

Shop Manual

WHEEL LOADER

WA500-7

SERIAL NUMBERS 10001 and up

KOMATSU

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Fire prevention (ALL-0000-001-K-27-A)

Action if fire occurs (ALL-0000-17A-K-01-A)

- Turn the starting switch to the OFF position to shutdown the engine.
- Use the handrails and steps to get off the machine.
- Do not jump off the machine. You may fall or suffer serious injury.
- The fume generated by a fire contains harmful materials which have a bad influence on a human body when they are sucked. Don't breathe a fume.
- After a fire, there may be harmful compounds left. If it touches your skin it may have a bad influence on your body.
Be sure to wear rubber gloves when handle the materials left after the fire.
The material of the gloves, which is recommended is polychloroprene (Neoprene) or polyvinyl chloride (in the lower temperature environment).
When wearing cotton-work-gloves, wear rubber gloves under them.

Prevent fire (ALL-0000-17B-K-03-A)

• Fire caused by fuel, oil, coolant or window washer fluid

Do not bring any flame or fire close to flammable substances such as fuel, oil, coolant or window washer fluid. There is danger that they may catch fire. Always observe the following.

- Do not smoke or use any flame near fuel or other flammable substances.
- Shut down the engine before adding fuel.
- Do not leave the machine when adding fuel or oil.
- Tighten all the fuel and oil caps securely.
- Be careful not to spill fuel on overheated surfaces or on parts of the electrical system.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the workplace.
- When washing parts with oil, use a non-flammable oil. Do not use diesel oil or gasoline. There is danger that they may catch fire.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.
- Determine well-ventilated areas for storing oil and fuel. Keep the oil and fuel in the specified place and do not allow unauthorized persons to enter.
- When performing grinding or welding work on the machine, move any flammable materials to a safe place before starting.



9JD01720



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• Fire caused by accumulation or attachment of flammable material

- Remove any dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated or attached to or around the engine exhaust manifold, muffler, or battery, or on the undercovers.
- To prevent fires from being caught, remove any flammable materials such as dry leaves, chips, pieces of paper, coal dust, or any other flammable materials accumulated around the cooling system (radiator, oil cooler) or on the undercover.

• Fire coming from electric wiring

Short circuits in the electrical system can cause fire. Always observe the following.

- Keep all the electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Reconnect any loose connectors or refasten wiring clamps. Repair or replace any damaged wiring.

• Fire caused by piping

Check that all the clamps for the hoses and tubes, guards, and cushions are securely fixed in position.

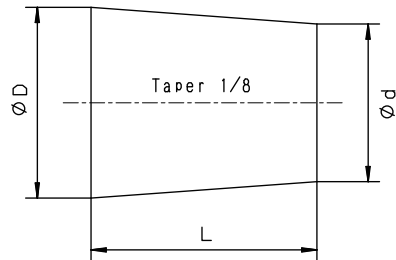
If they are loose, they may vibrate during operation and rub against other parts. There is danger that this may lead to damage to the hoses and cause high-pressure oil to spurt out, leading to fire and serious personal injury or death.

• Fire around the machine due to highly heated exhaust gas

This machine is equipped with KDPF (Komatsu Diesel Particulate Filter).

If the part is not under hydraulic pressure, the following corks can be used.

Nominal No.	Part No.	Dimensions		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34



DEW00401

Precautions for installation work

- Tighten all of the bolts and nuts (sleeve nuts) to the specified torque (KES).
 - Install the hoses without twist and interference, and securely fasten the clamps located in-between if they are.
 - Replace all of the gaskets, O-rings, cotter pins, and lock plates with new parts.
 - Bend the cotter pins and lock plates securely.
 - When applying adhesive, clean and degrease the part, and apply two to three drops of adhesive to the threaded portion.
 - When applying liquid gasket, clean and degrease the surface, and apply it uniformly after making sure that the surface is free from dirt or damage.
 - Clean all of the parts, and correct any damage, dents, burrs, or rust found on them.
 - Coat the rotating parts and sliding parts with engine oil.
 - Coat the surfaces of the press-fitting parts with molybdenum disulfide lubricant (LM-P).
 - After installing the snap ring, check that the snap ring is settled in the ring groove completely.
 - When connecting wiring harness connectors, clean the connectors to remove oil, dirt, or water, then connect them securely.
 - Use the eye bolts with no fatigue and deformation and screw them in securely. Match the directions of the eyes and the hook.
 - When installing split flanges, tighten the bolts uniformly and alternately to prevent excessive tightening on one side.
- ★ When the hydraulic cylinder is used for the first time after reassembly of the hydraulic equipment such as the hydraulic cylinder, pump, etc. and piping after removing them for repair, be sure to perform air bleeding of the hydraulic circuit according to the following procedure.
1. Start and run the engine at low idle.
 2. Repeat the operation to extend and retract each cylinder of the work equipment to approximately 100 mm before the stroke end four to five times.
 3. Operate the hydraulic cylinder three to four times to the end of its stroke.

01 Specification

Specification

Engine

Machine model		WA500-7
Serial number		10001 and up
Model		SAA6D140E-6
Type		4-cycle, water-cooled, in-line vertical, direct injection, with turbocharger, air-cooled aftercooler, and cooled EGR
No. of cylinders – bore x stroke	mm	6 - 140 x 165
Total piston displacement	ℓ {cc}	15.2 {15,240}
Performance (In P mode)	Flywheel horsepower	
	• SAE J1995[Gross](^{*1})	266 {357}/1,900 {1,900}
	• ISO 14396	266 {357}/1,900 {1,900}
	• ISO 9249/SAE J1349[Net](^{*2})	263 {353}/1,900 {1,900}
	Max. torque (^{*1})	1,784 {182}/1,250 {1,250}
	Fuel consumption ratio at rated horsepower	221 {162}
	Max. speed with no load	2,120 {2,120}
	Min. speed with no load	790 {790}
	Min. low idle (^{*4})	700 {700}
Starting motor		24 V, 11 kW
Alternator		24 V, 90 A
Battery (^{*3})		24 V, 136 Ah (165 G51), 2 pieces

Power train

Machine model		WA500-7
Serial number		10001 and up
Torque converter		3-element, 1-stage, 2-phase
Transmission		Planetary type, multiple disc type, 4 forward/reverse gear speed type
Reduction gear		Spiral bevel gear, splash lubrication type
Differential		Straight bevel gear type
Final drive		Single reduction planetary gear, splash lubrication type

^{*1}: Indicates the value of the basic engine (without cooling fan).

^{*2}: Indicates the value at the minimum cooling fan speed.

^{*3}: The battery capacity (Ah) is indicated in the 5-hour rate.

^{*4}: Indicates the low idle speed when the work equipment control lever is in NEUTRAL for at least 10 seconds while the auto-decelerator setting is ON and the directional lever is in NEUTRAL.

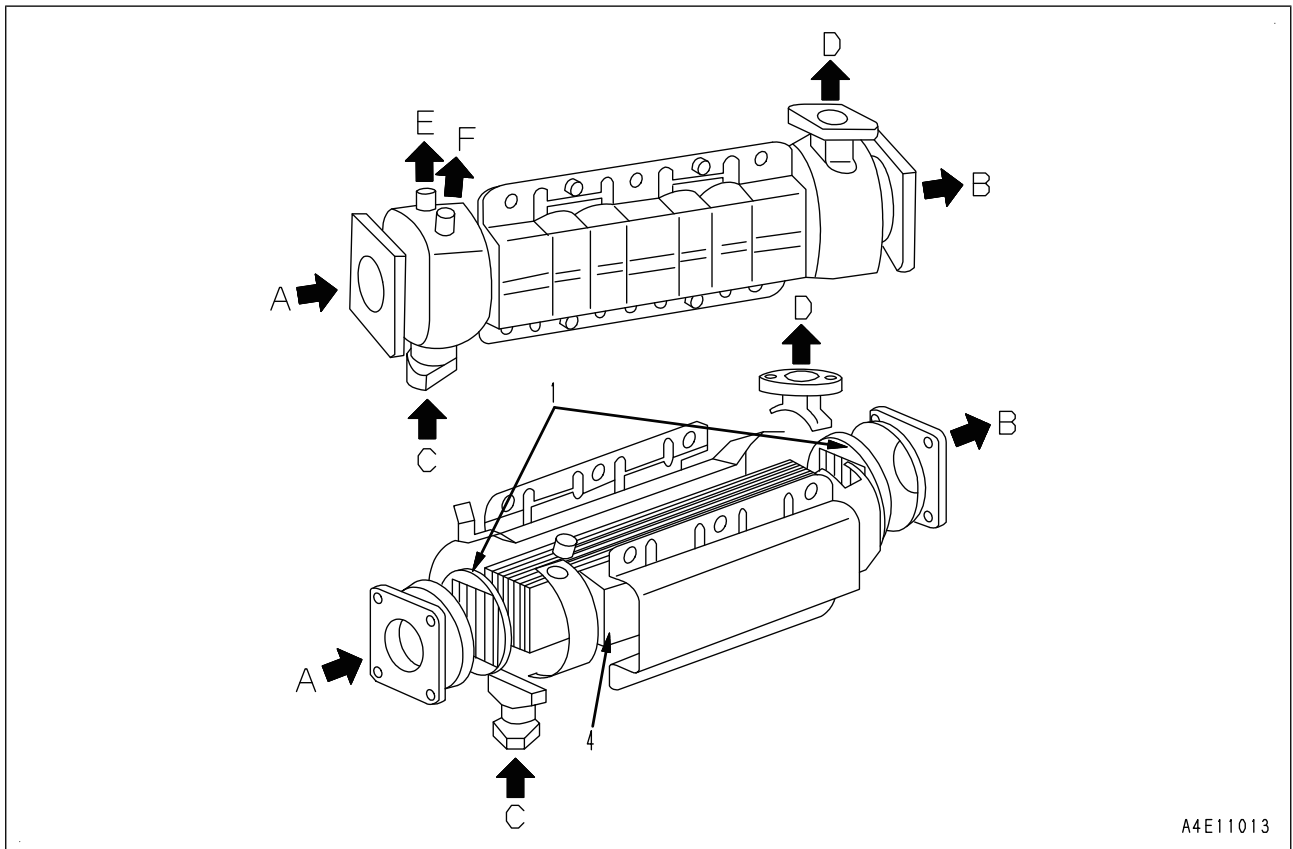
★ The engine flywheel horsepower is indicated in the net value and gross value. The gross denotes the flywheel horsepower measured on the basic engine unit, while the net denotes the value measured of an engine under the condition essentially the same as that when it is installed on a machine.

★ Following shows the flywheel horsepower (net) at the maximum cooling fan speed.

250 kW {335 HP}/1,900 min⁻¹ {rpm}

EGR cooler (ENG125-A9L0-041-K-00-A)

★ The shape is subject to machine models.



1. Header plate

4. Shell

A: EGR gas inlet

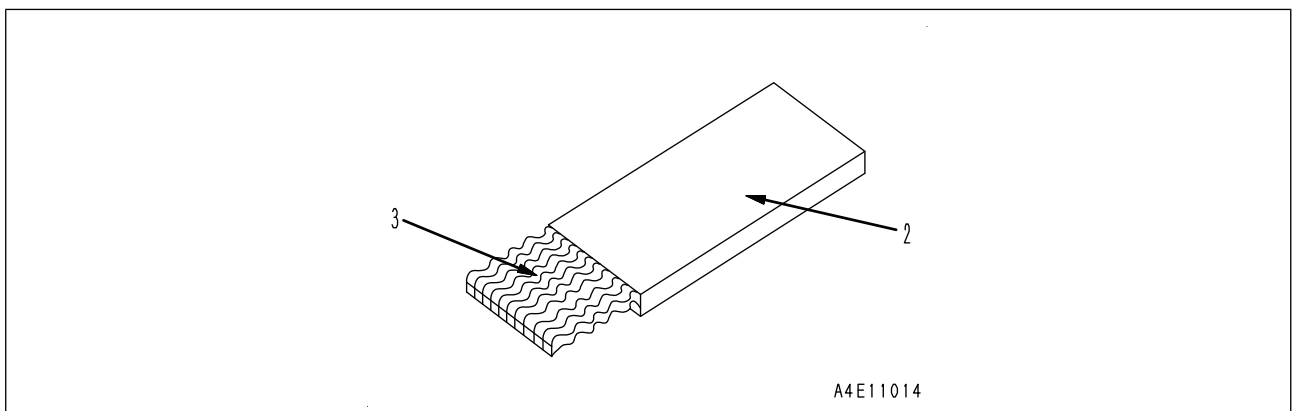
B: EGR gas outlet (to EGR valve)

C: Coolant inlet

D: Coolant outlet

E: Air vent

F: Air vent



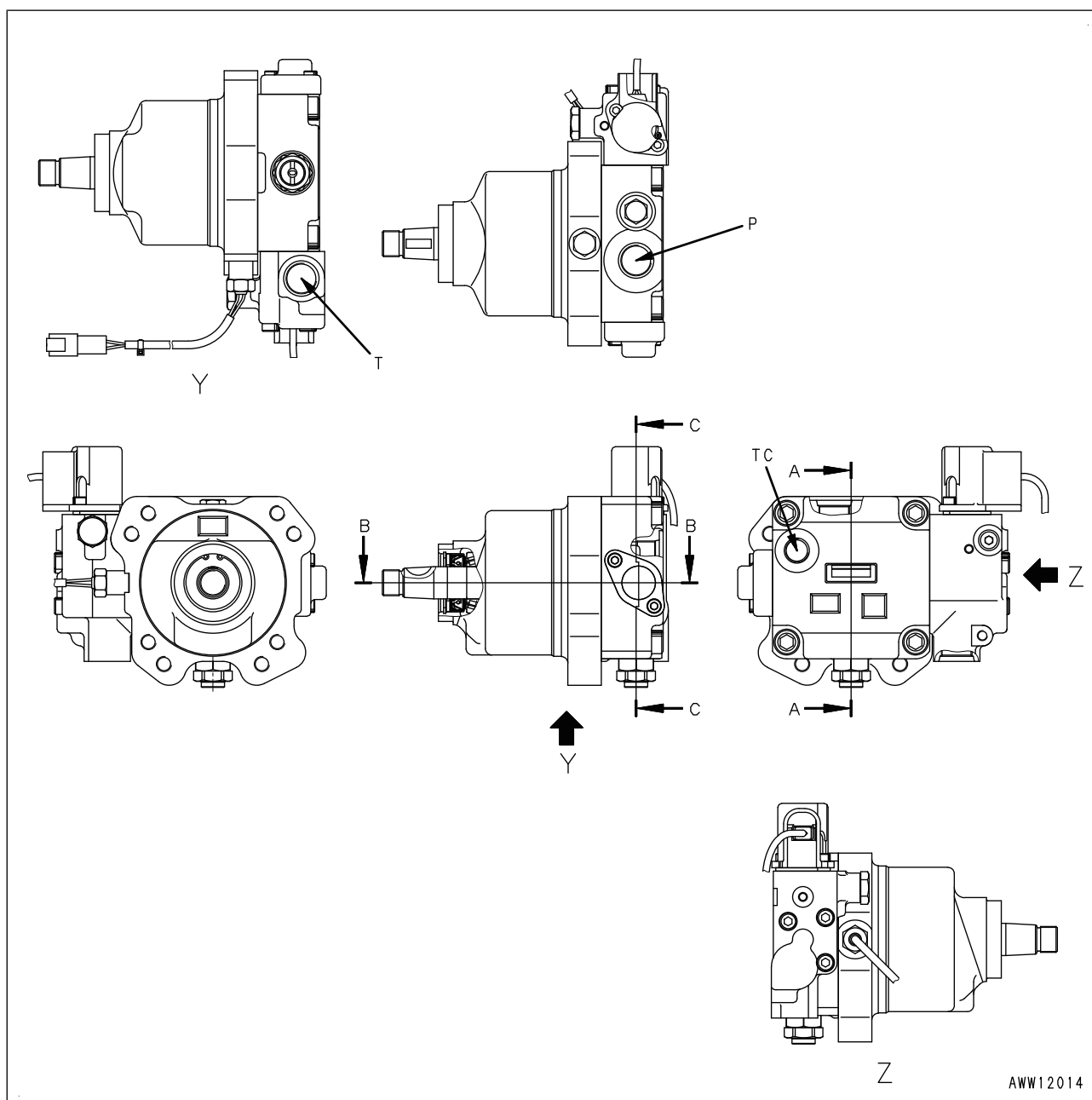
2. Flat tube

3. Inner fin

Operation (ENG125-A9L0-044-K-00-A)

- The EGR gas enters from (A) and flows through 9 flat tubes (2).

Cooling fan motor (WA380-B5L0-041-K-00-A)



P: From fan pump

T: To oil cooler

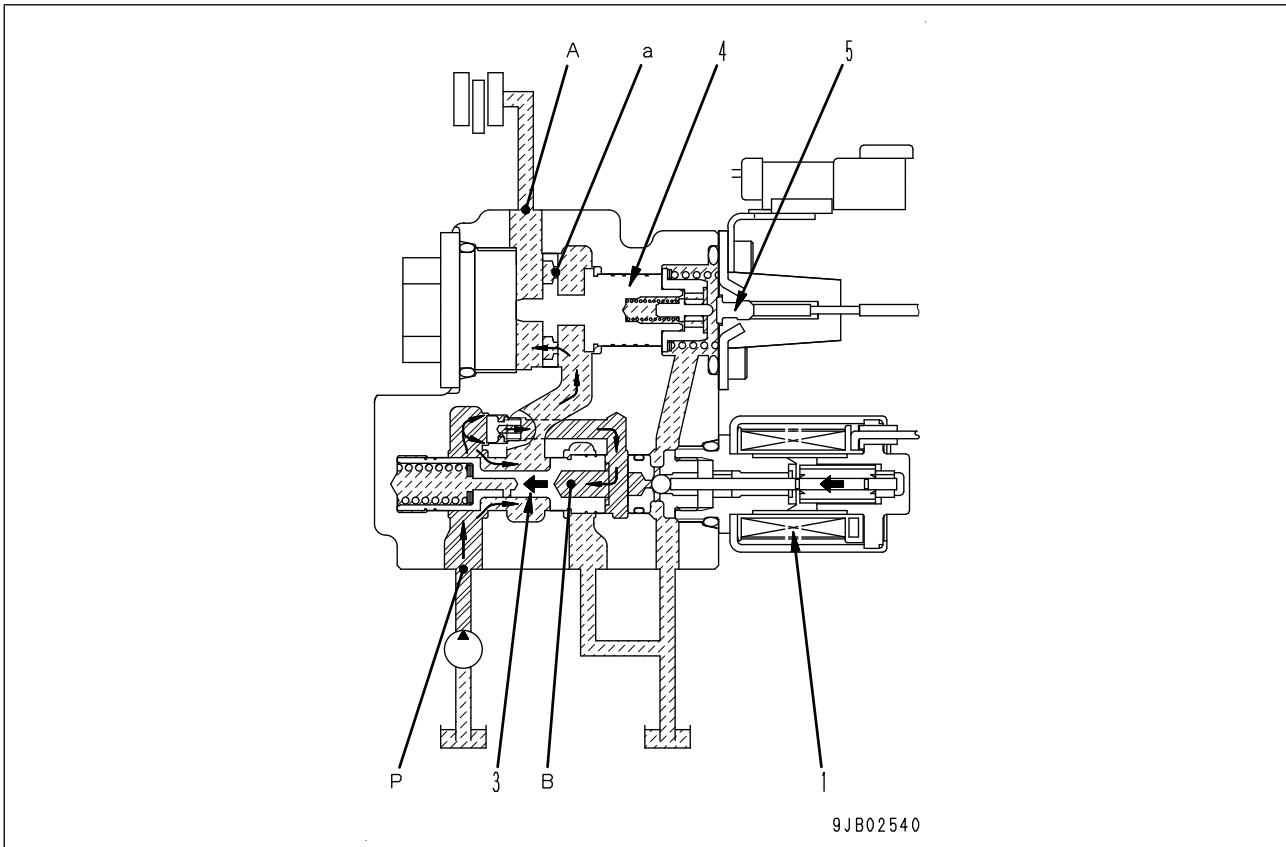
TC: To hydraulic tank

- 3. Transmission
- 4. Emergency steering pump mounting location
- 5. Oil filler pipe mounting location
- 6. Speed sensor
- 7. Transmission control valve
- 8. Torque converter drain tube mounting location
- 9. Drain valve
- 10. Drain plug
- 11. Transmission lubricating oil temperature sensor
- 12. Strainer

10 Structure and function

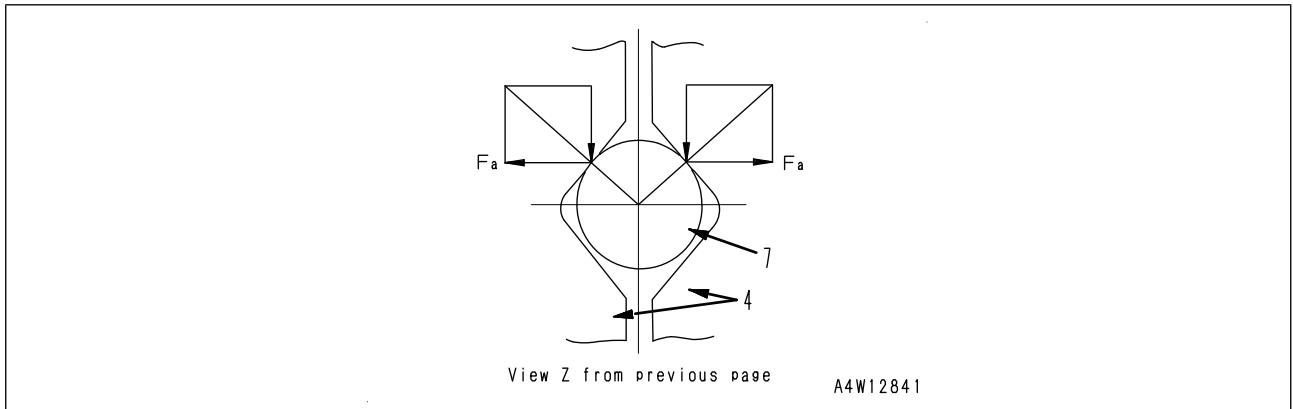
Forward and reverse clutch ECMV and gear speed clutch ECMV

Filling phase (range B in chart)



- When the current flows to proportional solenoid (1) while there is no oil in the clutch, the hydraulic force balanced with the solenoid force is applied to chamber (B) to push pressure control valve (3) to the left. As a result, the oil flows into the clutch chamber through pump port (P) and orifice (a) of flow detecting valve (4). At this time, differential pressure is caused between the upstream and downstream across the orifice (a) of flow detecting valve (4). This differential pressure pushes flow detecting valve (4) to the left. When the clutch chamber is filled with the oil and the oil does not flow from pump port (P) to clutch port (A) any more, the differential pressure over orifice (a) of flow detecting valve (4) is lost and the oil pressure pushes flow detecting valve (4) to the right, and fill switch (5) is turned "ON".

<Mechanism of generating braking torque to right and left side gears (6)>

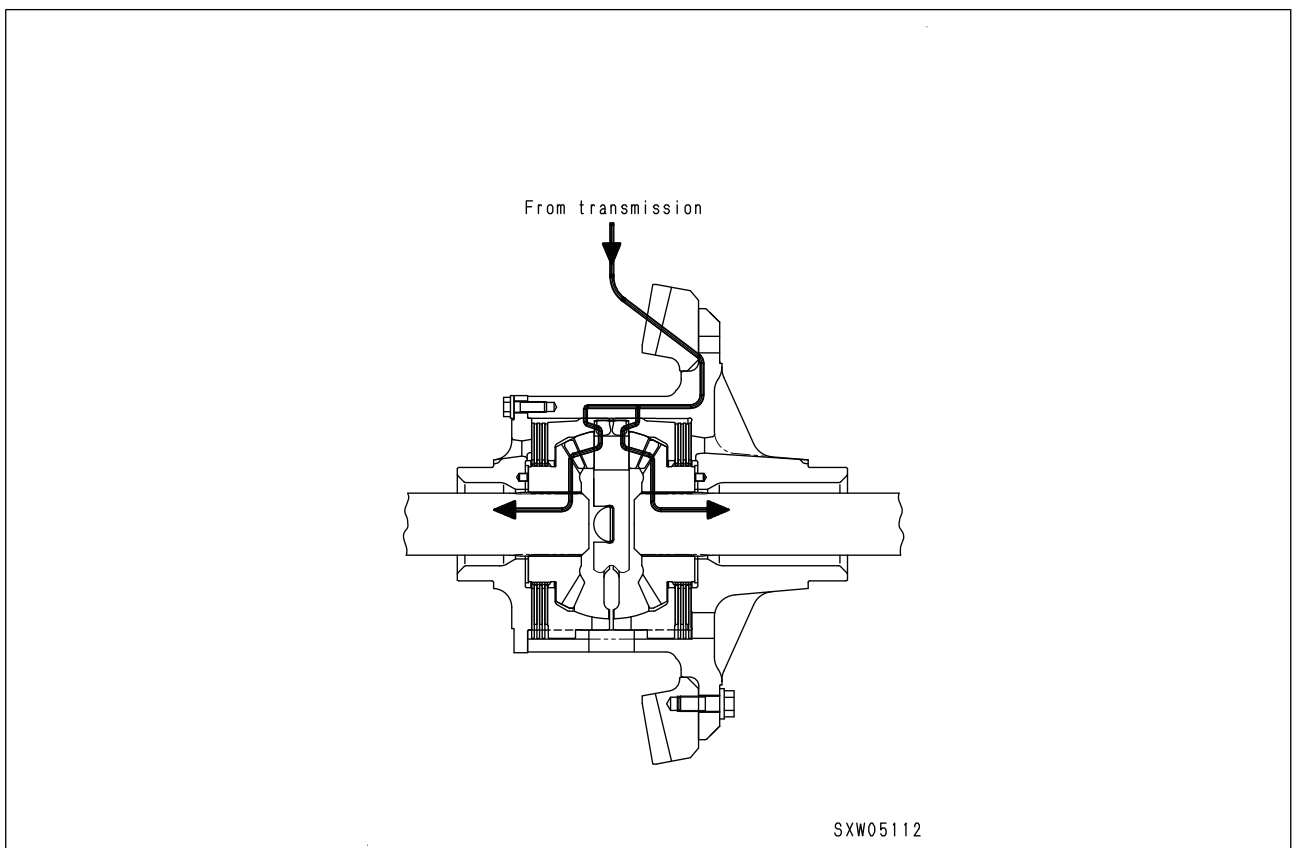


Shaft (7) is supported on the cam surfaces made on the surfaces of pressure rings (4) that are facing each other. The power (= torque) from pressure rings (4) is transmitted to shaft (7) through the cam surfaces. Force F_a to separate right and left pressure rings (4) is generated by inclination of the cam surfaces in proportion to the transmitted torque.

This separating force (F_a) acts on the brakes on the back of right and left side gears (6) to generate braking torque.

<When machine is traveling straight>

1. When the driving forces of the right and left wheels are balanced

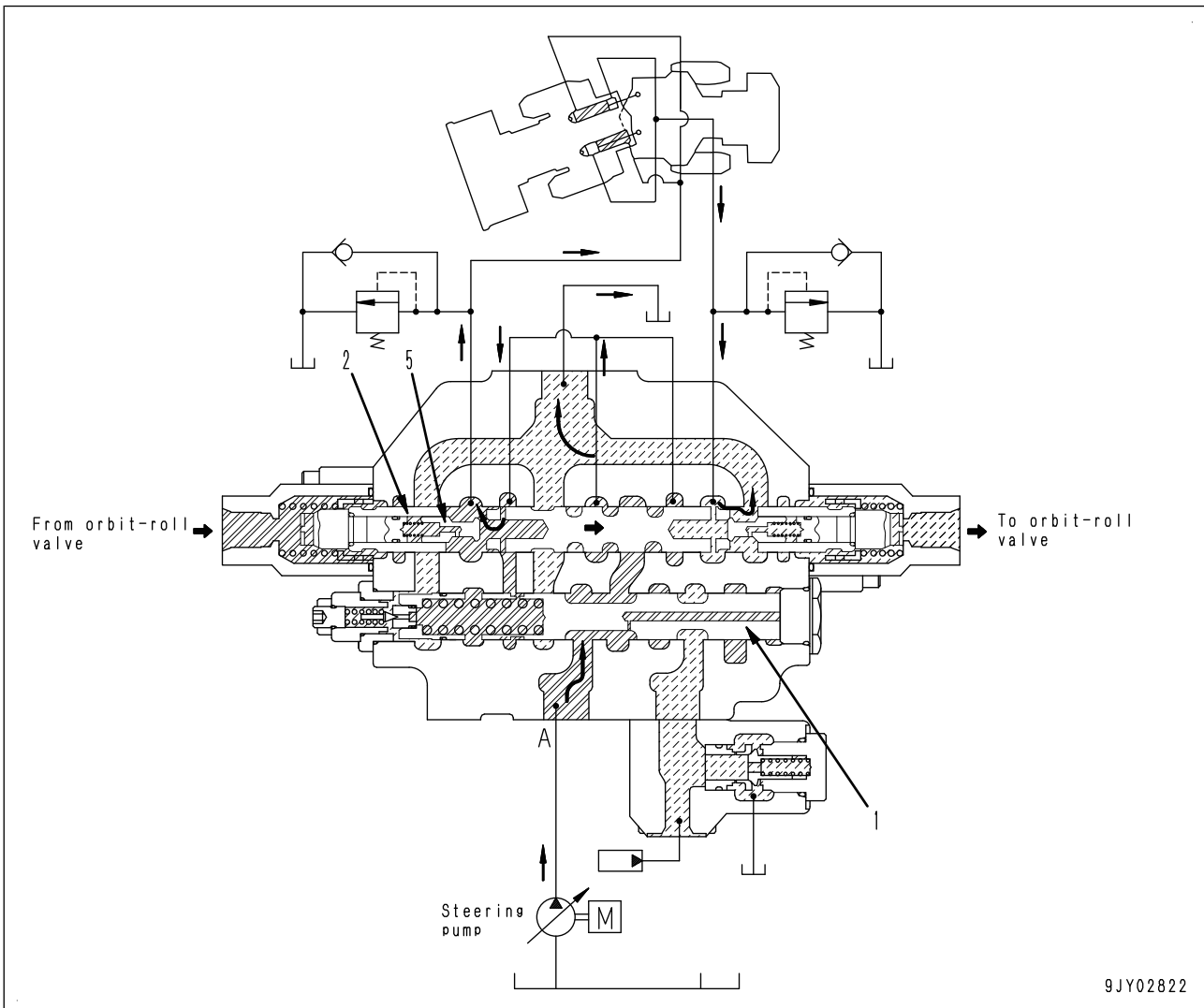


[When road conditions (friction coefficient) under the right and left wheels and the wheel loads are even and the center of load on the bucket is not shifted]

The power from the transmission is distributed evenly by the differential gear to the right and left. Since the wheel slip limits on the right and left sides are the same under this condition, both wheels slip and the differential does not operate even if the power from the transmission exceeds the wheel slip limit.

No load is applied to the brake on the back of each side gear.

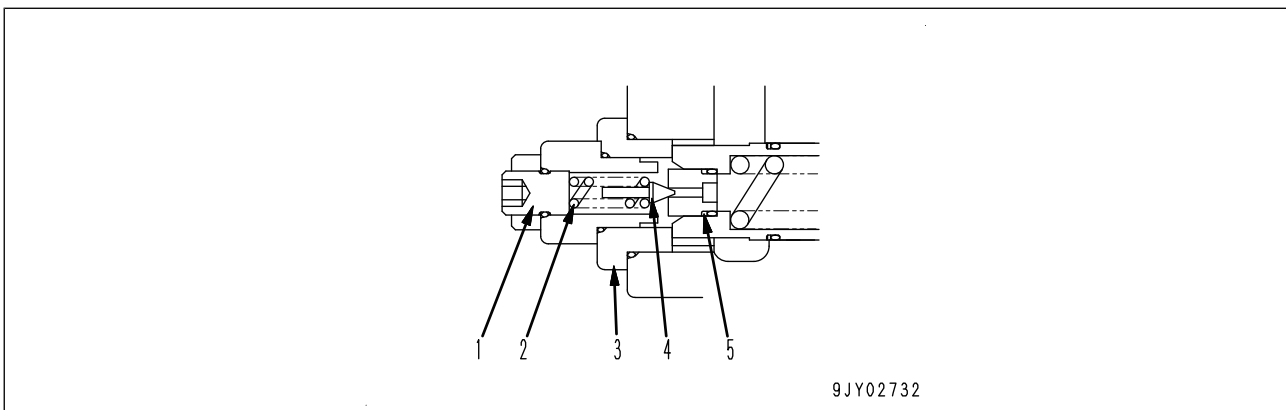
When machine turns to left



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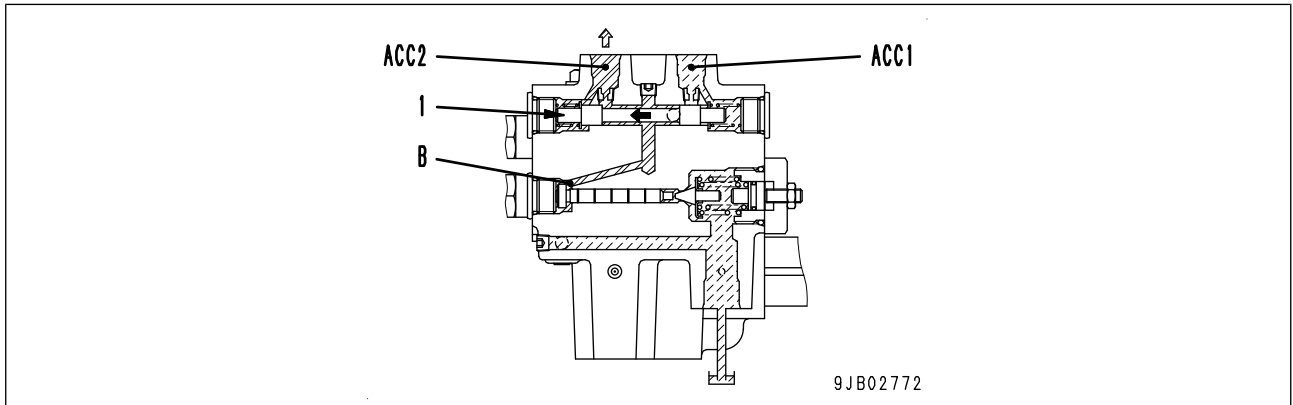
- When the steering wheel is turned to the left, the orbit-roll valve operates and steering spool (2) moves to the right.
The oil from the steering pump flows into port (A), and then flows through control spool (1) into steering spool (2), push opens load check valve (5) of the spool, and flows into the rod side of the L.H. cylinder and into the bottom side of the R.H. cylinder to turn the machine to the left.
- The return oil from the the right and left cylinders is drained through the passage inside steering spool.

Steering relief valve (WA500-F590-041-K-00-A)



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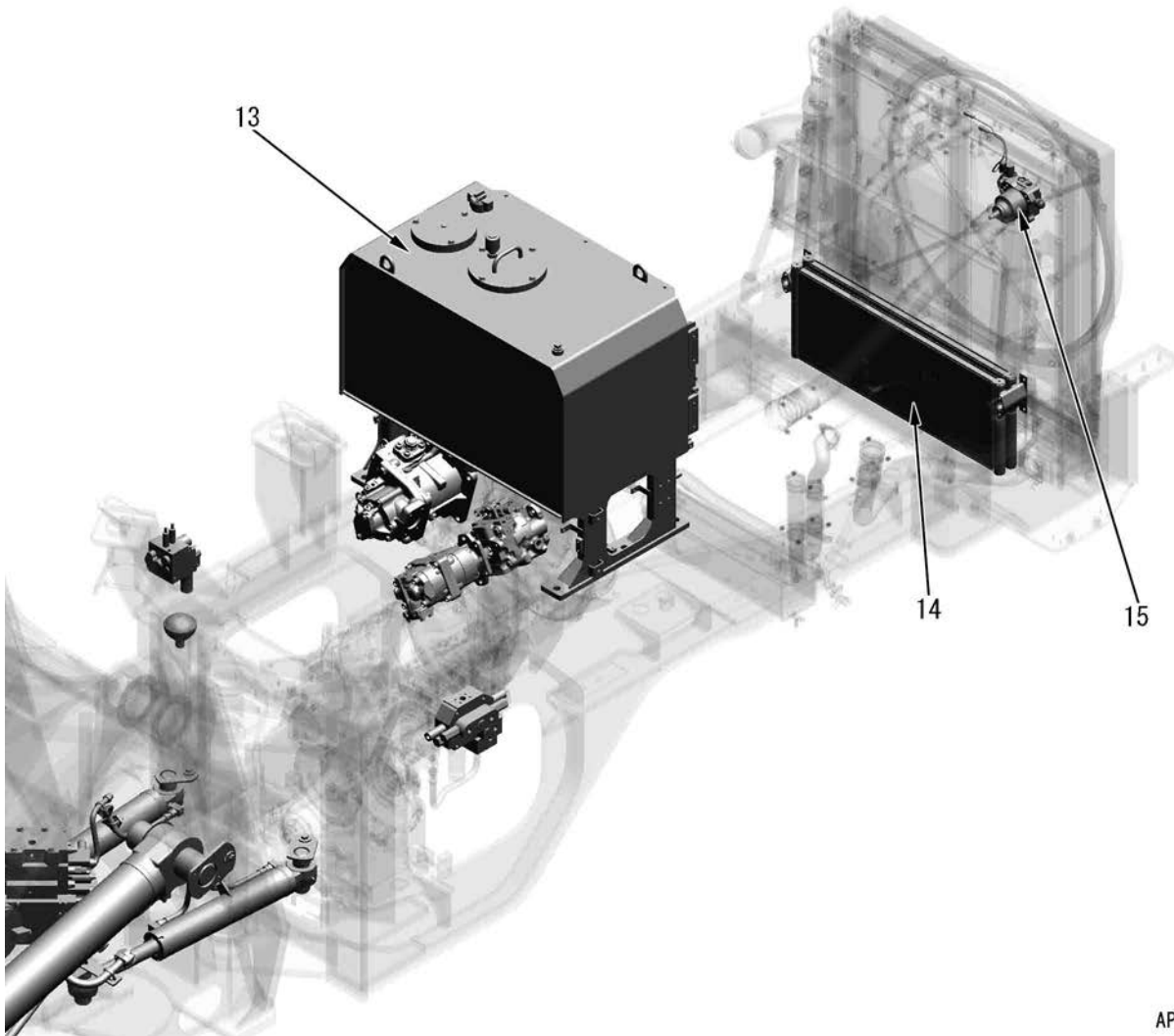
1. Adjustment screw
2. Spring



- When the pressure in port (ACC1) is higher than the pressure in port (ACC2), shuttle valve (1) moves to the left to disconnect port (ACC1) and oil passage (B).
- The open area between port (ACC2) and oil passage (B) increases and the oil is supplied to the accumulator on the port (ACC2) side.
- When the pressure in port (ACC2) is higher than port (ACC1), the oil is supplied to the accumulator on the port (ACC1) side.
- The pressurized oil from the pump is supplied first to the lower pressure circuit of the two systems.

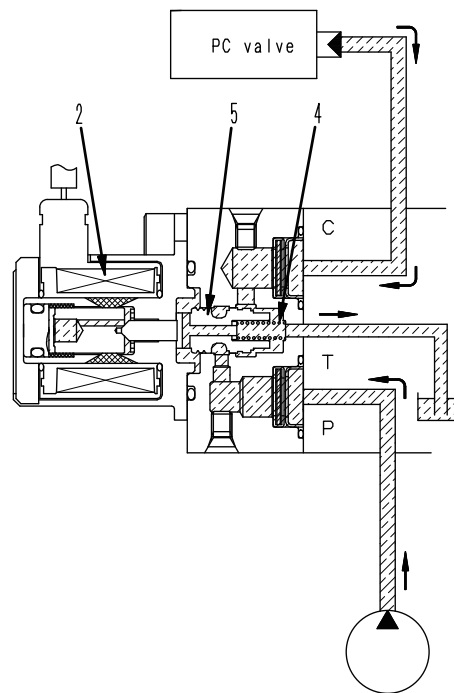
10 Structure and function

Hydraulic component layout



APW12726

1. Control valve
2. Bucket cylinder
3. Accumulator (for PPC circuit)
4. Charge valve
5. Work equipment pump
6. Cooling fan pump
7. Steering pump
8. Steering control valve
9. 2-spool gear pump (power train charge pump (1) and power train charge pump (2))
10. Steering cylinder
11. Lift cylinder
12. Accumulator (for ECSS)
13. Hydraulic tank
14. Hydraulic oil cooler
15. Cooling fan motor



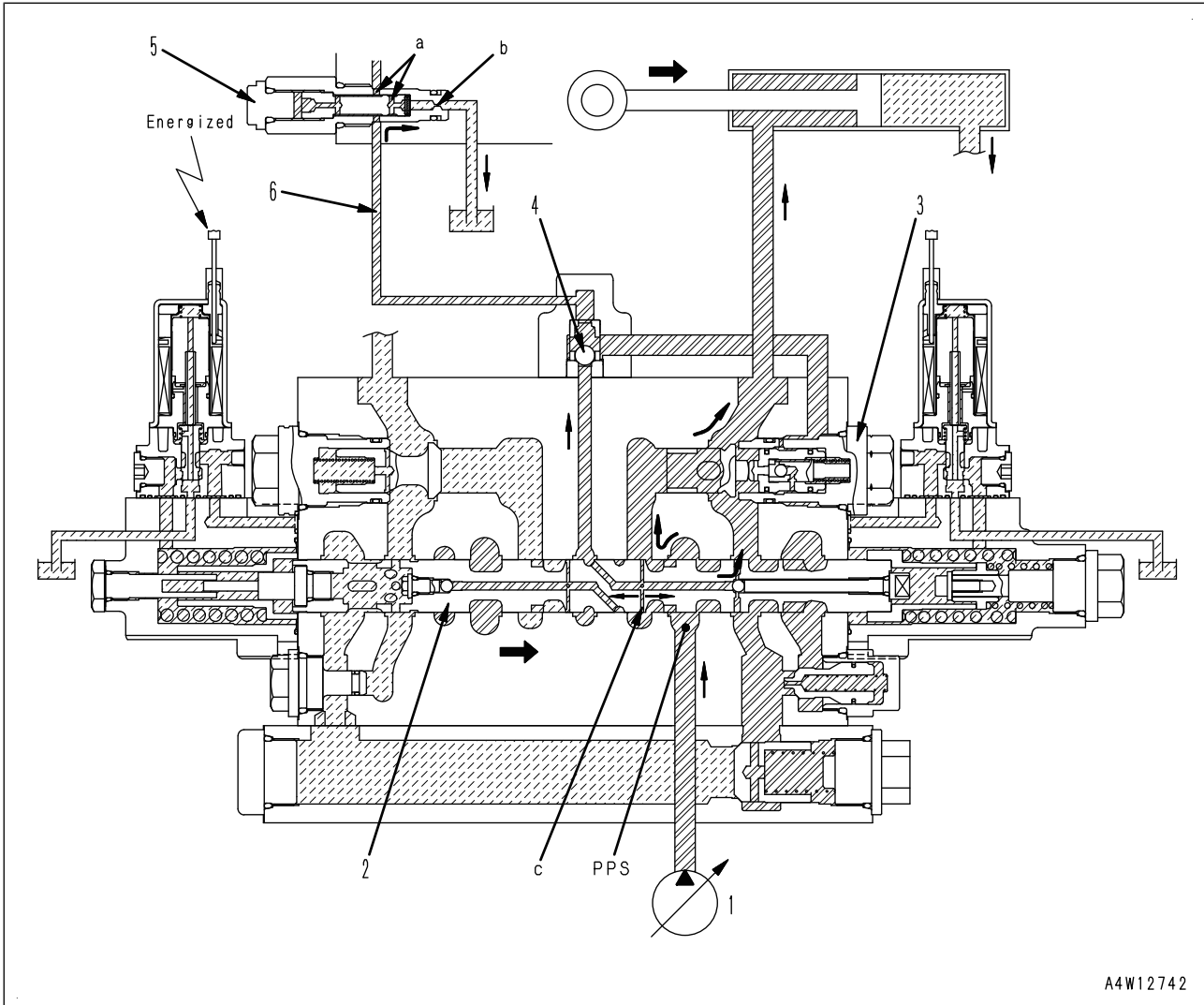
A4W12648

10 Structure and function

Hydraulic circuit diagram and names of valves

- When the pressure in actuator circuit (B) increases to the necessary pressure, pump discharge pressure (PPS) increases.
- Check valve (5) in main spool (2) opens and the high pressure oil of LS circuit (PLS) flows into actuator circuit (B).
- The pressure in LS circuit (PLS) becomes almost the same as that in actuator circuit (B).

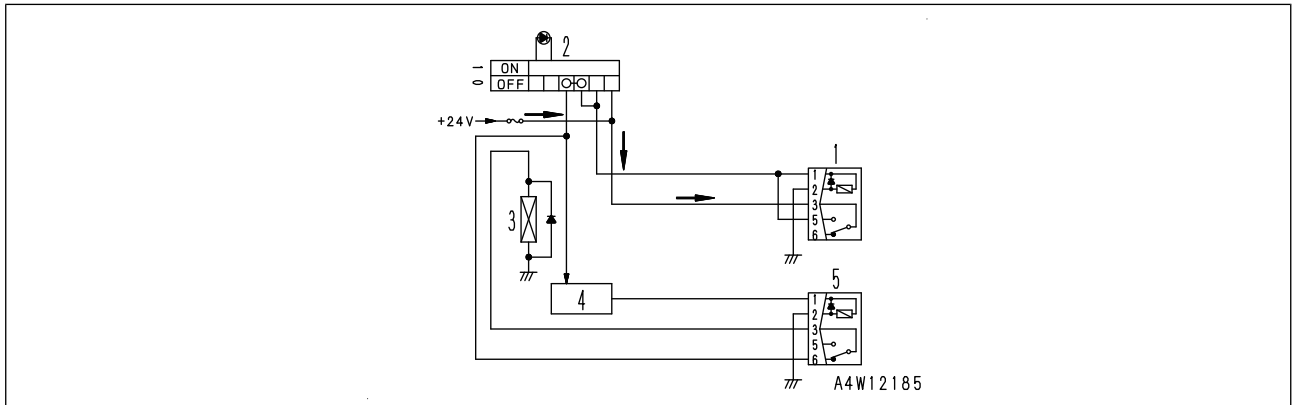
LS bypass valve (WA500-PQH2-041-K-00-A)



1. Hydraulic pump
2. Main spool
3. Pressure compensation valve
4. LS shuttle valve
5. LS bypass valve
6. LS circuit

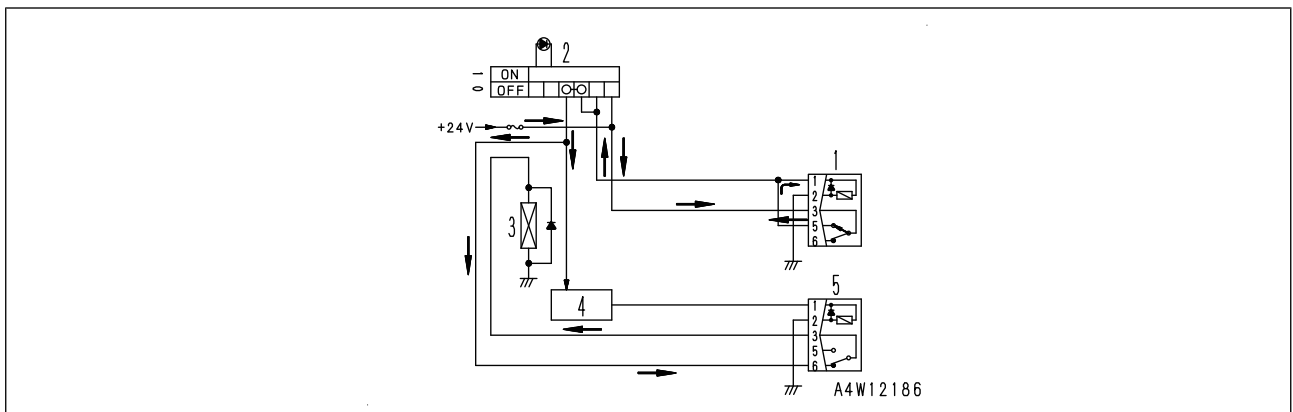
Function (WA500-PQH2-042-K-00-A)

- This valve releases the remaining pressure in LS pressure circuit (6) through orifices (a) and (b).
- This valve decreases the rising speed of the LS pressure to prevent a sudden change of the oil pressure.
- Since the oil flows through LS valve (5), pressure loss is made by the circuit resistance between throttle (c) of main spool (2) and LS shuttle valve (4).
- The effective LS differential pressure decreases to improve the dynamic stability of the actuator.

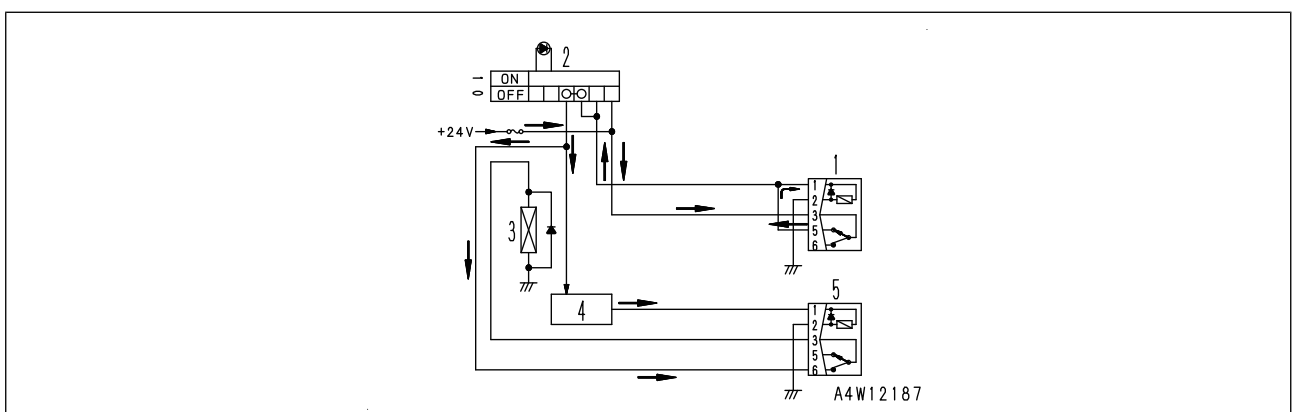


- When parking brake switch (2) is turned "OFF" (releasing), no current flows in parking brake relay (1) and the relay contacts are open.
- Even if starting switch is turned to the "ON" position, no current flows to parking brake solenoid valve (3). Accordingly, the parking brake is not released automatically.

When auto-idle stop operates



- If parking brake switch (2) is turned to the "OFF" (releasing) position while the starting switch is in the "ON" position, the current from the battery relay flows through parking brake relay (1), parking brake switch (2), and auto-idle stop parking brake relay (5) to parking brake solenoid valve (3), thus the parking brake is kept released.



- When the auto-idle stop operates, transmission controller (4) outputs a current to auto-idle stop parking brake relay (5).
- The current flows in the coil of auto idle stop parking brake relay (5) and the contacts open.
- No current flows in parking brake solenoid valve (3), and the parking brake is applied.
- When the auto-idle stop operates, the parking brake also operates automatically and keeps operating during restarting operation.

10 Structure and function

Transmission controller system

Range A: Engine speed < 500 rpm (Engine "stopped" to "being cranked")

- The target fan speed is set to 0 rpm to reduce the torque required to start the engine and for higher engine startability.

Range B: 500 rpm < Engine speed ≤ 740 rpm (Engine being cranked)

- During cranking for starting the engine, the fan target speed is set to 100 rpm to reduce the torque required to start the engine and improve the engine startability.

Range C: Basic control (740 rpm < Engine speed)

- The ordinary fan control based on "Fan speed set by temperature" is performed.

Control function when brake accumulator is charged (WA500-B71B-042-K-00-A)

- The fan pump is used for charging the brake accumulator as well.
- While the brake accumulator is being charged, the charge time is shortened and the control is performed differently from the normal control by temperature to prevent the fan from stopping during the charge.
- For 10 seconds after the brake accumulator pressure drop signal is turned OFF, the minimum fan speed is set to 620 rpm.
- If the brake accumulator pressure is turned OFF, the minimum fan speed is 620 rpm for 10 seconds after the control at the start of the engine is finished.

Fan reverse function (WA500-B715-042-K-00-A)

- When the manual fan reverse mode is operated through the machine monitor to clean the radiator core, the cooling fan reverse rotation solenoid valve of the cooling fan motor operates to reverse the fan rotation.

Fan auto reverse function

1. Fan rotation manual reverse function

- The operator can change the fan rotation direction freely by setting the manual fan reverse mode to the "Reverse" or "Forward" position.
- While the fan rotation direction is being changed, the pilot lamp is in changing displayed on the standard screen to notify the operator of the operating condition. If the changing condition is not satisfied because of high temperature of the coolant or oil, the pilot lamp which indicates that the satisfaction of the condition is waited lights up.
- On the standard screen, the cooling fan reverse rotation pilot lamp indicates the fan reverse rotation condition.

When all the conditions are satisfied, the fan rotation direction is changed from "Forward" to "Reverse".

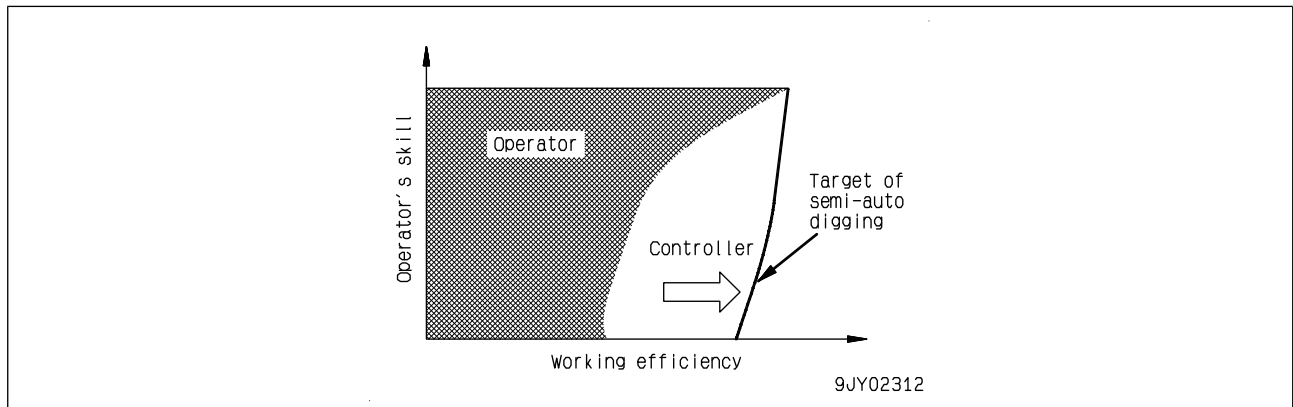
Condition 1	The manual fan reverse rotation mode is set to "Reverse".
Condition 2	The coolant temperature is below 102 °C. [for prevention of overheat]
Condition 3	The hydraulic oil temperature is below 97 °C. [for prevention of overheat]
Condition 4	The torque converter oil temperature is below 120 °C. [for prevention of overheat]
Condition 5	At least 10 seconds elapse after the brake accumulator pressure drop signal is turned OFF. Even if the accumulator pressure drop signal turns OFF at least 10 seconds elapse after the engine is started. [For securing oil quantity to be added to the brake accumulator]
Condition 6	There is no error in the fan speed sensor or engine speed sensor.

When any of the conditions is satisfied, the fan rotation direction is changed from "Reverse" to "Forward".

Condition 1	The manual fan reverse rotation mode is set to the "Forward" position while the fan is rotating in reverse.
Condition 2	10 minutes elapse with the fan rotating in reverse.
Condition 3	An error is detected in the fan reverse rotation solenoid or fan pump EPC solenoid.
Condition 4	The engine stops.

2. Fan rotation auto reverse function

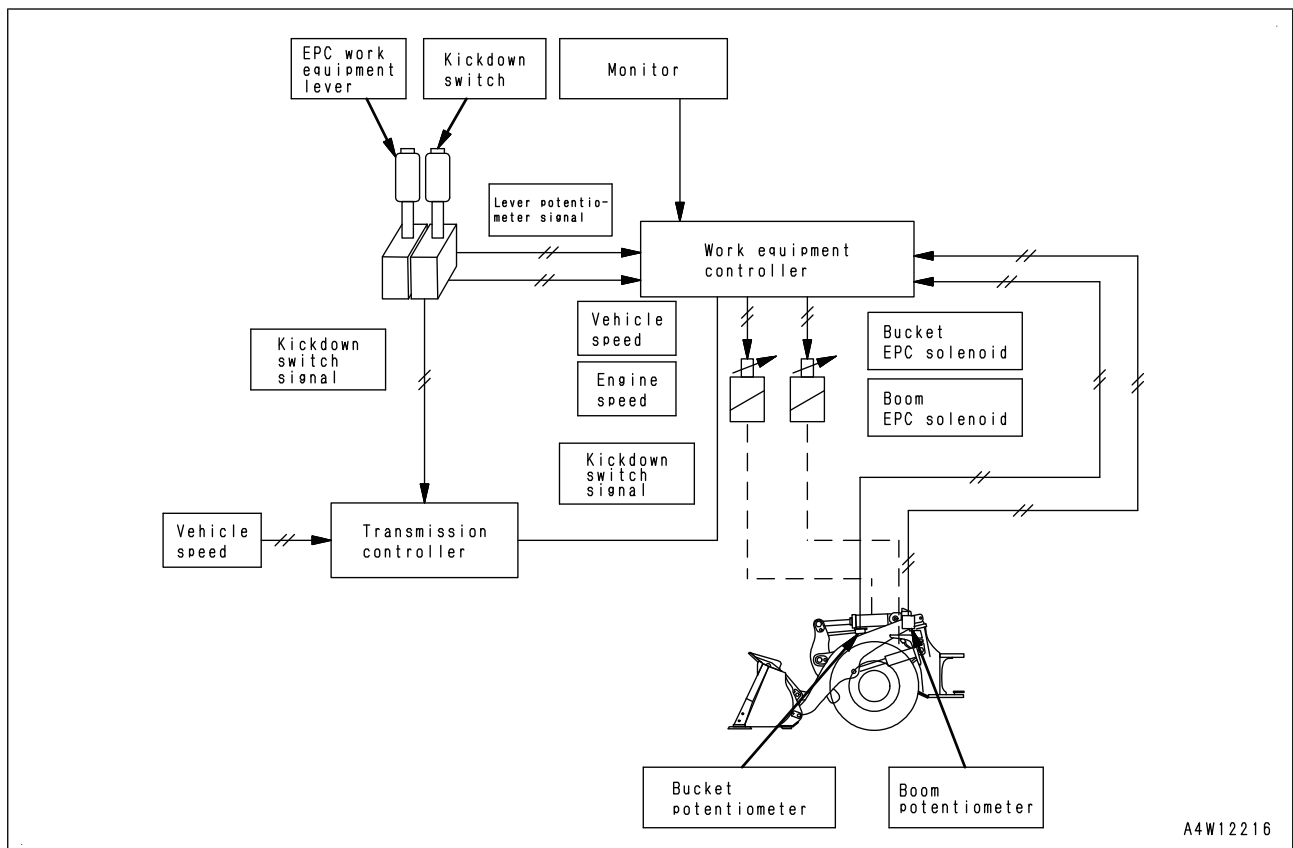
- The fan rotation reverse cycle and fan reverse rotation duration can be set at a certain interval by setting the auto-fan rotation reverse mode through the machine monitor.



- A bucket automatic operation pattern matched to the working cycle and load is selected.

Mode selection

No.	Objective material	Mode
1	Gravel/Sand	LOOSE mode
2	Quarry/Blasted rocks	ROCK mode



1. Condition for starting semi auto-digging

Condition 1	The semi auto-digging is ready when following (1) to (4) are satisfied.
	(1) Semi auto-digging is set in "ROCK" or "LOOSE" mode.
	(2) Machine is traveling forward (There is F signal)
	(3) Boom angle is less than -30 ° (almost on ground)
	(4) Kickdown switch is operated
Condition 2	★ Even during work in 1st gear speed, semi auto-digging does not start if kickdown switch is not operated.
	Semi auto-digging (auto tilt) starts when following (1) and (2) are satisfied.
	(1) Boom is raised after condition 1 is satisfied.

10 Structure and function

Machine monitor system

Monitor display	Item displayed	Display color	Contents	Remarks
 A4W12230	Semi-auto Digging	Green	Lights up while machine is digging in semi-auto mode.	
 A4W12231	Multi-coupler lock release (if equipped)	Red	Lights up when multi-coupler lock is released.	
 A4W12225	Directional selection	Green	Lights up when directional selector switch is effective.	
		Yellow	Lights up when wrong operation is made.	
 A4W13556	Joystick	Green	Lights up when joystick is effective.	
		Yellow	Lights up when wrong operation is made.	
 A4W12232	E.C.S.S.	Green	Lights up when ECSS is effective.	
 A4W12233	Throttle lock	Green	Lights up when throttle lock is set.	
		Yellow	Lights up when throttle lock is canceled temporarily or in auto-deceleration mode.	
 A4W12234	Remote positioner	Green	Lights up when raise stop is set.	
 A4W12235			Lights up when lower stop is set.	
 A4W12236			Lights up when raise and lower stops are set.	
 A4W12237	Work equipment lock	Red	Lights up when work equipment is locked.	
 A4W12238	Auto-shift	Green	Lights up when auto-shift operates.	
 A4W12239	Transmission cut-off	Green	- Lights up when transmission cut-off operates. - Flashes when resetting is acceptable.	

Pin No.	Signal name	Input/output signal
76	(*1)	—
77	(*1)	—
78	(*1)	—
79	(*1)	—
80	(*1)	—
81	(*1)	—

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

AMP-40P [CN-MCM1 B]

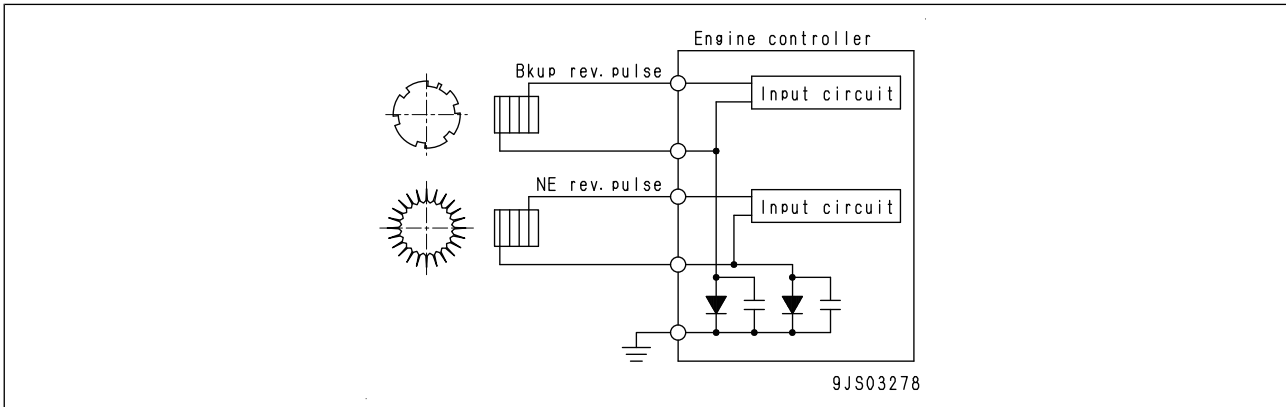
Pin No.	Signal name	Input/output signal
82	Switch panel built-in buzzer	Output
83	(*1)	—
84	(*1)	—
85	(*1)	—
86	Load meter printer BUSY	Input
87	(*1)	—
88	(*1)	—
89	CAN-L (KOMNET/c)	Input/Output
90	(*1)	—
91	Caution LED power supply	Output
92	(*1)	—
93	(*1)	—
94	Load meter printer GND	—
95	(*1)	—
96	(*1)	—
97	CAN-H (KOMNET/c)	Input/Output
98	Continuous power supply (5.6 V)	Output
99	GND	—
100	(*1)	—
101	(*1)	—
102	Load meter printer TX	Output
103	(*1)	—
104	(*1)	—
105	CAN-L (KOMNET/r)	Input/Output
106	External starting signal	Input
107	Power supply (12 V)	Output
108	LIN	Input/Output
109	(*1)	—
110	(*1)	—
111	(*1)	—
112	CAN-H (KOMNET/r)	Input/Output
113	CAN-H (KOMNET/r)	Input/Output
114	(*1)	—
115	(*1)	—
116	(*1)	—
117	(*1)	—
118	(*1)	—
119	(*1)	—
120	(*1)	—
121	(*1)	—

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

JAE-8P [CN-MCM2]

10 Structure and function

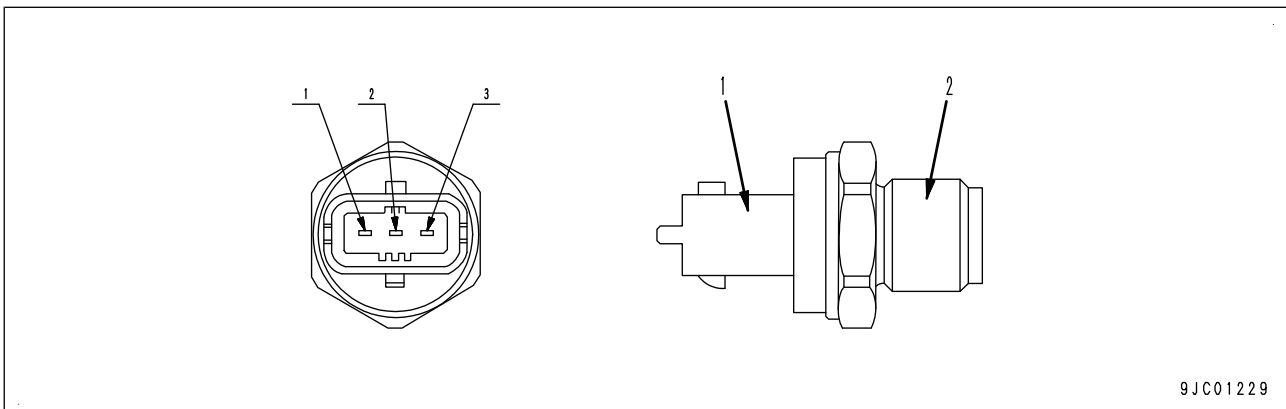
Sensor



Function (ENG125-AG62-042-K-00-A)

- Like the NE speed sensor, it utilizes 0 to 5 V pulses that result from the change in the magnetic lines passing through the sensor.
- The disc gear installed to the central part of the camshaft of the high-pressure pump has teeth (cut parts) around it at intervals of 120 deg.
- In addition to the above teeth, one more tooth is installed. Accordingly, seven pulses are generated every two revolutions of the engine.
- The standard pulse of No. 1 cylinder is recognized by the combination of the NE speed sensor pulse and Bkup speed sensor pulse.

Common rail pressure sensor (ENG-AE28-041-K-00-A)



1. Connector

2. Sensor

Function (ENG-AE28-042-K-00-A)

- This sensor, installed to the common rail in the engine, detects the fuel pressure to output the corresponding variable voltage.

EGR valve lift sensor (ENG125-A9S2-041-K-00-A)

EGR: Abbreviation for Exhaust Gas Recirculation

Standard value table for machine (WA500_7-0000-033-K-00-A)

Directional lever

Machine model				WA500-7	
Item		Measurement condition	Unit	Standard value for new machine	Repair limit
Operating effort	NEUTRAL→	• Engine stopped • Measure at center of lever knob stem.	N {kg}	7.95 ± 0.75 {0.81 ± 0.08}	7.95 ± 1.45 {0.81 ± 0.15}
	FORWARD/ REVERSE				
Stroke	NEUTRAL→	• Measure at 10 mm from lever top. • Tilt angle of steering column: Deepest position (monitor side)	mm	39 ± 6	39 ± 12
	FORWARD/ REVERSE				

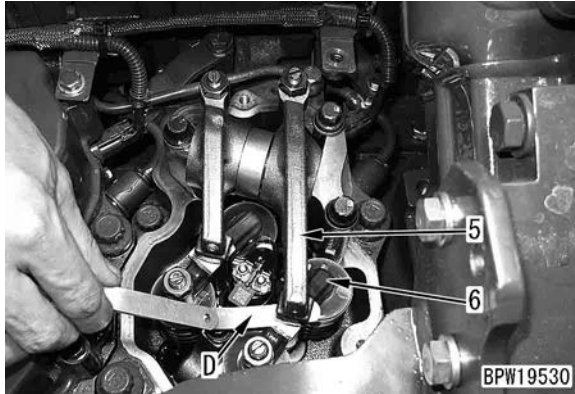
Gear speed switch

Machine model				WA500-7	
Item		Measurement condition	Unit	Standard value for new machine	Repair limit
Operating effort	1st→2nd	• Engine stopped	N {kg}	0.39 ± 0.03 {4 ± 0.3}	0.36 ± 0.12 {3.7 ± 1.2}
	2nd →3rd			0.39 ± 6 {4 ± 0.3}	0.36 ± 0.12 {3.7 ± 1.2}
	3rd →4th			0.39 ± 6 {4 ± 0.3}	0.36 ± 0.12 {3.7 ± 1.2}
Rotation angle	1st ↔ 2nd		deg.	20 ± 2	20 ± 4
	2nd ↔ 3rd			20 ± 2	20 ± 4
	3rd ↔ 4th			20 ± 2	20 ± 4

20 Standard value tables

Standard value table for electrical system

Equipment name	Procedure, measuring location, criteria and remarks			
	Resistance	Between R33 (male) (1) and (2)	Fuel level: Full Fuel level: Empty	Max. 12 Ω 80 to 100 Ω
Starting switch	1. Turn starting switch to OFF position. 2. Disconnect connector S40 and connect T-adapter to male side. 3. Troubleshoot by turning starting switch to ON, OFF, START, and HEAT positions.			
	Resistance	Between S40 (male) (1) and (3)	Starting switch: START Starting switch: OFF and ON	Max. 1 Ω Min. 1 MΩ
		Between terminal B and terminal R1	Starting switch: HEAT	Max. 1 Ω
Transmission cut-off switch	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH2 and connect T-adapter to male side.			
	Resistance	Between S_RH2 (male) (5) and (6)	Engine power mode selection switch: ON Engine power mode selection switch: OFF	Max. 1 Ω Min. 1 MΩ
		Between ground and each of S_RH2 (male) (5) and (6)	Always	Min. 1 MΩ
Remote positioner set switch (boom)	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH6, and connect T-adapters to male side.			
	Resistance	Between S_RH6 (male) (4) and (5)	Remote positioner set switch: Boom set ON Remote positioner set switch: Other than boom set ON	Max. 1 Ω Min. 1 MΩ
		Between ground and each of S_RH6 (male) (4) and (5)		Min. 1 MΩ
Throttle lock set/ acceleration switch	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH7, and connect T-adapter to male side.			
	Resistance	Between S_RH7 (male) (5) and (6)	Throttle lock set/ acceleration switch: Other than ON Throttle lock set/ acceleration switch: ON	Min. 1 MΩ Max. 1 Ω
Defective throttle lock resume/deceleration switch	1. Turn starting switch to OFF position. 2. Disconnect connector S_RH7, and connect T-adapter to male side			
	Resistance	Between S_RH7 (male) (4) and (5)	Throttle Lock Resume/ Deceleration Switch: Other than ON Throttle Lock Resume/ Deceleration Switch: ON	Min. 1 MΩ Max. 1 Ω
Engine shutdown secondary switch	1. Turn starting switch to OFF position. 2. Disconnect connector S_FS and connect T-adapter to male side.			
	Resistance	Between S_FS (male) (3) and (2)	Engine shutdown secondary switch: ON	Min. 1 MΩ
		Between S_FS (male) (6) and (5)		Min. 1 MΩ
		Between S_FS (male) (1) and (2)	Engine shutdown secondary switch: OFF	Max. 1 Ω
Between S_FS (male) (4) and (5)		Max. 1 Ω		
Parking brake indicator switch	1. Turn starting switch to OFF position. 2. Disconnect connector PB.SW, and connect T-adapter to male side.			
	Resistance	Between PB.SW (male) (1) and (2)	Parking brake pressure: When parking brake is	Max. 1 Ω



- ★ You may check the valve clearance of No. 1 cylinder while No. 1 cylinder is at the compression top dead center and then turn the crankshaft in the normal direction by 120 degrees and check the valve clearance of each cylinder in the firing order.
- ★ Firing order: 1-5-3-6-2-4
- ★ The valve clearance is normal if it is within the range of the following standard value.

Intake valve	0.35 ± 0.02 mm
Exhaust valve	0.57 ± 0.02 mm

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

Adjusting (WA500-A700-27D-K-00-A)

After testing, adjust the valve clearance according to the following procedure, if necessary.

- ★ After setting the No. 1 cylinder at the compression top dead center, adjust valve clearance of No. 1 cylinder.
1. While fixing adjustment screw (7), loosen lock nut (8).
 2. Insert feeler gauge D into the clearance between rocker arm (5) and crosshead (6), and adjust the valve clearance with adjustment screw (7).
 - ★ With feeler gauge D inserted, turn adjustment screw (7) to a degree that you can move feeler gauge D easily.
 - ★ Adjust the valve clearance to the range of the following standard value.

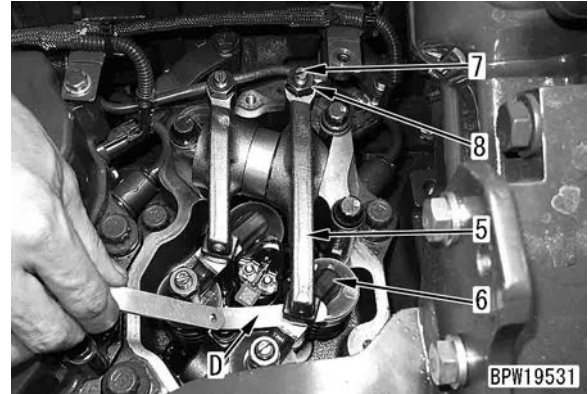
Intake valve	0.35 ± 0.02 mm
Exhaust valve	0.57 ± 0.02 mm

3. With adjustment screw (7) fixed, tighten lock nut (8).

Lock nut (8):

45.1 to 51.0 Nm {4.6 to 5.2 kgm}

- ★ After tightening lock nut (8), check the valve clearance again.



4. After finishing the adjustment of No. 1 cylinder, rotate the crankshaft forward by 120 degrees at one time to align "TOP" stamp line of each cylinder number to pointer (4), and adjust the valve clearance of each cylinder in the firing order.
 - Firing order: 1 — 5 — 3 — 6 — 2 — 4
5. After finishing the adjustment, remove the adjusting tools and restore the machine.

Procedures for cleaning fuel doser

(WA500-A9H6-360-K-00-A)

★ The procedure described as follows is applicable when you perform the engine troubleshooting "S-22 Active regeneration is operated for long" due to malfunctioning of KDPF device or clean the fuel doser in 4,500 hour periodic maintenance.

⚠ **Place the machine on a level ground, lower the work equipment to the ground, set the parking brake switch and work equipment lock switch in the LOCK position, stop the engine, and chock the wheels.**

⚠ **Install and remove the fuel doser after making sure that the temperature of the exhaust manifold and exhaust piping has lowered.**

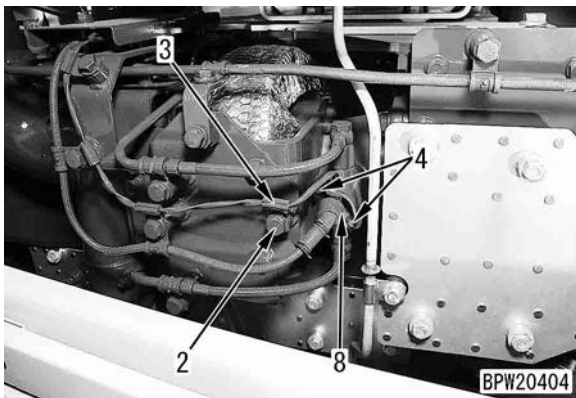
Removal

(WA500-A9H6-520-K-00-A)

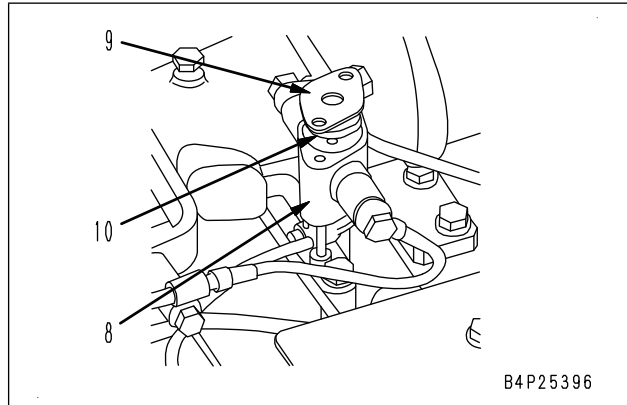
1. Open engine left side cover (1).



2. Remove bolt (2) and disconnect wiring harness clamp (3).
3. Remove bolts (4) to remove fuel doser (8).



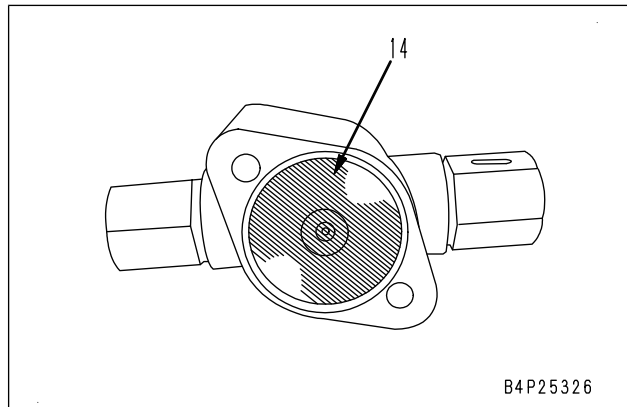
4. Face mounting surface of fuel doser (8) upward and remove gasket (9) and heat insulator (10) to clean fuel doser (8).



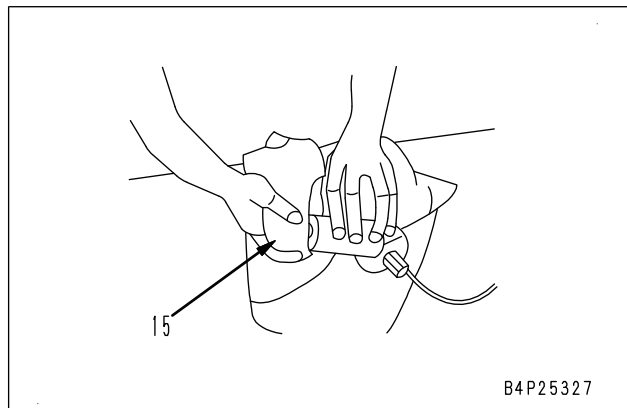
Cleaning

(HM300-A9H6-255-K-00-A)

1. Eliminate soot (14) adhered to fuel doser (8).



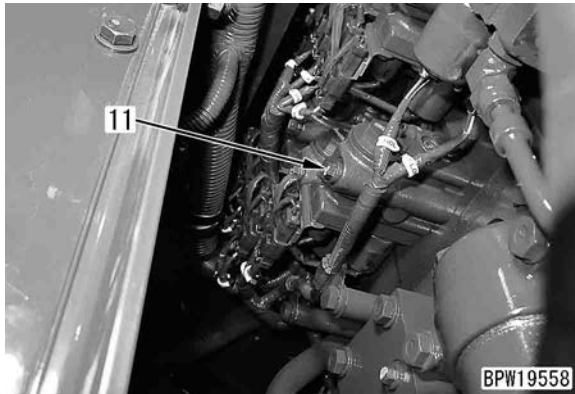
2. Soak cloth (15) with sufficient volume of diesel fuel, and press it against the accumulated soot in the tip of the fuel doser injection port for the diesel oil to permeate into the soot.



3. After the diesel fuel permeates into the accumulated soot, clean it with cloth (15).

Testing 3rd clutch pressure

- ★ 3rd clutch pressure pickup port (11)

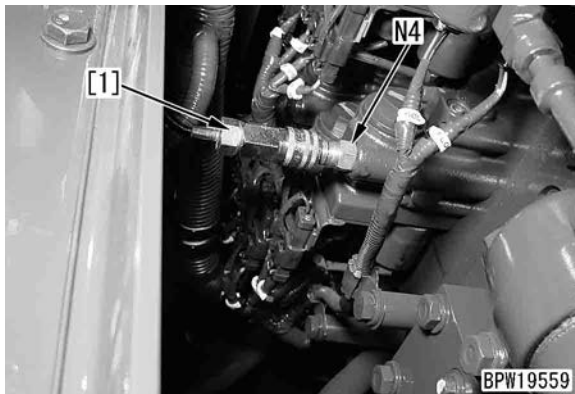


1. Remove 3rd clutch pressure pickup port plug (11). Install nipple N4 and hose [1] of hydraulic tester N1, and connect them to gauge [2].

 **Nipple N4:**

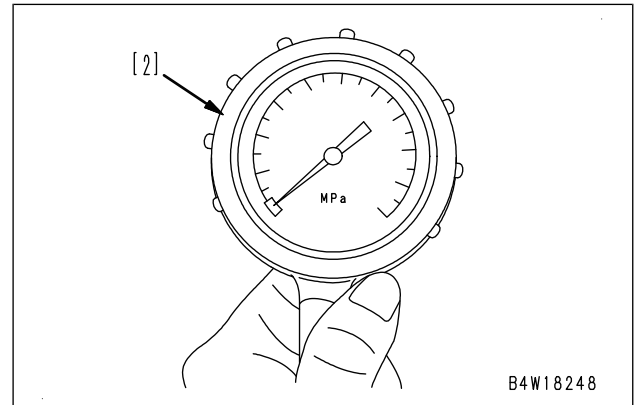
9.8 to 12.74 Nm {1.0 to 1.3 kgm}

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



2. Set the transmission shift mode selector switch to MANUAL.
3. Start the engine.
4. While keeping the directional lever or right directional selector switch, or joystick directional switch in N (NEUTRAL), set the gear speed switch to 3rd (3rd speed).
5. While running the engine at 1,900 rpm, measure the 3rd clutch oil pressure.

3rd clutch pressure	3.28 ± 0.2 MPa {33.5 ± 2 kg/cm ² }
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6. After finishing test, remove the testing tools and restore the machine.

 **3rd clutch pressure pickup port plug (11):**

9.8 to 12.74 Nm {1.0 to 1.3 kgm}

Testing wear of wheel brake disc (WA500-G167-360-K-00-A)

★ Testing tools

Sym- bol	Part No.	Part name
V	Commercially available	Vernier calipers

⚠ Place the machine on a level ground, lower the work equipment to the ground, set the parking brake switch and work equipment lock switch in the LOCK position, stop the engine, and chock the wheels.

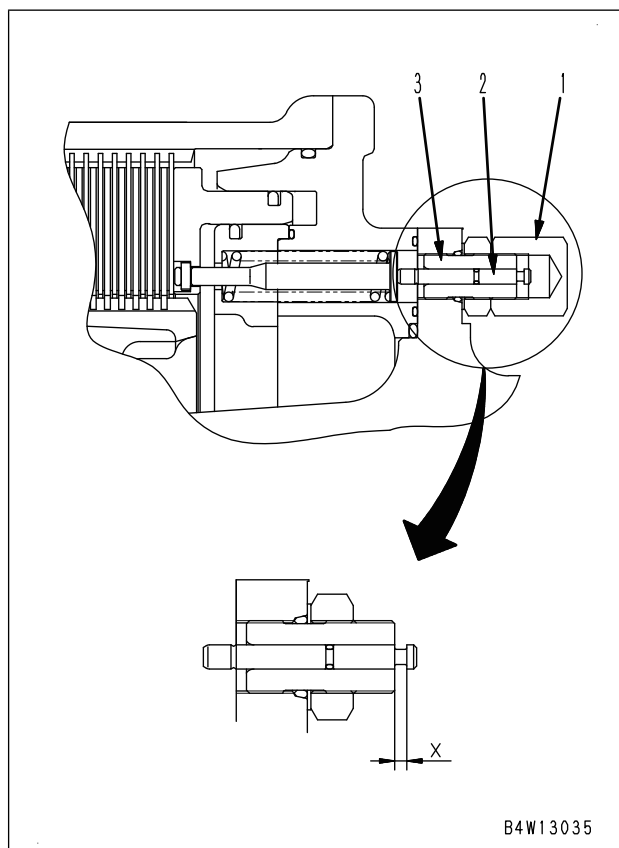
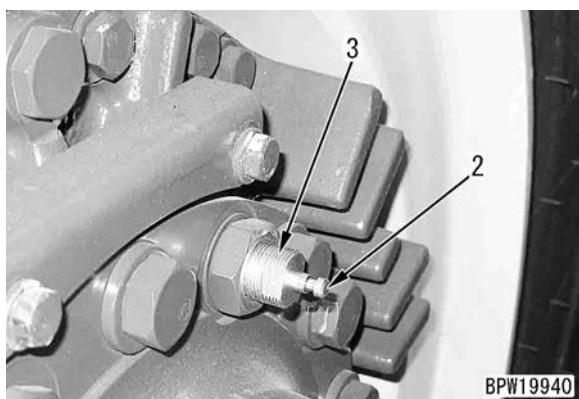
Testing (WA500-G167-389-K-00-A)

1. Remove cap (1).



2. Depress the brake pedal to the travel end.
3. Measure the projection (x) of shaft (2) from the end face of guide (3) with vernier calipers V while it is pushed.

- ★ Keep depressing the brake pedal while measuring the wear.
- ★ If projection (x) is 0 mm or less, replace the disc.
- Wear: $(4.0 - x)$ mm



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



Cap (1):

29.4 to 39.2 Nm {3.0 to 4.0 kgm}

Checking of ECSS accumulator nitrogen gas pressure and procedure for charging accumulator with nitrogen gas (WA500-L370-360-K-00-A)

★ Testing tools

Symbol	Part No.	Part name
ZD	792-610-1702	Charging tool assembly

⚠ In order to prevent leaked nitrogen gas from contacting your skin and clothing, be sure to wear the appropriate protective items (such as goggles, leather gloves and protective clothing) and do the work from the windward side as much as possible.

⚠ When handling nitrogen in an ill-ventilated location like in a room, you must improve ventilation of the room and observe the related laws.

⚠ The accumulator is charged with high-pressure nitrogen gas. Its inappropriate handling can cause an explosion accident, leading to serious personal injury or death. The following rules must be strictly observed when handling the gas.

- Do not bring any open flame near the accumulator or expose it to fire.
- Do not drill it, weld it nor use a cutting torch.
- Do not give impacts to it by hitting or rolling it.
- Bleed the gas in it before disposing it.

Testing nitrogen gas in accumulator (WA500-L370-280-K-00-A)

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

⚠ Cancel the work equipment lock switch while starting switch is ON.

⚠ Operate the work equipment control lever two to three times to release the pressure in the EPC accumulator circuit.

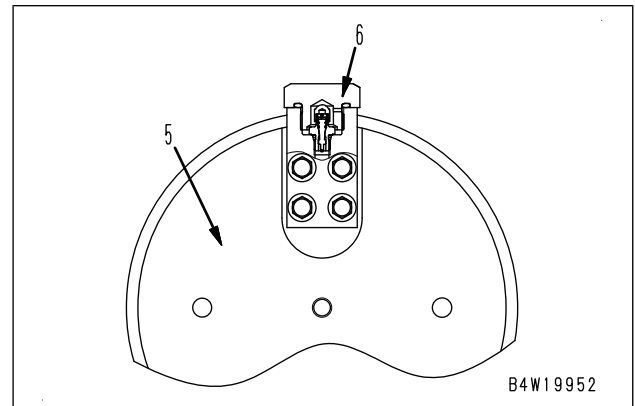
⚠ Place the machine on a level ground, lower the work equipment to the ground, and chock the wheels.

★ The following testing procedure is applicable to an independent accumulator as well.

1. Stop the engine and eliminate the pressure in the brake circuit completely by depressing the brake pedal until its reactive force disappears.

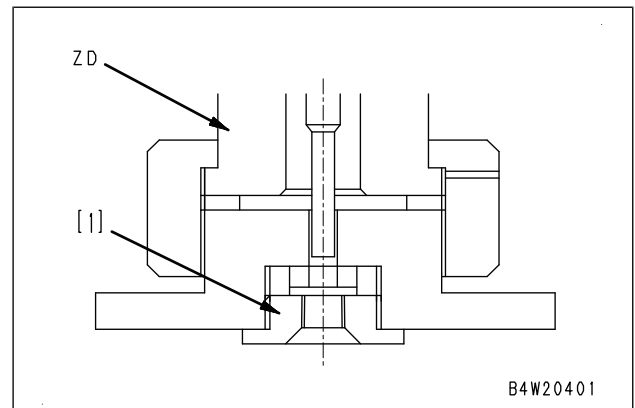
★ Depress the brake pedal approximately 30 times as a rough standard.

2. Remove plug (6) from accumulator (5).



3. Connect charging tool assembly ZD to valve (7) of accumulator (5) according to the following procedure.

★ The threaded portion of joint [1] of charging tool assembly ZD is coated with sealant. Never remove it since gas may leak if it is removed unnecessarily.



- 1) Turn handle (a) of charging tool assembly ZD fully counterclockwise until it stops.

- Connect nitrogen gas cylinder (c) even when only measuring the gas pressure.
- Keep the valve and handle (b) of nitrogen gas cylinder (c) closed.
- For connection of nitrogen gas cylinder (c) and charging tool assembly ZD, see the next section "Procedure for charging accumulator with nitrogen gas".

- 2) Install extension [2] of charging tool assembly ZD to valve (7).

30 Testing and adjusting

Electrical system

Service mode (WA500-Q194-100-K-00-A)

To change the operator mode to the service mode, perform the following operation.

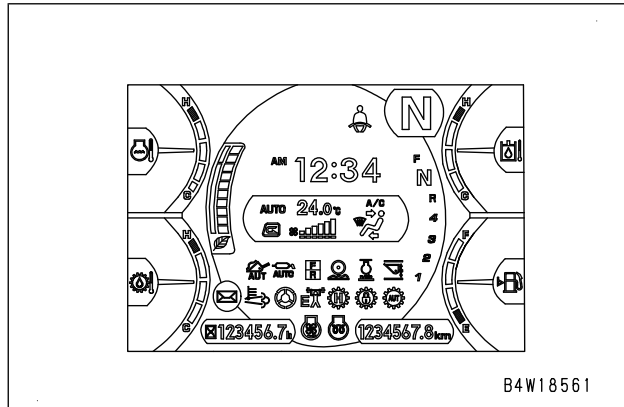
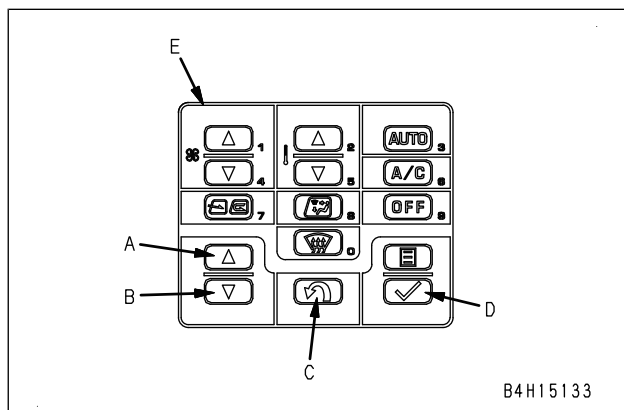
This operation is always required when you use the service mode.

1. Check of display of screen and operation of switches

While the standard screen is displayed, perform the following switch operations.

Switch operation: While pressing Down switch (B), press air conditioner/ numeral input switches (E) "1" → "2" → "3" in order.

- ★ This operation of the switches is accepted only while the standard screen is displayed.



2. Selecting the service menu

When "Service Menu" screen is displayed, the service mode is selected. Select a desired service menu.

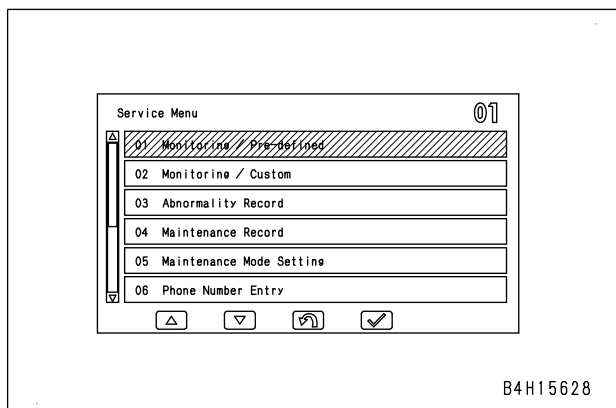
Up switch (A): Moves the selection up by one item

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

Return switch (C): Returns the display to the standard screen (operator mode)

Enter switch (D): Validates the selection

- ★ If you enter a 2-digit item number with the numeral input switches (E), the entered item is directly selected.



- ★ The following shows the items selectable on "Service Menu" screen (including some items which need special operations).

No.	Menu items
01	Monitoring/ Pre-defined(PAGE 30-148)
02	Monitoring(PAGE 30-153)
03	Abnormality record (mechanical systems) (PAGE 30-163) Abnormality record (electrical systems)(PAGE 30-164)
04	Maintenance Record(PAGE 30-166)
05	"Maintenance Mode Setting"(PAGE 30-167)
06	Phone number entry(PAGE 30-170)
07	Default (Machine Model Select)(PAGE 30-171) Default (Option Select)(PAGE 30-172) Default (Machine Model Select)(PAGE 30-171) Default (Rearview Monitor Setting)(PAGE 30-176) Default (Auto Idle Stop Timer Setting)(PAGE 30-183)
08	Testing (Cylinder Cut-out operation)(PAGE 30-184) Testing (Regeneration for Service)(PAGE 30-185) Testing (KDPF Memory Reset)(PAGE 30-187)
09	Adjustment (ECMV Automatic Compensation) (PAGE 30-189) Adjustment (T/M Initial Learning)(PAGE 30-191) Adjustment (T/M Initial Learning Reset) (PAGE 30-192) Adjustment (T/M Shift Point)(PAGE 30-193) Adjustment (T/M Shift Point Data Clear) (PAGE 30-194) Adjusting (Boom Angle Sensor for EPC (Raise))(PAGE 30-195) Adjusting (Boom Angle Sensor for EPC (Lower))(PAGE 30-196) Adjustment (Boom Raise Adjustment)(PAGE 30-197) Adjustment (Boom Lower Adjustment)(PAGE 30-200) Adjustment (Bucket Tilt Adjustment)(PAGE 30-202)

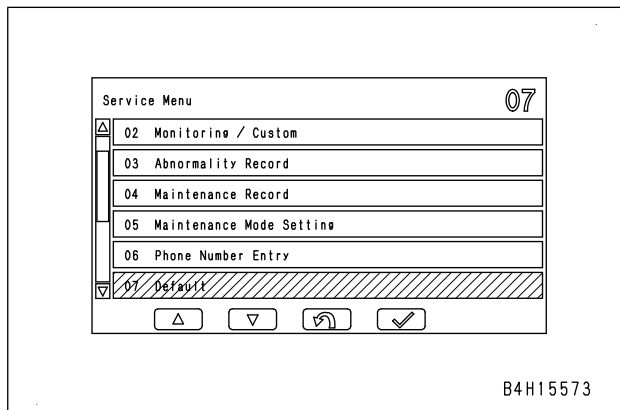
Default (Machine Model Select) (WA500-Q1GB-100-K-00-A)

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.

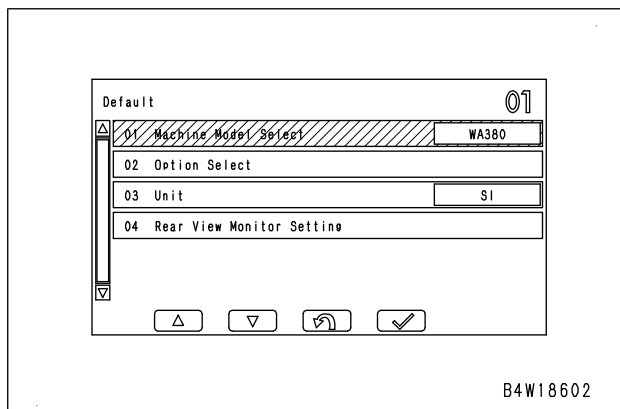
1. Selecting menu

Select "Default" on "Service Menu" screen.



2. Selecting sub menu

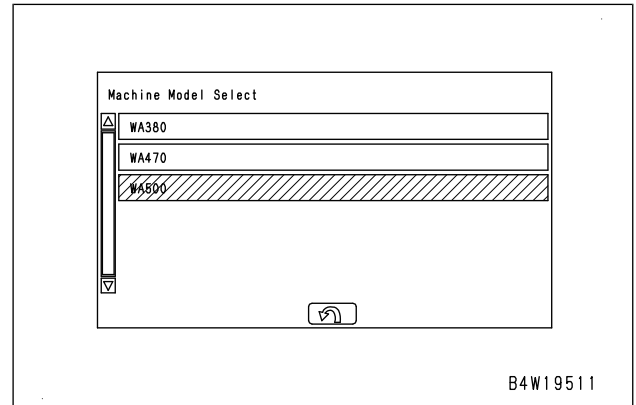
After the "Default" screen is displayed, select "Machine Model Select".



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.



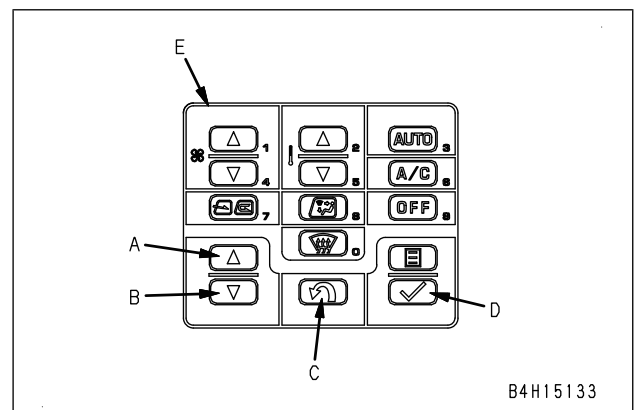
2) When the machine model selection is enabled, select the model.

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

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

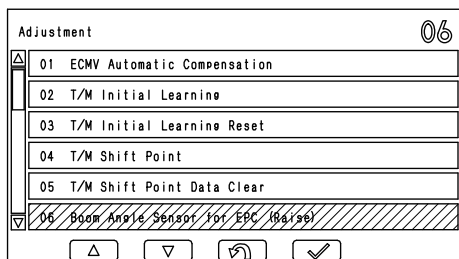
Return switch (C): Cancels the selection and returns to "Default" screen

Enter switch (D): Validates the selection



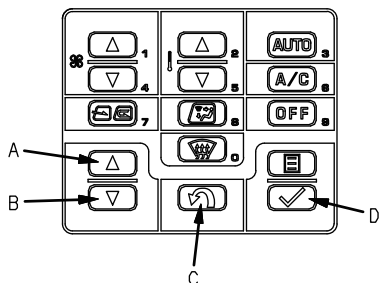
★ If you press the enter switch (D) to validate "Machine Model Select", the followings are performed.

- "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

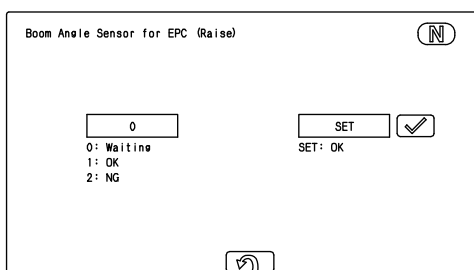


B4W18633

- Press Enter switch (D) after raising the boom to the upper limit position (cylinder stroke end).

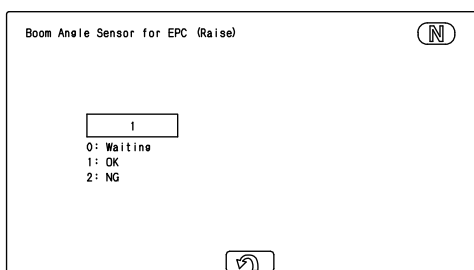


B4H15132



B4W18634

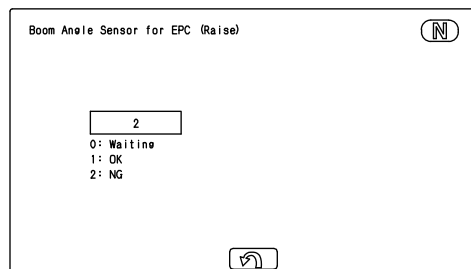
- If the display in the left window changes to "1", adjustment is complete.



B4W18635

- If the display in the left window changes to "2", the boom angle voltage is out of the specified value and the adjustment is not made.

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



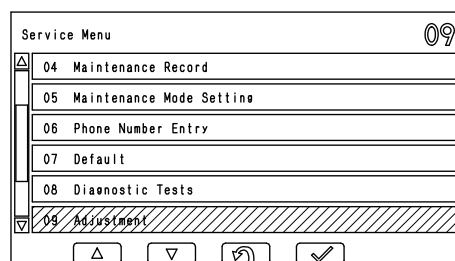
B4W18636

- When the adjustment does not end successfully, check the boom angle sensor voltage on "Monitoring/Custom" screen.
- Adjust the installed position of the boom angle sensor so that the voltage displayed on "Monitoring/Custom" screen is within the following range, and then perform the sensor adjustment again.

Boom specification	Boom position	Voltage range
STD	Top	$3.81 \pm 0.3 \text{ V}$
Hi Lift		$3.89 \pm 0.3 \text{ V}$

Adjusting (Boom Angle Sensor for EPC (Lower)) (WA500-CN21-270-K-00-A)

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



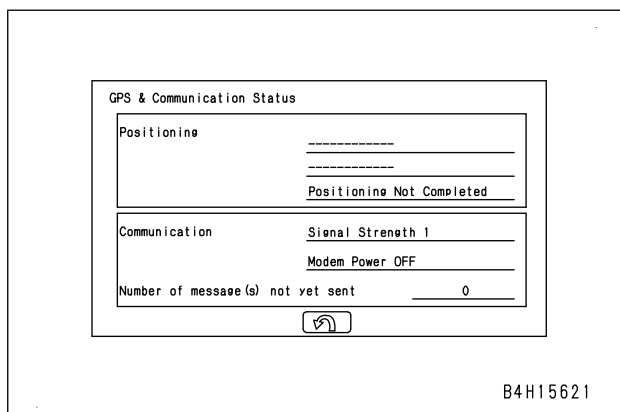
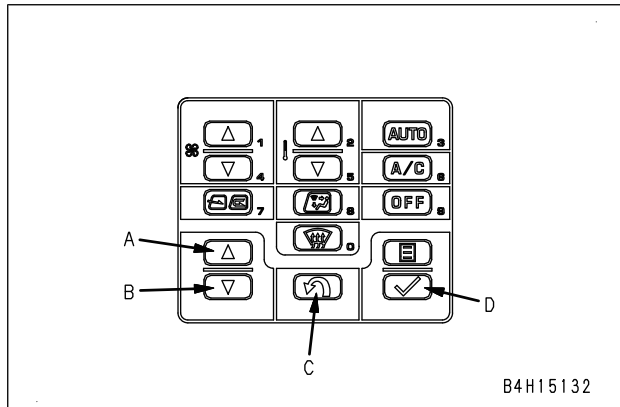
B4W18614

- Selecting sub menu
After "Adjustment" screen is displayed, select "Boom Angle Sensor for EPC (Lower)".

On the "GPS & Communication Status" screen, the following items of information are displayed.

- Positioning: GPS positioning status
- Communication: Communication environment and connecting condition of the communication modem
- Number of message(s) not yet sent: Number of mails that are saved in the machine monitor and have not yet been transmitted

Return switch (C): Returns the display to the KOMTRAX Settings screen.



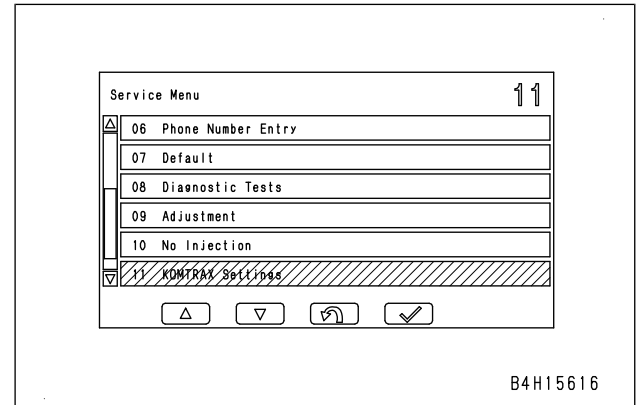
KOMTRAX Settings screen (Modem Status) (HM300-Q210-110-K-02-A)

Settings and operating status of KOMTRAX can be checked on the "KOMTRAX Settings" screen.

Modem information is used to check the IP address of the KOMTRAX communication modem.

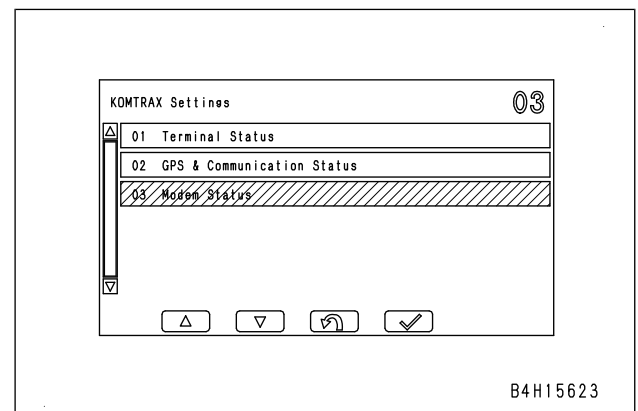
1. Selecting menu

Select "KOMTRAX Settings" on the "Service Menu" screen.



2. Selecting sub menu

After the "KOMTRAX Settings" screen is displayed, select "Modem Status".

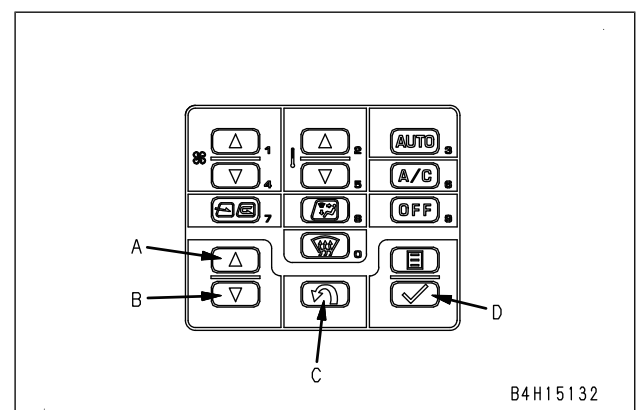


3. Details displayed on Modem Status screen

IP addresses (two 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.



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

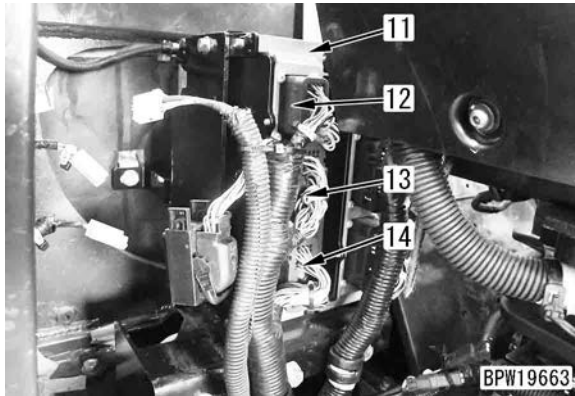
Troubleshooting points (ALL-5130-42A-A-00-A)

(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.

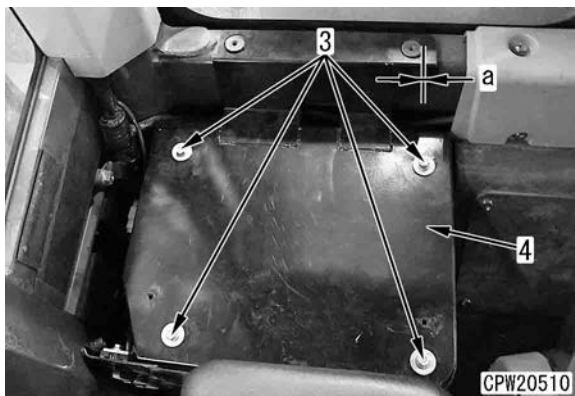


4. Monitor controller

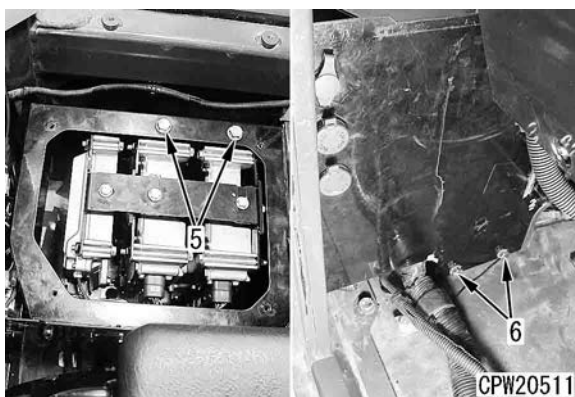
- 1) Fold operator's seat (1) forward.
- 2) Remove box mounting bolts (2) (4 pieces) and remove the box.



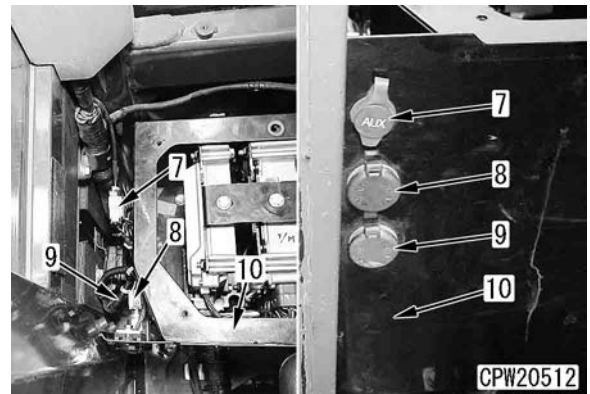
- 3) Remove top cover mounting bolts (3) (4 pieces) and remove top cover (4). [*1]



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

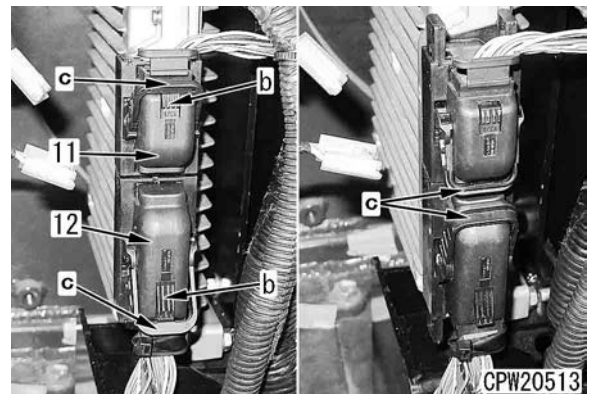


- 5) Disconnect connectors M01B (7), L18A (8), and L18B (9).
- 6) Remove cover (10).

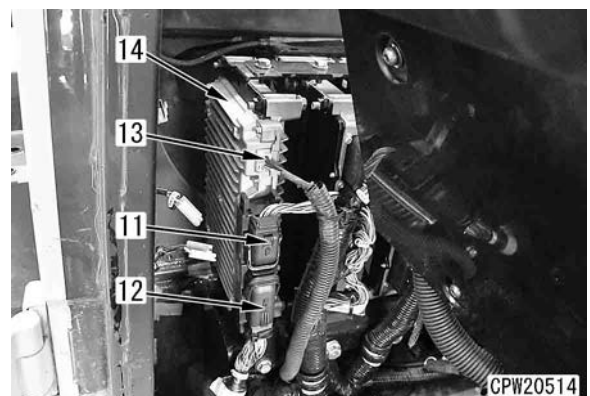


- 7) Unlock connectors (11) and (12).

★ Shift lever (c) inward while pressing tab (b). (as shown in the right of the following figure)

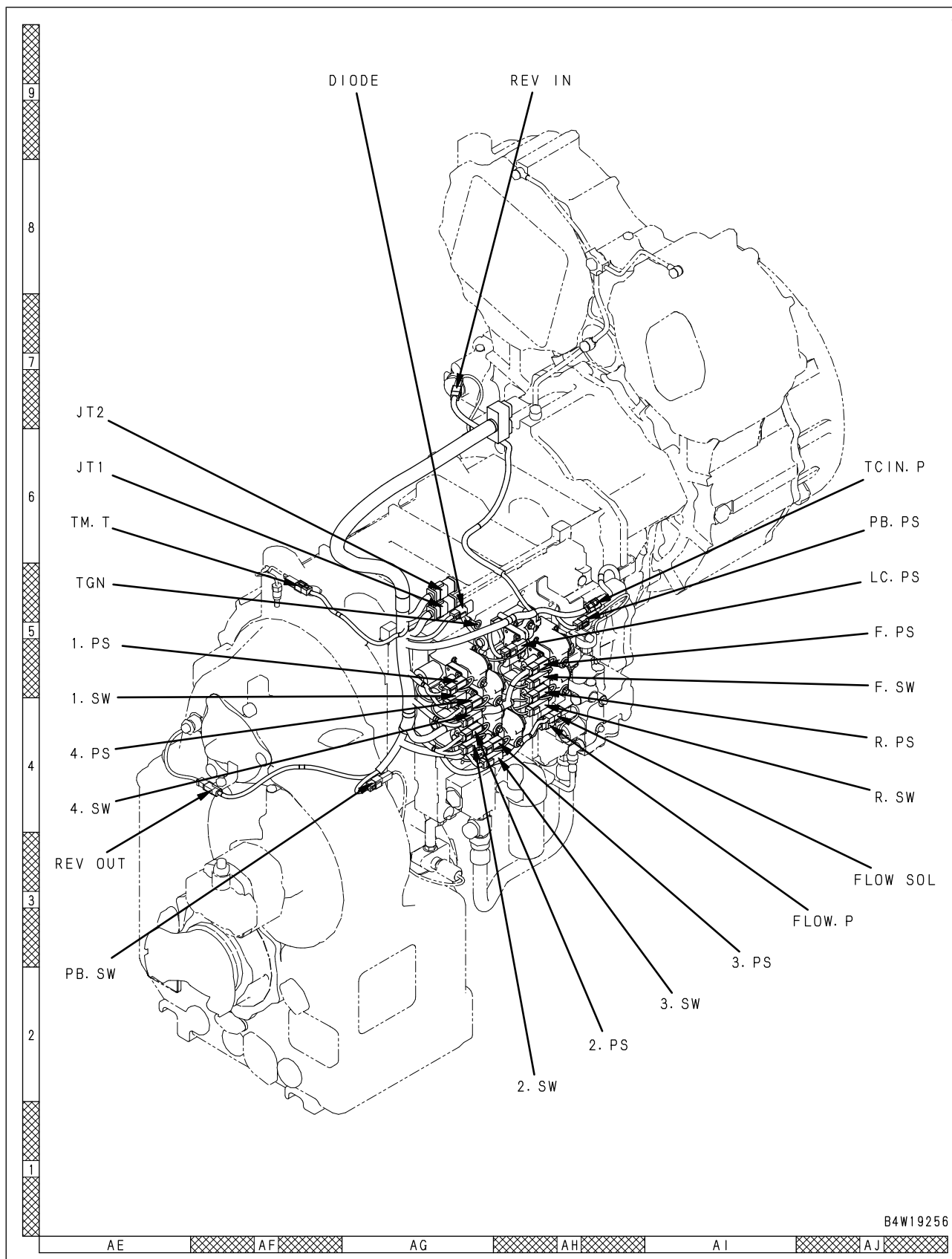


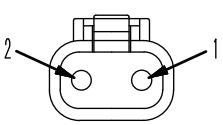
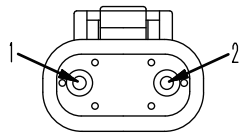
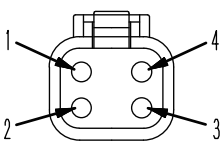
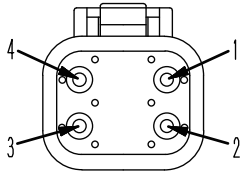
- 8) Disconnect connectors MCM2 (11), MCM1B (12), and MCM1A (13) of monitor controller (14), and insert or connect T-adapters for troubleshooting.



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

Layout of connectors (6/7)



(The pin No. is also marked on the connector (electric wire insertion end))			
No. of pins	DTP Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
	Pin (female terminal)	Socket (male terminal)	
2			-
	-	-	
4			799-601-4260 (T-adapter)
	Part No. :6261-81-2810	-	

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40 Troubleshooting

General information on troubleshooting

Precautions on troubleshooting of machine monitor (WA500-Q180-2A4-K-00-A)

- The machine monitor consists of various independent units that send and receive data to/from the monitor controller through LIN communication (see the next page).
- As the result, troubleshooting of the machine monitor and related units involves complicated procedures (see E-5 to E-20 of E-mode troubleshooting).
- Each unit related to the machine monitor has many new type of connectors (see Table 1).
- When performing the troubleshooting of the machine monitor LCD unit (see E-6 to E-8 of E-mode troubleshooting), refer to "Processing procedure of harness checker for troubleshooting of machine monitor LCD unit".

Table 1. Detail of connectors related to machine monitor

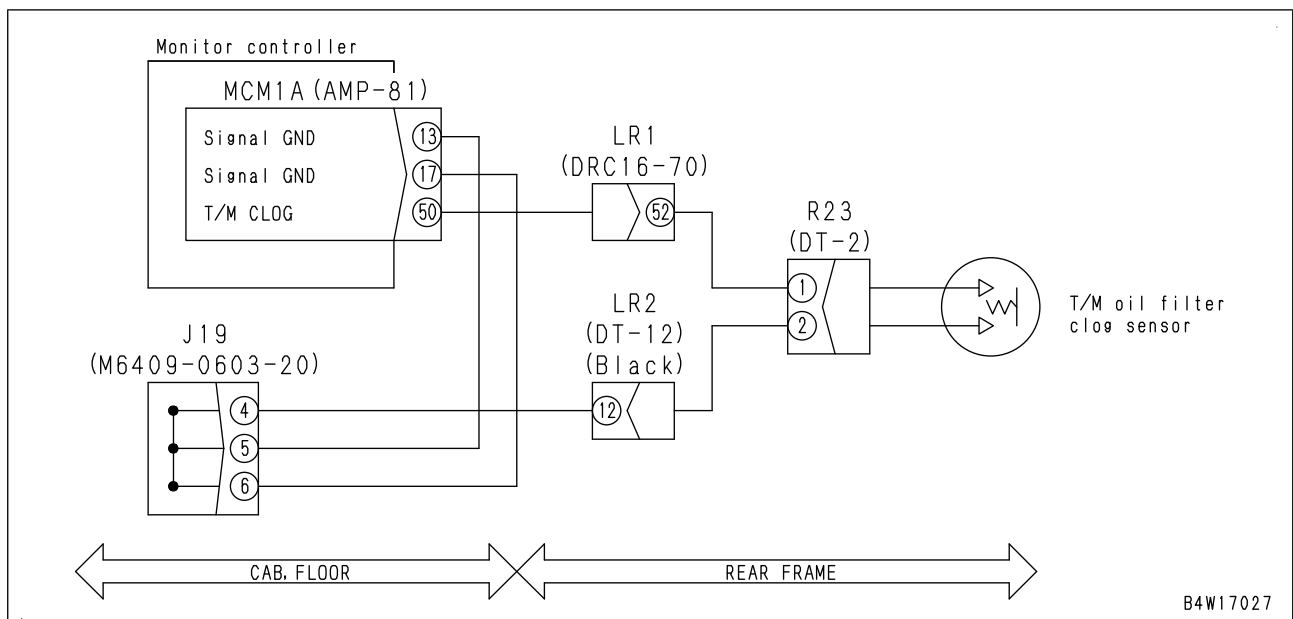
	Name of unit	Con- nector name	Num- ber of pins	Type code	Manu- factur- er	Connector type, etc.	Tool	New	Remarks
Ma- chine moni- tor	LCD unit	MDM1	8	MX40008U- Q1	JAE		–	●	
	LED unit	MDM2	6	175954-1	AMP	070 connector	T- adapter	●	
	Meter unit	MDM3	8	175955-1	AMP	070 connector	T- adapter	●	
–	Monitor controller	MCM1 A	81	TYCO- 1241434	AMP	Same as those used in pump controller of hydraulic excavators	Box-type socket		Measuring tool is not a T- adapter, so operating voltage cannot be measured.
–		MCM B	40						
–		MCM2	8	MX40008N- Q1	JAE		Harness checker	●	See "Processing procedure of harness checker for troubleshoot- ing of machine monitor LCD unit".
–	Switch panel	MOM1	6	175954-1	AMP	070 connector	T- adapter	●	
–	Rear view monitor	RVM1	12	175957-1	AMP	070 connector	T- adapter		
–		RVM2	8	175955-1	AMP	070 connector	T- adapter	●	

Failure code [15B0NX] Transmission Oil Filter Clogging (WA500_7-15B0NX-400-A-Z0-A)

Action level	Failure code	Failure	Transmission Oil Filter Clogging (Machine monitor system)
L01	15B0NX		
Detail of failure	When engine is started with torque converter oil temperature exceeding 50 °C, signal circuit of transmission oil filter clogging sensor is open (disconnected from ground).		
Action of controller	- Lights up transmission oil filter clogging caution lamp. - If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	If machine continues to be operated, transmission oil circuit may be damaged.		
Related information	- Voltage at MCM1 A (50) is GND level when oil filter is normal and 16 to 24 V when oil filter is clogged (circuit is open). - Input signal (ON/OFF) from transmission oil filter clogging sensor can be checked with monitoring function. (Code: 04509 T/M Oil Filter Clog Sig) - Method of reproducing failure code: Start engine. - As T-adapter for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Clogged transmission oil filter	Check filter for clogging. If clogged, clean or replace it.			
2	Defective transmission oil filter clogging sensor	1. Turn starting switch to OFF position. 2. Disconnect connector R23 and connect T-adapters to male side. 3. Start engine.			
		Resistance	Between R23 (male) (1) and (2)	When filter is normal	Max. 1 Ω
				When filter is clogged	Min. 1 MΩ
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connector MCM1 A and R23, and connect T-adapters to female side.			
		Resistance	Between MCM1 A (female) (50) and R23 (female) (1)		Max. 1 Ω
			Between R23 (female) (2) and MCM1 A (female) (13) or (17)		Max. 1 Ω
4	Defective machine monitor system	1. Turn starting switch to OFF position. 2. Insert T-adapters into R23. 3. Start engine.			
		Voltage	Between R23 (1) and (2)	When filter is normal	Max. 1 V
				When filter is clogged	6 to 12 V

Circuit diagram related to transmission oil filter clogging sensor



40 Troubleshooting

Troubleshooting by failure code (Display of code)

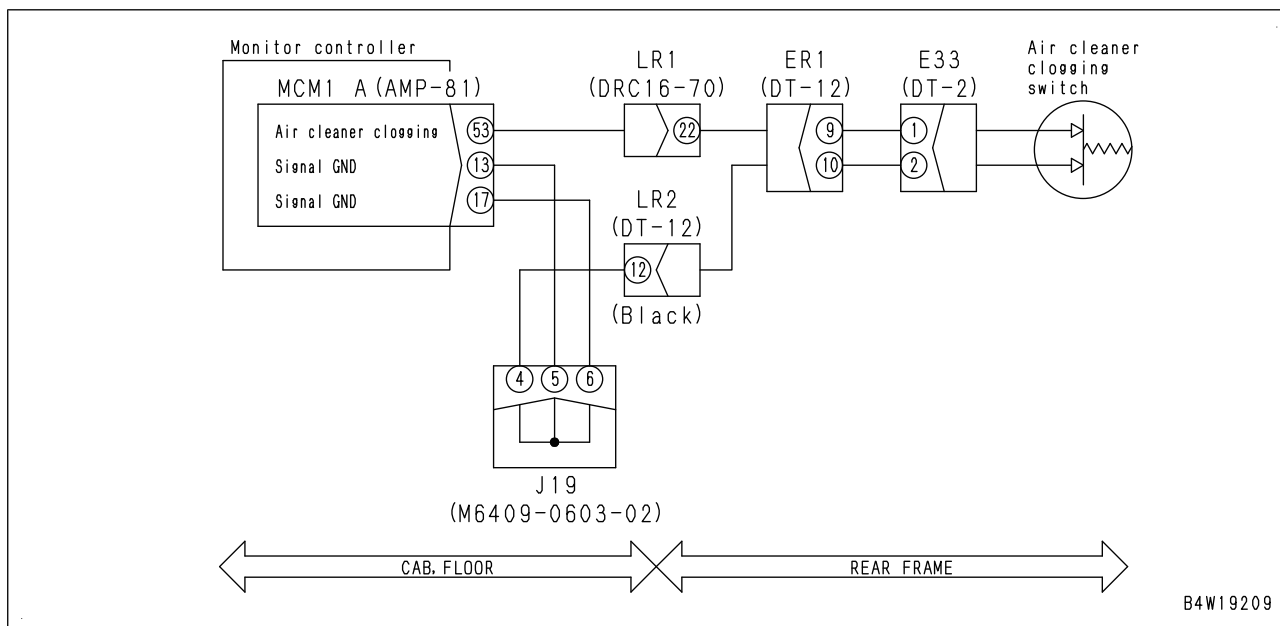
Failure code [2F00MA] Failure of Parking Brake Circuit (WA500_7-2F00MA-400-A-Z0-A)

⚠ Be sure to chock wheels. If you perform troubleshooting with parking brake released, depress foot brake (two persons required for this work).

Action level	Failure code	Failure	Failure of Parking Brake Circuit (Machine monitor system)
L03	2F00MA		
Detail of failure	Parking brake pressure switch remains off for 20 seconds during travel (parking brake is applied). (Monitor controller does not correctly recognize that parking brake pressure switch is ON (parking brake is released)).		
Action of controller	- Lights up centralized warning lamp and sounds alarm buzzer. - If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	If machine is used as is, parking brake may be damaged.		
Related information	- When 24 V is applied to parking brake solenoid, parking brake is released. - Method of reproducing failure code: Start engine and actual gear speed is other than NEUTRAL. - Since T-adaptor for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector. - Parking brake relay (L120) works as self-holding relay. - When parking brake switch is operated, pin 5 and pin 6 of parking brake switch are connected with each other. - Parking brake relay is engaged and L120 works as self-holding relay. - When parking brake switch is set to Release position, pin 3 and pin 4 of parking brake switch are connected with each other. Since L120 remains engaged, power is supplied to pin 4 of parking brake switch and then flows to L62 (6) pin of transmission controller. - If voltage of L62 (6) pin goes to 20 V or above, transmission controller drives parking brake solenoid from L63 (18) pin (parking brake is released).		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Inappropriate operation of parking brake switch	- Check that parking brake switch is set to "Release" position. - Do not use parking brake while machine is travelling.		
2	Defective parking brake relay (L120)	1. Turn starting switch to OFF position. 2. Interchange relay L120 with horn relay L119. 3. Start engine and drive machine.		
		Does machine become normal after parking brake relay (L120) is interchanged with relay L119?	Machine becomes normal.	Original relay L120 is defective.
			Machine does not become normal.	Original relay L120 is normal.
3	Defective auto-idle stop parking brake relay L133	- When failure code [D1E6KA], [D1E6KB] or [D1E6KY] is displayed, perform troubleshooting for it first. 1. Turn starting switch to OFF position. 2. Interchange relay L133 with horn relay L119. 3. Start engine and drive machine.		
		Does machine become normal after parking brake relay (L133) is interchanged with relay L119?	Machine becomes normal.	Original relay L133 is defective.
			Machine does not become normal.	Original relay L133 is normal.

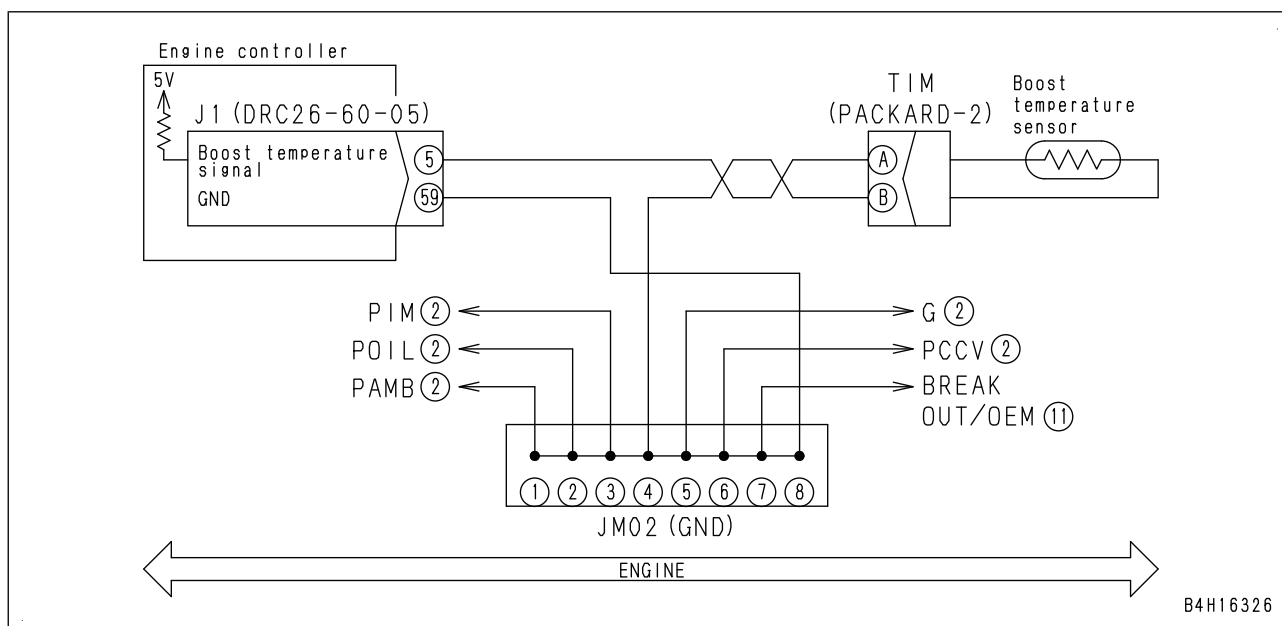
Circuit diagram related to air cleaner clogging sensor



40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to boost temperature sensor



Failure code [CA331] Inj #2(L#2) Open/Short Error (PC400-CA331-400-A-Z0-A)

Action level	Failure code	Failure	Injector #2(L#2) Open/Short Error (Engine controller system)
L03	CA331		
Detail of failure	• Open circuit or short circuit is detected in injector #2 circuit.		
Action of controller			
Problem on machine	• Engine output lowers. • Engine speed does not stabilize.		
Related information	• Method of reproducing failure code: Start engine. • While engine is running normally, approximately 65 V of pulse voltage is applied to injector (positive) side. But it is pulse voltage and cannot be measured by using multimeter.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code does not appear, harness connector is defective. ★ If this failure code appears, perform the following.		
2	Defective injector #2	1. Turn starting switch to OFF position. 2. Disconnect connector CN2 and connect T-adapter to male side.		
		Resistance	Between CN2 (male) (1) and (2) Between CN2 (male) (1) and ground	0.4 to 1.1 Ω Min. 1 MΩ
3	Open circuit or ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector J1 and connect T-adapters to female side.		
		Resistance	Between J1 (female) (47) and (57) Between J1 (female) (47) and ground	0.4 to 1.1 Ω Min. 1 MΩ
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and CN2, and connect T-adapter to each female side.		
		Resistance	Between J1 (female) (47) and CN2 (female) (1) Between J1 (female) (57) and CN2 (female) (2)	Max. 1 Ω Max. 1 Ω
5	Ground fault in wiring harness (contact with ground circuit)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and CN2, and connect T-adapter to either female side.		
		Resistance	Between J1 (female) (47) or CN2 (female) (1) and ground	Min. 1 MΩ
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and CN2, and connect T-adapter to the female side of connector J1. ★ Check by using multimeter in continuity mode.		
		Continuity	Between J1 (female) (47) and each other pin Between J1 (female) (57) and each other pin	No continuity (No sound is heard) No continuity (No sound is heard)

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [CA452] Rail Press Sensor Low Error (PC400-CA452-400-A-Z0-A)

Action level	Failure code	Failure	Rail Pressure Sensor Low Error (Engine controller system)
L03	CA452		
Detail of failure	Low voltage appears in signal circuit of common rail pressure sensor.		
Action of controller	Limits engine output and allows engine to run (limits common rail pressure).		
Problem on machine	Engine output decreases.		
Related information	- Signal voltage from common rail pressure sensor can be checked with monitoring function. (Code: 36401 (V)) - Common rail pressure sensed by common rail pressure sensor can be checked with monitoring function. (Code: 36400 (MPa)) - Method of reproducing failure code: Turn starting switch to ON position. - If sensor connector is disconnected even in normal condition, failure code [CA451] for "High Error" is generated instead of this code.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position. If this failure code disappears, harness connector is defective. ★ If this failure code appears, perform following checks.			
2	Defective common rail pressure sensor power supply system	★ If failure code [CA515] or [CA516] is also displayed, perform troubleshooting for it first. 1. Turn starting switch to OFF position. 2. Disconnect connector PFUEL, and connect T-adaptor to female side of connector. 3. Turn starting switch to ON position.			
		Voltage	Between PFUEL (female) (1) and (3)	Power supply input	4.75 to 5.25 V
3	Defective common rail pressure sensor	1. Turn starting switch to OFF position. 2. Disconnect connector PFUEL. 3. Turn starting switch to ON position. If failure code [CA452] changes to [CA451], sensor is defective.			
4	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors J2 and PFUEL, and connect T-adapters to each female side of connectors. ★ Open circuit of 5 V circuit			
		Resistance	Between J2 (female) (31) and PFUEL (female) (1)		Max. 1 Ω
5	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors J2 and PFUEL, and connect T-adaptor to female side of connector J2.			
		Resistance	Between J2 (female) (55) and ground		Min. 1 MΩ
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors J2 and PFUEL, and connect T-adaptor to female side of connector J2.			
		Resistance	Between J2 (55) and (21)		Min. 1 MΩ
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.)			

Failure code [CA778] Eng Bkup Speed Sensor Error (HM400_3-CA778-400-A-Z0-A)

Action level	Failure code	Failure	Engine Bkup Speed Sensor Error (Engine controller system)
L01	CA778		
Detail of failure	• Abnormality occurs in engine Bkup speed sensor circuit.		
Action of controller	• Controls engine by using signals of Ne speed sensor.		
Problem on machine	• Running engine stops (when Ne speed sensor is also defective). • Stopped engine cannot be restarted (when Ne speed sensor is also defective).		
Related information	• Method of reproducing failure code: Start engine. ★ If engine Bkup speed sensor needs to be replaced, fuel supply pump must be replaced as a unit. (See Disassembly and assembly, "Removal and installation of fuel supply pump".) • Since inside of speed sensor is not composed of coil but electronic circuit, speed sensor cannot be determined to be normal by measuring its resistance by using multimeter. • Since speed sensor output is pulse voltage of 5 V in normal state, multimeter is not usable for measurement.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.			
		If this failure code disappears, harness connector is defective.			
		★ If this failure code appears, perform following checks.			
2	Defective sensor power supply system	If failure code [CA187] or [CA227] is also displayed, perform troubleshooting for it first.			
3	Damage or improper (loose) installation of engine Bkup speed (G) sensor	Engine Bkup speed (G) sensor may be damaged or incorrectly (loosely) installed. Check it directly.			
4	Defective resistor (G-RES)	1. Turn starting switch to OFF position. 2. Disconnect connector G-RES and connect T-adapters to male side.			
		Resistance	Between G-RES (male) (1) and (2)		620 Ω
5	Improper power supply input to engine Bkup speed sensor	1. Turn starting switch to OFF position. 2. Disconnect connector G and connect T-adapters to female side. 3. Turn starting switch to ON position.			
		Voltage	Between G (female) (1) and (2)	Power supply	4.75 to 5.25 V
6	Open or short circuit in wiring harness (Resistor RES line)	1. Turn starting switch to OFF position. 2. Disconnect connectors J1 and G, and connect T-adapters to the female side of connector J1.			
		Resistance	Between J1 (female) (9) and (60)		620 Ω
7	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors J1, G, and G-RES, and connect T-adapters to each female side.			
		Resistance	★ If power supply voltage in check on cause 5 is normal, this check is not required. Between J1 (female) (60) and G (female) (1)		Max. 1 Ω
			★ If power supply voltage in check on cause 5 is normal, this check is not required. Between J1 (female) (59) and G (female) (2)		Max. 1 Ω
			Between J1 (female) (9) and G (female) (3)		Max. 1 Ω

40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
		★ When you finish the check of the exhaust gas color, release "Regeneration Disable".

Failure code [CA2185] Throt Sensor Sup Volt High Error (WA380_7-CA2185-400-A-Z0-A)

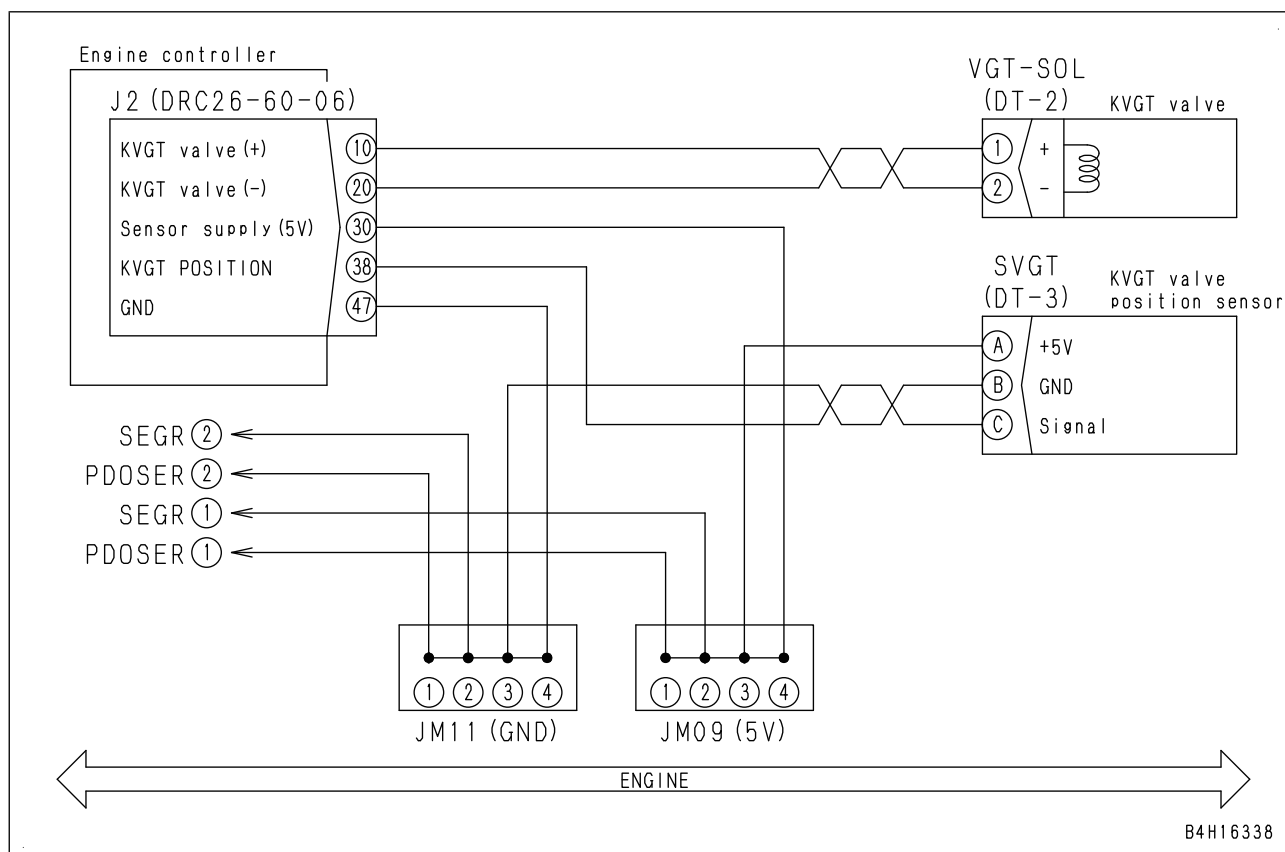
Action level	Failure code	Failure	Throttle Sensor Supply Voltage High Error (Engine controller system)
L03	CA2185		
Detail of failure	• High voltage (5.25 V or higher) appears in throttle sensor power supply circuit.		
Action of controller	• Sets throttle position at 0% with accelerator pedal released and at 50 % with accelerator pedal depressed, and allows engine to run.		
Problem on machine	• Engine does not run at full throttle.		
Related information	• Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective harness connector	See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it.		
2	Defective throttle sensor (accelerator pedal)	1. Turn starting switch to OFF position. 2. Disconnect connector PD and turn starting switch to ON position. If this failure code disappears, throttle sensor is defective. ★ Other failure codes are also displayed. They are generated because of disconnection of connector. Ignore failure codes other than [CA2185].		
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and PD, and connect T-adapters to female side of EC3.	Between EC3 (female) (42) and each pin other than pin (42) Between EC3 (female) (42) and EC3 (female) (1)	Min. 1 MΩ Min. 1 MΩ
4	Hot short circuit in wiring harness (contact with 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector PD and connect T-adapters to female side. 3. Turn starting switch to ON position.	Voltage	Between PD (female) (1) and ground 4.75 to 5.25 V
5	Defective engine controller	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and connect T-adapters to female side. 3. Turn starting switch to ON position.	Voltage	Between EC3 (42) and (41) 4.75 to 5.25 V

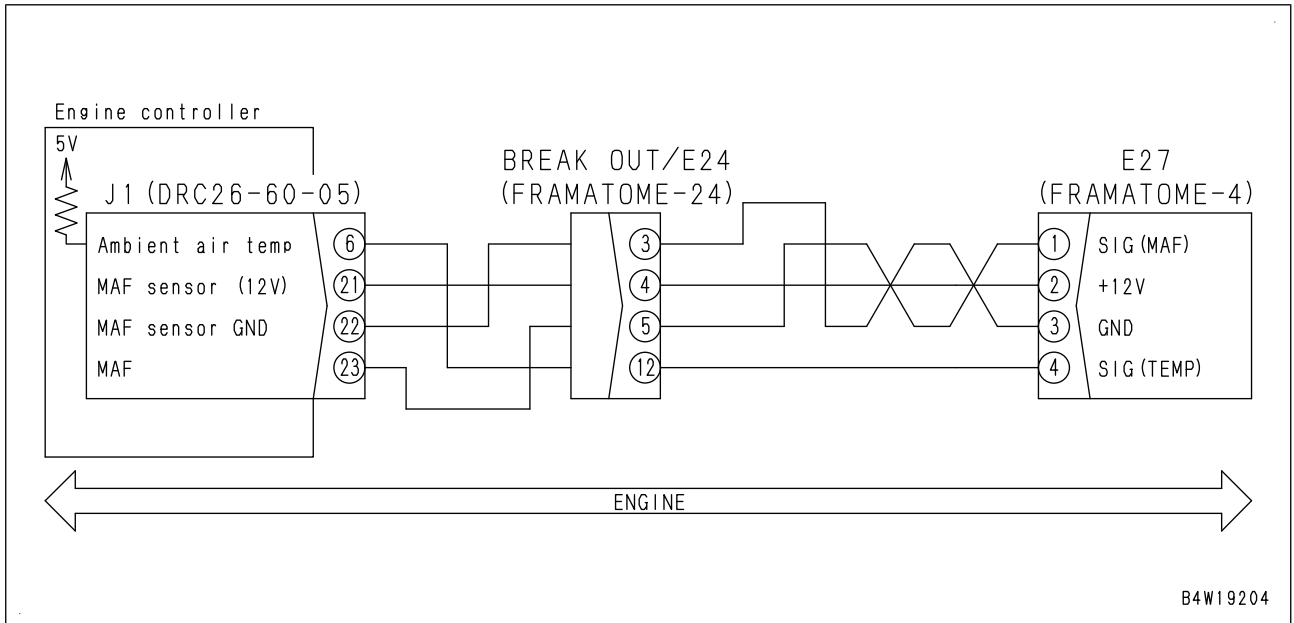
40 Troubleshooting

Troubleshooting by failure code (Display of code)

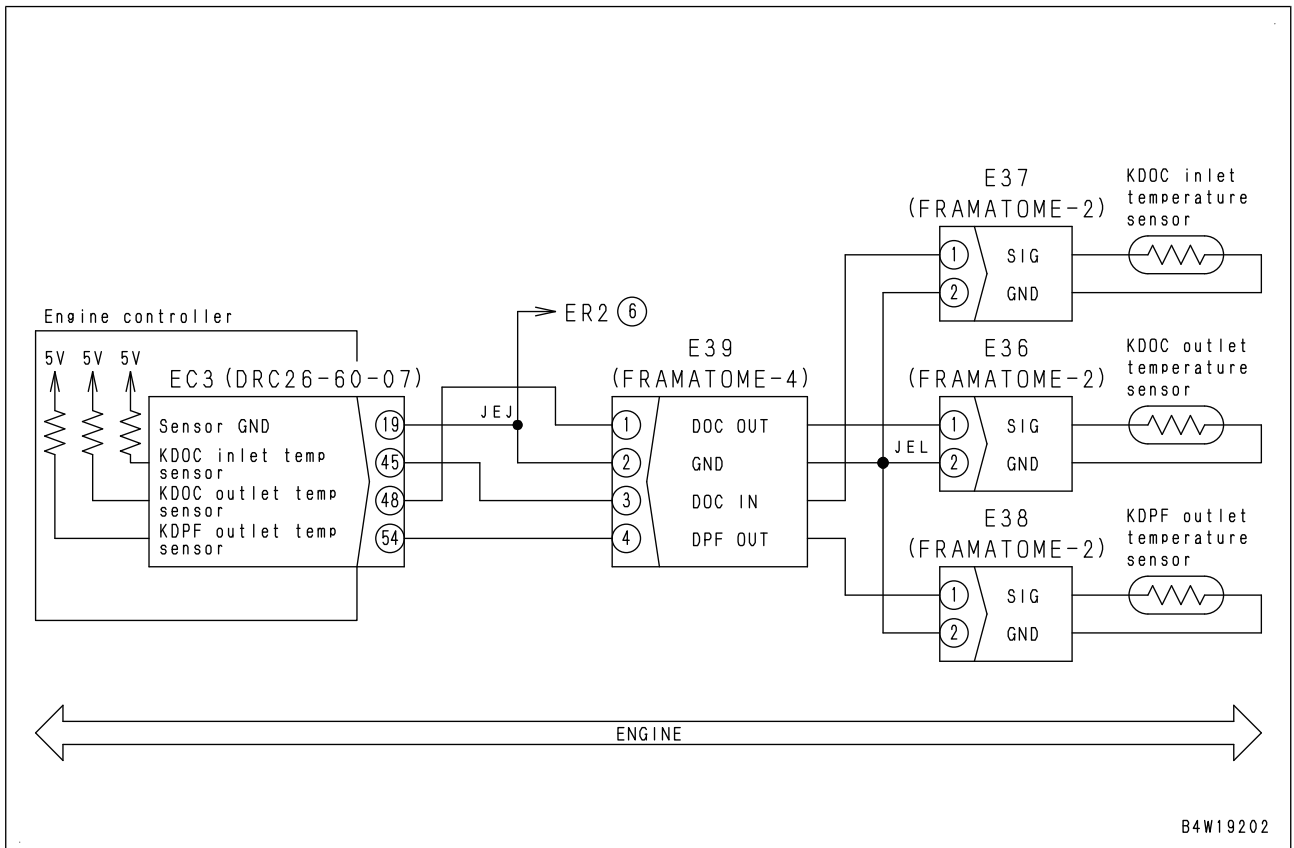
Circuit diagram related to KVGT solenoid



Circuit diagram related to mass air flow sensor



Circuit diagram related to KDOC and KDPF temperature sensors



40 Troubleshooting

Troubleshooting by failure code (Display of code)

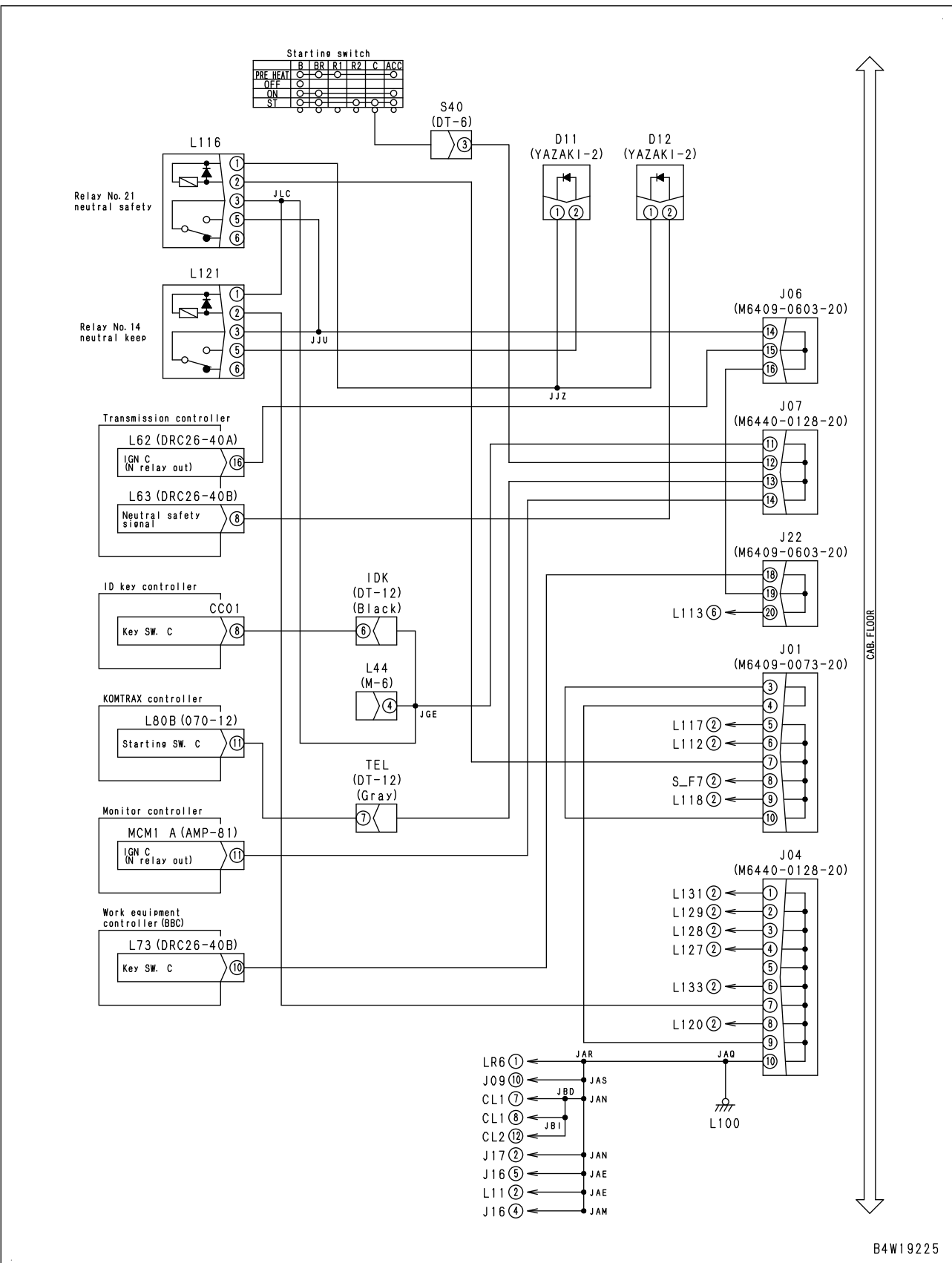
No.	Cause	Procedure, measuring location, criteria and remarks	
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E38 (KDPF outlet temperature sensor), and connect T-adapters to female side of EC3. ★ Check by using multimeter in continuity mode.	
		Between EC3 (female) (54) and each pin other than pin (54)	No continuity (no sound is heard)
4	Defective KDPF outlet temperature sensor	1. Turn starting switch to ON position. 2. Use monitoring function to display signal voltages and temperatures from KDOC inlet temperature sensor, KDOC outlet temperature sensor, and KDPF outlet temperature sensor on screen. 3. Run engine at idle for 10 minutes. 4. Note temperature values (after checking that they are stabilized). 5. Monitor temperature from each sensor.	
		If temperature of any temperature sensor fluctuates 24°C or greater, regard that temperature sensor as defective. - If none of temperature sensor values changes more than 24°C, problem is not in sensor system. Perform checks on causes 5 and after. - If another failure code appears with engine running at idle, perform troubleshooting for it first.	
5	Malfunction of intake system	Check intake system hoses, clamps, and tubes for damage and loosening. Repair as necessary. (Repair intake air leaks.)	
6	Defective injector	Perform cylinder cutout mode operation to identify disabled cylinder (see Testing and adjusting, "Handling of cylinder cutout mode operation").	
7	Oil leak into turbocharger exhaust connector	1. Remove turbocharger exhaust connector. 2. Check inside of turbocharger exhaust connector for adhesion of oil and fuel. If oil or fuel is found, visually check for oil leaks from EGR valve and turbocharger. Repair if any failure is found. ★ Wipe off oil and fuel from piping.	
8	Oil leak into exhaust connector and ducts leading to KDPF	Check exhaust system between turbocharger and KDPF for oil or fuel leaking in. Wipe off oil or fuel if found. ★ If trace of oil or fuel leakage into KDPF is found, check KDPF, and clean or replace it as necessary.	
B. Machine operation for clearing failure code			
1. Turn starting switch from OFF position to ON position. 2. Start engine and run it at low idle (with no load) for approximately 1 minute. 3. Perform regeneration for service. 4. End regeneration for service. (Perform regeneration for service 15 minimum or longer from its start.) If failure code disappears when regeneration for service is ended, repair is complete. ★ When service tool "INSITE" is available, you can clear every failure code by executing "Reset All Faults" command. For how to use "INSITE", see "INSITE" operation manual.			
9	Defective engine controller	If this failure code appears again after above procedures are implemented, engine controller is defective.	

No.	Cause	Procedure, measuring location, criteria and remarks			
3	Defective wiring harness or engine controller	1. Turn starting switch to OFF position. 2. Disconnect E36 (KDOC outlet temperature sensor). 3. Turn starting switch to ON position.			
		If failure code [CA3317] is not displayed, wiring harness or engine controller is defective. ★ Perform check on cause 2 again.			
		1. Turn starting switch to OFF position. 2. Disconnect connector E36 and connect T-adapters to male side. 3. Connect T-box to T-adaptor and connect pins (1) and (2) of T-box with jumper cable. ★ To connect ground line to signal line 4. Turn starting switch to ON position.			
		If failure code [CA3316] is not displayed, wiring harness or engine controller is defective. ★ Perform check on cause 2 again.			
4	Open circuit in wiring harness (wire breakage or defective contact of connector) (including KDOC temperature sensor)	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E36, and connect T-adapters to female side of EC3 and male side of E36.			
		Resistance	Between EC3 (female) (48) and E36 (male) (1)	Max. 1 Ω	
			Between EC3 (female) (19) and E36 (male) (2)	Max. 1 Ω	
5	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E36, and connect T-adapters to female side of EC3 or male side of E36.			
		Resistance	Between ground and EC3 (female) (48) or E36 (male) (1)	Min. 1 MΩ	
6	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E36, and connect T-adapters to female side of EC3. ★ Check by using multimeter in continuity mode.			
		Continuity	Between EC3 (female) (48) and each pin other than pin (48)	No continuity (No sound is heard)	
7	Open or short circuit in wiring harness (including KDOC outlet temperature sensor)	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and connect T-adapters to female side.			
		Resistance	Between EC3 (female) (48) and (19) ★ Use Temperature-Resistance characteristics shown below as resistance criteria.	64 Ω to 65 kΩ	
8	Defective KDOC outlet temperature sensor	★ When failure codes [CA3317] and [CA3316] are displayed in check on cause 3 and no failure is found by checks on causes 2 and 4 to 6, and if failure is found by check on cause 7, KDOC outlet temperature sensor is defective.			
		• Reference 1. Turn starting switch to OFF position. 2. Disconnect connector E36 and connect T-adapters to female side.			
		Resistance	Between E36 (female) (1) and (2) ★ Temperature-Resistance characteristics	-10°C	33 to 65 kΩ
				0°C	25 to 47 kΩ
				50°C	7.8 to 12.2 kΩ
				100°C	3.2 to 4.5 kΩ
				400°C	200 to 240 Ω
700°C	64 to 69 Ω				

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to neutral safety relay



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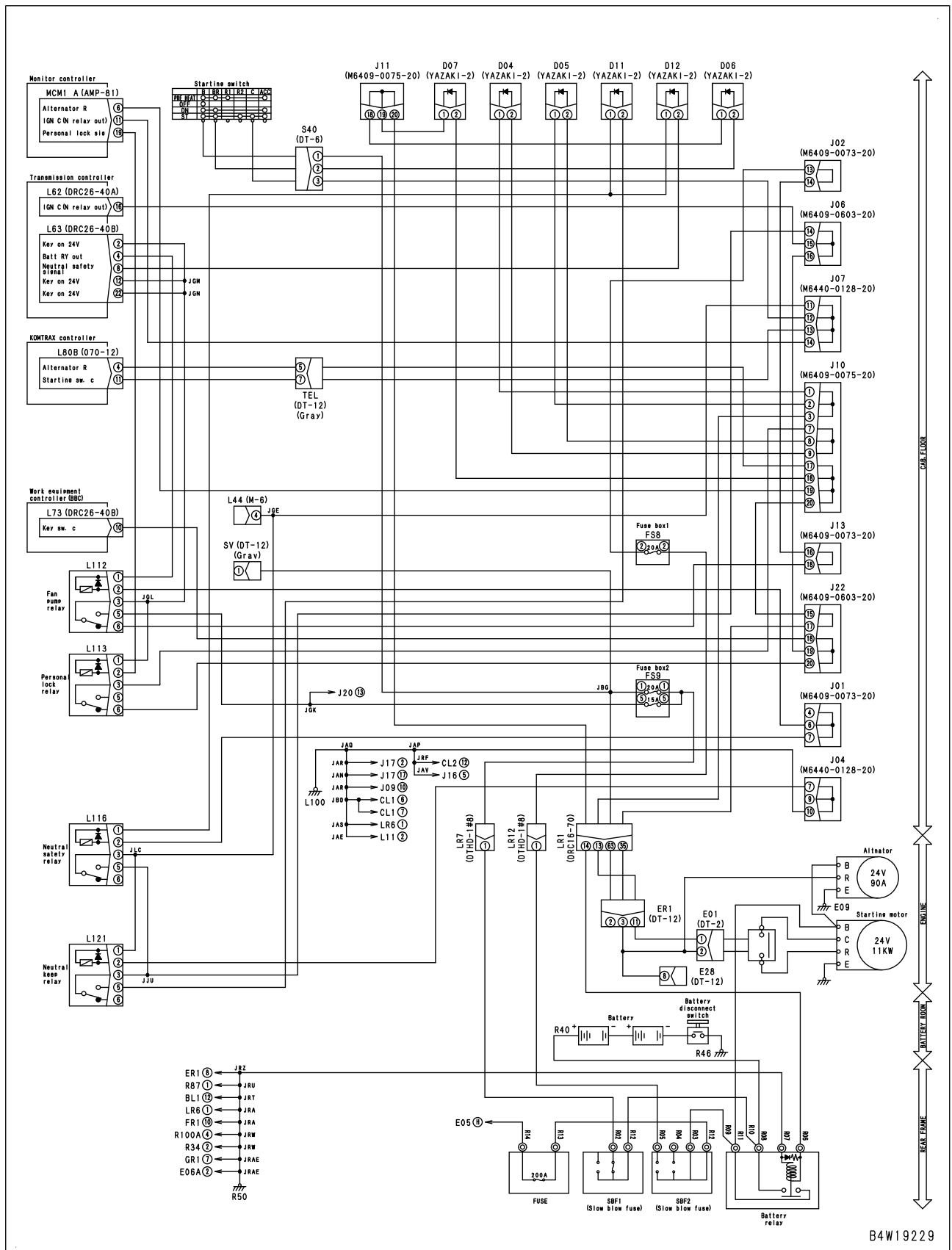
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Circuit diagram related to terminal-C signal circuit



40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [DAFLKB] Operating Lamp Short Circuit (MON) (WA500_7-DAFLKB-400-

A-Z0-A)

Action level	Failure code	Failure	Operating Lamp Short Circuit (Monitor) (Machine monitor system)
—	DAFLKB		
Detail of failure	Monitor controller determines that output circuit to system operating lamp shorts because voltage of output circuit does not become Low level while monitor controller drives system operating lamp.		
Action of controller	- Stops driving system operating lamp. - Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	While system operating lamp lights up, battery disconnect switch must not be set to OFF position. Setting battery disconnect switch to OFF position may destroy data stored in monitor controller memory.		
Related information	- Method of reproducing failure code: Turn starting switch to ON position. - Although monitor controller is not able to light up system operating lamp, no trouble will result unless battery disconnect switch is set to OFF position. - When controller lights up system operating lamp, output circuit voltage is at Low level.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch to OFF position. 3. Remove fuse-4 in fuse box 2. 4. Disconnect connectors MCM1 A, L63, L80A, EC3, R24, and L73, and connect T-adapters to female side of R24.		
		Resistance	Between R24 (female) (1) and (2)	Min. 1 MΩ
2	Hot short circuit in wiring harness (contact with 24 V circuit)	1. Turn starting switch to OFF position. 2. Turn battery disconnect switch to OFF position. 3. Remove fuse-4 in fuse box 2. 4. Disconnect connectors MCM1 A, L63, L80A, EC3, R24, and L73, and connect T-adapters to female side of R24. 5. Turn battery disconnect switch to ON position.		
		Voltage	Between R24 (female) (2) and ground	Max. 1 V
3	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 [DB2QKR] CAN2 Discon (Engine Con) (WA500_7-DB2QKR-400-A-Z0-A)

Action level	Failure code	Failure	CAN2 Disconnection (Engine Controller) (Detected by monitor controller) (Machine monitor system)
L03	DB2QKR		
Detail of failure	Monitor controller does not recognize engine controller over CAN communication-2 line (KOMNET/c).		
Action of controller	- Does not update communication information. - Lights up centralized warning lamp and sounds alarm buzzer. - If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	- Failure codes to be generate by engine controller are not displayed. - Monitoring data for which engine controller is responsible are not updated. - Manual regeneration of KDPF cannot be performed. - Cylinder cutout mode operation and no-injection cranking cannot be performed.		
Related information	- Method of reproducing failure code: Turn starting switch to ON position. - Start of CAN communication is recognized by each controller when ACC signal of starting switch is received. - If failure code [DB2RKR] is also displayed, engine controller is probably defective (cause 2). - For CAN communication error over CAN communication-2 line, monitor controller can generate six failure codes; [D8AQKR], [DAQQKR], [DAZQKR], [DB2QKR], [DB9QKR], and [DSJ0KR]. When all of these six failure codes are displayed simultaneously on screen, ground fault, short circuit, or hot short circuit may occur in wiring harness (CAN communication line). In this case, check whether air conditioner is operated (ON/OFF and air flow adjustment) from air conditioner operation screen since air conditioner is also controlled over CAN communication line. ★ Air conditioner can be controlled even when failure code is displayed on screen. If air conditioner is controlled, wiring harness (CAN communication line) does not have ground fault, short circuit, or hot short circuit. - Since each controller and machine monitor are connected directly to battery, they are supplied with power even after starting switch is turned to OFF position. - Since signal of active CAN communication line is pulse voltage, it cannot be measured by using multimeter. ★ If fuse-15 in fuse box2 is blown, machine monitor displays nothing..		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective fuse-6 in fuse box 2	1. Turn starting switch to OFF position. 2. Remove fuse-6 in fuse box 2. When fuse is blown, engine controller probably has internal short circuit.		
2	Defective engine controller	★ If fuse is not blown, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and connect T-adapters to male side.		
		Resis- tance	Between EC3 (male) (1) and (21) Between EC3 (male) (11) and (31)	Min. 10 Ω Min. 10 Ω
3	Defective power supply to engine controller	★ Check ground terminals E14A and E14B for looseness and corrosion. 1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and connect T-adapters to female side. 3. Turn starting switch to ON position. ★ If check result is abnormal, perform troubleshooting for [CA441].		
		Voltage	Between EC3 (female) (1) and (21) Between EC3 (female) (11) and (31)	20 to 30 V 20 to 30 V

40 Troubleshooting

Troubleshooting by failure code (Display of code)

Multi-function mono-lever specification

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective potentiometer (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors of the following sensors one by one and turn starting switch ON each time. ★ If this failure code goes out, disconnected sensor is defective. ★ Since connector is disconnected, other failure codes appear. Ignore all of displayed failure codes other than this one. 3. Each time troubleshooting is finished, return to step 1.		
		Connector	4th EPC lever potentiometer	L23_OP
			Bucket EPC lever potentiometer	MONO1
2	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors MONO1, L23_OP, and L72. 3. Connect T-adapter to female side of connector L72.		
		Resistance	Between L72 (female) (1) and ground	Min. 1 MΩ
3	Defective work equipment controller	1. Turn starting switch to OFF position. 2. Disconnect connector L72 and connect T-adapter to male side. 3. Turn starting switch ON.		
		Voltage	Between L72 (male) (1) and ground	5.0 to 5.2 V
4	Hot short circuit in wiring harness (contact with 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors MONO1 and L23_OP. 3. Insert T-adapter into connector L72. 4. Turn starting switch ON (with connector disconnected).		
		Voltage	Between L72 (1) and ground	5.0 to 5.2 V

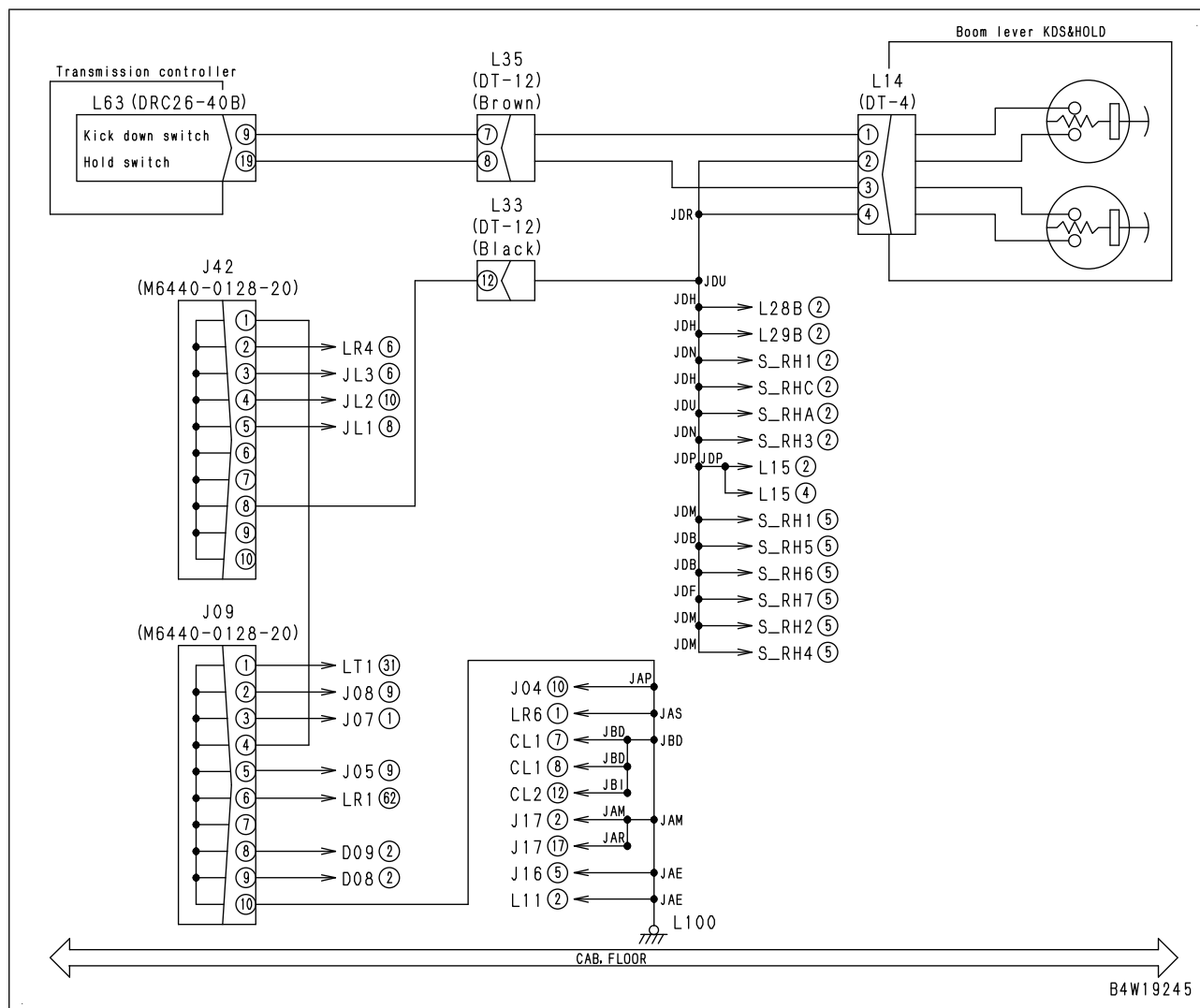
No.	Cause	Procedure, measuring location, criteria and remarks			
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A, PB.SW, and S_FA, and connect T-adapters to each female side.			
		Resistance	Between MCM1 A (female) (71) and PB.SW (female) (1)	Max. 1 Ω	
			Between PB.SW (female) (2) and ground	Max. 1 Ω	
			Between S_FA (female) (3) and L62 (female) (6)	Max. 1 Ω	
4	Defective transmission controller	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L62. 3. Turn starting switch to ON position.			
		Voltage	Between L62 (6) and ground	Parking brake switch: ON.	Max. 1 V
				After turn starting switch to ON position, turn parking brake switch to ON and then OFF.	20 to 30 V

40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks		
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors L62 and L02, and connect T-adapters to each female side. 3. Remove fuse No. 2 in fuse box 1.		
		Resistance	Between ground and fuse No. 2 of fuse box 1 or L02 (female) (1)	Min. 1 MΩ
			Between ground and L62 (female) (15) or L02 (female) (4)	Min. 1 MΩ
			Between ground and L62 (female) (25) or L02 (female) (3)	Min. 1 MΩ
			Between ground and L62 (female) (35) or L02 (female) (2)	Min. 1 MΩ
5	Defective transmission controller	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L62. 3. Turn starting switch to ON position.		
		Voltage	Between L62 (25) and ground	FNR (directional) lever: N (NEUTRAL) 20 to 30 V
				FNR (directional) lever: Other than N Max. 1 V
			Between L62 (35) and ground	FNR (directional) lever: F (FORWARD) 20 to 30 V
				FNR (directional) lever: Other than F Max. 1 V
			Between L62 (15) and ground	FNR (directional) lever: R (REVERSE) 20 to 30 V
				FNR (directional) lever: Other than R Max. 1 V

Circuit diagram related to kickdown switch and hold switch (2-lever specification or 3-lever specification)



40 Troubleshooting

Troubleshooting by failure code (Display of code)

Failure code [DHA4KA] Failure of Air Cleaner Sensor Circuit (WA500_7-DHA4KA-400-

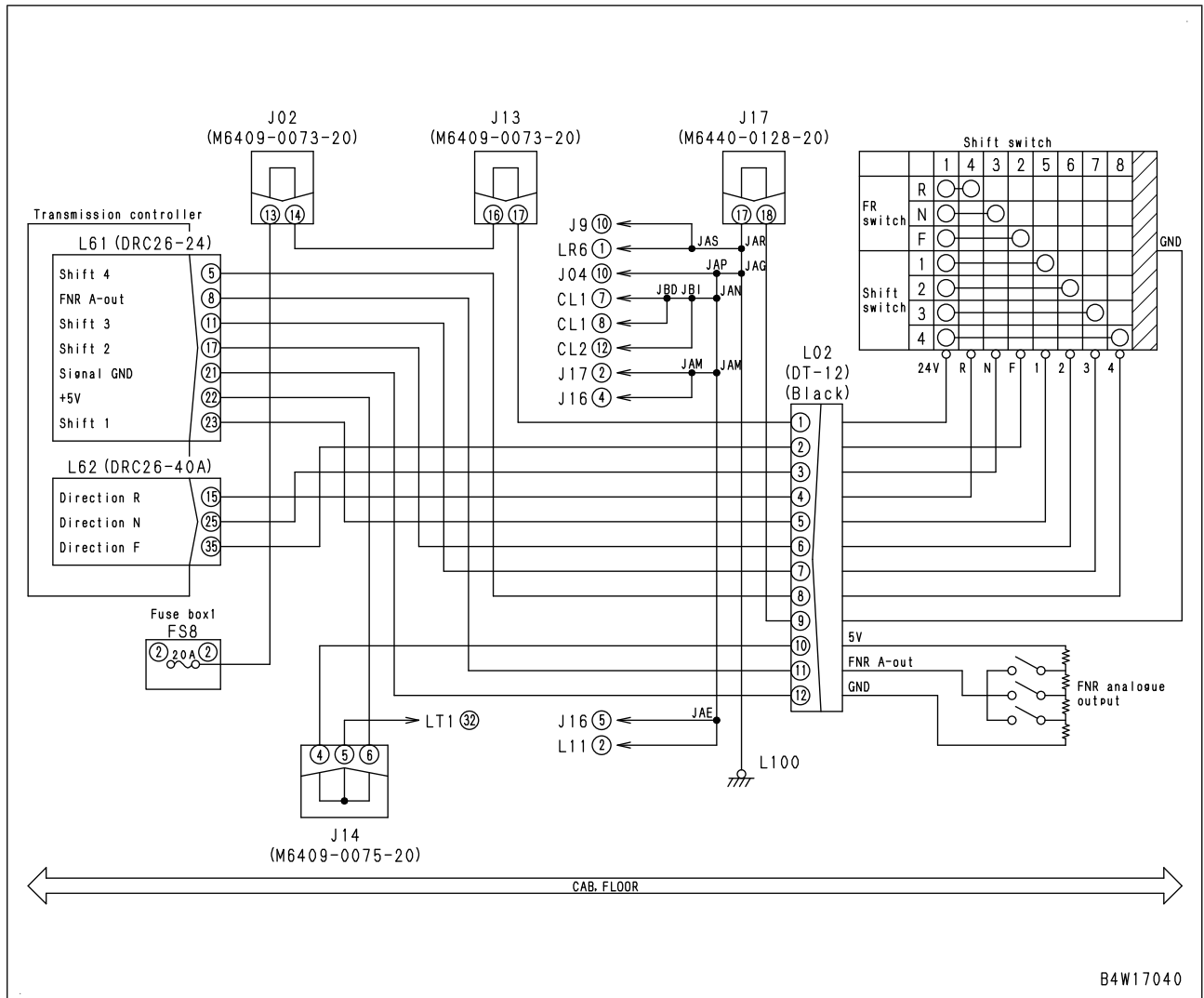
A-Z0-A)

Action level	Failure code	Failure	Failure of Air Cleaner Sensor Circuit (Machine monitor system)
L01	DHA4KA		
Detail of failure	Machine monitor determines that air cleaner clogging sensor circuit is open (open of sensor contacts) because signal voltage from air cleaner clogging switch is not 1 V or below when starting switch is turned to ON position.		
Action of controller	- Lights up air cleaner clogging caution lamp. - If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	If machine continues to be used, clogging of air cleaner cannot be detected correctly, inducing damage to engine.		
Related information	- Voltage at MCM1 A (53) is GND level when air cleaner is normal and 16 to 24 V when air cleaner is clogged (circuit is open). - Input signal (ON/OFF) from air cleaner clogging sensor can be checked with monitoring function. (Code: 04509 Air cleaner clogging sensor). - Method of reproducing failure code: Start engine. - Since T-adapter for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector.		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Clogged air cleaner	Dust indicator does not indicate red zone.		Air cleaner: Normal	
		Dust indicator indicates red zone.		Air cleaner: Clogged	
2	Defective air cleaner clogging sensor	1. Turn starting switch to OFF position. 2. Disconnect connector E33, and connect T-adapter to male side. 3. Turn starting switch to ON position.			
		Resistance	Between E33 (male) (1) and (2)	Air cleaner: Normal	Max. 1 Ω
				Air cleaner: Clogged	Min. 1 MΩ
3	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 E33, and connect T-adapters to each female side.			
		Resistance	Between MCM1 A (female) (53) and E33 (female) (1)		Max. 1 Ω
			Between E33 (female) (2) and each of MCM1 A (female) (13) and (17)		Max. 1 Ω
4	Defective monitor controller	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector E33. 3. Turn starting switch to ON position.			
		Voltage	Between E33 (1) and (2)	Air cleaner: Normal	Max. 1 V
				Air cleaner: Clogged	16 to 24 V

No.	Cause	Procedure, measuring location, criteria and remarks		
5	Defective transmission controller	If no failure is found by above checks, transmission controller is defective. - Reference 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L61. 3. Turn starting switch to ON position. 4. Move FNR lever to perform troubleshooting.		
		Voltage	Between L61 (22) and ground	Always 5.0 to 5.2 V
			Between L61 (8) and ground	FNR (directional) lever: F (FORWARD) 1.2 to 1.8 V
				FNR (directional) lever: N (NEUTRAL) 1.7 to 3.3 V
				FNR (directional) lever: R (REVERSE) 3.2 to 3.8 V

Circuit diagram related to FNR lever potentiometer



40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L71 and MONO1, and connect T-adapters to each female side.		
		Resistance	★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L71 (female) (22) and MONO1 (female) (4)	Max. 1 Ω
			★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L71 (female) (4) and MONO1 (female) (1)	Max. 1 Ω
			Between L71 (female) (2) and MONO1 (female) (2)	Max. 1 Ω
4	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 L71 and MONO1, and connect T-adapters to either female side.		
		Resistance	Between ground and L71 (female) (2) or MONO1 (female) (2)	Min. 1 MΩ
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 connector L71. 3. Set work equipment lock switch to LOCK position. 4. Turn starting switch to ON position. 5. Operate mono-lever to perform troubleshooting.		
		Voltage	Between L71 (22) and (4)	Always 5.0 to 5.2 V
			Between L71 (2) and (4)	Mono-lever: NEUTRAL 2.38 to 2.62 V
				Mono-lever: Boom RAISE (to short of detent position) 0.96 to 1.62 V
				Mono-lever: Boom RAISE (at detent position) 0.60 to 1.10 V
				Mono-lever: Boom LOWER (to short of detent position) 3.38 to 4.04 V
				Mono-lever: Boom FLOAT 3.90 to 4.40 V

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L71, L72, and L29A, and connect T-adapters to each female side.		
		Resistance	★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L72 (female) (1) and L29A (female) (1)	Max. 1 Ω
			★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L71 (female) (4) and L29A (female) (2)	Max. 1 Ω
			Between L71 (female) (14) and L29A (female) (4)	Max. 1 Ω
4	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 L71 and L29A, and connect T-adapter to either female side.		
		Resistance	Between ground and L71 (female) (14) or L29A (female) (4)	Min. 1 MΩ
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)	Always 5.0 to 5.2 V
			Between L71 (14) and (4)	Bucket lever: NEUTRAL 2.38 to 2.62 V
				Bucket lever: TILT (just before the detent position) 0.96 to 1.62 V
				Bucket lever: TILT (at detent position) 0.60 to 1.10 V
				Bucket lever: Full DUMP 3.90 to 4.40 V

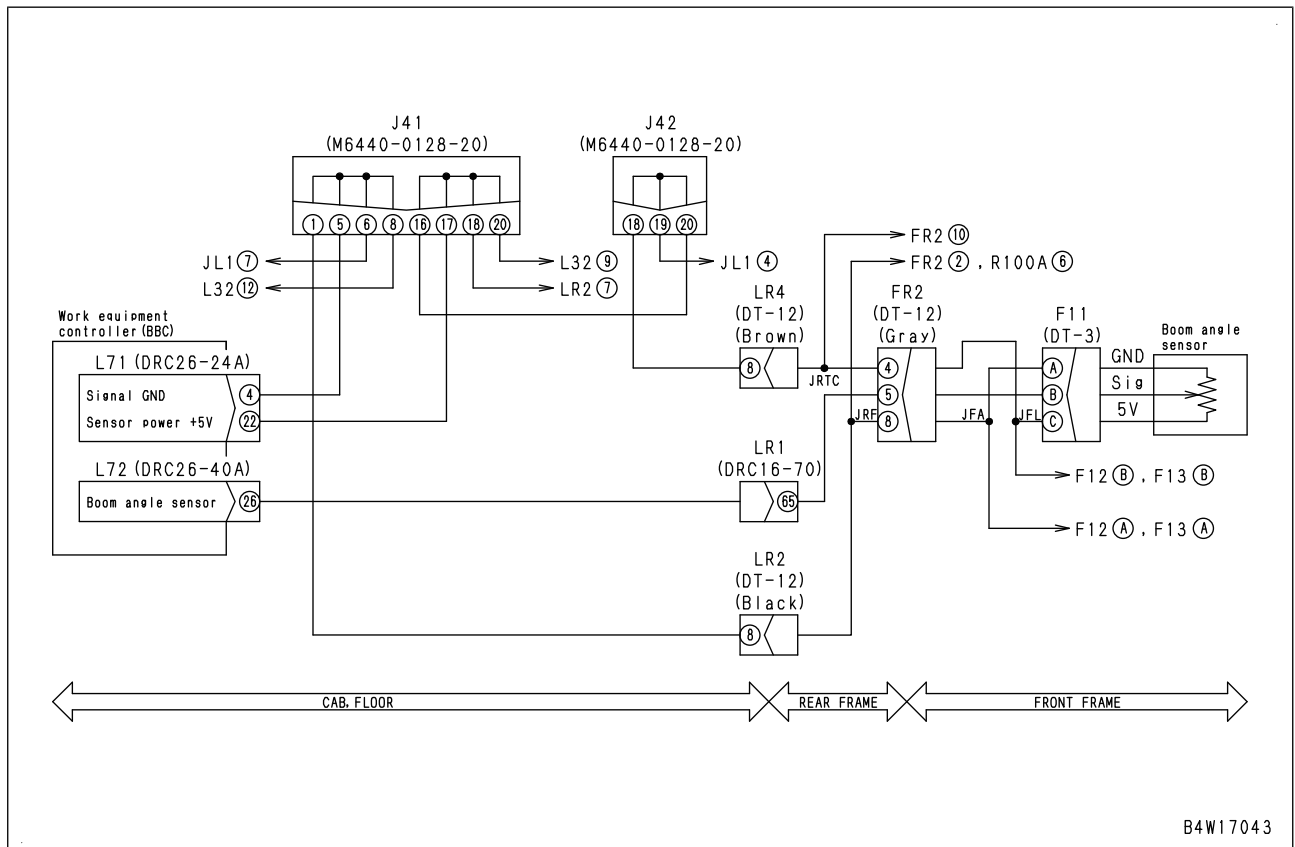
40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks		
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L71, L72, and L30, and connect T-adapters to each female side.		
		Resistance	★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L71 (female) (22) and L30 (female) (1)	Max. 1 Ω
			★ If power supply voltage in check on cause 1 is normal, this check is not required. Between L71 (female) (4) and L30 (female) (2)	Max. 1 Ω
			Between L72 (female) (25) and L30 (female) (4)	Max. 1 Ω
4	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 L72 and L30, and connect T-adaptor to either female side.		
		Resistance	Between ground and L72 (female) (25) or L30 (female) (4)	Min. 1 M Ω
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 3rd (attachment) lever to perform troubleshooting.		
		Voltage	Between L71 (22) and (4)	Always 5.0 to 5.2 V
			Between L72 (25) and L71 (4)	3rd (attachment) lever: NEUTRAL 2.38 to 2.62 V
				3rd (attachment) lever: Operated to extend cylinder fully 3.90 to 4.40 V
				3rd (attachment) lever: Operated to retract cylinder fully 0.60 to 1.10 V

No.	Cause	Procedure, measuring location, criteria and remarks		
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors L71, L72, and F11, and connect T-adapters to any female side.		
		Resistance	Between ground and F11 (female) (B) or L72 (female) (26)	Min. 1 MΩ
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-adapter into connector L72. 3. Turn starting switch to ON position. 4. Operate boom lever to perform troubleshooting.		
		Voltage	Between L72 (26) and ground	Always
				1.00 to 4.00 V
				RAISE stroke end
				3.50 to 4.00 V
				LOWER stroke end
				1.00 to 1.88 V

Circuit diagram related to boom angle sensor

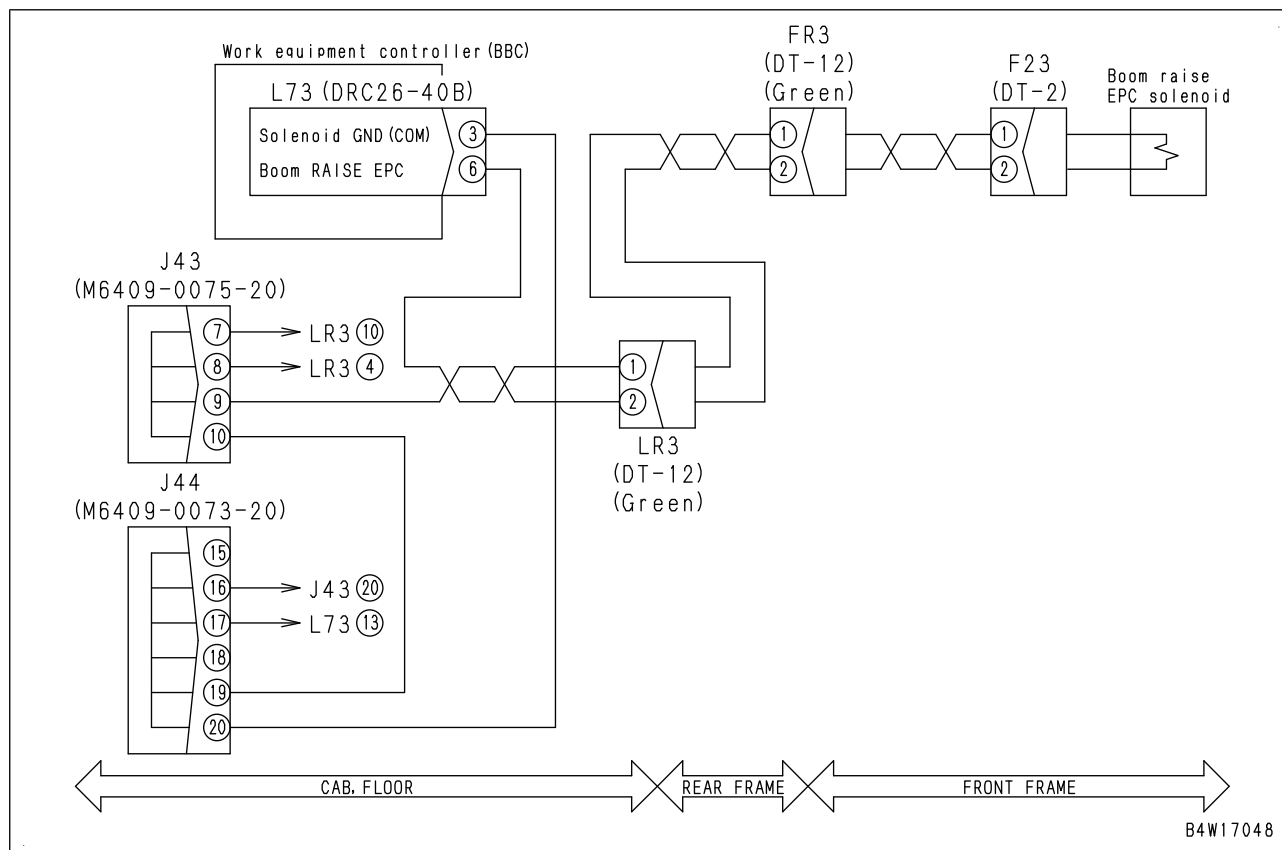


40 Troubleshooting

Troubleshooting by failure code (Display of code)

No.	Cause	Procedure, measuring location, criteria and remarks
6	Defective switch panel (operation switches of machine monitor)	- Perform this check when failure codes [DPQ1KR] and [DPQ3KR] are also displayed. 1. Turn starting switch to OFF position. 2. Disconnect connector MOM1. 3. Turn starting switch to ON position.
		If failure codes [DPQ2KR] and [DPQ3KR] disappear, switch panel is defective.
7	Defective LED unit (display unit of machine monitor)	- Perform this check when failure codes [DPQ1KR] and [DPQ3KR] are also displayed. 1. Turn starting switch to OFF position. 2. Disconnect connector MDM2. 3. Turn starting switch to ON position.
		If failure codes [DPQ1KR] and [DPQ3KR] disappear, LED unit is defective.
8	Defective rearview monitor	- Perform this check when failure codes [DPQ1KR] and [DPQ3KR] are also displayed. 1. Turn starting switch to OFF position. 2. Disconnect connector RVM1. 3. Turn starting switch to ON position.
		If failure codes [DPQ1KR] and [DPQ2KR] disappear, rearview monitor is defective.
9	Defective monitor controller	If no failure is found by above checks, monitor controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed).

Circuit diagram related to boom RAISE EPC solenoid



40 Troubleshooting

Troubleshooting by failure code (Display of code)

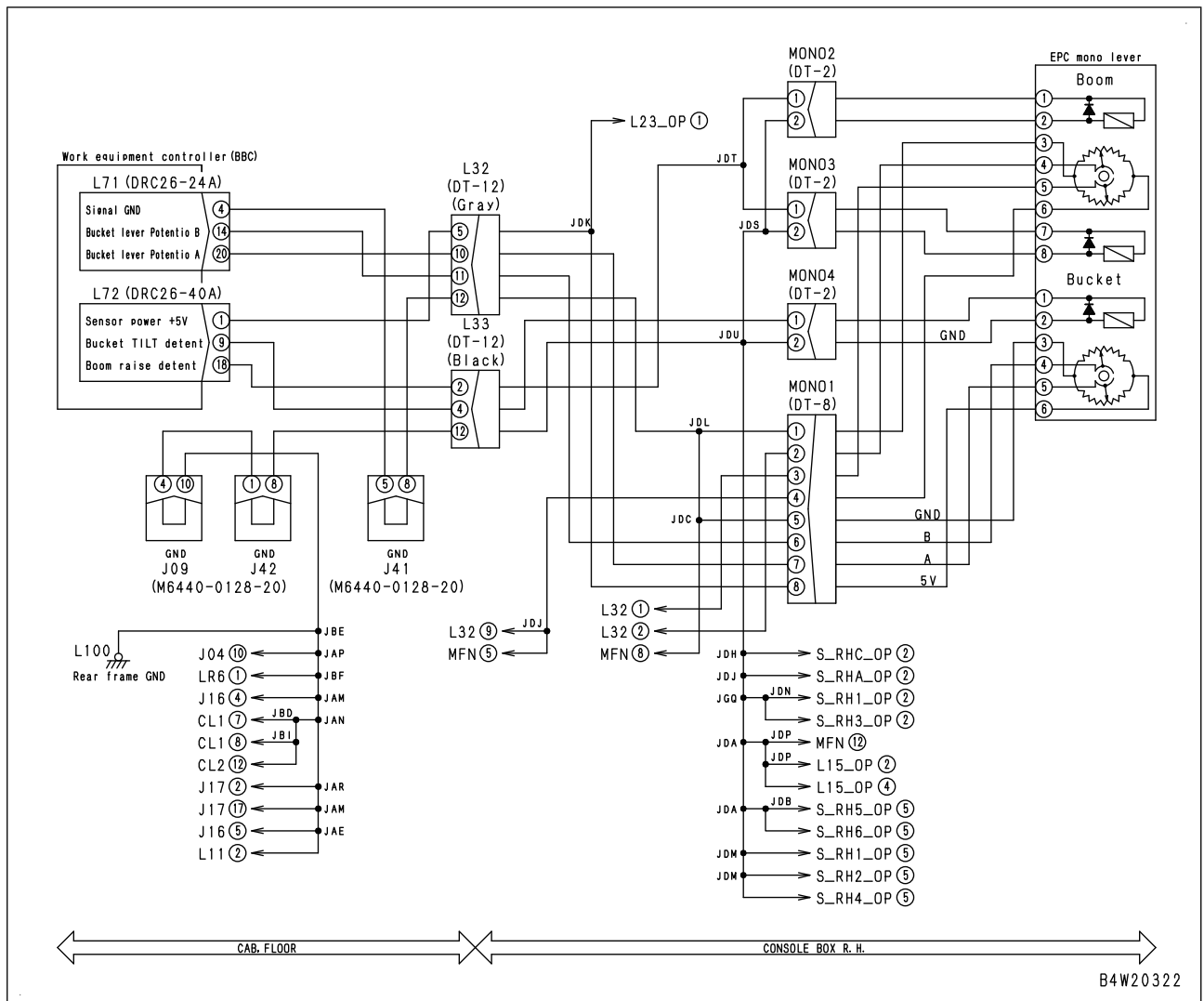
Failure code [DWM1KA] Disconnection of Neutral Lock Solenoid (WA500_7-

DWM1KA-400-A-Z0-A)

Action level	Failure code	Failure	Disconnection of Neutral Lock Solenoid (Work equipment controller system)
L01	DWM1KA		
Detail of failure	Due to open circuit in work equipment neutral lock solenoid circuit, no current flows when controller drives work equipment neutral lock solenoid.		
Action of controller	- Stops driving respective solenoids of work equipment according to input signal from work equipment lock switch. - If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	Respective work equipment solenoids are locked normally according to signal from work equipment lock switch.		
Related information	- Output signal (ON/OFF) to work equipment neutral lock solenoid can be checked with monitoring function. (Code: 41903 Bucket Dump EPC Current) - Method of reproducing failure code: Turn starting switch to ON position and set work equipment lock switch to "LOCK".		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective work equipment neutral lock solenoid (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector B02, and connect T-adaptor to male side.		
		Resistance	Between B02 (male) (1) and (2)	35 to 45 Ω
2	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L72 and B03, and connect T-adapters to female side of L72. ★ If resistance is 1 M Ω or higher, wiring harness has open circuit. If resistance is 1 Ω or below, wiring harness has short circuit.		
		Resistance	Between L72 (female) (19) and ground	35 to 45 Ω
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	★ 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 L72 and B02, and connect T-adapters to each female side.		
		Resistance	Between B02 (female) (2) and ground	Max. 1 Ω
			L72 (female) (19) and B02 (female) (1)	Max. 1 Ω
4	Defective work equipment controller	If no failure is found by above checks, work equipment controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

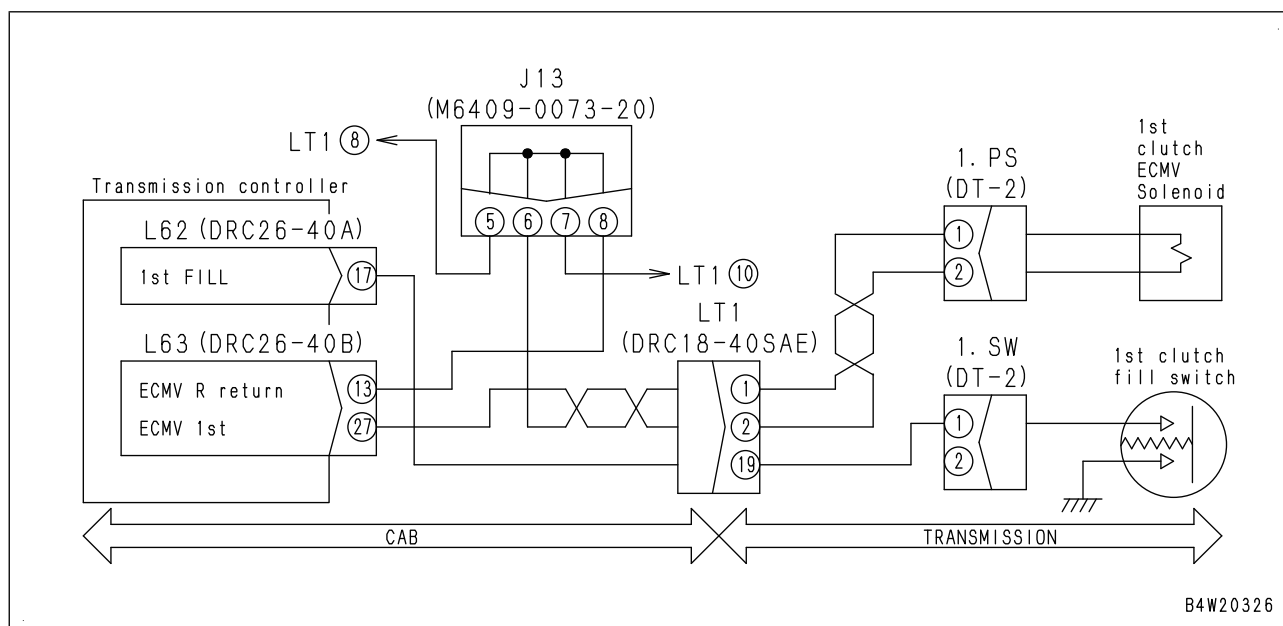
Circuit diagram related to bucket magnet detent solenoid (Multi-function mono-lever specification)



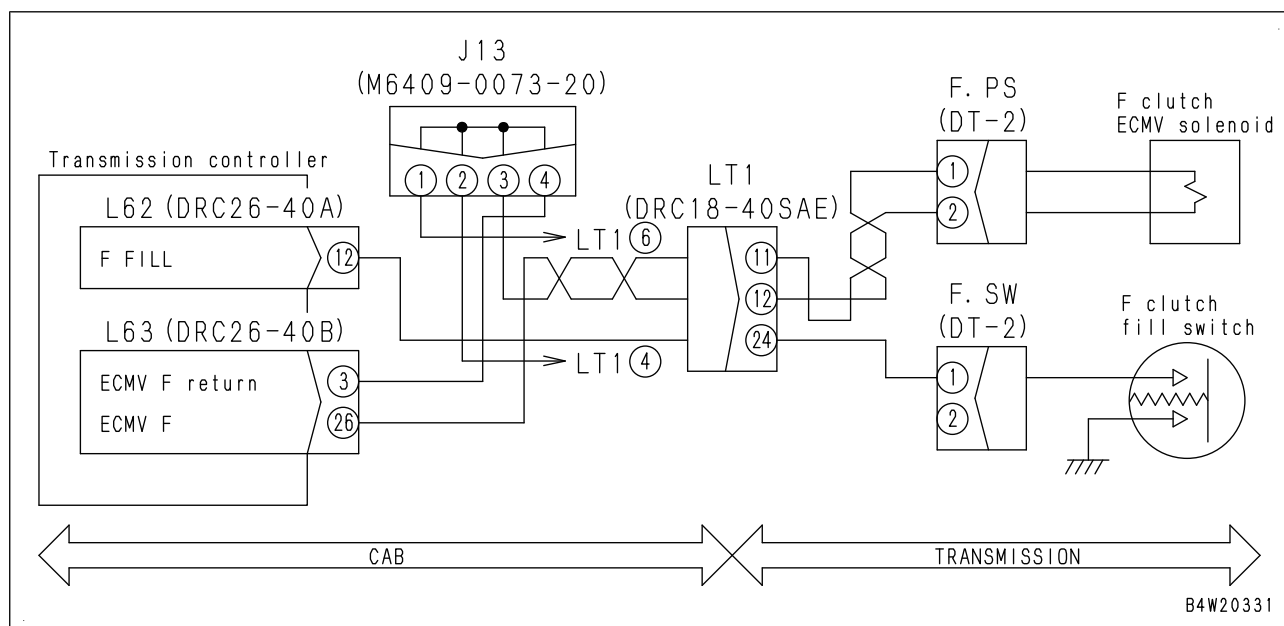
40 Troubleshooting

Troubleshooting by failure code (Display of code)

Circuit diagram related to 1st clutch ECMV solenoid



Circuit diagram related to F clutch ECMV solenoid



40 Troubleshooting

Troubleshooting by failure code (Display of code)

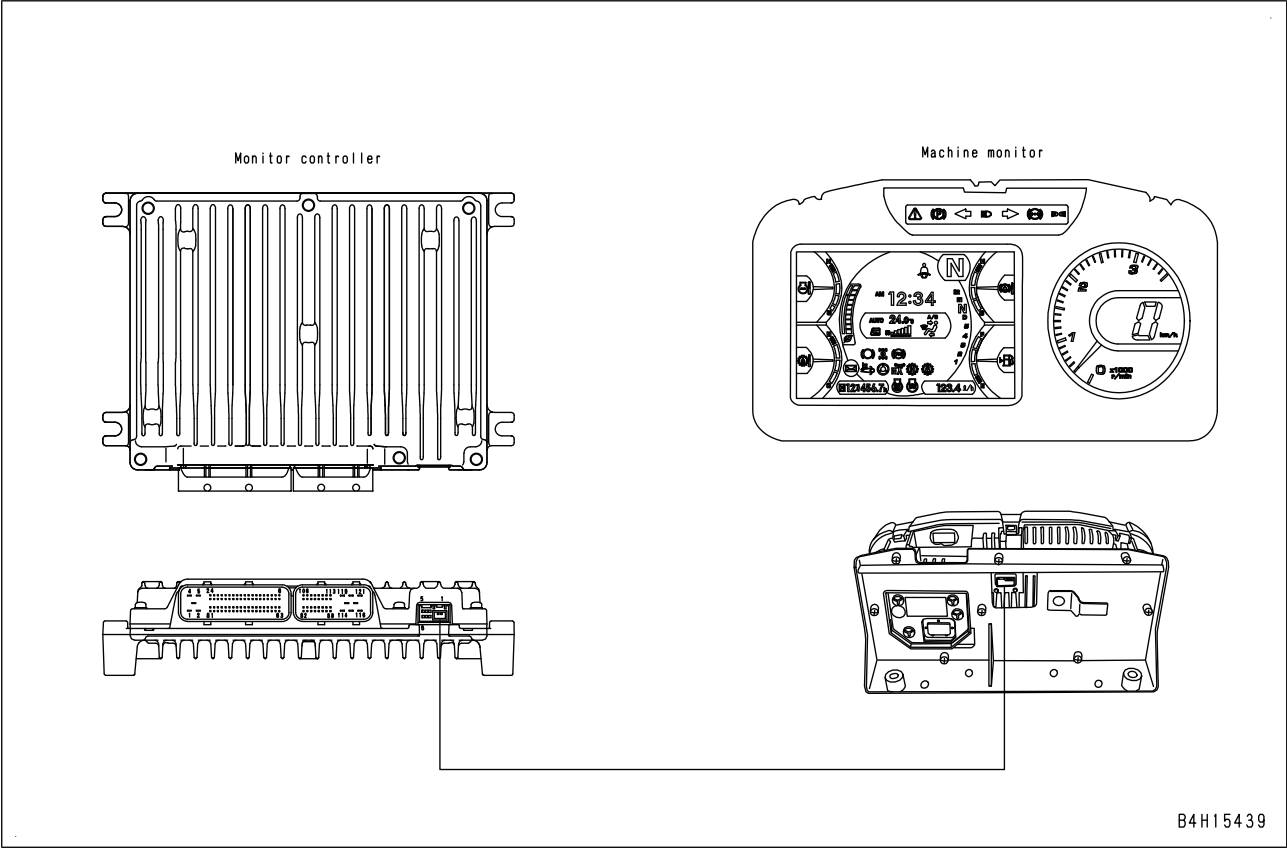
Failure code [DXHMKA] Disconnection of J/S Left EPC Solenoid (WA500_7-

DXHMKA-400-A-Z0-A)

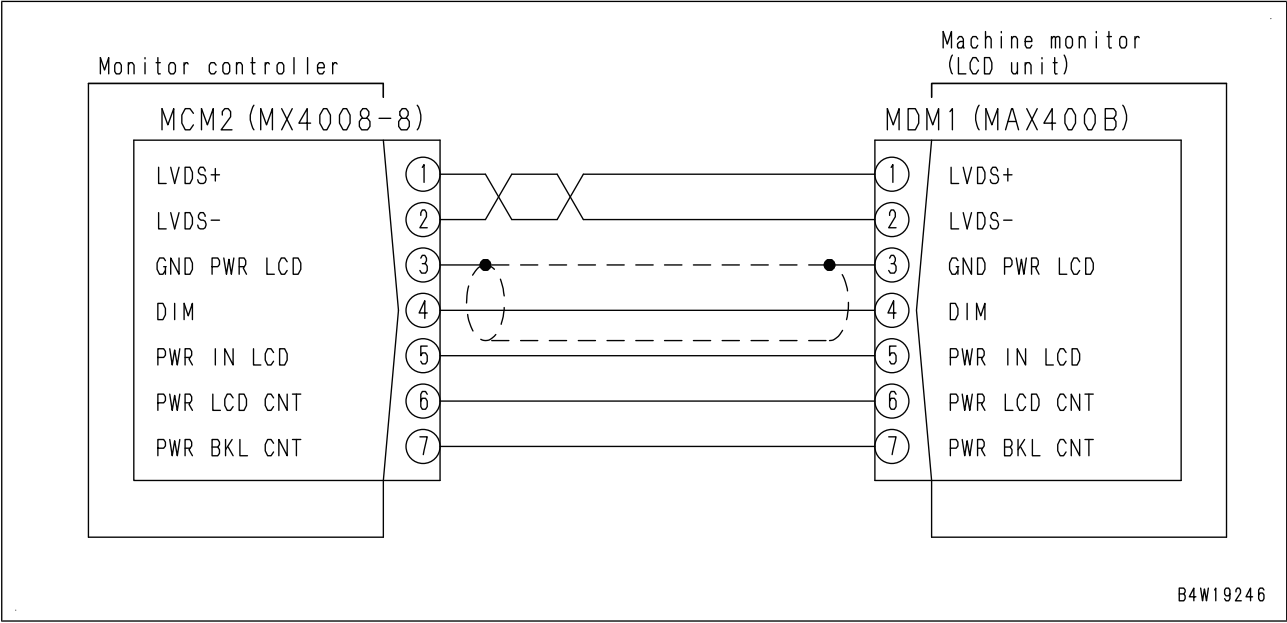
Action level	Failure code	Failure	Disconnection of Joystick Left EPC Solenoid (Work equipment controller system)
L03	DXHMKA		
Detail of failure	Due to disconnection of joystick steering left EPC solenoid system, no current flows through circuit when controller drives joystick steering left EPC solenoid.		
Action of controller	- Stops driving joystick right EPC solenoid and joystick left EPC solenoid. - Stops driving joystick steering solenoid cut-off relay. - Lights up centralized warning lamp and sounds alarm buzzer. - Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	Steering cannot be operated by using joystick steering control. (Steering can be operated by using steering wheel.)		
Related information	- Output state (current value) to joystick steering left EPC solenoid can be checked with monitoring function. (Code: 41905 "J/S L.H. EPC Current") - Method of reproducing failure code: Start the engine, and turn joystick steering to the left. - Output state (ON or OFF) to joystick steering solenoid cut-off relay can be checked with monitoring function. (Code: 03708 "J/S Solenoid Cut Relay")		

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective joystick steering solenoid cut-off relay	★ If failure code of joystick steering solenoid cut-off relay system is displayed, perform troubleshooting for failure codes [D193KA], [D193KB], [D193KY], and [D193MC] first.			
		1. Turn starting switch to OFF position. 2. Replace joystick steering solenoid cut-off relay JL3 with winker and hazard relay L122. 3. Start the engine, and turn joystick steering to the left.			
		★ If this failure code is not generated during this check, joystick steering solenoid cut-off relay JL3 is defective. If this code is generated, proceed to the next step.			
2	Defective joystick steering left EPC solenoid (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L36L, and connect T-adaptor to male side.			
		Resistance	Between L36L (male) (1) and (2)		5 to 15 Ω
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors L73 and L36L, and connect T-adaptor to each female side.			
		Resistance	Between L73 (female) (7) and L36L (female) (1)		Max. 1 Ω
			Between L36L (female) (2) and JL3 (female) (1)		Max. 1 Ω
			Between JL3 (female) (2) and L73 (female) (23)		Max. 1 Ω
4	Defective work equipment controller	1. Turn starting switch to OFF position. 2. Insert T-adaptor into connector L73. 3. Turn starting switch to ON position. 4. Operate joystick steering lever.			
		Voltage	Between L73 (7) and (23)	Joystick steering lever: NEUTRAL	Max. 1 V
				Joystick steering lever: Full operation to the left.	5 to 10 V

Wiring harness between monitor controller and LCD unit of machine monitor



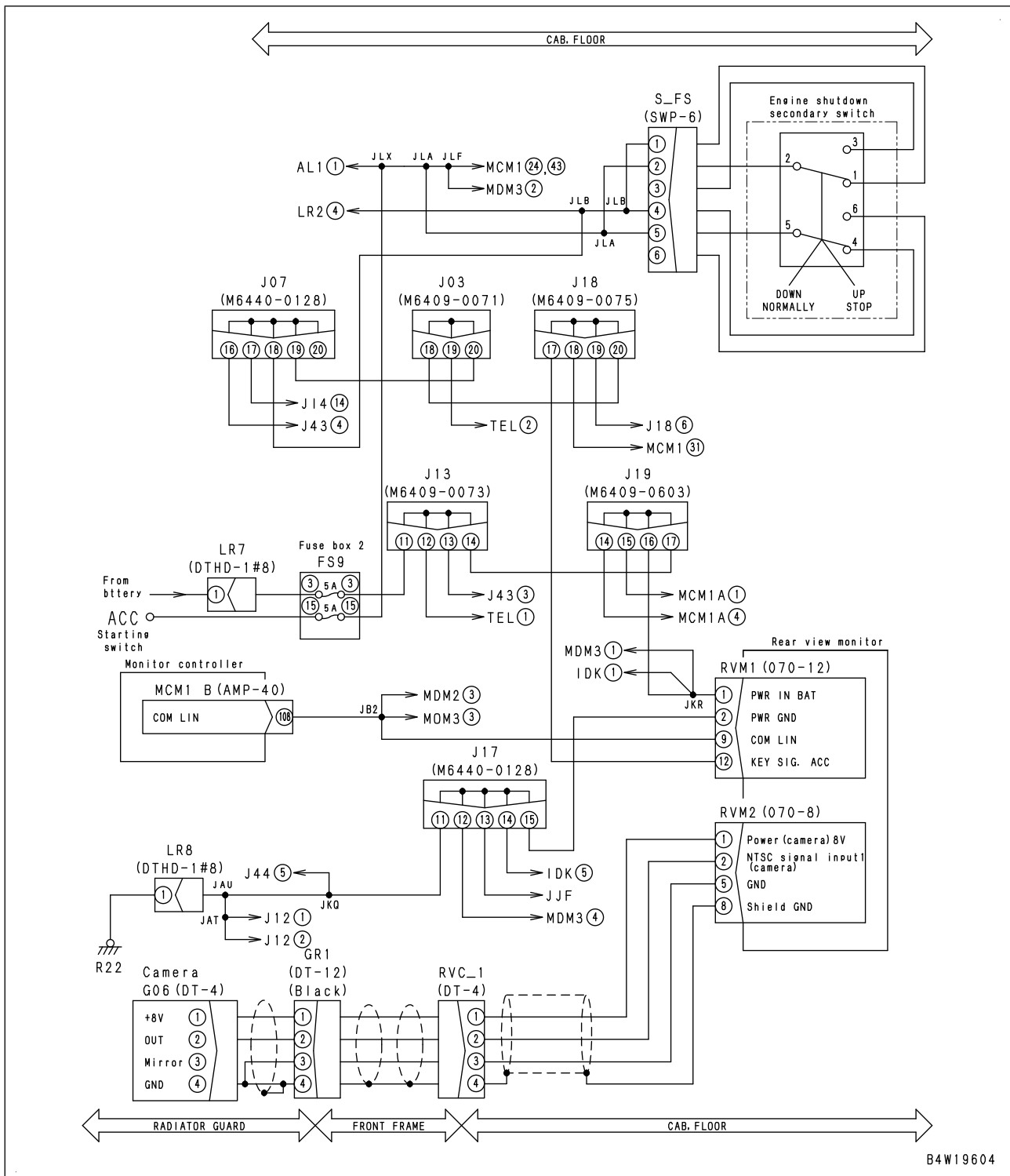
Circuit diagram between monitor controller and LCD unit of machine monitor



40 Troubleshooting

Troubleshooting of electrical system (E-mode)

Circuit diagram related to rearview monitor power supply

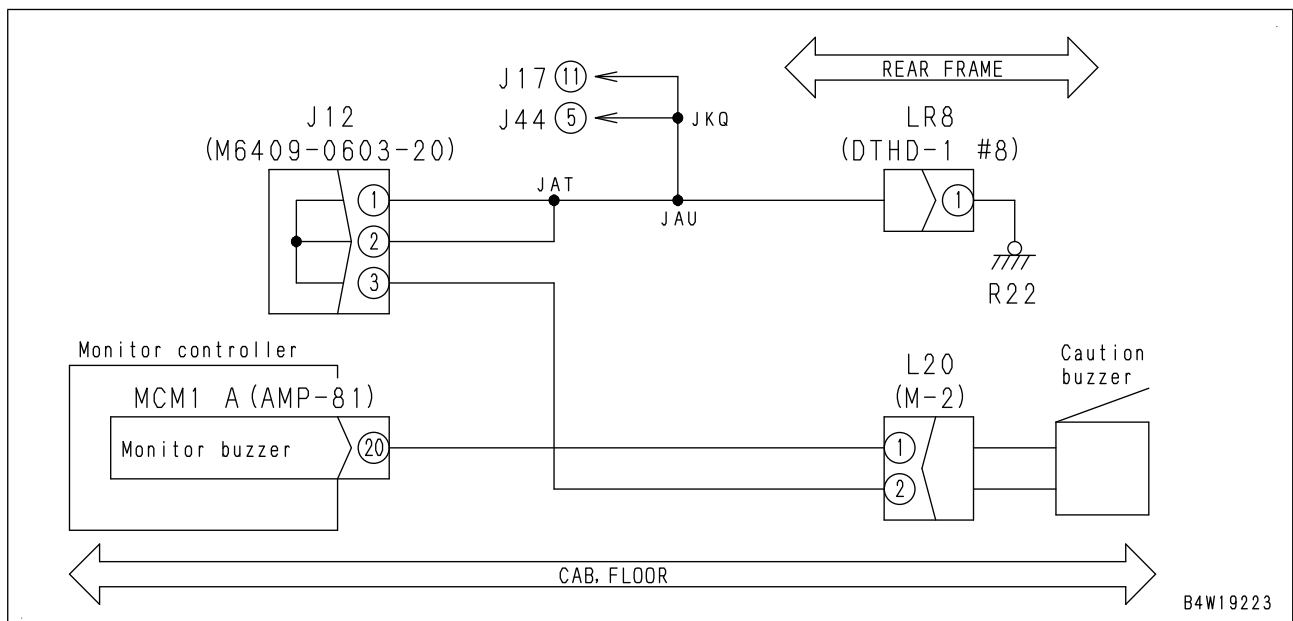


E-30 Alarm buzzer does not sound (WA500_7-KA7-400-A-Z0-A)

Failure	Alarm buzzer does not sound.
Related information	- Open circuit or ground fault of alarm buzzer output circuit - Output state (ON/OFF) from the alarm buzzer to the machine monitor can be checked with monitoring function. (Code: 04700 Buzzer) - If failure code [DV00KB] (alarm buzzer short circuit) is displayed, troubleshoot it first. - Since T-adapter for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector.

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective alarm buzzer (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L20, and connect T-adapter to female side. 3. Turn starting switch to ON position. ★ If following voltages are normal and alarm buzzer does not sound, alarm buzzer is defective.		
		Voltage	Between L20 (female) (1) and (2)	Alarm buzzer: OFF Max. 1 V When driving alarm buzzer (when starting engine) 20 to 30 V
2	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and L20, and connect T-adapters to each female side.		
		Resistance	Between MCM1 A (female) (20) and L20 (female) (1)	Max. 1 Ω
			Between L20 (female) (2) 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 MCM1 A and L20, and connect T-adapter to either female side.		
		Resistance	Between ground and MCM1 A (female) (20) or L20 (female) (1)	Min. 1 MΩ
4	Defective monitor controller	If no failure is found by above checks, monitor controller is defective.		

Circuit diagram related to alarm buzzer



40 Troubleshooting

Troubleshooting of electrical system (E-mode)

E-43 Both High and Low beams of headlamp do not light up or go out

(WA500_7-HQ9-400-A-Z0-A)

Failure	Both "High and Low beams" of headlamp do not light up or go out.
Related information	- Defective switch, lamps, or wiring harness of headlamp (low and high beam) circuit - If clearance lamp, tail lamp, and license-plate lamp light up and go out: - If headlamp does not go out, remove headlamp relay. If headlamp then goes out, headlamp relay is defective. - Input condition (ON/OFF) to machine monitor from lamp switch (headlamp) can be checked with monitoring function (Code: 04507 Head Light SW). - Input condition (ON/OFF) to machine monitor from dimmer switch (high beam) can be checked with monitoring function (Code: 04507 High Beam Status).

No.	Cause	Procedure, measuring location, criteria and remarks			
1	Defective fuses 14 and 15 in fuse box 1	If fuse is blown, circuit may have ground fault, etc. (See check on cause 6.)			
2	Defective headlamp relay (L131)	1. Turn starting switch to OFF position. 2. Replace headlamp relay (L131) with another relay, for example, horn relay (L119). 3. Turn starting switch to ON position. 4. Turn the lamp switch to HEAD/OFF position. If headlamp becomes normal, original headlamp relay (L131) is defective.			
3	Defective lamp switch (internal open or short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L04 and connect T-adapters to male side. 3. Operate lamp switch and perform troubleshooting.			
		Resistance	Between L04 (male) (1) and (2)	OFF	Min. 1 MΩ
			Between L04 (male) (1) and (3)	SMALL, HEAD	Max. 1 Ω
				OFF	Min. 1 MΩ
				SMALL	Min. 1 MΩ
				HEAD	Max. 1 Ω
		Resistance	Between ground and each of L04 (male) (1), (2), and (3)	Always	Min. 1 MΩ
			1. Turn starting switch to OFF position. 2. Disconnect connector L04 and connect T-adapters to male side. 3. Operate dimmer switch and perform troubleshooting.		
			Between L04 (male) (5) and (6)	Dimmer switch: LOW	Min. 1 MΩ
				Dimmer switch: HIGH	Max. 1 Ω
			Between L04 (male) (5) and (7)	Dimmer switch: LOW	Max. 1 Ω
				Dimmer switch: HIGH	Min. 1 MΩ
		Resistance	Between ground and each of L04 (male) (5), (6), and (7)	Always	Min. 1 MΩ
				Always	Min. 1 MΩ

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

Component causing failure		Power train component												Brake component					Troubleshooting No.
		Transmission charge pump	Torque converter	Transmission	Transmission charge pump main relief valve	Torque converter relief valve	Transmission valve (ECMV)	Transmission breather	Last chance filter	Transmission clutch (*)	Lockup clutch ECMV	Lockup clutch	Fan control pump	Brake valve	Brake pedal linkage	Brake piston	Slack adjuster	Pressure reducing valve of accumulator charge valve	
Failure																			
Work equipment system and hydraulic component	Boom does not rise.																	●	H-17
	Boom moves slow or boom lacks lifting force.																	●	H-18
	Rising boom slows down at certain height.																		H-19
	Lift cylinders do not serve to hold bucket on ground (bucket rises off ground).																	●	H-20
	Hydraulic drift of boom is large.																		H-21
	Boom moves up and down during operation.																	●	H-22
	Bucket does not tilt back.																	●	H-23
	Bucket moves slow or bucket lacks tilt-back force.																	●	H-24
	Bucket decelerates during tilt-back operation.																	●	H-25
	Bucket cylinder does not hold bucket on ground.																	●	H-26
	Hydraulic drift of bucket is large.																		H-27
	Bucket tilts back and forth during carrying load (work equipment valve in "HOLD").																	●	H-28
	Boom and bucket control levers do not move smoothly and heavy to move.																		H-29
	Operating work equipment causes engine speed to lower significantly or engine to stall.																	●	H-30
	Large shocks are made when work equipment starts to move and stops.																	●	H-31
	When single work equipment is relieved hydraulically, other work equipment moves.																	●	H-32
	E.C.S.S. (travel damper) does not work and machine pitches and bounces.																		H-33
Fan system	Fan speed is abnormal (too high or low, or fan does not rotate).												●						H-34
	Unusual noise is heard from around fan.																		H-35

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

No.	Cause	Procedure, measuring location, criteria and remarks		
15	Defective steering pump	- If measured pressure is unusual in check on cause (9) and main relief valve is normal, disconnect steering pump outlet hose, crank engine, and check that oil flows out. - Check return filter and suction strainer for foreign materials such as metal particles.		
16	Defective cooling fan pump	If measured output pressure of accumulator charge valve is below standard value in check on cause (4), cooling fan pump may be defective.		
		★ Perform troubleshooting with engine at full speed.		
		Fan speed	Coolant temperature: Min. 95 °C Torque converter oil temperature: Min. 105 °C Hydraulic oil temperature: Min. 95 °C	1,055 ± 100 rpm
		If fan speed is below standard value, perform troubleshooting for "H-35 Fan speed is abnormal".		

40 Troubleshooting

Troubleshooting of hydraulic and mechanical system (H-mode)

No.	Cause	Procedure, measuring location, criteria and remarks		
10	Defective bucket cylinder	★ Be ready with engine stopped, then perform troubleshooting with engine at full speed.		
		If measured relief pressure is below standard value, disconnect hydraulic hose from bucket cylinder head end, and relieve bucket cylinder hydraulically at its stroke end. If oil flows out of cylinder, cylinder piston ring is defective.		
11	Defective work equipment pump	- If measured pressure is unusual in check on cause (8) and main relief valve is normal, disconnect work equipment pump outlet hose, crank engine, and check that oil flows out. - Check return filter and suction strainer for foreign materials such as metal particles.		
12	Malfunction of PC valve	Check PC valve for locking of spool and setting of spring. If any failure is found, replace it.		
13	Malfunction of LS valve	Check LS valve for locking of spool and setting of spring. If any failure is found, replace it.		
14	Defective cooling fan pump	If measured output pressure of accumulator charge valve is below standard value in check on cause (4), cooling fan pump may be defective.		
		★ Perform troubleshooting with engine at full speed.		
		Fan speed	Coolant temperature: Min. 95°C Torque converter oil temperature: Min. 105°C Hydraulic oil temperature: Min. 95°C	1,055 ± 100 rpm
		If fan speed is below standard value, perform troubleshooting for "H-34 Fan speed is abnormal".		
15	Malfunction of suction safety valve in bucket cylinder bottom circuit	While bucket can tilt back when it is unloaded, if bucket cannot tilt back in digging or scooping operation, or if hydraulic drift of bucket cylinder is large, suction safety valve at bucket cylinder bottom end may malfunction.		

S-6 Engine stops during operation (WA500-AF0-400-A-Z0-A)

Failure	Engine stops during operation		
Related information	If any failure code is displayed, carry out troubleshooting for it first.		
No.	Cause	Detail of work, remarks	Remedy
1	Insufficient fuel in tank	When fuel tank is inspected, it is found to be empty	Add fuel
2	Air breather hole in fuel tank cap is clogged	Air breather hole in fuel tank cap is clogged	Flush air breather hole in fuel tank cap and clean surrounding area
3	Clogged fuel filter element	Check used hours of fuel filter. If used beyond specified hours, fuel filter element may be clogged	Replace fuel filter element
4	Foreign material in fuel	Rust and water are found when fuel tank is drained	Replace fuel
5	Air in fuel piping system	When air bleeding operation for fuel system is performed, air comes out (Reference: See Testing and adjusting, "Bleeding air from fuel system")	Performing air bleeding operation Correct or replace fuel piping
6	Leakage from fuel piping system	Fuel is leaking from fuel piping (Reference: See Testing and adjusting, "Bleeding air from fuel system")	Correct or replace fuel piping related parts
7	Defective priming pump	When priming pump is operated, no resistance is felt or it is heavy	Replace priming pump
8	Clogging of feed pump gauze filter	Gauze filter is clogged	Clean or replace gauze filter
9	Defective supply pump	See Testing and adjusting, "Checking fuel delivery, return rate and leakage"	Replace supply pump and pressure limiter
10	Defective air intake hose (from air cleaner to KVGIT inlet)	Visually check the air intake hose for damage	Replace air intake hose
11	Defective air intake manifold	Check the intake manifold for internal damage	Replace air intake manifold
12	Defective boost piping and connections (from KVGIT outlet to air intake manifold)	Air flows out from boost piping	Correct or replace boost piping
13	Defective exhaust pipes (from exhaust manifold to KDPF inlet)	Check exhaust pipes for damage and exhaust gas leakage (Check heat insulation cover and soot on heat shield plate)	Replace exhaust pipes
14	Damaged valve or rocker arm	Check valves and rocker arms (Unusual noise is heard and engine stopped suddenly)	Replace valve or rocker arm
15	Broken or seized piston or connecting rod	- Metallic powders are found in oil drained from oil pan - Remove oil pan and check pistons and connecting rods (Reference: Unusual noise is heard and engine stopped suddenly, or stopped after overheating)	Replace piston or connecting rod
16	Broken or seized crankshaft main bearing	- Metallic powders are found in oil drained from oil pan - Remove oil pan and check crankshaft main bearing	Replace crankshaft main bearing
17	Defective engine controller power supply wiring	Check engine controller power supply wiring (Reference: See Troubleshooting, Failure Code [CA343].)	Correct engine controller power supply wiring

General information on disassembly and assembly (ALL-3851-001-A-00-A)

How to read this manual (ALL-0320-011-A-00-A)

(Rev.2010.10)

Removal and installation of □□□□ assembly

Special tools

- Special tools which are necessary for removal or installation of assemblies are described as A1...X1 etc. and their part numbers, part names, necessities, and quantities are described in the special tool list.
- Marks used in the column of necessity are explained below.
 - : Tools are not substituted, must always be equipped (used).
 - : Tools extremely useful if available or tools that can be substituted with commercially available tool.
- For details and the sketches of the special tools, see "special tool list" and "sketches of special tools".

Removal

- In the removal section, the work procedures, precautions and know-how to do the work and the amount of oil and coolant to be drained are described.
- Common tools that are necessary for the removal work are indicated as [1], [2] ... etc. and their part numbers, part names and quantities are not described.
- Marks used in the removal section are explained below.

 : This mark indicates safety-related precautions which must be followed when performing the work.

★ : This mark gives guidance or precautions when performing the work.

[*1]: This mark indicates that instructions or precautions for the assembly installation work are given in the installation section.

 : This mark shows the amount of oil or coolant to be drained.

 : This mark shows the weight of a part or the assembled parts for a device.

Installation

- Unless otherwise instructed the installation of assemblies is to be made in the reverse order to removal.
- Instructions and precautions for assembly installation are shown with [*1] mark in the removal section, identifying which step the instructions are intended for.

- Common tools that are necessary for installation are described as [1], [2] ... etc. and their part numbers, part names and quantities are not described.
- Marks shown in the installation section are explained below.

 : This mark indicates safety-related precautions which must be followed when performing the work.

★ : This marks gives guidance or precautions when performing the work.

 : This mark shows the weight of a part or the assembled parts for a device.

 : This mark indicates a specific coating agent to be used.

 : This mark indicates the specified tightening torque.

 : This mark indicates the amount of oil or coolant to be added.

Disassembly and assembly of □□□□ assembly

Special tools

- Special tools which are necessary for disassembly and assembly of assemblies are described as A1...X1 etc. and their part numbers, part names, necessities, and quantities are described in the special tool list.
- Marks used in the column of necessity are explained below.
 - : Tools are not substituted, must always be equipped (used).
 - : Tools extremely useful if available or tools that can be substituted with commercially available tool.
- For details and the sketches of the special tools, see "special tool list" and "sketches of special tools".

Disassembly

- In the disassembly section, the work procedures, precautions and know-how to do the work, and the amount of oil and coolant to be drained are described.
- Common tools that are necessary for the disassembly work are indicated as [1], [2] ... etc. and their part numbers, part names, and quantities are not described.
- Marks used in the disassembly section are explained below.

Removal and installation of injector assembly (WA500-AE60-924-K-00-A)

⚠ Place the machine on a level ground and set the parking brake to the LOCK position.

⚠ Set the lock bar to the front and rear frames to lock them and chock the wheels.

⚠ Lower the work equipment to the ground and set the work equipment lock lever to the LOCK position.

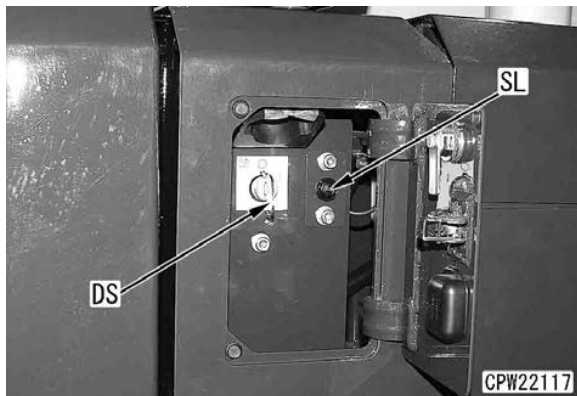
⚠ Turn the starting switch to the OFF position and stop the engine.

⚠ Turn the battery disconnect switch to the OFF position and remove the key.

★ When turning off the battery disconnect switch, perform the following procedure.

1. Turn the starting switch key to the OFF position.
2. Check that system operation lamp (SL) is turned off, and then turn battery disconnect switch (DS) to the OFF position.

★ For details, see Testing and adjusting, "Handling of battery disconnect switch".



Removal (WA500-AE60-520-K-00-A)

★ When removing the injector assembly of each cylinder, remove the engine hood, and then perform the following.

- When removing No. 1 injector assembly, perform step 3.
- When removing No. 2 and No. 3 injector assemblies, perform step 4.

(The difference between the removal procedures of the No. 2 and No. 3 injector assemblies is only the position of fuel high-pressure tube clamp to be removed)

- When removing No. 4 and No. 5 injector assemblies, perform step 5.

(The difference between the removal procedures of the No. 4 and No. 5 injector assemblies is only the position of fuel high-pressure tube clamp to be removed)

- When removing No. 6 injector assembly, perform step 6.
- When removing all of the injector assemblies, perform steps 1 to 6, skipping the repeated steps.

1. Drain the coolant.



Radiator:

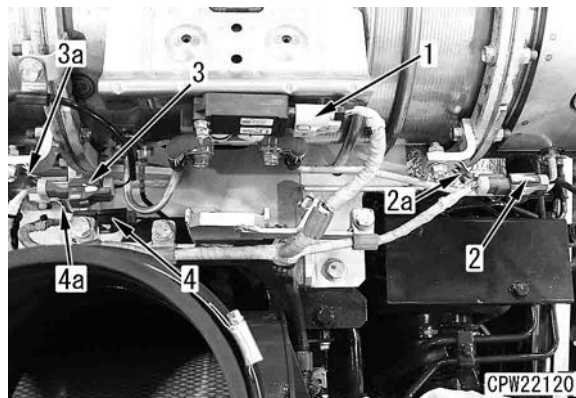
132.5 ℓ

2. Remove the engine hood. For details, see "Removal and installation of engine hood".
3. Removal of No. 1 injector

- 1) Remove KDPF assembly according to the following procedure.

★ When removing the KDPF assembly to disassemble or replace it, remove and install it according to "Removal and installation of KDPF assembly".

- 1] Disconnect wiring connectors (1) to (4) and clips (2a) to (4a).



- 2] Remove KDPF pipe (5).

50 Disassembly and assembly

Engine and cooling system

11. Remove the KCCV assembly according to the following procedure.

- 1) Remove wiring connector CN-E35 (42a).
- 2) Remove tubes (42b) to (42e). [*17]
- 3) Disconnect drain hose (42f) from KCCV. [*18]
- 4) Remove mounting bolts (42g) (4 pieces), and remove KCCV assembly (42).

★ Do not remove KCCV filter assembly (42h) from bracket (42i) for any purpose other than replacement of the KCCV filter. [*19]

12. Disconnect wiring terminals (43a) to (43d).

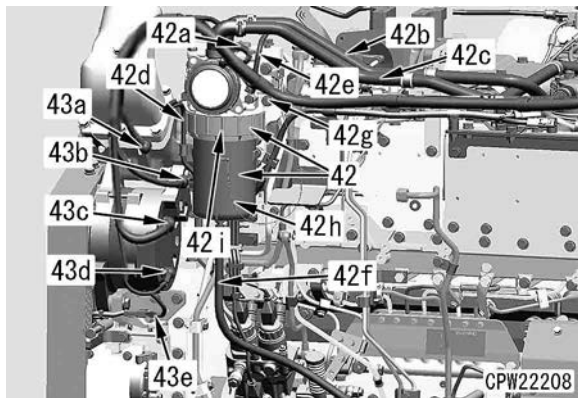
Wiring terminal (43a): CN-E07B

Wiring terminal (43b): CN-E02

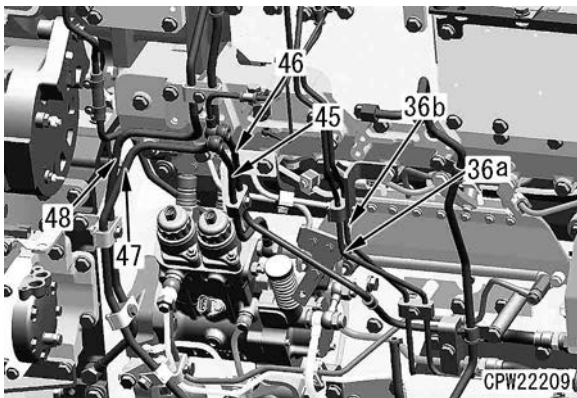
Wiring terminal (43c): CN-E03

Wiring terminal (43d): CN-E04

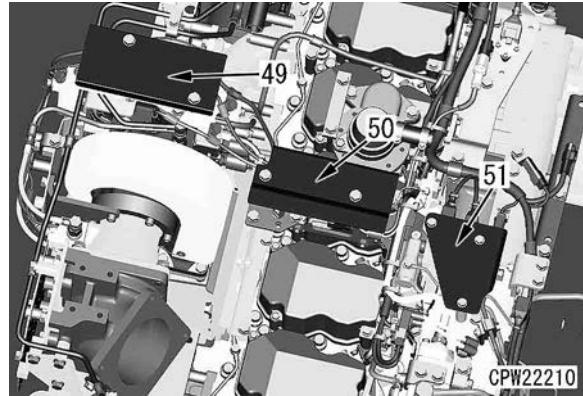
13. Disconnect wiring connector CN-E010 (43e).



14. Remove tubes (36a), (36b), and (45) to (48). [*20]



15. Remove covers (49) to (51).

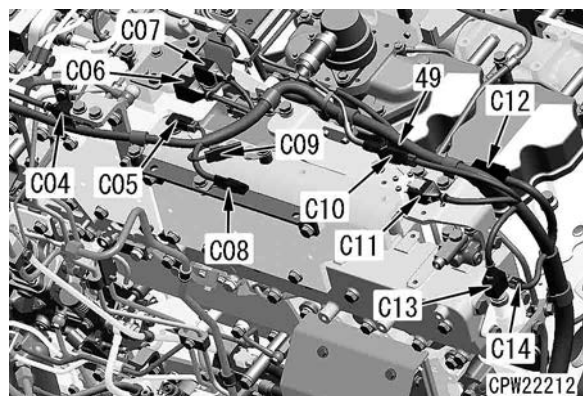


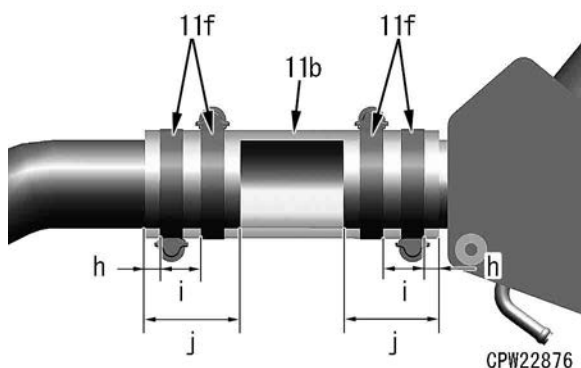
16. Disconnect wiring connectors (C01) to (C20), and move wiring (49) toward the rear of the machine.

(C01): G	(C11): PAMB
(C02): PCV1	(C12): INJ
(C03): PCV2	(C13): PIM
(C04): PCCV	(C14): TIM
(C05): G_RES	(C15): EGR-SOL
(C06): SOV1	(C16): VGT-SOL
(C07): PDOSER	(C17): SOV2
(C08): CAN_C	(C18): VGT-REV
(C09): B_RES	(C19): SEGR
(C10): SVGT	(C20): DOSER

17. Disconnect wiring connector (C21), and remove wiring (52).

18. Disconnect the clip and band, and remove wirings (52), (53a), and (53b).

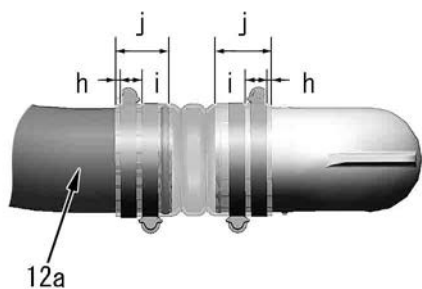




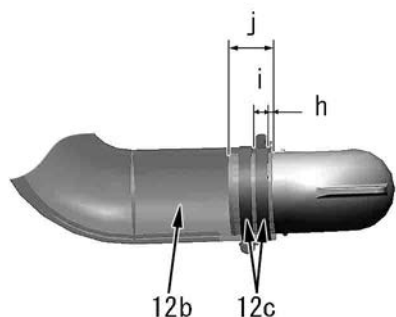
[*5]

- Installed dimensions of clamp of aftercooler hoses (12a) and (12b)
(h): 5 mm
(i): 21 mm
(j): 55 mm

 **Clamp mounting bolts of aftercooler hoses (12a) and (12b):**
 $10.5 \pm 0.5 \text{ Nm}$ { $1.07 \pm 0.05 \text{ kgm}$ }



CPW22885



CPW22886

- Refilling of oil
Refill with the coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant through system. Then check the coolant level again.



Radiator:

132.5 ℓ (when drained completely)

50 Disassembly and assembly

Engine and cooling system

- Install KDPF assembly (7) according to the following procedure.
1. Loosen bracket mounting bolts (7c) (4 pieces).
 2. Sling KDPF assembly (7), and install it to bracket (8).



KDPF assembly (7):

110 kg

3. Install U-bolt (7b) and washer (11), and tighten mounting nuts (9) (4 places) lightly.
4. Loosen mounting bolts (7a) (4 pieces), and adjust the position of bracket (12) so that excessive stress is not applied to KDPF assembly (7).
5. Tighten mounting bolts (7a) (4 pieces).



Mounting bolt (7a):

98 to 123 Nm {10 to 12.5 kgm}

6. Loosen bracket mounting bolts (7c) (4 pieces).



Mounting bolt (7c):

98 to 123 Nm {10 to 12.5 kgm}

7. Tighten mounting nuts (9) (4 places) evenly.



Mounting nut (9):

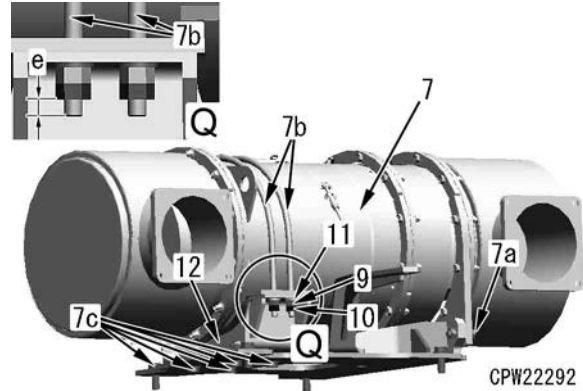
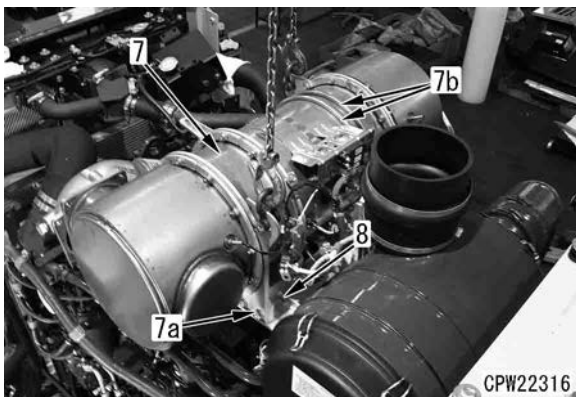
14.7 to 34.3 Nm {1.5 to 3.5 kgm}

8. Tighten lock nuts (10) (4 places) evenly.
- ★ Check that dimensions (e) between tip end of U-bolt (7b) and the end surface of lock nut (10) are even on both sides.
 - ★ After tightening lock nut (10) to the specified torque, turn mounting nut (9) slightly to the loosening direction.



Lock nut (10):

20.1 to 49.0 Nm {2.1 to 5.0 kgm}



Perform subsequent procedure in the reverse order to removal.

[*1]

- ★ When installing, check clearance (t2) between flanges (F3) and (F4).
 - Clearance (t2) between flanges of KDPF inlet and KDPF piping: Max. 1 mm (including gasket) (Measure at four places of top, bottom, right, and left)
- ★ When KDPF piping (6) is removed, install it according to the following procedure. (Install KDPF piping (6) after installing KDPF assembly (7).)

1. Lightly install KDPF piping (6) with mounting bolts (6a), (6b), and (6c).

- ★ Check that bellows (B) is not deformed.



Mounting bolt:

Seizure prevention compound (LC-G)

2. Check clearance (t1) between KGVV outlet flange (F1) and KDPF piping flange (F2) and clearance (t2) between KDPF inlet flange (F4) and KDPF piping flange (F3).
 - Clearance (t1) between flanges of KDVV outlet and KDPF piping: Max. 2 mm (including gasket) (Measure at four places of top, bottom, front, and rear)
 - Clearance (t2) between flanges of KDPF inlet and KDPF piping: Max. 1 mm (including gasket) (Measure at four places of top, bottom, right, and left)
3. If clearance (t1) or (t2) between flanges is larger than the specified value, adjust it according to the following procedure.
 - 1) Loosen bracket mounting bolts (7a) (4 pieces).
 - 2) Adjust KDPF assembly (7) by moving it in front, rear, right and left directions, and then check the clearance again in step 3.
 - 3) After adjusting, tighten mounting bolts (7a) to the specified torque.



O-ring and threaded portion:

Compressor oil (DENSO: ND-OIL8)

- When connecting air conditioner pipes, tighten them by using two wrenches.



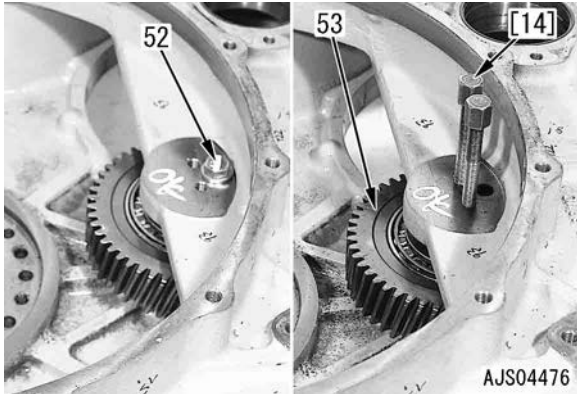
Screw size (M6 x 1.0) (width across flats: 10 mm):

8 to 12 Nm {0.8 to 1.2 kgm}

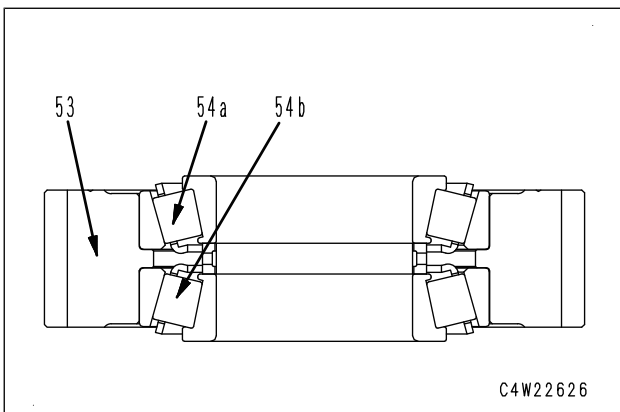
- Add refrigerant (R134a).
Filling quantity: 1050 ± 50 g

50 Disassembly and assembly

Power train



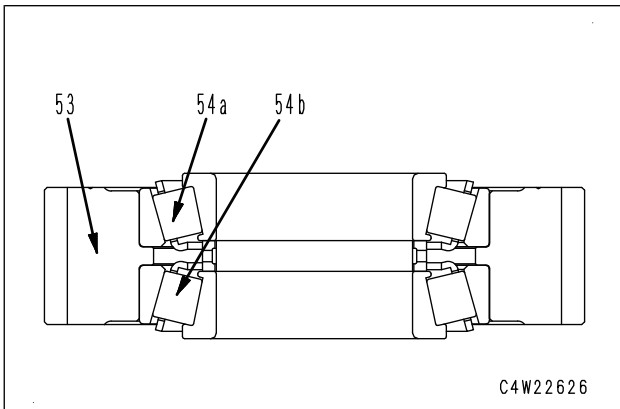
- 3) Remove bearings (54a) and (54b) from gear (53).



Assembly (WA500-CD00-710-K-00-A)

1. Idler gear

- 1) Install bearings (54a) and (54b) to gear (53).



- 2) Set gear (53) to case.
3) Fit the O-ring to shaft (55), and press fit them.



O-ring:

Grease (G2-LI)

- 4) Reverse the case, and install mounting bolts (52).



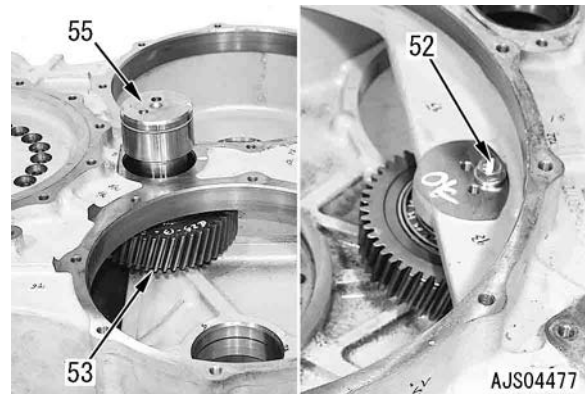
Mounting bolt:

Adhesive (LT-2)



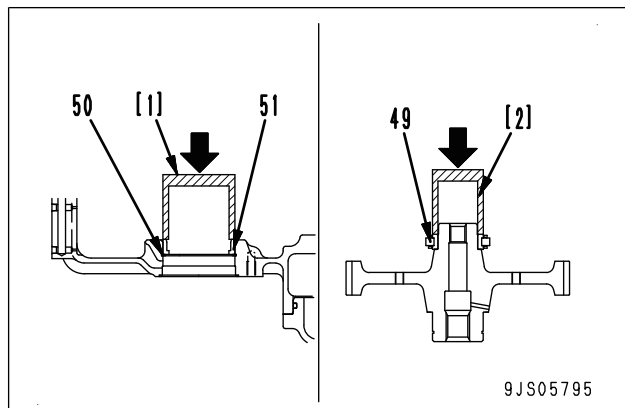
Mounting bolt:

153 to 190 Nm {15.5 to 19.5 kgm}

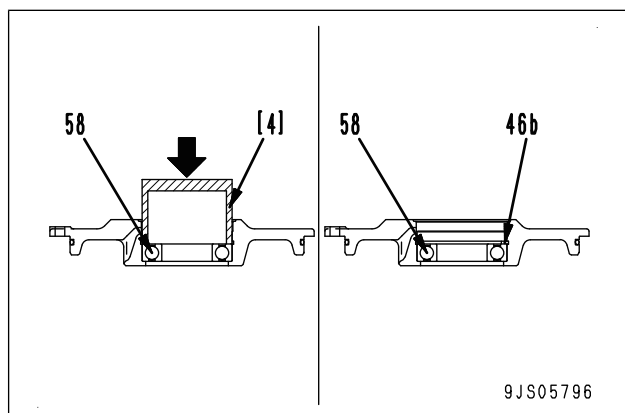


2. PTO gear B assembly

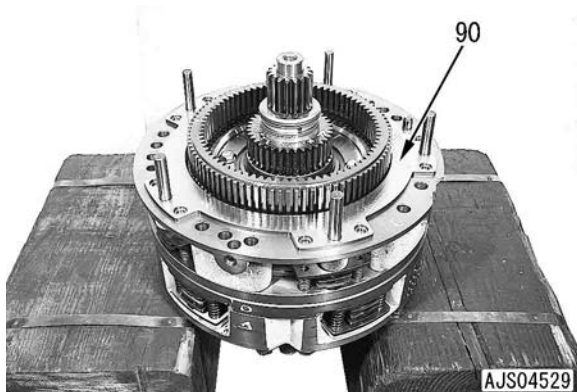
- 1) Install snap ring (50) to the case.
2) By using push tool [1] (outside diameter: 99 mm), press fit outer race (51) on the case side.
3) By using push tool [2] (inside diameter: 56 mm), press fit bearing (49) to the gear.



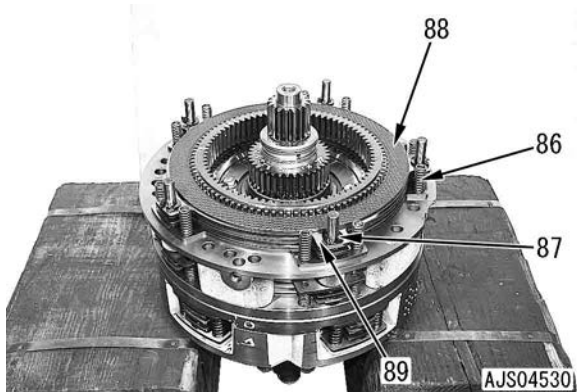
- 4) By using push tool [4] (outside diameter: 124 mm), press fit bearing (58) to the cover.
5) Install snap ring (46b).



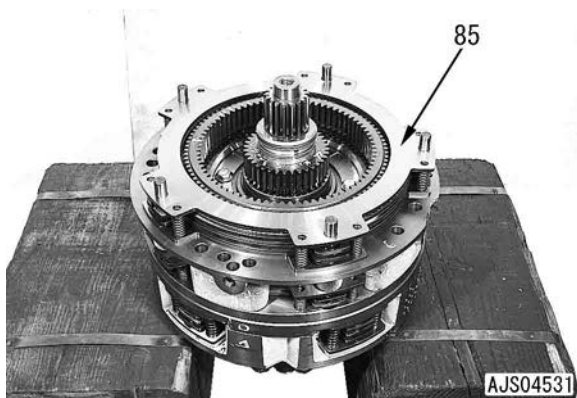
- 6) By using push tool [5] (inside diameter: 71 mm), press fit cover assembly (59) to gear (48).
7) Install spacer (47) and snap ring (46a).



24. No. 4 plate, spring, and No. 4 disc
Install No. 4 plates (89) (2 pieces), springs (87) (15 pieces), and No. 4 discs (88) (3 pieces) alternately.
25. No. 4 spring
Install No. 4 springs (86) (10 pieces).



26. Plate
Install upper plate (85).

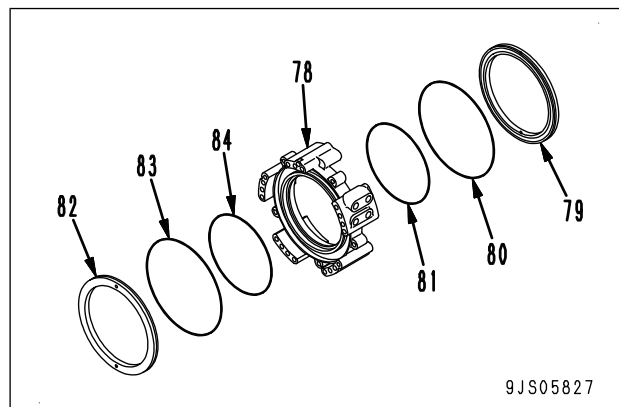


27. No. 3 piston and No. 4 piston assembly
- 1) Install seal rings (81) and (84) to No. 3 and No. 4 housing (78).
 - 2) Install seal ring (80) to No. 3 piston (79), and install them to No. 3 and No. 4 housing (78).
 - 3) Install seal ring (83) to No. 3 piston (82), and install them to No. 3 and No. 4 housing (78).

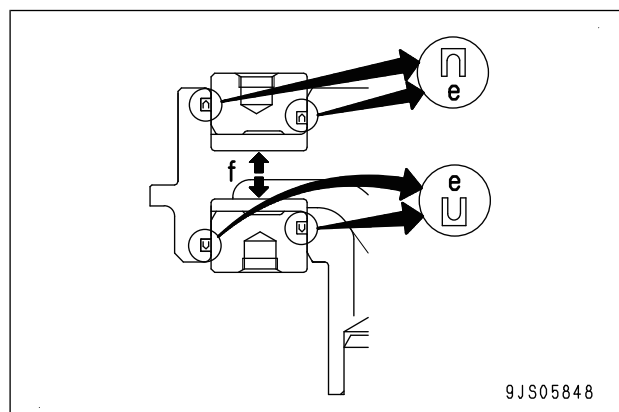


Seal ring:

Grease (G2-LI)

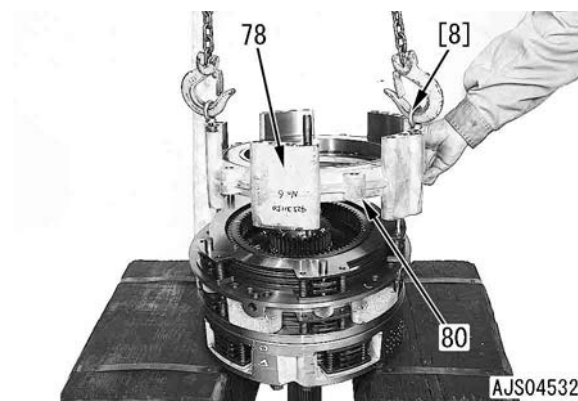


- ★ Install the seal rings directing their grooves (e) in the pressure-receiving direction (f).



28. No. 3 and No. 4 housing assembly
By using eyebolts [8], install No. 3 and No. 4 housing assembly (78).

- ★ If there is any protrusion caused by a flaw on the contact surface against the mating housing, remove it completely by using sandpaper, etc.
- ★ When installing, support No. 4 piston (80) so that it does not fall.
- ★ Drive in the dowel pins with a copper hammer.



29. No. 3 and No. 4 carrier assembly

- 1) Assemble No. 3 and No. 4 carrier assembly according to the following procedure.

50 Disassembly and assembly

Power train



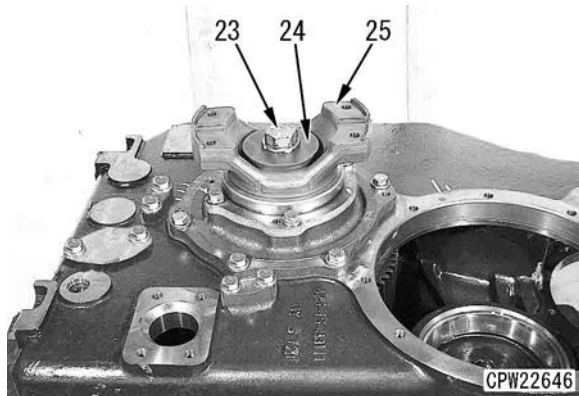
Mounting bolt:

Adhesive (LT-2)



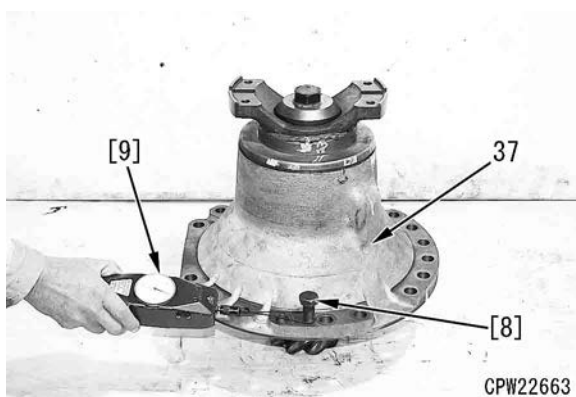
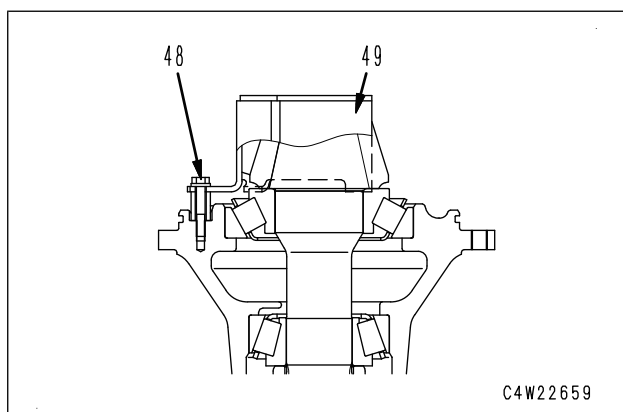
Mounting bolt:

824 to 1.030 Nm {84.0 to 105 kgm}



32. Connect the transfer and parking brake assembly to the power train unit assembly. For details, see "Disconnection and connection of power train unit assembly".

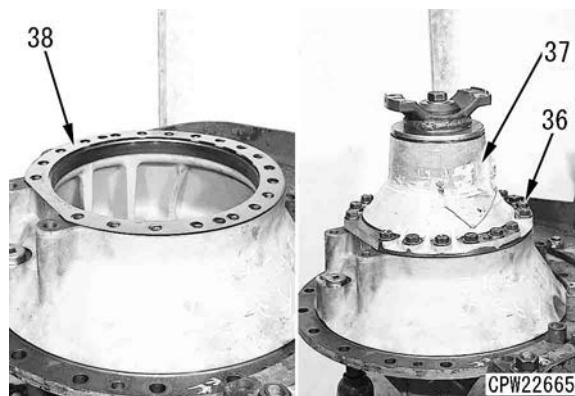
- 1] Install measurement bolt [8] to pinion assembly (37).
- 2] By using push-pull scale [9], measure starting torque (a).
Starting torque (a): 49.0 to 127.4 N {5 to 13 kgm}
- ★ If the measured value is out of the above range, increase or decrease the shim to adjust.
- 4) Install pinion gear cover (49) and tighten mounting bolts (48) (3 pieces).

**Mounting bolt:****Adhesive (LT-2)****Mounting bolt (48):****59 to 74 Nm {6.0 to 7.5 kgm}**

- 5) Install shim (38) removed during disassembly.
Shim adjustment allowance: 0.71 to 2.21 mm
- 6) Fit the O-ring and install pinion assembly (37).

**O-ring:****Grease (G2-LI)****Pinion assembly:****110 kg**

- 7) Tighten mounting bolts (36) (18 pieces).

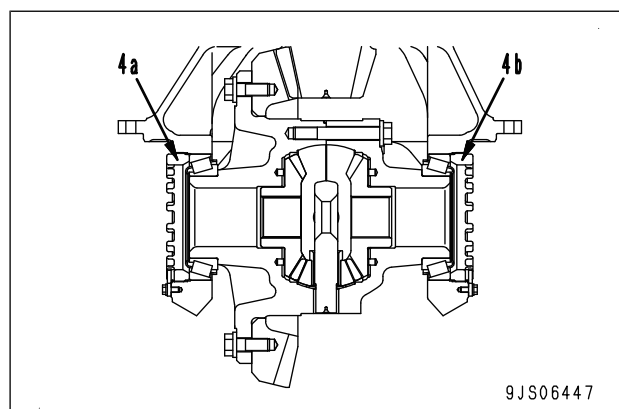
**Mounting bolt:****245 to 309 Nm {25 to 31.5 kgm}**

9. Adjustment of tooth contact and backlash
Adjust the backlash, and at the same time, adjust the tooth contact.

- 1) Adjust the backlash according to the following procedure.

- 1] Move the bevel gear with adjustment nuts (4a) and (4b).

- ★ Rotate adjustment nuts (4a) and (4b) by the same amount in the same direction so that the adjusted bearing preloads do not change.



- 2] Apply dial gauge [14] vertically to the tooth surface on the reverse side at the outer tip of the bevel gear.
- 3] Rotate adjustment nut (4) so that dial gauge [14] indicates the following (backlash).
Standard backlash: 0.36 to 0.51 mm

- ★ While fixing the bevel pinion, move the bevel gear in the rotational direction to measure.

- ★ Measure at three to four points.

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

Removal and installation of center hinge pin (WA500-H1L2-924-K-00-A)

★ Special tools

Symbol	Part No.	Part name	Necessity	Q'ty
K	1	793-520-2630 Bar	■	2
	2	793-520-2640 Push tool	■	1
	3	793-520-2550 Guide	■	1
	4	790-101-2300 Push puller	■	1
	5	790-101-2310 • Block		1
	6	02215-11622 • Nut		2
	7	790-101-2360 • Plate		4
	8	790-101-2102 Puller (294 kN {30 ton})	■	1
	9	790-101-1102 Pump	■	1
	1	793-520-2530 Guide	■	1
	2	01010-31480 Bolt	■	2
	3	01643-31445 Washer	■	2
2	4	793-520-2640 Push tool	■	1
	5	790-101-2102 Puller (294 kN {30 ton})	■	1
	6	790-101-1102 Pump	■	1

⚠ Place the machine on a level ground and set the parking brake to the LOCK position.

⚠ Set the lock bar to the front and rear frames to lock them and chock the wheels.

⚠ Lower the work equipment to the ground and set the work equipment lock lever to the LOCK position.

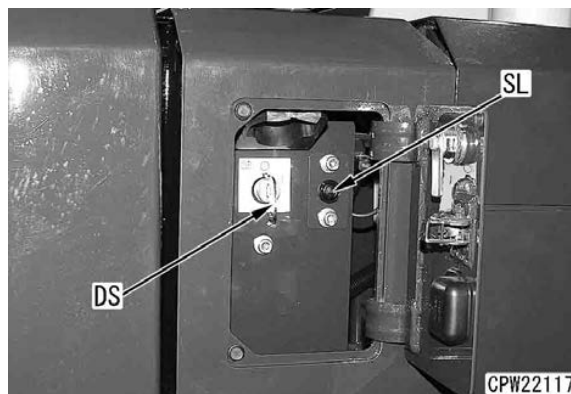
⚠ Turn the starting switch to the OFF position and stop the engine.

⚠ Turn the battery disconnect switch to the OFF position and remove the key.

★ When turning off the battery disconnect switch, be sure to perform the following procedure.

1. Turn the starting switch key to the OFF position.
2. Check that system operation lamp (SL) is turned off, and then turn battery disconnect switch (DS) to the OFF position.

★ For details, see Testing and adjusting, "Handling of battery disconnect switch".



Removal (WA500-H1L2-520-K-00-A)

1. Drain the coolant.



Coolant:

132.5 ℓ

2. Drain the hydraulic oil.



Hydraulic oil:

337 ℓ

3. Remove the operator's cab and floor frame assembly. For details, see "Removal and installation of operator's cab and floor frame assembly".
4. Set jacks [1] under the right and left of the rear frame.
5. Set jack [2] under the front frame.



6. Set jack [3] under the counterweight at the rear.

Removal and installation of diverter valve assembly (WA500-F9C0-924-K-00-A)

⚠ Place the machine on a level ground and set the parking brake to the LOCK position.

⚠ Set the lock bar to the front and rear frames to lock them and chock the wheels.

⚠ Lower the work equipment to the ground and set the work equipment lock lever to the LOCK position.

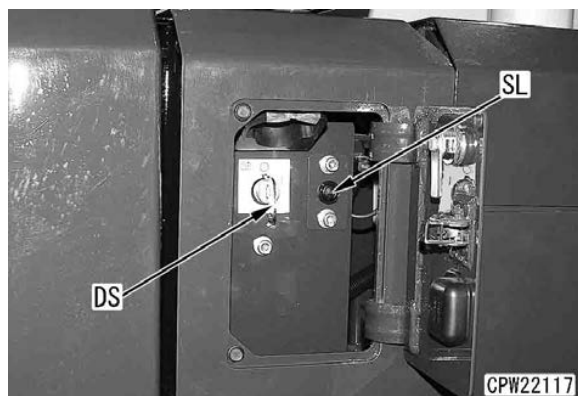
⚠ Turn the starting switch to the OFF position and stop the engine.

⚠ Turn the battery disconnect switch to the OFF position and remove the key.

★ When turning the battery disconnect switch to the OFF position, be sure to perform the following procedure.

1. Turn the starting switch to the OFF position.
2. Check that system operation lamp (SL) is turned off, and then turn battery disconnect switch (DS) to the OFF position.

★ For details, see Testing and Adjusting, "Handling battery disconnect switch".



★ When removing and installing the fuel piping, take extreme care not to allow foreign matters to enter the fuel piping. If dust, etc. sticks to any part, wash that part thoroughly with clean fuel.

★ Note the connector numbers and installed positions before disconnecting wiring and hoses.

★ When disconnecting wiring and hoses, be careful not to damage or deform them by tightening clips and clamps. Remove clips and clamps in advance if they may damage wiring or hoses.

Removal (WA500-F9C0-520-K-00-A)

1. Drain the coolant.

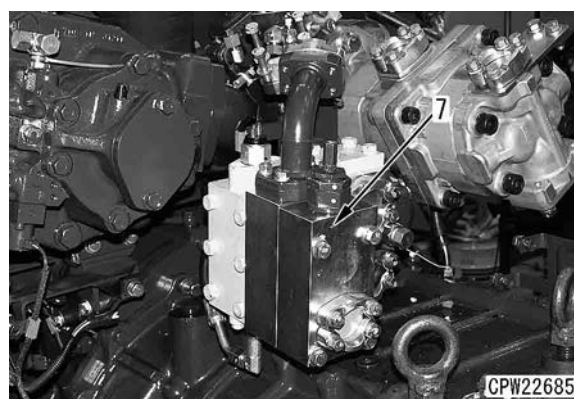
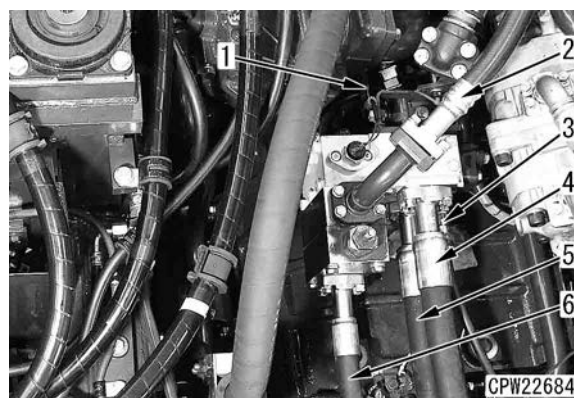
🔥 **Coolant:**
132.5 ℓ

2. Drain the hydraulic oil.

🔥 **Hydraulic oil:**
337 ℓ

3. Remove the engine hood. For details, see "Removal and installation of engine hood".
4. Remove the operator's cab assembly. For details, see "Removal and installation of operator's cab assembly".
5. Disconnect wiring harness connector TO2 (1).
6. Disconnect hoses (2) to (6).
7. Remove the mounting bolts (2 pieces), sling the diverter valve assembly (7), and remove it.

📦 **Diverter valve assembly:**
45 kg

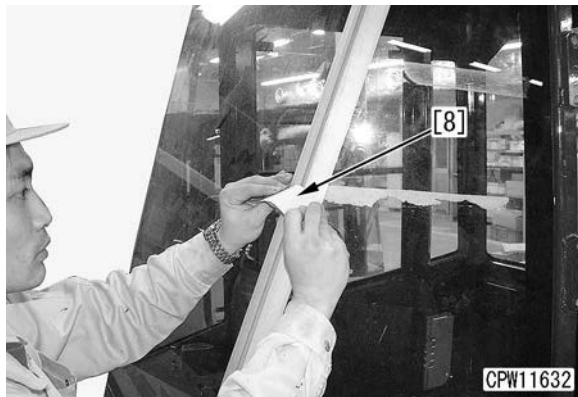


Installation (WA500-F9C0-720-K-00-A)

- Perform installation in the reverse order to removal.
- Refilling with coolant
Refill with the coolant to the specified level through the coolant filler port. Run the engine to circulate the coolant through system. Then check the coolant level again.

50 Disassembly and assembly

Cab and its attachments

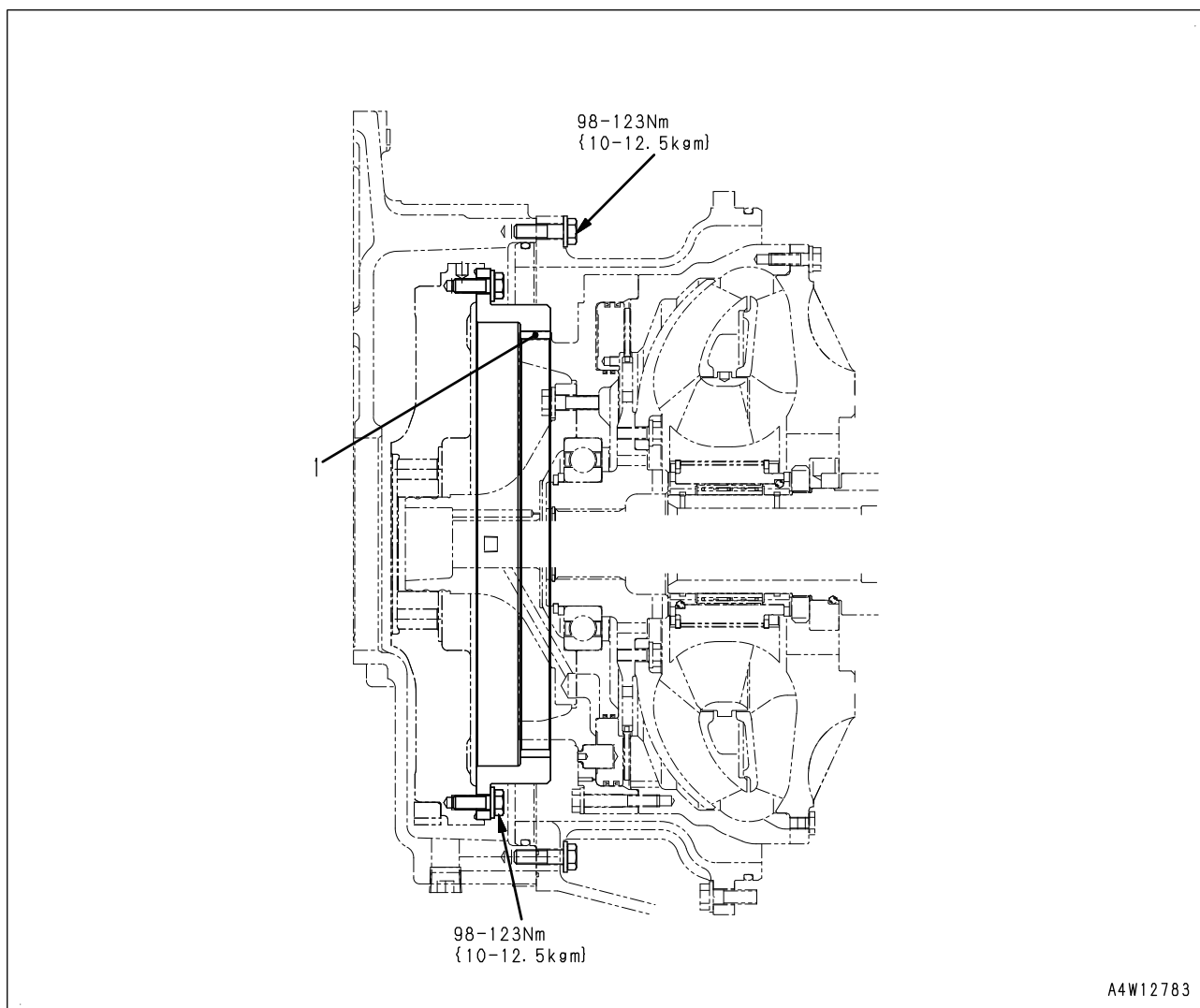


4) Remove masking tape from the window glass.

11. Clean off primers and adhesives adhering to the operator's cab and window glasses.

- ★ By using white gasoline, wipe off adhesives before it is dried up.
- ★ Avoid giving impacts to window glassed in the cleaning.

Joint (WA500-H301-034-K-00-A)

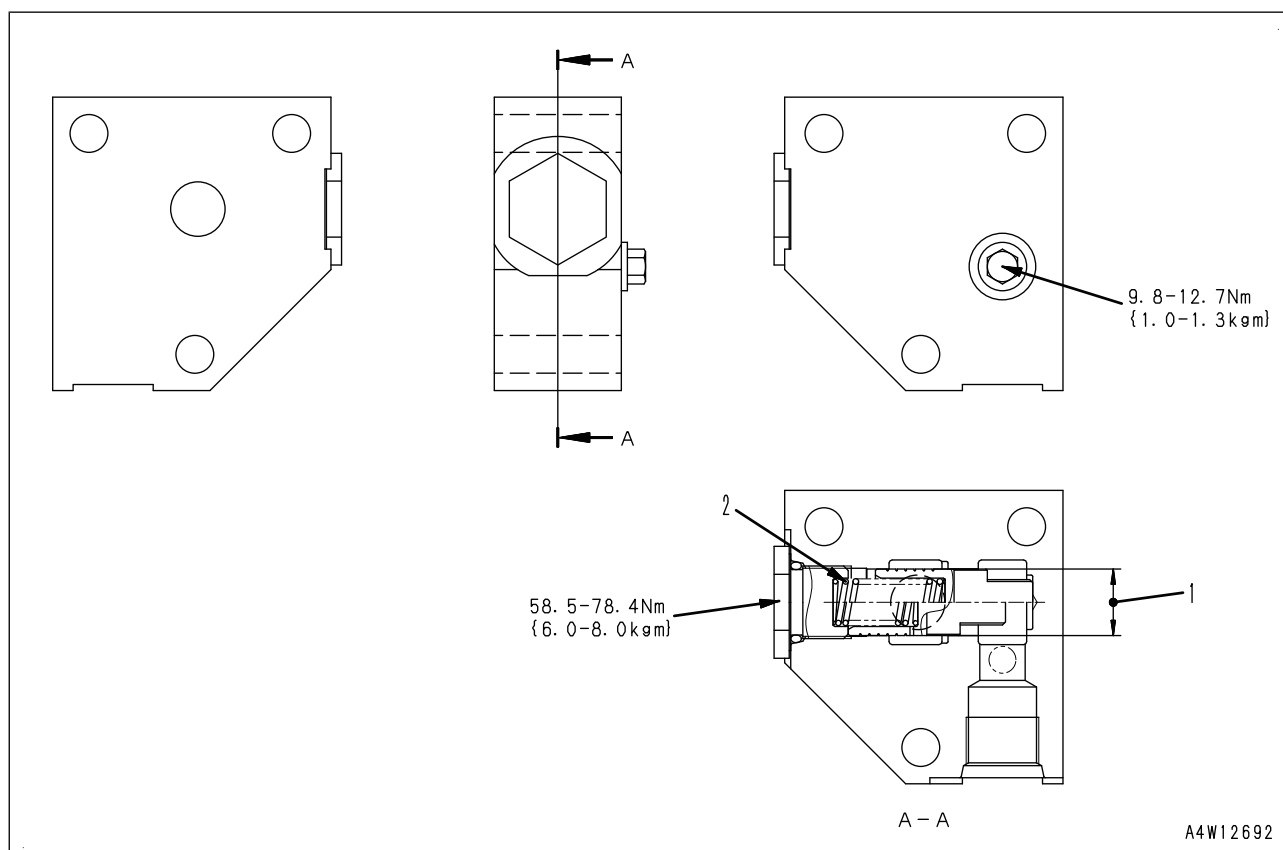


Unit: mm			
No.	Item	Criteria	Remedy
1	Backlash between ring gear and torque converter case gear	0.059 to 0.240	Replace

60 Maintenance standard

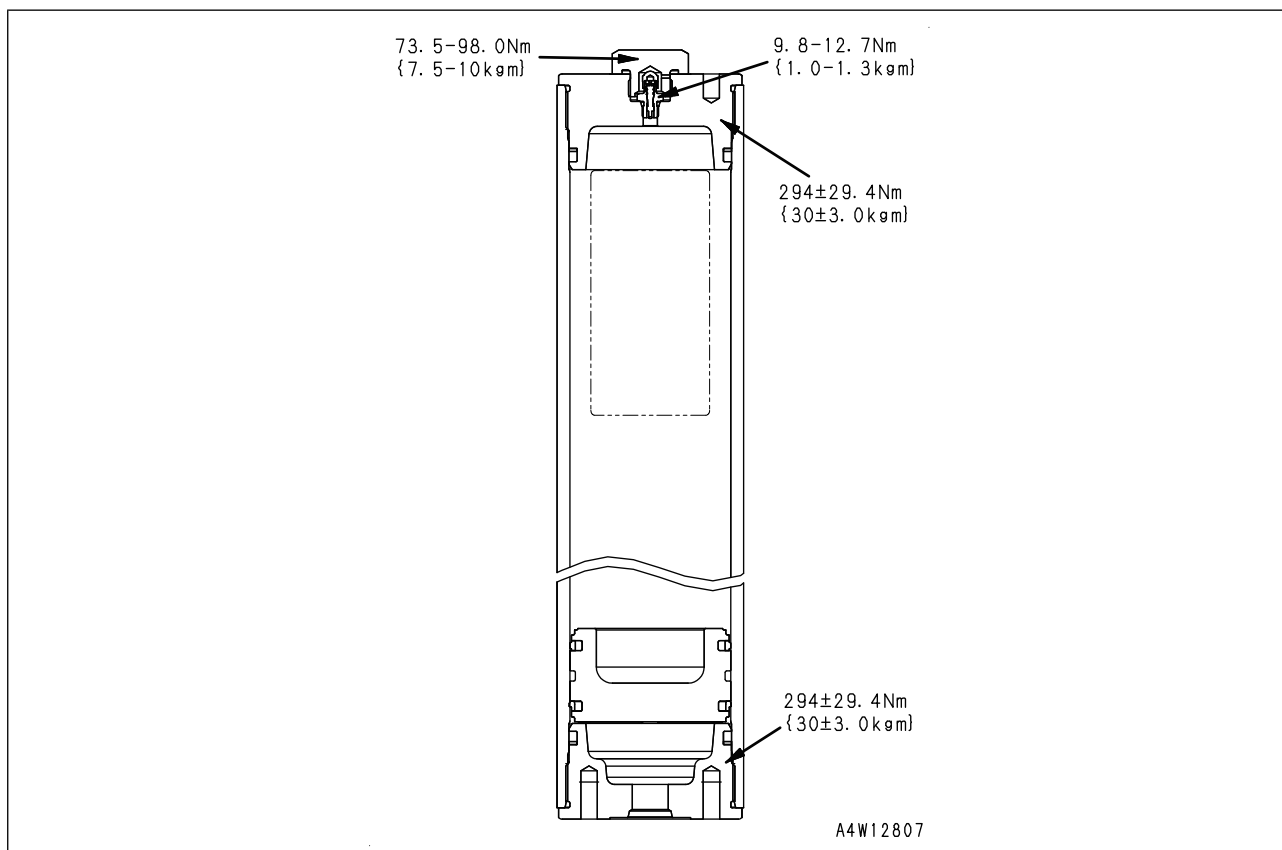
Lubricating oil relief valve

Lubricating oil relief valve (WA500-CK30-034-K-00-A)

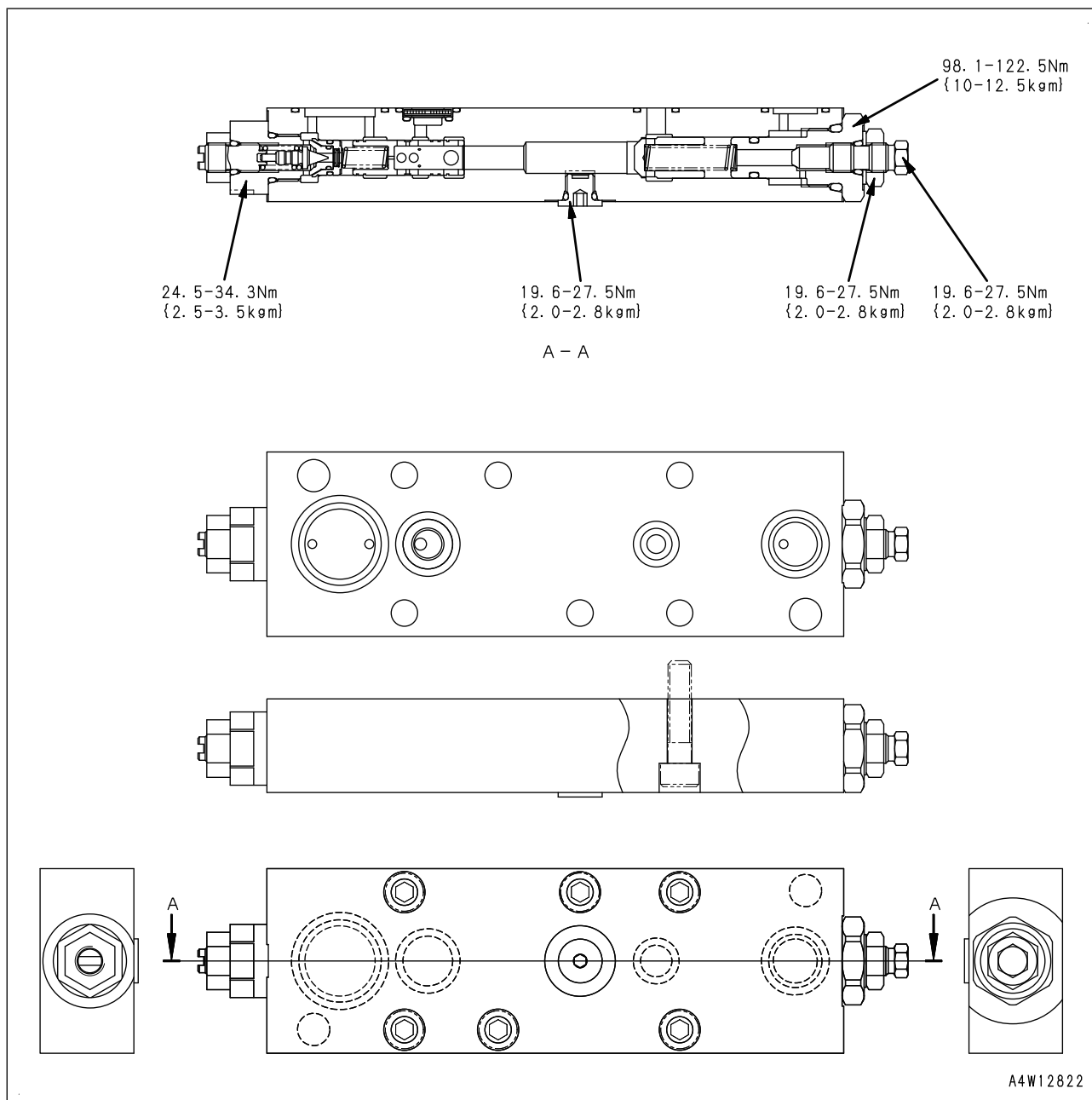


Unit: mm								
No.	Item	Criteria					Remedy	
1	Clearance between spool and valve body	Standard dimension	Tolerance		Standard clearance	Allowable clearance	Replace	
			Shaft	Hole				
		22	-0.035 -0.045	+0.013 0	0.035 to 0.058	0.078		
2	Valve spring	Standard dimension			Repair limit			
		Free length	Installed length	Load at installed length	Free length	Load at installed length		
		59.7	37	97.4 N {9.94 kg}	57.9	92.6 N {9.44 kg}		

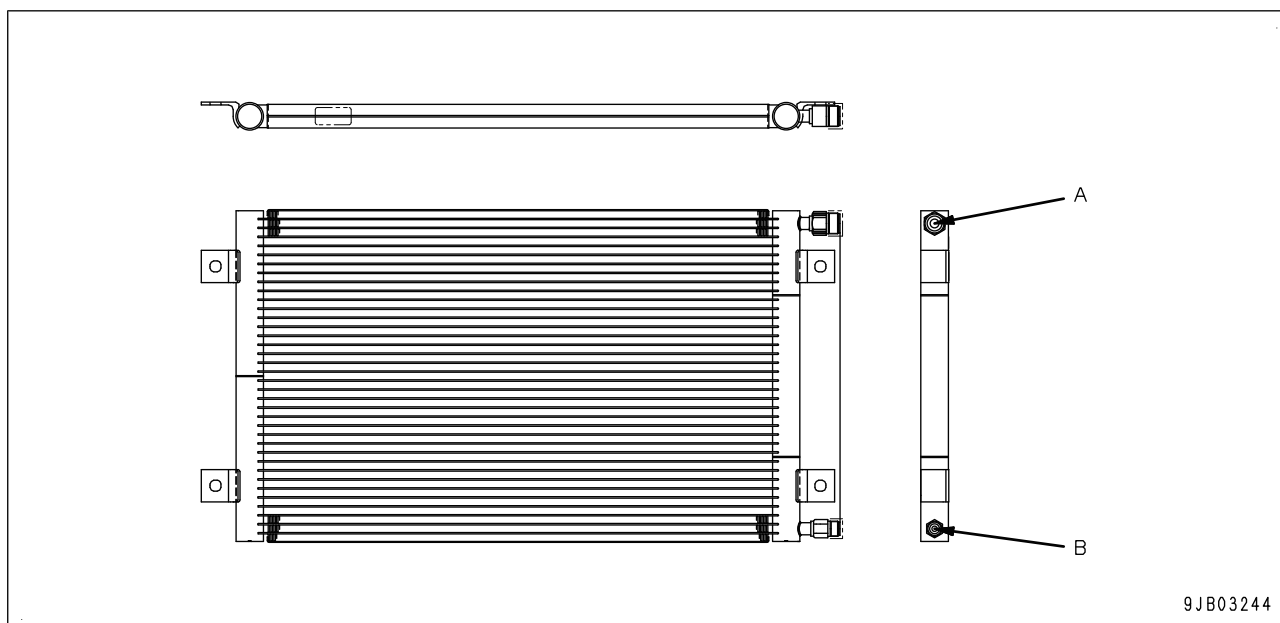
Accumulator (for brake) (WA500-G2G0-034-K-00-A)



Accumulator charge valve (WA500-G2H0-034-K-01-A)



Condenser (WA380-K580-041-K-00-A)



A: Refrigerant inlet (from condenser)

B: Refrigerant outlet (to receiver dryer)

Specifications (WA380-K580-030-K-00-A)

Fin pitch (mm)	1.5
Total heat dissipation area (m ²)	6.55
Max. operating pressure: (MPa {kg/cm ² })	3.6 {36}

Function (WA380-K580-042-K-00-A)

- The condenser liquefies high-pressure and high-temperature misty refrigerant sent from the compressor by taking the heat from the refrigerant.
- ★ If its cooling fins are crushed or clogged with dirt and dust, heat exchange efficiency lowers. Accordingly, the condenser cannot liquefy the refrigerant entirely. If this happens, the circuit pressure in the refrigerant cycle increases resulting in unnecessary load on the engine and poor cooling effect. Take care not to crush the fins in handling and daily maintenance of the condenser.

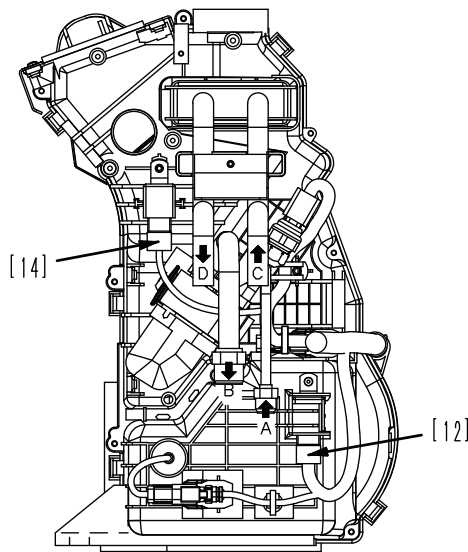
Testing relays (WA380-K5FE-360-K-00-A)

- ★ 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".)

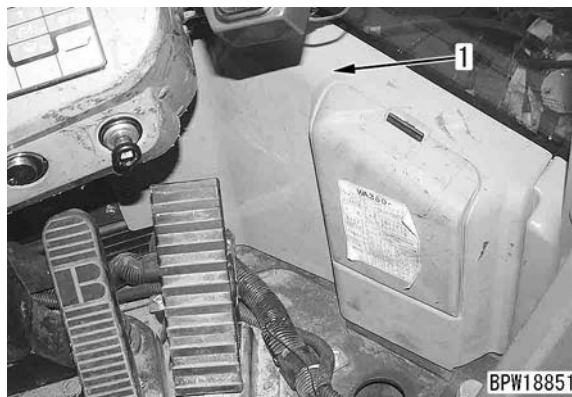
- Blower OFF relay: ON/OFF of fan motor (connector [12])
- Compressor relay: ON/OFF of air conditioner compressor (clutch) (connector [14])

- ★ To check blower OFF relay, hot water hose should be removed. Otherwise it cannot be checked.



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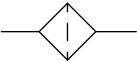
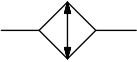
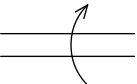
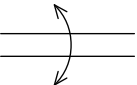
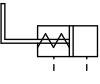
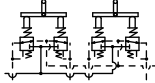
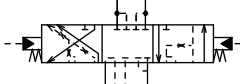
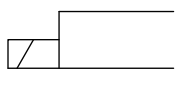
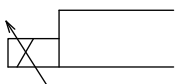
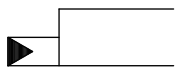
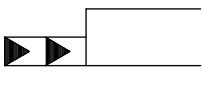
1. Remove cover (1).



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).

No.	Cause	Procedure, measuring location, criteria and remarks	
3	Defective air mix actuator, defective air conditioner harness, defective air conditioner controller	1. Turn the starting switch to the OFF position. 2. Disconnect connectors [1] and [2], and insert T-adapters. 3. Turn the starting switch to the ON position.	
		Voltage	Between [2] (5) and [1] (9) 5 V
		1. Turn the starting switch to the OFF position. 2. Disconnect connectors [1] and [2], and insert T-adapters. 3. Turn the starting switch to the ON position. 4. Be ready with COOL MAX by operating temperature control switch on the air conditioner operation screen. 5. Change to HOT MAX by operating temperature control switch on the air conditioner operation screen. ★ The voltage is generated between connector [2] (20) and [2] (19) for approx. 3 seconds (only while door moves). ★ The voltage between connector [2] (16) and [1] (9) changes for approx. 3 seconds (only while door moves). (When door stops, the voltage is stabilized to fixed value.)	
		Voltage	Between [2] (20) (+) and [2] (19) (-) ★ When vent is changed from HOT MAX to COOL MAX, the polarity of voltage becomes reverse. Approx. 12 V Between [2] (16) (+) and [1] (9) (-) Varies within max. 5 V
4	Defective air conditioner harness	★ Perform when test result for cause 2 is normal and that for cause 3 is abnormal. Check by referring to circuit diagram.	
5	Defective air conditioner controller	★ When test result for cause 2 is normal and that for cause 3 is abnormal and that for cause 4 is normal, air conditioner controller is defective.	
6	Defective switch panel (defective switch)	1. Turn the starting switch to the ON position. 2. Display the air conditioner operation screen on the machine monitor.	
		Press temperature control switch.	LCD display changes between 18 to 32 °C.

Symbols	Substances
	Filter
	Oil cooler
	Stop valve
	Drive shaft (unidirectional)
	Drive shaft (bidirectional)
	Pump Note: Black triangle shows outlet port
	Variable capacity hydraulic pump
	Hydraulic motor Note: Two black triangles in the figure show direction of oil entering hydraulic motor depending on the oil entry port, the direction of rotation is reversed.
	Servo piston
	PPC valve
	Control valve
	Single-acting solenoid
	Single-acting proportional solenoid
	Hydraulic pilot valve
	Hydraulic two-stage pilot valve

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