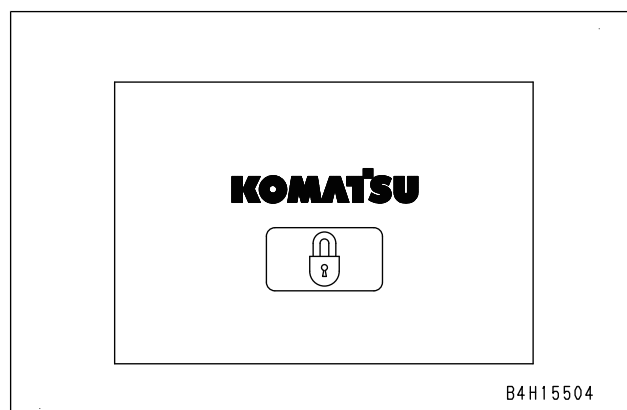
After KOMATSU logo mark is displayed, input screen of engine start lock password appears.

- ★ This screen is displayed only when the engine start lock function is enabled.
- ★ When a correct password is input, the display changes to the standard screen.
- ★ The machine monitor equips with several protect functions by passwords other than the engine start lock. Those functions are independent from each other.



- ★ The following screen may sometimes be displayed instead of the above Password input screen.

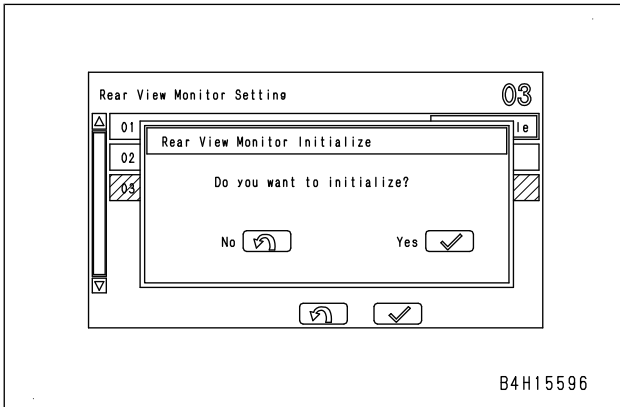
- ★ If this screen is displayed, call the person responsible for the operation of KOMTRAX in your Komatsu distributor and ask for remedy.



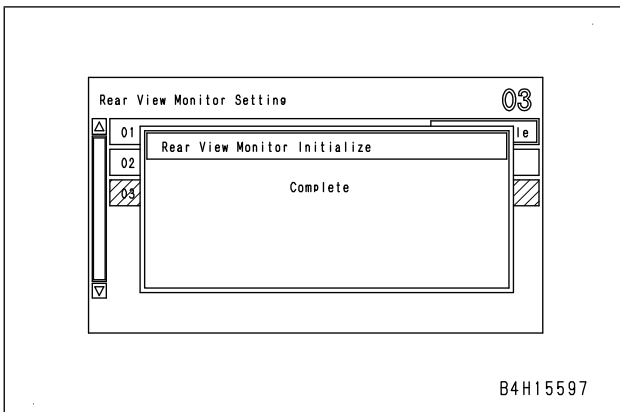
Display of standard screen (WA380-Q180-044-K-07-A)

If the machine monitor starts normally, the standard screen is displayed.

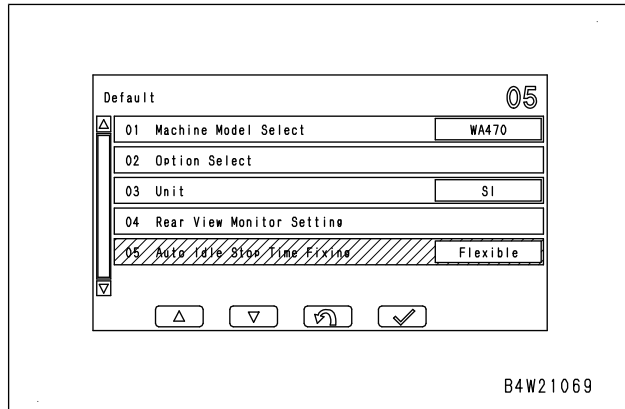
Code No.	Monitoring item (Display on screen)	Unit (Default: SI)		Applicable component	Remarks
		SI	Non-SI		
47201	KDPF 1 Outlet Temp Sens Volt	V	V	KDPF	
47300	KDOC 1 Inlet Temperature	°C	°F	KDPF	
47301	KDOC 1 Inlet Temp Sens Volt	V	V	KDPF	
47400	KDOC 1 Outlet Temperature	°C	°F	KDPF	
47401	KDOC 1 Outlet Temp Sens Volt	V	V	KDPF	
47500	Dosing Fuel Rate	ℓ/h	gal/h	KDPF	
47600	Dosing Fuel Pressure	kPa	psi	KDPF	
47601	Dosing Fuel P Sens Volt	V	V	KDPF	
47700	Soot Level Estimation	g/ℓ	g/gal	KDPF	
41600	Engine Power Mode	-	-	T/M	
31200	T/M Input Shaft Speed	r/min	rpm	T/M	
31400	T/M Output Shaft Speed	r/min	rpm	T/M	
10009	Radiator Fan Speed	r/min	rpm	T/M	
10007	Radiator Fan Speed Command	r/min	rpm	T/M	
30100	T/C Oil Temperature	°C	°F	T/M	
30101	T/C Oil Temp. Sensor Volt	V	V	T/M	
04401	Hydr. Oil Temperature	°C	°F	T/M	
04404	Hydr. Temp. Sensor Volt	V	V	T/M	
32500	T/M Oil Temperature	°C	°F	T/M	
32501	T/M Oil Temp. Sensor Volt	V	V	T/M	
32601	T/C Input Oil Pressure	kPa	psi	T/M	
32602	T/C In. Oil Press Sensor Volt	V	V	T/M	
32603	T/C Output Oil Pressure	kPa	psi	T/M	
32604	T/C Out. Oil Press Sensor Volt	V	V	T/M	
41201	Brake Oil Pressure	kPa	psi	T/M	
41202	Brake Oil Press Sensor Volt	V	V	T/M	
41203	Brake Cut Off Pressure	kPa	psi	T/M	
93700	T/C Speed Ratio	%	%	T/M	
93501	T/C Output Shaft Torque	Nm	lbft	T/M	
91105	Shift Lever Volt	V	V	T/M	
31602	ECMV Current (1st)	mA	mA	T/M	
31603	ECMV Current (2nd)	mA	mA	T/M	
31604	ECMV Current (3rd)	mA	mA	T/M	
31605	ECMV Current (4th)	mA	mA	T/M	
31606	ECMV Current (Reverse)	mA	mA	T/M	
31608	ECMV Current (Forward)	mA	mA	T/M	
31609	ECMV Current (Lockup)	mA	mA	T/M	Displays only when optional setting is enabled.
93300	ECSS Current	mA	mA	T/M	Displays only when optional setting is enabled.
41400	Rad. Fan Pump EPC Sol. Current	mA	mA	T/M	
31646	Fan Reverse Solenoid Current	mA	mA	T/M	
38902	Trigger Compensation (1st)	-	-	T/M	
38903	Trigger Compensation (2nd)	-	-	T/M	
38904	Trigger Compensation (3rd)	-	-	T/M	
38905	Trigger Compensation (4th)	-	-	T/M	
38906	Trigger Compensation (Reverse)	-	-	T/M	
38907	Trigger Compensation (Forward)	-	-	T/M	
41802	Fill Time (1st)	msec	msec	T/M	
41803	Fill Time (2nd)	msec	msec	T/M	
41804	Fill Time (3rd)	msec	msec	T/M	



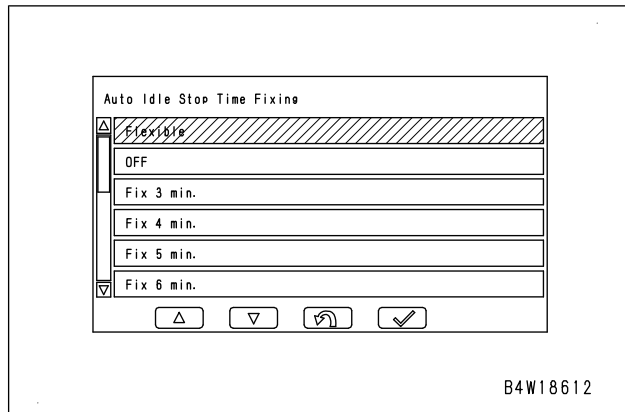
- ★ When the Initialization Completion screen appears sometime after pressing the enter switch (D), display "Rear View Monitor Setting" and the initialization is completed.



Select "Auto Idle Stop Time Fixing" on "Default" screen.



3. Setting auto idle stop time
Select a time on "Auto Idle Stop Time Fixing" screen.



- ★ The value selected here will become the maximum value of auto idle stop time that can be selected in the user menu.
- ★ The maximum value of the auto idle stop time must be set after checking compliance with the applicable law, which differs by region.

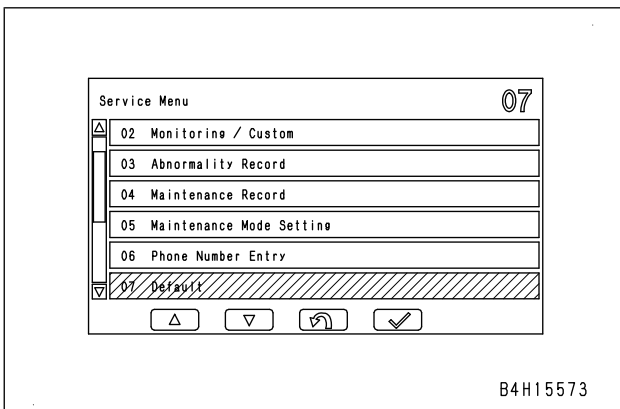
Default (Auto Idle Stop Timer Setting) (WA470-Q1GE-100-K-00-A)

Checking and change of auto idle stop setting range are performed in "Default".

This is to select the range of auto idle stop time setting that can be selected in the user mode.

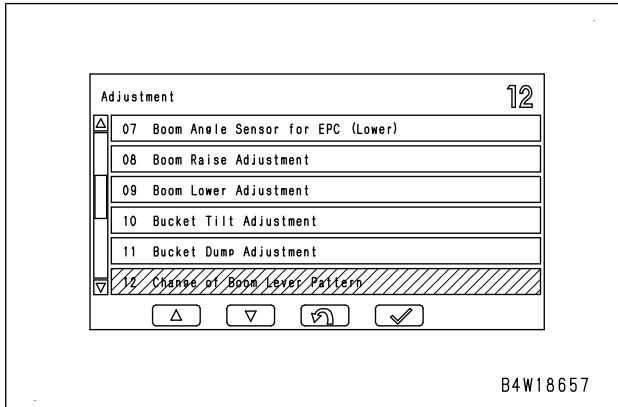
- ★ This item is displayed only when "Auto Idle Stop Setting" is set to "ADD".

1. Selecting menu
Select "Default" on "Service Menu" screen.

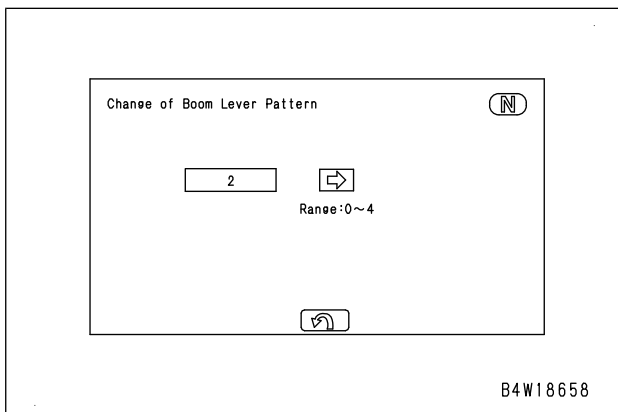


2. Selecting sub menu

2. Selecting sub menu
After "Adjustment" screen is displayed, select "Change of Boom Lever Pattern".

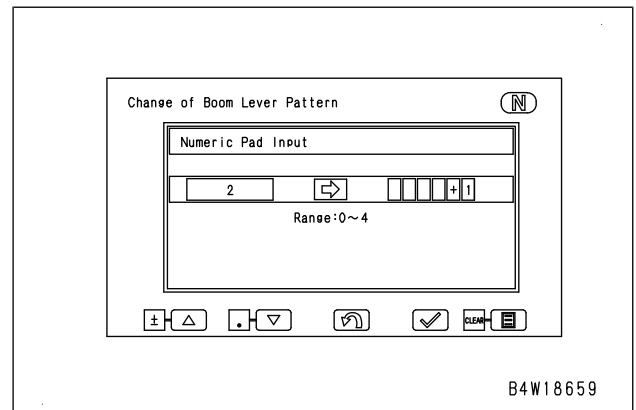
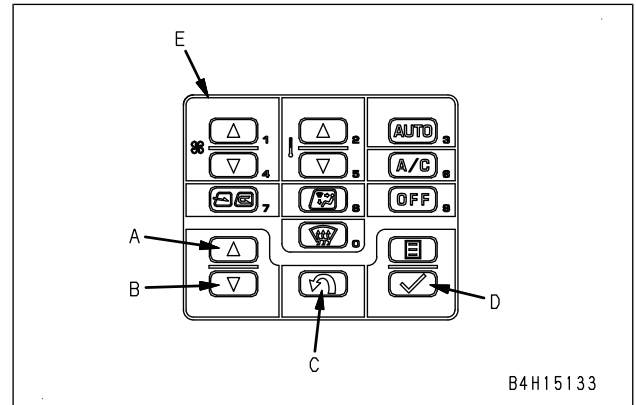


- ★ The adjustment screen for "Change of Boom Lever Pattern" is displayed.

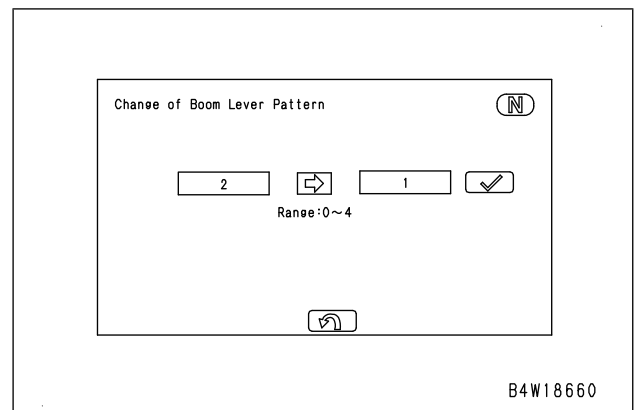


3. Press numeral input switch (E) on "Change of Boom Lever Pattern" adjustment screen. (Any switch of "0" to "9" is accepted.)

- ★ The setting input screen is displayed.
Up switch (A): Switches sign between "+" and "-"
Down switch (B): Enters decimal point
Return switch (C): Returns the display to "Adjustment" screen
Enter switch (D): Validates the setting
- ★ Input a set value with numeral input switches (E) and accept the setting with the enter switch (D).



4. The input value is displayed at the right part of the screen. If this value is correct, press the enter switch (D) again.



5. When the input numeric value is displayed in the left display area, the setting is complete.

30 Testing and adjusting

Pm clinic

2. Transmission valve

★ When shifting transmission gear to forward or reverse, apply brake securely.

Item	Condition		Unit	Standard value for new machine	Repair limit	Test results	Acceptable	Unacceptable	
Main relief pressure	Low idle	<ul style="list-style-type: none"> Torque converter oil temperature: 60 to 80°C Transmission: Neutral 	MPa {kg/cm ² }	2.12 to 2.52 {21.5 to 25.5}	2.12 to 2.52 {21.5 to 25.5}				
	Engine speed: 2,000 rpm			2.35 to 2.75 {24.0 to 28.0}	2.35 to 2.75 {24.0 to 28.0}				
Torque converter inlet pressure (*1)	Engine speed: 2,000 rpm			0.1 to 0.88 {1.0 to 9.0}	0.1 to 0.88 {1.0 to 9.0}				
Torque converter outlet pressure (*1)	Engine speed: 2,000 rpm			0.06 to 0.71 {0.6 to 0.7}	0.06 to 0.71 {0.6 to 0.7}				
ECMV output (clutch) pressure	1st	<ul style="list-style-type: none"> Torque converter oil temperature: 60 to 80°C Engine speed: 2,000 rpm Manual switch at ON 			2.2 to 2.5 {22.5 to 25.5}	2.2 to 2.5 {22.5 to 25.5}			
	2nd				2.2 to 2.5 {22.5 to 25.5}	2.2 to 2.5 {22.5 to 25.5}			
	3rd				2.15 to 2.45 {22 to 25}	2.15 to 2.45 {22 to 25}			
	4th				2.15 to 2.45 {22 to 25}	2.15 to 2.45 {22 to 25}			
	F (forward)			1.91 to 2.21 {19.5 to 22.5}	1.91 to 2.21 {19.5 to 22.5}				
	R (reverse)			1.91 to 2.21 {19.5 to 22.5}	1.91 to 2.21 {19.5 to 22.5}				
	L/C (lockup)			1.51 to 1.81 {15.5 to 18.5}	1.51 to 1.81 {15.5 to 18.5}				

*1: Items which can be inspected in special functions of machine monitor

3. Steering


Item	Condition	Unit	Standard value for new machine	Repair limit	Test results	Acceptable	Unacceptable
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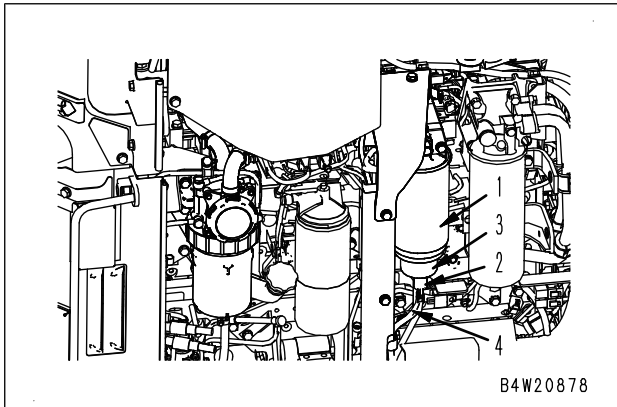
Secure frame with frame lock bar.

Steering relief pressure (*1)	<ul style="list-style-type: none"> Hydraulic oil temperature: 45 to 55°C Engine speed: High idle Maximum pressure at operation 	MPa {kg/cm ² }	23.3 to 25.7 {237.5 to 262.5}	22.0 to 25.7 {225 to 262.5}			
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*1: Items which can be inspected in special functions of machine monitor

5. Remove drain hose (4). Reuse the drain hose and clip.
6. By using the filter wrench, turn filter cartridge (1) counterclockwise to remove it. The filter cartridge (1) is one with transparent cup (3).
7. Make sure that drain valve (2) which is provided in the lower part of transparent cup (3) of the new filter cartridge is firmly tightened.

 **Tightening torque of drain valve:**
2.5 to 3.4 Nm {0.25 to 0.35 kgm}

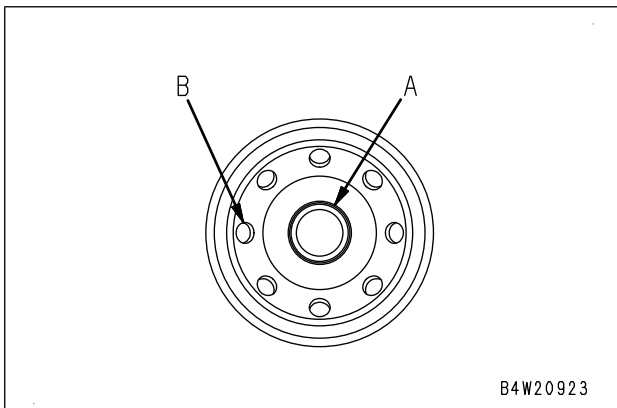


8. Clean the filter holder, fill the new filter cartridge with clean fuel, apply thin film of oil to the packing surface, then install it to the filter holder.

⚠ When adding fuel, do not remove cap (A) at the center. Always fill fuel from dirty side of eight small holes (B).

⚠ After adding fuel, remove cap (A) at the center and install fuel filter.

⚠ Always fill with clean fuel. Be careful not to let any dirt or dust get into the fuel. In particular, since center portion is the clean side, do not remove cap (A) when adding fuel. Be careful not to let dirt or dust get into the center clean side.



9. When installing, fasten it by finger until the packing surface contacts the seal surface of the filter holder. If the filter cartridge is fastened too much, the packing will be damaged and this

leads to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing. Therefore, be sure to observe the fastening angle.

10. Fasten it by using filter wrench 1/2 to 3/4 turns. At that time, take care not to damage or deform the filter cartridge.

11. Install drain hose (4).

12. After replacing the filter cartridge, start the engine and run it at low idle for 10 minutes. Check for fuel leakage from the filter seal surface and transparent cup mounting face. If there is any leakage of fuel, check the fastening condition of the filter cartridge.

If the fuel still leaks, follow Step 1 to 6 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the cartridge with a new one, then repeat Steps 7 to 10.

a10. Check of fuel main filter

⚠ Immediately after the engine is stopped, its parts and oil are still very hot, and may cause burn injury. Accordingly, wait until all parts have cooled down before starting the work.

⚠ High pressure is generated inside the engine fuel piping system when the engine is running. Stop the engine and wait at least 30 seconds until the inner pressure is released and then replace the filter .

⚠ Never bring flames near fuel.

⚠ When using fuel feed pump, be sure not to loosen air bleeding plug in fuel circuit. While the fuel feed pump is in operation, pressure is applied to the fuel circuit. Do not loosen the air bleeding plug at this time, since the fuel may spout out.

★ A special filter with high-efficiency filtering properties is adopted for Komatsu genuine fuel filter cartridges. Be sure to use Komatsu genuine parts when replacing.

★ The common rail fuel injection system used on this machine consists of more precise parts than those in the conventional injection pump and nozzles. If any cartridge other than a Komatsu genuine fuel filter cartridge is used, foreign material may enter and it may cause problems in the injection system. Do not use substitute parts.

★ During testing or maintenance of the fuel system, take extreme care not to allow any foreign material to enter the fuel system. If any dust or other material sticks to any part, wash the part thoroughly with clean fuel.

40 Troubleshooting

General information on troubleshooting

- ★ If "E" is displayed at the left to the failure code, this code is "active" (that is, this failure still continues or its recovery is not verified yet). If "E" is not displayed, the failure code is "inactive" and the code will be cleared in the subsequent clearing step. Be sure to record this failure code on a paper.

Electrical Systems		01	
01/20	CA351	Injectors Drive Circuit Error	E
	1	First	0.0h
		Last	0.0h
02/20	CA554	Rail Press Sensor In Range Error	
	1	First	0.0h
		Last	0.0h
03/20	CA271	IMV/PCVI Short Error	
	1	First	0.0h
		Last	0.0h
04/20	CA2973	Che Air Press Sensor In Range Error	
	1	First	0.0h
		Last	0.0h
05/20	CA122	Che Air Press Sensor High Error	
	2	First	0.0h
		Last	0.0h

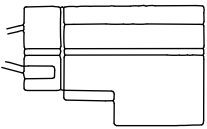
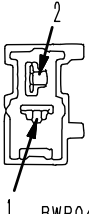

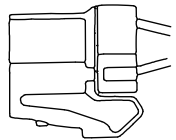
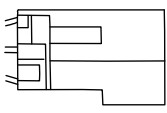
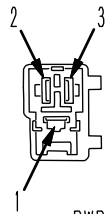

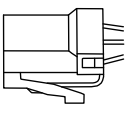
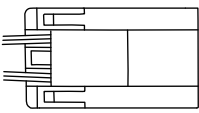
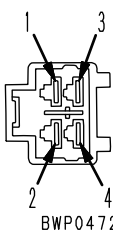
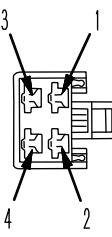
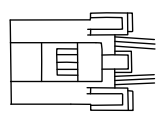
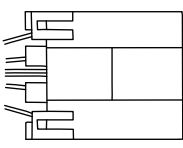
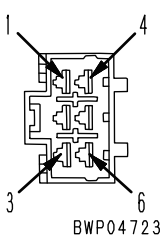
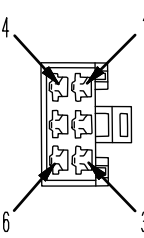
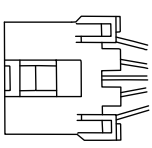
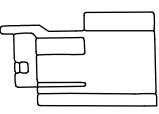
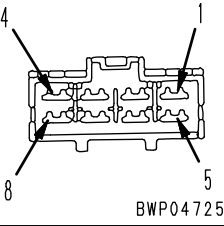
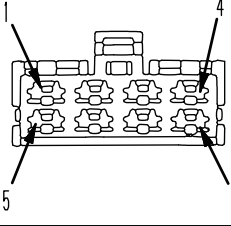
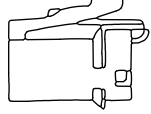
B4H15553

9. Hold down the inverted triangle key [▽], and press numeric keys [1], [2] and [3] in this order to go to the "Clear mode". (Same as 1)
10. Press the Menu switch of the switch panel (as explained above).

Electrical Systems		01	
01/20	CA351	Injectors Drive Circuit Error	E
	1	First	0.0h
		Last	0.0h
02/20	CA554	Rail Press Sensor In Range Error	
	1	First	0.0h
		Last	0.0h
03/20	CA271	IMV/PCVI Short Error	
	1	First	0.0h
		Last	0.0h
04/20	CA2973	Che Air Press Sensor In Range Error	
	1	First	0.0h
		Last	0.0h
05/20	CA122	Che Air Press Sensor High Error	
	2	First	0.0h
		Last	0.0h

B4H15668

11. Press the Enter key (check mark) to clear all failure codes.
12. Return to the "Electrical Systems" screen by pressing the Return key (explained above). Check if a failure code is still displayed or not, and record it on a paper.
13. Return to the "Abnormality Record" screen by pressing the Return key (explained above).

No. of pins	M type connector		
	Male (female housings)	Female (male housings)	Testing connection use special tool Part No.
1	Part No. : 08056-00171	Part No. : 08056-00181	799-601-7080 (T-adapter)
2	  <p>BWP04717</p>	  <p>BWP04718</p>	799-601-7090 (T-adapter)
	Part No. : 08056-00271	Part No. : 08056-00281	
3	  <p>BWP04719</p>	  <p>BWP04720</p>	799-601-7110 (T-adapter)
	Part No. : 08056-00371	Part No. : 08056-00381	
4	  <p>BWP04721</p>	  <p>BWP04722</p>	799-601-7120 (T-adapter)
	Part No. : 08056-00471	Part No. : 08056-00481	
6	  <p>BWP04723</p>	  <p>BWP04724</p>	799-601-7130 (T-adapter)
	Part No. : 08056-00671	Part No. : 08056-00681	
8	  <p>BWP04725</p>	  <p>BWP04726</p>	799-601-7340 (T-adapter)
	Part No. : 08056-00871	Part No. : 08056-00881	

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40 Troubleshooting

General information on troubleshooting

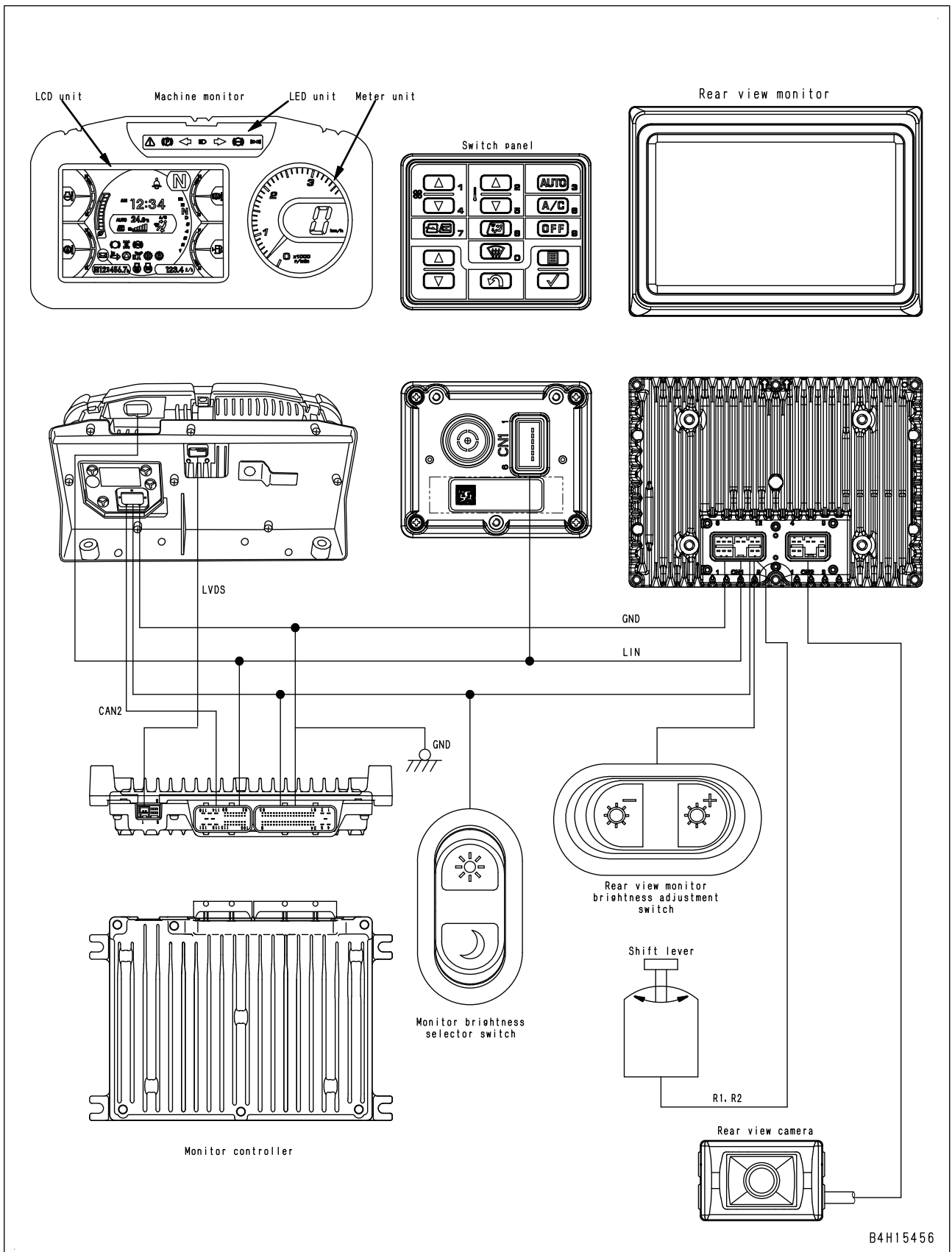
[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DRC12, 16 Series connector		Testing connection use special tool Part No.
	DRC12:Male pin (female housing)	DRC16:Female pin (male housing)	
24 (A)※ (B) (C)			-
	-	-	
40 (A)※ (B) (C)			-
	-	Seal (S) Part No. : 17A-06-41830	
70 (A)※ (B) (C)			-
	-	Seal (S) Part No. : 17A-06-41840	

※ (A)、(B)、(C) : Key position

B4D18416

Configuration drawing of machine monitor and related units



B4H15456

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [15SAL1] Release Trouble of ECMV (Forward) (WA380_7-15SAL1-400-A-

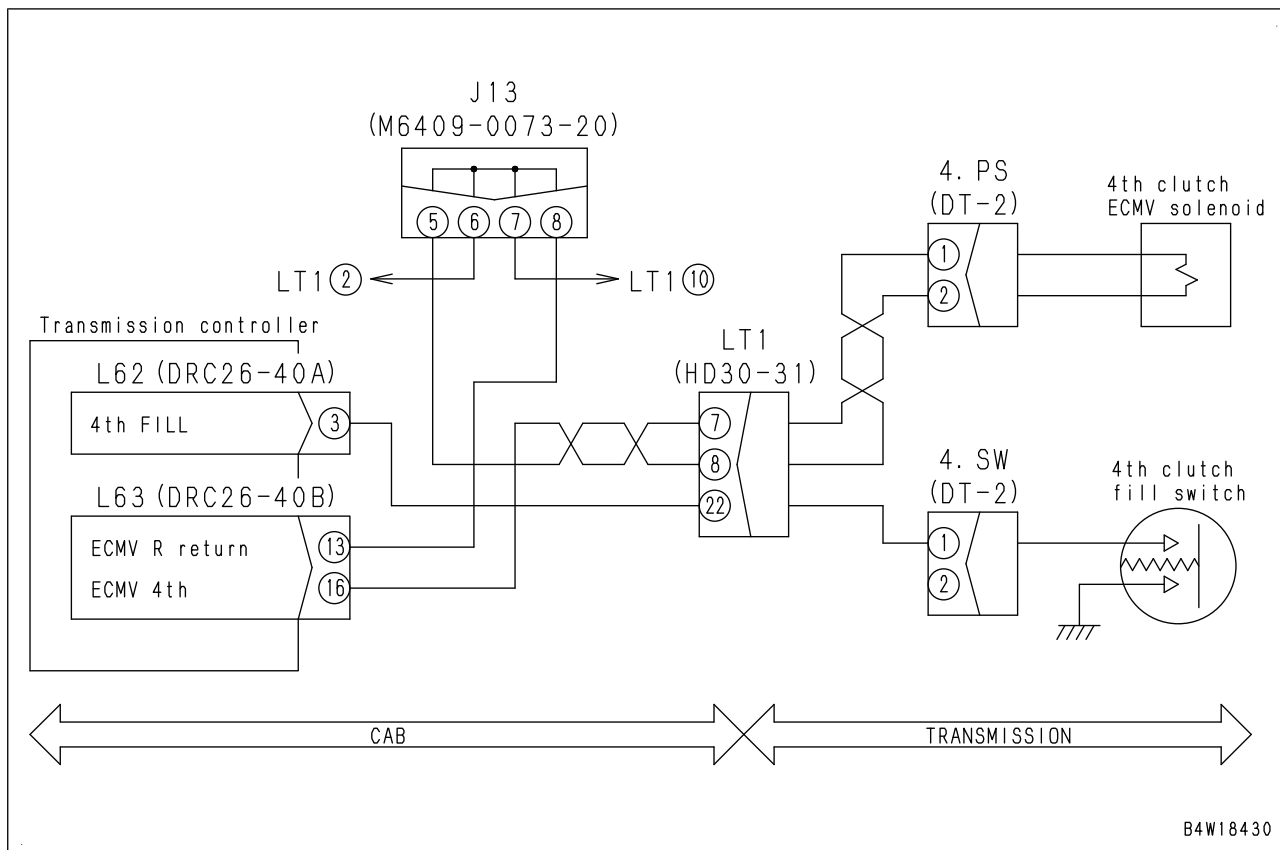
Z0-A)

Action level	Failure code	Failure	Release Trouble of ECMV (Forward) (Transmission controller system)
L03	15SAL1		
Detail of failure	<ul style="list-style-type: none"> When controller does not drive F (forward) ECMV solenoid, ON signal is input from F (forward) ECMV fill switch and F clutch is not disengaged. 		
Action of controller	<ul style="list-style-type: none"> Determines that F (forward) ECMV fill switch signal is ON. Lights up centralized warning lamp and sounds alarm buzzer. Even if cause of failure disappears, machine does not become normal until directional (FNR) lever or R.H. directional selector (FNR) switch is set to N (NEUTRAL) position. 		
Problem on machine	<ul style="list-style-type: none"> Machine can travel forward but cannot travel in reverse. 		
Related information	<ul style="list-style-type: none"> Output current value to F (forward) clutch ECMV solenoid can be checked with monitoring function. (Code: 31608 "ECMV Current (Forward)") Input signal (ON/OFF) from F (Forward) clutch fill switch can be checked with monitoring function (0: OFF, 1: ON) (Code: 02216 "F clutch"). First, check for mechanical trouble such as clogged oil filter of F clutch or pressure control valve. Method of reproducing failure code: Start engine. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Abnormal F (forward) clutch pressure	This failure code appears if clutches other than F (forward) clutch do not have remaining pressure and only F (forward) clutch has remaining pressure. (See troubleshooting for hydraulic and mechanical systems (H mode).)	
2	Defective F (forward) clutch fill switch	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connector F.SW. Turn starting switch to ON position. 	
		If failure code [15SAL1] disappears, F clutch fill switch is defective.	
		★ If failure code [15SAL1] is still displayed, wiring harness has ground fault or transmission controller is defective.	
3	Ground fault in wiring harness (contact with ground circuit)	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connectors L62 and F.SW, and connect T-adaptor to either female side. 	
		Resistance	Between F.SW (male) (1) and ground (Fill switch turned OFF)
4	Defective transmission controller	If no failure is found by above checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	
		<ul style="list-style-type: none"> Reference 1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector L62. 3. Start engine. 4. Set transmission cut-off switch to OFF position. 5. Set parking brake switch to OFF position. 6. Depress brake pedal to prevent machine from starting. 	
		Voltage	Between L62 (12) and ground

No.	Cause	Procedure, measuring location, criteria and remarks				
5	Defective transmission controller	If no failure is found by above checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)				
		<ul style="list-style-type: none"> • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L62. 3. Start engine. 4. Set transmission cut-off switch to OFF position. 5. Set parking brake switch to OFF position. 6. Depress brake pedal to prevent machine from starting. 7. Set manual/auto shift selector switch to MANUAL. 8. Set directional (FNR) lever or R.H. directional selector (FNR) switch to F (forward) or R (reverse) position. 				
		Voltage	Between L62 (female) (3) and ground	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Gear shift lever: 4th</td> <td style="width: 50%;">Max. 1 V</td> </tr> <tr> <td>Gear shift lever: Other than 4th</td> <td>7 to 9 V</td> </tr> </table>	Gear shift lever: 4th	Max. 1 V
Gear shift lever: 4th	Max. 1 V					
Gear shift lever: Other than 4th	7 to 9 V					

Circuit diagram related to 4th clutch ECMV



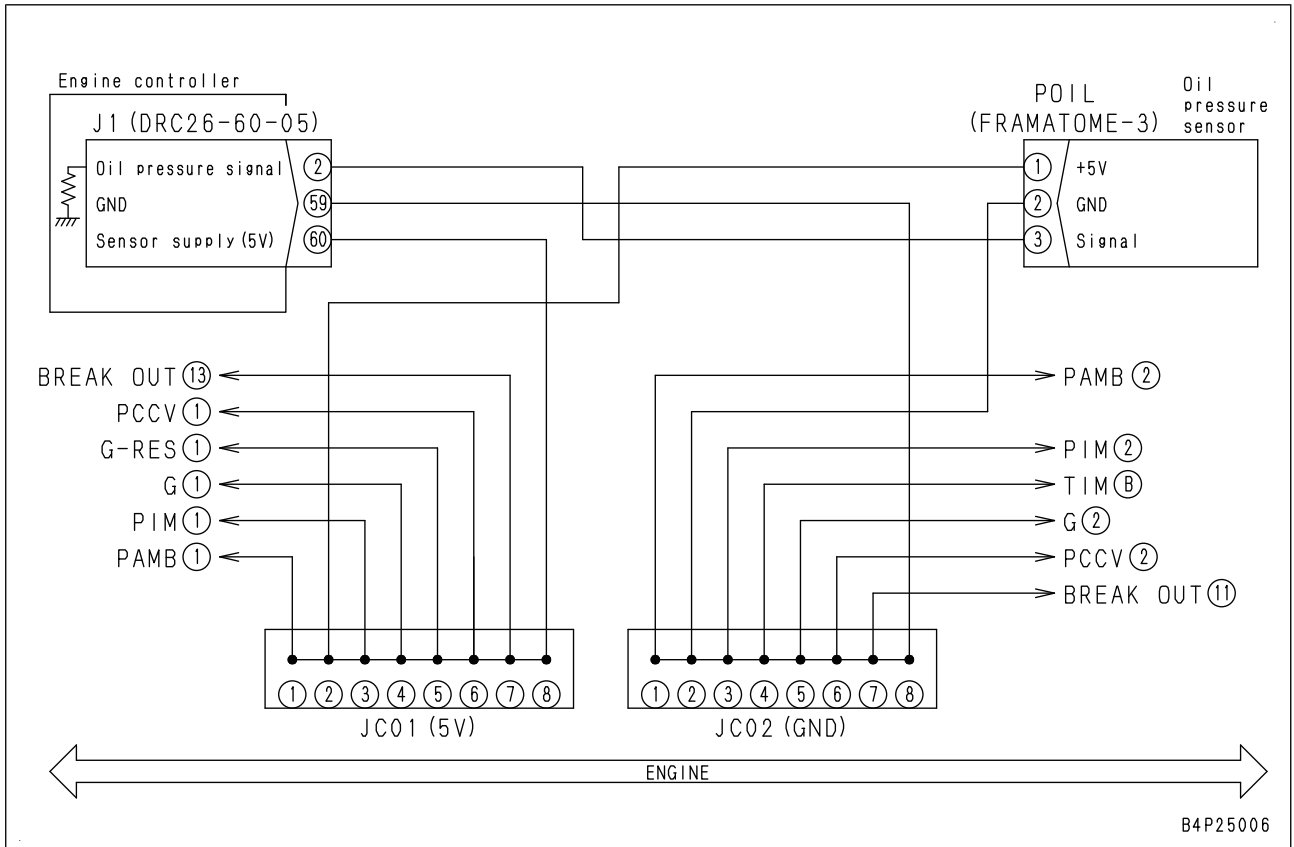
40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
1	Performing manual stationery regeneration regeneration (to dry KDPF)	1. Perform manual stationary regeneration by following the instructions on the monitor.
		If this failure code is cleared after regeneration is performed, repair is complete.
2	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it.
		2. Turn starting switch to ON position.
		If this failure code disappears, harness connector is defective. ★ If this failure code appears, perform following checks.
3	Defective KDOC inlet temperature sensor	If failure code [CA3313], [CA3314] or [CA3315] is also displayed, perform troubleshooting for [CA3313], [CA3314] or [CA3315] first.
4	Defective engine controller	1. Turn starting switch to ON position.
		If this failure code appears and no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

★ Turn the starting switch ON and make sure that this failure code is not displayed.

Circuit diagram related to engine oil pressure sensor



40 Troubleshooting

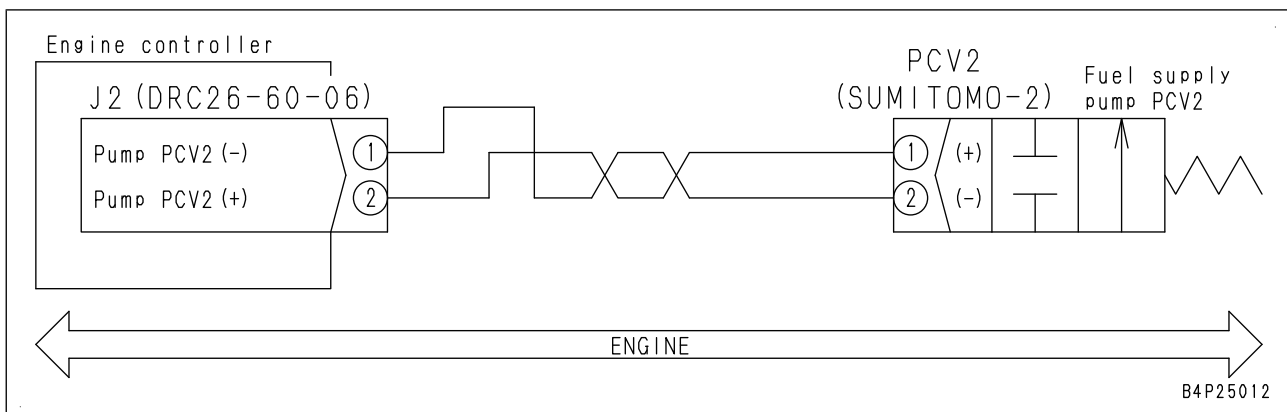
Troubleshooting by failure code (Display of code)

Failure code [CA273] PCV2 Short Error (PC400-CA273-400-A-Z0-A)

Action level	Failure code	Failure	PCV2 Short Error (Engine controller system)
L03	CA273		
Detail of failure	<ul style="list-style-type: none"> Short circuit is detected in supply pump PCV2 circuit. 		
Action of controller			
Problem on machine	<ul style="list-style-type: none"> Engine output lowers. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. Under normal conditions, pulse voltage of approx. 24 V is applied to PCV2 (1) while engine is running. However, it cannot be measured by using multimeter since it is pulse voltage. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code does not appear, harness connector is defective. ★ If this failure code appears, perform the following.		
2	Defective supply pump PCV2 (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector PCV2 and connect socket to male side.		
		Resistance	Between PCV2 (male) (1) and (2)	2.3 to 5.3 Ω
		Resistance	Between PCV2 (male) (1) and ground	Min. 1 MΩ
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector J2 and connect T-adapters to female side.		
		Resistance	Between J2 (female) (1) and (2) (PCV2 resistance)	2.3 to 5.3 Ω
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors J2 and PCV2 and connect T-adaptor to female side of connector J2.		
		Resistance	Between J2 (female) (2) and ground	Min. 1 MΩ
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to PCV2



Failure code [CA431] Idle Validation Sw Error (WA380_7-CA431-400-A-Z0-A)

Action level	Failure code	Failure	Idle Validation Switch Error (Engine controller system)
L01	CA431		
Detail of failure	<ul style="list-style-type: none"> Idle validation switch signals 1 and 2 (IVS1 and IVS2) are abnormal. 		
Action of controller	<ul style="list-style-type: none"> Uses throttle position from throttle sensor to run engine. 		
Problem on machine			
Related information	<ul style="list-style-type: none"> Input (ON/OFF) of idle validation signal 1 can be checked with monitoring function. (Code: 18300) Input (ON/OFF) of idle validation signal 2 can be checked with monitoring function. (Code: 18301) Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective harness connector	See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it.		
2	Defective power supply system	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector PDV. 3. Turn starting switch to ON position. ★ If check result is unusual, go to check on cause 4.		
		Voltage	Between PDV (1) and (2)	4.75 to 5.25 V
3	Defective accelerator pedal (internal defect)	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector PD. 3. Turn starting switch to ON position. ★ If check result is unusual, perform checks on causes 4 and 5 to check wiring harness. If wiring harness is normal, regard accelerator pedal as defective.		
		Between PD (5) and (4)		See IVS1 in Fig. 1
		Between PD (6) and (4)		See IVS2 in Fig. 1
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position, and set battery disconnect switch to OFF position. 2. Disconnect connectors PD, PDV and EC3, and connect T-adapters to each female side.		
		Resistance	Between EC3 (female) (19) and PD (female) (4)	Max. 1 Ω
			Between EC3 (female) (49) and PD (female) (5)	Max. 1 Ω
			Between EC3 (female) (50) and PD (female) (6)	Max. 1 Ω
			Between EC3 (female) (52) and PDV (female) (1)	Max. 1 Ω
Between EC3 (female) (43) and PDV (female) (2)	Max. 1 Ω			
5	Short circuit in wiring harness	1. Turn starting switch to OFF position, and set battery disconnect switch to OFF position. 2. Disconnect connectors PD and EC3, and connect T-adapters to female side of EC3.		
		Resistance	Between EC3 (female) (49) and each pin other than pin (49)	Min. 1 MΩ
			Between EC3 (female) (50) and each pin other than pin (50)	Min. 1 MΩ

40 Troubleshooting

Troubleshooting by failure code (Display of code)

B. Inspection with machine monitor

(02 = Abnormality record; 01 = Monitoring; 09 = Cylinder cutout mode operation)

Good	No good
------	---------

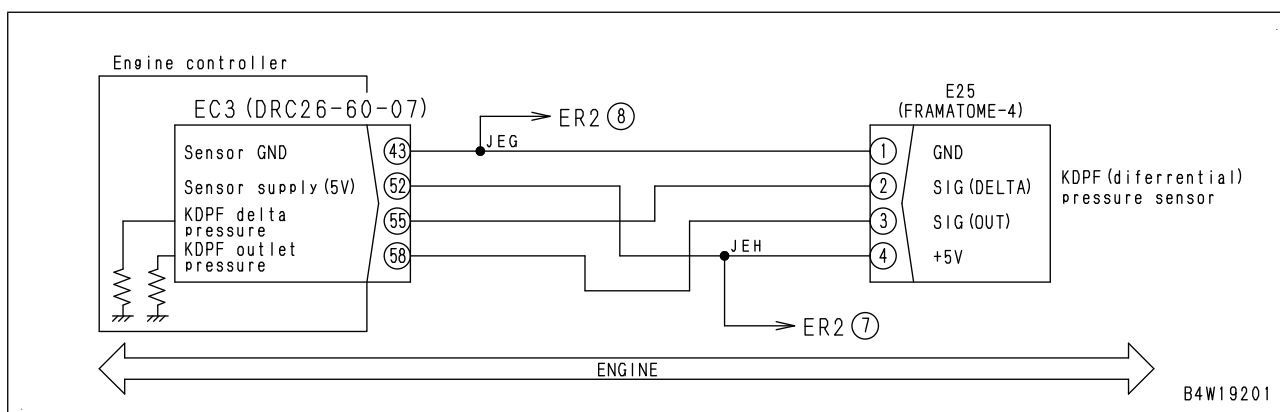
3	Check of failure code	/	/	/	/		
4	Check of monitoring information						
	Code	Item displayed	Testing conditions	ISO unit	Standard value (Reference value)	Measured value	Good No good
	01002	Engine speed	Low idle	r/min	800 (+50 / -0)		
			High idle	r/min	2,170 (± 50)		
			Torque converter stall (E-mode)	r/min	1,710 (± 50)		
			Torque converter stall (P-mode)	r/min	1,785 (± 50)		
	31701	Throttle opening	Low idle	%	0		
			High idle	%	100		
	18600	Last fuel injection quantity command (in weight)	Torque converter stall	mg/st	-		- -
	36200	Last common rail pressure command	Torque converter stall	MPa	-		
	36400	Common rail pressure	Torque converter stall	MPa	-		
	36300	Last injection timing command	Low idle	CA	-		- -
			High idle	CA	-		- -
			Torque converter stall	CA	-		- -
	36500	Charge pressure	Torque converter stall	kPa	-		- -
04107	Engine coolant temperature	Low idle	°C	-		- -	
14200	Fuel temperature	Low idle	°C	-		- -	
5	Check result of cylinder cutout mode operation (engine speed)						
	Function	Cutout cylinder	Testing conditions	ISO unit	Standard value (Reference value)	Measured value	Good No good
	Set cylinder to be cut out by cylinder.	No. 1 cylinder	Low idle	r/min	-		- -
		No. 2 cylinder	Low idle	r/min	-		- -
		No. 3 cylinder	Low idle	r/min	-		- -
		No. 4 cylinder	Low idle	r/min	-		- -
		No. 5 cylinder	Low idle	r/min	-		- -
		No. 6 cylinder	Low idle	r/min	-		- -

Failure code [CA1695] Sensor 5 Supply Volt High Error (WA500_7-CA1695-400-A-Z0-A)

Action level	Failure code	Failure	Sensor 5 Supply Voltage High Error (Engine controller system)
L03	CA1695		
Detail of failure	<ul style="list-style-type: none"> High voltage appears in 5 V power supply for KDPF delta pressure sensor and KDPF outlet pressure sensor. 		
Action of controller	<ul style="list-style-type: none"> Takes it that KDPF outlet pressure sensor is at fixed value (0 kPa {0 kg/cm²}) and allows engine to run. Takes it that KDPF delta pressure value is at estimated value and allows engine to run (uses delta pressure of 0 kPa in some cases). Closes EGR valve and open KVTG fully. Limits engine output and allows engine to run. Stops KDPF regeneration control. 		
Problem on machine	<ul style="list-style-type: none"> Engine output decreases. 		
Related information	<ul style="list-style-type: none"> KDPF delta pressure sensor and KDPF outlet pressure sensor are integrated. Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code disappears, harness connector is defective. ★ If this failure code appears, perform following checks.		
2	Defective KDPF delta pressure (outlet pressure) sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector E25. 3. Turn starting switch to ON position.		
		★ Ignore displayed failure codes other than this code. If this failure code is not displayed, KDPF delta pressure (outlet pressure) sensor is defective.		
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E25, and connect T-adapters to female side of EC3.		
		Resistance	Between EC3 (female) (52) and each pin other than pin (52)	Min. 1 MΩ
4	Defective engine controller	1. Turn starting switch to OFF position. 2. Disconnect connector E25. 3. Insert T-adapters into connector EC3, or connect T-adapters to female side of connector E25. 4. Turn starting switch to ON position.		
		Voltage	Between EC3 (52) and (43) or between E25 (female) (4) and (1)	4.75 to 5.25 V

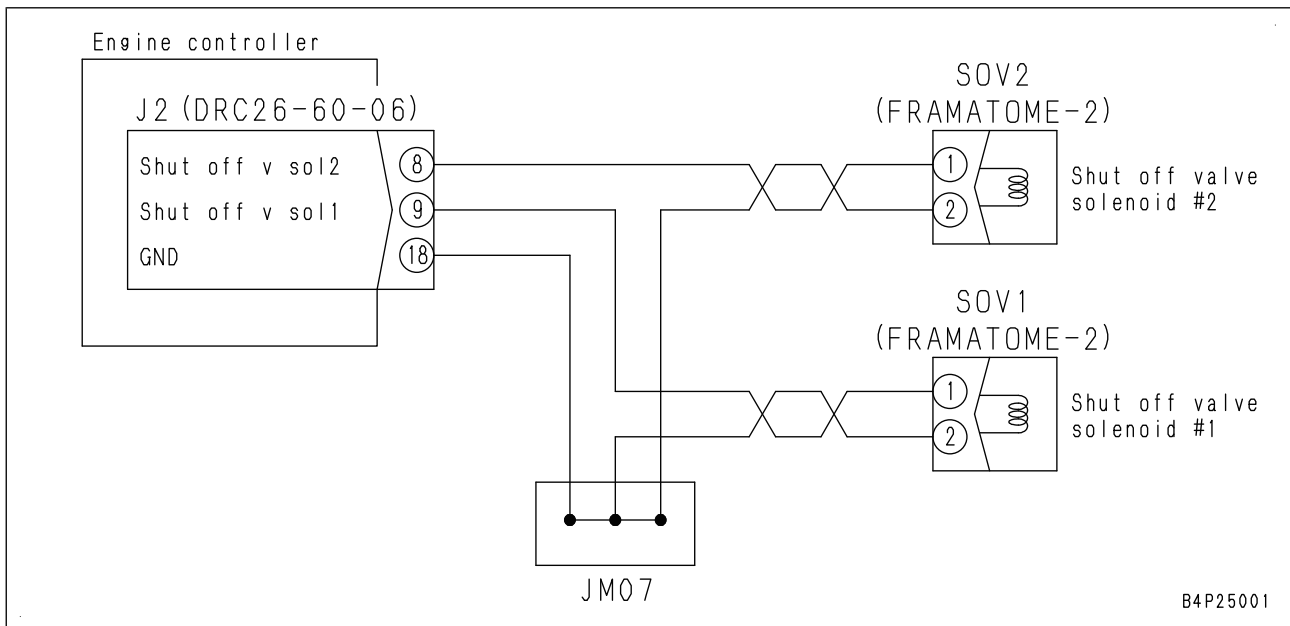
Circuit diagram related to sensor power supply 5 circuit



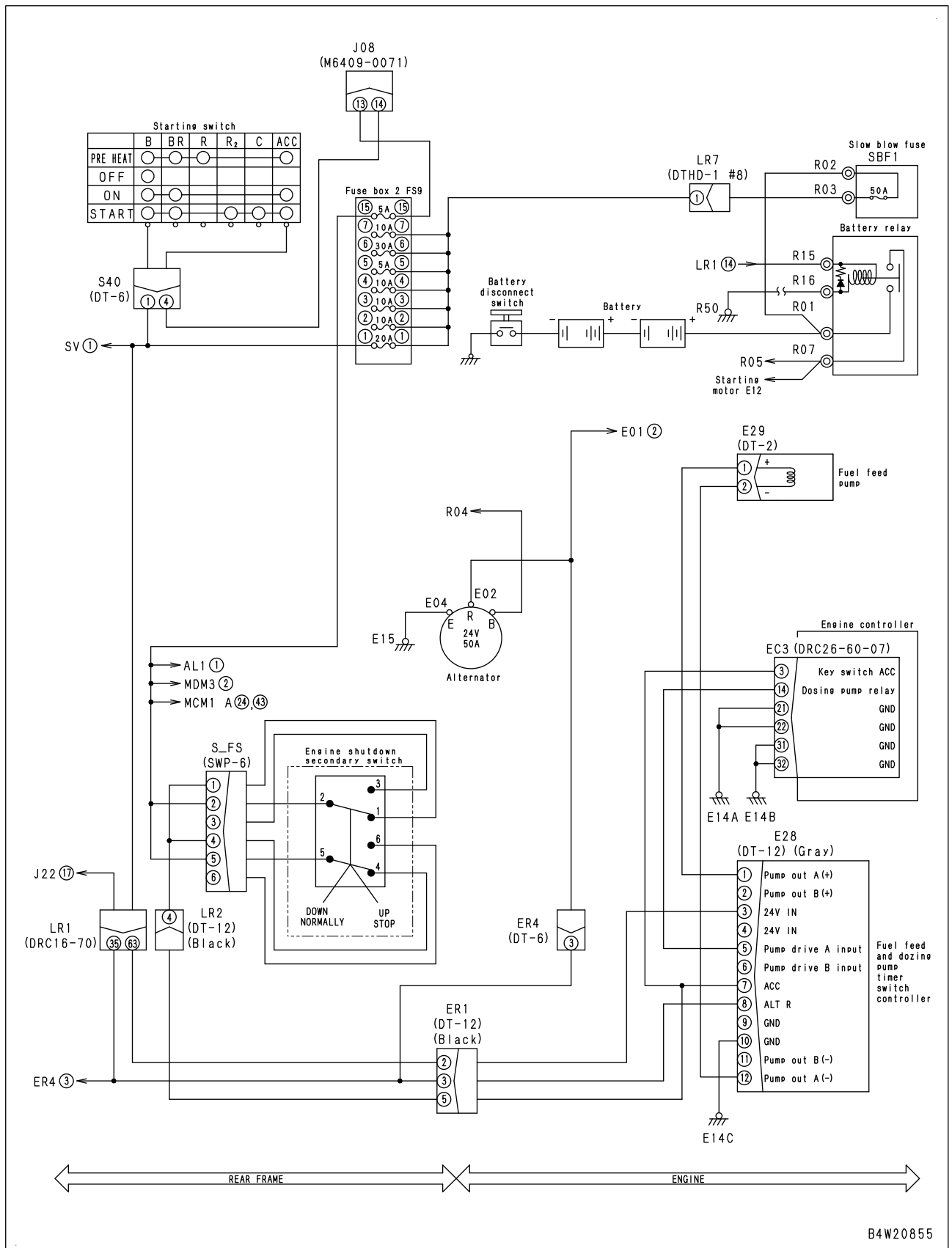
40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to dosing fuel solenoid valve



Circuit diagram related to fuel feed pump



B4W20855

40 Troubleshooting

Troubleshooting by failure code (Display of code)

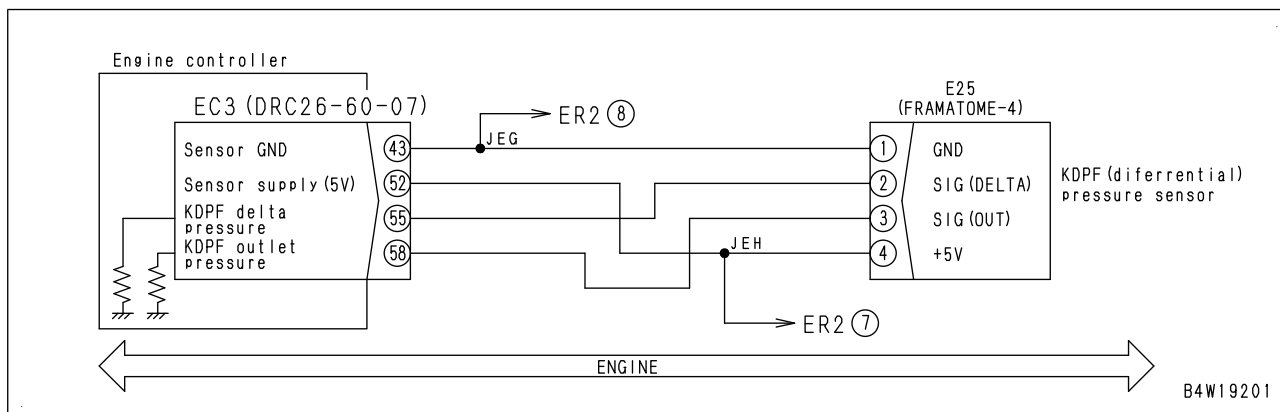
Failure code [CA2556] Grid Htr Relay Volt High Error (WA470_7-CA2556-400-A-Z0-A)

Action level	Failure code	Failure	Grid Heater Relay Voltage High Error (Engine controller system)
L01	CA2556		
Detail of failure	<ul style="list-style-type: none"> Short circuit is in preheat relay drive circuit (primary circuit). 		
Action of controller	<ul style="list-style-type: none"> None in particular 		
Problem on machine	<ul style="list-style-type: none"> Intake air heater does not work in auto preheating mode (resulting in degraded startability and emission of white smoke at low temperatures). 		
General information	<ul style="list-style-type: none"> Temperature sensed by engine coolant temperature sensor can be checked with monitoring function. (Code: 04107 (°C)) Method of reproducing failure code: Turn starting switch to the ON position (Engine coolant temperature: Max. -5 °C). Troubleshooting of this failure code covers circuits from engine controller to primary circuit (coil) of preheat relay L125. For troubleshooting of secondary circuit of heater relay and preheat relay L125, see E-2 in E-mode troubleshooting. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.	
		If this failure code is not displayed, wiring harness connector is defective. ★ If this failure code is displayed, perform following troubleshooting.	
2	Defective preheat relay L125	1. Turn starting switch to OFF position. 2. Disconnect relay L125 and connect T-adapter to male side.	
		Resistance	Between L125 (male) (1) and (2)
3	Ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector EC3 and relay L125, and connect T-adapter to either female side.	
		Resistance	Between ground and EC3 (female) (4) or L125 (female) (1)
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector EC3 and relay L125, and connect T-adapter to female side of EC3. ★ Check by using multimeter in continuity mode.	
		Continuity	Between EC3 (female) (4) and each pin other than pin (4)
5	Defective engine controller	If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

No.	Cause	Procedure, measuring location, criteria and remarks	
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E25, and connect T-adapters to female side of EC3. ★ Check by using multimeter in continuity mode.	
		Continuity	Between EC3 (female) (58) and each pin other than pin (58)
6	Defective engine controller	1. Turn starting switch to ON position.	
		If this failure code appears and no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

Circuit diagram related to KDPF outlet pressure sensor



40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and TEMP3 (KDPF outlet temperature sensor), and connect T-adapter to female side of EC3. ★ Check by using multimeter in continuity mode.
		<table border="1"> <tr> <td>Between EC3 (female) (54) and each pin other than pin (54)</td> <td>No continuity (No sound is heard)</td> </tr> </table>
Between EC3 (female) (54) and each pin other than pin (54)	No continuity (No sound is heard)	
4	Defective KDPF outlet temperature sensor	1. Turn starting switch to ON position. 2. Use monitoring function to display signal voltages and temperatures from KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor on screen. 3. Run engine at idle for 10 minutes. 4. Note temperature values (after checking that they are stabilized). 5. Monitor temperature from each sensor.
		If temperature of any temperature sensor fluctuates 24°C or greater, regard that temperature sensor as defective. <ul style="list-style-type: none"> If none of temperature sensor values changes more than 24°C, problem is not in sensor system. Perform checks on causes 5 and after. If another failure code appears with engine running at idle, perform troubleshooting for it first.
5	Malfunction of intake system	Check intake system hoses, clamps, and tubes for damage and loosening. Repair as necessary. (Repair intake air leaks.)
6	Defective injector	Perform cylinder cutout mode operation to identify disabled cylinder (see Testing and adjusting, "Handling of cylinder cutout mode operation").
7	Oil leak into turbocharger exhaust connector	1. Remove turbocharger exhaust connector. 2. Check inside of turbocharger exhaust connector for adhesion of oil and fuel. <ul style="list-style-type: none"> If oil or fuel is found, visually check for oil leaks from EGR valve and turbocharger. Repair if any failure is found. ★ Wipe off oil and fuel from piping.
8	Oil leak into exhaust connector and ducts leading to KDPF	Check exhaust system between turbocharger and KDPF for oil or fuel leaking in. <ul style="list-style-type: none"> Wipe off oil or fuel if found. ★ If trace of oil or fuel leakage into KDPF is found, check KDPF, and clean or replace it as necessary.

B. Machine operation for clearing failure code

No.	Cause	Procedure, measuring location, criteria and remarks
		1. Turn starting switch from OFF position to ON position. 2. Start engine and run it at low idle (with no load) for approximately 1 minute. 3. Perform regeneration for service. 4. End regeneration for service. (Perform regeneration for service for 15 minutes minimum from its start.) If failure code is cleared when regeneration for service is ended, repair is complete. ★ When service tool "INSITE" is available, you can clear every failure code by executing "Reset All Faults" command. For how to use "INSITE", see "INSITE" operation manual.
9	Defective engine controller	If this failure code appears again after above procedures are implemented, engine controller is defective.

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Failure code [CA3317] KDOC Outlet Temp Sens High Error (WA470_7-CA3317-400-A-Z0-

A)

Action level	Failure code	Failure	KDOC Outlet Temperature Sensor High Error (Engine controller system)
L03	CA3317		
Detail of failure	<ul style="list-style-type: none"> High voltage appears in KDOC outlet temperature sensor circuit. 		
Action of controller	<ul style="list-style-type: none"> Uses KDOC inlet temperature for KDOC outlet temperature to run engine. (If failure is detected in KDOC inlet temperature sensor as well, controller sets KDOC outlet temperature to default value (250°C) and runs engine.) Closes EGR valve and opens KVGTT fully. Limits engine output and allows engine to run. Stops KDPF regeneration control. 		
Problem on machine	<ul style="list-style-type: none"> Engine output reduces. 		
General information	<p>⚠ Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.</p> <ul style="list-style-type: none"> Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) This failure code appears if sensor connector is disconnected. If failure codes [CA3314] and [CA3319] are also displayed, connector in KDPF temperature sensor consolidating box may be disconnected or probably has open circuit (defective contact of connector) in ground line. KDOC inlet temperature sensor connector label "TEMP1" expressed in black embossed letters is seen on KDPF temperature sensor consolidating box (KDOC outlet temperature sensor connector label "TEMP2" and KDPF outlet temperature sensor connector label "TEMP3" are shown similarly to "TEMP1"). Method of reproducing failure code: Turn starting switch to ON position. <p><How to clear failure code></p> <p>To avoid error due to improper operation, start and run engine at idle for 1 minute. If this failure code is cleared, repair is complete.</p> <p>★ Soot accumulation reaches level 3 when this failure code is being displayed. This may cause automatic regeneration to be started after this failure code is cleared. Controller takes this measure intentionally to reduce soot accumulation and it is not failure.</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.
		If this failure code is not displayed, wiring harness connector is defective. ★ If this failure code is displayed, perform following checks.

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [CA3421] Mass Air Flow Sensor Sup Volt Low Error (WA500_7-

CA3421-400-A-Z0-A)

Action level	Failure code	Failure	Mass Air Flow Sensor Supply Voltage Low Error (Engine controller system)
L03	CA3421		
Detail of failure	<ul style="list-style-type: none"> Low voltage appears in mass air flow sensor power supply (12 V) circuit. 		
Action of controller	<ul style="list-style-type: none"> ★ If signal voltage of mass air flow sensor becomes abnormal, controller takes following measures for failure codes [CA356] and [CA357]. Takes it that mass air flow is at fixed value (10 kg/min) and allows engine to run. Closes EGR valve and opens KVGT fully. Limits engine output and allows engine to run. Stops KDPF regeneration control. 		
Problem on machine	<ul style="list-style-type: none"> Engine output decreases. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. 		

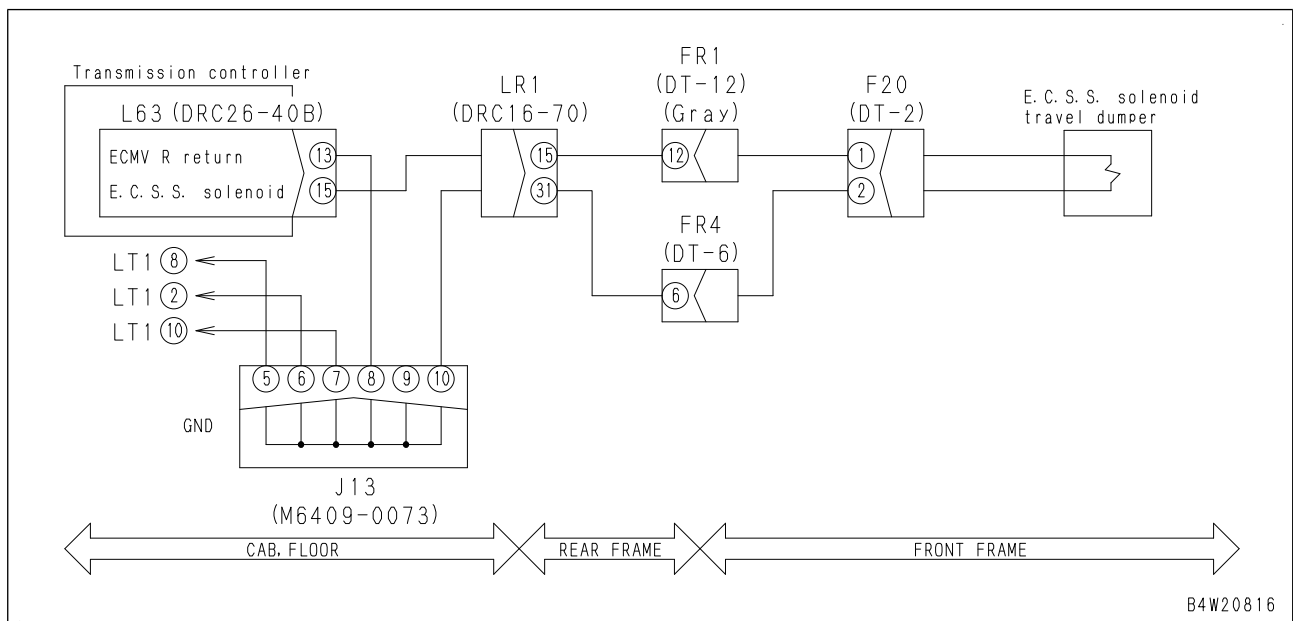
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code disappears, harness connector is defective. ★ If this failure code appears, perform following checks.		
2	Defective mass air flow sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector E27. 3. Turn starting switch to ON position.		
		If this failure code does not appear, mass air flow sensor is defective. ★ Other failure codes (many codes) are also displayed. They are generated because of disconnection of connector. Ignore failure codes other than this code.		
3	Defective wiring harness or connector	1. Turn starting switch to OFF position. 2. Disconnect connector J1. 3. Turn starting switch to ON position.		
		If this failure code does not appear, wiring harness is defective. ★ Other failure codes (many codes) are also displayed. They are generated because of disconnection of connector. Ignore failure codes other than this code.		
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and E27, and connect T-adapters to either female side.		
		Resistance	Between ground and J1 (female) (21) or E27 (female) (2)	Min. 1 MΩ
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and E27, and connect T-adapters to either female side.		
		Resistance	Between J1 (female) (21) and (22), or between E27 (female) (2) and (3)	Min. 1 MΩ
6	Defective engine controller	1. Turn starting switch to OFF position. 2. Disconnect connector J1 and connect T-adapters to male side. 3. Turn starting switch to ON position.		
		Voltage	Between J1 (male) (21) and (22)	Approx. 12 V
		If no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Failure code [D192KY] Hot Short of ECSS Solenoid (WA470_7-D192KY-400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of ECSS Solenoid (Transmission controller system)
L01	D192KY		
Detail of failure	<ul style="list-style-type: none"> When controller drives electronically controlled suspension system (ECCS) solenoid, abnormal voltage appears at circuit. 		
Action of controller	<ul style="list-style-type: none"> Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Problem on machine	<ul style="list-style-type: none"> ECCS (electronically controlled suspension system) remains actuated. 		
Related information	<ul style="list-style-type: none"> Output signal (ON/OFF) to ECCS (electronically controlled suspension system) solenoid can be checked with monitoring function. (Code: 03705 E.C.C.S. Solenoid) This troubleshooting is applicable only to machines with ECCS (electronically controlled suspension system) specification. Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective ECCS solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector F20 and connect T-adapter to male side.		
		Resistance	Between F20 (male) (1) and (2)	35 to 45 Ω
			Between ground and each of F20 (male) (1) and (2)	Min. 1 MΩ
2	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector L63, and connect T-adapter to female side. ★ Coil resistance of solenoid		
		Resistance	Between L63 (female) (15) and (13)	35 to 45 Ω
3	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector F20, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between F20 (female) (1) and (2)	Max 1 V
4	Defective transmission controller	If no failure is found by above checks, transmission controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed).		

Circuit diagram related to electronically controlled suspension system (ECCS) solenoid



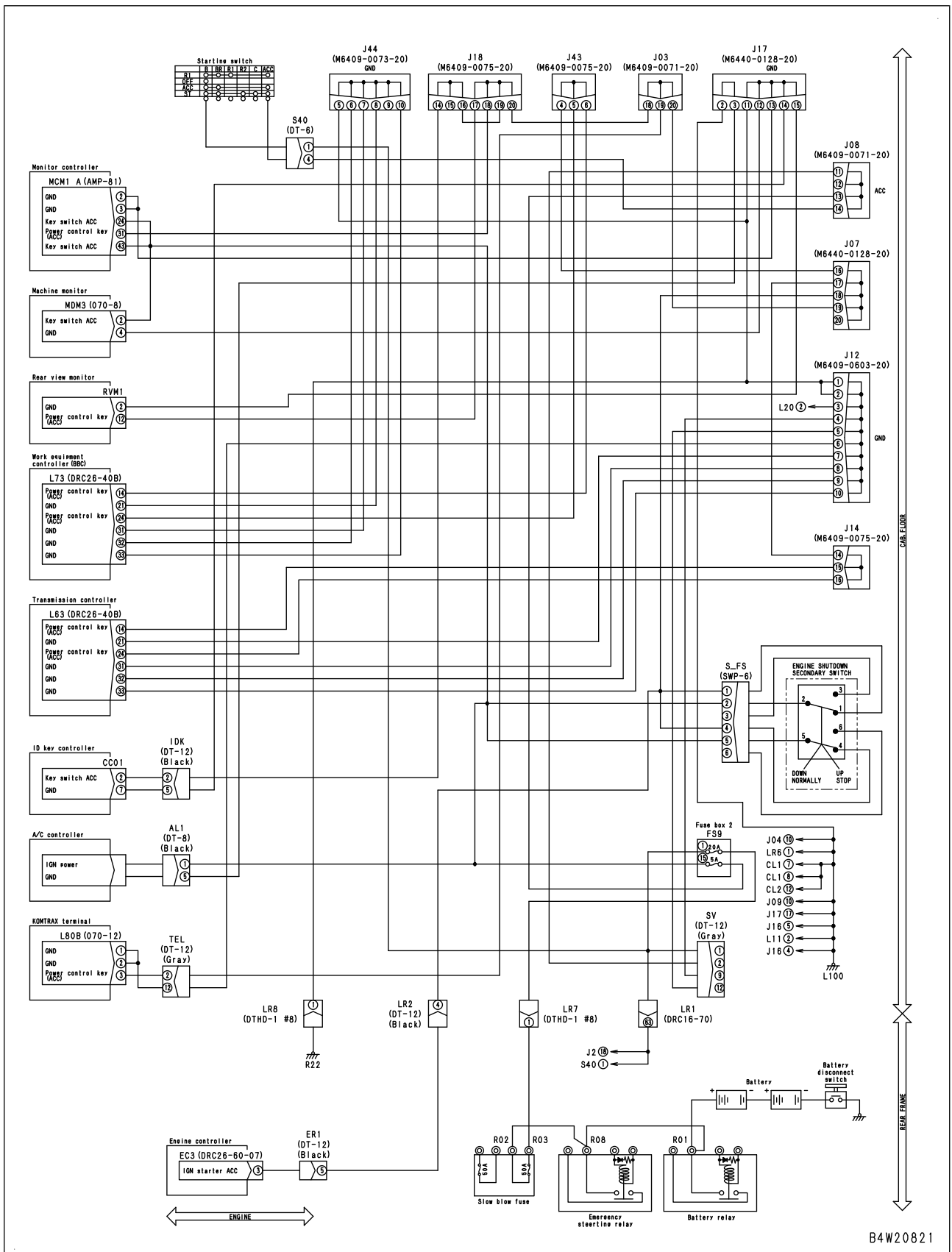
40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [D8AQK4] CAN2 Discon (KOMTRAX) 2 (WA380_7-D8AQK4-400-A-Z0-A)

Action level	Failure code	Failure	CAN2 Disconnection (KOMTRAX) 2 (Detected by monitor controller) (Machine monitor system)
L03	D8AQK4		
Detail of failure	<ul style="list-style-type: none"> Monitor controller does not recognize KOMTRAX terminal over CAN communication-2 line (KOMNET/c). 		
Action of controller	<ul style="list-style-type: none"> Does not update communication information. 		
Problem on machine	<ul style="list-style-type: none"> Engine does not start. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. For CAN communication error over CAN communication-2 line, monitor controller can generate six failure codes; [D8AQKR], [DAQQKR], [DAZQKR], [DB2QKR], [DB9QKR], and [DSJ0KR]. When all of these six failure codes are displayed simultaneously on screen, ground fault, short circuit, or hot short circuit may occur in wiring harness (CAN communication line). In this case, check whether air conditioner is operated (ON/OFF and air flow adjustment) from air conditioner operation screen since air conditioner is also controlled over CAN communication line. ★ Air conditioner can be controlled even when failure code is displayed on screen. If air conditioner is controlled, wiring harness (CAN communication line) does not have ground fault, short circuit, or hot short circuit. Since each controller and machine monitor are connected directly to battery, they are supplied with power even after starting switch is turned to OFF position. Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter. 		
No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective CAN-2 communication line	Perform troubleshooting for [D8AQKR].	

Circuit diagram related to ACC signal



B4W20821

40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks			
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ul style="list-style-type: none"> ACC signal of starting switch (start of CAN communication is not recognized) <ol style="list-style-type: none"> Turn starting switch to OFF position, and disconnect battery ground cable. Disconnect connectors MCM1 A, L63, and EC3, and insert T-adapters. Set battery disconnect switch to ON position, and turn starting switch to ON position. 			
		Voltage	Between MCM1 A (female) (4) and each of (24) and (43)	20 to 30 V	
			Between EC3 (3) and (21)	20 to 30 V	
			Between L73 (female) (21) and each of (14) and (24)	20 to 30 V	
			Between L63 (female) (21) and each of (14) and (24)	20 to 30 V	
		<ul style="list-style-type: none"> ★ If no failure is found by check on cause 3, this check is not required. <ol style="list-style-type: none"> Turn starting switch to OFF position, and set battery disconnect switch to OFF position. Disconnect connectors MCM1 B, L62, ECM J1, ECM J2, and B_RES, and connect T-adapters to each female side. 			
		Resistance	Between MCM1 B (female) (113) and L62 (female) (33)	Max. 1 Ω	
			Between MCM1 B (female) (105) and L62 (female) (23)	Max. 1 Ω	
			Between MCM1 B (female) (113) and L72 (female) (33)	Max. 1 Ω	
			Between MCM1 B (female) (105) and L72 (female) (23)	Max. 1 Ω	
Between MCM1 B (female) (113) and ECM J1 (female) (8)	Max. 1 Ω				
Between MCM1 B (female) (105) and ECM J1 (female) (18)	Max. 1 Ω				
Between ECM J2 (female) (24) and B_RES (female) (A)	Max. 1 Ω				
Between ECM J2 (female) (25) and B_RES (female) (B)	Max. 1 Ω				
5	Ground fault in wiring harness (contact with ground circuit)	<ol style="list-style-type: none"> Turn starting switch to OFF position, and set battery disconnect switch to OFF position. Disconnect connectors MCM1 B, L72, L62, ECM J1, ECM J2, and C23, and connect T-adapters to each female side. 			
		Resistance	Between ground and any of L72 (female) (33), L62 (female) (33), MCM1 B (female) (113), MCM1 B (female) (112), and ECM J1 (female) (8)	Min. 1 MΩ	
			Between ground and ECM J2 (female) (24) or C23 (female) (A)	Min. 1 MΩ	
			Between ground and any of L72 (female) (23), L62 (female) (23), MCM1 B (female) (105), and ECM J1 (female) (18)	Min. 1 MΩ	
			Between ground and either of ECM J2 (female) (25) and B_RES (female) (B)	Min. 1 MΩ	

Failure code [DBE5KX] Failure of 5V Power Source (WA380_7-DBE5KX-400-A-Z0-A)

Action level	Failure code	Failure	Failure of 5V Power Source (Transmission controller system)
L01	DBE5KX		
Detail of failure	<ul style="list-style-type: none"> Voltage of 5 V sensor power supply system is outside of normal voltage output range of 4.7 to 5.3 V. 		
Action of controller	<ul style="list-style-type: none"> Does not detect input signal normally because erroneous signal is input from potentiometer. If cause of failure disappears, machine becomes normal by itself. 		
Problem on machine	<ul style="list-style-type: none"> Sensor failure codes [DK55KA], [DK555Y], and [DK55L5] are displayed. No particular problem occurs, as long as directional (FNR) lever switch is normal. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective directional (FNR) lever potentiometer	1. Turn starting switch to OFF position. 2. Disconnect connector L02. 3. Turn starting switch to ON position.		
		If failure code [DBE5KX] disappears, directional (FNR) lever potentiometer is defective. ★ Other failure codes also appear due to disconnection of connector. Ignore displayed failure codes other than this failure code.		
2	Ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L61 and L02, and connect T-adapter to either female side.		
		Resistance	Between ground and L61 (female) (22) or L02 (female) (10)	Min. 1 MΩ
3	Defective transmission controller	1. Turn starting switch to OFF position. 2. Disconnect connector L61, and connect T-adapter to male side. 3. Turn starting switch to ON position.		
		Voltage	Between L61 (male) (22) and (21)	4.7 to 5.3 V
4	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector L02, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between L02 (female) (10) and (12)	4.7 to 5.3 V

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [DDNRKY] Hot Short of Work Equipment Lock SW (WA470_7-

DDNRKY-400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of Work Equipment Lock Switch (Work equipment controller system)
L03	DDNRKY		
Detail of failure	Due to hot short circuit in work equipment lock switch circuit, work equipment lock remains released or applied.		
Action of controller	<ul style="list-style-type: none"> None in particular If cause of failure disappears, machine becomes normal by itself. 		
Problem on machine	<ul style="list-style-type: none"> Condition of work equipment lock switches (work equipment lock is released if it has been applied, or it is applied if it has been released). Once condition of work equipment lock is changed, it is fixed and cannot be changed. 		
Related information	<ul style="list-style-type: none"> Output signal (ON/OFF) from work equipment lock switch can be checked with monitoring function. (Code: 02217BBC Input 1, Work Equipment Lock SW) Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective work equipment lock switch	1. Turn starting switch to OFF position.			
		2. Disconnect connector S_RHC and replace switch with another one of same type.			
		3. Turn starting switch to ON position.			
		If failure code [DDNRKY] disappears, original work equipment lock switch is defective.			
2	Hot short circuit in wiring harness	4. Turn starting switch to OFF position.			
		5. Disconnect connector S_RHC and connect T-adaptor to male side.			
		Resistance	Between S_RHC (male) (5) and (6)	Work equipment lock switch: OFF	Min. 1 MΩ
				Work equipment lock switch: ON	Max. 1 Ω
3	Defective work equipment controller	1. Turn starting switch to OFF position.			
		2. Disconnect connector S_RHC and connect T-adaptor to female side.			
		Voltage	Between S_RHC (female) (6) and ground	Max. 1 V	
		3. Turn starting switch to ON position.			
		If no failure is found by above checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)			

Failure code [DGR2KB] Ground Fault of Brake Oil Temp. Sensor (WA380_7-

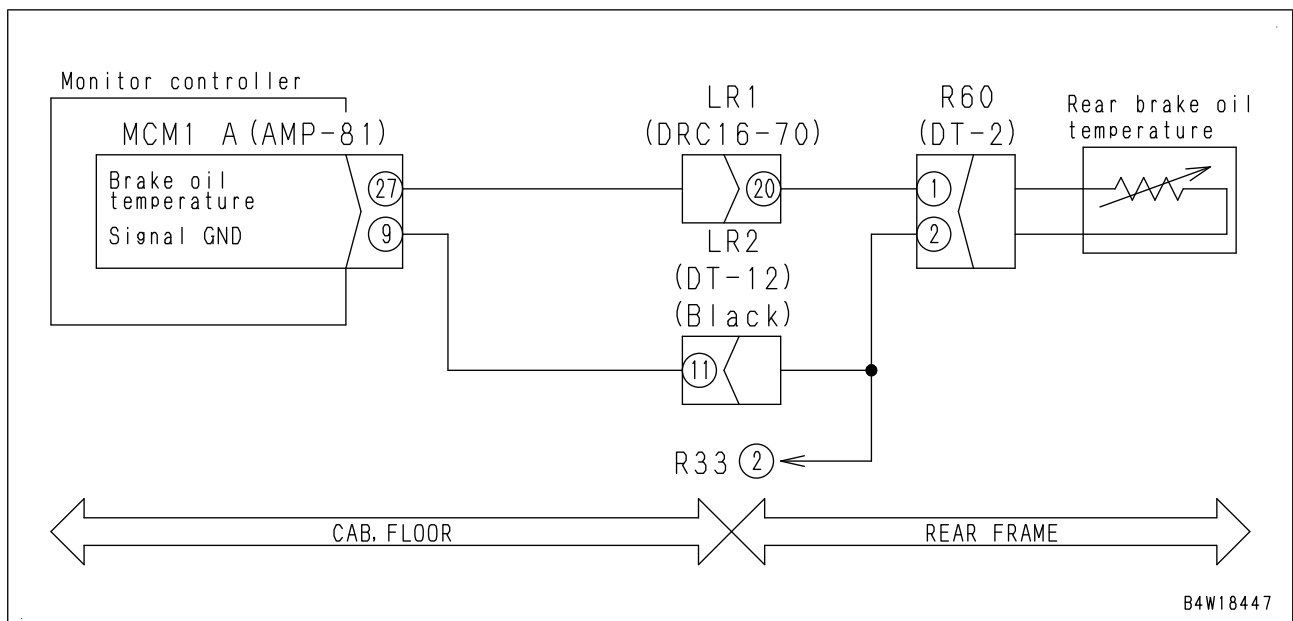
DGR2KB-400-A-Z0-A)

Action level	Failure code	Failure	Ground Fault of Brake Oil Temperature Sensor (Monitor controller system)
L01	DGR2KB		
Detail of failure	<ul style="list-style-type: none"> Voltage of signal circuit of brake oil temperature sensor (rear) drops below 0.97 V or increases above 175 °C. 		
Action of controller	<ul style="list-style-type: none"> Light up system caution lamp. If cause of failure disappears, machine becomes normal by itself. 		
Problem on machine	<ul style="list-style-type: none"> Oil temperature gauge is disabled due to failure code in sensor. 		
Related information	<ul style="list-style-type: none"> Signal from brake oil temperature sensor can be checked with monitoring function. (Code: 30202 (°C), 30205 (V)) Method of reproducing failure code: Turn starting switch to ON position. 		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective brake oil temperature sensor (rear)	1. Turn starting switch to OFF position. 2. Disconnect connector R60 and connect T-adapter to male side.			
		Resistance	Between R60 (male) (1) and (2)	Rear brake oil temperature: 25°C	42.7 kΩ *
				Rear brake oil temperature: 30°C	35.13 kΩ *
				Rear brake oil temperature: 80°C	6.556 kΩ *
				Rear brake oil temperature: 90°C	4.925 kΩ *
				Rear brake oil temperature: 100°C	3.75 kΩ *
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A, R60 and connect T-adapter to either female side.			
		Resistance	Between ground and MCM1 A (female) (27) or R20 (female) (1)	Min. 1 MΩ	
3	Defective monitor controller (When system is normal)	If no failure is found by above checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed).			

*: Sensor resistance at various temperatures are only the average figures and they may vary.

Electrical circuit diagram related to brake oil temperature sensor (rear)

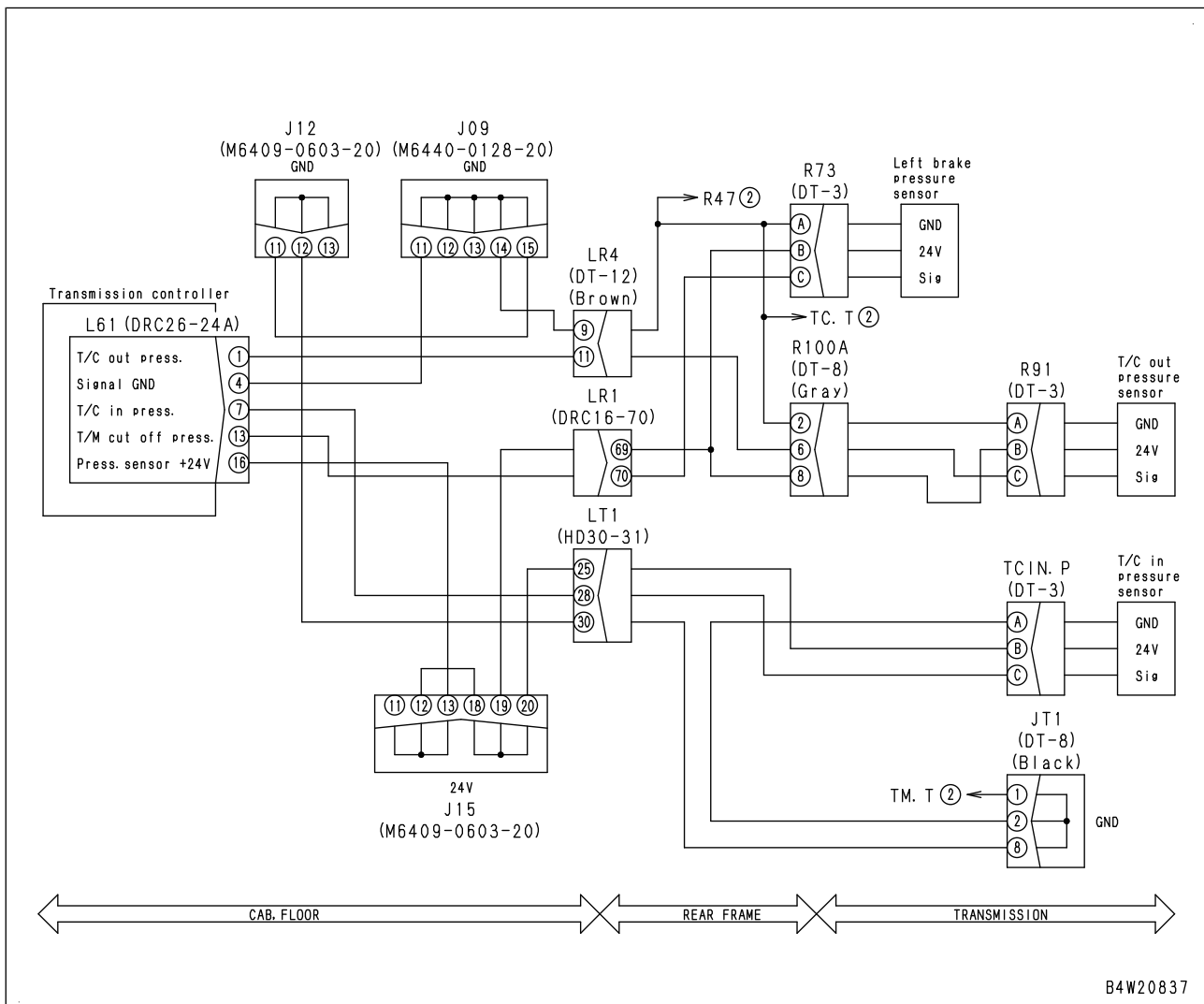


40 Troubleshooting

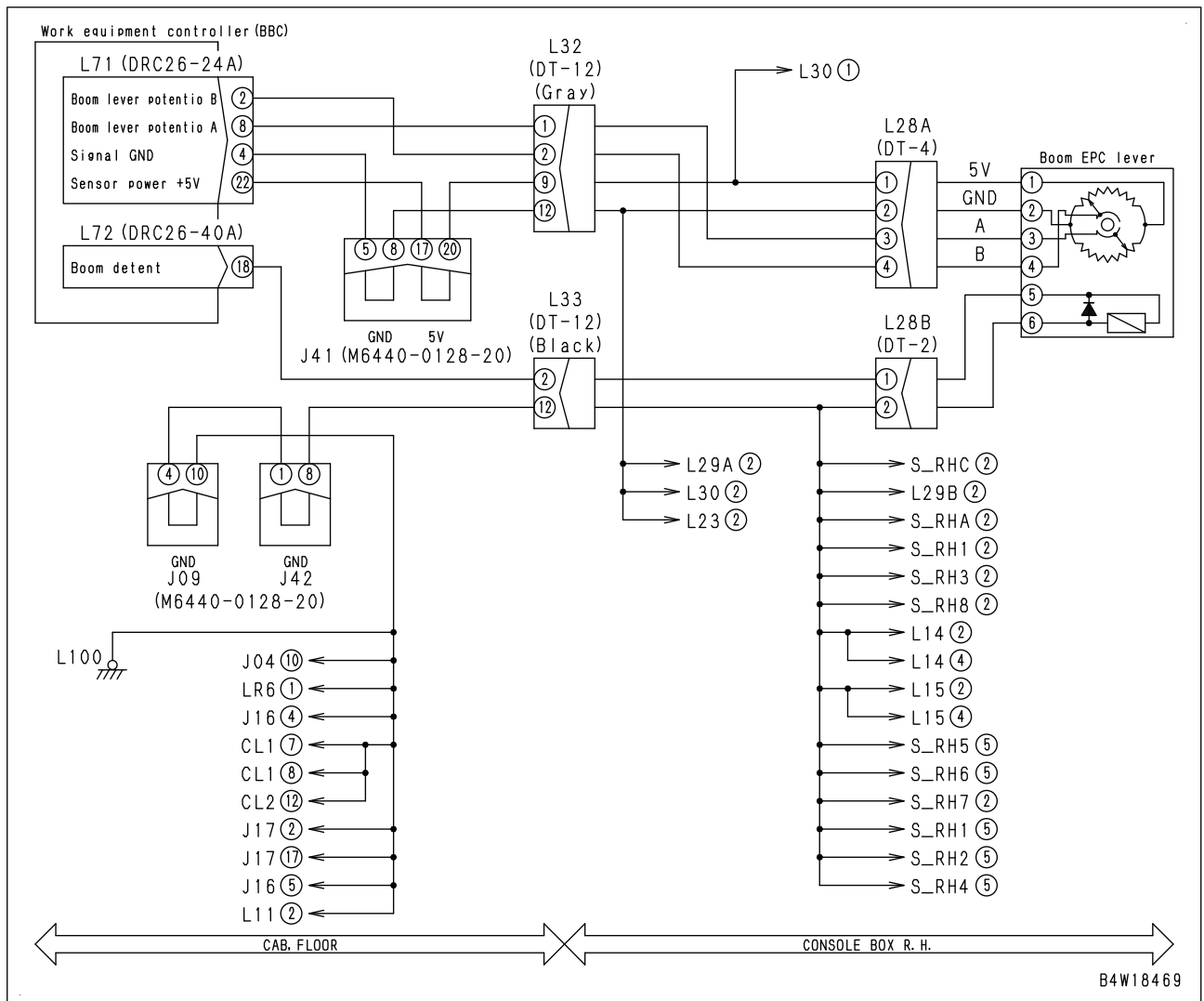
Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks		
5	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L61 and R91, and connect T-adapters to each female side.		
		Resistance	★ If power supply voltage is normal, this check is not required. Between L61 (female) (16) and R91 (female) (B)	Max. 1 Ω
			★ If power supply voltage is normal, this check is not required. Between L61 (female) (4) and R91 (female) (A)	Max. 1 Ω
			Between L61 (female) (1) and R91 (female) (C)	Max. 1 Ω
6	Defective transmission controller	If no failure is found by above checks, transmission controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed).		
		★ Reference 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L61. 3. Turn starting switch to ON position.		
		Voltage	Between L61 (16) and (4)	20 to 30 V
Between L61 (1) and (4)	0.9 to 5.1 V			

Circuit diagram related to torque converter oil pressure sensor



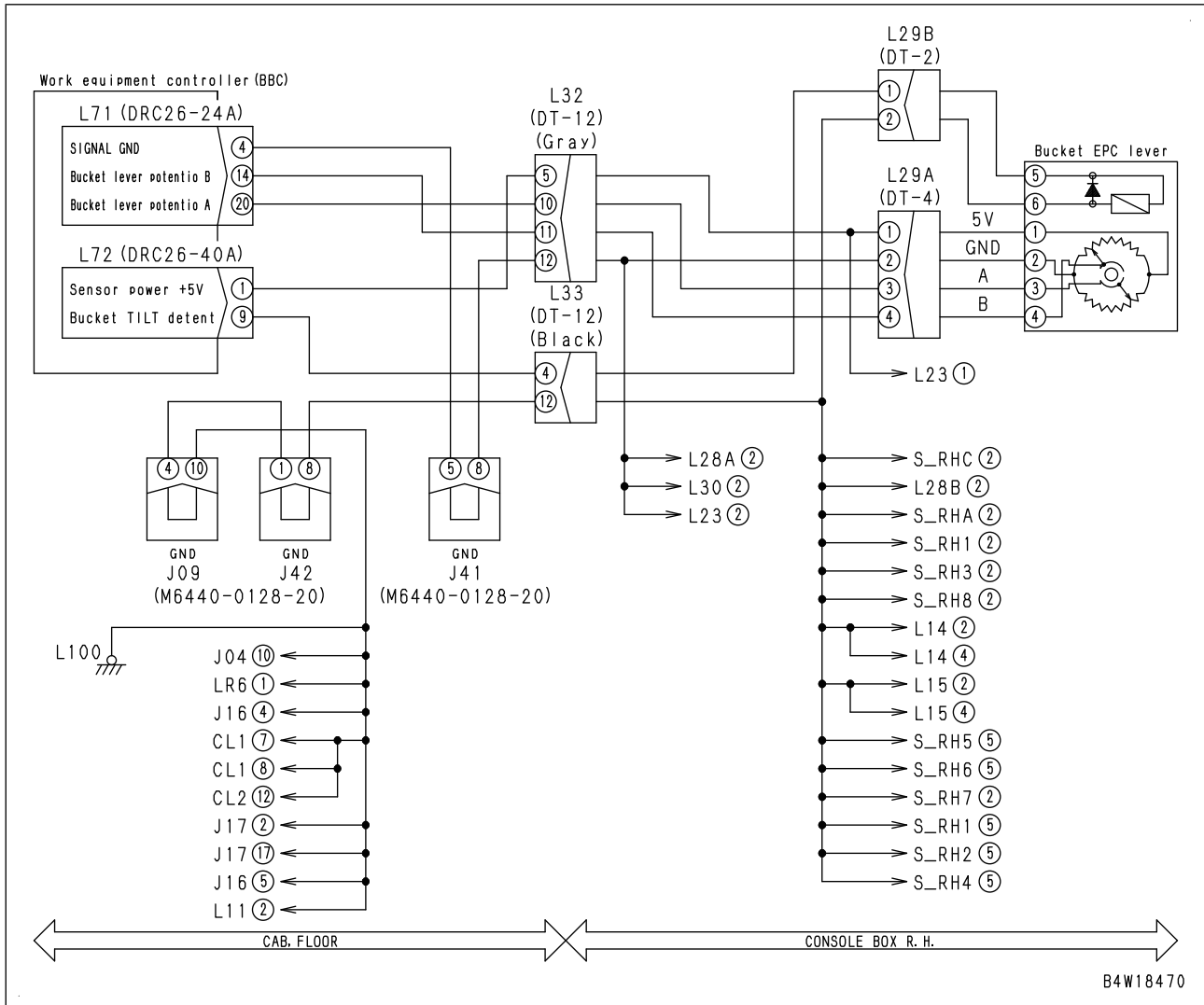
Circuit diagram related to boom lever potentiometer



40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to bucket lever potentiometer



Failure code [DKA1KA] Failure of Bucket Angle Sensor (WA470_7-DKA1KA-400-A-Z0-A)

Action level	Failure code	Failure	Failure of Bucket Angle Sensor (Work equipment controller system)
L01	DKA1KA		
Detail of failure	<ul style="list-style-type: none"> Due to open circuit or ground fault in bucket angle sensor system, signal voltage from bucket angle sensor is lower than normal range. (Signal voltage from bucket angle sensor: Max. 0.3 V) 		
Action of controller	<ul style="list-style-type: none"> Determines that bell crank angle is at its minimum. Disables bucket positioner function. Disables semi-auto digging. Disables bucket detent function. If cause of failure disappears, machine becomes normal by itself. 		
Problem on machine	<ul style="list-style-type: none"> Bucket positioner malfunctions (does not work). Semi-auto digging system malfunctions (does not work). Komatsu SmartLoader Logic malfunctions. 		
Related information	<ul style="list-style-type: none"> Input voltage from bucket angle sensor can be checked with monitoring function. (Code: 55601 Bucket Link Angle Sensor Volt) Angle sensed by bucket angle sensor can be checked with monitoring function. (Code: 55600 Bucket Link Angle) Method of reproducing failure code: Turn starting switch to ON position. 		

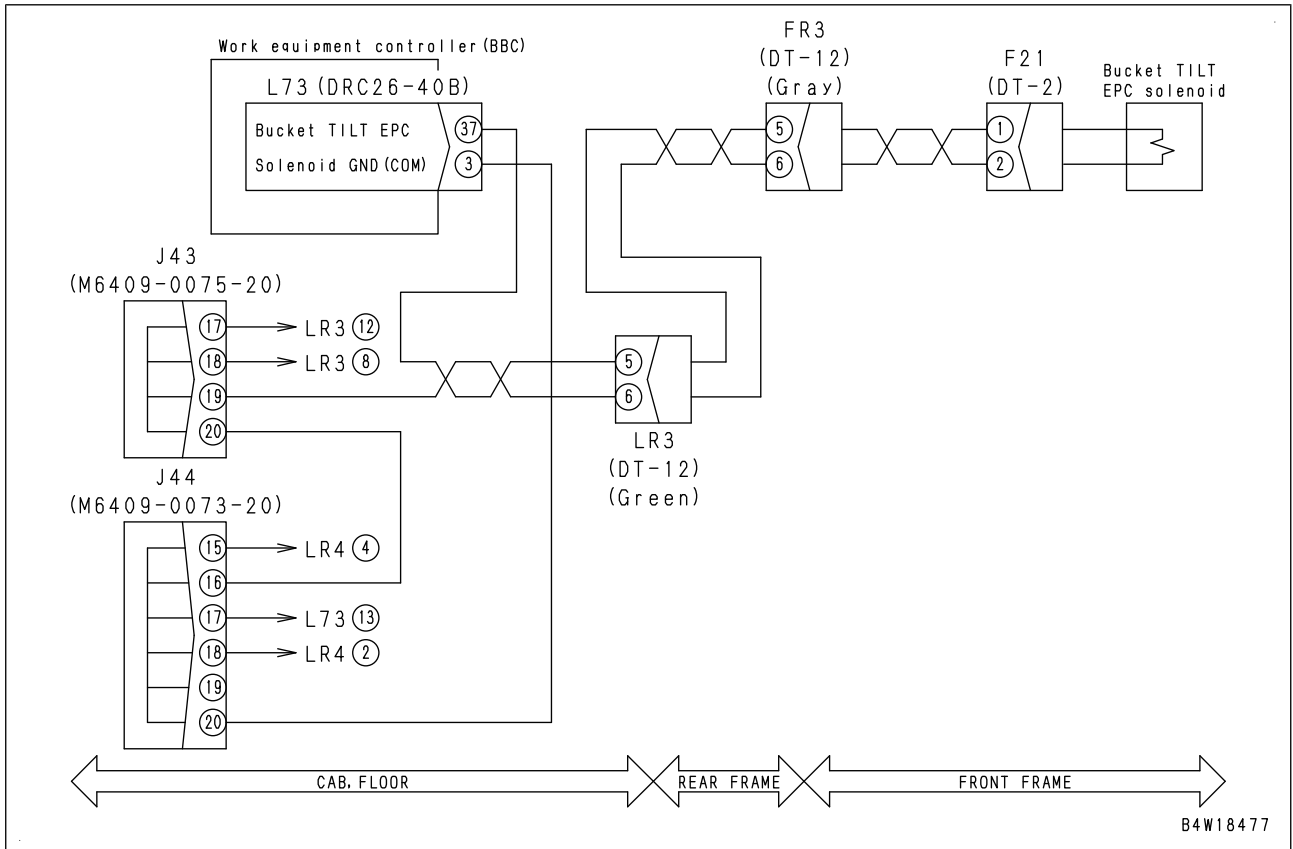
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 5 V sensor power supply system	If failure code [DB95KX] is also displayed, perform troubleshooting for it first.		
		<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connector F32, and connect T-adaptor to female side. Turn starting switch to ON position. 		
		★ If power supply voltage is abnormal, go to check on cause 3 and after.		
		Voltage	Between F32 (female) (C) and (A)	5.0 to 5.2 V
2	Defective bucket angle sensor (internal open or short circuit)	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connector F32, and connect T-adaptor to male side. 		
		Resistance	Between F32 (male) (A) and (C)	4 to 6 kΩ
			Between F32 (male) (A) and ground	Min. 1 MΩ
			Between F32 (male) (B) and ground	Min. 1 MΩ
			Between F32 (male) (C) and ground	Min. 1 MΩ
		<ol style="list-style-type: none"> Turn starting switch to OFF position. Insert T-adaptor into connector F32. Turn starting switch to ON position. Operate bucket lever to perform troubleshooting. 		
Voltage	Between F32 (B) and (A)	Continuous	2.15 to 4.45 V	
		Full TILT	3.95 to 4.45 V	
		Full DUMP	2.15 to 2.65 V	
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connectors L71, L72, and F32, and connect T-adaptors to each female side. 		
		Resistance	Between F32 (female) (A) and L71 (female) (4)	Max. 1 Ω
			Between F32 (female) (B) and L72 (female) (36)	Max. 1 Ω
		Between F32 (female) (C) and L71 (female) (22)	Max. 1 Ω	
4	Ground fault in wiring harness (contact with ground circuit)	<ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connectors L71, L72, and F32, and connect T-adaptor to any female side. 		
		Resistance	Between ground and F32 (female) (B) or L72 (female) (36)	Min. 1 MΩ

40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
7	Defective LED unit (display unit of machine monitor)	<ul style="list-style-type: none">• Perform this check when failure codes [DPQ1KR] and [DPQ2KR] are also displayed. <ol style="list-style-type: none">1. Turn starting switch to OFF position.2. Disconnect connector MDM2.3. Turn starting switch to ON position.
		If failure codes [DPQ1KR] and [DPQ3KR] disappear, LED unit is defective.
8	Defective rear view monitor	<ul style="list-style-type: none">• Perform this check when failure codes [DPQ1KR] and [DPQ2KR] are also displayed. <ol style="list-style-type: none">1. Turn starting switch to OFF position.2. Disconnect connector RVM1.3. Turn starting switch to ON position.
		If failure codes [[DPQ1KR] and [DPQ2KR] disappear, rear view monitor is defective.
9	Defective monitor controller	If no failure is found by above checks, monitor controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed).

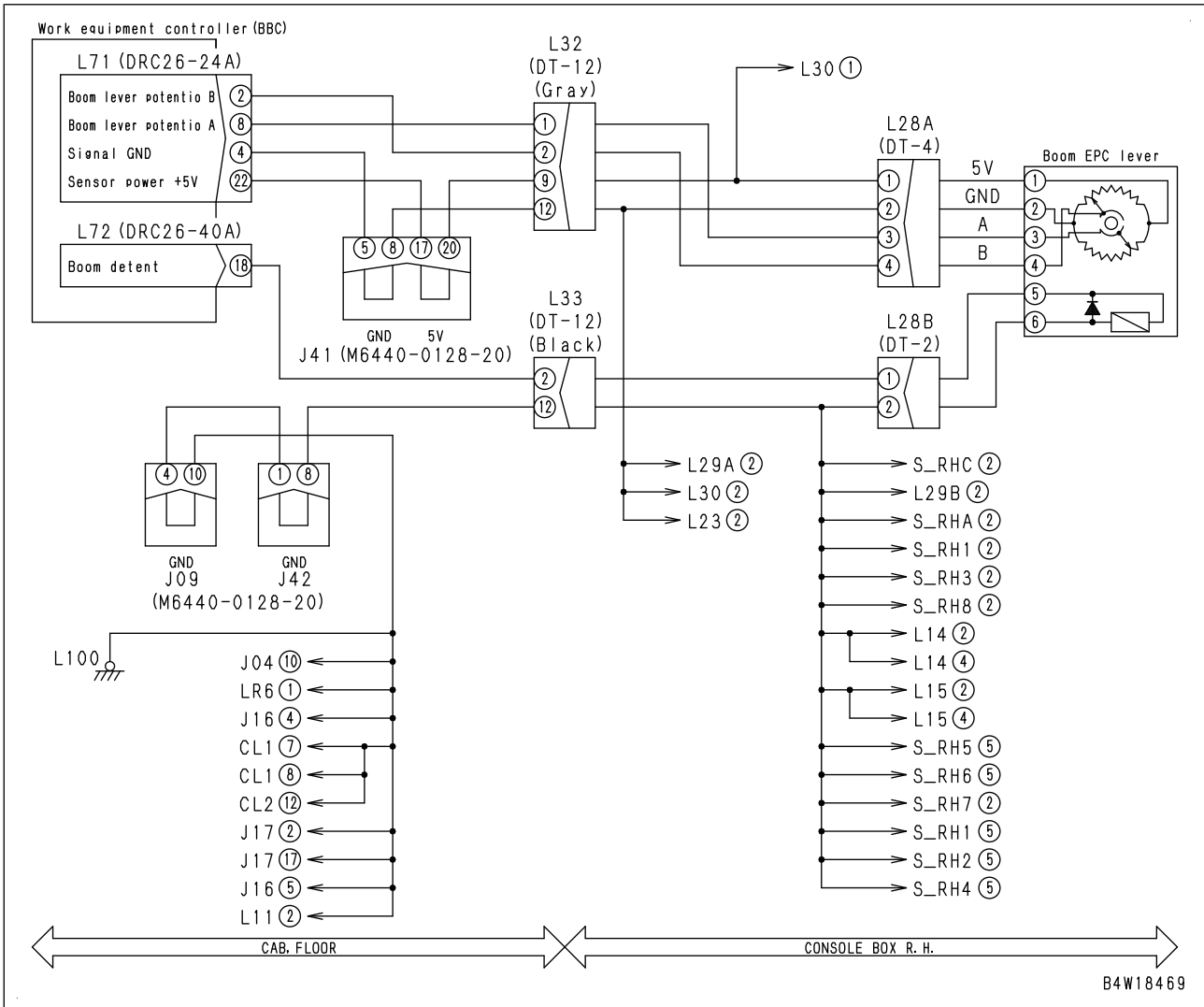
Circuit diagram related to bucket TILT EPC solenoid



40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to magnet detent solenoid



Failure code [DXANKA] Disconnection of Steering Pump EPC Sol. (WA470_7-

DXANKA-400-A-Z0-A)

Action level	Failure code	Failure	Disconnection of Steering Pump EPC Solenoid (Work equipment controller system)
L01	DXANKA		
Detail of failure	<ul style="list-style-type: none"> Due to open circuit in steering pump EPC solenoid system, no current flows when controller drives steering pump EPC solenoid. 		
Action of controller	<ul style="list-style-type: none"> Continues to drive steering pump EPC solenoid normally. Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Problem on machine	<ul style="list-style-type: none"> Fuel consumption may degrade at low engine speed. Engine may stall. Engine acceleration may degrade. Turning speed may accelerate suddenly. 		
Related information	<ul style="list-style-type: none"> Output current value to steering pump EPC solenoid can be checked with monitoring function. (Code: 94600 Steering Pump EPC Current) Using "2-stage low idle" function allows increasing engine speed at low idle, thereby avoiding decrease in machine performance. Method of reproducing failure code: Start engine. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective steering pump EPC solenoid (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector R90 and connect T-adaptor to male side.	
		Resistance	Between R90 (male) (2) and (1) 5 to 15 Ω
2	Open circuit, short circuit, ground fault, hot short circuit of wiring harness, or defective transmission controller	1. Turn starting switch to OFF position. 2. Disconnect connector R90 and connect T-adapters to female side. 3. Turn starting switch to ON position. ★ Shake the wiring harness by hand while measuring the voltage. If the voltage drops to approximately 0 V during shaking, circuit is open around this point.	
		Voltage	Between R90 (female) (2) and (1) Min. 20 V
3	Open or short circuit in wiring harness	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connector L73, and connect T-adaptor to female side.	
		Resistance	Between L73 (female) (25) and each of (21), (31), (32), and (33) 5 to 15 Ω
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors L73 and R90, and connect T-adapters to each female side.	
		Resistance	Between R90 (female) (1) and each of L73 (female) (21), (31), (32), and (33) Max. 1 Ω
			Between L73 (female) (25) and R90 (female) (2) Max. 1 Ω
5	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

40 Troubleshooting

Troubleshooting by failure code (Display of code)

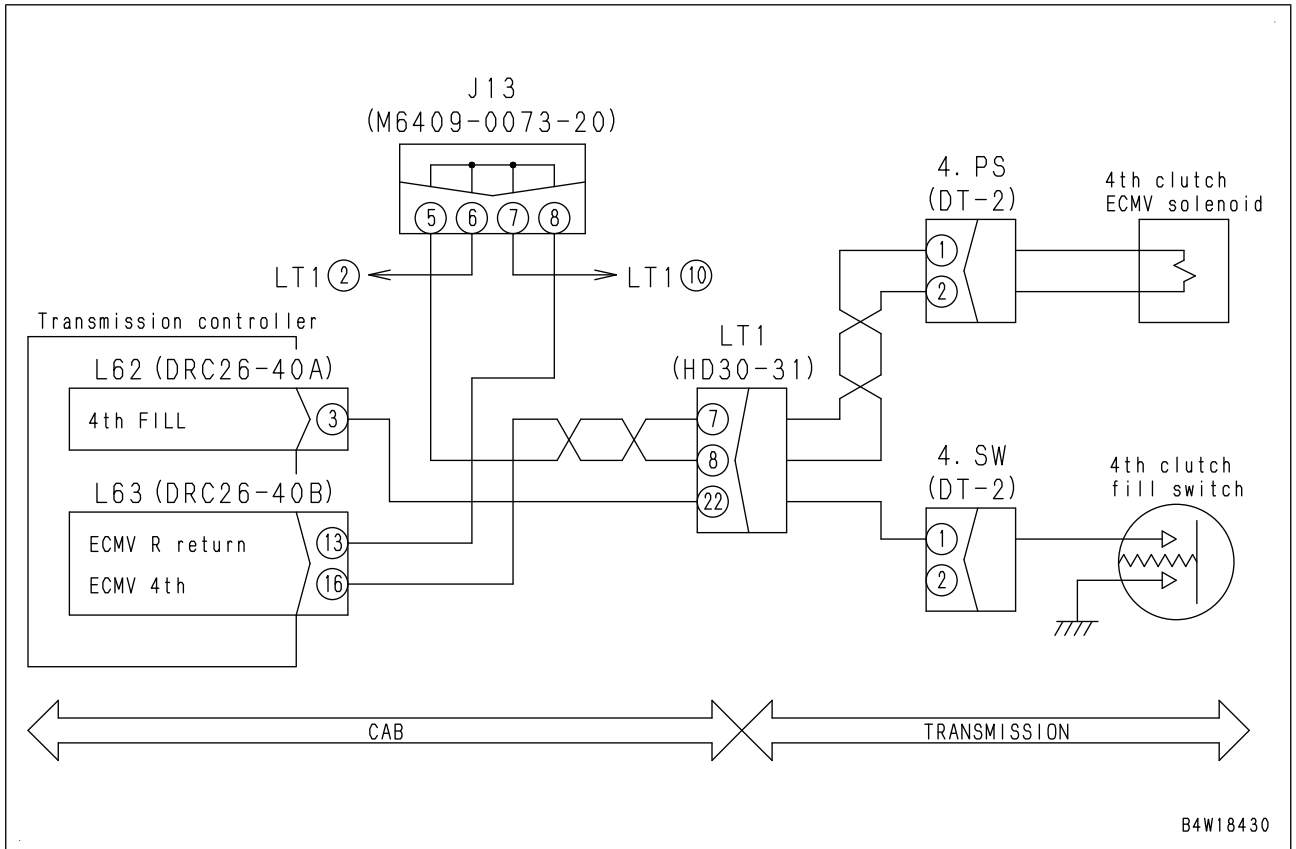
Failure code [DXH6KA] Disconnection of ECMV Solenoid (3rd) (WA380_7-DXH6KA-

400-A-Z0-A)

Action level	Failure code	Failure	Disconnection of ECMV Solenoid (3rd) (Transmission controller system)
L03	DXH6KA		
Detail of failure	<ul style="list-style-type: none"> Due to open circuit in 3rd clutch ECMV solenoid circuit, no current flows when controller drives 3rd clutch ECMV solenoid. 		
Action of controller	<ul style="list-style-type: none"> Stops driving 3rd clutch ECMV solenoid. Lights up centralized warning lamp and sounds alarm buzzer. Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position. 		
Problem on machine	<ul style="list-style-type: none"> 3rd clutch is not engaged (machine can travel with any gear speed other than 3rd). 		
Related information	<ul style="list-style-type: none"> Output current value to 3rd clutch ECMV solenoid can be checked with monitoring function. (Code: 31604 ECMV Current (3rd)) Method of reproducing failure code: Turn starting switch to ON position and set transmission shift mode selector switch to AUTO shift mode, or set transmission shift mode selector switch to MANUAL shift mode and select 3rd gear speed by using shift down switch or gear shift lever. 		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective 3rd clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 3.PS, and connect T-adapter to male side.	
		Resistance	Between 3.PS (male) (1) and (2) 5 to 15 Ω
2	Open circuit, short circuit, ground fault, hot short circuit of wiring harness, or defective transmission controller	1. Turn starting switch to OFF position. 2. Disconnect connector 3.PS, and connect T-adapter to female side. 3. Turn starting switch to ON position. ★ Shake the wiring harness by hand while measuring the voltage. If the voltage drops to approximately 0 V during shaking, circuit is open around this point.	
		Voltage	Between 3.PS (female) (1) and (2) 1 to 4.5 V
3	Open or short circuit in wiring harness	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connector L63, and connect T-adapter to female side.	
		Resistance	Between L63 (female) (6) and (3) 5 to 15 Ω
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors L63 and 3.PS, and connect T-adapters to each female side.	
		Resistance	Between L63 (female) (6) and 3.PS (female) (1) Max. 1 Ω
			Between L63 (female) (3) and 3.PS (female) (2) Max. 1 Ω
5	Defective transmission controller	If no failure is found by above checks, transmission controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)	

Circuit diagram related to 4th clutch ECMV solenoid



40 Troubleshooting

Troubleshooting of electrical system (E-mode)

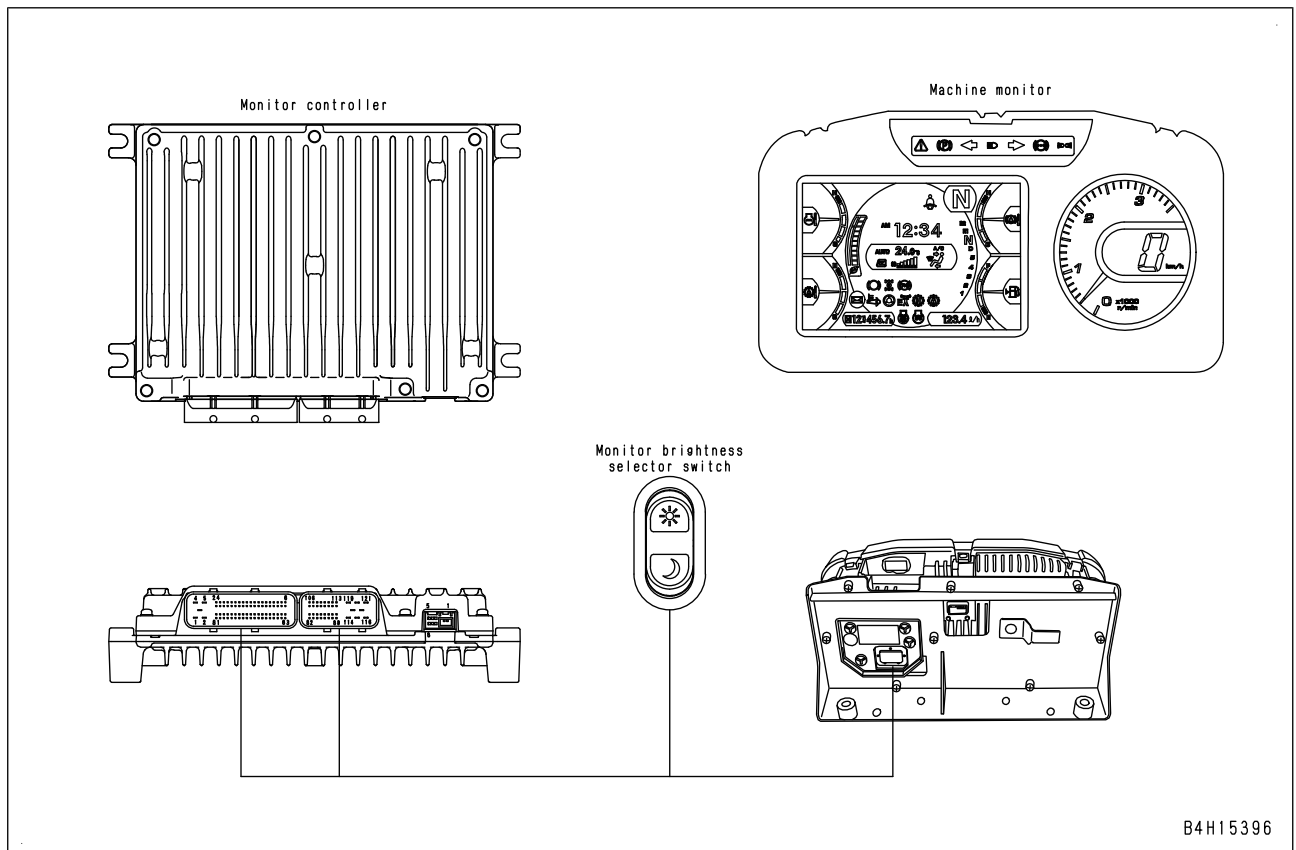
Troubleshooting of electrical system (E-mode) (ALL-3840-001-A-01-A)

E-1 Engine does not start (WA470_7-A20-400-A-Z0-A)

Failure	Engine does not start (engine does not crank).
Related information	<ul style="list-style-type: none"> Engine starting circuit has following two start lock mechanisms. <ol style="list-style-type: none"> Start lock by password protection of machine monitor Start lock by directional lever and R.H. directional selector (FNR) switch positions (engine can start only when in NEUTRAL). If failure symptom "Battery relay operation sound is not heard" appears when starting switch is turned to ON position, perform troubleshooting for E-1 as well. If failure symptom "Machine monitor does not light up" appears when turning starting switch to ON position, main electric power supply system is supposed to be defective. Perform the troubleshooting for E-5 (lines of slow-blow fuse, fuses-1 and -5 of fuse box 2). Battery charge voltage sensed by transmission controller can be checked with monitoring function. (Code: 04307 (V))

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Loose terminal or open circuit at terminal	1. Turn starting switch to OFF position.		
		Check terminals of starting motor, alternator, battery relay, and ground terminals R50, E14, etc.		
2	Poor contact (grounding) between battery relay and frame	1. Turn starting switch to OFF position.		
		Resistance	Between battery relay terminal R16 and ground ★ Use machine frame as grounding point for measurement. ★ Loose or rusted terminal R50	Max. 1 Ω
3	Insufficient battery capacity	★ Be ready with starting switch at OFF position, then perform troubleshooting without turning starting switch to ON position.		
		Battery voltage (two batteries)		Min. 24 V
		Specific gravity of electrolyte (each battery)		Min. 1.26
4	Defective engine controller system	Defects of engine controller power supply and ACC signal are indicated with failure codes [DB2QKR] and [DB2RKR]. If these codes appear, perform troubleshooting for causes 1 to 3 of [DB2QKR] first.		
5	Defective transmission controller system	If failure code [DAQQKR] or [DAQRKR] is displayed, perform troubleshooting for [DAQQKR] or [DAQRKR].		
6	Defective directional lever system	If failure code [DF10KA] or [DF10KB] is displayed, perform troubleshooting for [DF10KA] or [DF10KB].		
7	R.H. directional selector (FNR) switch system	If failure code [DDK3KA] or [DDK3KB] is displayed, perform troubleshooting for [DDK3KA] or [DDK3KB].		
8	Defective battery relay system	1. Turn starting switch to ON position (to connect ACC). ★ If battery relay operation sound is not heard, go to checks on causes 19 and after.		
9	Defective starting switch, gear shift lever switch, neutral safety relay L116, neutral keep relay L121, personal code relay L113, battery relay, or wiring harness	1. Turn starting switch to OFF position. 2. Remove fuse-6 (30 A) in fuse box 2. (To prevent engine from starting during troubleshooting) 3. Insert T-adapters into connector E01. 4. Turn starting switch to START position and hold it (two persons required for this check). ★ If voltage is abnormal, go to check on cause 13 and after.		
		Voltage	Between E01 (1) and ground	20 to 30 V
10	Defective alternator (internal short circuit)	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector E01. 3. Turn starting switch to ON position.		
		Voltage	Between E01 (female) (2) and ground	Input from alternator generation Max. 1 V

Wiring harness between monitor controller and meter unit of machine monitor



40 Troubleshooting

Troubleshooting of electrical system (E-mode)

E-18 Night lighting lamp of rear view monitor is abnormal (WA380_7-FHL-400-A-Z0-A)

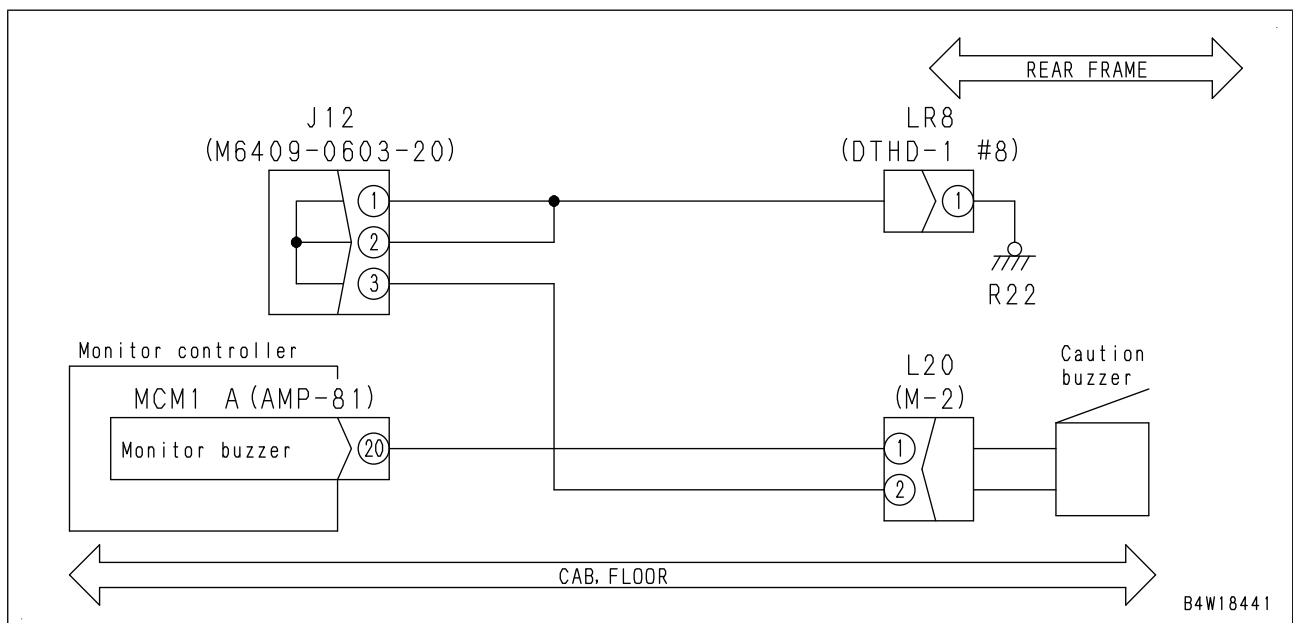
Failure	Night lighting lamp of rearview monitor is abnormal.														
Related information	<ul style="list-style-type: none"> Night lighting lamp of rearview monitor lights up only when clearance lamp is turned on while monitor brightness selector switch is at the night mode. Check whether night lighting lamp of meter unit of machine monitor is also unusual. 														
No.	Cause	Procedure, measuring location, criteria and remarks													
1	Defective harness connector	<ol style="list-style-type: none"> Check that system operating lamp does not light up, and then set battery disconnect switch to OFF position. Turn starting switch to OFF position. Visually check connector (RVM1) of wiring harness connected to rearview monitor and connector of night lighting switch, and repeat connection and disconnection of connectors. Turn battery disconnect switch to ON position. Turn starting switch to ON position. <p>If normal conditions are restored, cause of failure is defective contact of connector.</p>													
2	Defective monitor brightness selector (night lighting) switch	<p>★ If night lighting lamp of meter unit lights up, this check is not required.</p> <ol style="list-style-type: none"> Turn starting switch to OFF position. Disconnect connector S_F7 and connect T-adapter to male side. <table border="1"> <tr> <td>Resistance</td> <td>Between S_F7 (male) (5) and (4)</td> <td>Brightness selector switch: OFF</td> <td>Min. 1 MΩ</td> </tr> <tr> <td></td> <td>Between S_F7 (male) (5) and (4)</td> <td>Brightness selector switch: ON</td> <td>Max. 1 Ω</td> </tr> </table>		Resistance	Between S_F7 (male) (5) and (4)	Brightness selector switch: OFF	Min. 1 MΩ		Between S_F7 (male) (5) and (4)	Brightness selector switch: ON	Max. 1 Ω				
Resistance	Between S_F7 (male) (5) and (4)	Brightness selector switch: OFF	Min. 1 MΩ												
	Between S_F7 (male) (5) and (4)	Brightness selector switch: ON	Max. 1 Ω												
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ol style="list-style-type: none"> Check that system operating lamp does not light up, and then set battery disconnect switch to OFF position. Turn starting switch to OFF position. Disconnect connector RVM1, and connect T-adapters to female side. Turn battery disconnect switch to ON position. Turn starting switch to ON position. Lighting up of clearance lamp <table border="1"> <tr> <td rowspan="2">Voltage</td> <td>Between RVM1 (female) (8) and (2)</td> <td>Night lighting switch: OFF</td> <td>Max. 0.2 V</td> </tr> <tr> <td>Between RVM1 (female) (8) and (2)</td> <td>Night lighting switch: ON</td> <td>20 to 30 V</td> </tr> </table> <p>★ If no failure is found by above checks, this check is not required.</p> <ol style="list-style-type: none"> Check that system operating lamp does not light up, and then set battery disconnect switch to OFF position. Turn starting switch to OFF position. Disconnect connectors RVM1, S_F7, S_RV, and connect T-adapters to each female side. <table border="1"> <tr> <td rowspan="2">Resistance</td> <td>Between S_F7 (female) (4) and RVM1 (female) (8)</td> <td>Max. 1 Ω</td> </tr> <tr> <td>Between L04 (female) (2) and S_F7 (female) (5)</td> <td>Max. 1 Ω</td> </tr> </table>		Voltage	Between RVM1 (female) (8) and (2)	Night lighting switch: OFF	Max. 0.2 V	Between RVM1 (female) (8) and (2)	Night lighting switch: ON	20 to 30 V	Resistance	Between S_F7 (female) (4) and RVM1 (female) (8)	Max. 1 Ω	Between L04 (female) (2) and S_F7 (female) (5)	Max. 1 Ω
Voltage	Between RVM1 (female) (8) and (2)	Night lighting switch: OFF	Max. 0.2 V												
	Between RVM1 (female) (8) and (2)	Night lighting switch: ON	20 to 30 V												
Resistance	Between S_F7 (female) (4) and RVM1 (female) (8)	Max. 1 Ω													
	Between L04 (female) (2) and S_F7 (female) (5)	Max. 1 Ω													
4	Defective rearview monitor	<p>If no failure is found by check on cause 3, rearview monitor is defective.</p> <p>★ When not using T-adapter for connector RVM1 (070-12)</p> <ol style="list-style-type: none"> Turn battery disconnect switch to ON position. Turn starting switch to ON position. Turn on night lighting switch. <p>If night lighting of LCD unit, meter unit, LED unit, and switch panel of machine monitor is normal, rearview monitor is defective.</p>													

E-30 Alarm buzzer does not sound (WA380_7-KA7-400-A-Z0-A)

Failure	Alarm buzzer does not sound.
Related information	<ul style="list-style-type: none"> Open circuit or ground fault of alarm buzzer output circuit Output state (ON/OFF) from the alarm buzzer to the machine monitor can be checked with monitoring function. (Code: 04700 Buzzer) If failure code [DV00KB] (alarm buzzer short circuit) is displayed, troubleshoot it first. Since T-adaptor for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective alarm buzzer (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L20, and connect T-adaptor to female side. 3. Turn starting switch to ON position. ★ If following voltages are normal and alarm buzzer does not sound, alarm buzzer is defective.		
		Voltage	Between L20 (female) (1) and (2)	Alarm buzzer: OFF When driving alarm buzzer (when starting engine)
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and L20, and connect T-adapters to each female side.		
		Resistance	Between MCM1 A (female) (20) and L20 (female) (1)	Max. 1 Ω
3	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and L20, and connect T-adaptor to either female side.		
		Resistance	Between ground and MCM1 A (female) (20) or L20 (female) (1)	Min. 1 MΩ
4	Defective monitor controller	If no failure is found by above checks, monitor controller is defective.		

Circuit diagram related to alarm buzzer



40 Troubleshooting

Troubleshooting of electrical system (E-mode)

No.	Cause	Procedure, measuring location, criteria and remarks		
5	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Remove fuses 12 and 13 in fuse box 1 (FS8). 3. Disconnect connectors L04, LDR_L, LDR_R, COMBI (R.H. and L.H.), and connect T-adapters to each female side.		
		Resistance	Between L04 (female) (2) and ground	Min. 1 MΩ
			Between ground and R.H. COMBI (female) (A) or LDR_R (female) (B)	Min. 1 MΩ
			Between ground and L.H. COMBI (female) (A) or LDR_L (female) (B)	Min. 1 MΩ
6	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Remove fuses 12 and 13 in fuse box 1 (FS8). 3. Disconnect connectors L04, LDR_L, LDR_R, COMBI (R.H. and L.H.), and connect T-adapters to each female side. 4. Turn starting switch to ON position. ★ Headlamp switch OFF		
		Voltage	Between L04 (female) (2) and ground	Max. 1 V
			Between ground and R.H. COMBI (female) (A) or LDR_R (female) (B)	Max. 1 V
			Between ground and L.H. COMBI (female) (A) or LDR_L (female) (B)	Max. 1 V
7	Defective LED (rear combination lamp)	If no failure is found by above checks, the LED (rear combination lamp) is defective.		

No.	Cause	Procedure, measuring location, criteria and remarks		
6	Open circuit in wiring harness (wire breakage or defective contact of connector)	<ul style="list-style-type: none"> • Primary side GND line of relay <ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Disconnect connectors L111 and L122, and connect T-adapters to each female side. 3. Hazard lamp switch: ON 		
		Resistance	Between L111 (female) (2) and ground	Max. 1 Ω
			Between L122 (female) (6) and ground	Max. 1 Ω
		<ul style="list-style-type: none"> • Hazard lamp power supply input <ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Disconnect connectors L111 and L122, and connect T-adapters to each female side. 3. Turn starting switch to ON position. 		
		Voltage	Between L111 (female) (5) and ground	20 to 30 V
			Between L111 (female) (1) and ground	20 to 30 V
			Between L122 (female) (5) and ground	20 to 30 V
		<ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Disconnect connectors L19, L122, LDY_R, LDY_L, COMBI (R.H. and L.H.), and connect T-adapters to each female side. 		
		Resistance	Between L122 (female) (4) and LDY_L (female) (1)	Max. 1 Ω
			Between L122 (female) (4) and L.H. COMBI (female) (C)	Max. 1 Ω
Between L122 (female) (2) and LDY_R (female) (1)	Max. 1 Ω			
Between L122 (female) (2) and R.H. COMBI (female) (C)	Max. 1 Ω			
Between L122 (female) (1), (3) and L19 (female) (4)	Max. 1 Ω			
<ul style="list-style-type: none"> ★ If no failure is found by above checks, this check is not required. <ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Disconnect connectors S_FB, L111, L122, and connect T-adapters to each female side. 				
Resistance	Between L111 (female) (2) and S_FB (female) (5)	Max. 1 Ω		
	Between S_FB (female) (6) and ground	Max. 1 Ω		
	Between L122 (female) (6) and S_FB (female) (5)	Max. 1 Ω		

7	Ground fault in wiring harness (contact with ground circuit)	<ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Turn the battery disconnect switch to the OFF position. 3. Disconnect connectors S_FB, L111, L122, and connect T-adapters to either female side. 4. Remove slow blow fuse R03. 5. Remove fuses 1, and 3 to 7 in fuse box 2 (FS9). <ul style="list-style-type: none"> ★ If fuse 2 in fuse box 2 (FS9) is blown, replace it in advance. 		
		Resistance	Between ground and L111 (female) (1), (5) or L122 (female) (5)	Min. 1 MΩ
			Between ground and L111 (female) (2) or S_FB (female) (5)	Min. 1 MΩ

8	Hot short circuit in wiring harness	<ol style="list-style-type: none"> 1. Turn starting switch to OFF position. 2. Remove fuse 8 in fuse box 2 (FS9). 3. Disconnect connectors L122, LDY_R, LDY_L, COMBI (R.H. and L.H.), and connect T-adapters to either female side. 4. Turn starting switch to ON position. <ul style="list-style-type: none"> • Hot short circuit in wiring harness of the following two systems 		
		Voltage	Between ground and L122 (female) (2), LDY_R (female) (1), or R.H. COMBI (female) (C)	Max. 1 V
			Between ground and L122 (female) (4), LDY_L (female) (1), or L.H. COMBI (female) (C)	Max. 1 V

H-7 Torque converter oil temperature is high (WA470_7-AM0-400-A-Z0-A)

Failure	Torque converter oil temperature is high.
Related information	<ul style="list-style-type: none"> • Check that transmission oil level is normal. • If any failure code is displayed, perform troubleshooting for that failure code first. (15SAL1, 15SALH, 15SBL1, 15SBLH, 15SEL1, 15SELH, 15SFL1, 15SFLH, 15SGL1, 15SGLH, 15SHL1, 15SHLH, DGT1KA, or DGT1KB) • Check that parking brake is surely released. • Measure torque converter oil temperature actually and compare it with that displayed by using monitoring function to determine whether oil temperature sensor is normal. (Monitoring code: 30100) • Torque converter oil pressure can be checked with monitoring function. (Monitoring code: 32601 (Input pressure), 32603 (Output pressure)) • Engine speed can be checked with monitoring function. (Monitoring code: 01001)

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective strainer of transmission charge pump	Check strainer for clogging.			
2	Air sucked in on suction side of transmission charge pump	Check suction piping for cracks, etc.			
3	Clogged transmission breather	Check breather for clogging.			
4	Defective main relief valve of transmission charge pump	★ Be ready with engine stopped, then perform troubleshooting with engine running at low idle and 2,000 rpm.			
		Main relief pressure	Engine speed	Low idle	2.32 ± 0.2 MPa {23.5 ± 2 kg/cm ² }
				2,000 rpm	2.55 ± 0.2 MPa {26 ± 2.0 kg/cm ² }
When pressure cannot be adjusted to normal level, check main relief valve for malfunction (setting of spring) and internal defect (defective valve seat).					
5	Improper torque converter pressure (relief valve)	★ Be ready with engine stopped, then perform troubleshooting with engine running at 2,000 rpm.			
		Torque converter input pressure	Brake	OFF	0.1 to 0.88 MPa {1.0 to 9.0 kg/cm ² }
		Torque converter output pressure	Brake	OFF	0.06 to 0.71 MPa {0.6 to 7.1 kg/cm ² }
When pressure cannot be adjusted to normal level, check relief valve for malfunction (setting of spring) and internal defect (defective valve seat).					
• If torque converter output pressure is low, oil cooler may be broken.					
6	Defective torque converter	★ Be ready with engine stopped, then perform troubleshooting with torque converter at stall.			
		Torque converter stall speed	Economy mode switch	ON	1、 710 ± 100 rpm
			Power mode switch	ON	1、 785 ± 100 rpm

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

H-23 Bucket does not tilt back (WA470_7-M80-400-A-Z0-A)

Failure	Bucket does not tilt back.
Related information	<ul style="list-style-type: none"> Check that oil level in hydraulic tank is normal. If any failure code is displayed, perform troubleshooting for that failure code first. (DB90KK, DB92KK, DB95KX, DK5BL8, DW4PKY, DW4QKY, DW4RKA, DW4RKB, DW4RKY, DW4SKY, DWM1KY, DXA1KY, DXHJKY, or DXHKKY) Check that lever stroke of bucket control lever is correct. Work equipment pump pressure can be checked with monitoring function. (Monitoring code: 94700) Check that engine high idle speed is normal with monitoring function. (Monitoring code: 01001) (Engine high idle speed: 2,120 to 2,220 rpm) For measuring procedure, see "Testing engine speed" in "Testing and adjusting".

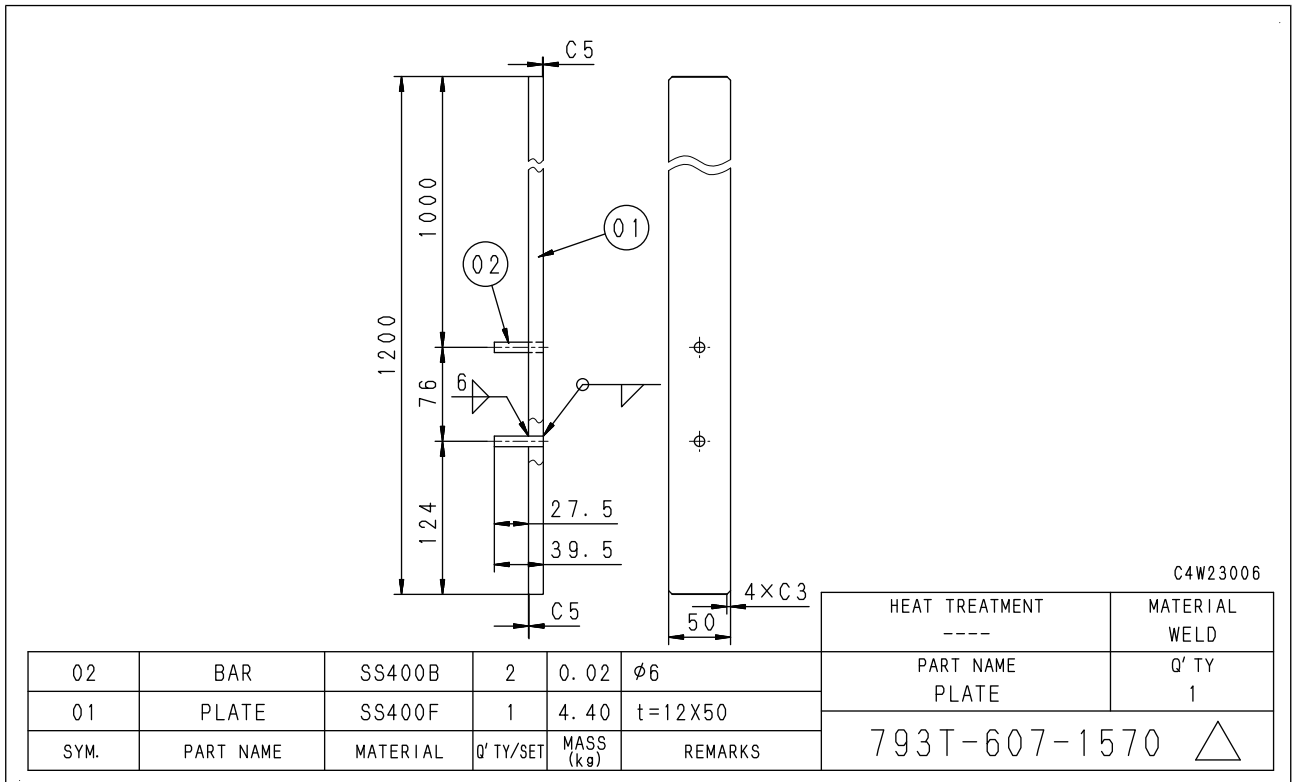
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective PTO	If boom does not move and bucket does not tilt back, PTO may be defective.			
2	Defective strainer of work equipment pump	Check strainer for clogging.			
3	Air sucked in on suction side of work equipment pump	Check suction piping for cracks, etc.			
4	Defective charge valve of accumulator	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.*			
		Output pressure of accumulator charge valve	All control levers (including steering wheel)	NEUTRAL	3.72 ± 0.2 MPa {38 ± 2.0 kg/cm ² }
		• Output pressure of accumulator charge valve is source pressure of pilot pressure for bucket control valve (TILT and DUMP).			
	Malfunction of bucket TILT BACK EPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.*			
		Output pressure of EPC valve	Bucket control lever	Tilt control	3.1 ± 0.17 MPa {31.5 ± 1.7 kg/cm ² }
		If output pressures of all EPC valves including bucket (TILT) control EPC valve are below standard value in check on cause (5), shut off valve may malfunction. Check shut off valve spool for sticking.			
7	Defective unload valve of work equipment valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.*			
		Unload valve relief pressure	Work equipment control lever	NEUTRAL	1.72 to 3.43 MPa {17.5 to 35 kg/cm ² }
8	Defective suction safety valve at bucket control valve on tilt side	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle. (For measuring procedure, see Testing and adjusting, "Testing work equipment oil pressure".)			
		Set pressure of safety valve	Bucket cylinder	Bucket TILT relief	32.4 (+1.6/-4.3) MPa {330 (+16/-43) kg/cm ² }
9	Bucket control valve Malfunction of spool	When no failure is found by checks on causes (5) and (7), if main circuit pressure at bucket TILT BACK operation does not rise above relief pressure of unload valve, work equipment valve spool may malfunction. Check spool for sticking.			
10	Bucket control valve Malfunction of load check valve	When no failure is found by checks on cause (8), check load check valve for sticking.			

S-5 Engine does not pick-up smoothly (PC400-A30-400-A-Z0-A)

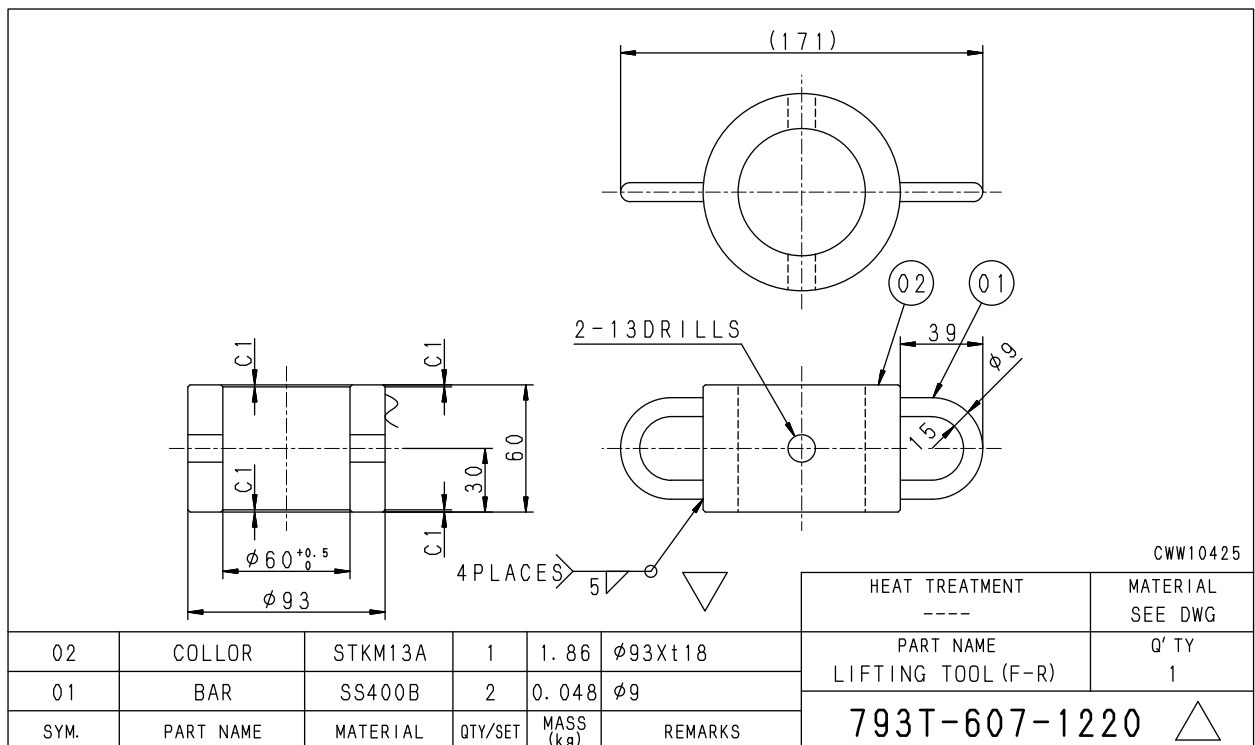
Failure	Engine does not pick up smoothly		
Related information	<ul style="list-style-type: none"> If any failure code is displayed, carry out troubleshooting for it first. 		
No.	Cause	Detail of work, remarks	Remedy
1	Insufficient fuel in tank	<ul style="list-style-type: none"> When fuel tank is inspected, it is found to be empty 	Add fuel
2	Air breather hole in fuel tank cap is clogged	<ul style="list-style-type: none"> Air breather hole in fuel tank cap is clogged 	Flush air breather hole in fuel tank cap and clean surrounding area
3	Clogged fuel filter element	<ul style="list-style-type: none"> Check used hours of fuel filter. If used beyond specified hours, fuel filter element may be clogged 	Replace fuel filter element
4	Foreign material in fuel	<ul style="list-style-type: none"> Rust and water are found when fuel tank is drained 	Replace fuel
5	Air in fuel piping system	<ul style="list-style-type: none"> When air bleeding operation for fuel system is performed, air comes out (Reference: See Testing and adjusting, "Bleeding air from fuel system") 	Perform air bleeding operation Correct or replace fuel piping
6	Leakage from fuel piping system	<ul style="list-style-type: none"> Fuel is leaking from fuel piping (Reference: See Testing and adjusting, "Bleeding air from fuel system") 	Correct or replace fuel piping related parts
7	Defective common rail	<p>Check leakage from common rail pressure limiter according to "Measuring fuel delivery, return and leakage" in "Testing and adjusting".</p> <ul style="list-style-type: none"> ★ Common rail is normal if the leakage from common rail pressure limiter is Max.10 (CC/min) 	Replace common rail
8	Defective supply pump	<ul style="list-style-type: none"> ★ Check "Defective common rail" described above first. If the pressure doesn't rise during cranking when checking common rail pressure on machine monitor, the supply pump is defective. ★ Common rail pressure can be checked with monitoring function. (Code: 36400 (MPa)) 	Replace supply pump
9	Clogging of feed pump gauze filter	<ul style="list-style-type: none"> Gauze filter is clogged 	Clean or replace gauze filter
10	Abnormally high crankcase pressure	<ul style="list-style-type: none"> If Crankcase Pressure High Error (failure code: CA555) is still displayed after KCCV filter element is replaced, blow-by pressure may be high due to seizure or damage of KVGT (see Testing and adjusting, "Testing blow-by pressure") 	Perform troubleshooting for cause 10 and after.
11	Defective injector	<ul style="list-style-type: none"> When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low When a certain cylinder is cut out, engine speed does not change (Reference: See Testing and adjusting, "Handling of cylinder cut-out operation".) 	Replace injector
12	Seized or broken KVGT	<ul style="list-style-type: none"> Unusual noise is heard from KVGT Check if KVGT shaft rotates (Move KVGT vanes with hand in axial and radial directions to judge) 	Replace KVGT
13	Incorrect valve clearance	<ul style="list-style-type: none"> When engine is cranked, Unusual noise is generated around cylinder head Check valve clearance 	Adjust valve clearance

Note: Komatsu does not take any responsibility for special tools manufactured according to these sketches.

B3: Plate



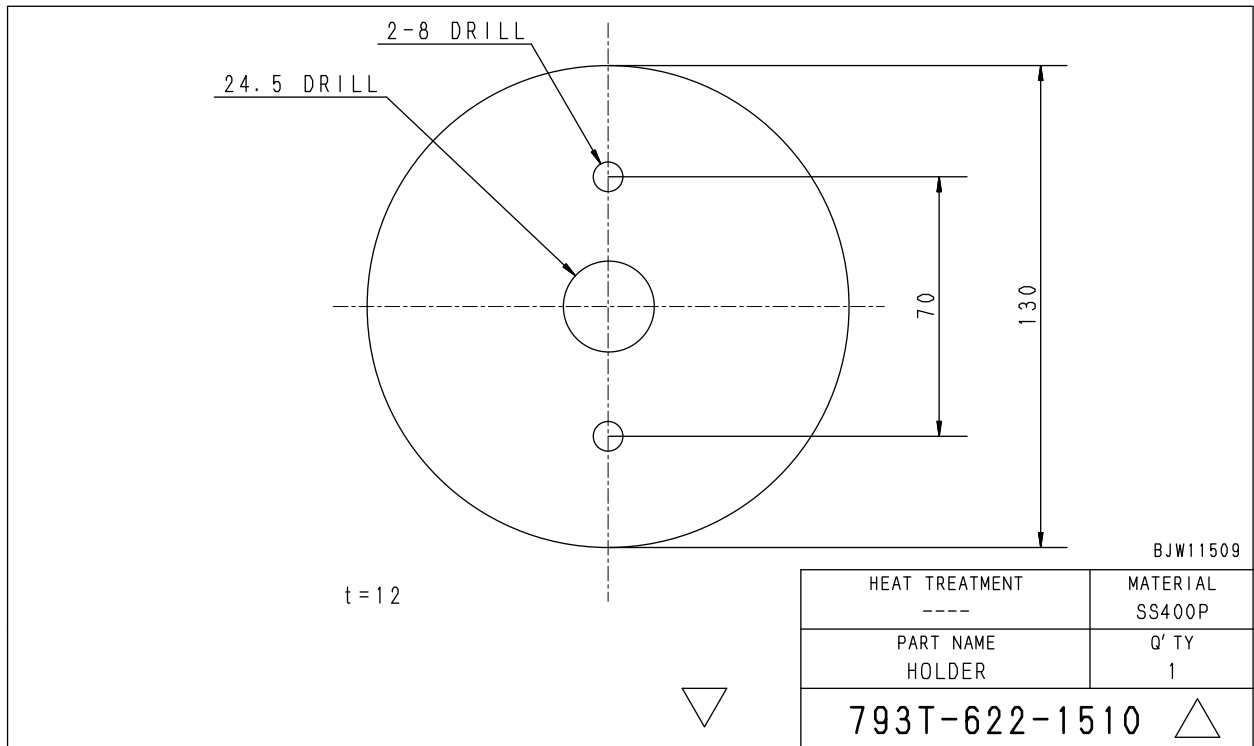
B5: Lifting tool

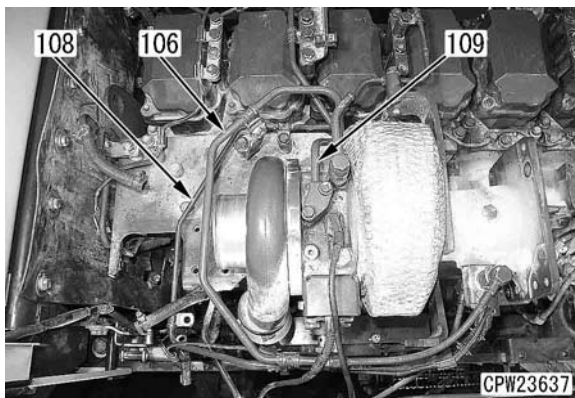
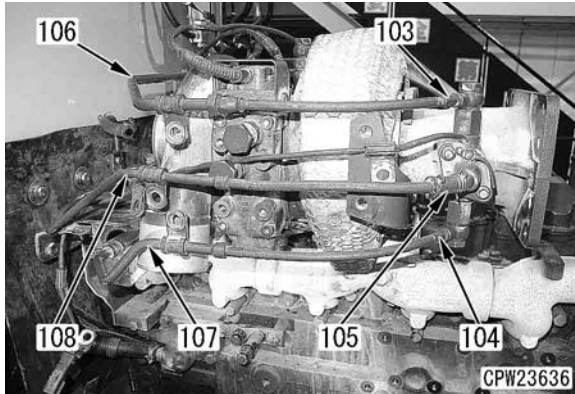


50 Disassembly and assembly

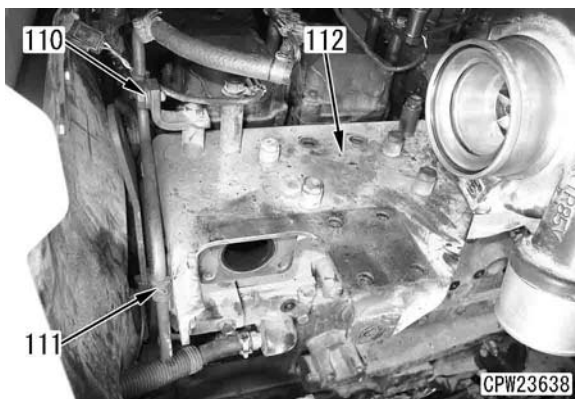
General information on disassembly and assembly

Note: Komatsu does not take any responsibility for special tools manufactured according to these sketches.
 D24: Holder





62. Remove clamps (110) and (111), and remove bracket (112). [*28]

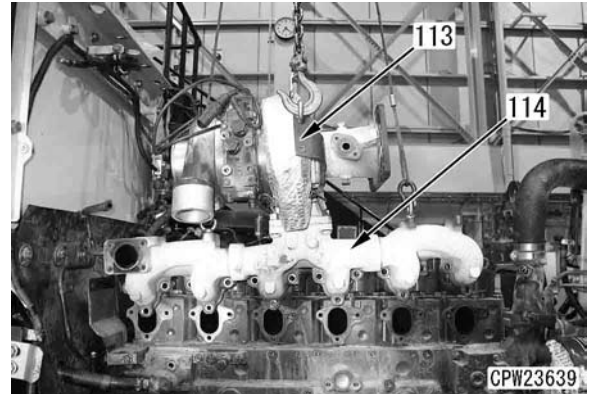


63. Sling the KVGT assembly and exhaust manifold.
64. Remove the exhaust manifold mounting bolt, and then remove KVGT assembly (113) and exhaust manifold (114) together as a unit. [*29]

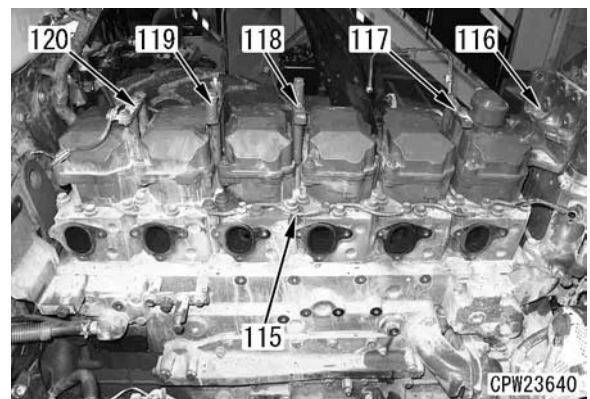


KVGT assembly and exhaust manifold:

55 kg

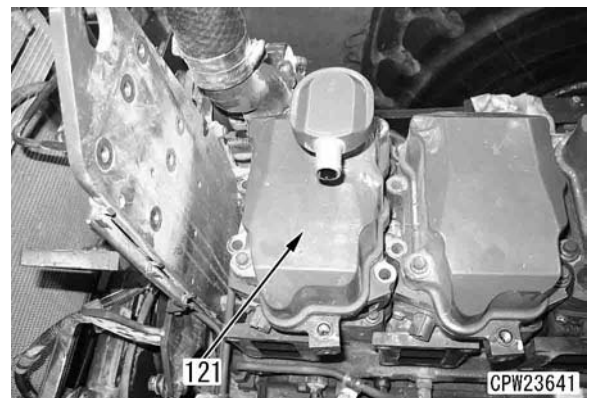


65. Remove tube (115). [*30]
66. Remove brackets (116) to (120).



67. Remove head cover (121).

★ The head cover has been already removed in "Removal and installation of injector assembly". Note that it has been installed loosely to prevent foreign material from entering.



68. Remove push rod (122). [*31]
69. Remove crossheads (123). [*32]

Removal and installation of power train oil cooler assembly (WA470-B850-924-K-00-A)

- ⚠ Place the machine on a level ground, and turn the parking brake switch to ON position.
- ⚠ Set the frame lock bar to LOCK position, and chock the wheels.
- ⚠ Lower the work equipment to the ground, and set the work equipment lock switch to LOCK.
- ⚠ Turn the starting switch to OFF position, and stop the engine.
- ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and adjusting, "Handling battery disconnect switch".)

Removal (WA470-B850-520-K-00-A)

1. Drain the coolant.

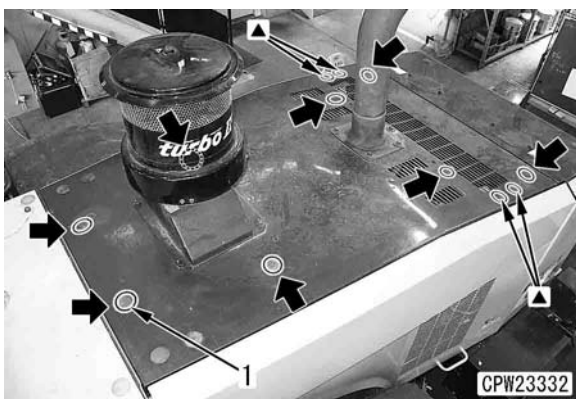
 **Radiator: 75 ℓ**

2. Drain the power train oil.

 **Transmission case: 65 ℓ**

3. Remove caps (1) (8 pieces) of the engine upper cover and inner bolts (8 pieces).

- ★ Remove the caps and bolts indicated by the arrows.
- ★ Do not remove the bolts marked with ▲. (Otherwise, the door hinge is removed and adjustment during installation process becomes difficult.)



4. Sling cover (2), and remove it.

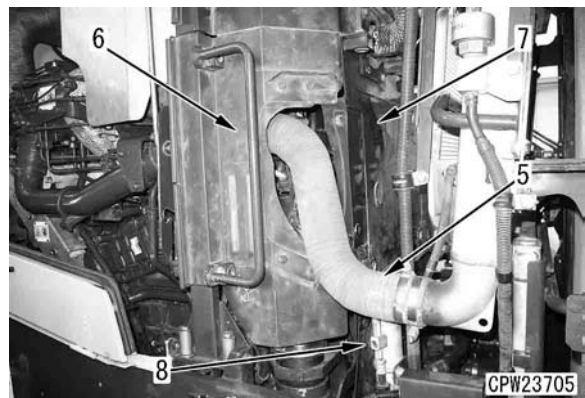
 **Cover (1):**
70 kg

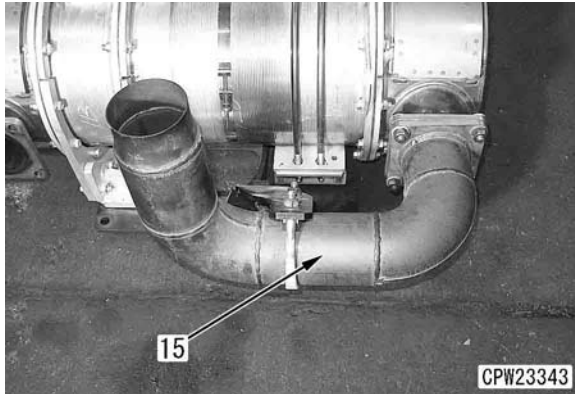


5. Open full-length fender (3) on the right and left side of the machine body, and then open side cover (4).



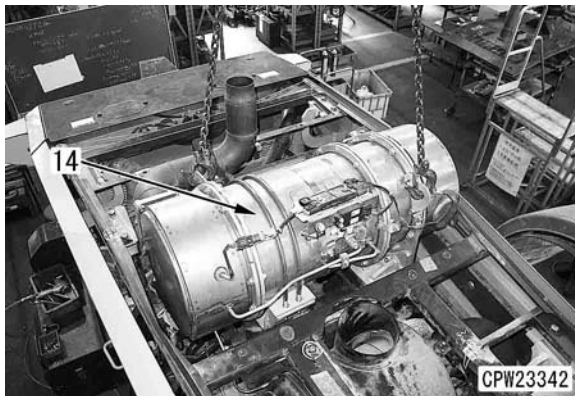
6. Disconnect hose (5). [*1]
7. Remove covers (6) to (8).
8. Remove bolts (9) to (11) and move the bracket and piping together as a unit.
9. Disconnect hose (11-1).





9. Install KDPF assembly (14) and bracket together as a unit.

 **KDPF assembly (14) and bracket:**
115 kg



10. Tighten eight mounting bolts (11) of KDPF assembly bracket lightly.



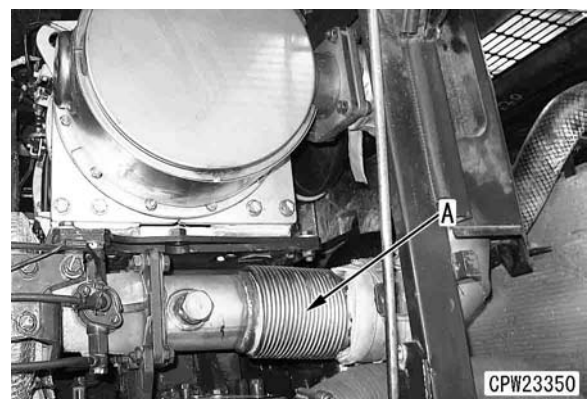
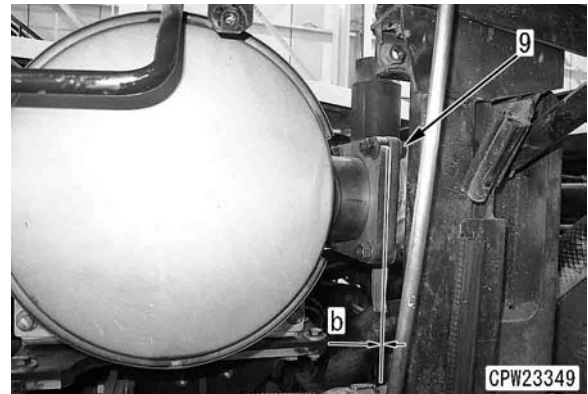
11. Tighten bolts (9) (4 pieces) on the inlet side of KDPF lightly.

 **Threaded portion of bolt (9):**
Seizure prevention compound (LC-G)

12. Check that clearance (b) between the flanges is in the following dimensions.

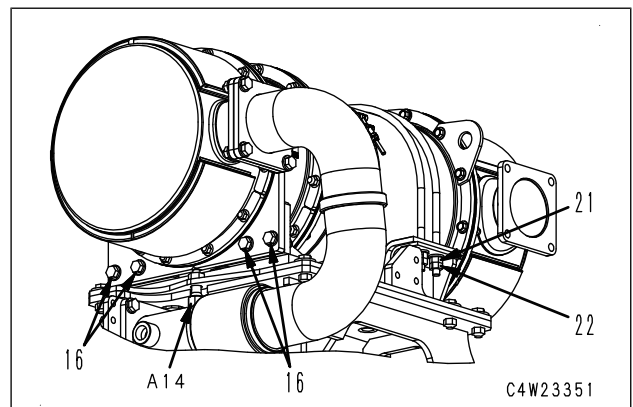
- ★ Measure clearance (b) at 4 positions on each flange surface in total.
 - Clearance (b): Max. 2 mm (including gasket thickness)

★ At this time, check that bellows portion (A) of pipe (23) is not deformed.




13. If the above clearance (b) exceeds the standard value, adjust it according to the following procedure.

- 1) Push the KDPF assembly by hands to adjust the position in the lateral and vertical directions.
- 2) Loosen bolt (16) and nuts (21) and (22) insert tool A14 to the position in the figure to adjust the position in the vertical direction.
- 3) After the adjustment, proceed with steps 2 to 7 again.
- 4) Remove tool A14.



14. Tighten bolts (9) (4 pieces) on the inlet side of KDPF to the specified torque.

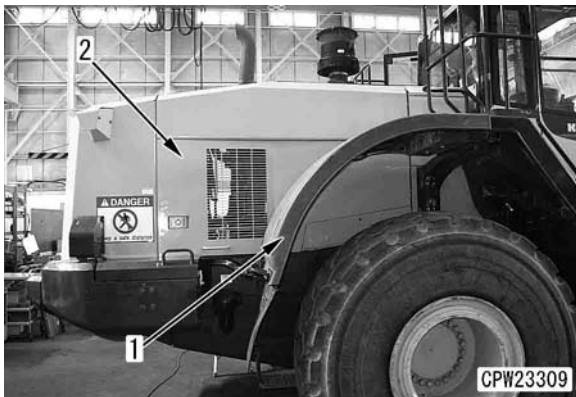
 **Bolt (9):**
78.5 to 88.3 Nm {8.0 to 9.0 kgm}

Removal and installation of air conditioner compressor belt (WA470-AT50-924-K-00-A)

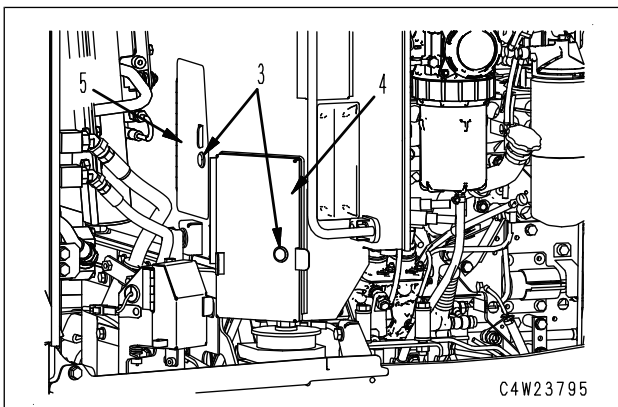
- ⚠ Place the machine on a level ground, and turn the parking brake switch to ON position.
- ⚠ Set the frame lock bar to LOCK position, and chock the wheels.
- ⚠ Lower the work equipment to the ground, and set the work equipment lock switch to LOCK.
- ⚠ Turn the starting switch to OFF position, and stop the engine.
- ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and adjusting, "Handling of battery disconnect switch".)

Removal (WA470-AT50-520-K-00-A)

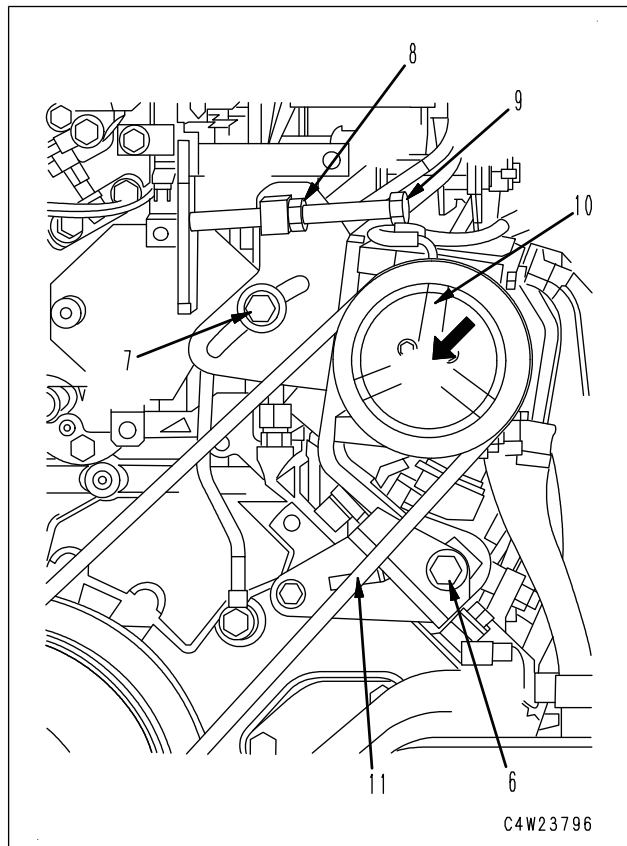
1. Open full-length fender (1) and the side cover (2).



2. Insert the starting switch key into lock (3) to release it, and open covers (4) and (5).

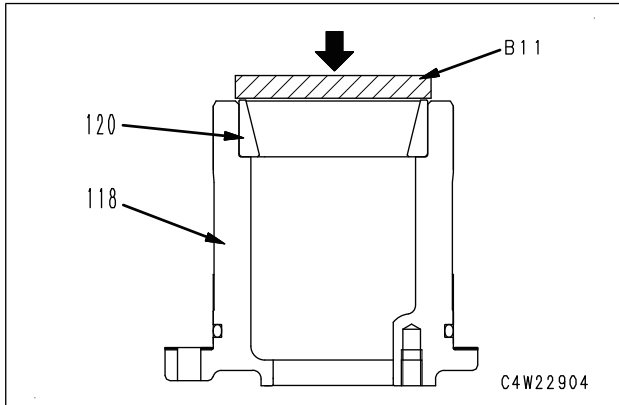


3. Loosen bolts (6) and (7).
4. Loosen nut (8) and bolt (9), and slide air conditioner compressor (10) in the direction indicated by the arrow.
5. Remove air conditioner compressor belt (11).



Installation (WA470-AT50-720-K-00-A)

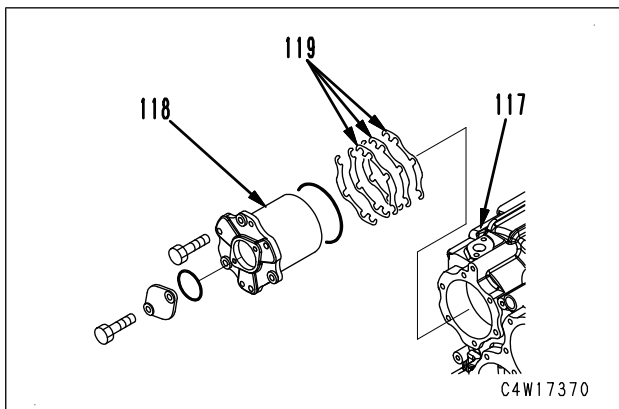
- Perform installation in the reverse order of removal.
- ★ Adjust the belt tension. For details, see Testing and adjusting, "Testing and adjusting air conditioner compressor belt tension".



2) Install shim (119) and cage (118) to front case (117) loosely.

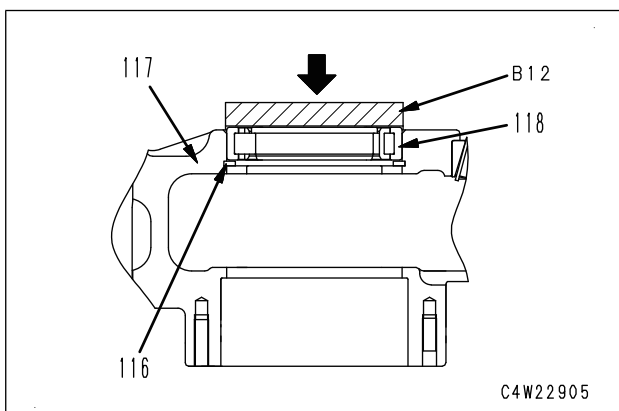
**Periphery of O-ring:
Grease (G2-LI)**

- ★ Set the total thickness of shim (119) to be 2.2 to 2.5 mm.
- ★ After completion of assembly of transmission assembly, adjust shim (119).



3. Bearing for transfer shaft 1

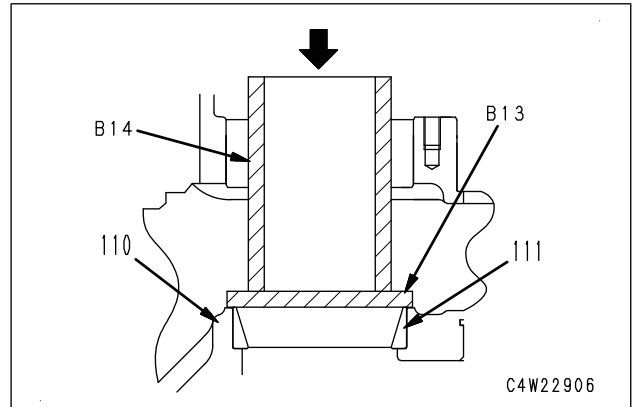
- 1) Install snap ring (116) to front case (117).
- 2) By using tool B12, press-fit bearing (118).



4. Transfer shaft 2 and transfer gear 2

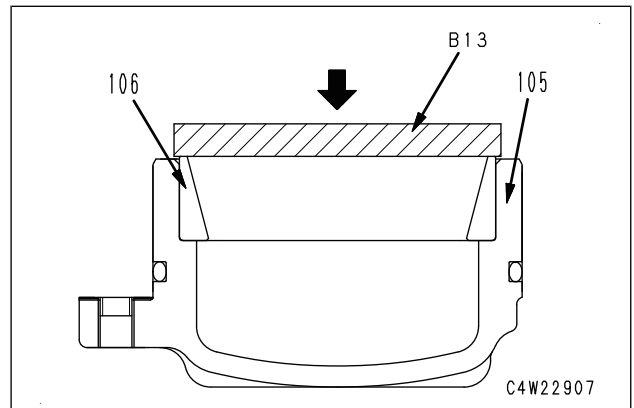
- 1) By using tools B13 and B14, press fit outer race (111) to front case (110).

**Inner periphery of outer race:
Power train oil (TO10)**



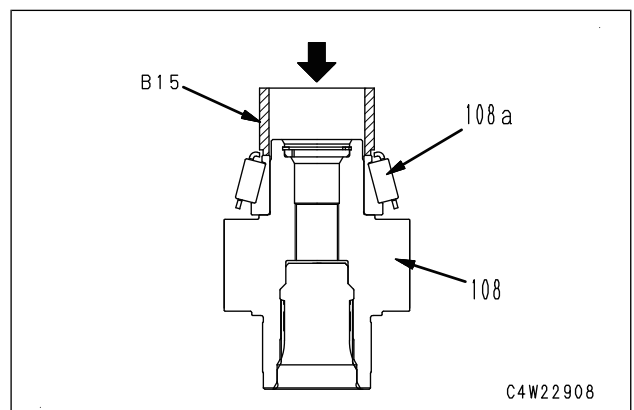
- 2) By using tool B13, press fit outer race (106) to cage (105).

**Inner periphery of outer race:
Power train oil (TO10)**



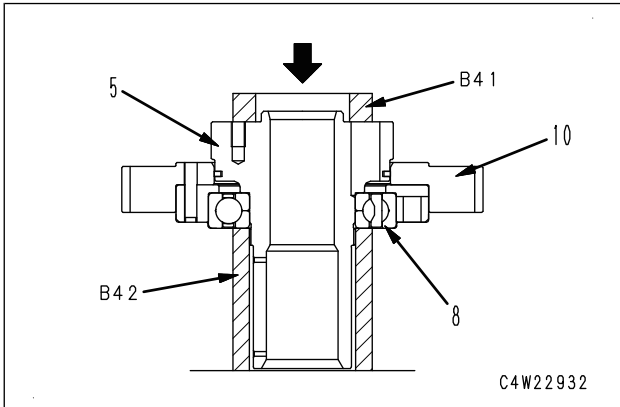
- 3) By using tools B15 and B16, press-fit bearings (108a) and (108b) to transfer shaft 2 (108).
- 4) Apply oil to bearings (108a) and (108b) and rotate the bearing at least 10 turns to spread the oil.

**Bearing:
Power train oil (TO10)**



50 Disassembly and assembly

Power train



5) Install pump (7) and tighten bolts (6).



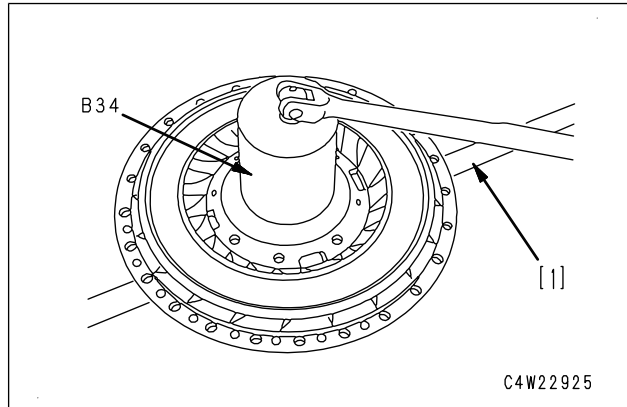
Mounting bolt:

Adhesive (LT-2)



Mounting bolt:

58.8 to 73.5 Nm {6.0 to 7.5 kgm}

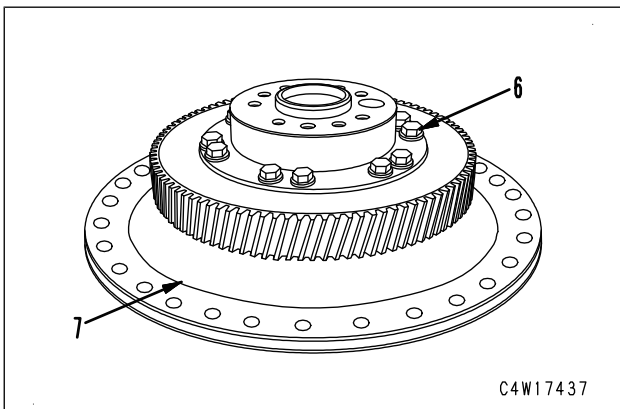


10. Stator assembly and turbine and case assembly

1) Set stator assembly (13) to stator shaft (5).

2) Check that the stator rotates as follows when seen from the boss side (input side: view A).

- Clockwise: Free rotation
- Counterclockwise: Locked



6) By using tool B34, tighten nut (4).

- ★ Install bolts (M12 x 1.75) (2 pieces) to the bottom of stator shaft (5) diagonally and fix them by using bar [1].



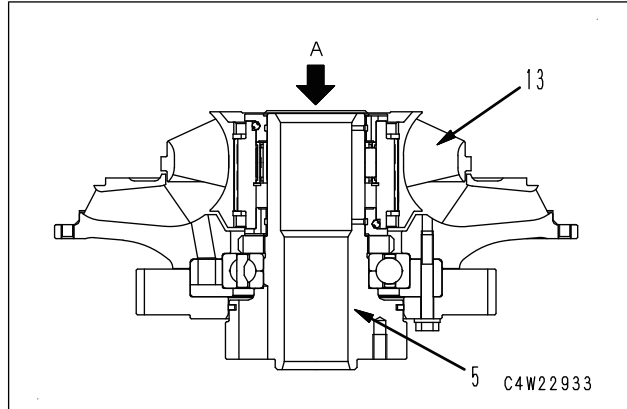
Nut:

Adhesive (LT-2)



Nut:

441 to 490 Nm {45 to 50 kgm}



3) By using eyebolts [9] (M12 x 1.75), sling and lower turbine and case assembly (40) and tighten bolts (2) lightly.

4) Turn over the torque converter assembly and tighten bolts (2).



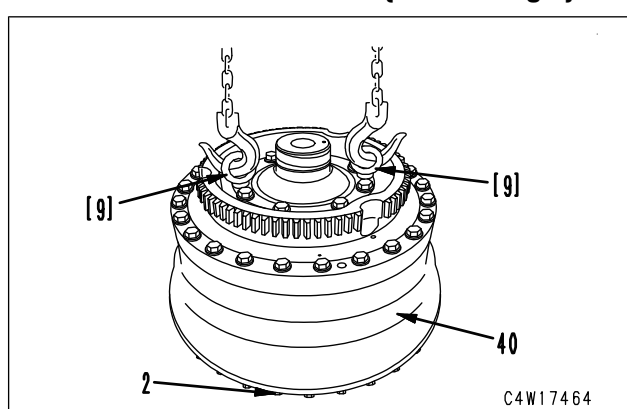
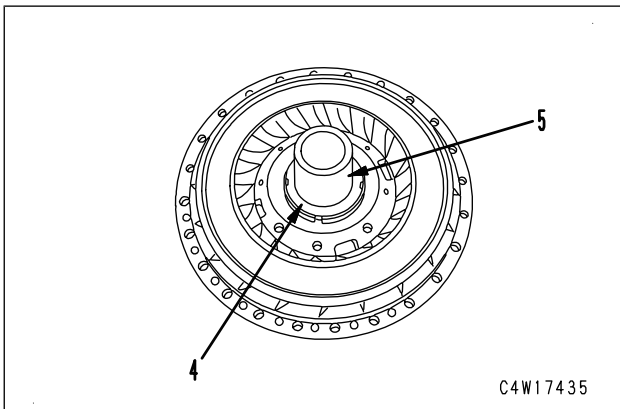
Bolt:

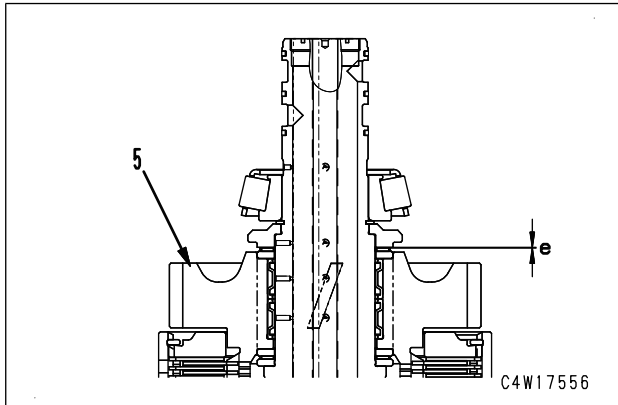
Adhesive (LT-2)



Bolt:

49.0 to 58.8 Nm {5.0 to 6.0 kgm}

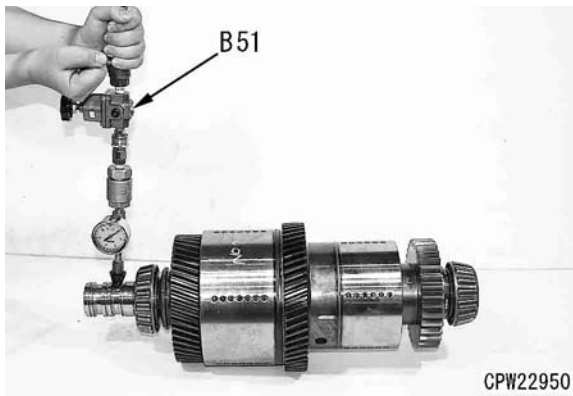




18. Operation check of clutch

By using tool B51, supply compressed air to the oil hole of the shaft to check that the F and 1st clutches operate.

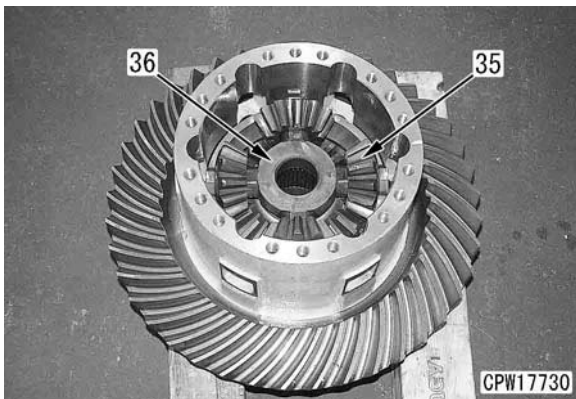
- ★ If the gear on the side to which air is supplied is locked, the operation of the clutch is normal.



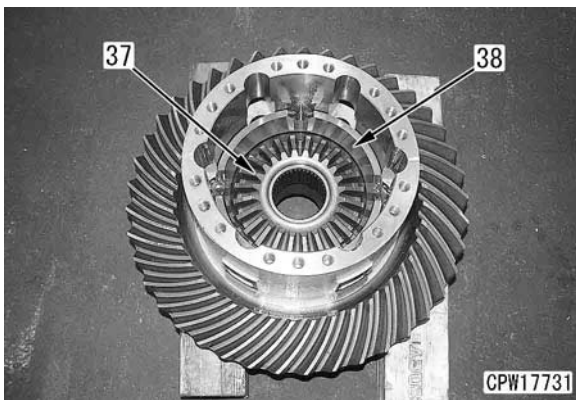
50 Disassembly and assembly

Power train

5) Remove pinion (35) and spider shaft (36).

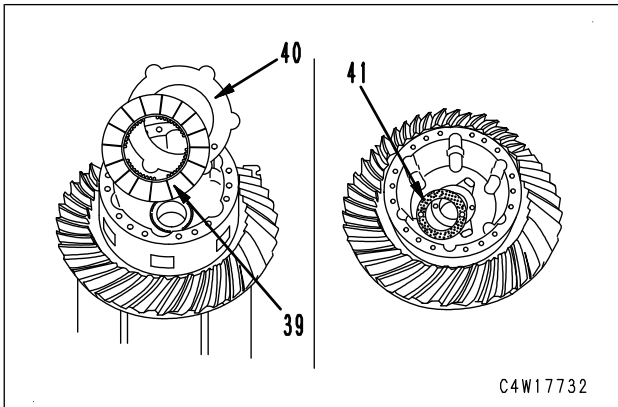


6) Remove side gear (37) and pressure ring (38).

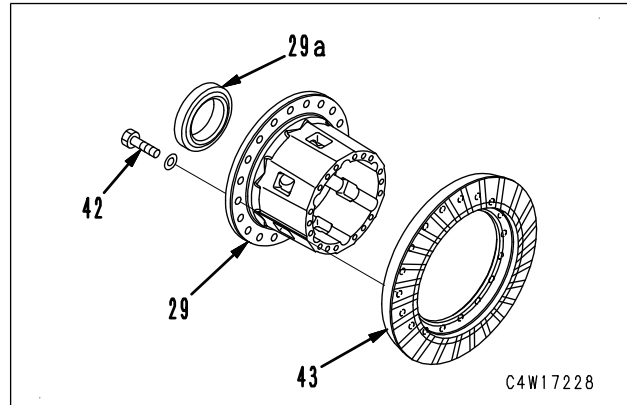


7) Remove discs (39) (2 pieces) and plates (40) (2 pieces).

8) Remove washer (41).



9) Turn over case (29), and remove bolts (42) to remove bevel gear (43) and bearing (29a).

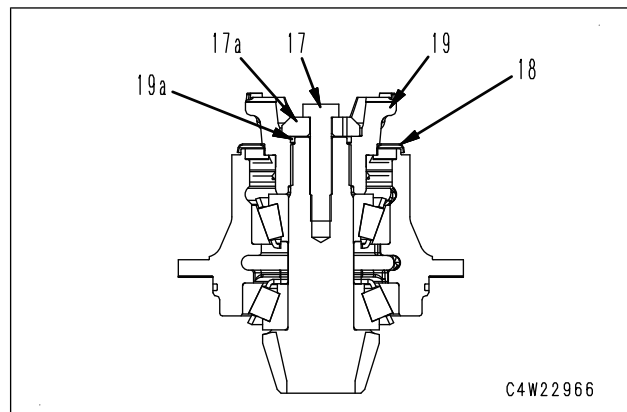


13. Pinion and cage

- 1) Remove mounting bolts (17) to remove holder (17a).
- 2) Remove coupling (19) and protector (18) together.

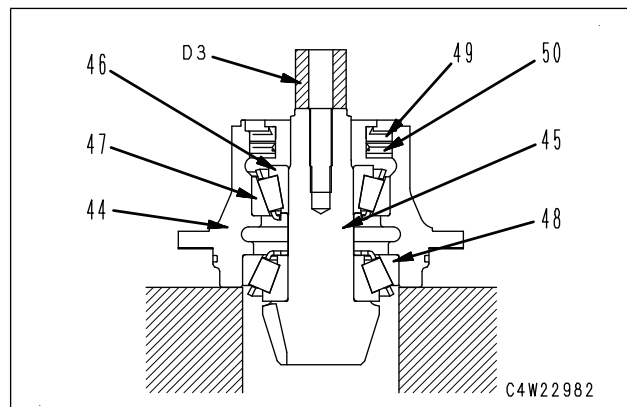
★ Do not remove protector (18) from coupling (19) except when necessary.

- 3) Remove O-ring (19a).

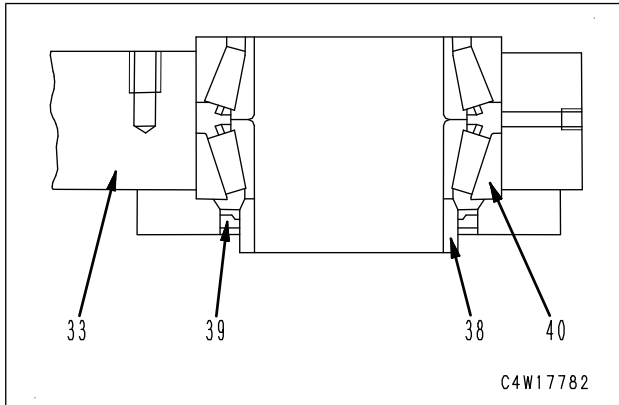


- 4) By using tool D3 and a press, pull pinion gear (45) out of cage (44).

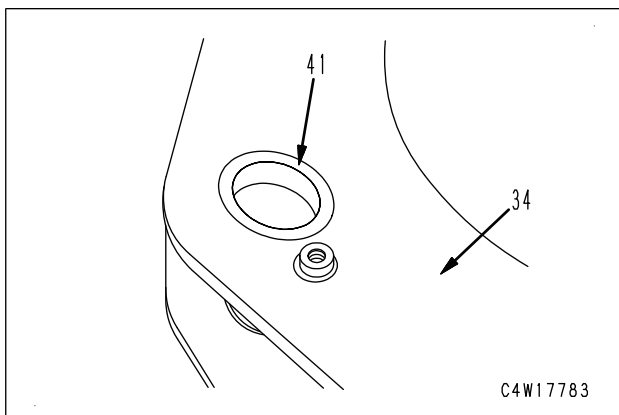
- 5) Remove dust seal (49), oil seal (50), bearing (46), and outer races (47) and (48) from cage (44).



- 6) Remove bearing inner race (52) from pinion gear (45).

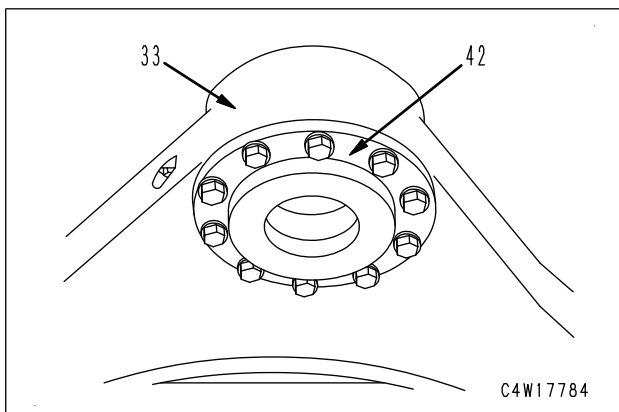


28. Remove bushings (41) on the top and bottom from the lower hinge of rear frame (34). [*12]

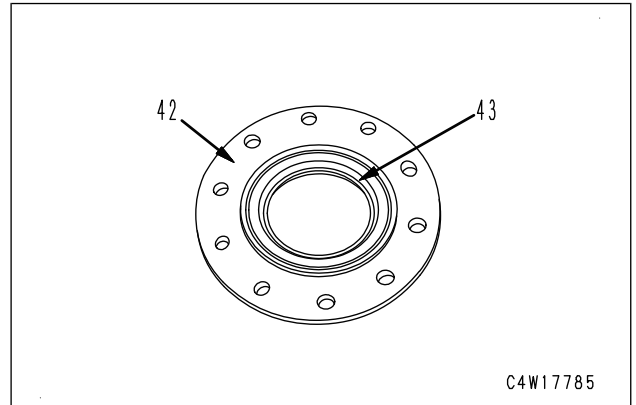


29. Remove the mounting bolt from the lower hinge of front frame (33), and remove retainer (42). [*13]

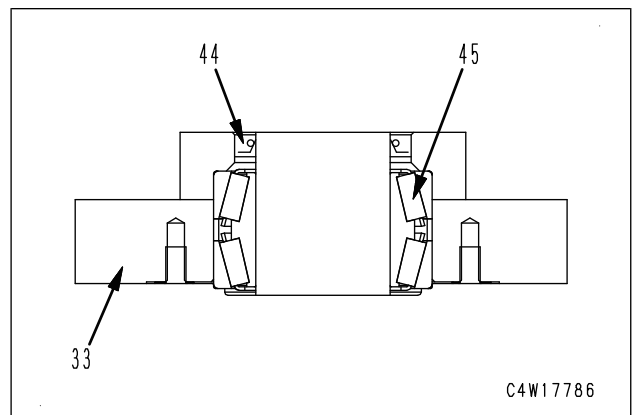
- ★ Record the number and thickness of the shims between the retainer and frame.



30. Remove dust seal (43) from retainer (42). [*14]




31. Remove dust seal (44) from the lower hinge of front frame (33), and remove bearing (45). [*15]



Installation (WA470-H1L2-720-K-00-A)

- Perform installation in the reverse order of removal.

[*1]

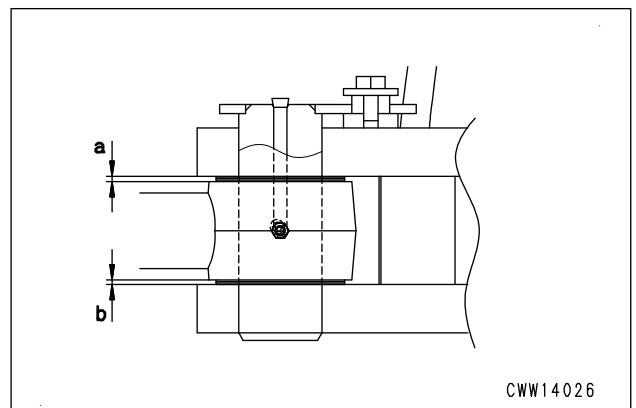
 Drive shaft mounting bolts:
98 to 123 Nm {10 to 12.5 kgm}

[*2]

- ★ Adjust clearance (a) and (b) of the mounting surfaces of the cylinder and frame to the specified value by using shims.

- Clearance (a) and (b): Max. 0.5 mm

- ★ Be sure to provide clearance.



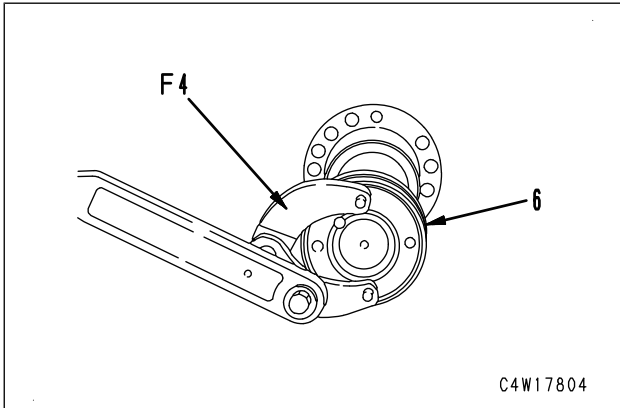
[*8], [*9], [*10], [*11]

50 Disassembly and assembly

Hydraulic system

1] Screw in piston assembly (6), and tighten it until the screw holes are matched by using tool F4.

- ★ Clean them thoroughly and remove all chips and dirt.
- ★ Remove burrs and sharp edges from threaded part by using a file.



2] Tighten screw (7).



Threaded part of screw:

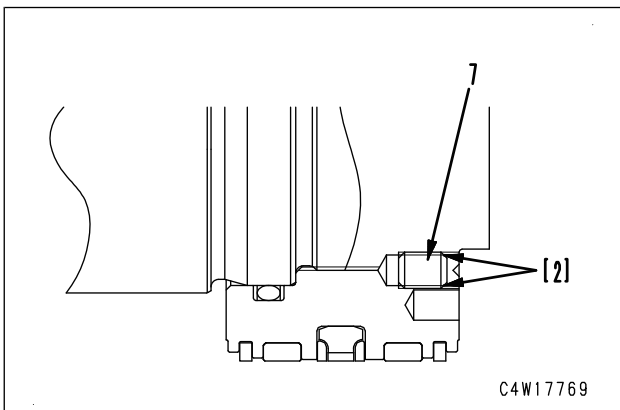
Adhesive (Loctite No. 262 and equivalent)



Screw (7):

58.9 to 73.6 Nm {6 to 7.5 kgm}

- 3] Punch 4 places on the circumference of the threaded part [2] with a punch.
- 4] Apply torque of 41.2 to 88.2 Nm {4.2 to 9 kgm} to screw (7) in the direction of loosening. Check the screw does not loose.



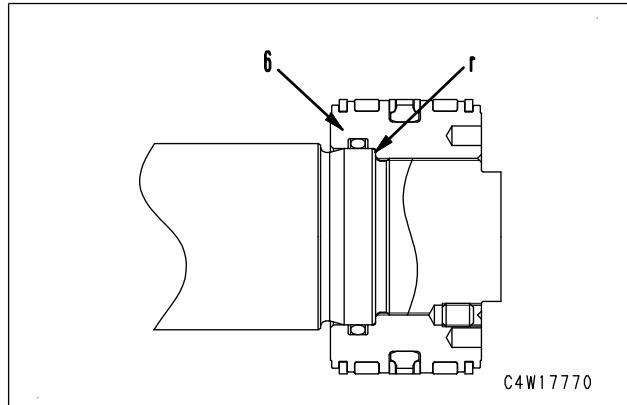
- When either or both of the rod and piston assembly (5) are new

1] Screw in piston assembly (6) until it reaches rod end (r), and then tighten it to the specified torque by using tool F4.



Piston assembly (6):

294 ± 29.4 Nm {30 ± 3.0 kgm}



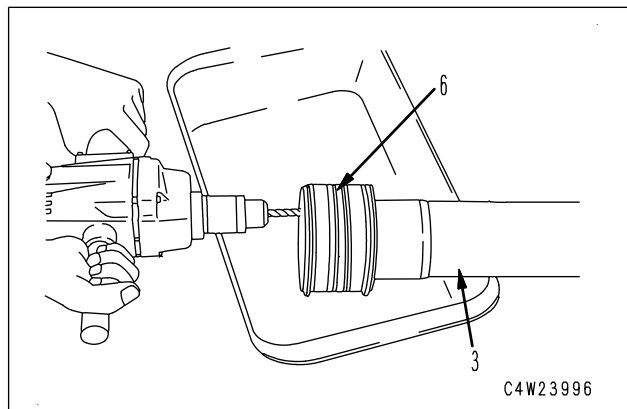
2] Make 1 threaded hole for installing screw (7).

- ★ Drill a hole in horizontal into the V-groove where piston (6) and the threads of rod (3) mesh with each other.

- Drilling dimensions (mm)

- ★ Make the hole in following dimensions.

- Tap to be used: M12 x 1.75
- Tap drill hole diameter: 10.3 mm
- Tap drill hole depth: 27 mm
- Tapping depth: 20 mm



3] After making the hole, remove all chips and dirt, and clean the hole thoroughly.

4] Tighten screw (7).



Threaded part of screw:

Adhesive (Loctite No. 262 and equivalent)

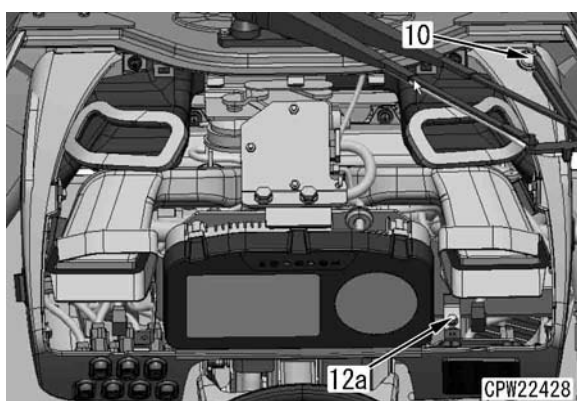
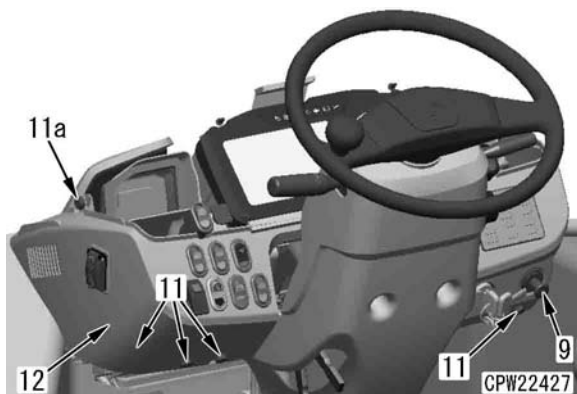


Screw (7):

58.9 to 73.6 Nm {6 to 7.5 kgm}

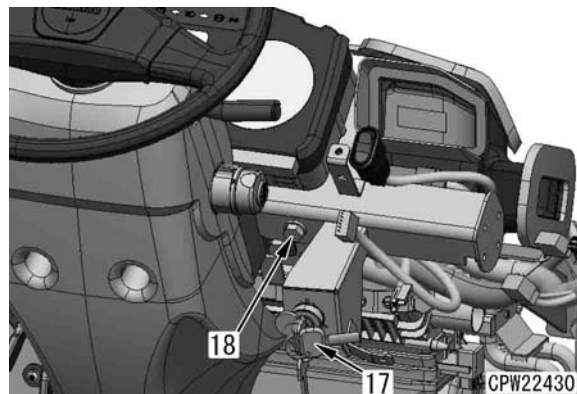
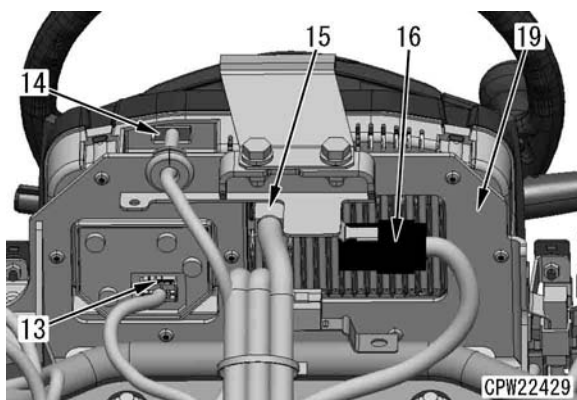
5] Punch 4 places on the circumference of the threaded part with a punch.

6] Apply torque of 41.2 to 88.2 Nm {4.2 to 9 kgm} to screw (7) in the direction of loosening. Check the screw does not loose.



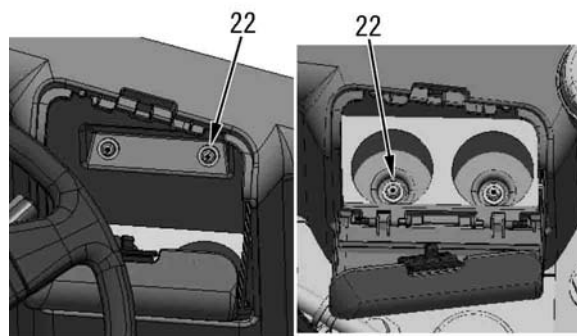
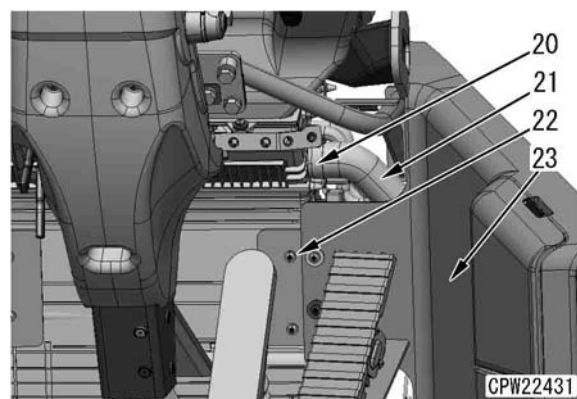
5. Remove the machine monitor assembly according to the following procedure.

- 1) Disconnect machine monitor wiring connectors (13) to (16) and key switch wiring connector (17).
- 2) Remove mounting bolts (18) (2 pieces) of the machine monitor bracket to remove machine monitor assembly (19).



6. Remove the right side drink box cover according to the following procedure.

- 1) Loosen clamp screw (20) of air conditioner duct hose, and pull out the hose (21).
- 2) Remove mounting bolts (22) (6 places) to remove right side drink box cover (23).

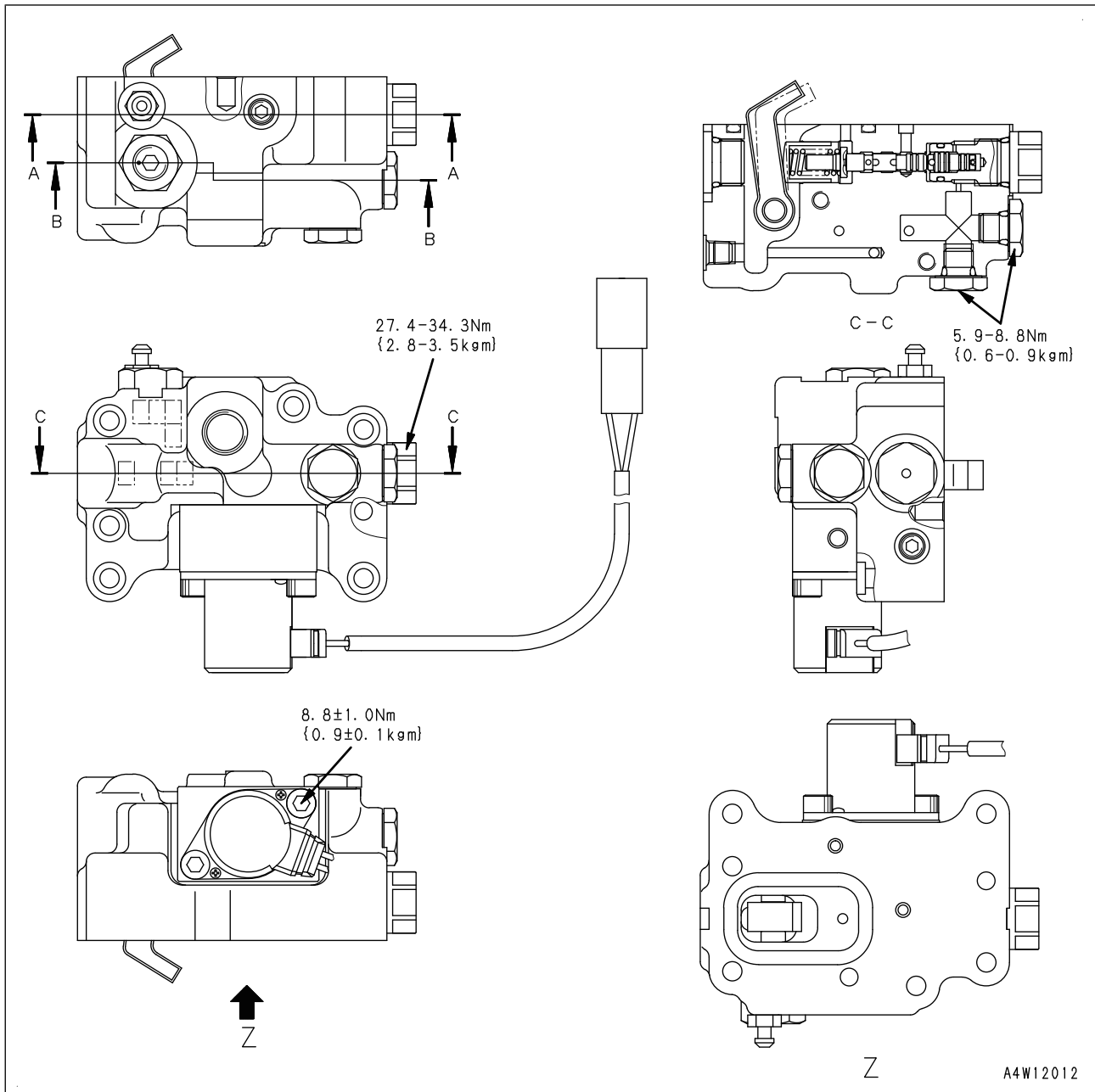


CPW22432

7. Remove the left recirculation air filter cover according to the following procedure.

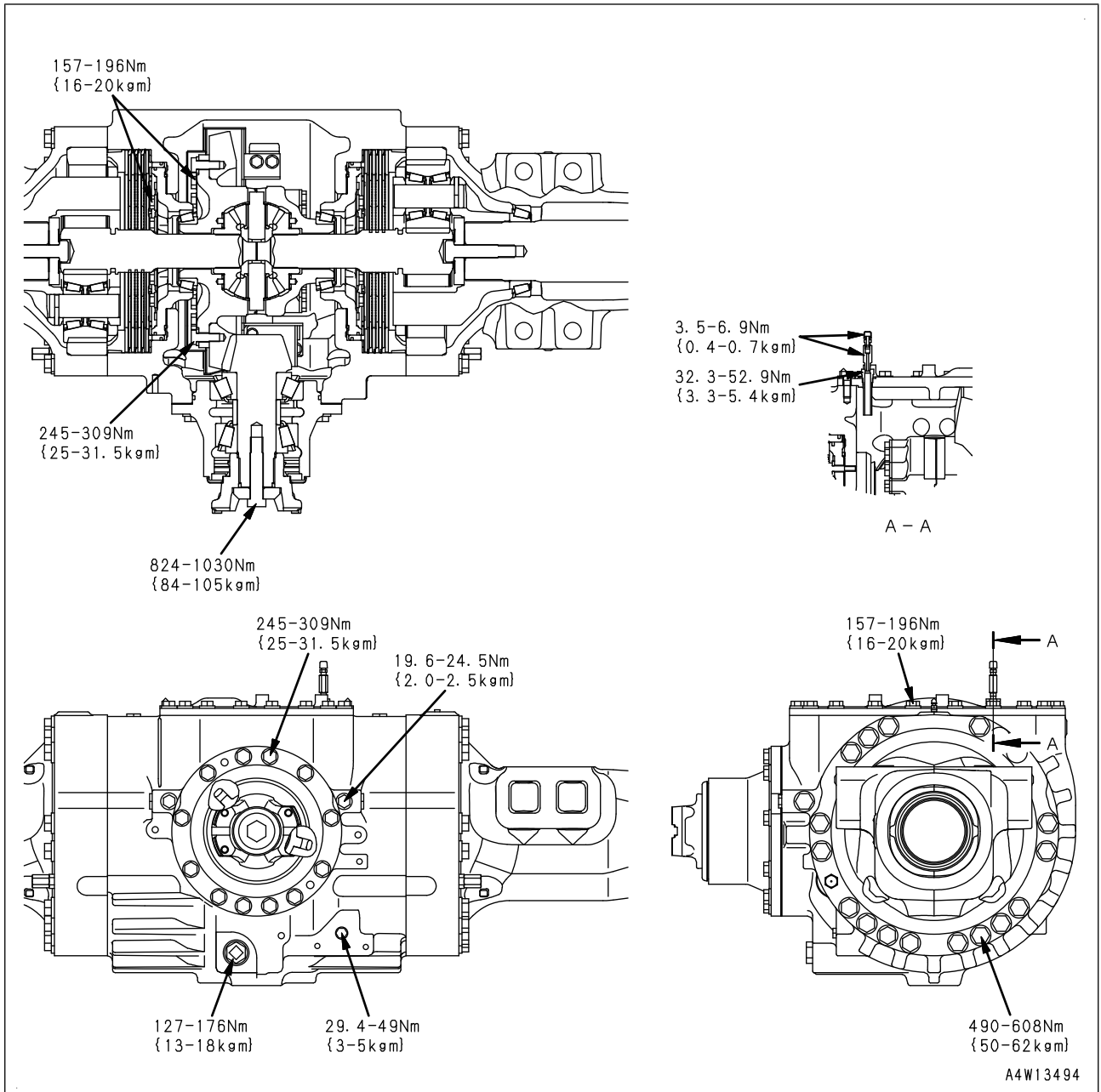
- 1) Remove sheet metal cover (24) and recirculation air filter (25).
- 2) Remove cover mounting screws (26) (6 places).
- 3) Remove recirculation air sensor (27) from the cover and remove recirculation air filter cover (28).

Servo valve (WA380-B4H0-034-K-00-A)



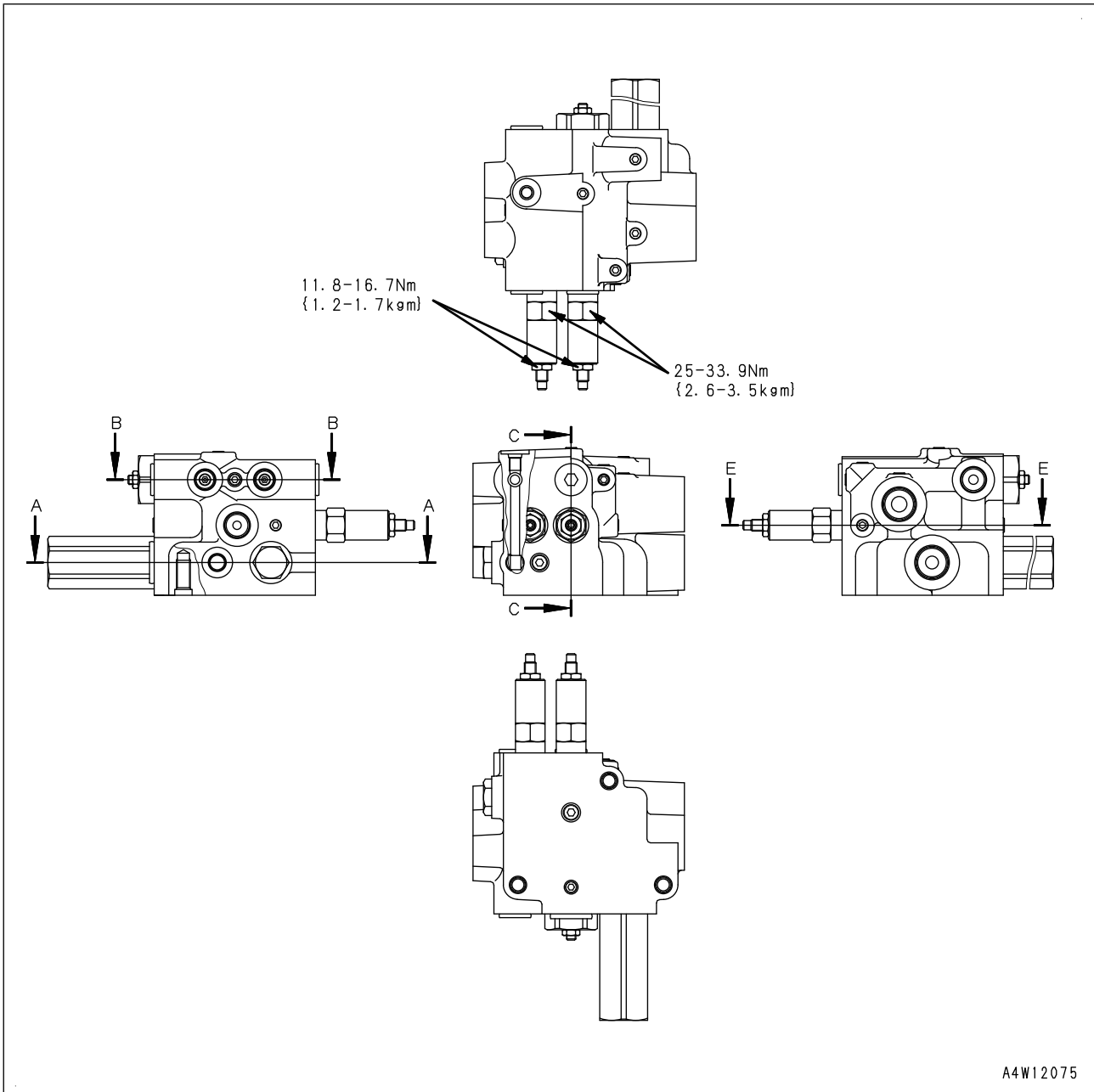
Differential (WA380-DC10-001-K-60-A)

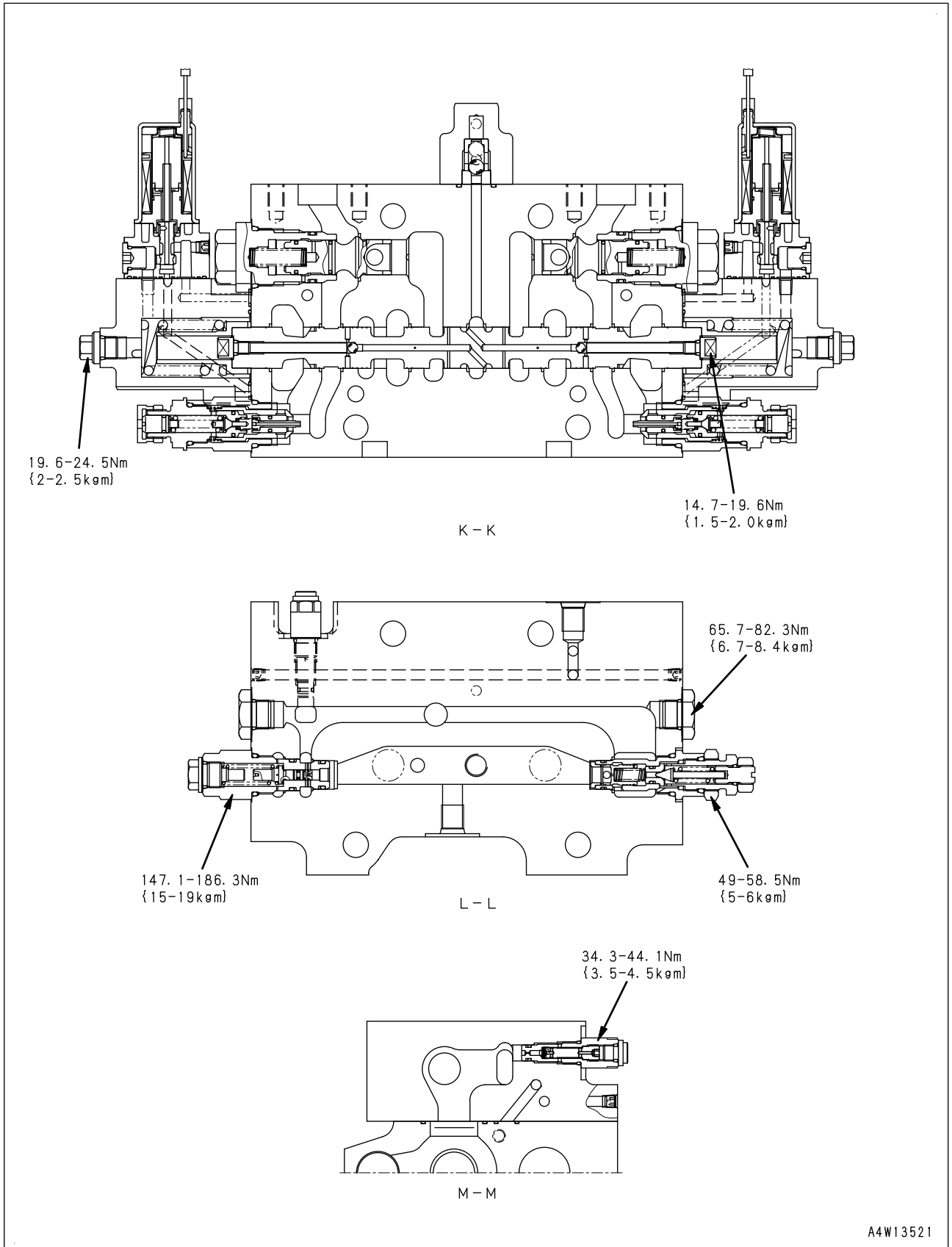
Front conventional differential (WA470-DC70-034-K-00-A)



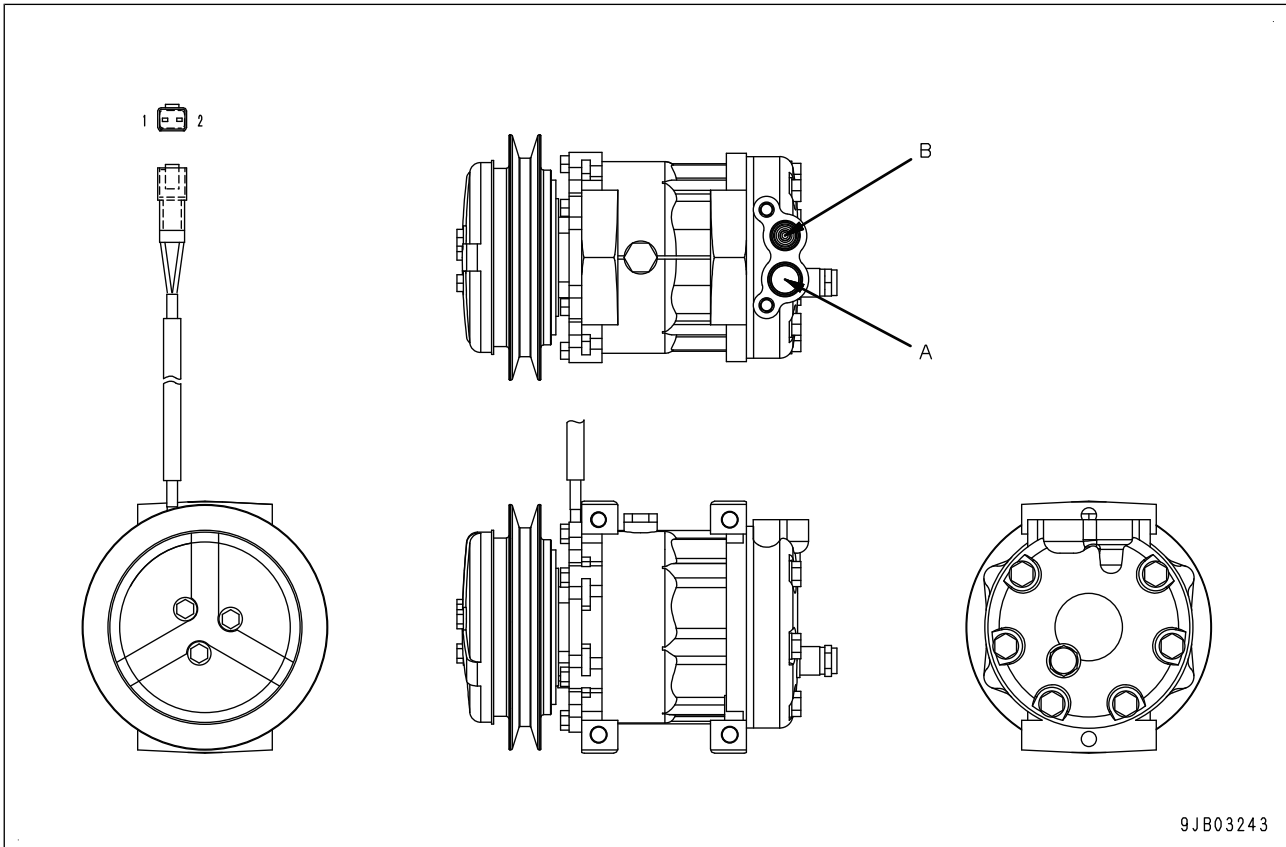
Brake system (ALL-G000-001-K-00-A)

Charge valve (WA380-G2H0-034-K-00-A)





Compressor (WA380-K590-041-K-00-A)



A: Refrigerant inlet (from air conditioner unit)

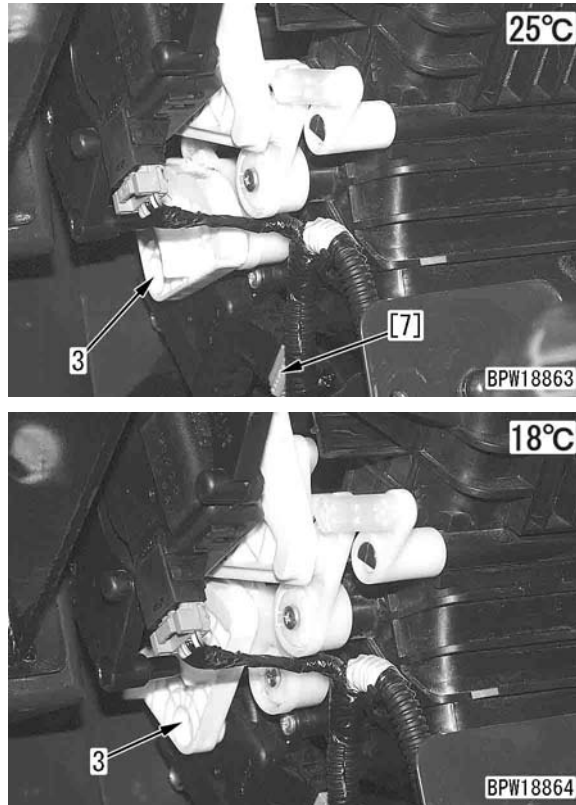
B: Refrigerant outlet (to condenser)

Specification (WA380-K590-044-K-00-A)

Number of cylinders - Bore x Stroke	7 -29.3 x 27.4
Piston displacement (cc/rev)	129.2
Max. allowable speed (rpm)	4,000
Compressor oil to use	SANDEN: SP-10
Compressor oil refill amount (cc)	135

Function (WA380-K590-042-K-00-A)

- The compressor circulates the refrigerant and compresses the gaseous refrigerant from the evaporator into a misty refrigerant at high pressure and high temperature so that it will be easily regenerated (liquefied) at the normal temperature.
- Built-in electromagnetic clutch is connected according to the temperature of evaporator and pressure of refrigerant. Then compressor starts to run.

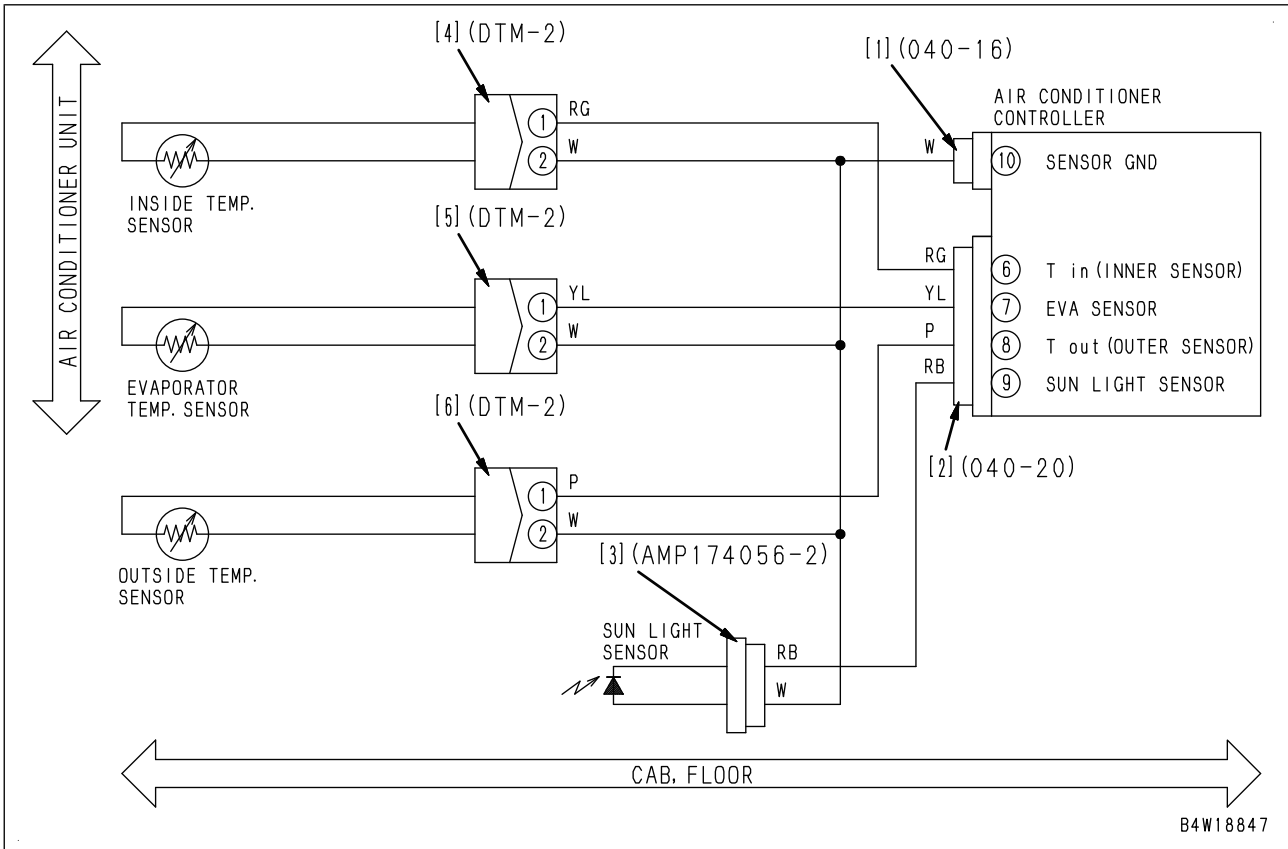


★ For electrical failures, see Troubleshooting, "Failure code [879FMC] Air Mix Damper Abnormality".

80 Appendix

Failure code [879CKA] Ventilating Sensor Open Circuit

Circuit diagram related to temperature sensor of air conditioner



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