

# Shop Manual

WHEEL LOADER

WA470-7

SERIAL NUMBERS

H52051 and up  
10001 and up

**KOMATSU**

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

## 00 Index and foreword

### Foreword, safety and general information

---

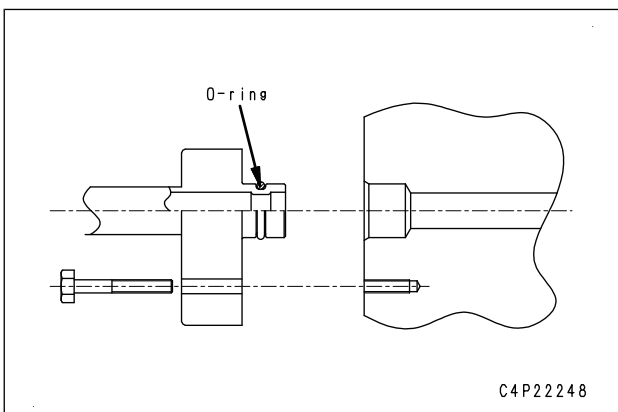
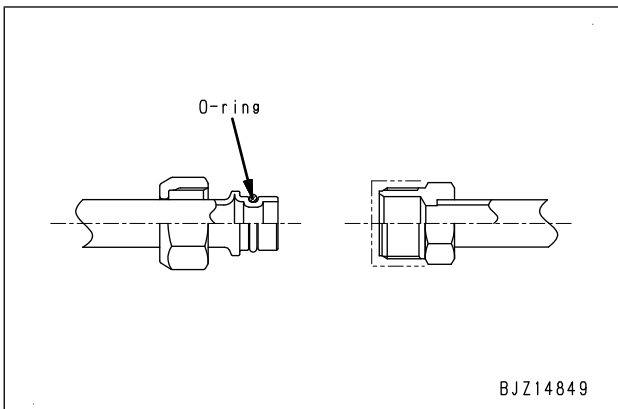
- Check that the O-ring is not damaged or deteriorated.
- Apply compressor oil for refrigerant (R134a) to the O-ring.
  - ★ However, do not apply oil to the threaded portion of a bolt, nut or union.

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.

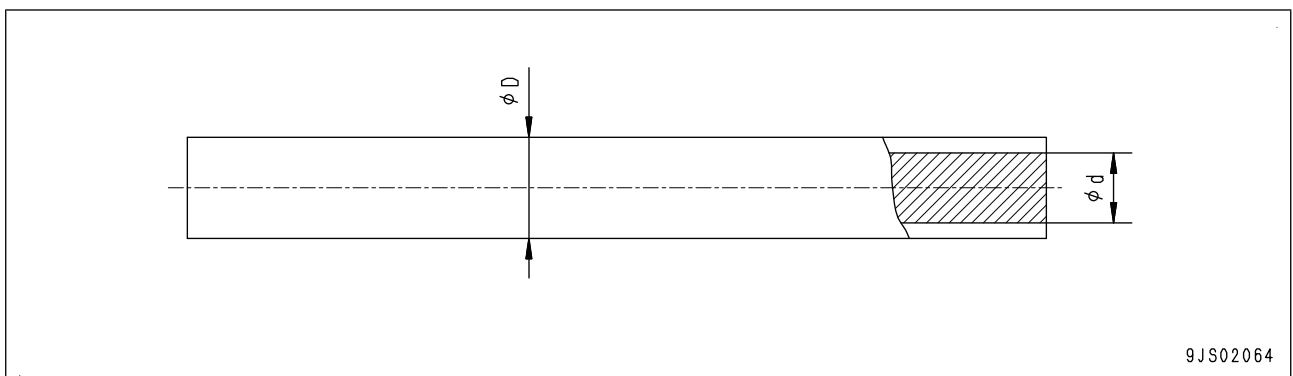


**For tightening torques, see "Others",  
"Precautions for disconnection and connection  
of air conditioner piping".**

**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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	—	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

## Table of contents

---

### Table of contents (ALL-0310-002-A-00-A)

01 Specification.....	01-1
Table of contents .....	01-2
Specifications .....	01-3
Specification drawing .....	01-3
Specifications .....	01-5
Weight table .....	01-11
Table of fuel, coolant, and lubricants .....	01-13

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.

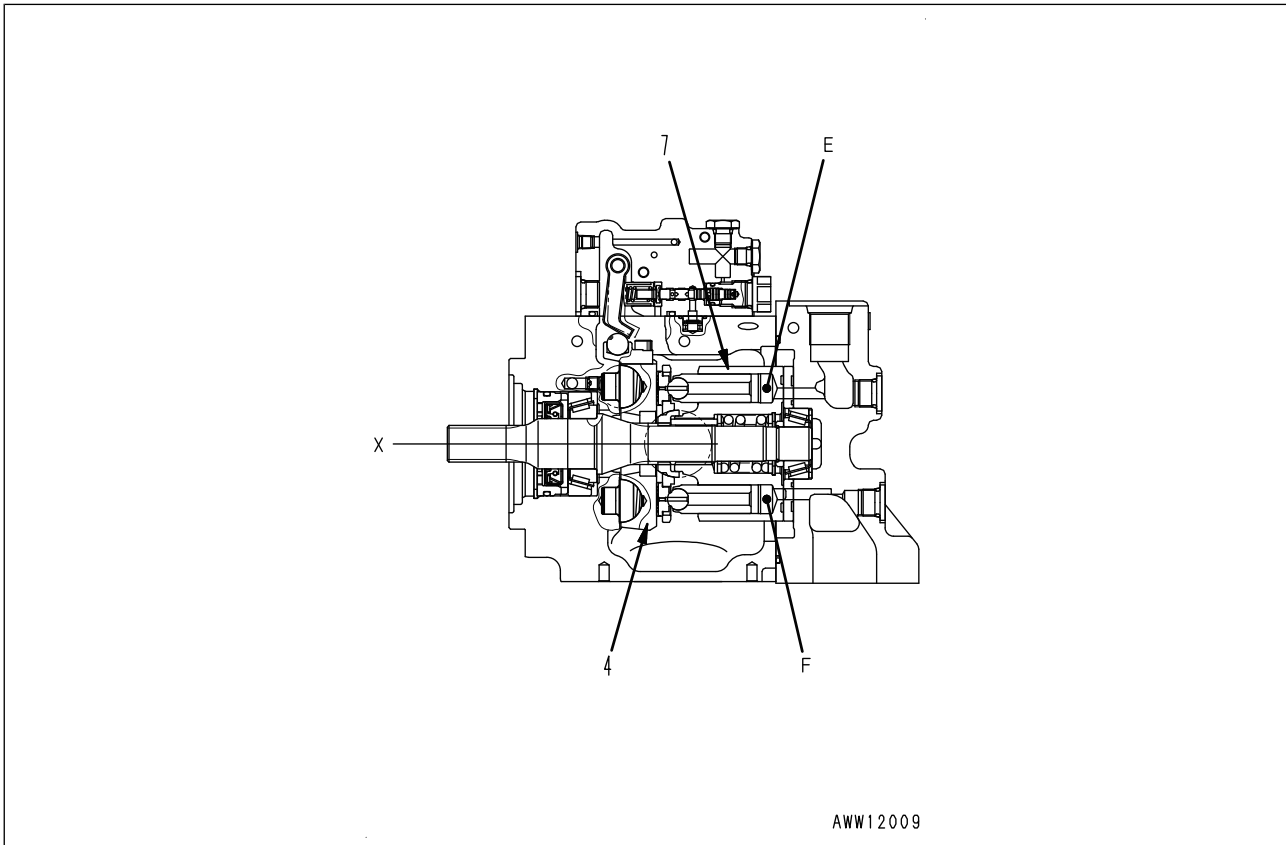
#### **Cooling**

- 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

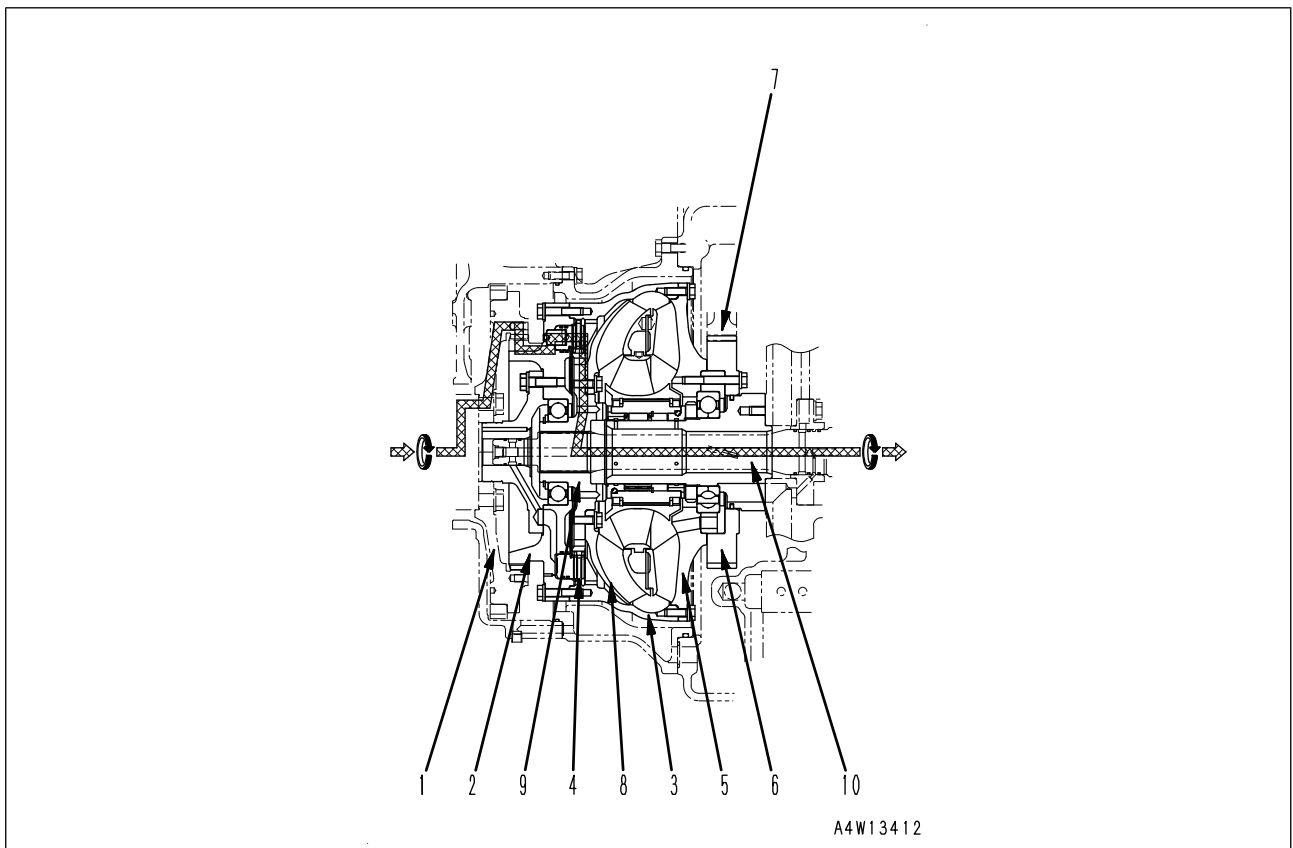
### Cooling fan pump

---



- 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

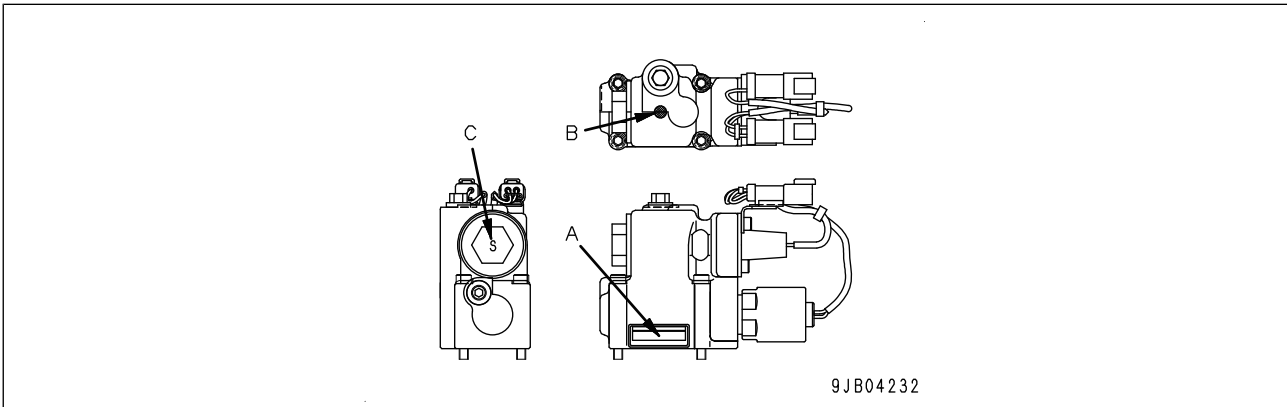
## Transmission control valve

### 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 <sup>2</sup> })	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.



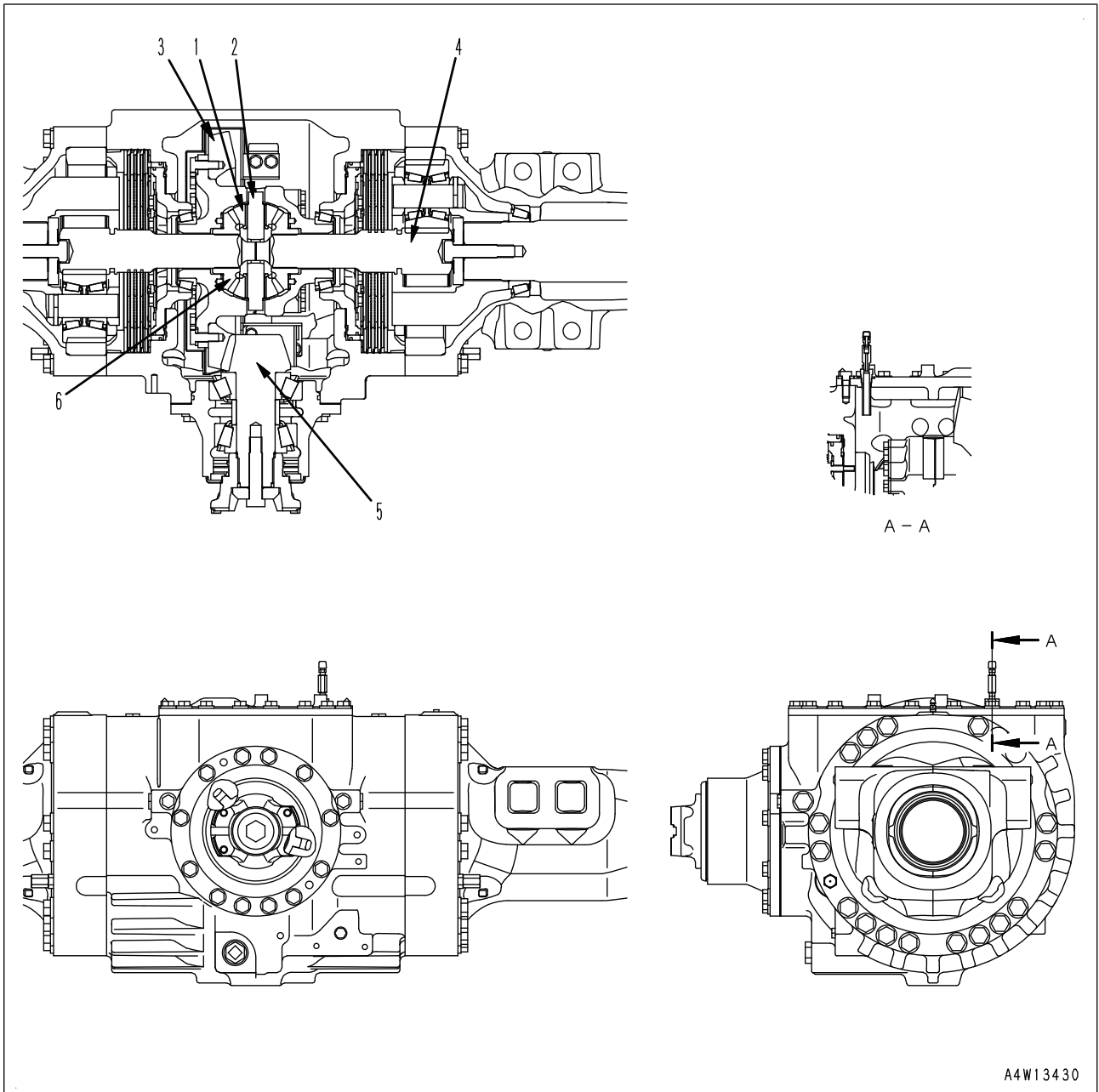
- Table of ECMV operation

		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

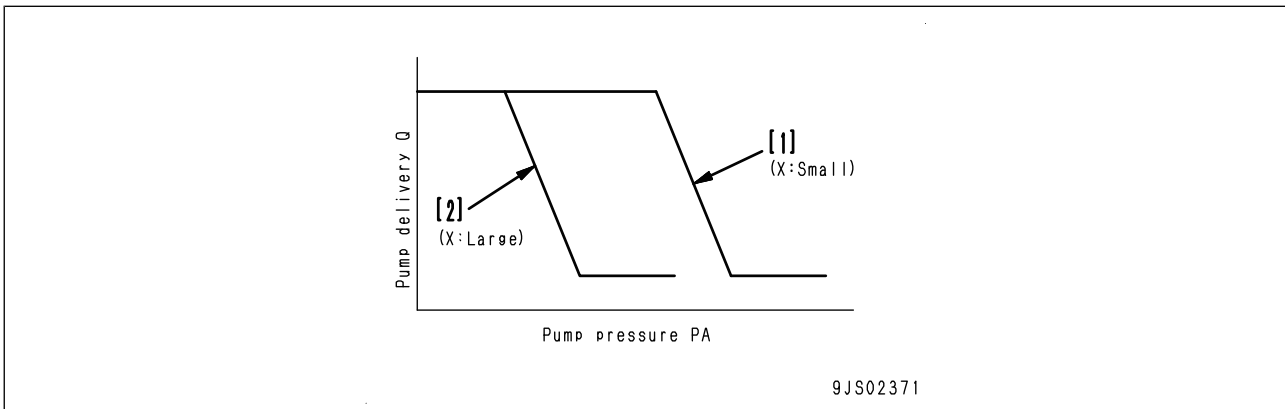
## 10 Structure and function

### 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.

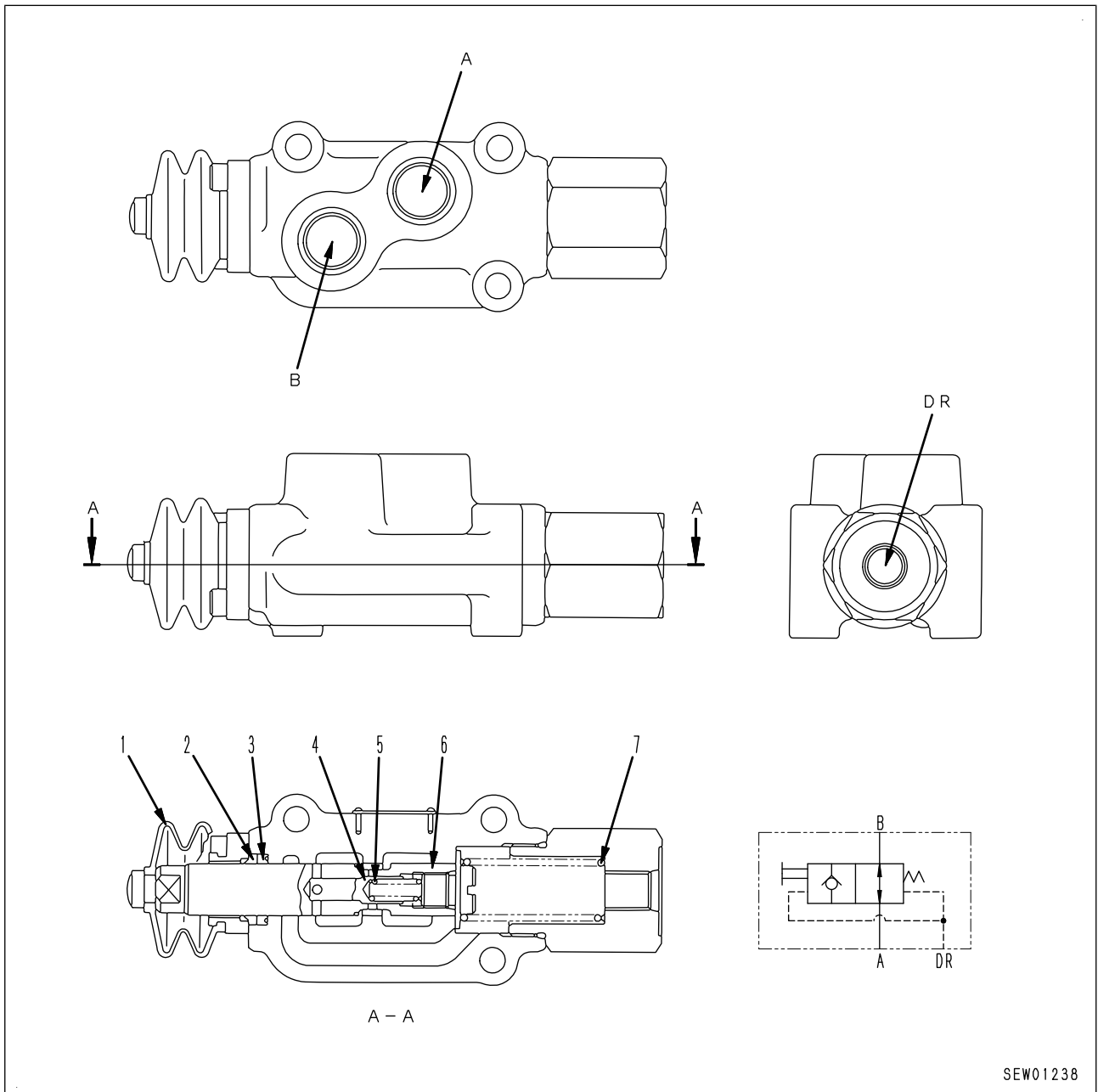
##### When pump pressure (PA) is low

- 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

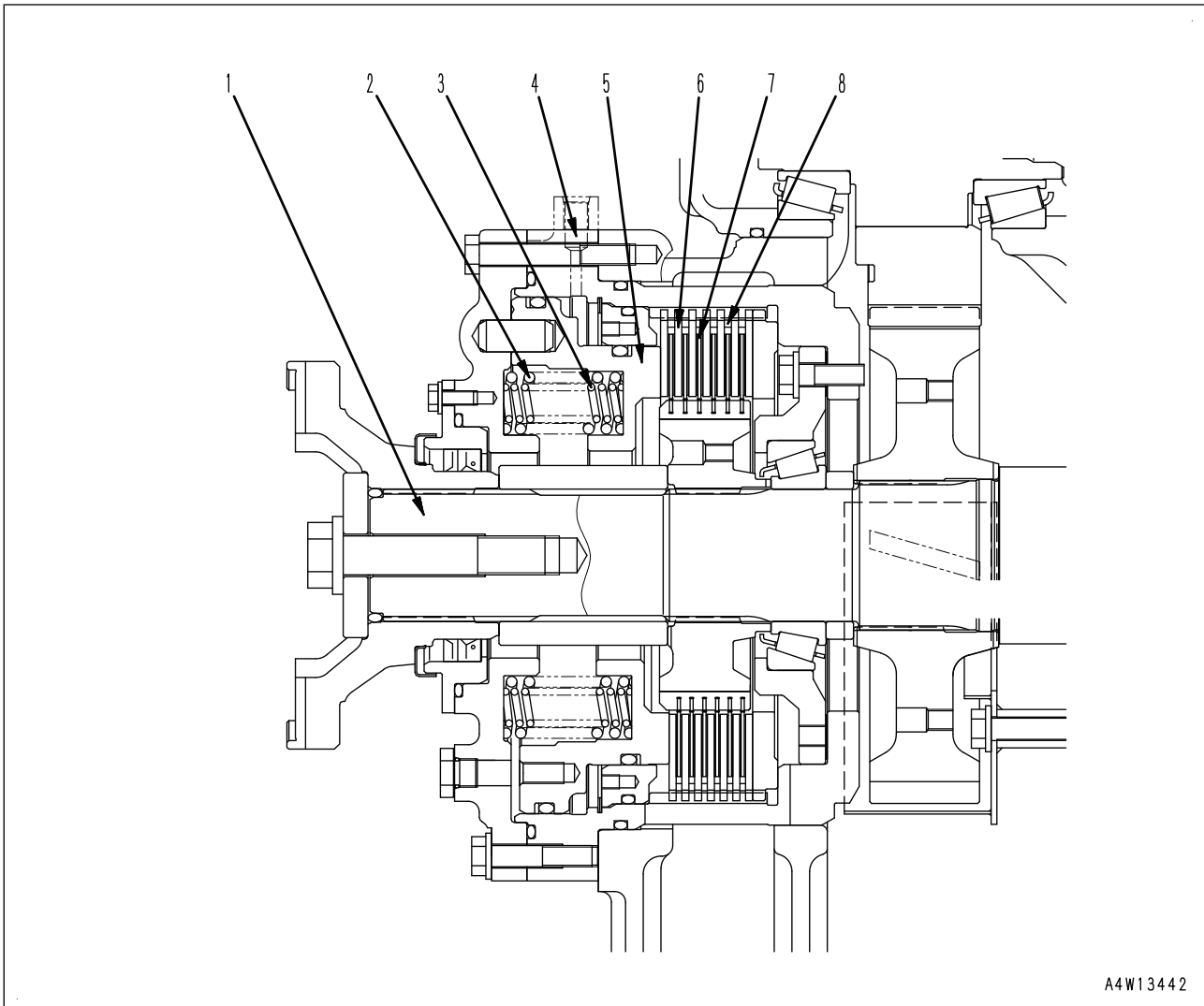
DR: Drain

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

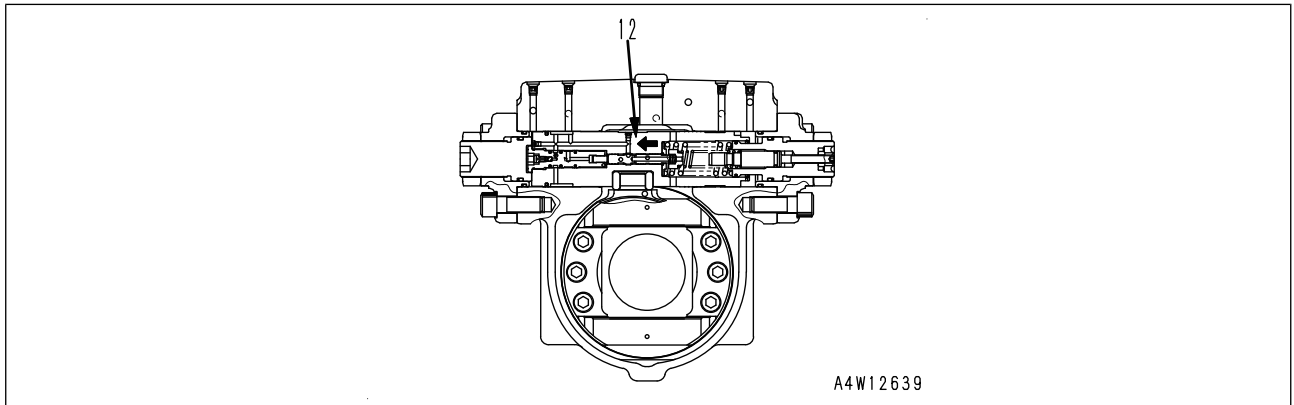
1. Output shaft
2. Spring (outside)
3. Spring (inside)
4. Parking brake oil port
5. Piston
6. Plate
7. Disc
8. Wave spring

#### Structure

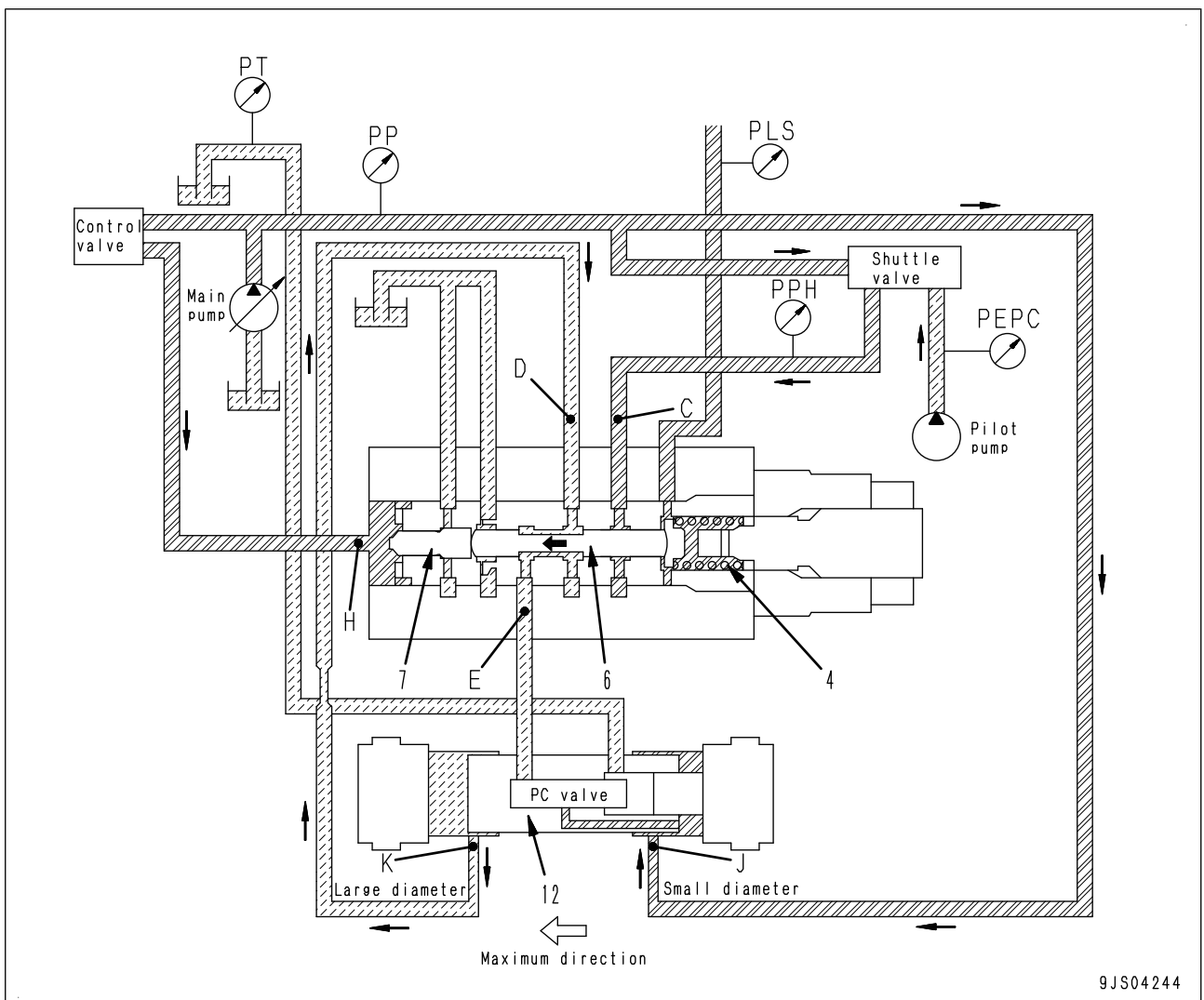
- The parking brake is a wet-type multiple-disc brake, which is operated mechanically by springs (2) and (3) to brake output shaft (1).

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

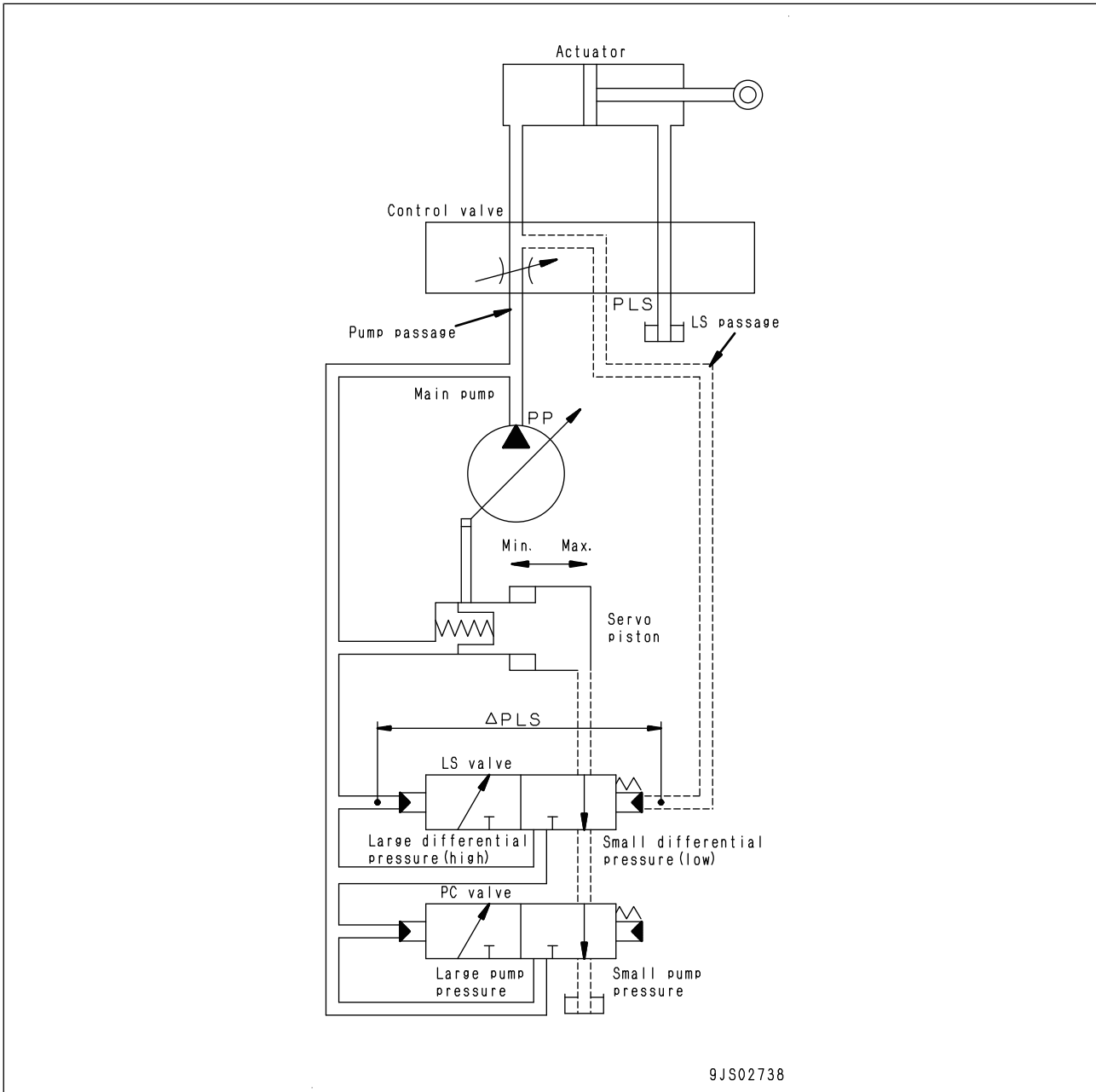
- When the brake is applied, piston (5) presses plates (6) and discs (7) against each other with the tension of springs (2) and (3) to lock output shaft (1).
- When the brake is released, the oil pressure from parking brake oil port (4) moves piston (5) to release the pressing force on discs (7) and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



Operation in direction to increase pump discharge

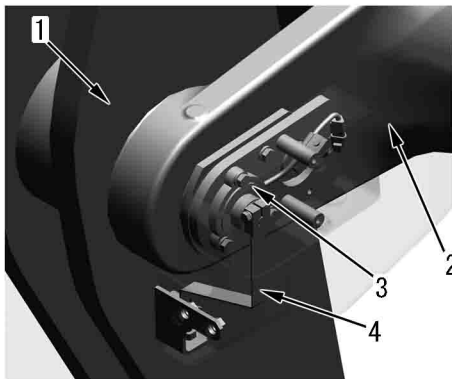
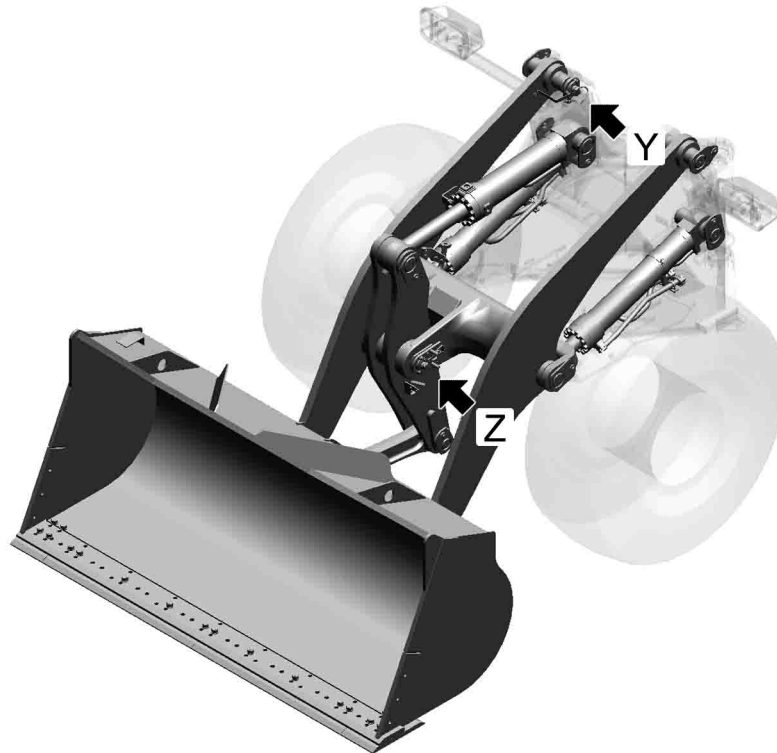


- When the difference between pump discharge pressure (PP) and LS pressure (PLS), in other words, LS differential pressure ( $\Delta PLS$ ) becomes smaller [for example, when the area of opening of the control valve becomes larger and pump discharge pressure (PP) drops], spool (6) is pushed to the left 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.)

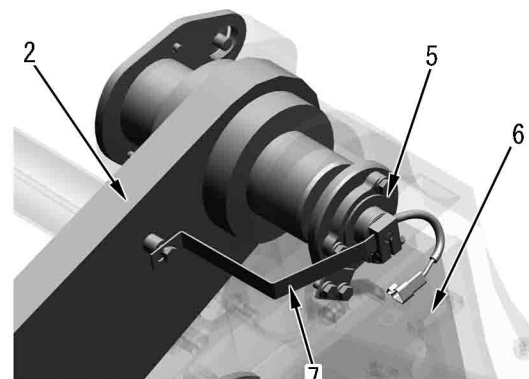


- The pump swash plate shifts toward the maximum angle position if LS differential pressure ( $\Delta PLS$ ) is lower than the set pressure of the LS valve.
- The pump swash plate shifts toward the minimum angle position if LS differential pressure is higher than the set pressure.

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



Z



Y

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.

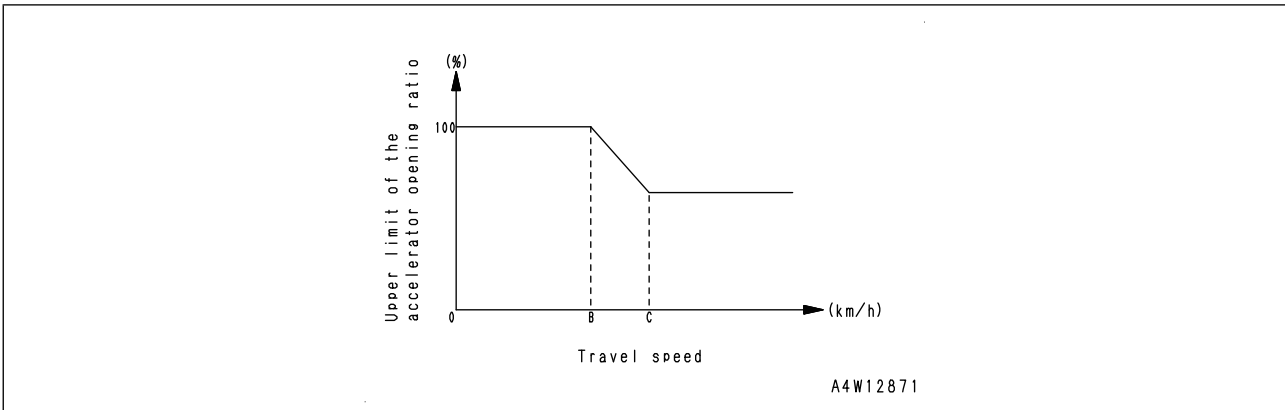
Unit: km/h

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.









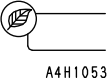
**Setting and cancelation of lowering stop position**

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"> <li>Lights up when fan rotates in reverse.</li> <li>Flashes while rotation direction is being changed.</li> </ul>	
 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"> <li>Guidance on excessive engine idling</li> <li>Guidance on deterrence of hydraulic relief</li> <li>Guidance on deterrence of brake dragging</li> <li>Guidance on deterrence of accelerator pedal depressing</li> <li>Guidance on recommendation of 4th gear</li> <li>Guidance on recommend of lockup</li> <li>Guidance on deterrence of long-period digging</li> </ul>	

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.

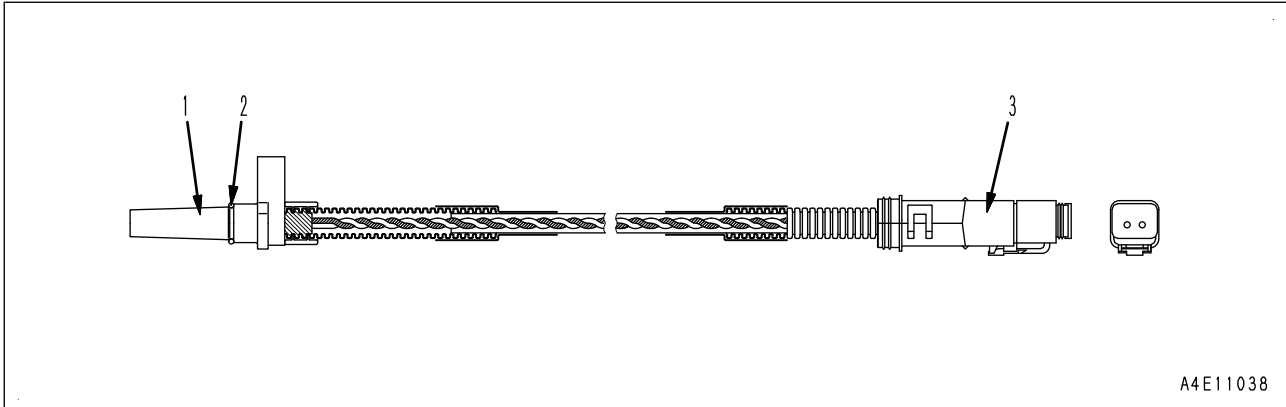
## 10 Structure and function

### 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.

## Central lubrication system (CLS)

The central lubrication system providing lubricant from a reservoir to each connected lube point.

The lubricant flow is divided feeders so every point is provided with the right lubricant amount.

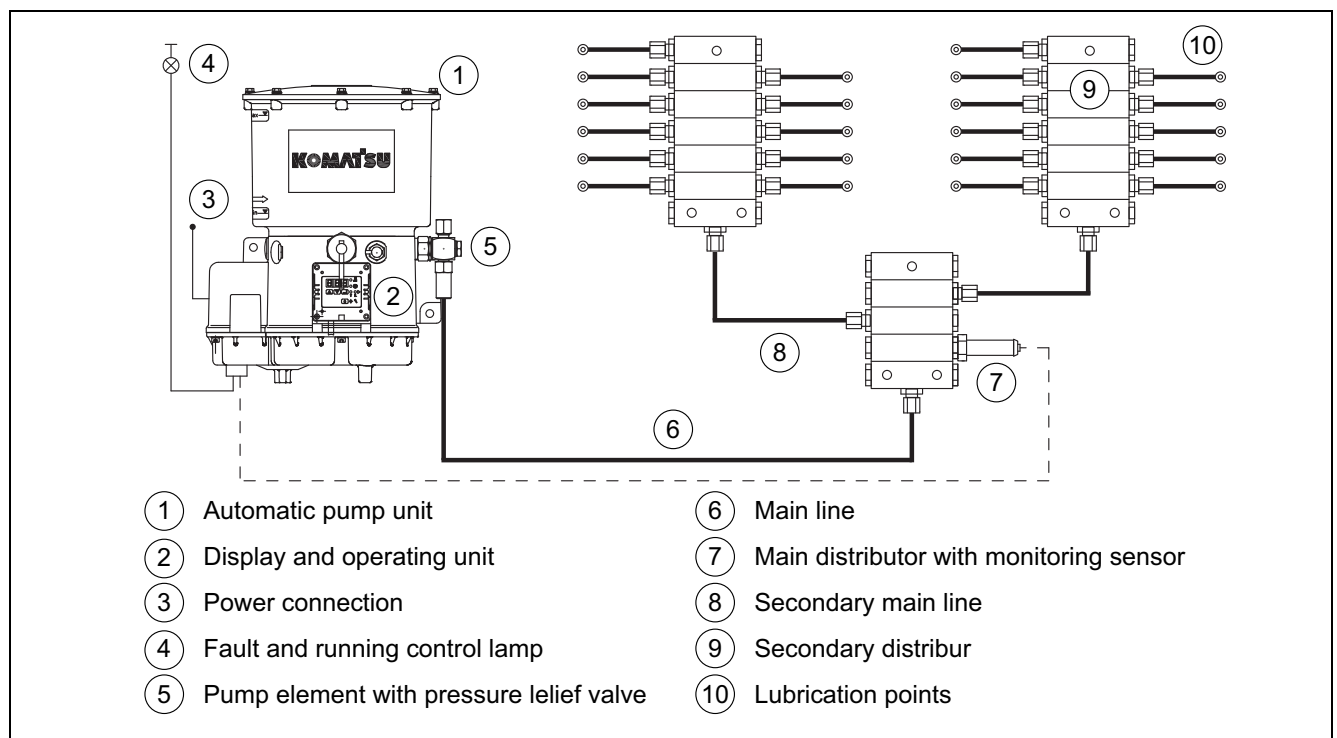
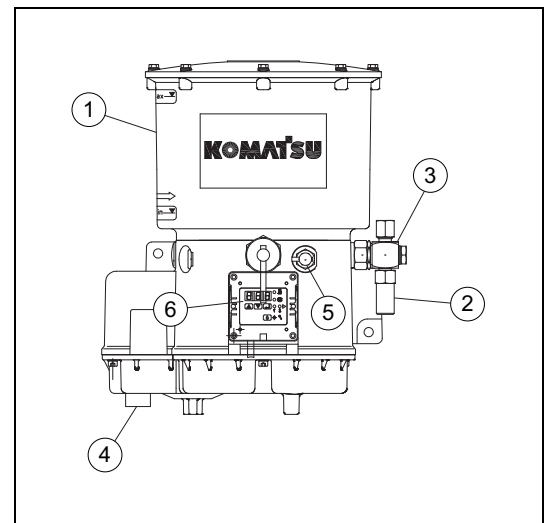
The Pump is operated by a timed controller:

The needed lubricant is provided in fixed intervals. The operator can shorten this intervals with a push button at any time.

### Auto-grease pump

1. Lubricant reservoir
2. Pressure safety valve
3. Pump element
4. Electrical connection port (7-pole)
5. Filler nipple (grease gun)
6. Control (with display)

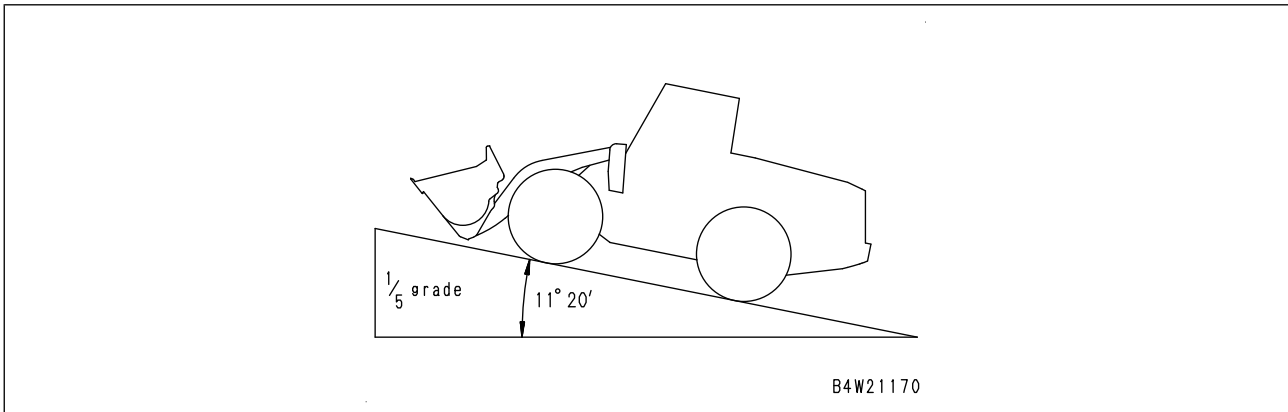
The Auto-grease unit is designed as an additional equipment for the automatic lubrication of the machine. The central lubrication system supplies all connected components with their required lubricant quantity in programmable time intervals. The automatic lubrication cycle takes place while the machine is in operation and provides a significant work reduction for the machine operator



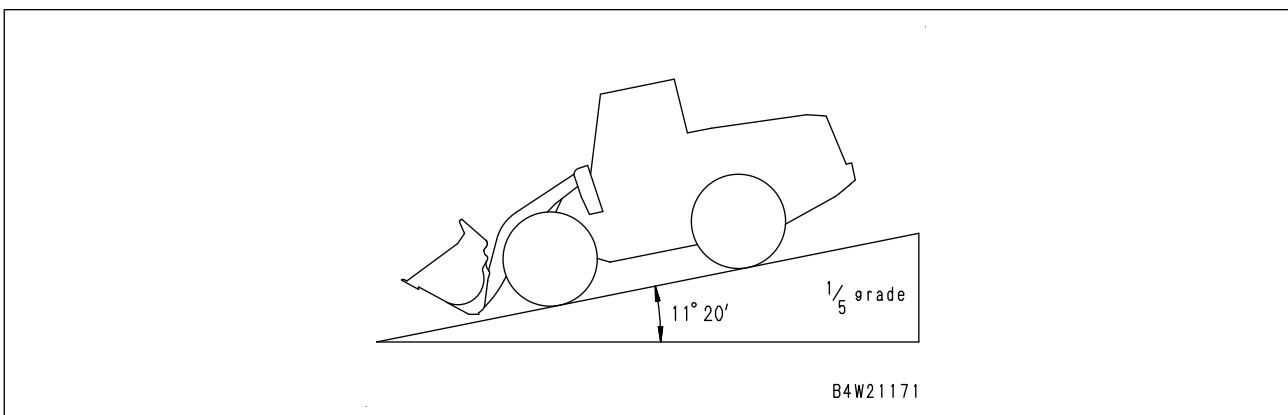
**20 Standard value tables**  
Standard value table for machine

---

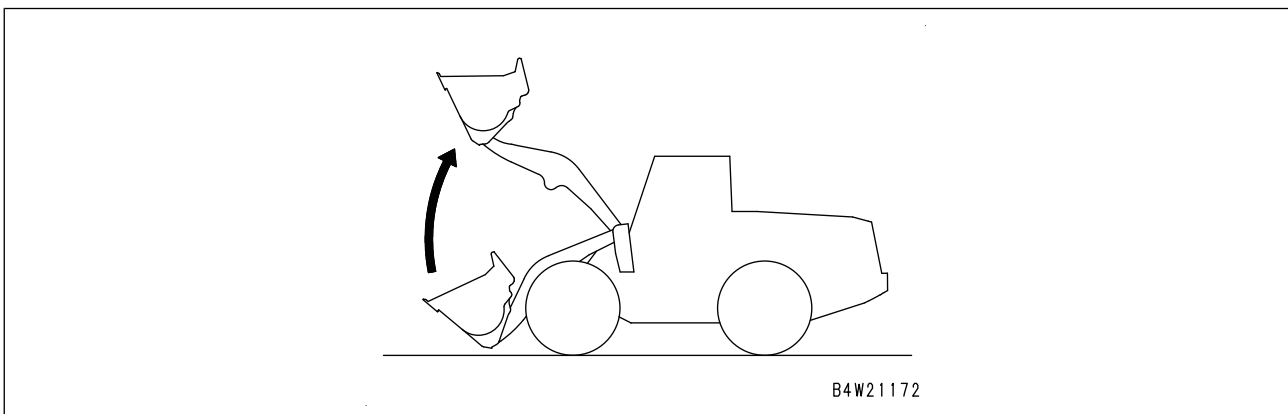
★ Fig. D



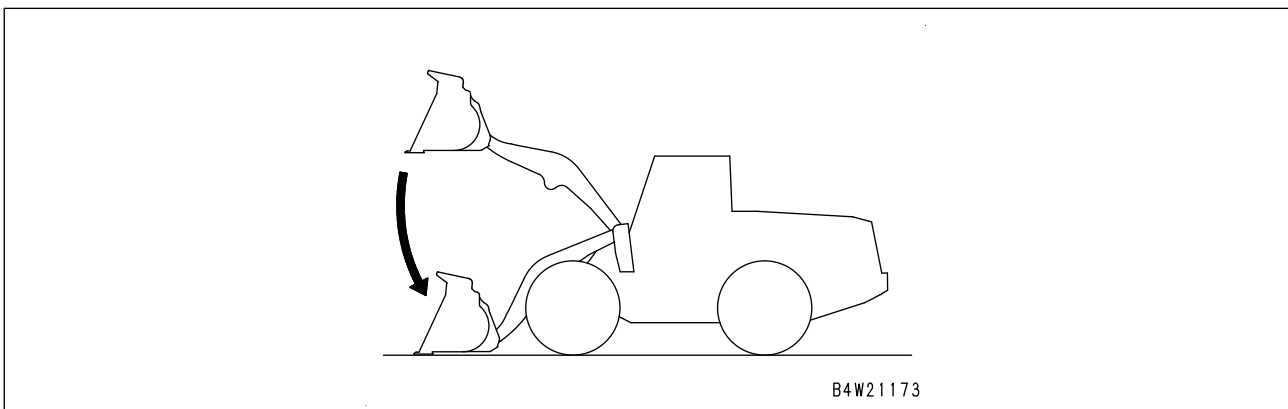
★ Fig. E



★ Fig. F



★ Fig. G



**30 Testing and adjusting**  
General information on testing and adjusting

Testing and adjusting item	Sym- bol	Part No.	Part name	Q'ty	Remarks
Testing brake accumulator nitrogen gas pressure and procedure for charging accumulator with nitrogen gas.	1	792-610-1702	Gas charge tool	1	
		ZE 2	792-610-1310	Nipple (for Russia)	1
	792-610-1320		Nipple (for US)	1	CGA No. 351
	792-610-1330		Nipple (for US)	1	ASA B-571-1965
	792-610-1350		Nipple (for German)	1	DIN 477-7963 NEN 3268-1966 SIS-SMS 2235/2238
	792-610-1360		Nipple (for UK)	1	BS 341 Part1-1962
Removal and installation of coolant temperature sensor	—	795T-981-1010	Socket	1	

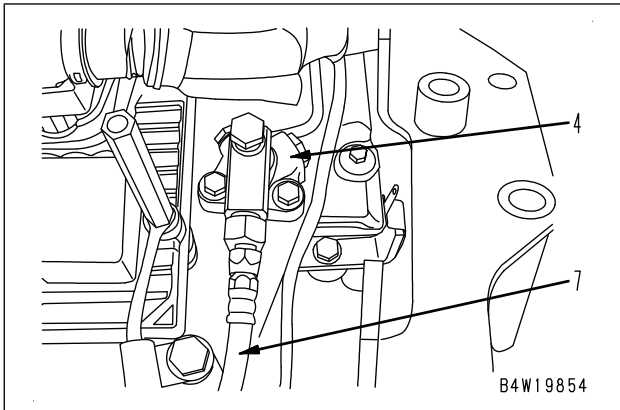
## 30 Testing and adjusting

### Engine and cooling system

- ★ While measuring the fuel return rate from the injector, keep the hose on the pressure limiter side connected and insert the hose end in the container.

1. Disconnect fuel return hose (7) of return block (4).

- ★ Plug the fuel hose by using a plug.  
Plug part number: 07376-70315



2. Connect test hose K4 to the return block (4) side.

- ★ Bind the connected part of the test hose with a wire, etc. to prevent it from coming off.
- ★ Arrange the route of the test hose so that it does not sag, and put its end in a container.



3. Start the engine, and stall the torque converter.

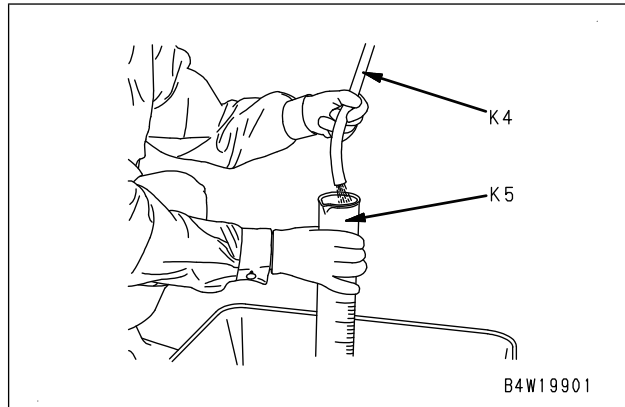
- ★ For the torque converter stalling procedure, see "Testing engine speed".

4. After the engine speed is stabilized, measure the return rate for 1 minute by using measuring cylinder K5.

- ★ Measuring duration can be 20 seconds if the leaked amount is multiplied by 3 after the measurement.
- ★ If the error of no-pressure feed occurs on the supply pump, there is a case that the engine speed does not increase. In such case, record the engine speed during testing, as well.


- ★ Return (spill) rate from the injector is normal if it is within the following standard value range.

Engine speed (rpm)	Limit return (spill) rate (cc/min)
1,600	See standard value table
1,700	See standard value table
1,800	See standard value table
1,900	See standard value table
2,000	See standard value table



5. After finishing the test, stop the engine, remove the testing tools and restore the machine.

 **Joint bolt on block side:**  
**24.5 to 34.3 Nm {2.5 to 3.5 kgm}**

 **Joint bolt on common rail side:**  
**17.7 to 22.6 Nm {1.8 to 2.3 kgm}**

same procedure as the one described in the step 1.

**⚠ Be sure to replace the cartridge with a new one because the cartridge used for flushing for long hours causes premature clogging.**

★ When installing the filter cartridge, tighten it by 2/5 turns after the O-ring came in touch with the filter head.

2) Add oil and check the oil level again.

**Testing work equipment control lever** (WA380-PK00-001-K-01-A)

★ Testing tools

Symbol	Part No.	Part name
Y	1	79A-264-0021 Push-pull scale
	2	Commercially available Ruler

⚠ **Apply the frame lock bar.**

- ★ Check the work equipment control lever under the following condition.
- Engine speed: Low idle

**Testing** (WA380-PK00-384-K-00-A)

1. Measuring operating effort of work equipment control lever  
Install and fix tool Y1 to the work equipment control lever.  
3-lever type

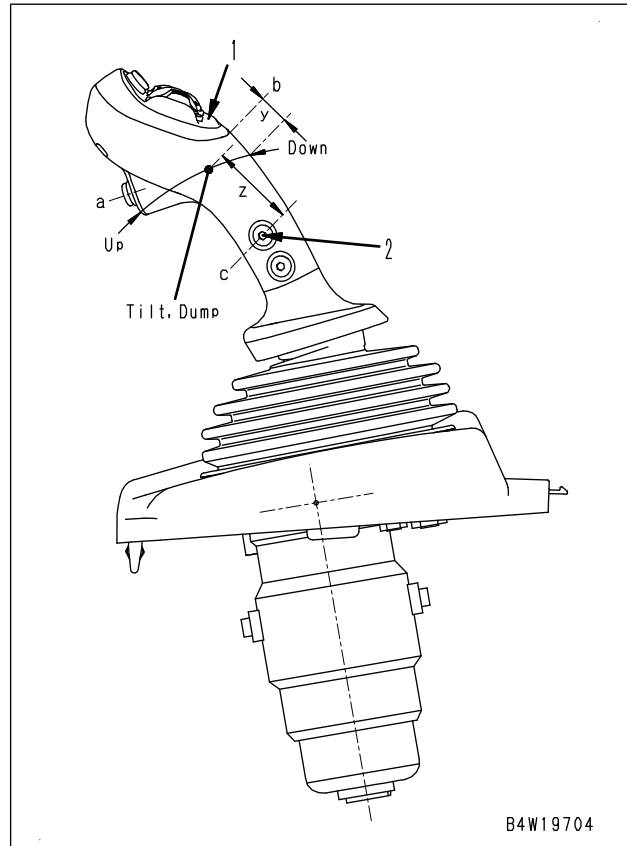
- ★ Install tool Y1 to the position 12 mm down from the top of the knob.
- ★ Operate the control lever at the same speed as that for the normal operation, with the minimum value for the effort needed to operate the knob.



Multi-function mono-lever type

- ★ Install tool Y1 to the following position.
  - ★ Operate the control lever at the same speed as that for the normal operation, with the minimum value for the effort needed to operate the knob.
- 1) RAISE  
Push the lower end of kickdown switch (8 mm from center (a) of switch) horizontally toward tangential direction of lever movement.
  - 2) LOWER  
Push the point, 21 mm (y) under the lower end (b) of cap (1), toward tangential direction of lever movement.
  - 3) TILT, DUMP

Push the point, 42 mm (z) up the center (c) of side screw (2), toward tangential direction of lever movement (right and left direction).



2. Measuring travel of work equipment control lever  
Check the travel of the work equipment control lever at each point.  
3-lever type

- ★ Put a mark on the lever knob at 12 mm down from the top and use scale Y2 for the measurement.
- ★ If the travel is out of the standard range, replace the lever.



## Releasing remaining pressure in brake accumulator circuit (WA380-G2F0-001-K-00-A)

**⚠** Before disconnecting any of the following brake accumulator circuits, release remaining pressure in the brake circuit.

### Releasing remaining pressure (WA380-G2F0-22A-K-00-A)

- Between accumulator charge valve and brake accumulator
  - Between accumulator charge valve and parking brake solenoid valve
  - Between brake accumulator and brake valve
1. Stop the engine.
  2. Depress the brake pedal at least 100 times to release the pressure in the brake accumulator circuit.

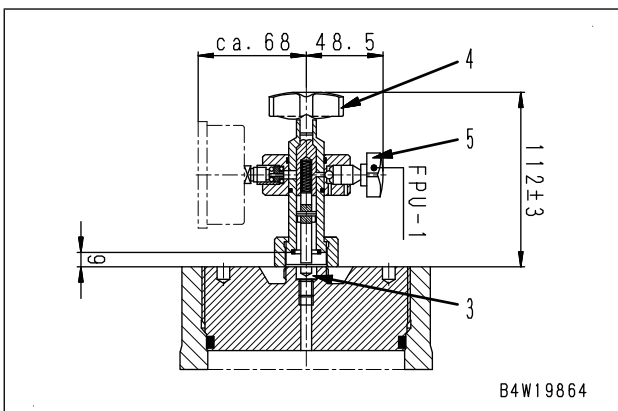
## 30 Testing and adjusting

### Hydraulic system

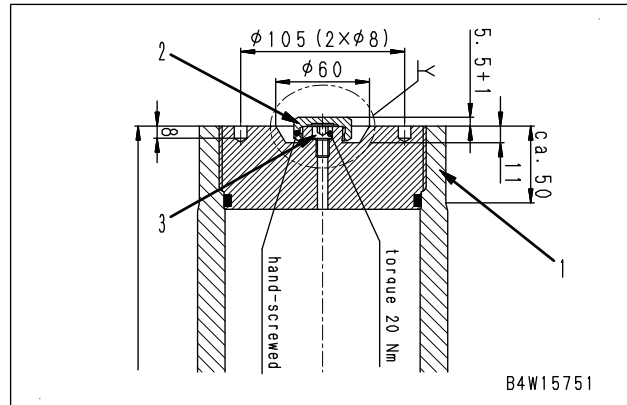
Ambient temperature °C	Gas pressure		Remarks
	MPa	kg/cm <sup>2</sup>	
23	2.97	30.3	
24	2.98	30.4	
25	2.99	30.5	
26	3.00	30.6	
27	3.01	30.7	
28	3.03	30.8	
29	3.04	31.0	
30	3.05	31.1	
31	3.06	31.2	
32	3.07	31.3	
33	3.08	31.4	
34	3.09	31.5	
35	3.10	31.6	
36	3.11	31.7	
37	3.12	31.8	
38	3.13	31.9	
39	3.14	32.0	
40	3.15	32.1	
41	3.16	32.2	
42	3.17	32.3	
43	3.18	32.4	
44	3.19	32.5	
45	3.20	32.6	

7. Remove gas charge tool ZD1 from the accumulator according to the following procedure.

- 1) Slowly turn handle (4) clockwise, and tighten the hexagonal socket head bolt (3).
- 2) Open pressure relief valve (5), and discharge nitrogen gas remaining in gas charge tool ZD1 and hose.
- 3) Remove gas charge tool ZD1 from the filling port of the accumulator.



8. Apply suds to the filling port of the accumulator to make sure there is no leakage of nitrogen gas.
9. Install hexagonal socket head bolt (3) and cap (2) to accumulator (1).



10. Within a week from charging nitrogen gas, check that no pressure drop of nitrogen gas is found.

- ★ Check the brake function within 5 minutes from stop of the engine. (If more than 5 minutes elapse from stop of the engine, correct measurement becomes unavailable because oil pressure in the brake circuit drops.)
- 1) Place the machine on a level ground and turn the parking brake switch to the "ON" position.
  - 2) Start and run the engine at medium speed for a minute, then stop the engine.
  - 3) Turn the starting switch to ON position and depress the brake pedal repeatedly to record how many times depressing are required for the brake oil pressure caution lamp to light up.
    - Number of times of depressing is less than 5: Accumulator gas pressure may be low
    - Number of times of depressing is 5 or more: Accumulator gas pressure is normal.

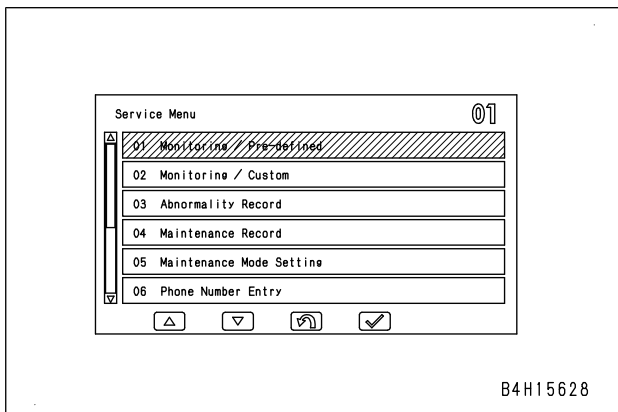
**Monitoring/ Pre-defined** (WA500-Q1S1-100-K-00-A)

The machine monitor can monitor the condition of the machine in real time by receiving signals from various switches, sensors, and actuators installed to various parts of the machine and the information from the controllers which is controlling switches, etc.

In the "Monitoring/ Pre-defined", frequently used monitoring items in daily work are selected beforehand.

1. Selecting menu

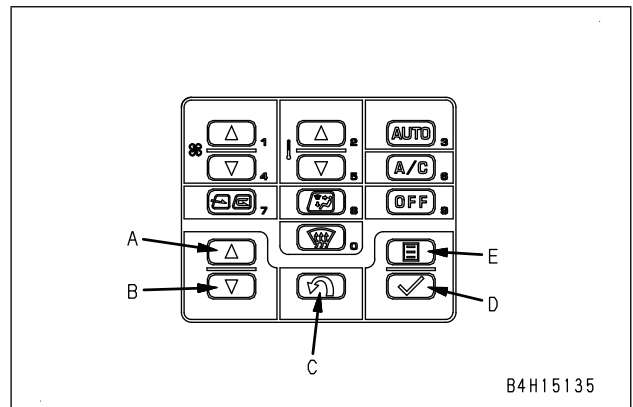
Select "Monitoring/Pre-defined" on "Service Menu" screen.



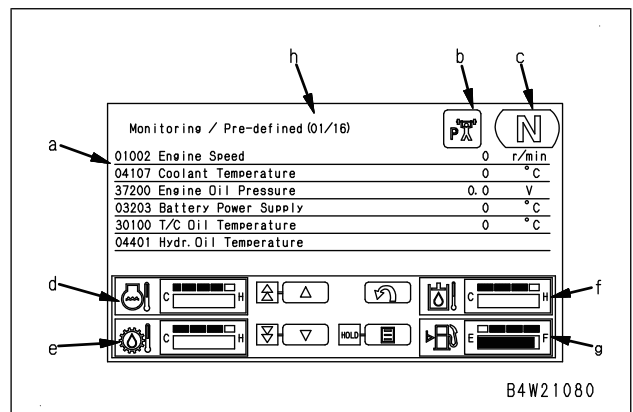
2. Checking Monitoring/Pre-defined information

"Monitoring/Pre-defined" screen displays the following information and allows switching among the monitoring items.

- (a): Monitoring information
  - (b): Power mode pilot lamp
  - (c): Shift indicator
  - (d): Engine coolant temperature
  - (e): Torque converter oil temperature
  - (f): Hydraulic oil temperature
  - (g): Fuel level
  - (h): Current number of pages / total number of pages
- Up switch (A): Moves selection to the previous page (screen)
- Down switch (B): Moves selection to the next page (screen)
- Return switch (C): Returns to the service menu
- Enter switch (D): Validates your selection
- Menu switch (E): Switches between the Hold and the Releasing hold
- (If the Hold is selected, a diagonal line appears on the HOLD portion.)



★ For the items not displayed in "Monitoring/ Pre-defined", you can freely select and check from "Monitoring/Custom" items.



## 30 Testing and adjusting

### Electrical system

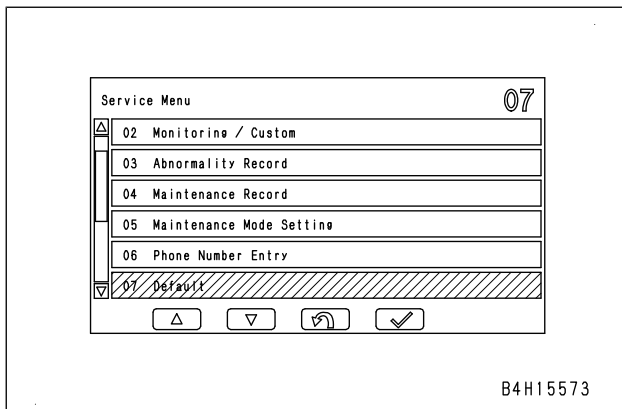
#### Default (Machine Model Select) (WA470-Q1GB-100-K-00-A)

Use the menu of "Default" to check or change various settings of the machine monitor and machine.

When a controller is replaced with a new one, the machine model selection function informs the new control of the machine model to which it is now installed.

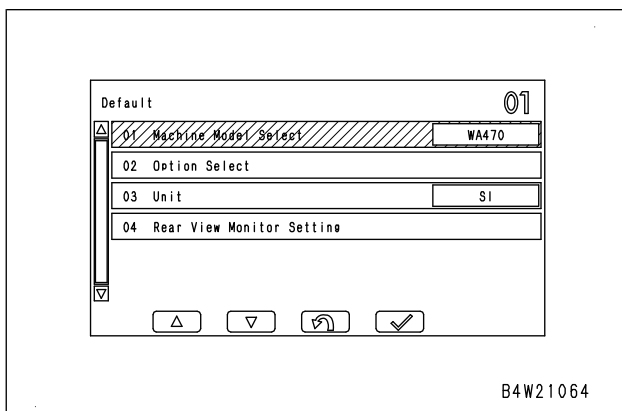
#### 1. Selecting menu

Select "Default" on "Service Menu" screen.



#### 2. Selecting sub menu

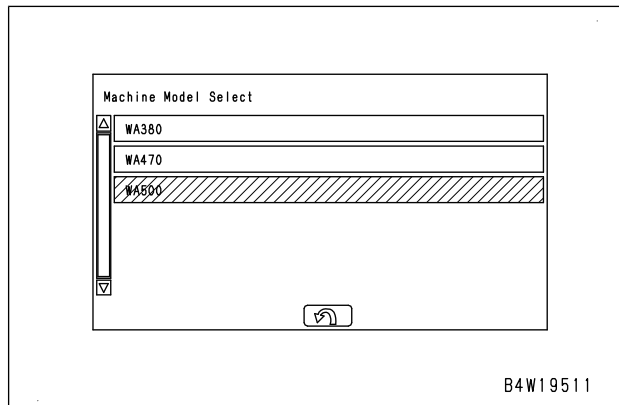
After the "Default" screen is displayed, select "Machine Model Select".



#### 3. Selecting machine model

1) When "Machine Model Select" screen is displayed, perform the following operation.

- Switch operation: While pressing DOWN switch (B), press numeral input switches (E) "1" → "2" → "3" in order.



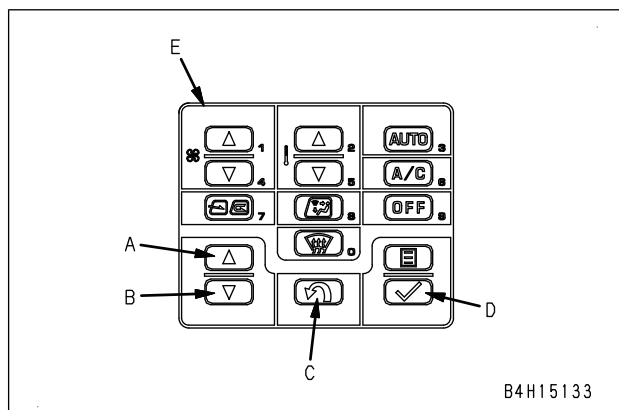
2) When the machine model selection is enabled, select the model.

Up switch (A): Moves the selection up by one item

Down switch (B): Moves the selection down by one item

Return switch (C): Cancels the selection and returns the display to "Default" screen

Enter switch (D): Validates the selection

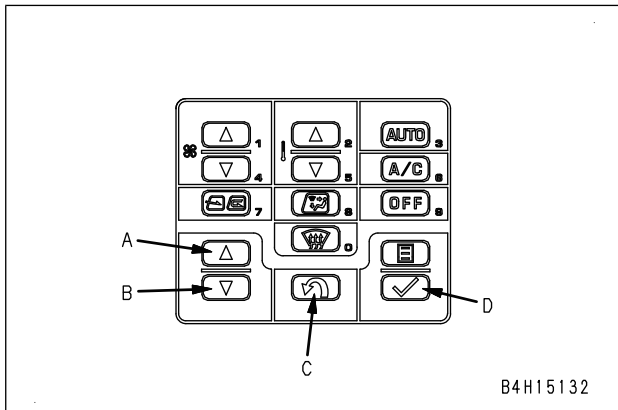


★ If you press the enter switch (D) to validate "Machine Model Select", the followings are performed.

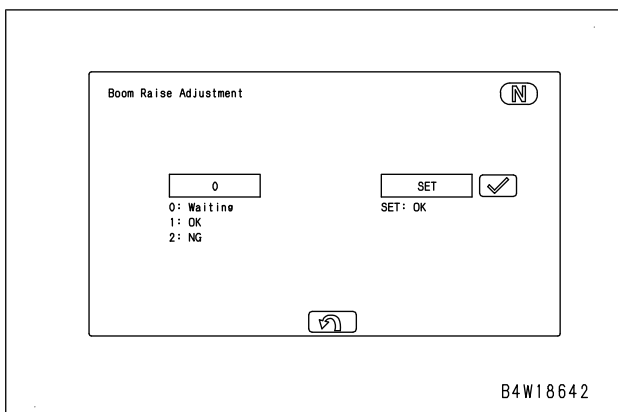
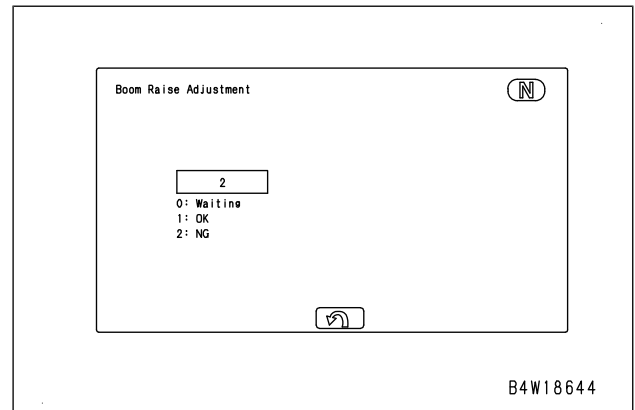
- "Monitoring/Custom": Currently stored items are cleared
- "Maintenance Mode Setting": "Maintenance Mode On/Off" and "Maintenance Notice Time Setting" are returned to the default values of the model.
- "Default" (Option Select): Default value of the selected model are restored
- "ECO Guidance": All of the fuel consumption data are reset

★ This screen is displayed when the service menu is opened for the first time after the monitor controller is replaced to the one that has not been used for the machine model selection before. Therefore, select the model first (the screen display may be somewhat different from the actual one).

- ★ Do not move the lever to RAISE detent position.



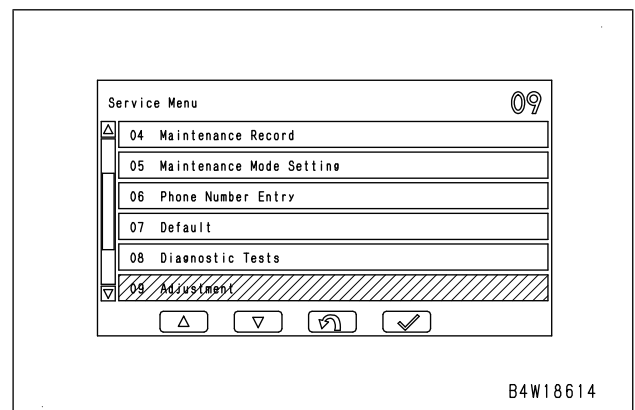
- ★ If the return switch is pressed while the calibration is continued, the calibration currently taking place is stopped even if it is not completed.



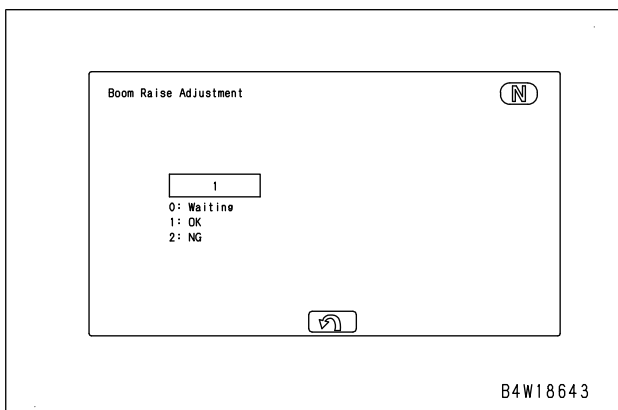
### Adjusting starting current of boom RAISE EPC

- ★ Perform this adjustment with the engine running.

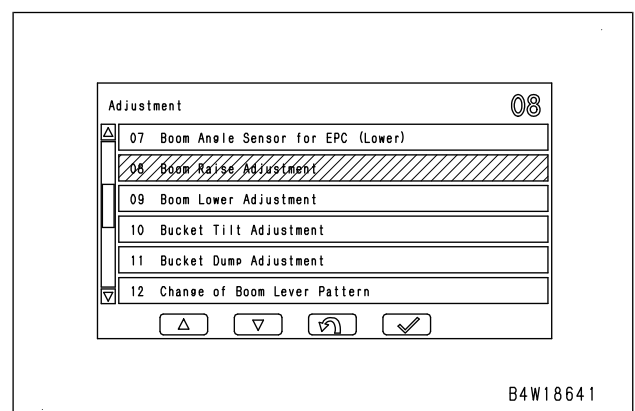
1. Selecting menu screen  
Select "Adjustment" on "Service Menu" screen.



4. When "1" is displayed in the display area, this adjustment is complete.



2. Selecting sub menu  
After the "Adjustment" screen is displayed, select "Boom Raise Adjustment".

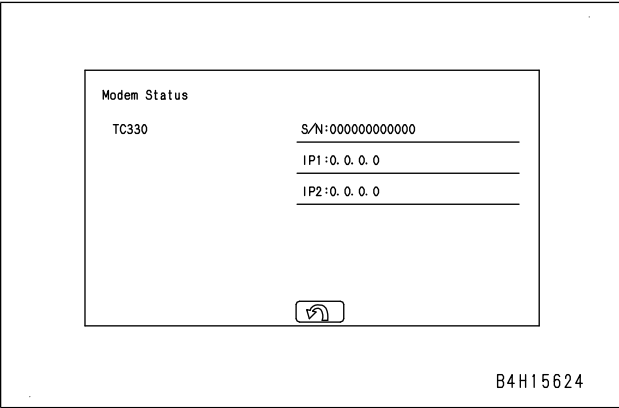
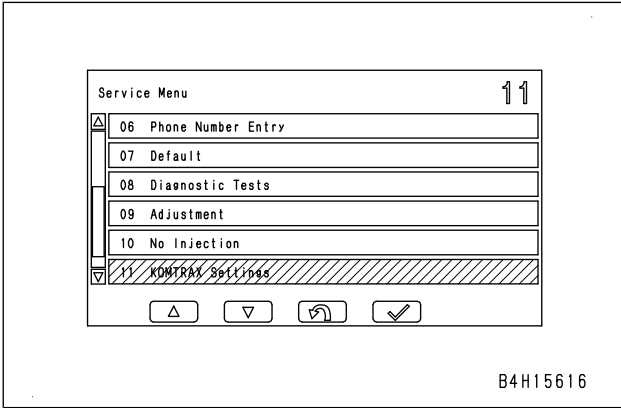


5. If "2" is displayed, the signal voltage of lever angle is out of the standard voltage range. This adjustment is not performed.

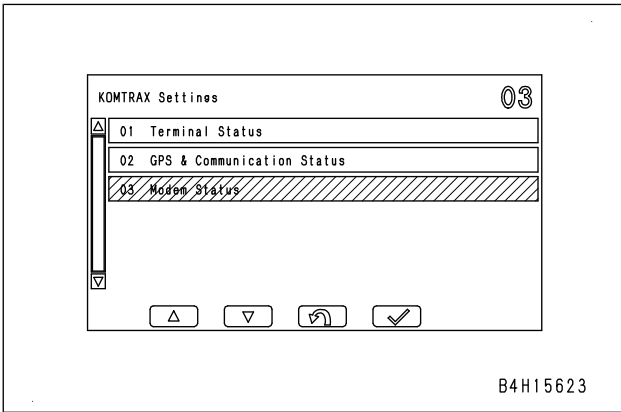
3. Set the bucket in DUMP posture and lower the boom to lift the front wheels off the ground.
4. With the engine running at high speed, start to lower the boom (to lower the machine) gradually.
5. Return the lever finely. When the boom stops moving (front wheels are off ground), hold the

# 30 Testing and adjusting

## Electrical system

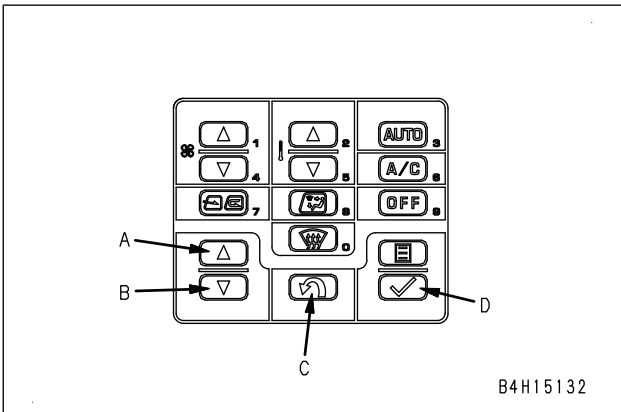


2. Selecting sub menu  
 After the “KOMTRAX Settings” screen is displayed, select “Modem Status”.



3. Details displayed on Modem Status screen  
 IP addresses (2 systems) of the modem are displayed.  
 Return switch (C): The display is returned to KOMTRAX settings screen

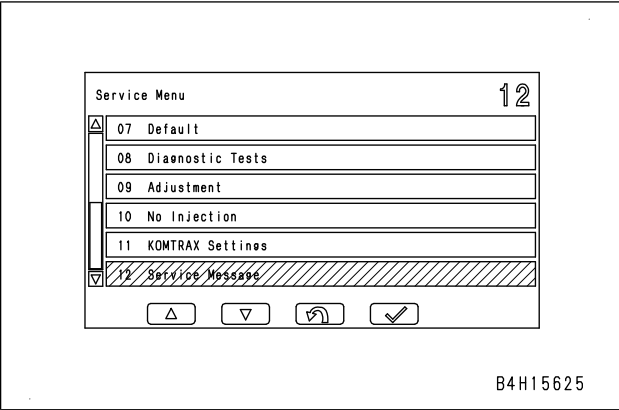
- ★ An IP address is a unique number assigned to each modem that is used when communication between the modem and server is established.



**Service Message** (HM300-Q210-100-K-00-A)  
 Special messages for the technician sent from the KOMTRAX base station (a distributor, etc.) can be checked with this function.

If a received message includes a setting operation, a return mail can be sent by using the numeral input switches as well.

1. Selecting menu  
 Select “Service Message” on “Service Menu” screen.



2. Displaying message (read only)  
 If a message is received, the description in the message is displayed. If there is no message, “No message.” is displayed.  
 Return switch (C): Returns to the “Service Menu” screen

- ★ This message is different from that sent to the operator with the machine monitor in the operator mode.
- ★ Since this message is special for the technician, the message pilot lamp does not light up when it is received unlike the operator mode.

## General information on troubleshooting (ALL-5100-001-A-00-A)

### Troubleshooting points (ALL-5130-42A-A-00-A)

(Rev. 2011/09)

- ⚠ Place the machine on a level ground, and make sure that the frame lock bar, chocks, and parking brake are applied.**
- ⚠ When performing the operation with two or more service technicians, keep strictly to the agreed signals, and do not allow any unauthorized person to come near.**
- ⚠ If the radiator cap is removed when the engine is hot, hot water may spurt out and cause burns, so wait for the engine to cool down before starting troubleshooting.**
- ⚠ Be extremely careful not to touch any hot parts or to get caught in any rotating parts.**
- ⚠ Before disconnecting wiring, remove the key and turn the battery disconnect switch to OFF position.**
- ⚠ When removing the plug or cap from a component which is under pressure of oil, water, or air, always release the internal pressure first. When installing measuring equipment, be sure to connect it properly.**

Troubleshooting denotes to locate the primary cause, fix the trouble without delay and prevent its recurrence. Despite the importance of understanding the structure and operation of the target system in troubleshooting, you should be aware how interviewing with the operator concerned can facilitate in roughly identifying the cause of the given undesirable symptom.

1. When performing troubleshooting, do not hurry to disassemble the components.  
If components are disassembled immediately after any failure occurs:
  - Parts that have no connection with the failure or other unnecessary parts will be disassembled.
  - It will become impossible to find the cause of the failure.It will also cause a waste of manhours, parts, or oil or grease, and at the same time, will also lose the confidence of the user or operator.  
For this reason, when performing troubleshooting, it is necessary to perform thorough prior investigation and to perform troubleshooting in accordance with the fixed procedure.
2. Points to ask the user or operator
  - 1) Have any other problems occurred apart from the problem that has been reported?
  - 2) Was there anything strange about the machine before the failure occurred?
  - 3) Did the failure occur suddenly, or were there problems with the machine condition before the failure?
  - 4) Under what conditions did the failure occur?
  - 5) Had any repairs been performed before the failure? When were these repairs performed?
  - 6) Has the same kind of failure occurred before?
3. Check before troubleshooting
  - 1) Is there any sign of irregularities of the machine?
  - 2) Make checks before starting day's work.
  - 3) Make checks of other items.
  - 4) Check other maintenance matters which can be checked externally and are considered to be necessary.
4. Checking failure  
Check the extent of the failure by yourself, and judge whether it is a real failure or a problem with the method of operation, etc.
  - ★ When operating the machine to reenact the troubleshooting symptoms, do not perform any inspection or measurement that may make the problem worse.
5. Troubleshooting  
Use the results of the investigation and inspection in Items 2 to 4 to narrow down the probable causes of the failure, then use the troubleshooting flowchart to locate the failure exactly.

## 40 Troubleshooting

### General information on troubleshooting

## Preparation work for troubleshooting of electrical system (WA380-C050-42C-K-01-A)

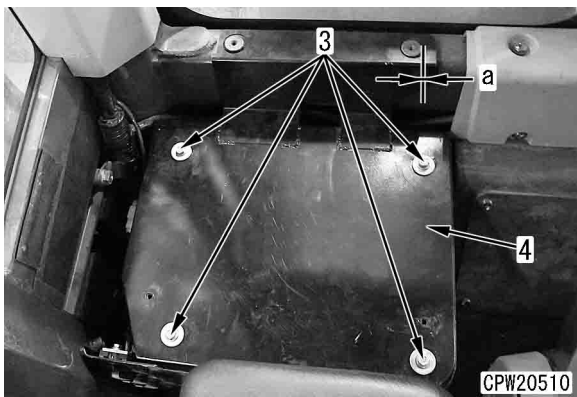
- ★ When carrying out troubleshooting of an electric circuit related to the transmission controller, monitor controller, engine controller, work equipment controller, or KOMTRAX communication MODEM, expose the related connectors according to the following procedure.
- ★ Disconnect and connect the connectors, which have a special locking device, according to the following procedure.

### Preparation (WA470-C050-42C-K-00-A)

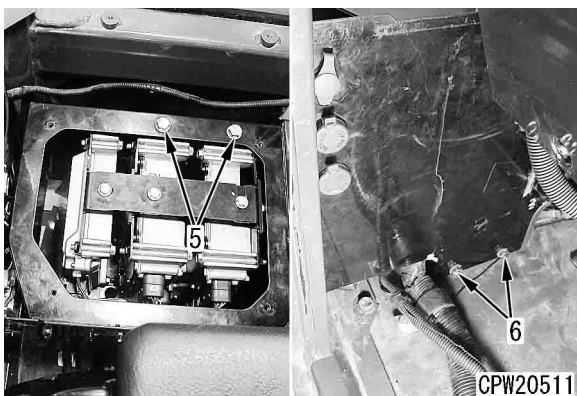
1. Work equipment controller
  - 1) Fold operator's seat (1) forward.
  - 2) Remove box mounting bolts (2) (4 pieces) and remove the box.



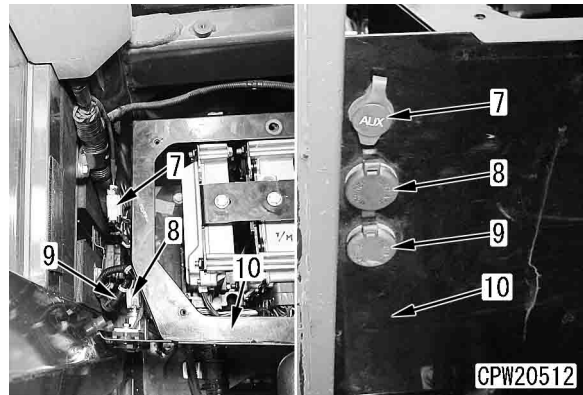
- 3) Remove top cover mounting bolts (3) (4 pieces), and remove top cover (4). [\*1]



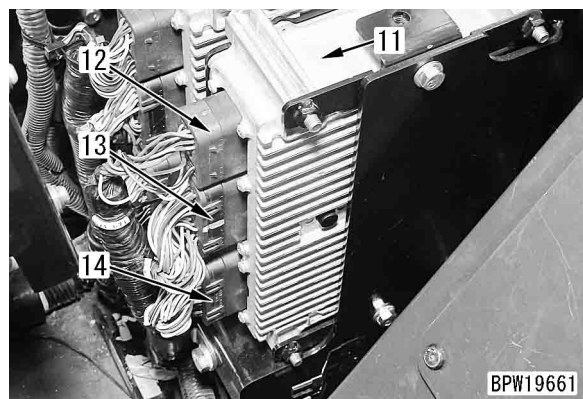
- 4) Remove bolts (5) and (6) (2 pieces each).



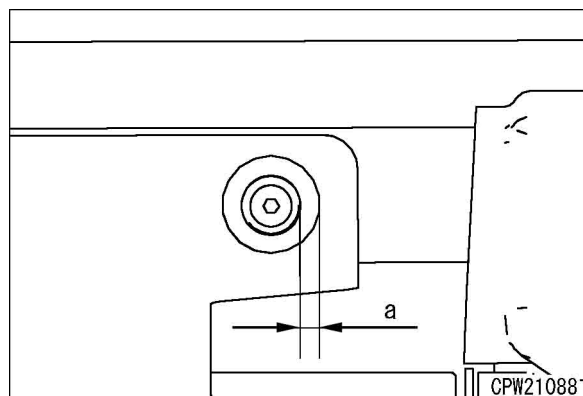
- 5) Disconnect connectors M01B (7), L18A (8), and L18B (9).
- 6) Remove cover (10).



- 7) Disconnect connectors L71 (12), L72 (13), and L73 (14) of work equipment controller (11), and insert or connect T-adapters for troubleshooting.



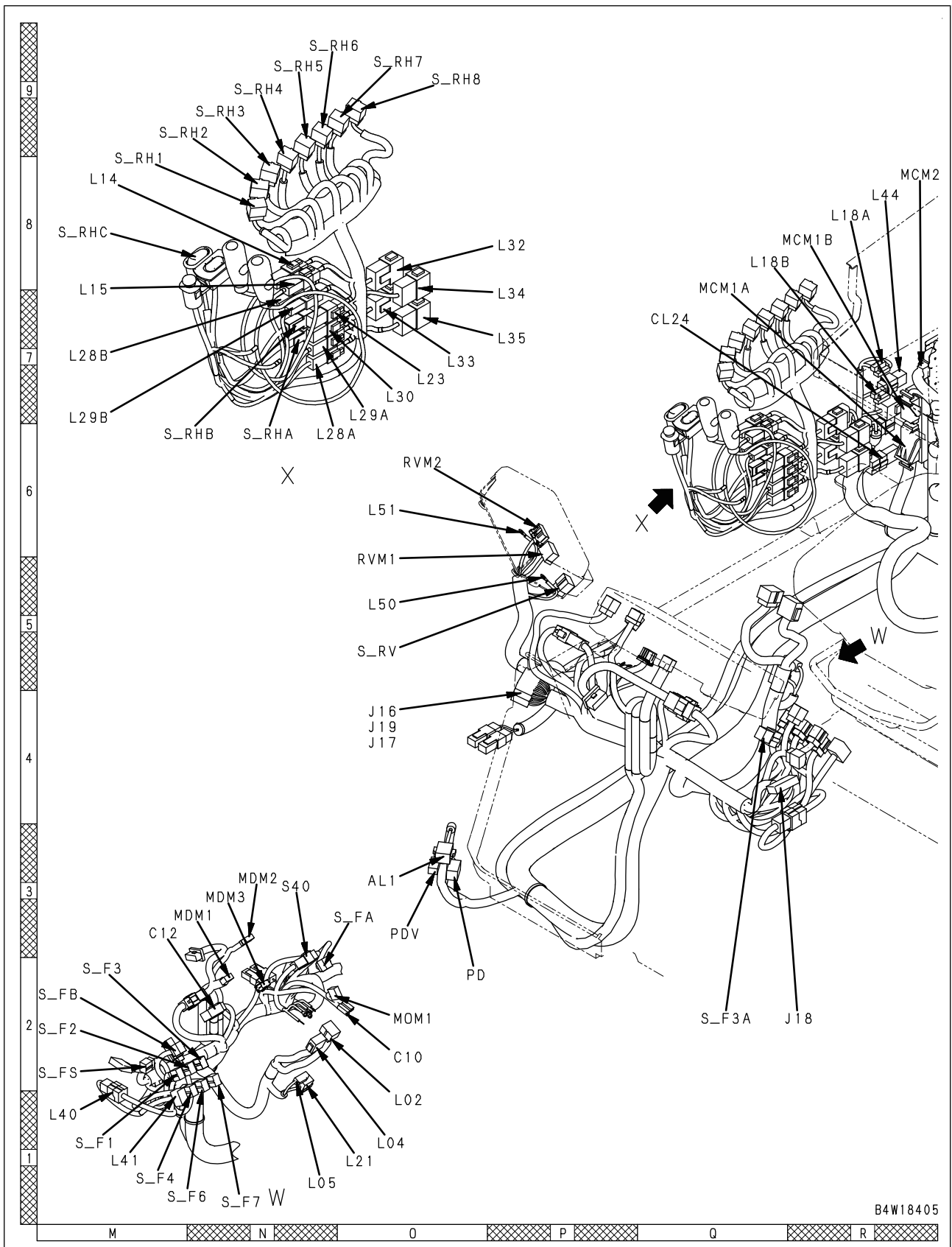
- ★ Install top cover (4) so that the whole circumference of clearance (a) becomes Min. 2 mm.



### 2. Engine controller

- 1) Open the right engine side cover.
  - ★ The engine controller is mounted on the engine (front of the machine).
- 2) Remove cover (1) and fuel feed pump switch (2).

Layout of connectors (3/7)

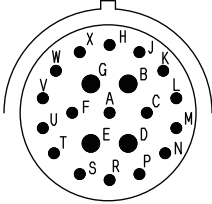
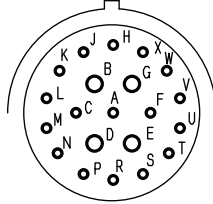
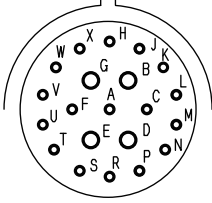
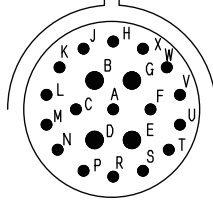
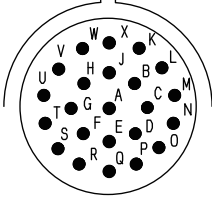
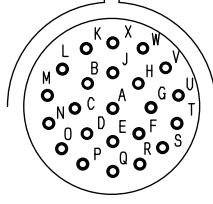
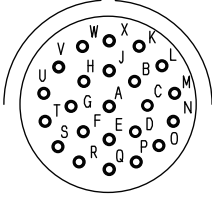
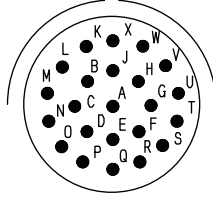


B4W18405

# 40 Troubleshooting

## General information on troubleshooting

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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
24-21 (7)	Pin (male terminal)	Socket (female terminal)	799-601-9270 (T-adapter)
			
	BWP05025	BWP05026	
	Part No. :08191-71201, 08191-71202, 08191-71205, 08191-71206	Part No. :08191-74101, 08191-74102, 08191-74105, 08191-74106	
24-23 (8)	Socket (female terminal)	Pin (male terminal)	799-601-9280 (T-adapter)
			
	BWP05027	BWP05028	
	Part No. :08191-72201, 08191-72202, 08191-72205, 08191-72206	Part No. :08191-73101, 08191-73102, 08191-73105, 08191-73106	
24-23 (8)	Pin (male terminal)	Socket (female terminal)	799-601-9280 (T-adapter)
			
	BWP05029	BWP05030	
	Part No. :08191-81201, 08191-81202, 08191-81203, 08191-81204, 08191-81205, 08191-80206	Part No. :08191-84101, 08191-84102, 08191-84103, 08191-84104, 08191-84105, 08191-84106	
24-23 (8)	Socket (female terminal)	Pin (male terminal)	799-601-9280 (T-adapter)
			
	BWP05031	BWP05032	
	Part No. :08191-82201, 08191-82202, 08191-82203, 08191-82204, 08191-82205, 08191-82206	Part No. :08191-83101, 08191-83102, 08191-83103, 08191-83104, 08191-83105, 08191-83106	

B4D18408



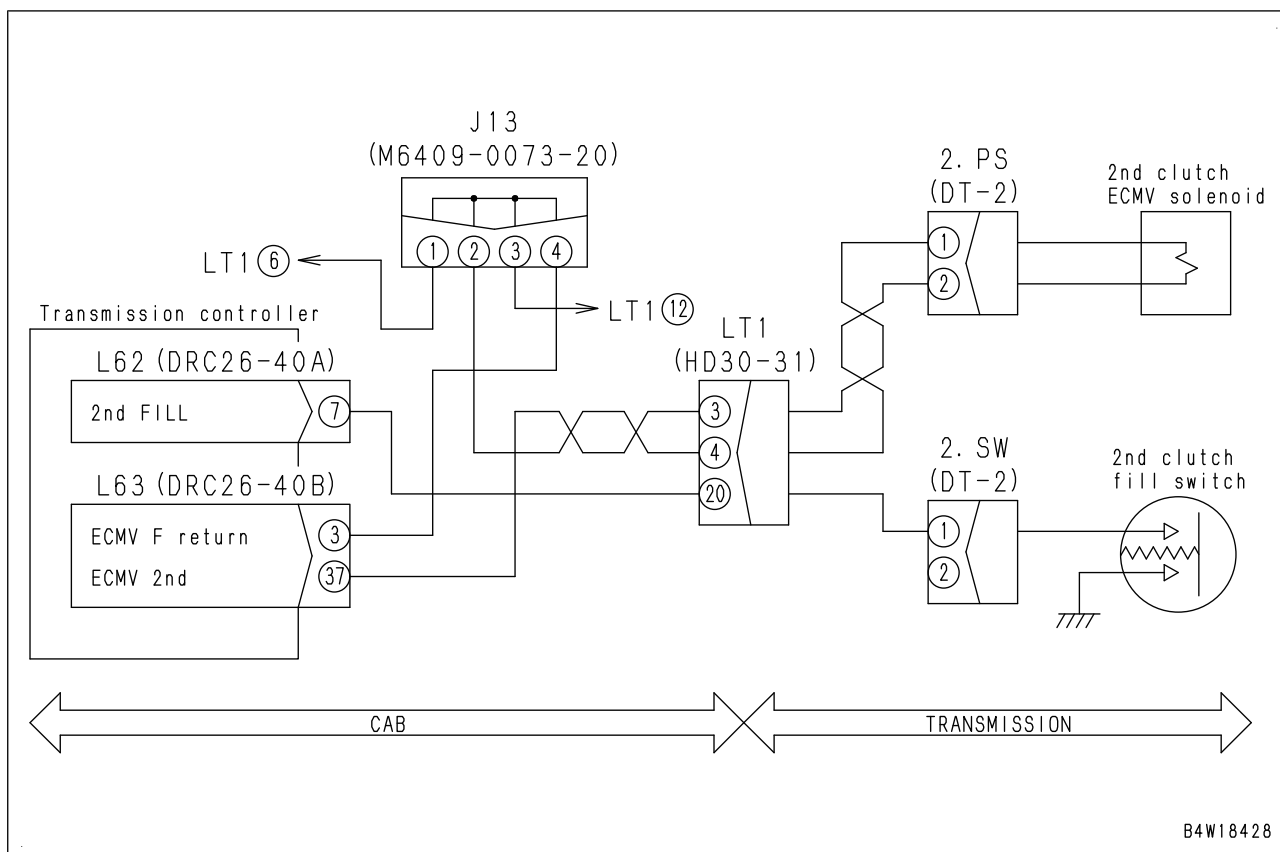
## 40 Troubleshooting

### General information on troubleshooting

Failure code	Failure (Displayed on screen)	Controller	Action level	Category history	Remarks
DAF3KK	Failure code [DAF3KK] Controller Power Source Low (MON)(PAGE 40-508)	MON	–	Electrical system	
DAF8KB	Failure code [DAF8KB] Camera Power Supply Short Circuit(PAGE 40-510)	MON	L03	Electrical system	
DAFDKB	Failure code [DAFDKB] Monitor 12V Power Output Short Circuit(PAGE 40-511)	MON	L01	Electrical system	
DAFGMC	Failure code [DAFGMC] GPS Module Error (PAGE 40-513)	KOMTRAX	–	Electrical system	
DAFLKA	Failure code [DAFLKA] Operating Lamp Open Circuit (MON)(PAGE 40-514)	MON	–	Electrical system	
DAFLKB	Failure code [DAFLKB] Operating Lamp Short Circuit (MON)(PAGE 40-516)	MON	–	Electrical system	
DAFQKR	Failure code [DAFQKR] CAN2 Discon (Monitor)(PAGE 40-518)	KOMTRAX	–	Electrical system	
DAQ0KK	Failure code [DAQ0KK] Controller Power Source Low (T/M)(PAGE 40-519)	TM	L03	Electrical system	
DAQ0KT	Failure code [DAQ0KT] Abnormality of Non-volatile Memory (T/M)(PAGE 40-522)	TM	L01	Electrical system	
DAQ0MC	Failure code [DAQ0MC] T/M Con Error(PAGE 40-523)	TM	–	Electrical system	
DAQ1KA	Failure code [DAQ1KA] Disconnection of Key SW ACC (T/M)(PAGE 40-524)	TM	L03	Electrical system	
DAQ2KK	Failure code [DAQ2KK] Solenoid Power Source Low (T/M)(PAGE 40-526)	TM	L03	Electrical system	
DAQ4KB	Failure code [DAQ4KB] Ground Fault of Sol. Self-Holding Relay(PAGE 40-529)	TM	L01	Electrical system	
DAQ9KQ	Failure code [DAQ9KQ] Inconsistency of Model Selection (T/M)(PAGE 40-531)	TM	L03	Electrical system	
DAQLKA	Failure code [DAQLKA] Operating Lamp Open Circuit (T/M)(PAGE 40-532)	TM	–	Electrical system	
DAQLKB	Failure code [DAQLKB] Operating Lamp Short Circuit (T/M)(PAGE 40-534)	TM	–	Electrical system	
DAQQKR	Failure code [DAQQKR] CAN2 Discon (Transmission Con)(PAGE 40-536)	MON	L03	Electrical system	
DAQRKR	Failure code [DAQRKR] CAN1 Discon (Transmission Con)(PAGE 40-537)	MON	L03	Electrical system	
DAQRMA	Failure code [DAQRMA] Inconsistency of Option Selection (T/M)(PAGE 40-538)	TM	L03	Electrical system	
DAZ9KQ	Failure code [DAZ9KQ] A/C Model Selection Abnormality(PAGE 40-539)	MON	–	Electrical system	
DAZQKR	Failure code [DAZQKR] CAN2 Discon (Aircon ECU)(PAGE 40-540)	MON	L01	Electrical system	
DB2QKR	Failure code [DB2QKR] CAN2 Discon (Engine Con)(PAGE 40-541)	MON	L03	Electrical system	
DB2RKR	Failure code [DB2RKR] CAN1 Discon (Engine Con)(PAGE 40-546)	MON	L03	Electrical system	
DB90KK	Failure code [DB90KK] Drop in BBC Controller Main Power Source(PAGE 40-551)	WRK	L03	Electrical system	
DB90KT	Failure code [DB90KT] Abnormality of Non-volatile Memory (BBC)(PAGE 40-553)	WRK	L01	Electrical system	
DB90MC	Failure code [DB90MC] BBC Error(PAGE 40-554)	WRK	–	Electrical system	
DB91KA	Failure code [DB91KA] Disconnection of Key SW ACC (BBC)(PAGE 40-555)	WRK	L03	Electrical system	
DB92KK	Failure code [DB92KK] Solenoid Power Source Low (BBC)(PAGE 40-557)	WRK	L03	Electrical system	

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"> <li>• Reference</li> <li>1. Turn starting switch to OFF position.</li> <li>2. Insert T-adapter into connector L62.</li> <li>3. Start engine.</li> <li>4. Set transmission cut-off switch to OFF position.</li> <li>5. Set parking brake switch to OFF position.</li> <li>6. Depress brake pedal to prevent machine from starting.</li> <li>7. Set manual/auto shift selector switch to MANUAL.</li> <li>8. Set directional (FNR) lever or R.H. directional selector (FNR) switch to F (forward) or R (reverse) position.</li> </ul>				
		Voltage	Between L62 (female) (7) and ground	<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Gear shift lever: 2nd</td> <td style="width: 50%;">Max. 1 V</td> </tr> <tr> <td>Gear shift lever: Other than 2nd</td> <td>7 to 9 V</td> </tr> </table>	Gear shift lever: 2nd	Max. 1 V
Gear shift lever: 2nd	Max. 1 V					
Gear shift lever: Other than 2nd	7 to 9 V					

**Circuit diagram related to 2nd clutch ECMV**



## 40 Troubleshooting

Troubleshooting by failure code (Display of code)

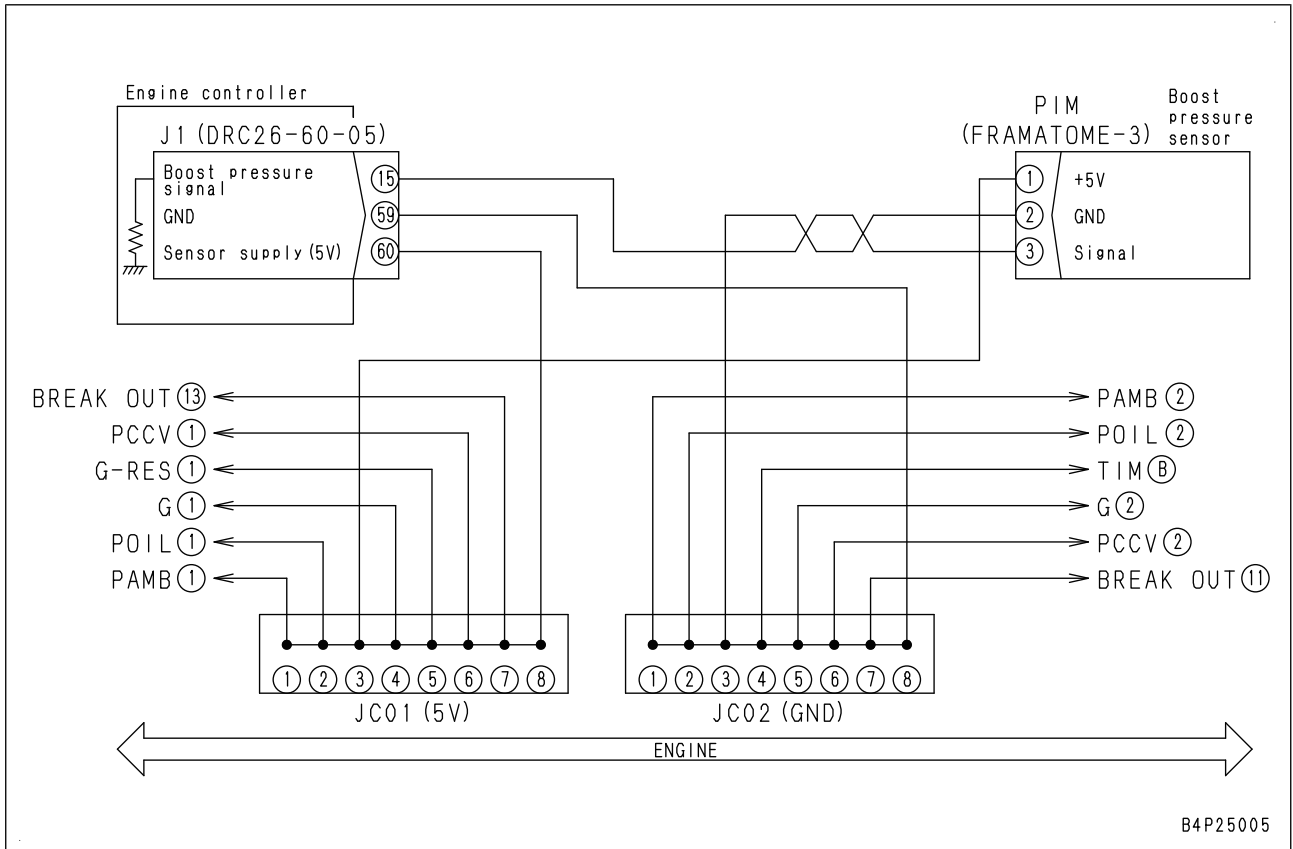
---

### **Failure code [879DKZ] Sunlight Sensor Open or Short Circuit** (WA380\_7-879DKZ-

441-A-Z0-A)

See "Failure code [879DKZ] Sunlight Sensor Open or Short Circuit" in chapter 80 of "Others".

Circuit diagram related to charge pressure sensor



## 40 Troubleshooting

Troubleshooting by failure code (Display of code)

### Failure code [CA222] Ambient Press Sensor Low Error (PC400-CA222-400-A-Z0-A)

Action level	Failure code	Failure	Ambient Pressure Sensor Low Error (Engine controller system)
L03	CA222		
Detail of failure	<ul style="list-style-type: none"> <li>Low voltage occurs in signal circuit of ambient pressure sensor.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Sets ambient pressure to fixed value (52.44 kPa {0.53 kg/cm<sup>2</sup>}) and runs engine.</li> <li>Closes EGR valve and opens KVGT fully.</li> <li>Limits engine output and allows engine to run.</li> <li>Stops KDPF regeneration control.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Engine output reduces.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Signal voltage from ambient pressure sensor can be checked with monitoring function. (Code: 37401 (V))</li> <li>Ambient pressure sensed by ambient pressure sensor can be checked with monitoring function. (Code: 37400 (kPa))</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> <li>Since female connector alone is provided for "socket" used for troubleshooting of this sensor, it is not usable for check of open circuit in wiring harness and voltage at sensor connector (not designed as T-adaptor).</li> <li>This failure code appears if sensor connector is disconnected.</li> </ul>		

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.			
2	Defective ambient pressure sensor power supply system	If failure code [CA187] or [CA227] is also displayed, perform troubleshooting for it first. 1. Turn starting switch to OFF position. 2. Disconnect connector PAMB, and connect T-adaptor to female side. 3. Turn starting switch to ON position.			
		Voltage	Between PAMB (female) (1) and (2)	Power supply input	4.75 to 5.25 V
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors PAMB and J1, and connect T-adaptor to either female side.			
		Resistance	Between J1 (female) (16) and (59), or between PAMB (female) (3) and (2)	Min. 1 MΩ	
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors PAMB and J1, and connect T-adaptor to either female side.			
		Resistance	Between ground and J1 (female) (16) or PAMB (female) (3)	Min. 1 MΩ	
5	Open circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors PAMB and J1, and connect T-adaptor to female side of connector J1.			
		Resistance	Between J1 (female) (16) and PAMB (female) (3)	Max. 1 Ω	
			Between J1 (female) (59) and PAMB (female) (2)	Max. 1 Ω	
		Between J1 (female) (60) and PAMB (female) (1)	Max. 1 Ω		

**Failure code [CA351] Injectors Drive Circuit Error** *(PC400-CA351-400-A-Z0-A)*

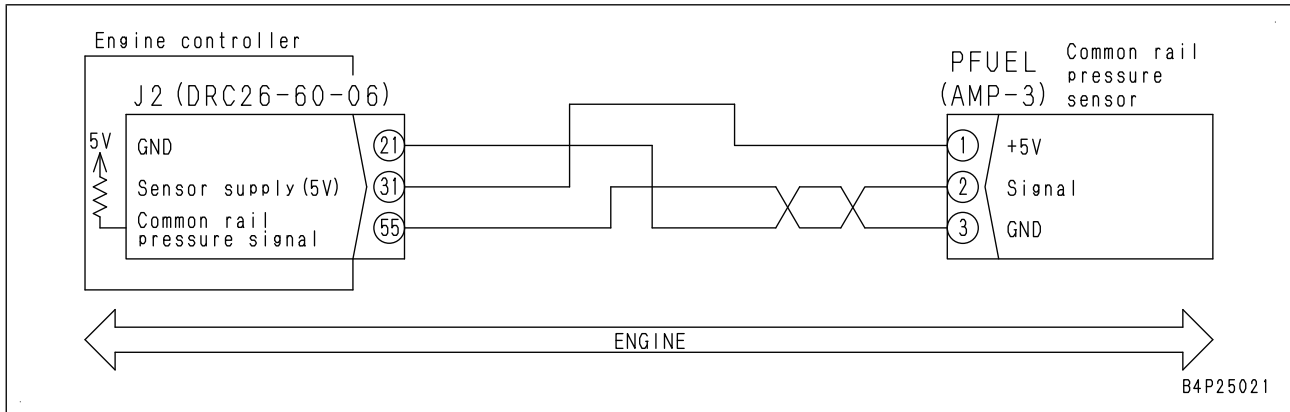
Action level	Failure code	Failure	Injectors Drive Circuit Error (Engine controller system)
L03	CA351		
Detail of failure	<ul style="list-style-type: none"> <li>• Injector drive circuit is defective.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>• Limits engine output (limits common rail pressure) and allows engine to run.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>• Engine output lowers.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>• Method of reproducing failure code: Start engine.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defect in related system	Check failure code (injector system failure code) that is displayed at the same time. If another code is displayed, perform troubleshooting for it.
2	Defective engine controller system	Perform troubleshooting for failure code [CA441].

# 40 Troubleshooting

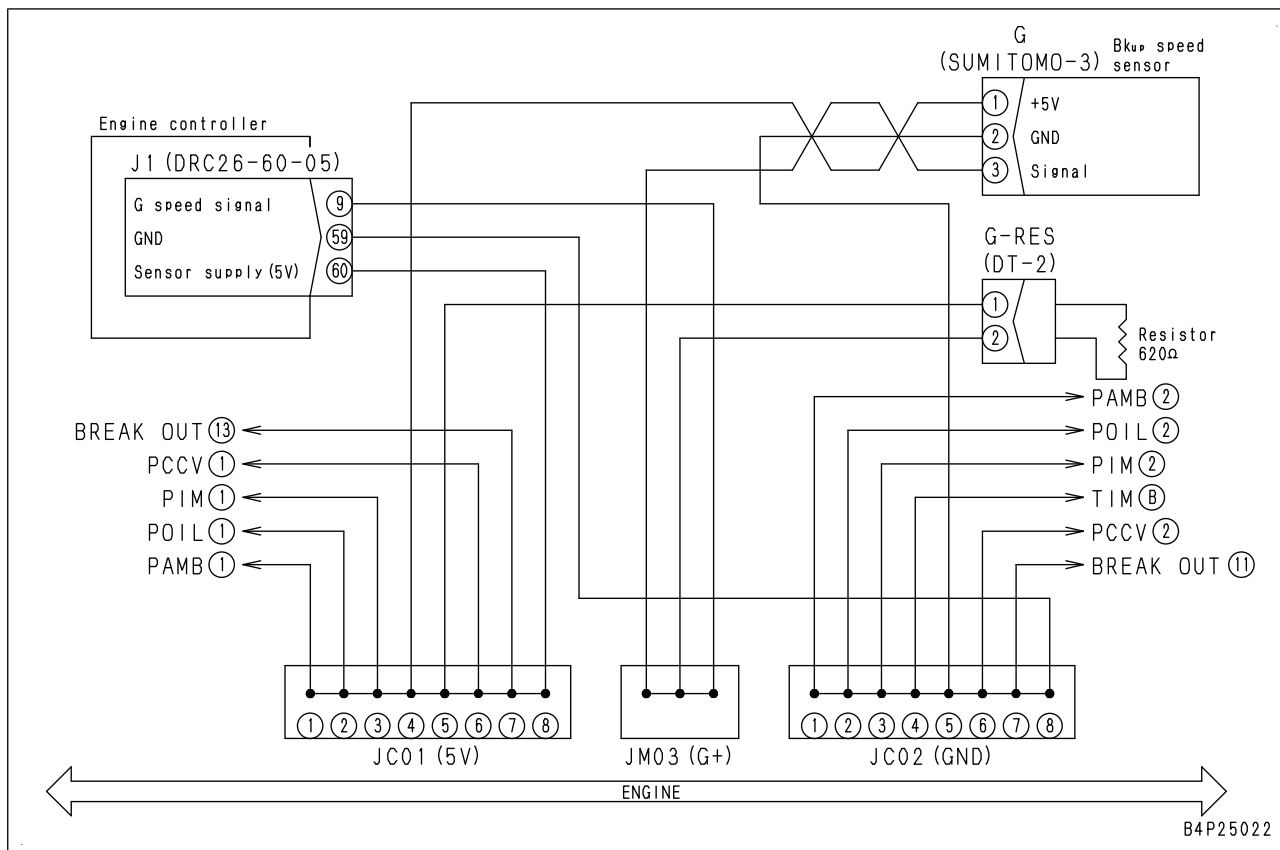
## Troubleshooting by failure code (Display of code)

### Circuit diagram related to common rail pressure sensor



No.	Cause	Procedure, measuring location, criteria and remarks		
8	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J1, G, and G-RES, and connect T-adapter to female side of J1 or G.		
		Resistance	Between J1 (female) (60) and (9), or between G (female) (1) and (3)	Min. 1 MΩ
9	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and G and connect T-adapter to either female side.		
		Resistance	Between J1 (female) (9) or G (female) (3) and ground	Min. 1 MΩ
10	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors G and G-RES, and connect T-adapter to female side of G. 3. Turn starting switch to ON position.		
		Voltage	Between G (female) (3) and ground	Max. 1 V
11	Defective engine Bkup speed sensor	If no problem is found by above checks, engine Bkup speed sensor may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		
12	Defective engine controller	If no abnormality is found by above diagnosis, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

**Circuit diagram related to engine Bkup speed sensor**



## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

	<p>★ Time required for the manual stationary regeneration depends on the accumulated soot in KCSF, however, it is estimated as follows.</p> <ul style="list-style-type: none"> <li>• If soot accumulation is level 4: approximately 40 minutes to 1 hour</li> <li>• If soot accumulation is level 5: approximately 1 to 2 hours</li> <li>• If soot accumulation is level 6 or 7: approximately 1 to 3 hours</li> <li>• If soot accumulation is level 8: The manual stationary regeneration can not be performed.</li> </ul> <p>Factors for excessive soot accumulation</p> <ol style="list-style-type: none"> <li>1. Engine runs with light loads and cannot keep exhaust gas temperature high enough to burn soot in KDPF. <ul style="list-style-type: none"> <li>• If temperature of the gas entered into after-treatment system (KDPF) is low, a large amount of soot may accumulate.</li> <li>• To avoid the soot accumulation in KDPF, the engine must run under high load.</li> </ul> </li> <li>2. Engine has failure that leads to excessive black smoke.</li> <li>3. "Regeneration Disable" is set from the screen monitor. <ul style="list-style-type: none"> <li>• Even if the soot is accumulated, regeneration does not start automatically. You must move the machine to a safe place to release the "Regeneration Disable", and perform the regeneration.</li> </ul> </li> </ol> <p>★ Releasing method of "Regeneration Disable"  Select the "Cancel of Regeneration Disable" from the "KDPF Regeneration" screen and execute.  (For details, see Operation and Maintenance Manual, "Operation", "Handling KDPF", "Operation procedure of KDPF Regeneration Disable".)</p> <p>★ If another failure code is displayed (including when manual stationary regeneration is in progress), perform troubleshooting for it first.</p> <p>★ If failure code [CA1922] has been displayed originally, it changes to [CA1921] during troubleshooting process of [CA1922]. In such case, refer to failure code [CA1922].</p> <ul style="list-style-type: none"> <li>• Method of reproducing failure code: Turn starting switch to the ON position.</li> </ul>
--	---

No.	Cause	Procedure, measuring location, criteria and remarks
1	Excessive KDPF (KCSF) soot accumulation level	<ol style="list-style-type: none"> <li>1. Check if the regeneration stop button is pressed down from the machine monitor. <ul style="list-style-type: none"> <li>★ If the regeneration stop button is pressed down, release it.</li> </ul> </li> <li>2. Start the engine.</li> <li>3. Make sure that machine is in safe condition.</li> <li>4. Perform manual stationary regeneration from user mode. <ul style="list-style-type: none"> <li>★ When the manual stationary regeneration is finished correctly, the repair is completed.</li> <li>★ If the regeneration does not complete within 3 hours, perform the troubleshooting of [CA2639].</li> <li>★ Check that failure code is not displayed after manual stationary regeneration is completed.</li> <li>★ If failure code [CA1922] or [CA2639] is displayed after manual stationary regeneration is completed, proceed to checks on cause 2.</li> </ul> </li> </ol>
2	Unusual exhaust gas color	<ul style="list-style-type: none"> <li>★ If failure code [CA1921], or [CA2639] is displayed after manual stationary regeneration is completed, perform following.</li> <li>★ For check of the exhaust gas color, see "30 Testing and adjusting", "Testing exhaust gas color".</li> <li>★ When checking the exhaust gas color, perform the "Regeneration Disable" from the machine monitor.</li> </ul> <ol style="list-style-type: none"> <li>1. Rapidly accelerate engine from low idle to high idle 2 times, and then keep engine running at high idle for 5 seconds. <ul style="list-style-type: none"> <li>• If excessive black smoke is exhausted when accelerating engine or running it at high idle, perform troubleshooting for "S-9 KDPF gets clogged in a short time".</li> </ul> </li> </ol>

**Failure code [CA1993] KDPF Delta Pressure Low Error** (WA500\_7-CA1993-400-A-Z0-A)

Action level	Failure code	Failure	KDPF Delta Pressure Low Error (Engine controller system)
L03	CA1993		
Detail of failure	<ul style="list-style-type: none"> <li>Signal voltage from KDPF delta pressure sensor is lower than threshold value.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Closes EGR valve and open KVGT fully.</li> <li>Limits engine output and allows engine to run.</li> <li>Stops KDPF regeneration control.</li> </ul> <p>★ You can cancel above measure by "turning starting switch to OFF position once, then turning starting switch to ON position" after failure code is generated.</p>		
Problem on machine	<ul style="list-style-type: none"> <li>Engine output decreases.</li> </ul>		
Related information	<p><b>⚠ Since KDPF is heated to 500°C or above, take care not to get burn injury.</b></p> <ul style="list-style-type: none"> <li>KDPF delta pressure sensor and KDPF outlet pressure sensor are integrated.</li> <li>Signal voltage from KDPF delta pressure sensor can be checked with monitoring function. (Code: 47101 (V))</li> <li>Delta pressure sensed by KDPF delta pressure sensor can be checked with monitoring function. (Code: 47100 (kPa))</li> <li>Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C))</li> <li>Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C))</li> <li>Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C))</li> <li>As to procedure for accessing KDPF delta pressure sensor, wiring harness, and tube, see 50 Disassembly and assembly, "Removal and installation of KDPF assembly" and "Disassembly and assembly of KDPF".</li> <li>Engine controller stops approximately 30 seconds after starting switch is turned to OFF position. So when you restart engine, wait 1 minute minimum before turning starting switch to ON position again.</li> </ul>		
Machine operation for clearing failure code	<ul style="list-style-type: none"> <li>When this failure code appears, perform troubleshooting according to following work flow.</li> </ul> <p>A. Identification of cause and repair  ↓  B. Machine operation for clearing failure code</p> <p>★ This failure code does not disappear by simply turning starting switch to ON position from OFF position after repair. You must perform machine operation for clearing failure code after repair trouble.</p>		

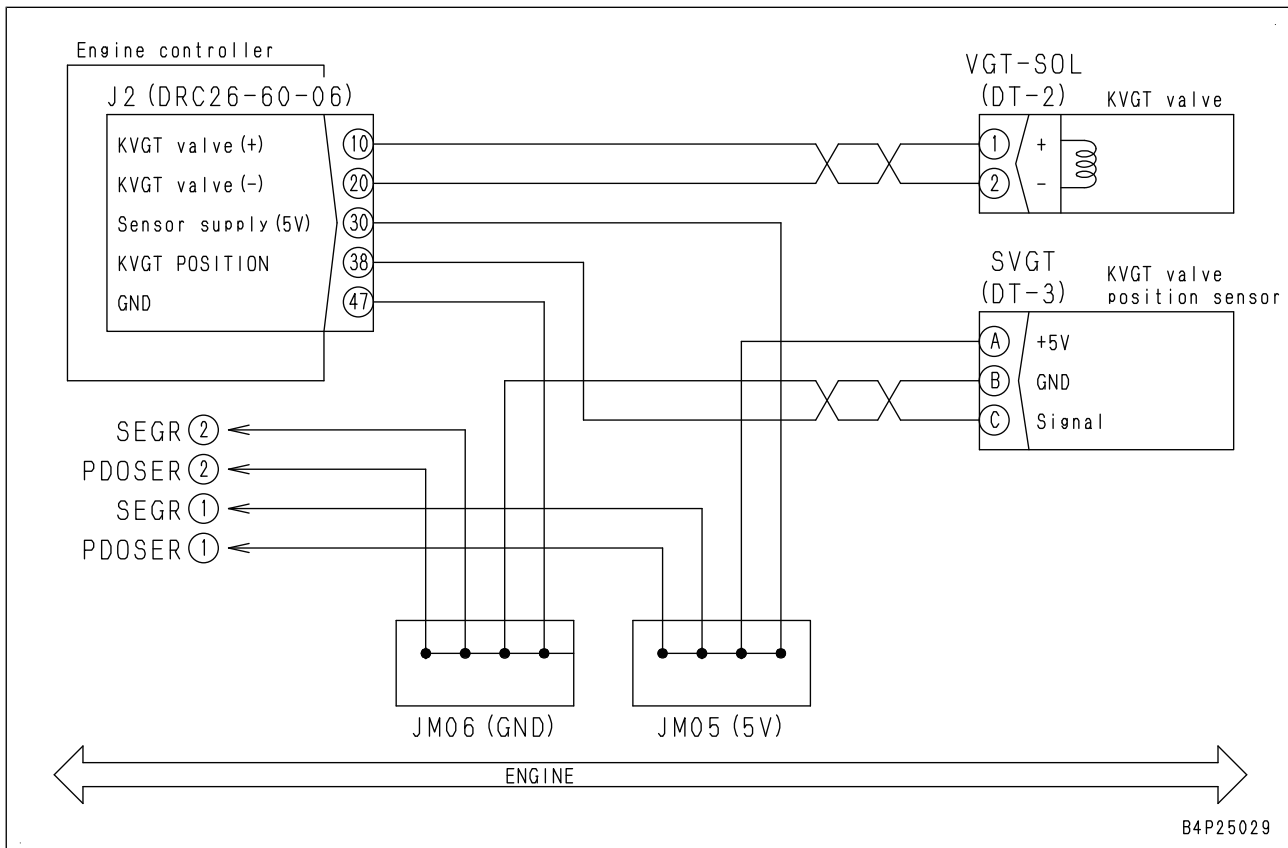
A. Identification of cause and repair		
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDPF delta pressure sensor	If failure code [CA1879], [CA1881], or [CA1883] is displayed, perform troubleshooting for [CA1879], [CA1881], or [CA1883] first.
2	KCSF abnormality 1	<ol style="list-style-type: none"> <li>Turn starting switch to OFF position once, and then turn it to ON position.</li> <li>Check whether failure codes other than [CA1993] are generated.</li> <li>Start engine and accelerate it suddenly from low idle to full speed 2 times, then run it at high idle for 5 seconds. During above operation, check exhaust gas color at exhaust pipe when engine accelerates suddenly and runs at high idle.</li> <li>If black smoke is exhausted from exhaust pipe in above step 3, KCSF is abnormal. Check whether KCSF is installed. If yes, check KCSF for damage and contamination by foreign substances, and fix trouble as needed.</li> </ol> <p>★ If black smoke is not exhausted, proceed to checks on causes 3 and after.</p>

## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

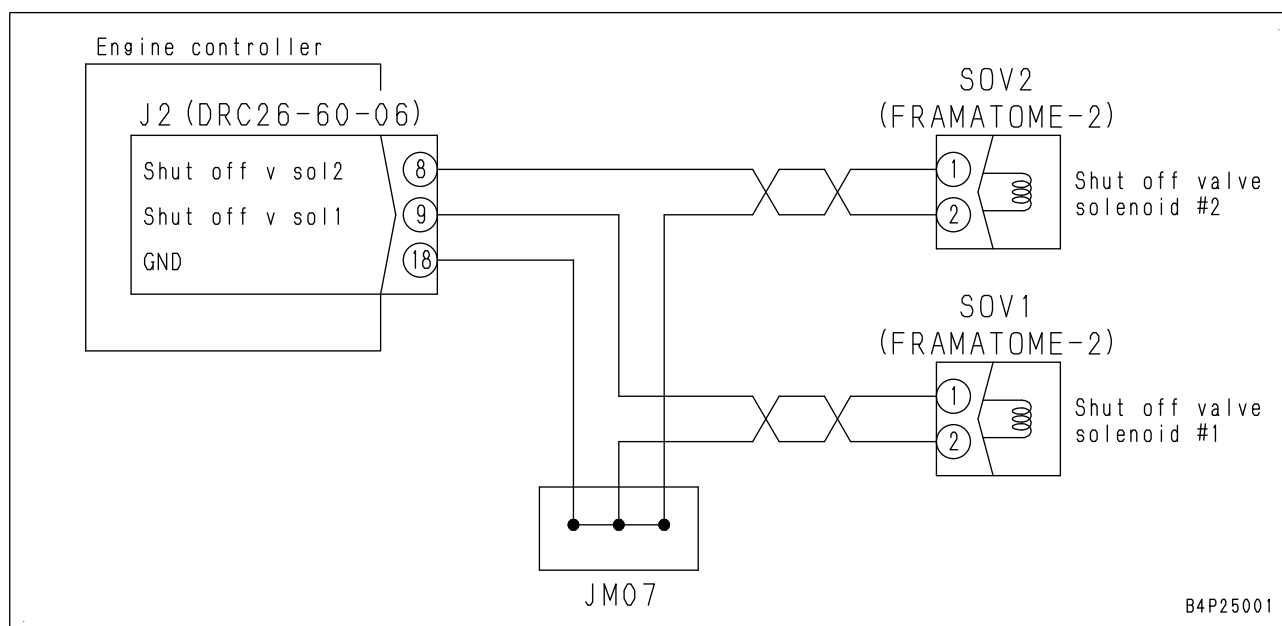
No.	Cause	Procedure, measuring location, criteria and remarks	
6	Defective KVGT position sensor	<p>★ If no failure is found by checks on causes 1 to 5 and check result of cause 6 is abnormal, sensor is defective.</p> <p>1. Turn starting switch to OFF position.                      2. Insert T-adaptor into connector J2 or SVGT.                      3. Turn starting switch to ON position.</p>	
		<table border="1"> <tr> <td>Voltage</td> <td>Between J2 (38) and (47), or between SVGT (C) and (B)</td> <td>1.0 to 4.0 V</td> </tr> </table>	Voltage
Voltage	Between J2 (38) and (47), or between SVGT (C) and (B)	1.0 to 4.0 V	
7	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 KVGT solenoid



No.	Cause	Procedure, measuring location, criteria and remarks
7	Defective dosing fuel solenoid valve 2 (drain valve)	1. Turn starting switch to OFF position. 2. Disconnect connectors SOV1 and SOV2. 3. Replace dosing fuel solenoid valve 1 with dosing fuel solenoid valve 2. ★ Do not replace the SOV1 and SOV2 connectors. 4. Turn starting switch to ON position.
		If this failure code changes to [CA1963], the previous dosing fuel solenoid valve 2 (drain valve) is defective. ★ If this failure code appears, perform following checks.
8	Clogging of fuel return tube	Disconnect the fuel return tube and check it for clogging.
9	Defective fuel shut-off valve manifold	Disconnect the fuel system tube and check the fuel connector of fuel shut-off valve manifold for clogging.
10	Defective dosing fuel pressure sensor	1. Turn starting switch to OFF position. 2. Disconnect fuel supply line (2) from fuel doser (1). 3. Turn starting switch to ON position. 4. See "Related information", and display dosing fuel pressure and ambient pressure at the same time.
		If the dosing fuel pressure is clearly different from ambient pressure, the dosing fuel pressure sensor is defective. ★ The dosing fuel pressure must be equal to the ambient pressure.

**Circuit diagram related to dosing fuel solenoid valve**



## 40 Troubleshooting

Troubleshooting by failure code (Display of code)

### Failure code [CA3254] KDOC Outlet Temp High Error 1 (WA470\_7-CA3254-400-A-Z0-A)

Action level	Failure code	Failure	KDOC Outlet Temperature High Error 1 (Engine controller system)
L01	CA3254		
Detail of failure	<ul style="list-style-type: none"> <li>KDOC outlet temperature remains at high level.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>None in particular</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>None in particular</li> </ul>		
General information	<p><b>⚠ Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.</b></p> <ul style="list-style-type: none"> <li>Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V))</li> <li>Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C))</li> <li>Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V))</li> <li>Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C))</li> <li>Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V))</li> <li>Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C))</li> <li>KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when engine is at idle (KDPF regeneration is not executed) are approximately 100 to 250°C, and difference between these temperatures is approximately 10°C. (KDOC inlet temperature &gt; KDOC outlet temperature &gt; KDPF outlet temperature)</li> <li>Misfire of cylinder can induce following phenomena.             <ol style="list-style-type: none"> <li>Combustion is impaired causing high exhaust temperature.</li> <li>Cylinders other than disabled cylinder may increase their fuel injection in order to compensate for torque drop, causing high exhaust temperature.</li> </ol> </li> <li>As to procedure for accessing KDPF temperature sensor, see 50 Disassembly and assembly, "Removal and installation of KDPF assembly" and "Disassembly and assembly of KDPF assembly".</li> <li>Engine controller stops approximately 30 seconds after starting switch is turned to OFF position. So when you restart engine, wait 1 minute and more before turning starting switch to ON position again.</li> </ul>		
Machine operation for clearing failure code	<ul style="list-style-type: none"> <li>When this failure code appears, perform troubleshooting according to the following work flow.</li> </ul> <p>A. Identification of cause and repair</p> <p>↓</p> <p>B. Machine operation for clearing failure code</p> <p>★ This failure code is not cleared by simply turning starting switch to ON position from OFF position after repair. You must perform machine operation for clearing failure code after completing repair.</p>		

#### A. Identification of cause and repair

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC outlet temperature sensor	If failure code [CA3316], [CA3317], or [CA3318] appears, perform troubleshooting for [CA3316], [CA3317] or [CA3318] first.
2	Defective fuel doser solenoid valve 1	If failure code [CA1925] or [CA1963] is also displayed, perform troubleshooting for [CA1925] or [CA1963] first.
3	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 and repair as needed.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

## Failure code [CA3315] KDOC Inlet Temp Sens In Range Error (WA470\_7-CA3315-400-

A-Z0-A)

Action level	Failure code	Failure	KDOC Inlet Temperature Sensor In Range Error (Engine controller system)
L03	CA3315		
Detail of failure	<ul style="list-style-type: none"> <li>Difference between temperature sensed by KDOC inlet temperature sensor and that by KDOC outlet temperature sensor differs from expected value. (Signal voltage is within input range.)</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Uses KDOC outlet temperature for KDOC inlet temperature to run engine. (If failure is detected in KDOC outlet temperature sensor as well, controller sets KDOC inlet temperature to default value (250°C) and runs engine.)</li> <li>Closes EGR valve and opens KVGT fully.</li> <li>Limits engine output and allows engine to run.</li> <li>Stops KDPF regeneration control.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Engine output reduces.</li> </ul>		
General information	<p><b>⚠ Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.</b></p> <ul style="list-style-type: none"> <li>Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V))</li> <li>Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C))</li> <li>Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V))</li> <li>Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C))</li> <li>Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V))</li> <li>Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C))</li> <li>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").</li> <li>As to procedure for accessing KDPF temperature sensor, see 50 Disassembly and assembly, "Removal and installation of KDPF assembly" and "Disassembly and assembly of KDPF assembly".</li> <li>Engine controller stops approximately 30 seconds after starting switch is turned to OFF position. So when you restart engine, wait one minute and more before turning starting switch to ON position again.</li> </ul>		
Machine operation for clearing failure code	<ul style="list-style-type: none"> <li>When this failure code appears, perform troubleshooting according to the following work flow.</li> </ul> <p>A. Identification of cause and repair  ↓  B. Machine operation for clearing failure code</p> <ul style="list-style-type: none"> <li>★ This failure code is not cleared by simply turning starting switch to ON position from OFF position after repair. You must perform machine operation for clearing failure code after completing repair.</li> <li>★ In machine operation for clearing failure code, "dummy temperature sensor: 799T-601-4680" is used.</li> </ul>		

### A. Identification of cause and repair

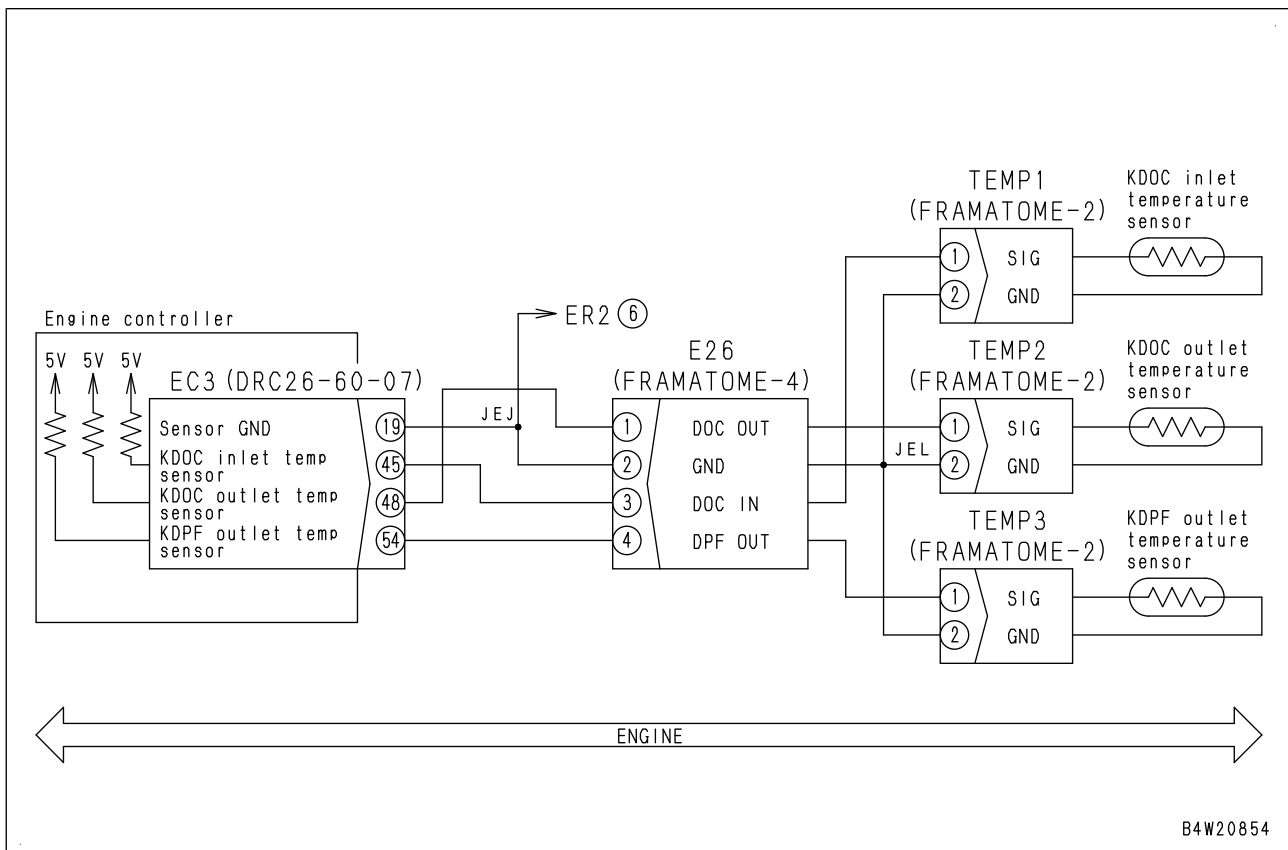
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective KDOC inlet temperature sensor	If failure code [CA3313] or [CA3314] is displayed, perform troubleshooting for it first.
2	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it and repair as needed.

## 40 Troubleshooting

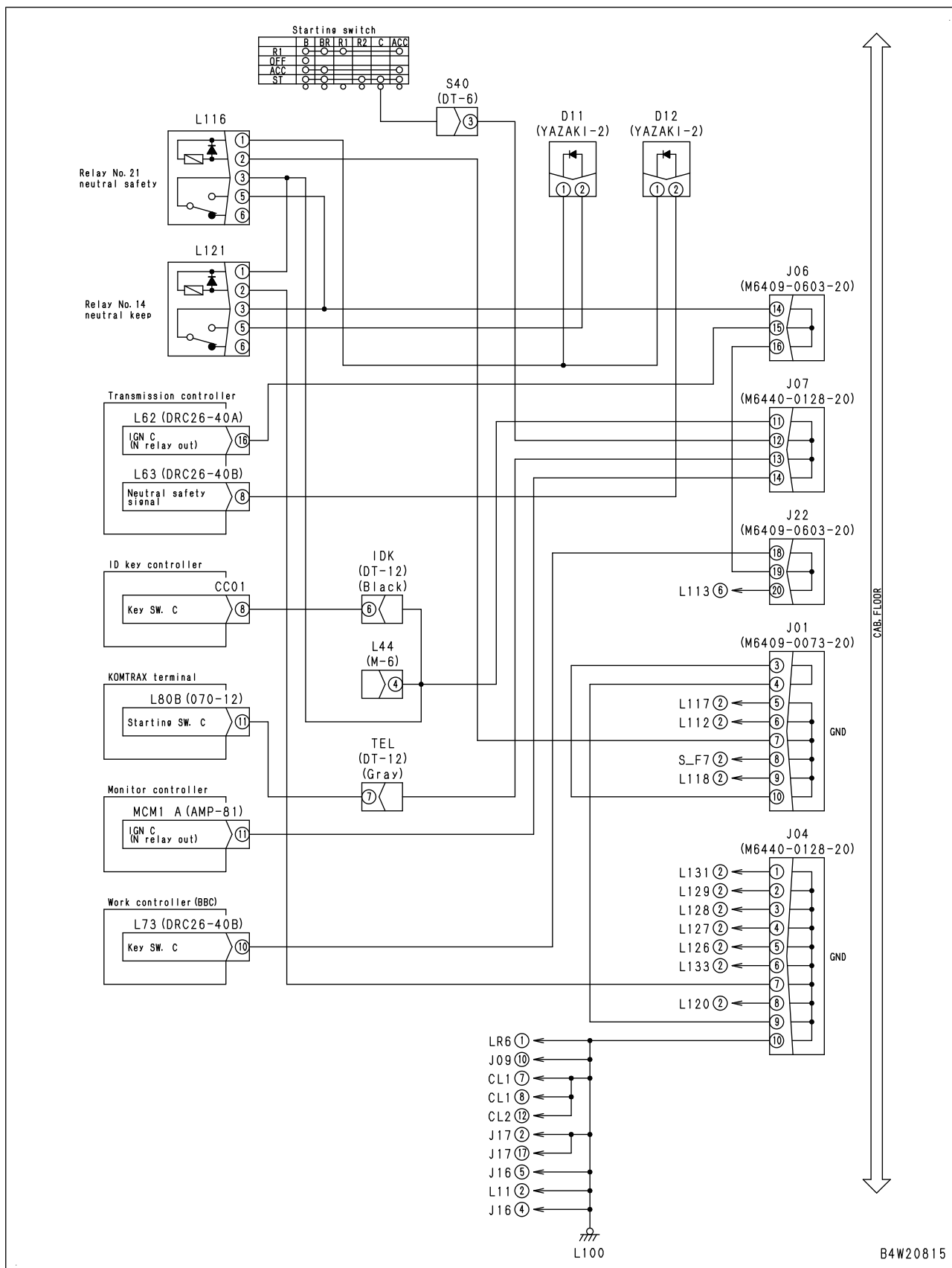
### Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
7	Short circuit in wiring harness	<ul style="list-style-type: none"> <li>★ If no failure is found by check on cause 4, this check is not required.</li> <li>1. Turn starting switch to OFF position.</li> <li>2. Disconnect connectors EC3 and E26, and connect T-adaptor to female side of EC3.</li> </ul>
		<ul style="list-style-type: none"> <li>★ Check by using multimeter in continuity mode.</li> </ul>
	Continuity	Between EC3 (female) (54) and each pin other than pin (54)
		No continuity (No sound is heard)
8	Defective engine controller	<ul style="list-style-type: none"> <li>1. Turn starting switch to ON position.</li> <li>2. If this failure code appears, perform procedure for &lt;How to clear failure code&gt; in "Related information".</li> </ul>
		If this failure code is still displayed 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 KDOC and KDPF temperature sensors



Circuit diagram related to neutral safety relay



## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

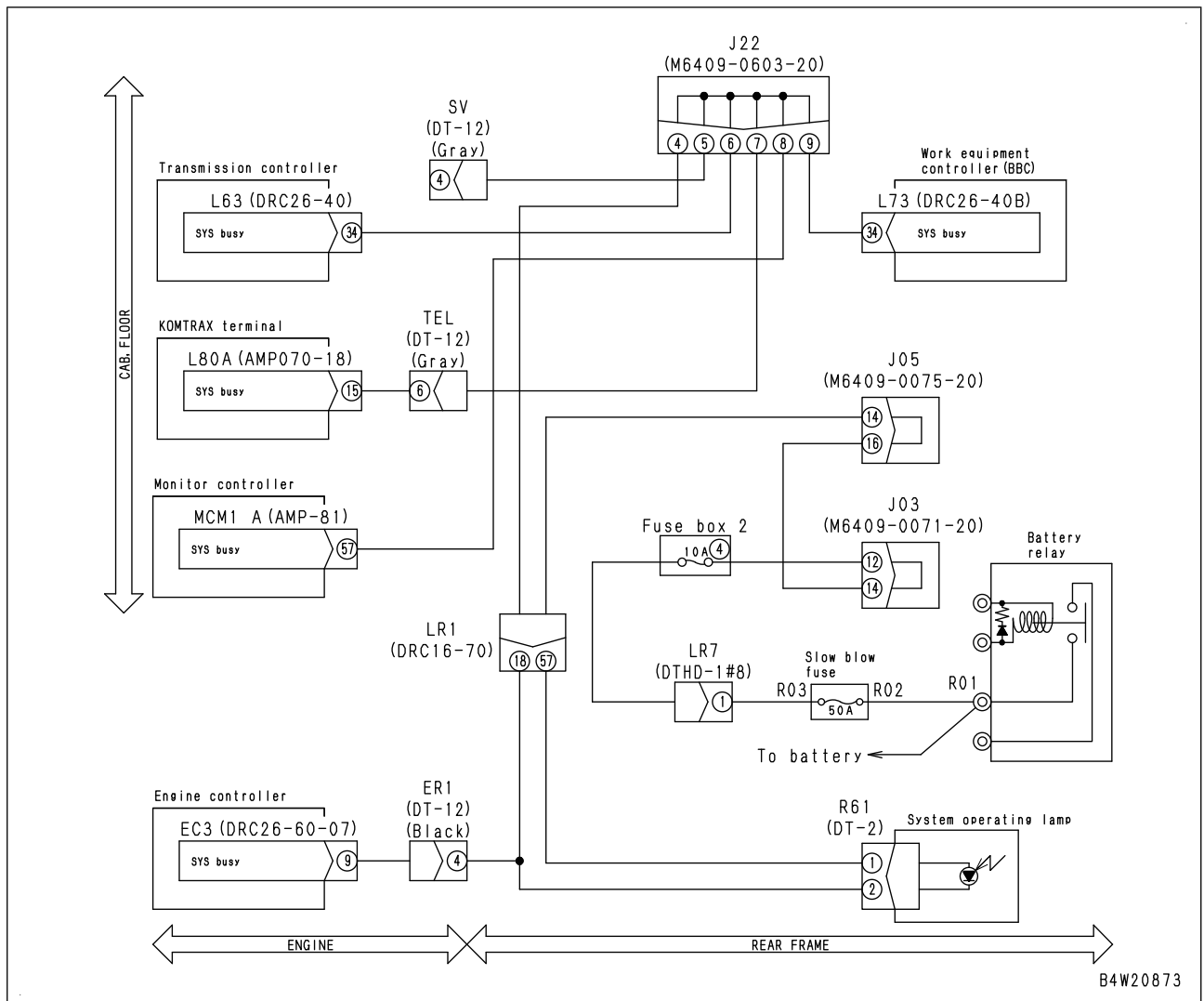
#### Failure code [D5ZHL6] Disconnection of Key SW C

(WA470\_7-D5ZHL6-400-A-Z0-A)

Action level	Failure code	Failure	Disconnection of Key Switch C (Machine monitor system)
L01	D5ZHL6		
Detail of failure	<ul style="list-style-type: none"> <li>While engine speed is 500 rpm or higher and R signal voltage of alternator exceeds 8 V, key switch C terminal signal received by monitor controller remains "OFF".</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>None in particular</li> <li>Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>None in particular</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Method of reproducing failure code: Start engine.</li> <li>Input condition (ON/OFF) to machine monitor from starting switch terminal C can be checked with monitoring function (Code: 04508 Engine Starter).</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	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 S40, and insert T-adapters into each female side.		
		Resistance	Between S40 (female) (3) and MCM1 A (female) (11)	Max. 1 Ω
2	Defective monitor controller	If no failure is found by above checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed). <ul style="list-style-type: none"> <li>Reference</li> </ul> 1. Turn starting switch to OFF position. 2. Disconnect connector MCM1 A, and connect T-adapter to female side. 3. Turn starting switch to START position.		
		Voltage	Between MCM1 A (female) (11) and ground	20 to 30 V

Circuit diagram related to system operating lamp



## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

#### Failure code [DAZQKR] CAN2 Discon (Aircon ECU) (WA380\_7-DAZQKR-400-A-Z0-A)

Action level	Failure code	Failure	CAN2 Disconnection (Air Conditioner ECU) (Detected by monitor controller) (Machine monitor system)
L01	DAZQKR		
Detail of failure	<ul style="list-style-type: none"> <li>Monitor controller does not recognize air conditioner controller over CAN communication-2 line (KOMNET/c).</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Holds information at time of occurrence of failure.</li> <li>If cause of failure disappears, machine becomes normal by itself.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Failure codes to be generate by air conditioner controller are not displayed.</li> <li>Monitoring data for which air conditioner controller is responsible are not updated.</li> <li>Air conditioner cannot be operated (air does not blow out).</li> <li>Display of air conditioner operation screen of machine monitor is not correct.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> <li>Start of CAN communication is recognized by each controller when ACC signal of starting switch is received.</li> <li>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).</li> <li>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.</li> <li>Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter.</li> </ul> <p>★ If fuse-15 in fuse box2 is blown, machine monitor displays nothing..</p>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective power supply to air conditioner controller	★ Perform troubleshooting shown in Chapter 80 "Troubleshooting of power supply system".
2	Defective CAN-2 communication line	Perform checks on causes 4 to 9 in troubleshooting for failure code [DB2QKR].
3	Defective air conditioner controller	If no failure is found by above checks, air conditioner controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)
4	Defective monitor controller	If no failure is found by above checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

**Failure code [DB99KQ] Inconsistency of Model Selection (BBC)** (WA380\_7-

DB99KQ-400-A-Z0-A)

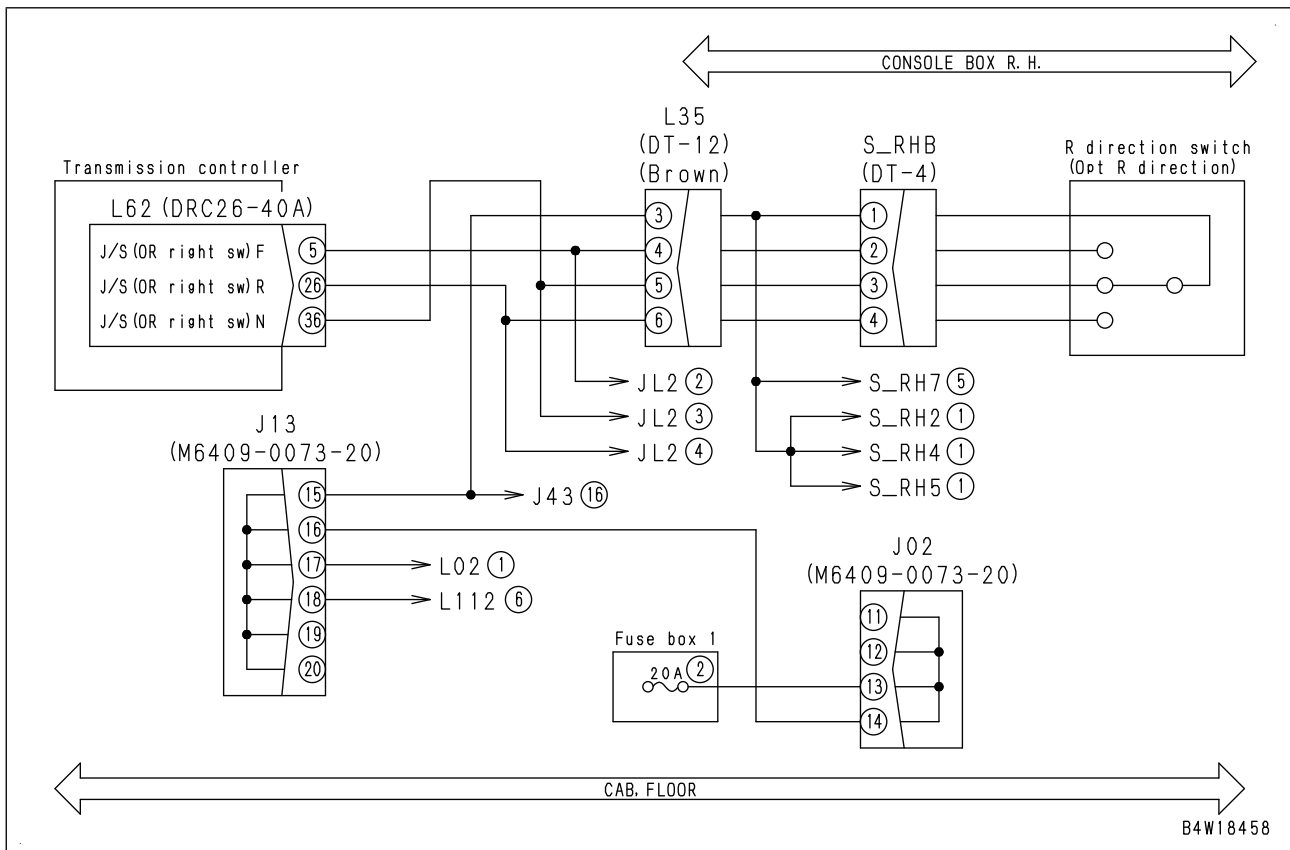
Action level	Failure code	Failure	Inconsistency of Model Selection (Bucket Boom Controller) (Work equipment controller system)
L03	DB99KQ		
Detail of failure	<ul style="list-style-type: none"> <li>Model selection signal sent from monitor controller when starting switch is turned ON differs from the model setting stored in work equipment controller.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Continues to operate taking it that machine model is same as that before generation of this failure code.</li> <li>Lights up centralized warning lamp and sounds alarm buzzer.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Work equipment may not operate normally.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Perform initial setting and initial adjustment similar to those required when the work equipment controller is replaced.</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective model setting by monitor controller	★ Model setting of monitor controller is probably incorrect. After replacing the monitor controller or work equipment controller, set the model correctly. For details, see Testing and Adjusting, "Special functions of machine monitor".
2	Installation of wrong work equipment controller	Wrong work equipment controller may be installed. Check part No. and install correct work equipment controller.
3	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.)
4	Defective monitor controller	If no failure is found by above checks, monitor controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)

# 40 Troubleshooting

## Troubleshooting by failure code (Display of code)

### Circuit diagram related to R.H. directional selector (FNR) switch



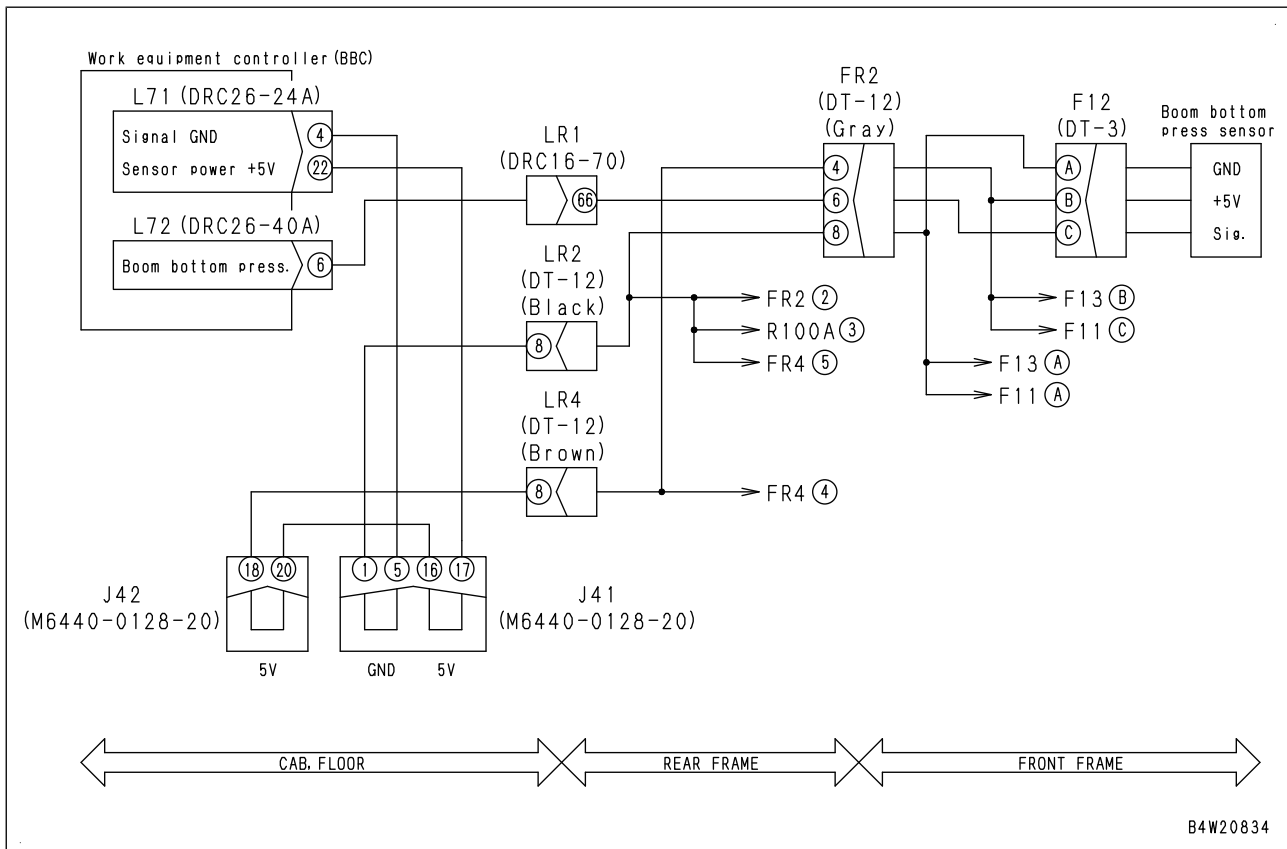
No.	Cause	Procedure, measuring location, criteria and remarks			
4	Defective transmission controller	If no failure is found in above checks, transmission controller is defective. ★ Reference 1. Turn starting switch OFF. 2. Insert T-adaptor into connector L61. 3. Turn starting switch ON. 4. Operate shift lever to troubleshoot.			
		Voltage	Between L61 (23) and ground	Shift range: 1st	20 to 30 V
				Shift range: Other than 1st	Max. 1 V
			Between L61 (17) and ground	Shift range: 2nd	20 to 30 V
				Shift range: Other than 2nd	Max. 1 V
			Between L61 (11) and ground	Shift range: 3rd	20 to 30 V
				Shift range: Other than 3rd	Max. 1 V
			Between L61 (5) and ground	Shift range: 4th	20 to 30 V
				Shift range: Other than 4th	Max. 1 V

## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks			
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L71, L72 and F12, and connect T-adapter to either female side.			
		Resistance	Between L72 (female) (6) and L71 (female) (4) or between F12 (female) (A) and (C)	Min. 1 MΩ	
6	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector F12, and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between F12 (female) (C) and ground	Max. 1 V	
7	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.) • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connectors L71 and L72. 3. Start engine and raise boom.			
		Voltage	Between L71 (22) and ground	5.0 to 5.2 V	
			Between L72 (6) and ground	Continuous	0.50 to 4.40 V
				Boom: At Neutral	0.50 to 0.90 V
				Boom cylinder bottom: Hydraulic relief	2.80 to 3.20 V

### Circuit diagram related to boom cylinder bottom pressure sensor



B4W20834

## Failure code [DK55KY] Hot Short of FNR Lever Potentio Circuit (WA380\_7-

DK55KY-400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of FNR Lever Potentiometer Circuit (Transmission controller system)
L01	DK55KY		
Detail of failure	<ul style="list-style-type: none"> <li>Due to hot short circuit in directional (FNR) lever analog signal system, analog signal voltage from directional (FNR) lever is higher than normal range. (Signal voltage from FNR lever potentiometer: Above 3.8 V)</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Judges that the lever position to be determined from analog signal is N (Neutral).</li> <li>Continues to take it that lever position to be determined from analog signal is N (Neutral) until it receives analog signal showing lever position of N (Neutral), even if cause of failure disappears.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>No particular problem occurs, as long as directional (FNR) lever switch is normal.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Analog signal input voltage from directional (FNR) lever can be checked with monitoring function. (Code: 91105 Shift lever Volt)</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective 5 V sensor power supply system	If failure code [DBE5KX] is also displayed, perform troubleshooting for it first.			
		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)	5.0 to 5.2 V	
2	Defective analog signal system of directional (FNR) lever (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L02. 3. Turn starting switch to ON position.			
		If this failure code [DK55KY] is not displayed, analog signal system of directional (FNR) lever is defective. (If this failure code is still displayed, wiring harness or transmission controller is defective.)  ★ Since connector L02 is disconnected, many failure codes appear. Ignore all of displayed failure codes other than this failure code [DK55KY].			
3	Hot short circuit in wiring harness (contact with 24 V circuit)	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) (11) and ground	Max. 1 V	
4	Defective transmission controller	If no failure is found by above checks, transmission controller is defective.			
		<ul style="list-style-type: none"> <li>Reference</li> <li>1. Turn starting switch to OFF position.</li> <li>2. Insert T-adapter into connector L61.</li> <li>3. Turn starting switch to ON position.</li> <li>4. Move directional (FNR) lever to perform troubleshooting.</li> </ul>			
		Voltage	Between L61 (22) and ground	Continuous	5.0 to 5.2 V
			Between L61 (8) and ground	Directional (FNR) lever position: F (forward)	1.2 to 1.8 V
Directional (FNR) lever position: N (neutral)	1.7 to 3.3 V				
		Directional (FNR) lever position: R (reverse)	3.2 to 3.8 V		

## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks			
3	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L71, L72, and L29A, and connect T-adapters to each female side.			
		Voltage	Between L71 (female) (20) and ground	Max. 1 V	
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L71 and L29A, and connect T-adapter to female side of L71.			
		Continuity	Between L71 (female) (20) and each pin other than L71 (female) (20)	No continuity (No sound is heard)	
5	Defective work equipment controller	If no failure is found by above checks, work equipment controller is defective. • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connectors L71 and L72. 3. Set work equipment lock switch to LOCK position. 4. Turn starting switch to ON position. 5. Operate bucket lever to perform troubleshooting.			
		Voltage	Between L72 (1) and L71 (4)	Bucket lever: Continuous	5.0 to 5.2 V
			Between L71 (20) and (4)	Bucket lever: NEUTRAL	2.38 to 2.62 V
				Bucket lever: TILT (just before the detent position)	3.38 to 4.04 V
				Bucket lever: TILT (at detent position)	3.90 to 4.40 V
				Bucket lever: Full DUMP	0.60 to 1.10 V

## Failure code [DK5EKY] Hot Short of 3rd Lever Potentio (Sub) (WA470\_7-DK5EKY-

400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of 3rd Lever Potentiometer (Sub) (Work equipment controller system)
L03	DK5EKY		
Detail of failure	<ul style="list-style-type: none"> <li>Controller determines that 3rd (attachment) lever potentiometer (sub: B line) circuit has hot short because signal voltage from 3rd (attachment) lever potentiometer (sub: B line) is higher than normal range. (Signal voltage from 3rd (attachment) lever potentiometer (sub: B line): Min. 4.7 V)</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Controls attachment by using signals from 3rd (attachment) lever potentiometer (main: A line) if it is normal. However, in this case, decreases work equipment speed 30 %.</li> <li>Lights up centralized warning lamp and sounds alarm buzzer.</li> <li>Even if cause of failure disappears, machine does not become normal until 3rd (attachment) lever is set in NEUTRAL.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Work equipment speed decreases 30 %.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>This failure code does not appear on a machine that is not equipped with 3rd valve (attachment). (If this failure code is displayed on the machine, select "None" for 3rd valve (attachment) setting on option setting screen of machine monitor.)</li> <li>Input voltage from 3rd (attachment) lever potentiometer (main: A line) can be checked with monitoring function. (Code: 42006 3rd Lever Volt(Main))</li> <li>Input voltage from 3rd (attachment) lever potentiometer (sub: B line) can be checked with monitoring function. (Code: 42007 3rd Lever Volt(Sub))</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

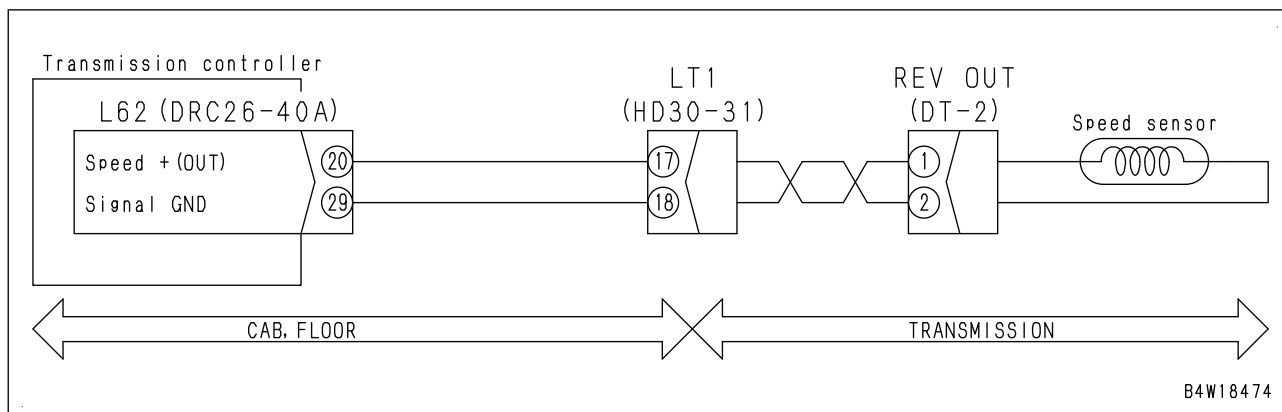
No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective 5 V sensor power supply system	If failure code [DB95KX] is also displayed, perform troubleshooting for it first.		
		1. Turn starting switch to OFF position. 2. Disconnect connector L30, and connect T-adapter to female side. 3. Turn starting switch to ON position. ★ If power supply voltage is abnormal, go to check on cause 3 and after.		
		Voltage	Between L30 (female) (1) and (2)	5.0 to 5.2 V
2	Defective 3rd (attachment) lever potentiometer	1. Turn starting switch to OFF position. 2. Disconnect connector L30, and connect T-adapters to male side.		
		Resistance	Between L30 (male) (1) and ground	Min. 1 MΩ
			Between L30 (male) (2) and ground	
			Between L30 (male) (3) and ground	
			Between L30 (male) (4) and ground	
3. Turn starting switch to OFF position. 4. Insert T-adapter into connector L30. 5. Set work equipment lock switch to LOCK position. 6. Turn starting switch to ON position. 7. Operated 3rd (attachment) lever to perform troubleshooting.				
Voltage	Between L30 (4) and (2)	3rd (attachment) lever: NEUTRAL	2.38 to 2.62 V	
		3rd (attachment) lever: Operated to extend cylinder fully	0.60 to 1.10 V	
		3rd (attachment) lever: Operated to retract cylinder fully	3.90 to 4.40 V	

## 40 Troubleshooting

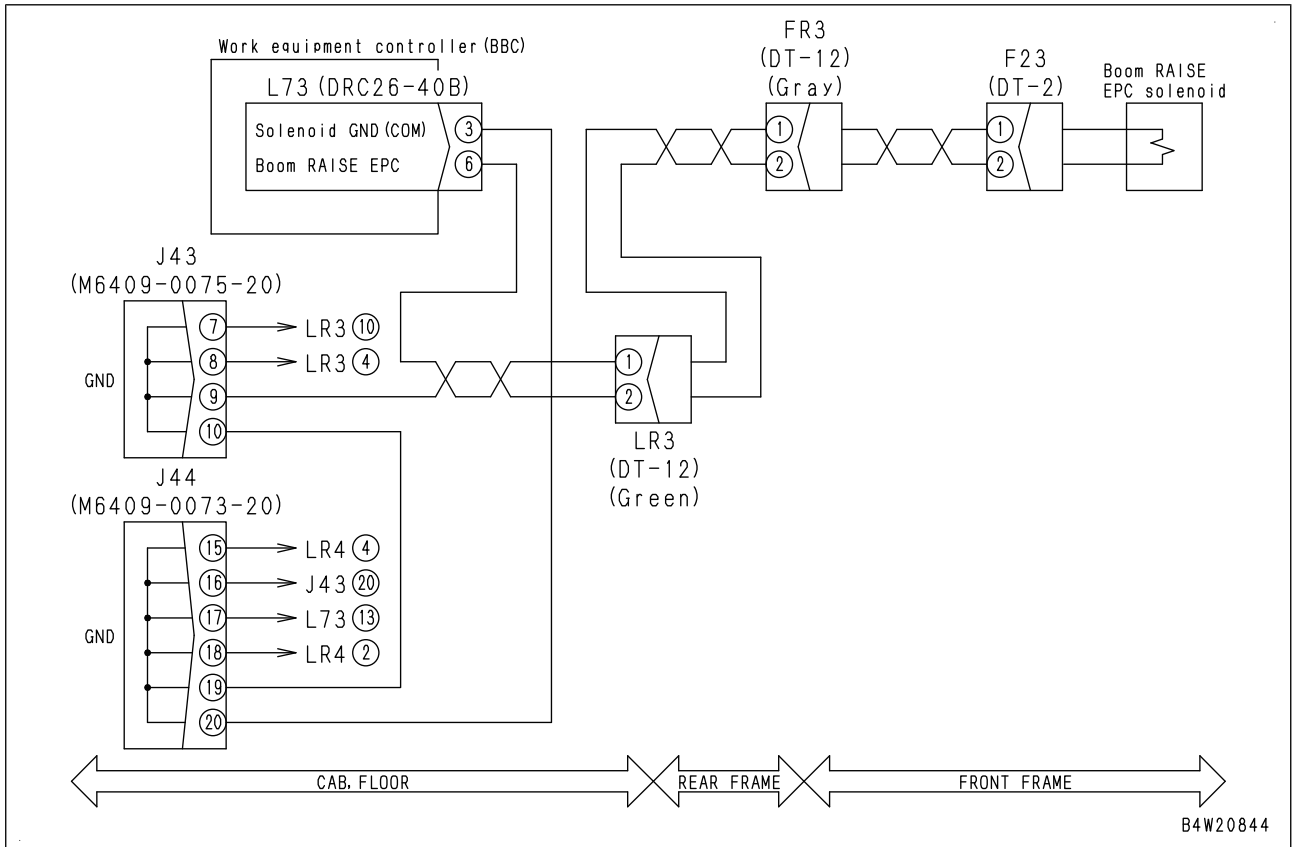
### Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks	
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector REV OUT. 3. Disconnect connector L62, and connect T-adapter to female side.	
		<table border="1"> <tr> <td>Resistance</td> <td>Between L62 (female) (20) and each pin other than pin (20)</td> <td>Min. 1 MΩ</td> </tr> </table>	Resistance
Resistance	Between L62 (female) (20) and each pin other than pin (20)	Min. 1 MΩ	
5	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 transmission output shaft speed sensor



**Circuit diagram related to boom RAISE EPC solenoid**



## 40 Troubleshooting

### Troubleshooting by failure code (Display of code)

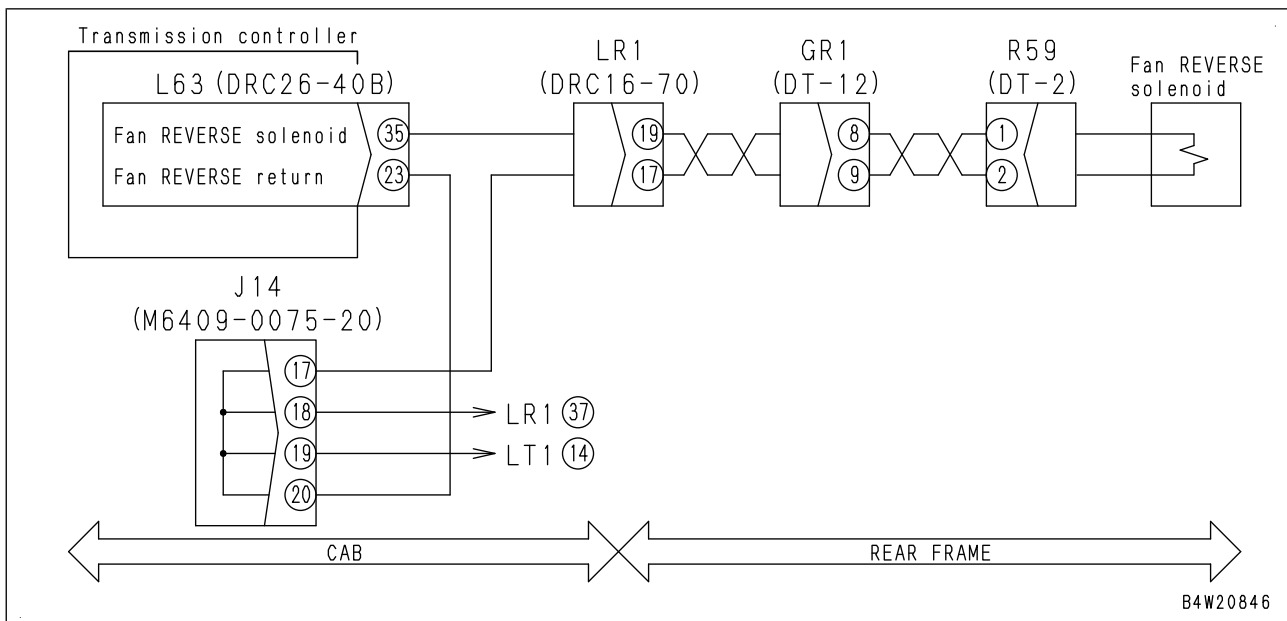
## Failure code [DW7BKY] Hot Short of Radiator Fan Rev. Sol. (WA470\_7-DW7BKY-400-A-

Z0-A)

Action level	Failure code	Failure	Hot Short of Radiator Fan Reverse Solenoid (Transmission controller system)
L01	DW7BKY		
Detail of failure	<ul style="list-style-type: none"> <li>Due to hot short circuit in fan reverse solenoid system, abnormal voltage appears when controller does not drive fan reverse solenoid.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Disables reverse rotation of fan.</li> <li>Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Fan does not rotate in normal direction.</li> <li>Radiator may overheat.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Output current value to fan reverse solenoid can be checked with monitoring function. (Code: 31646 Fan Reverse solenoid Current)</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective fan reverse solenoid (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector R59 and connect T-adaptor to male side.
		Resistance   Between R59 (male) (1) and (2)   5 to 15 Ω
2	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector R59, and connect T-adaptor to female side. 3. Turn starting switch to ON position.
		Voltage   Between R59 (female) (1) and (2)   Max. 4.5 V
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L63 and R59, and connect T-adaptor to female side of L63. ★ Check by using multimeter in continuity mode.
		Continuity   Between L63 (female) (35) and each pin other than pin (35)   No continuity (No sound is heard)
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 fan reverse solenoid



## Failure code [DX16KY] Hot Short of Radiator Fan Pump EPC Sol. (WA470\_7-

DX16KY-400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of Radiator Fan Pump EPC Solenoid (Transmission controller system)
L01	DX16KY		
Detail of failure	<ul style="list-style-type: none"> <li>Due to hot short circuit in fan pump EPC solenoid circuit, abnormal voltage appears when controller does not drive fan pump EPC solenoid.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Disables fan to rotate in reverse direction.</li> <li>Stops driving fan pump EPC solenoid.</li> <li>If cause of failure disappears, machine becomes normal by itself.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>Fan rotates at its minimum speed.</li> <li>Fan cannot rotate in reverse direction.</li> <li>When this failure occurs with fan rotating in reverse direction, fan rotation direction switches to normal direction.</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Output current value to fan pump EPC solenoid can be checked with monitoring function. (Code: 41400 Rad. Fan Pump EPC Sol. Current)</li> <li>Since female side voltage is 20 V or above when pump EPC solenoid connector is disconnected and starting switch is turned to ON position, check of hot short circuit in wiring harness is not available.</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective fan pump EPC solenoid (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector R29, and connect T-adapter to male side.	
		Resistance	Between R29 (male) (1) and (2)      5 to 10 Ω
2	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L63 and R29, and connect T-adapter to female side of L63. ★ Check by using multimeter in continuity mode.	
		Continuity	Between L63 (female) (25) and each pin other than pin (25)      No continuity (No sound is heard)
		1. Turn starting switch to OFF position. 2. Disconnect connectors L61, L62, L63, and R29, and connect T-adapters to each female side of L61, L62, and L63. ★ Check by using multimeter in continuity mode.	
		Continuity	Between L63 (female) (25) and each pin of L61 (female)      No continuity (No sound is heard)
Between L63 (female) (25) and each pin of L62 (female)      No continuity (No sound is heard)			
3	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.)	

## 40 Troubleshooting

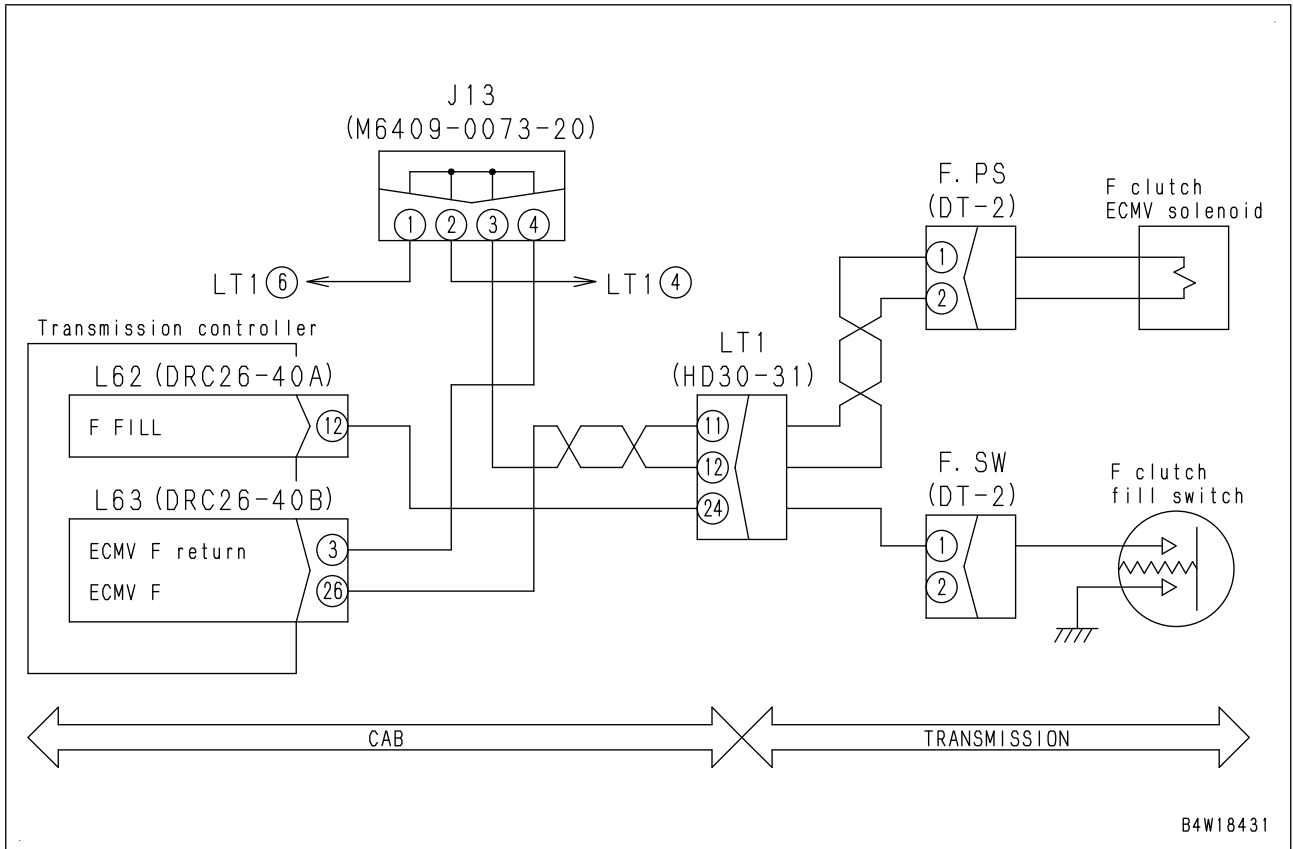
### Troubleshooting by failure code (Display of code)

#### Failure code [DXH4KY] Hot Short of ECMV Solenoid (1st) (WA380\_7-DXH4KY-400-A-Z0-A)

Action level	Failure code	Failure	Hot Short of ECMV Solenoid (1st) (Transmission controller system)
L03	DXH4KY		
Detail of failure	<ul style="list-style-type: none"> <li>Due to hot short circuit in 1st clutch ECMV solenoid circuit, abnormal voltage appears when controller does not drive 1st clutch ECMV solenoid.</li> </ul>		
Action of controller	<ul style="list-style-type: none"> <li>Stops driving 2nd, 3rd and 4th clutch ECMV solenoids.</li> <li>When not driving ECMV solenoids of speed clutches (other than 1st clutch), controller also stops driving F (forward) and R (reverse) clutch ECMV solenoids.</li> <li>Lights up centralized warning lamp and sounds alarm buzzer.</li> <li>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.</li> </ul>		
Problem on machine	<ul style="list-style-type: none"> <li>2nd, 3rd, and 4th clutches are not engaged (machine can travel with 1st gear speed).</li> </ul>		
Related information	<ul style="list-style-type: none"> <li>Output current value to 1st clutch ECMV solenoid can be checked with monitoring function. (Code: 31602 ECMV Current (1st))</li> <li>Method of reproducing failure code: Turn starting switch to ON position.</li> </ul>		

No.	Cause	Procedure, measuring location, criteria and remarks	
1	Defective 1st clutch ECMV solenoid	1. Turn starting switch to OFF position. 2. Disconnect connector 1.PS, and connect T-adapter to male side.	
		Resistance	Between 1.PS (male) (1) and (2)   5 to 15 Ω
2	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector 1.PS, and connect T-adapter to female side. 3. Turn starting switch to ON position. ★ If failure code [DXH4KA] for open circuit appears, wiring harness does not have hot short circuit. (1st clutch ECMV solenoid is defective.)	
		Voltage	Between 1.PS (female) (1) and (2)   Max. 4.5 V
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector 1.PS. 3. Disconnect connector L63, and connect T-adapter to female side.	
		Continuity	Between L63 (female) (27) and each pin other than (27)   No continuity (No sound is heard)
		1. Turn starting switch to OFF position. 2. Disconnect connector L63. 3. Disconnect connectors LT1 and 1.PS. 4. Connect T-adapter to either male or female side of connector LT1.	
		Continuity	Between LT1 (female) (1) and each pin other than (1)   No continuity (No sound is heard)
Between LT1 (male) (1) and each pin other than (1)   No continuity (No sound is heard)			
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.)	

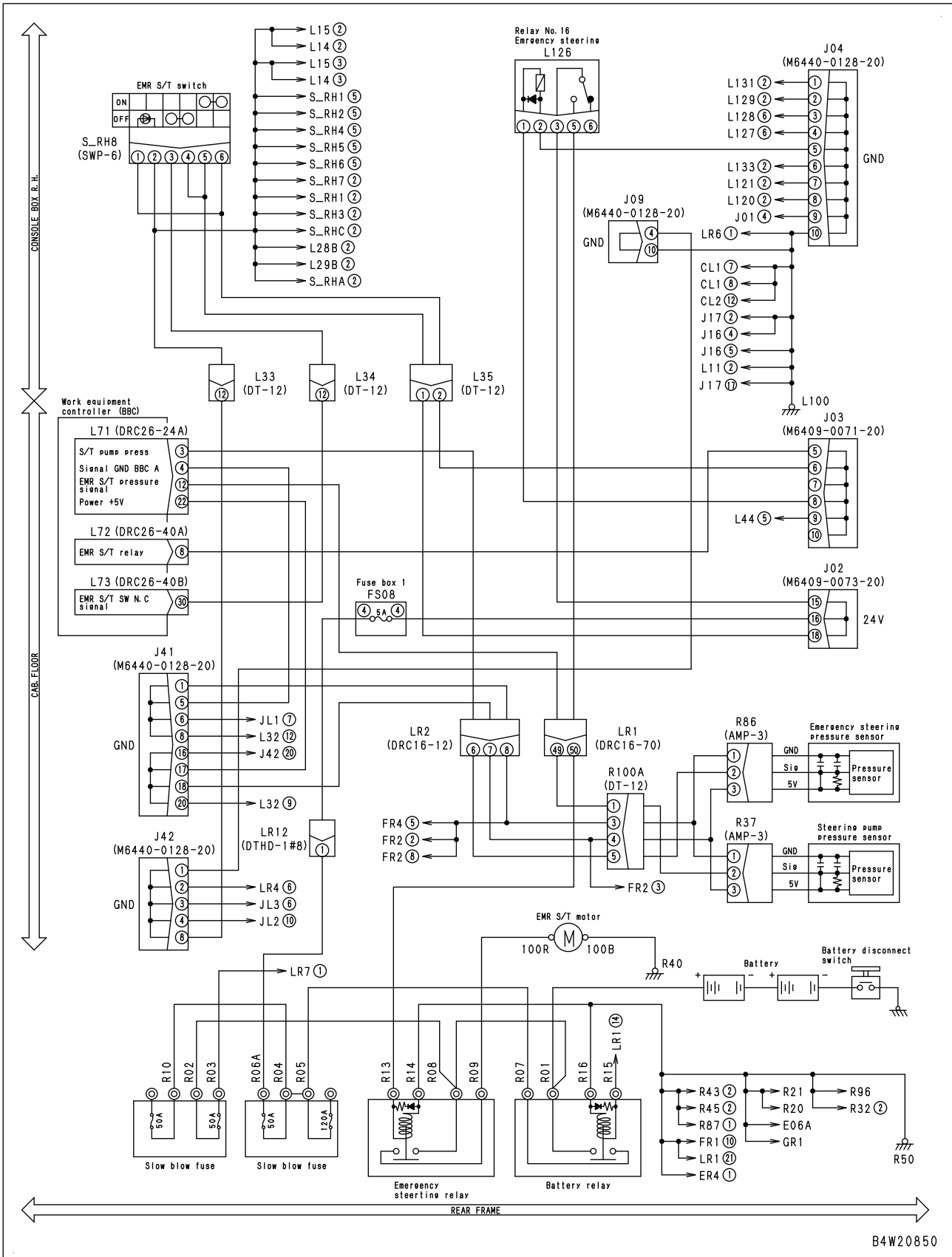
Circuit diagram related to F clutch ECMV solenoid



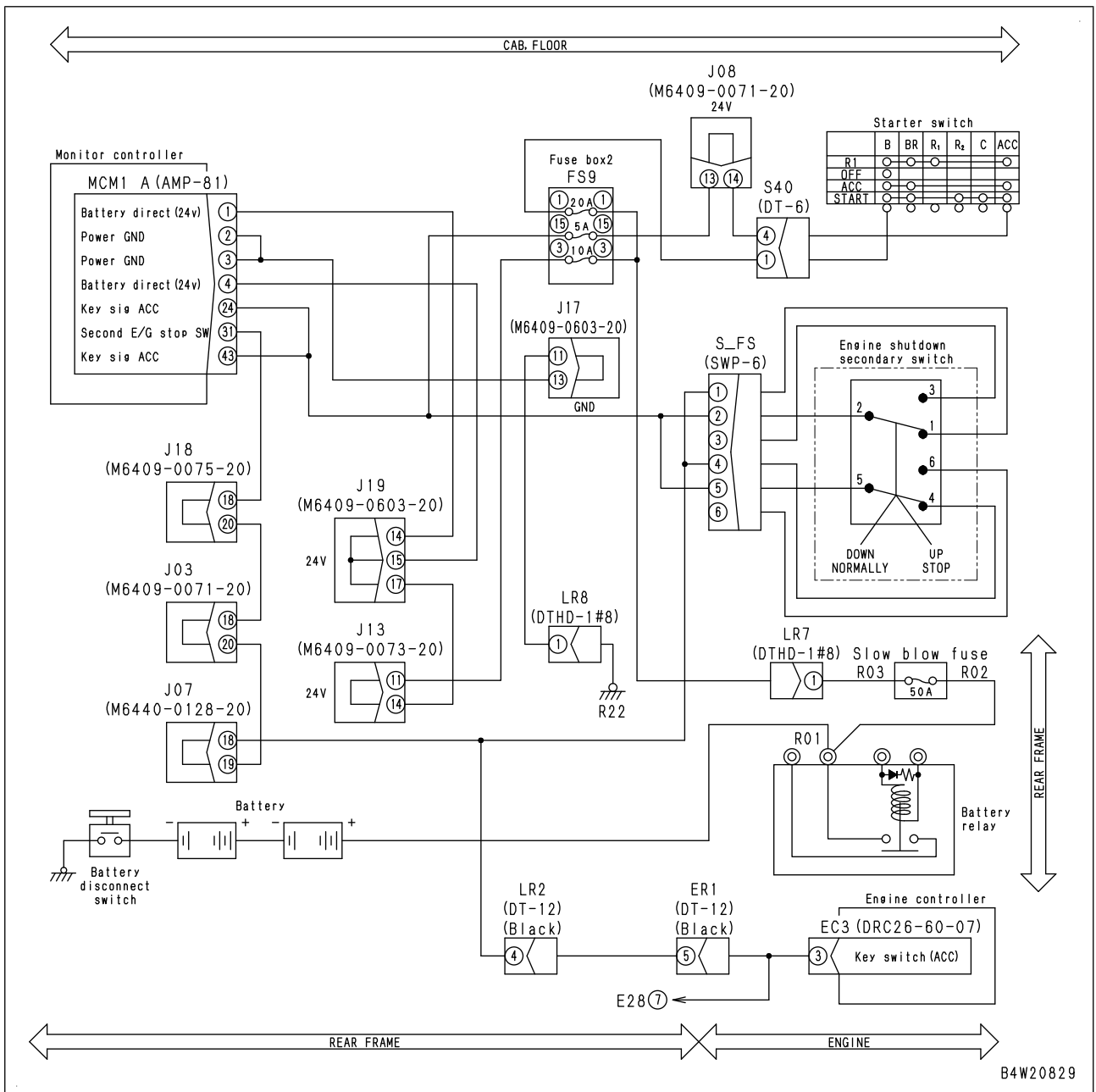
# 40 Troubleshooting

## Troubleshooting by failure code (Display of code)

### Circuit diagram related to emergency steering motor



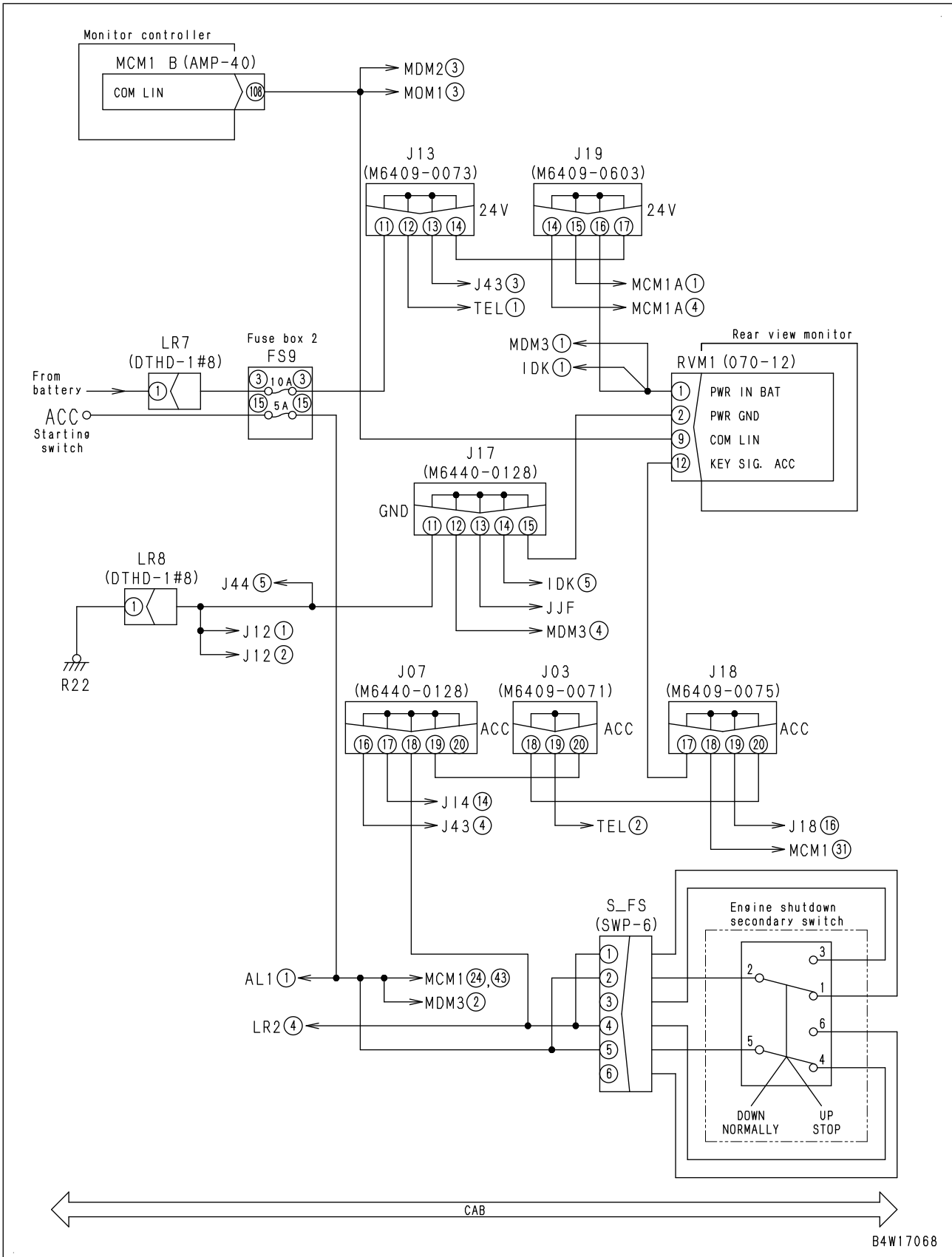
Circuit diagram related to monitor controller



# 40 Troubleshooting

## Troubleshooting of electrical system (E-mode)

### Circuit diagram related to rearview monitor power supply



## E-26 Fuel level gauge does not indicate correct level (WA470\_7-FGB-400-A-Z0-A)

Failure	Fuel level gauge does not indicate correct level.				
Related information	<ul style="list-style-type: none"> <li>Input voltage from fuel level sensor can be checked with monitoring function. (Code: 04200 Fuel Level Sensor [V])</li> <li>Since T-adaptor for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector.</li> </ul>				
No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective fuel level sensor (internal open or short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector R33, and connect T-adapters to male side.			
		Resistance	Between R33 (male) (1) and (2)	FULL	Max. 12 Ω
			★ Fuel level sensor characteristics	EMPTY	80 to 100 Ω
		Between R33 (male) (2) and ground		Min. 1 MΩ	
2	Open circuit, short circuit, or ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector R33, and connect T-adapters to female side. 3. Turn starting switch to ON position.			
		★ If voltage is 0 V, wiring harness has open circuit, ground fault, or short circuit, and if voltage is 24 V, wiring harness has hot short circuit. ★ Voltage of approximately 3.3 V is applied to fuel level sensor signal line through resistor inside monitor controller.			
		Voltage	Between R33 (female) (1) and (2)	Approx. 3.3 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 MCM1 A, and connect T-adapters to female side.			
		★ Use fuel level sensor characteristics table for check on cause 1 as resistance criteria. ★ If resistance is 1 MΩ or higher, harness has open circuit. If it is 1 Ω or below, harness has short circuit.			
		Resistance	Between MCM1 A (female) (8) and (9)	Approx. 4 to 100 Ω	
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 2 or 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and R33, and connect T-adapters to each female side.			
		Resistance	Between MCM1 A (female) (8) and R33 (female) (1)	Max. 1 Ω	
			Between MCM1 A (female) (9) and R33 (female) (2)	Max. 1 Ω	
5	Ground fault in wiring harness (contact with ground circuit)	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and R33, and connect T-adaptor to either female side.			
		Resistance	Between ground and MCM1 A (female) (8) or R33 (female) (1)	Min. 1 MΩ	
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and R33, and connect T-adapters to female side of MCM1 A.			
		★ Check by using multimeter in continuity mode.			
		Continuity	Between MCM1 A (female) (8) and each pin other than pin (8)	No continuity (No sound is heard)	
7	Defective monitor controller	If no failure is found by above checks, monitor controller is defective.			

## 40 Troubleshooting

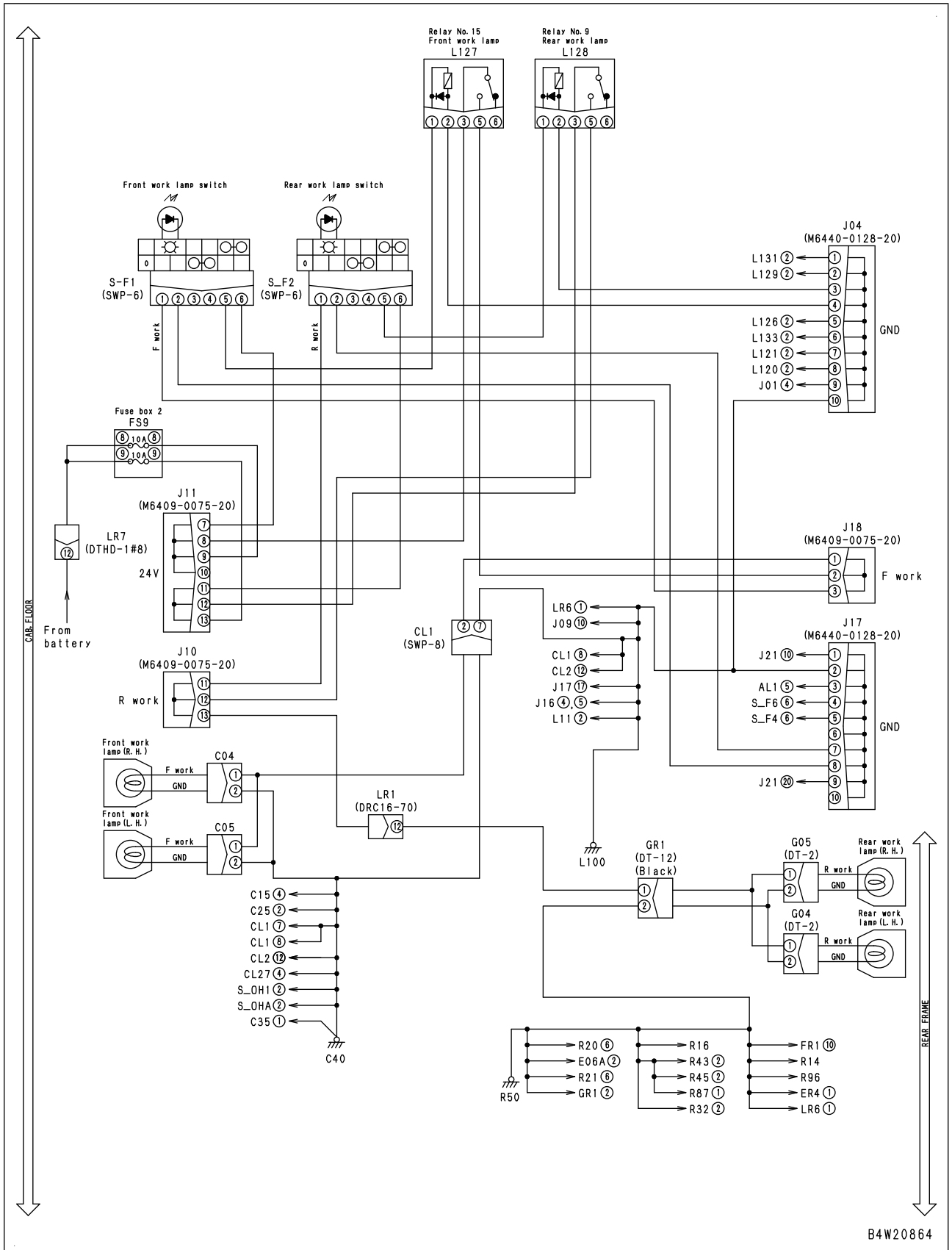
### Troubleshooting of electrical system (E-mode)

#### E-38 When operating engine power selection switch, engine power selection function does not operate properly (WA380\_7-E22-400-A-Z0-A)

Failure	When operating engine power selection switch, engine power selection function does not operate properly.
Related information	<ul style="list-style-type: none"> <li>If mechanical system failure code is displayed, perform troubleshooting for that code first.</li> </ul>

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective engine power selection switch	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH2 and connect T-adapters to male side.			
		Resistance	Between S_RH2 (male) (5) and (6)	Switch: OFF Switch: ON	Min. 1 MΩ Max. 1 Ω
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L72 and S_RH2, and connect T-adapters to each female side.			
		Resistance	Between L72 (female) (37) and S_RH2 (female) (6)	Max. 1 Ω	
			Between S_RH2 (female) (5) and ground	Max. 1 Ω	
3	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors L72 and S_RH2, and connect T-adapter to either female side.			
		Resistance	Between ground and L72 (female) (37) or S_RH2 (female) (6)	Min. 1 MΩ	
4	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH2 and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between S_RH2 (female) (6) and ground	7 to 9 V	
5	Defective work equipment controller	1. Turn starting switch to OFF position. 2. Insert T-adapters into connector L72. 3. Turn starting switch to ON position.			
		Voltage	Between L72 (female) (37) and ground	Switch: OFF	7 to 9 V
Switch: ON	Max. 1 V				

Circuit diagram related to working lamps



B4W20864

## 40 Troubleshooting

### Troubleshooting of electrical system (E-mode)

#### E-56 Window washer does not operate (WA470\_7-FH0-400-A-Z0-A)

Failure	Window washer does not operate.
Related information	<ul style="list-style-type: none"> <li>Window washer does not operate due to the failure of window washer motor, switch, timer (front system only), or wiring harness.</li> <li>Perform following troubleshooting when wiper operates normally. (If wiper does not operate normally, perform troubleshooting for E-54 and E-55 first.)</li> <li>Check that front wiper (Hi, Lo, INT) and rear wiper operate normally.</li> <li>T-adapter is not prepared for connectors L31, R43, R45, D08, and D09.</li> </ul>

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective front washer motor (internal failure)	1. Turn starting switch to OFF position. 2. Disconnect connector R43 and connect T-adapters to male side.		
		Resistance	Between R43 (male) (1) and (2)	3 to 10 Ω
			Between R43 (male) (1) and ground	Min. 1 MΩ
2	Defective rear washer motor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector R45 and connect T-adapters to male side.		
		Resistance	Between R45 (male) (1) and (2)	3 to 10 Ω
			Between R45 (male) (1) and ground	Min. 1 MΩ
3	Defective front wiper switch (internal failure)	1. Turn starting switch to OFF position. 2. Disconnect connector L21 and connect T-adapters to male side.		
		Resistance	Between L21 (male) (7) and (6)	Front wiper washer switch: ON Max. 1 Ω
				Front wiper washer switch: OFF Min. 1 MΩ
			Between L21 (male) (3) and (5)	Front wiper switch: OFF Max. 1 Ω
		Between L21 (male) (6) and ground	Min. 1 MΩ	
4	Defective rear wiper switch (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector L21 and connect T-adapters to male side.		
		Resistance	Between L21 (male) (7) and (10)	Rear wiper washer switch: ON Max. 1 Ω
				Rear wiper washer switch: OFF Min. 1 MΩ
		Between L21 (male) (10) and ground	Min. 1 MΩ	
5	Defective diode (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connectors D08 and D09.		
		Continuity	Between D08 (male) (2) (+) and (1) (-)	Continuity
			Between D08 (male) (2) (-) and (1) (+)	No continuity
			Between D09 (male) (2) (+) and (1) (-)	Continuity
Between D09 (male) (2) (-) and (1) (+)	No continuity			

### H-3 Torque converter lockup clutch is not engaged (WA470\_7-F11-400-A-Z0-A)

Failure	Torque converter lockup clutch is not engaged.				
Related information	<ul style="list-style-type: none"> <li>• Check that transmission oil level is normal.</li> <li>• If any failure code is displayed, perform troubleshooting for that failure code first. (DXH1KA, DXH1KB, or DXH1KY )</li> </ul>				
No.	Cause	Procedure, measuring location, criteria and remarks			
1	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 <sup>2</sup> }
				2,000 rpm	2.55 ± 0.2 MPa {26.0 ± 2.0 kg/cm <sup>2</sup> }
When pressure cannot be adjusted to normal level, check main relief valve for malfunction (setting of spring) and internal defect (defective valve seat).					
2	Clogged last chance filter	If no failure is found by check on cause (1) but lockup clutch pressure is low or "0", check last chance filter for clogging.			
3	Malfunction of lockup clutch ECMV	★ Be ready with engine stopped, then perform troubleshooting with engine running at 2,000 rpm.			
		Output pressure of lockup clutch ECMV	When torque converter lockup clutch is engaged (Manual switch: ON)	1.66 ± 0.15 MPa {17.0 ± 1.5 kg/cm <sup>2</sup> }	
			When torque converter lockup clutch is disengaged	0 MPa {0 kg/cm <sup>2</sup> }	
4	Defective lockup clutch	<p>If measured pressure is normal in check on cause (3), lockup clutch may have worn.</p> <p>If measured pressure is unusual but ECMV is normal, sealing of lockup clutch piston may be defective.</p>			

## 40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

### H-17 Boom does not rise (WA470\_7-M60-400-A-Z0-A)

Failure	Boom does not rise.
Related information	<ul style="list-style-type: none"> <li>Check that oil level in hydraulic tank is normal.</li> <li>If any failure code is displayed, perform troubleshooting for that failure code first. (DB90KK, DB92KK, DB95KX, DK59L8, DW4PKA, DW4PKB, DW4PKY, DW4QKY, DW4RKY, DW4SKY, DWM1KY, DXA1KY, or DXHKKY)</li> <li>Check that lever stroke of boom control lever is correct.</li> <li>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".</li> <li>Work equipment pump pressure can be checked with monitoring function. (Monitoring code: 94700)</li> </ul>

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective PTO	If bucket does not move and boom does not rise, 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 <sup>2</sup> }
		• Output pressure of accumulator charge valve is source pressure of pilot pressure for boom control valve (RAISE and LOWER).			
5	Malfunction of boom RAISE EPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.*			
		Output pressure of EPC valve	Boom control lever	RAISE	2.94 ± 0.2 MPa {30.0 ± 1.6 kg/cm <sup>2</sup> }
6	Malfunction of shut off valve (for pilot circuit of work equipment valve)	If output pressures of all EPC valves including boom (RAISE) 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 <sup>2</sup> }
8	Defective work equipment main relief valve	★ Be ready with engine stopped, then perform troubleshooting with engine at full speed. (For measuring procedure, see Testing and adjusting, "Testing work equipment oil pressure".)			
		Work equipment main relief pressure	Lift cylinder	Relief	34.3 (+1.8/-4.4) MPa {350 (+18/-45) kg/cm <sup>2</sup> }
		If relief pressure is not increased to normal level after main relief valve is adjusted, unload valve may remain opened.			
9	Malfunction of boom control valve spool	When no failure is found by checks on causes (4) and (7), if main circuit pressure at boom RAISE operation does not rise above relief pressure of unload valve, work equipment valve spool may malfunction. Check spool for sticking.			
10	Boom control valve Malfunction of load check valve	When no failure is found by checks on cause (8), check load check valve for sticking.			

## H-35 Fan speed is abnormal (too high or low, or fan does not rotate) (WA470\_7-FTP-400-A-Z0-A)

Failure	Fan speed is abnormal (too high or low, or fan does not rotate).
Related information	<ul style="list-style-type: none"> <li>• When engine is started for first time after hydraulic oil replacement, fan may temporarily rotate at higher speed but this is normal.</li> <li>• If any failure code is displayed, perform troubleshooting for that failure code first. (DW7BKA, DW7BKB, DW7BKY, DLM3KA, DLM3LC, LA00L3, DX16KA, DX16KB, DB16KY, DGT1KA, DGT1KB, or DGH2KX)</li> <li>• Engine speed can be checked with monitoring function. (Monitoring code: 01001)</li> <li>• Radiator fan speed can be checked with monitoring function. (Monitoring code: 10009)</li> </ul>

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective engine speed	★ For measuring procedure, see "Testing engine speed" in "Testing and adjusting".		
		Engine speed	Engine low idle	825 ± 25 rpm
			Engine high idle	2,170 ± 50 rpm
If engine speed is not increased to specification, perform troubleshooting for "S-5 Engine runs rough or is unstable".				
2	Defective fan speed	★ Perform troubleshooting with engine at high idle.		
		Fan speed	Coolant temperature: Min. 95°C Torque converter oil temperature: Min. 105°C Hydraulic oil temperature: Min. 95°C	1,300 ± 200 rpm
3	Defective PTO (fan pump drive)	Fan pump drive of PTO may be defective.		
4	Malfunction of accumulator charge valve (relief valve)	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.*		
		Fan motor drive pressure	Fan adjustment mode: 100% Hydraulic oil temperature: 50°C	14.3 ± 2.1 MPa {146 ± 22 kg/cm <sup>2</sup> }
5	Defective fan pump	If pressure does not reach specified value after relief valve is adjusted in check on cause (4), fan pump may have internal defect. Check strainer of self-pressure reducing valve inlet for metal particles.		
6	Malfunction of fan motor (direction selector valve)	★ Be ready with engine stopped, then perform troubleshooting with engine at full speed and fan in reverse rotation mode.		
		Fan reverse solenoid output pressure	Fan adjustment mode: 100% Hydraulic oil temperature: 50°C	1.98 to 3.04 MPa {20.2 to 31.0 kg/cm <sup>2</sup> }
7	Defective fan motor	★ Release remaining pressure from hydraulic tank and piping, and then perform troubleshooting with engine stopped. <ul style="list-style-type: none"> <li>• Check direction selector valve spool in valve body for seizure or sticking. (Spool shall move smoothly and shall not be caught.)</li> <li>• Take direction selector spool from valve body, and check it for defects and dirt.</li> </ul>		
		If no failure is found by checks on causes (1) to (6), fan motor may have internal defect.		

\*: This means the accelerator pedal is fully depressed. (There is no need to operate the work equipment lock switch or to lower the boom to the minimum position.)

## 40 Troubleshooting

### Troubleshooting of engine (S-mode)

#### S-16 Water mixes into engine oil (milky) (PC400-B32-400-A-Z0-A)

Failure	Water mixes into engine oil (milky)
Related information	<ul style="list-style-type: none"> <li>If oil mixes into the coolant, perform troubleshooting for "S-13 Oil mixes into coolant"</li> <li>If any failure code is displayed, carry out troubleshooting for it first.</li> </ul> <p>When engine starting and stopping is frequently repeated in low outside temperatures, the KCCV may cause condensation of water vapor in the blow-by gas leading to milky oil or emulsification inside the engine, but this is normal. This is not a problem if coolant is not leaking.</p> <p>If coolant leakage is suspected by such as drop of coolant level in a short time, carry out the following troubleshooting procedures.</p>

No.	Cause	Detail of work, remarks	Remedy
1	Cracks in EGR cooler	<ul style="list-style-type: none"> <li>Coolant containing antifreeze flows out when EGR cooler inlet and outlet gas piping are removed. (Make sure the water is coolant or not. It may be condensate water) (Reference: If cracks are found in the EGR cooler, this may be caused by low coolant level in the cooling system. When replacing the EGR cooler, check for leaks from coolant system piping and radiator.)</li> </ul>	Replace EGR cooler
2	Damaged oil cooler element or O-ring	<ul style="list-style-type: none"> <li>Check oil cooler element and O-ring</li> <li>Pressure-tightness test of oil cooler shows oil leakage</li> </ul>	Replace oil cooler element or O-ring
3	Leakage from water pump mechanical seal	<ul style="list-style-type: none"> <li>Check for leaks from water pump mechanical seal</li> </ul>	Replace water pump mechanical seal
4	Clogged water pump drain hole	<ul style="list-style-type: none"> <li>Check water pump drain hole</li> </ul>	Clean water pump drain hole
5	Broken cylinder head or cylinder head gasket	<ul style="list-style-type: none"> <li>Disassemble engine and check cylinder head and cylinder head gasket</li> </ul>	Replace cylinder head or cylinder head gasket
6	Cracks or pitting in cylinder block	<ul style="list-style-type: none"> <li>Engine oil level rises and oil is milky</li> <li>Disassemble engine and check for cracks or pitting in cylinder block</li> </ul>	Replace cylinder block

**Liquid gasket**

Komatsu code	Part No.	Capacity	Container	Main features and applications
LG-5	790-129-9080	1 kg	Polyethylene container	<ul style="list-style-type: none"> <li>• Use to seal various thread portions, pipe joints, and flanges.</li> <li>• Use to seal taper plugs, elbows, and nipples for hydraulic piping.</li> </ul>
LG-6	790-129-9160	200 g	Tube	<ul style="list-style-type: none"> <li>• Features: Silicon-based heat and cold-resistant sealant</li> <li>• Use to seal thread portions and flange surface.</li> <li>• Use to seal oil pan, final drive case, etc.</li> </ul>
LG-7	790-129-9170	1 kg	Tube	<ul style="list-style-type: none"> <li>• Features: Silicon-based quick-curing sealant</li> <li>• Use to seal flywheel housing, intake manifold, oil pan, thermostat housing, etc.</li> </ul>
LG-8 ThreeBond 1207B	419-15-18131	100 g	Tube	<ul style="list-style-type: none"> <li>• Features: Silicon-based, heat and cold-resistant, vibration-resistant, impact-resistant sealant</li> <li>• Use to seal transfer case, etc.</li> </ul>
LG-9 ThreeBond 1206D	790-129-9310	200 g	Tube	<ul style="list-style-type: none"> <li>• Use for rough surfaces such as the circle gear top seal which is not clamped by bolts, gaps in the weld which must be caulked, etc.</li> <li>• Can be coated with paint.</li> </ul>
LG-10 ThreeBond 1206E	790-129-9320	200 g	Tube	<ul style="list-style-type: none"> <li>• Use as lubricant or sealant when the radiator hoses are put on.</li> <li>• Can be coated with paint.</li> </ul>
LG-11 ThreeBond 1121	790-129-9330	200 g	Tube	<ul style="list-style-type: none"> <li>• Feature: Can be used together with solid gaskets.</li> <li>• Use for covers of the transmission case and steering case etc.</li> </ul>
ThreeBond 1211	790-129-9090	100 g	Tube	<ul style="list-style-type: none"> <li>• Liquid gasket used to repair engine</li> </ul>

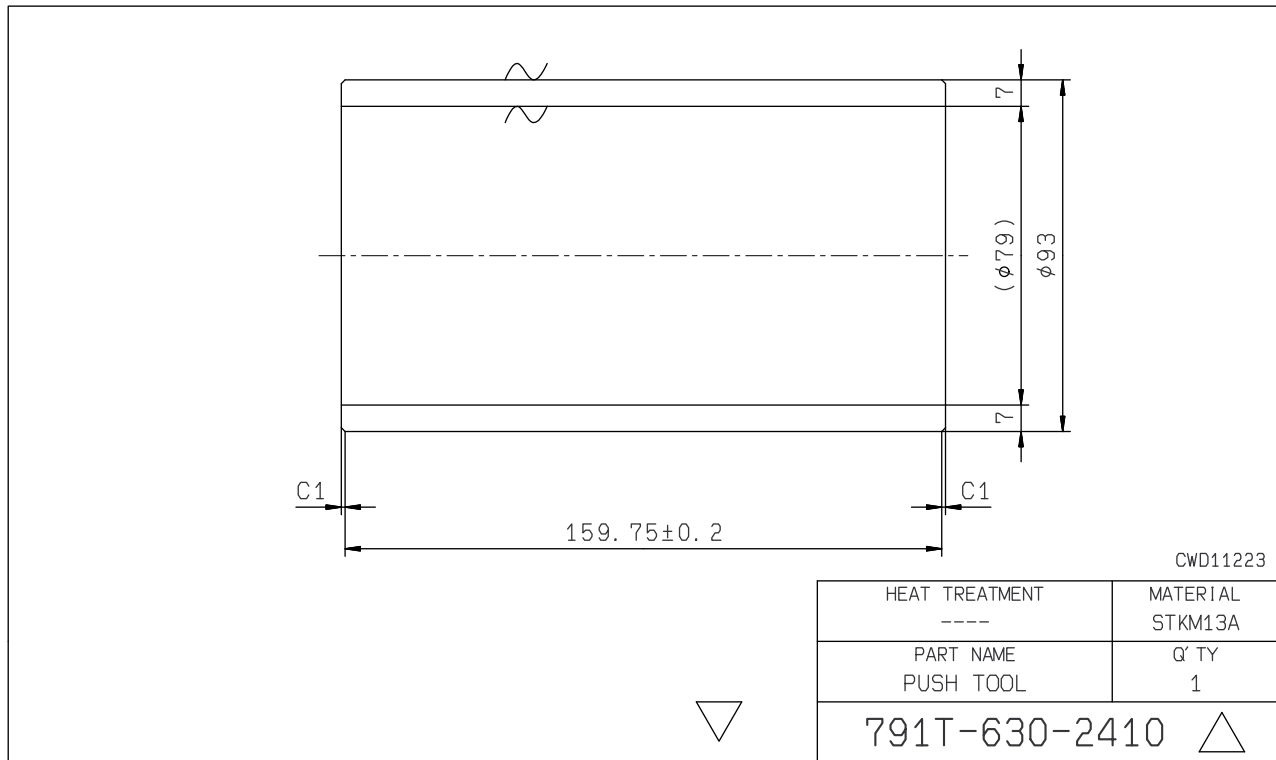
**Molybdenum disulfide lubricant**

Komatsu code	Part No.	Capacity	Container	Main features and applications
LM-P	09940-00040	200 g	Tube	<ul style="list-style-type: none"> <li>• Use to prevent galling and seizure of press-fitted portions, shrinkage-fitted portions, and thread portions.</li> <li>• Use to lubricate linkages, bearings, etc.</li> </ul>
LM-S	09995-00250	190 g	Can	<ul style="list-style-type: none"> <li>• Spray type</li> <li>• Thin molybdenum disulfide films are made on metal surfaces to prevent the metals from galling.</li> <li>• Use for the drive shaft splines, needle bearings, pins and bolts of various links, etc.</li> </ul>

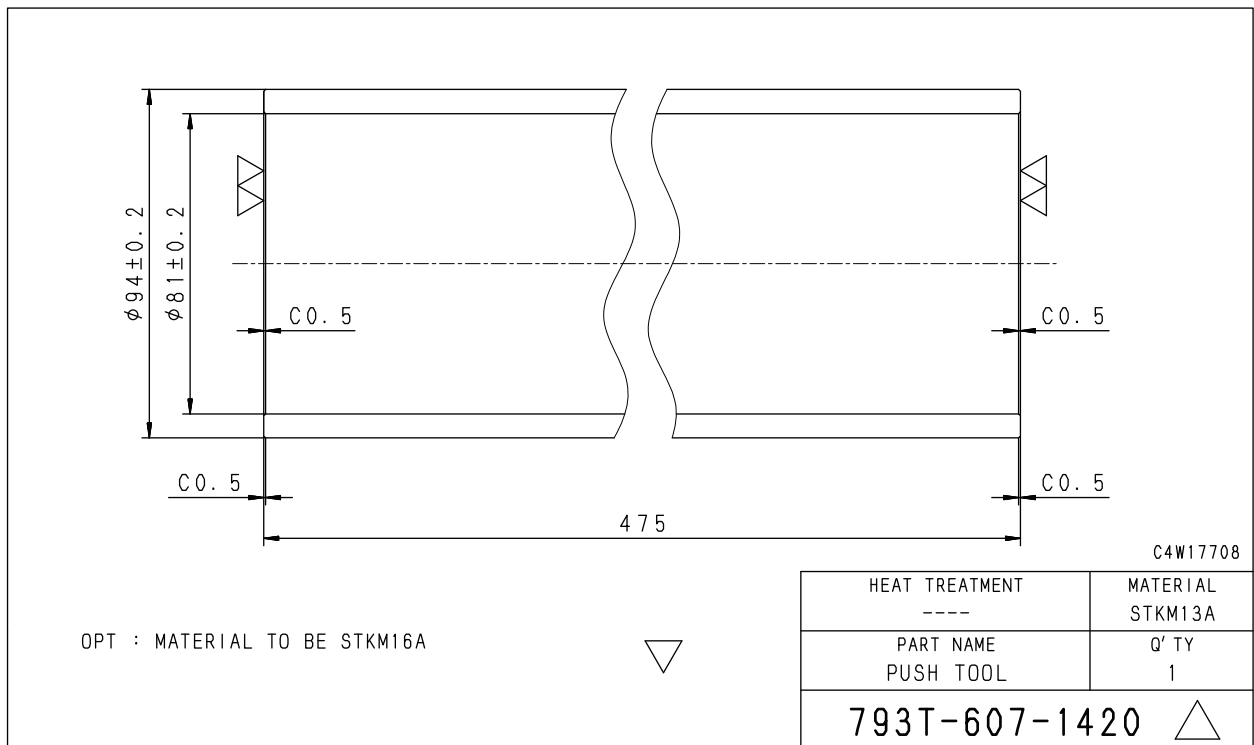
# 50 Disassembly and assembly

General information on disassembly and assembly

Note: Komatsu does not take any responsibility for special tools manufactured according to these sketches.  
 B20: Push tool



B23: Push tool



## Removal and installation of injector assembly (WA470-AE60-924-K-00-A)

★ Special tools

Symbol	Part No.	Part name	Necessity	Q'ty
A4	6212-82-0110	Wrench	■	1

⚠ 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".)

★ When removing or installing fuel piping, be careful not to let foreign matter enter. If any dirt or dust sticks on the parts of the fuel system, clean it off thoroughly with clean fuel.

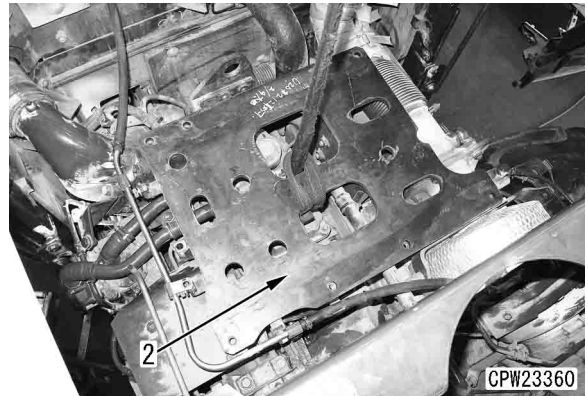
### Removal (WA470-AE60-520-K-00-A)

1. Remove the KDPF assembly. For details, see "Removal and installation of KDPF assembly".
2. Remove the air cleaner assembly. For details, see "Removal and installation of air cleaner assembly".
3. Remove clamps (1) (3 places).



4. Sling and remove bracket (2).

 **Bracket (2):**  
40 kg



5. Remove case (3) of KCCV ventilator, fuel filter (4), fuel prefilter (5), and oil filter (6). [\*1]





6. Disconnect following connectors and move the wiring harness.

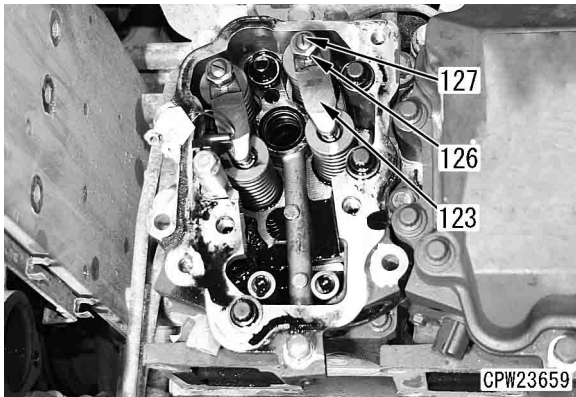
- G(7)
- PCV1(8)
- PCV2(9)
- POIL(10)
- SEGR(11)
- EGR-SOL(12)
- VGT-SOL(13)
- PCCV(14)
- PIM(15)

[\*32]


- ★ Adjust the crosshead according to the following procedure.
- 1. Loosen lock nut (126) and back off adjustment screw (127).
- 2. While pressing the top of crosshead (123) lightly, tighten adjustment screw (127).
- 3. When adjustment screw (127) touches the valve stem, tighten it further by 20 degrees.
- 4. With the adjustment screw in this position, tighten lock nut (126).

 **Crosshead guide and top of crosshead:**  
**Engine oil**

 **Lock nut (126):**  
**58.7 ± 5.9 Nm {6.0 ± 0.6 kgm}**

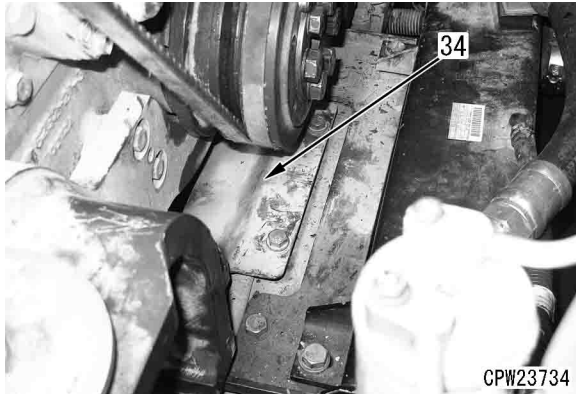


[\*33]

 **Rocker housing mounting bolt:**  
**58.8 to 73.5 Nm {6.0 to 7.5 kgm}**

- Adjust the valve clearance. For details, see Testing and adjusting, "Adjusting valve clearance".
- Refilling of coolant (radiator)  
Refill with the coolant to the specified level through the water filler port. Run the engine to circulate the coolant through system. Then check the coolant level again.

 **Radiator:**  
**75 ℓ**



26. Disconnect terminals E02 (35) and E04 (36), and remove the harness clamp.



27. Remove air conditioner compressor belt (37).  
For details, see "Removal and installation of air conditioner compressor belt".

28. Remove the clamps of hoses (38) and (39).

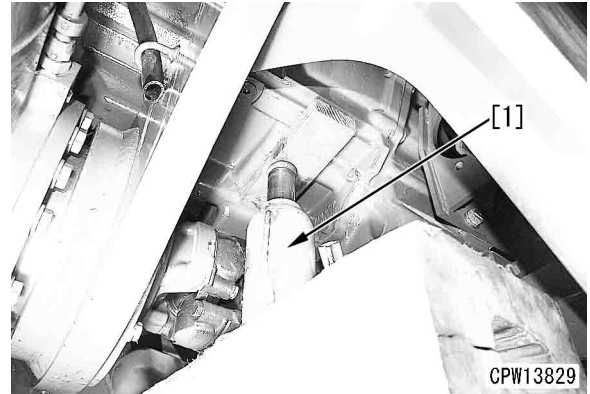
29. Disconnect connector E10 (40).

30. Remove air conditioner compressor (41), and fix it on the machine body side.



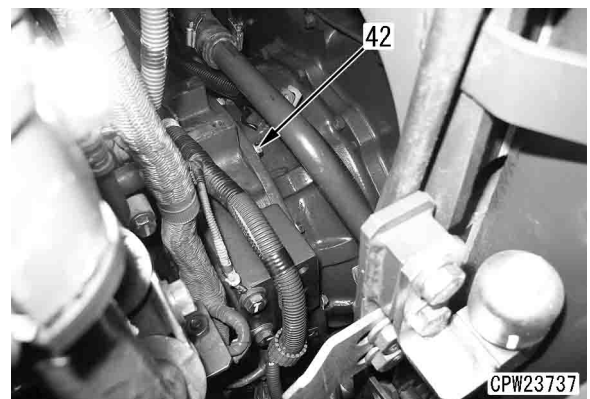
31. Set jack [1] under the transmission.

- ★ This prevents the transmission from lowering during separation of the engine assembly.

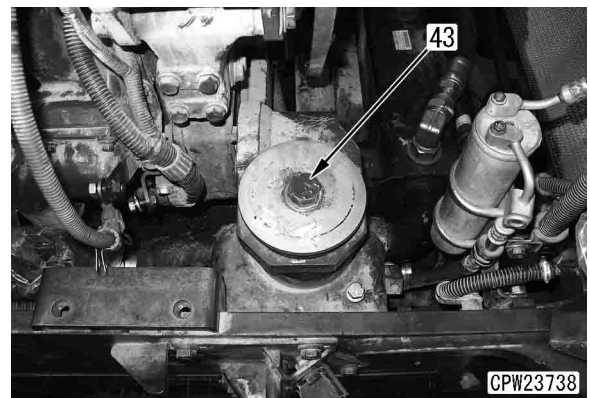


32. Sling the engine assembly.

33. Remove connection bolts (42) (12 pieces) between the engine and transmission.




34. Remove engine mount mounting bolts (43) (2 pieces). [\*4]



35. Sling engine assembly (44) and remove it.

- ★ Check that all wiring and pipes are disconnected.
- ★ When removing wiring and pipes, be careful to prevent interference with the parts of the machine body.

 **Engine assembly (44):**  
1,600 kg

## 50 Disassembly and assembly

### Engine and cooling system

- Place blocks [2] at 4 places under the bodies to support the assembly securely.

★ Use the blocks used at disassembly.

- Set inlet body (2), KDOC body (3), KCSF body (4), and outlet body (5).

- Set them by aligning match marks (a), (b), and (c) made at disassembly.

★ If they are assembled with match marks displaced, the flanges of KDPF inlet and outlet are installed at wrong angle, causing defective installation of exhaust pipe to the inlet and slanted installation of tail pipe to the outlet.

- Install gaskets (35) between the bodies.

★ Use new gaskets (35).

- Install backup plate (34), hangers (36) and (37), and harness bracket (38).

- Install and lightly tighten mounting bolts (33a), (33b), and (33c), 12 bolts each at connection between the bodies.

★ Install mounting bolts (33a), (33b), and (33c) from the direction shown in the following figure.

- Install mounting bolts (33a) and (33b) from the upstream side.
- Install mounting bolt (33c) from the downstream side.

- Tighten mounting bolts (33a), (33b), and (33c) to the specified torque.

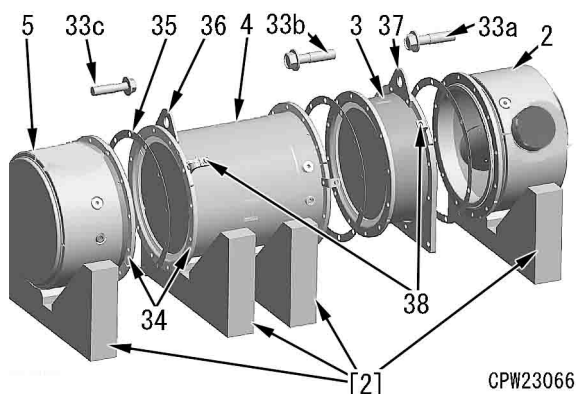
- Width across flats of mounting bolts (33a), (33b), and (33c): 14 mm

 **Mounting bolts (33a), (33b), and (33c):**

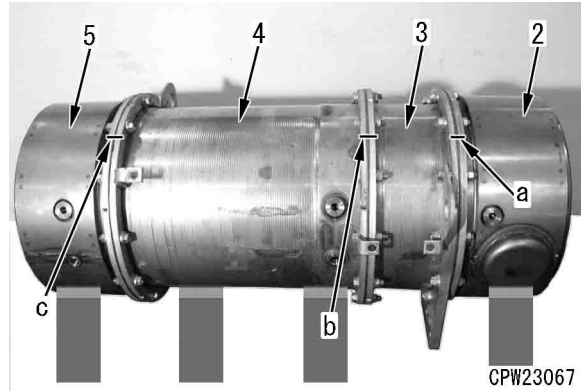
**Seizure prevention compound (LC-G)**

 **Mounting bolts (33a), (33b), and (33c):**

**59 to 74 Nm {6.0 to 7.6 kgm}**



CPW23066



★ The figure shows the view from the inlet side (upstream side).

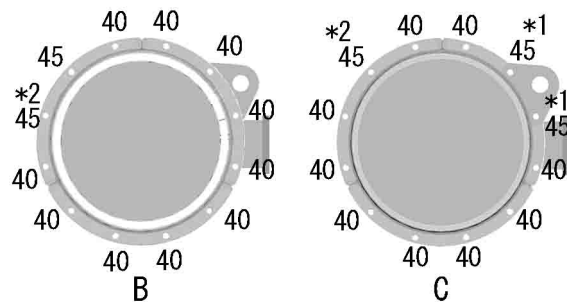
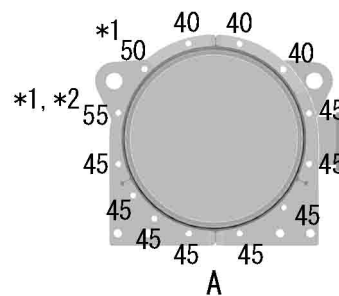
\*1: Bolt that tightens also hanger

\*2: Bolt that tightens also harness bracket

(A): Connection between inlet and KDOC

(B): Connection between KDOC and KCSF

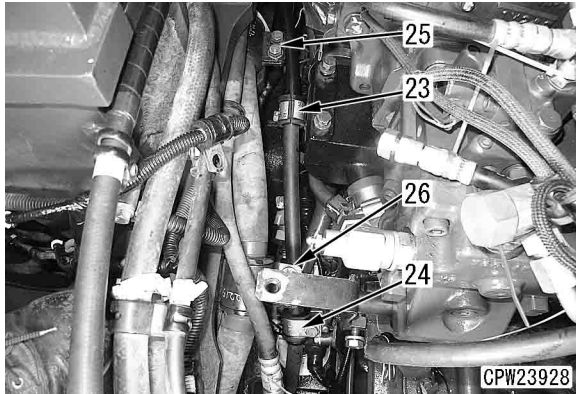
(C): Connection between KCSF and outlet



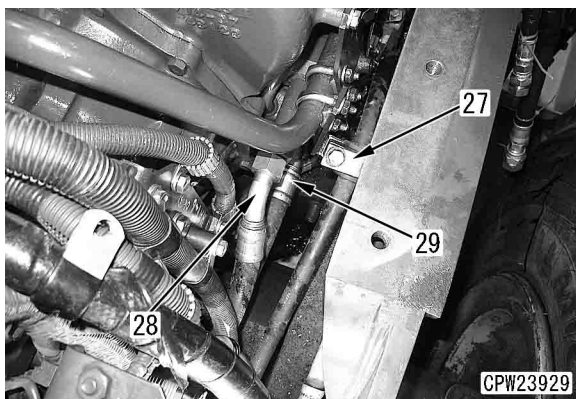
CPW23068

★ Installed positions of backup plates (34a) and (34b) are shown in the following figure.

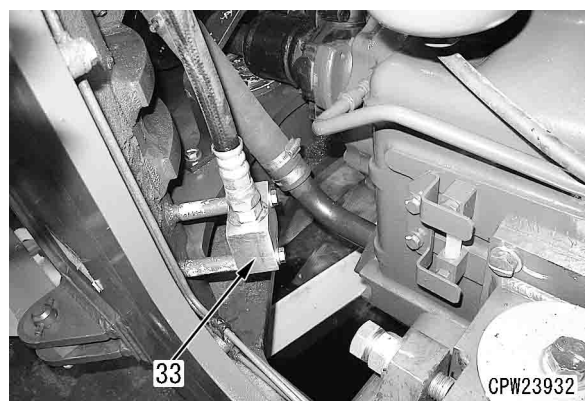
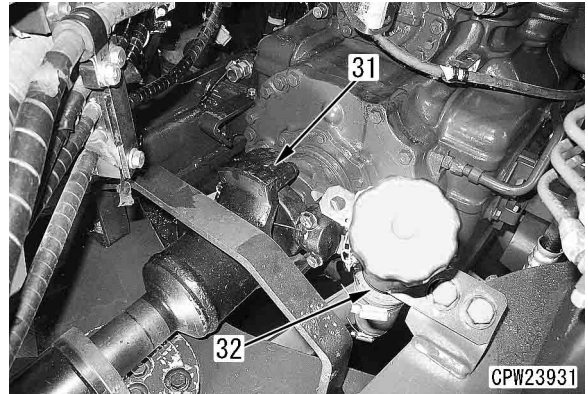
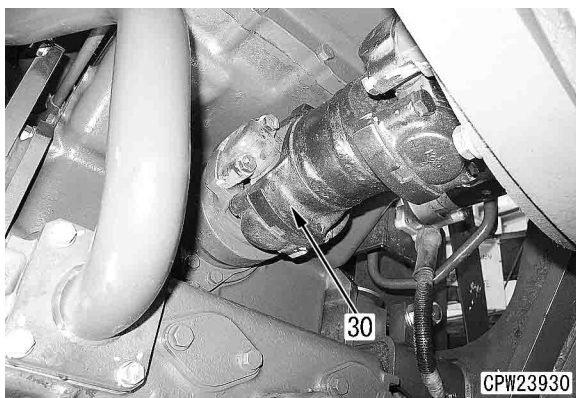
★ Install backup plates while aligning lower flat part (h) of each backup plate not to cause a step.



23. Remove clamp (27).  
24. Disconnect hoses (28) and (29).

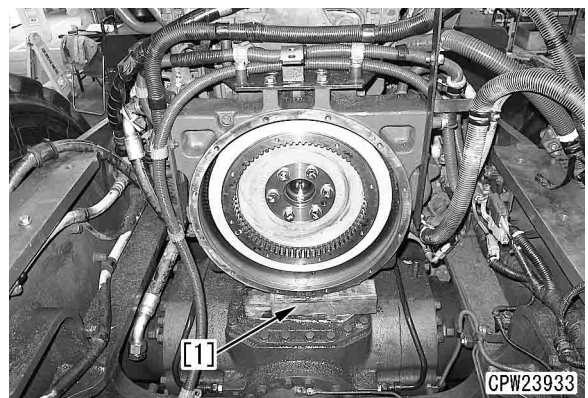


25. Remove rear drive shaft (30) and center drive shaft (31). [\*2]  
★ Make a matchmark on the coupling and drive shaft, and then remove them.  
26. Remove oil filler pipe (32).  
27. Remove drain port (33) on the left side of the machine body.



28. Set blocks [1] under the flywheel housing.

- ★ The figure shows the state without the torque converter and transmission assembly for illustration purposes.
- ★ Using block [1] prevents the combined part on the engine side from lowering during separation of the torque converter and transmission assembly.

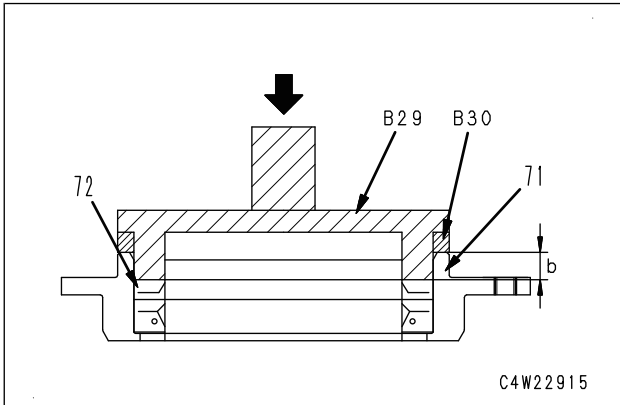


29. Sling the torque converter and transmission assembly.  
30. Remove transmission mount bracket (34).

- 1) Remove right and left engine mount bolts (35). [\*3]
- 2) Remove mounting bolts (36) (2 pieces) on the upper side of left and right transmission mount brackets (34) and bolt (37). [\*4]
- 3) Use jack [2] to raise the bottom surface of the transmission to the position where mounting

## 50 Disassembly and assembly

### Power train



23) Apply and fill grease as shown in the following figure.

★ Part a:

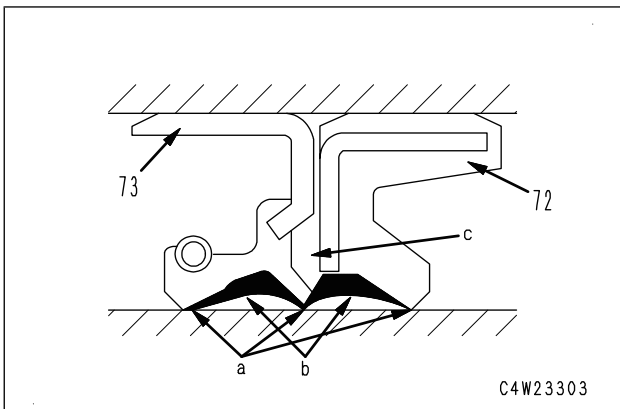
Apply grease (G2-S or G2-LI) to the lip ends (3 places).

★ Part b:


Fill 40 to 60% of the clearance between the main lip of oil seal (73) and the lip of dust seal (72) and the clearance between the dust seal and the oil seal with grease (G2-S or G2-LI).

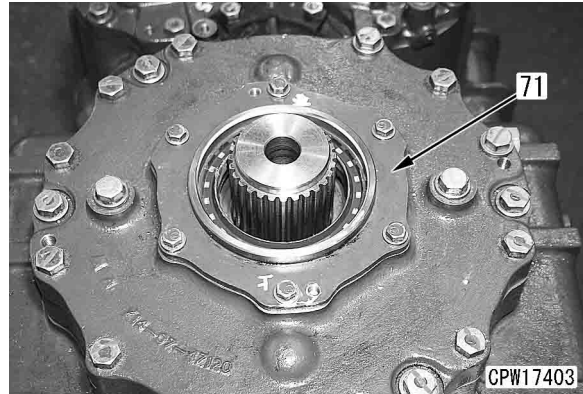
★ Part c:

Grease may protrude into the clearance between the oil seal and the dust seal. Note, however, that excessively applied grease can be mistaken for oil leakage.




24) Install cage (71).

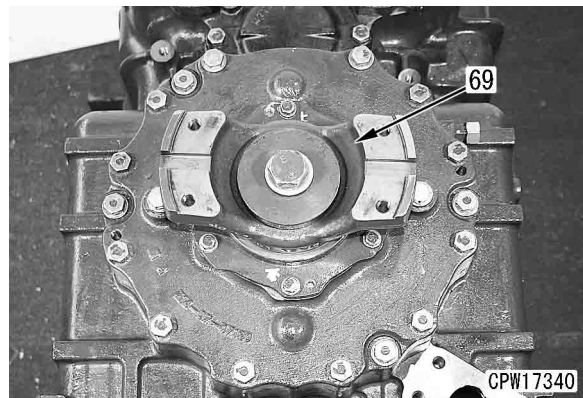
 **Periphery of O-ring:**  
**Grease (G2-LI)**



25) Install coupling (69).

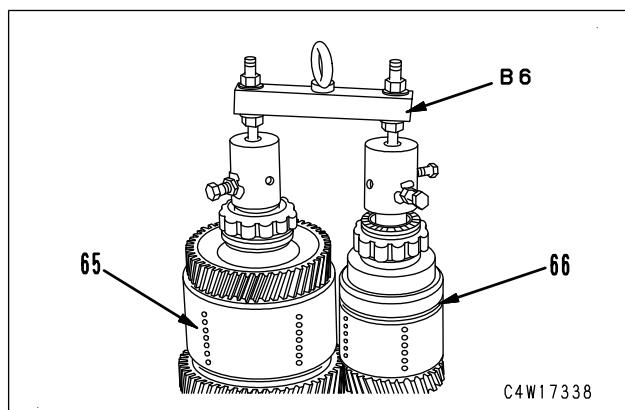
 **Mounting bolt:**  
**Adhesive (LT-2)**

 **Mounting bolt:**  
**662 to 829 Nm {67.5 to 84.5 kgm}**



6. Clutch pack assembly

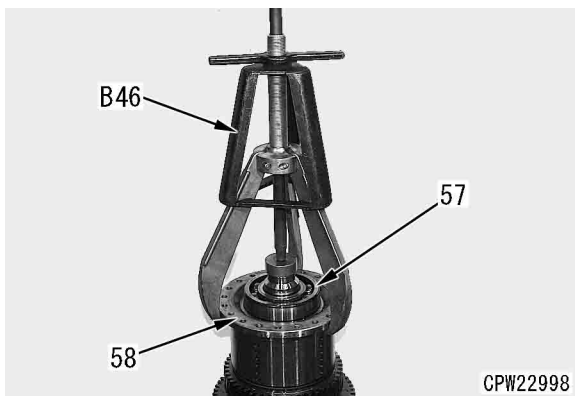
- 1) Turn over the front case.
- 2) By using tool B6, install R and 2nd clutch pack assembly (65) and 3rd and 4th clutch pack assembly (66) simultaneously to the front case.



- 3) By using tool B5, install F, 1st clutch pack assembly (64).

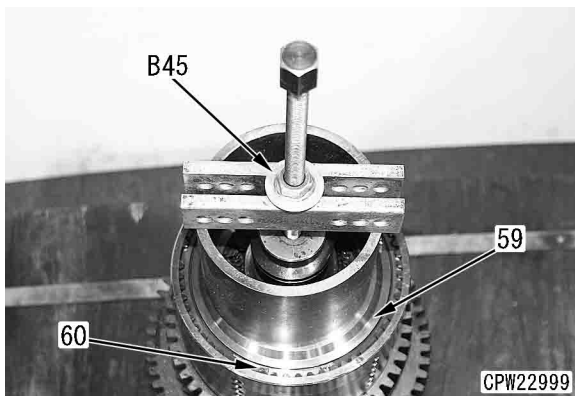


2) By using tool B46, remove bearing (57) and hub (58) as a unit.



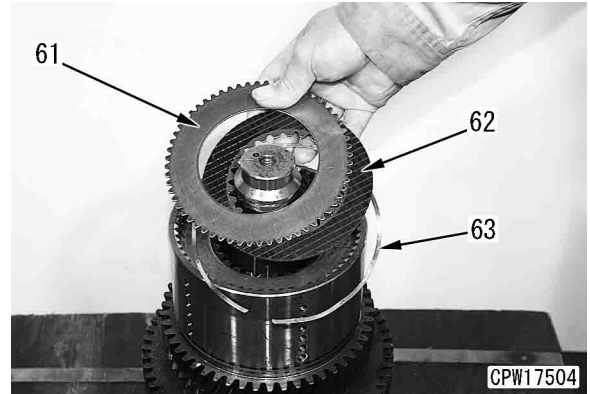
#### 11. End plate

- 1) Using tool B45, press end plate (59).
- 2) Remove snap ring (60).
- 3) Remove end plate (59).



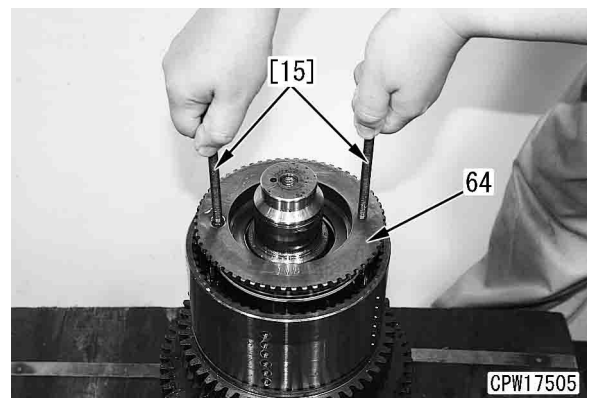
#### 12. Plate, disc, and spring

Remove plate (61), disc (62), and spring (63).

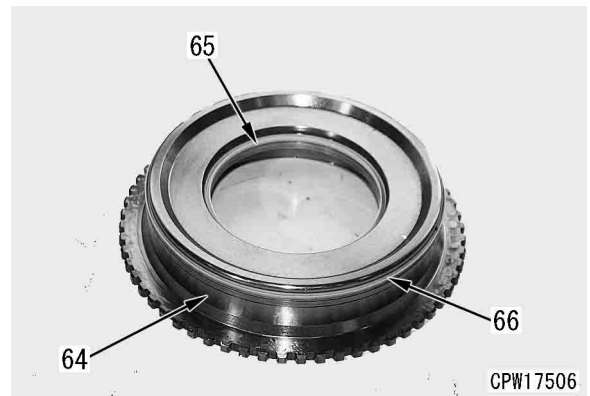


#### 13. Piston

- 1) By using bolts [15] (M8 x 1.25), remove piston (64).



- 2) Remove seal rings (65) and (66) from piston (64).



#### Assembly of 3rd and 4th clutch pack assembly

##### [4th clutch]

##### 1. Bearing


- 1) By using tool B43, remove bearing (67) and plate (68).
- 2) Remove bearing (69).

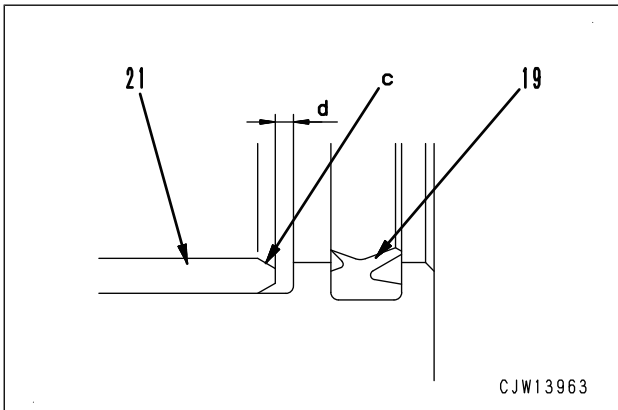
## 50 Disassembly and assembly

### Power train


- ★ Install bush (21) with chamfer (c) facing to the axle housing side so that clearance (d) is in the dimension as follows.


- Clearance (d): 0.5 mm

 **Contacting surface of front support bushing:**  
**Grease (G2-LI)**





[\*7]

 **Thrust cap mounting bolt:**  
**Adhesive (LT-2)**

 **Thrust cap mounting bolt:**  
**245 to 308 Nm {25 to 31.5 kgm}**


[\*8]

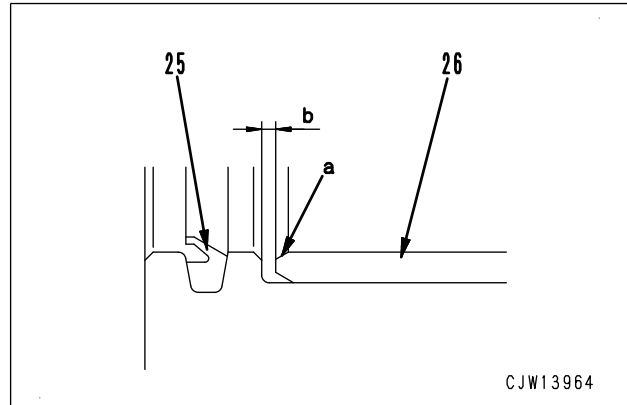
 **Thrust plate mounting bolt:**  
**Adhesive (LT-2)**

 **Thrust plate mounting bolt:**  
**245 to 308 Nm {25 to 31.5 kgm}**

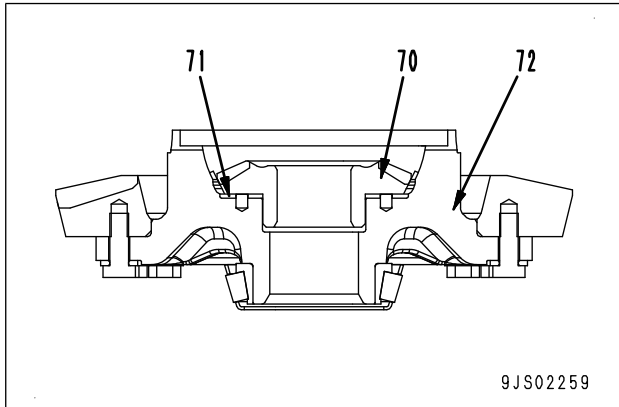
[\*9]

- ★ Securely install packing (25) to the groove with its lip facing to the axle housing side.
- ★ Install bush (26) with chamfer (a) facing to the axle housing side so that clearance (b) is in the dimension as follows.
  - Clearance (d): 0.5 mm

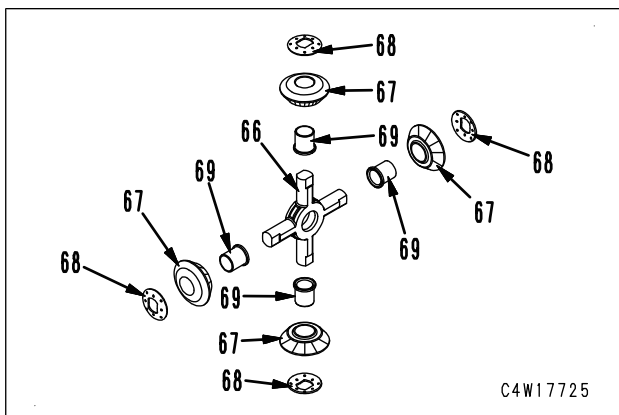
 **Contacting surface of support bushing:**  
**Grease (G2-LI)**



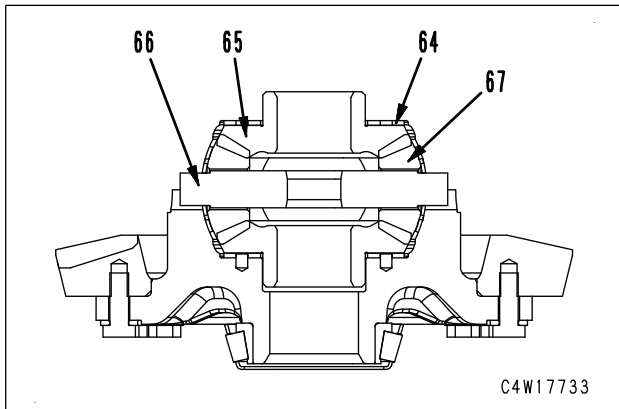
- **Air bleeding**  
Bleed air from the brake circuit. For details, see Testing and adjusting "Bleeding air from wheel brake circuit".



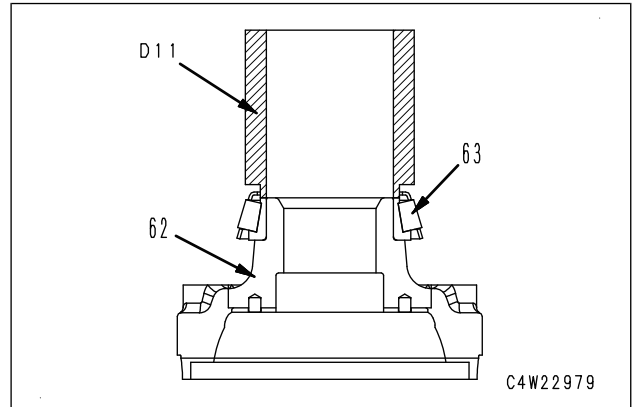
4) Install bushing (69), pinion gear (67), and spherical washer (68) to spider shaft (66).




5) Install pinion gear (67) and spider shaft (66) as a unit.  
6) Install side gear (65) and washer (64).

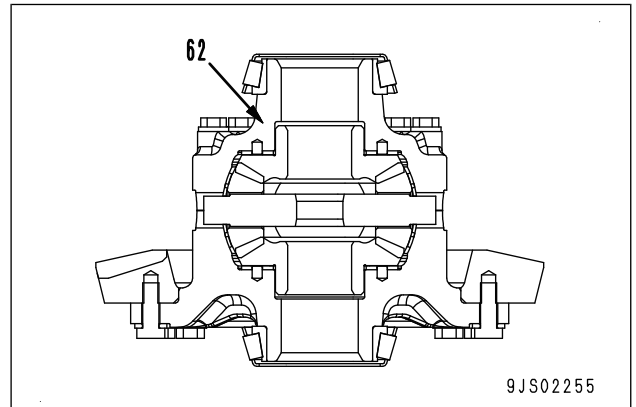


7) By using tool D11, press fit bearing (63) to case (62).




8) Install case (62).

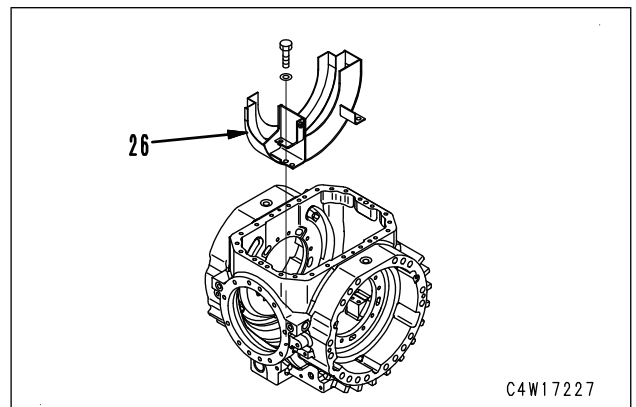
 **Mounting bolt:**  
**157 to 196 Nm {16 to 20 kgm}**



5. Gear cover  
Install gear cover (26) to the differential case.

 **Mounting bolt:**  
**Adhesive (LT-2)**

 **Mounting bolt:**  
**98 to 123 Nm {10.0 to 12.5 kgm}**



6. Shim adjustment of bearing carrier

1) Sling differential carrier assembly (23) and set it to its installed position in differential case (25).

**Removal and installation of full-length fender assembly** (WA470-H560-924-K-00-A)

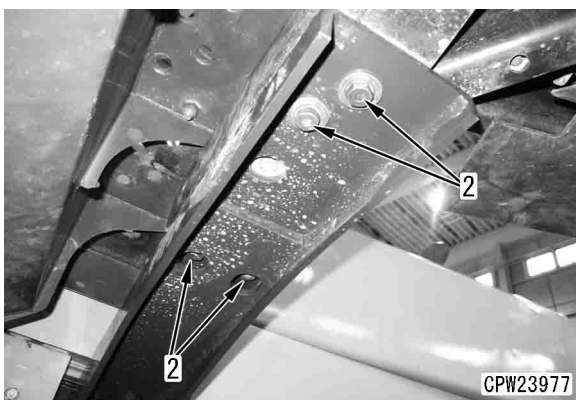
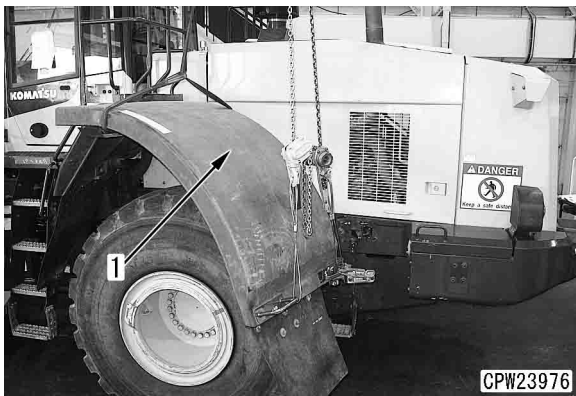
- ⚠ Place the machine on a level ground, and turn the parking brake switch to ON position.
- ⚠ Set the frame lock bar to LOCK position, and chock the wheels.
- ⚠ Lower the work equipment to the ground, and set the work equipment lock switch to LOCK.
- ⚠ Turn the starting switch to OFF position, and stop 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-H560-520-K-00-A)

1. Open and sling full-length fender assembly (1).
2. Remove mounting bolts (2) (4 pieces) from the bottom and sling and remove full-length fender assembly (1).



**Full-length fender assembly (1): 75 kg**



**Installation** (WA380-H560-720-K-00-A)

Perform installation in the reverse order to removal.

## Cab and its attachments (ALL-K000-001-K-00-A)

### Removal and installation of operator's cab and floor frame assembly (WA470-K000-924-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".)
- ⚠ Loosen the cap of the hydraulic tank slowly to release the pressure in the hydraulic tank.
- ⚠ If you disconnect the heater hose when the coolant in the radiator is still hot, you may be scalded. Wait until the coolant temperature drops before starting the work.
- ⚠ Collect the refrigerant (air conditioner gas: R134a) from the air conditioner circuit.
- ★ Never release the refrigerant (air conditioner gas: R134a) to the atmosphere.
- ★ Ask a qualified person for collecting, adding, and filling operations of the refrigerant (air conditioner gas: R134a).
- ⚠ If refrigerant gas (air conditioner gas: R134a) gets in your eyes, you may lose your sight. And if it touches your skin, you may suffer from frostbite. Accordingly, put on the protective eyeglasses, gloves and working suits with long sleeves for collecting and filling operations.

### Removal (WA470-K000-520-K-00-A)

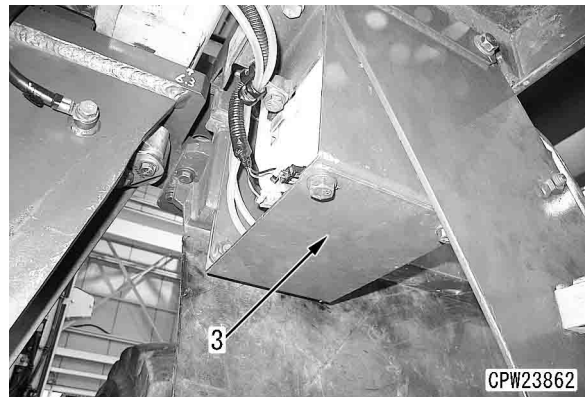
1. Collect refrigerant (air conditioner gas: R134a). [\*1]
  - Refrigerant to be collected: 1,100 ± 50 g
2. Remove the full-length fender assembly. For details, see "Removal and installation of full-length fender assembly".
3. Remove the engine hood assembly. For details, see "Removal and installation of engine hood assembly".
4. Remove the hydraulic tank assembly. For details, see "Removal and installation of hydraulic tank assembly".
5. Remove covers (1) on right and left sides.



6. Remove right fender rubber cover (2).



7. Remove cover (3).



8. Disconnect connectors R43 (5) and R45 (6) of washer tank (4).
  - R43 (front: black), R45 (rear: white)
9. Disconnect washer hoses (7).
  - ★ Remove clamp (7a) as well.

## 50 Disassembly and assembly

### Cab and its attachments

---



#### O-ring and threaded portion:

##### Compressor oil (DENSO: ND-OIL8)

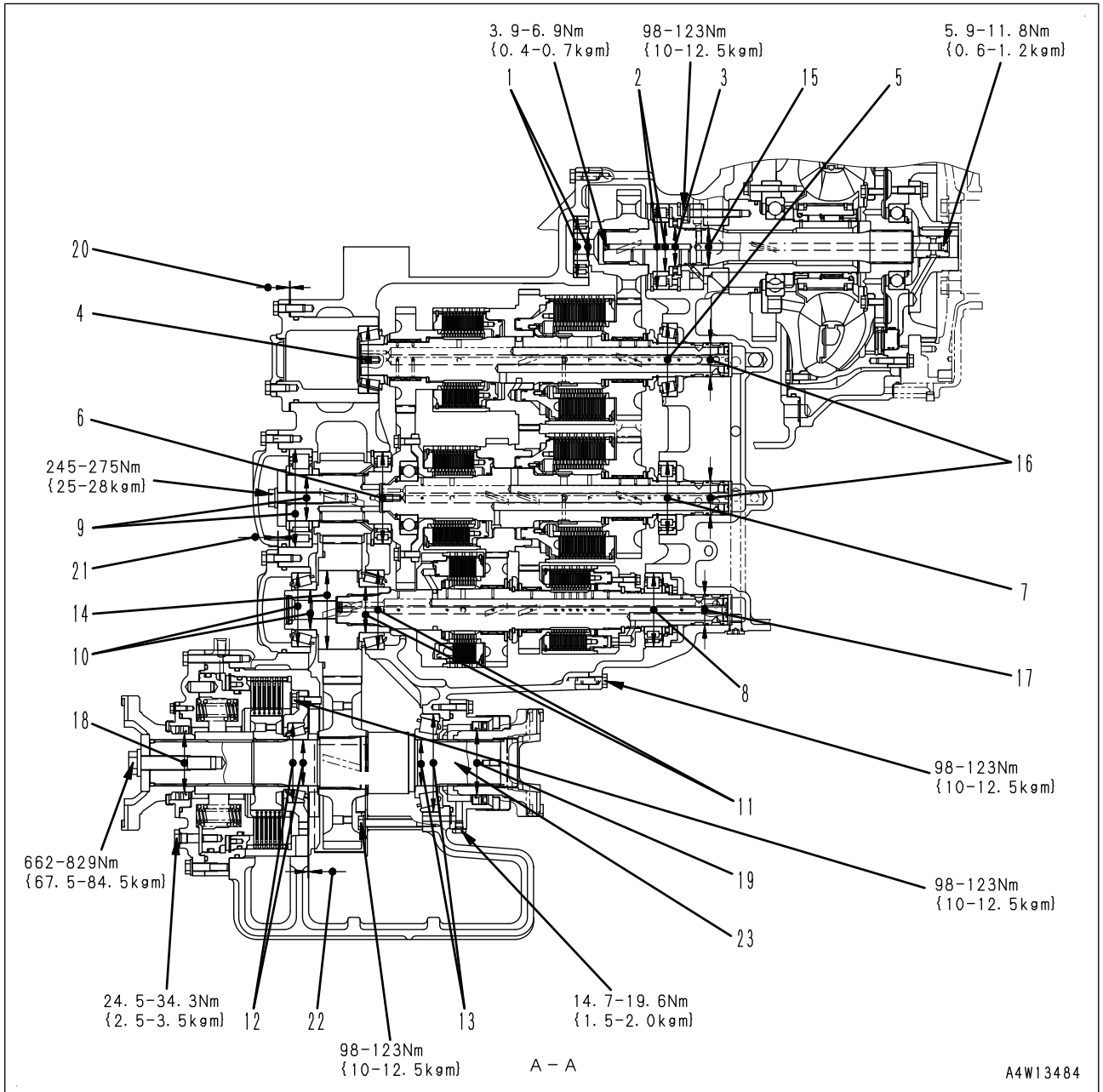
- When tightening the sleeve nut of air conditioner pipes, tighten them by using 2 wrenches.



#### Screw size (M6 x 1.0) (width across flats: 10 mm):

**8 to 12 Nm {0.8 to 1.2 kgm}**

- ★ Fill it with refrigerant (air conditioner gas: R134a).
- Filling quantity: 1100 ± 50 g



A4W13484

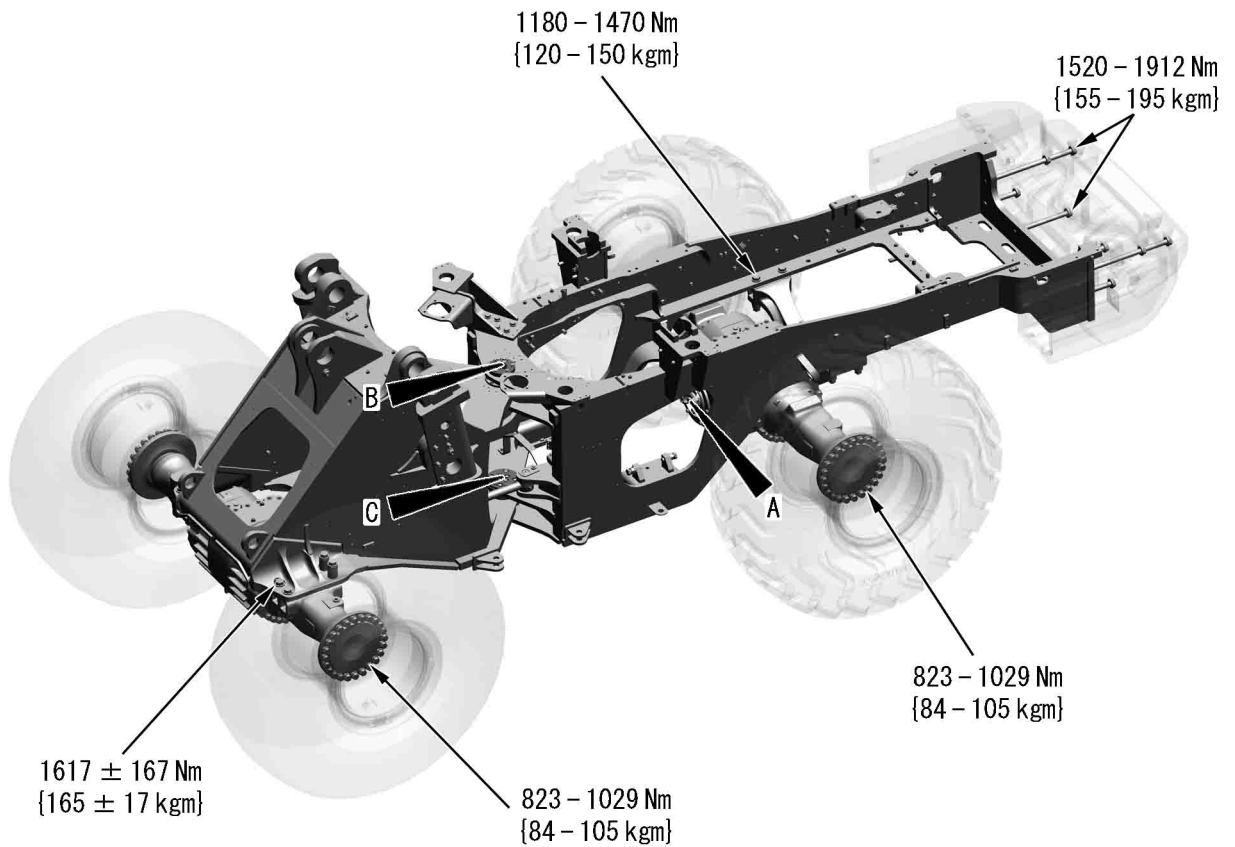
## 60 Maintenance standard

### Differential

						Unit: mm	
No.	Item	Criteria				Remedy	
		Standard dimension	Tolerance		Repair limit		
1	Thickness of washer	4	±0.05		3.8	Replace	
		4.1					
2	Thickness of plate	3.1	±0.02		3.0		
		3.2					
3	Thickness of disc	3.6	±0.07		3.5		
4	Clearance between spider and differential pinion	Standard dimension 35	Tolerance		Standard clearance 0.110 to 0.210		Allowable clearance —
			Shaft	Hole			
			-0.11	+0.05			
			-0.16	0			
5	Backlash between case and plate	0 to 0.5					
6	Clearance between disc and plate (total of clearances on both sides)	0.2 to 0.75 (when a load of 70 kg is applied)					
7	Backlash between side gear and disc	0.13 to 0.32					
8	Axial end play of side gear (one side)	0.2 to 0.4 (when measured at one side), 0.4 to 0.8 (when measured at both sides)					

**Undercarriage and frame** (ALL-DT00-001-K-00-A)





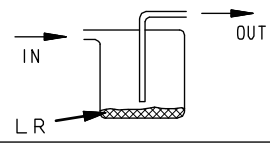
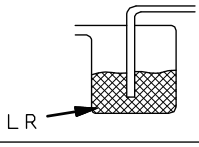
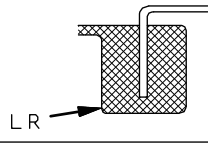
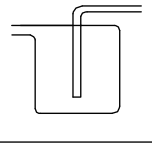
**Axle mount and center hinge pin** (WA470-H1K0-034-K-00-A)



APW13508



S: Condition viewed through sight glass  
 R: Receiver drier internal condition  
 LR: Liquid refrigerant

	A: LOW	B: OK	C: OVER or NONE
S		 	
R			 

B4P20617

\*3 If the refrigerant leaks from a place, the compressor oil circulating in the air conditioner circuit also leaks from that place.

In such a case, retighten according to the tightening torque table in "Precautions for disconnecting and connecting air conditioner piping."

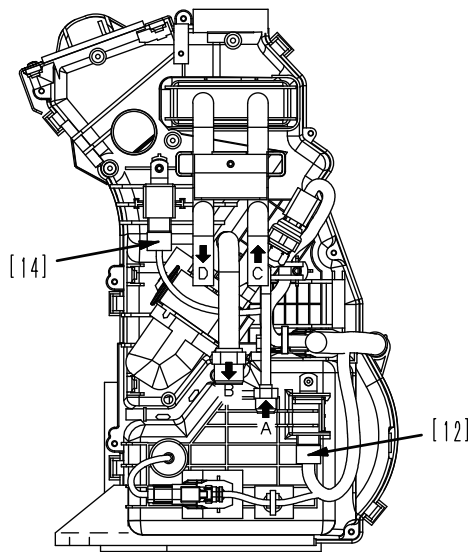
\*4: Start the engine, turn the air conditioner switch ON, and check.

## Testing relays (WA380-K5FE-360-K-00-A)

- ★ If air conditioner is normal (cool) and air blow out, it is normal. Skip trouble shooting.
- ★ Listen closely to the relay to check whether or not it is defective.

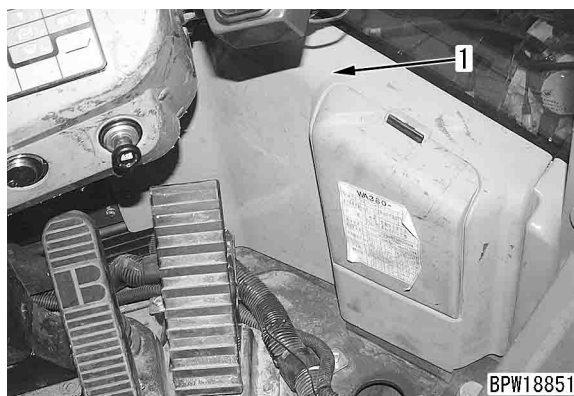
There are two relays as follows. (See "Parts and connectors layout".)

- Blower OFF relay: ON/OFF of fan motor (connector [12])
  - Compressor relay: ON/OFF of air conditioner compressor (clutch) (connector [14])
- ★ To check blower OFF relay, hot water hose should be removed. Otherwise it cannot be checked.



B4W19265

1. Remove cover (1).



2. Turn starting switch to ON position (engine stopped), turn main switch of air conditioner ON, then blower OFF relay is turned ON if it is normal. Check that a click is heard.
  3. Turn air conditioner switch to ON position, compressor relay is turned ON if it is normal. Check that a click is heard.
- ★ The controller panel will not turn on the compressor relay in the following cases.
    - 1) When evaporator temperature is 3°C or below (with evaporator temperature sensor)
    - 2) When the pressure switch detects abnormality (it is turned OFF).

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: [www.heydownloads.com](http://www.heydownloads.com) by clicking the link below



- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL