VENBM28500

Shop Manual

WHEEL LOADER **WA270-7**

SERIAL NUMBERS 80001 and up

H01051 and up

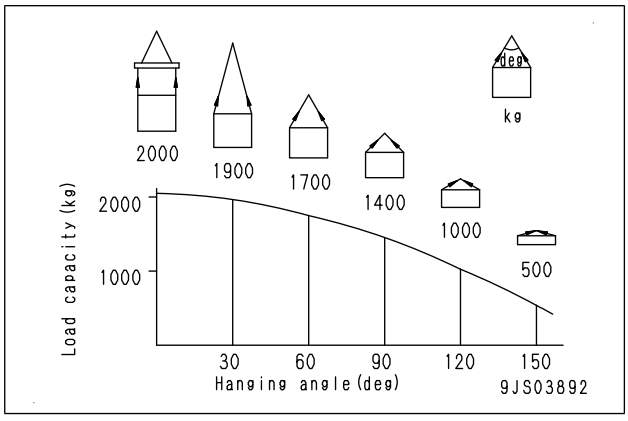
KOMATSU

- Keep putting on the gloves during sling work. (Put on the leather gloves, if available.)
- Measure the weight of the load by the eye and check its center of gravity.
- Use the proper sling according to the weight of the load and method of slinging. If too thick wire ropes are used to sling a light load, the load may slip and fall.
- Do not sling a load with 1 wire rope only. If do so, the load may rotate or the sling gets loose and the sling may slip off. Install 2 or more wire ropes symmetrically.

⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original slinging position on the load, which can result in a dangerous accident.

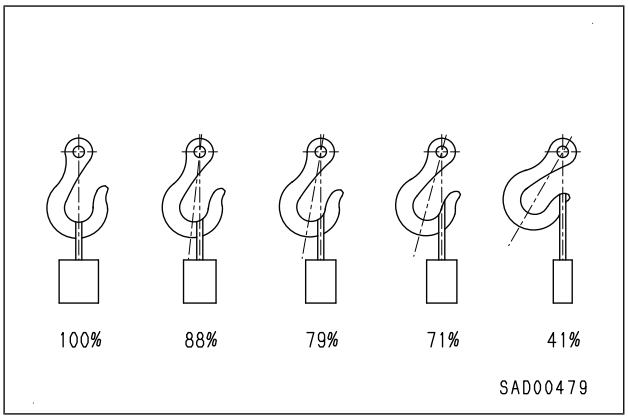
- Hanging angle must be 60 deg. or smaller as a rule.
- When hanging a heavy load (25kg or heavier), the hanging angle of the rope must be narrower than that of the hook.

★ When slinging a load with 2 ropes or more, the larger the hanging angle is, the larger the tension of each rope. The figure bellow shows the variation of allowable load in kg when hoisting is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1,000kg} a load vertically, at various hanging angles. When the 2 ropes sling a load vertically, up to 2,000 kg of total weight can be suspended. This weight is reduced to 1,000 kg when the 2 ropes make a hanging angle of 120 deg.. If the 2 ropes sling a 2,000 kg load at a hanging angle of 150 deg., each rope is subjected to a force as large as 4,000 kg.



- When installing wire ropes to an angular load, apply pads to protect the wire ropes. If the load is slippery, apply proper material to prevent the wire rope from slipping.
- Use the specified eye bolts and fix wire ropes, chains, etc. to them with shackles, etc.
- Apply wire ropes to the middle part of the hook.

★ Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The strength of the hook is maximum at its central part.



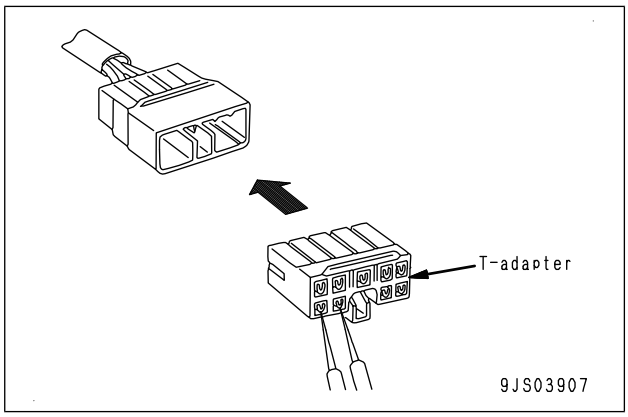
- Do not use twisted or kinked wire ropes.
- When slinging up a load, observe the following.
  1. Wind up the rope slowly until the wire rope tensions. When putting your hands on the wire ropes, do not grasp them but press them down from above. If you grasp them, your fingers may be caught.
  2. After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.
  3. If the load is unstable or the wire rope or chains are twisted, lower the load and lift it up again.
  4. Do not lift up the load at an angle.
- When lowering a load, pay attention to the following.
  1. When lifting down a load, stop it temporarily at 30 cm above the floor, and then lower it slowly.
  2. Check that the load is stable, and then remove the sling.
  3. Remove kinks and dirt from the wire ropes and chains used for the sling work, and put them in the specified place.

Precautions for using mobile crane

★ Read the Operation and Maintenance Manual of the crane carefully in advance and operate the crane safely.

Precautions for using overhead traveling crane

⚠ The hoist or crane must be used to sling the components weighing 25 kg or heavier. A part weighing 25 kg or heavier in "disassembly and assembly" section is indicated with the symbol of ▭.



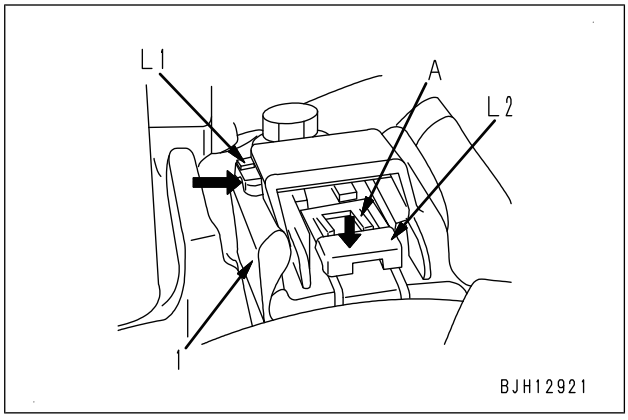
Handling of connectors used on engine

Slide, lock type
(FRAMATOME-3, FRAMATOME-2)

Disconnection

1. Slide lock (L1) to the right.
2. While pressing lock (L2), pull out connector (1) toward you.

   ★ In the case that even if lock (L2) is pressed, connector (1) cannot be pulled out toward you unless part A floats, float part A with a small flat-head screwdriver while pressing lock (L2), and then pull out connector (1) toward you.



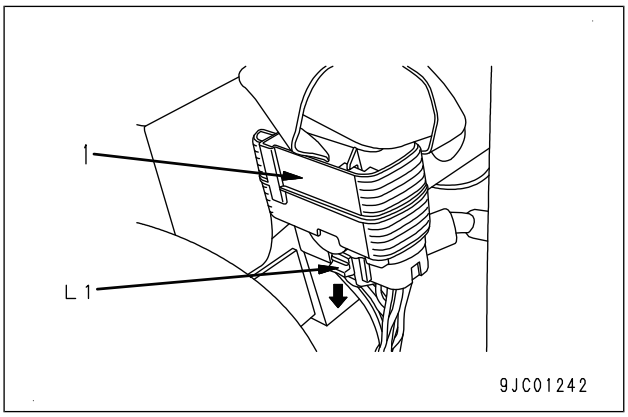
Connection

1. Insert the connector securely until a click is heard.

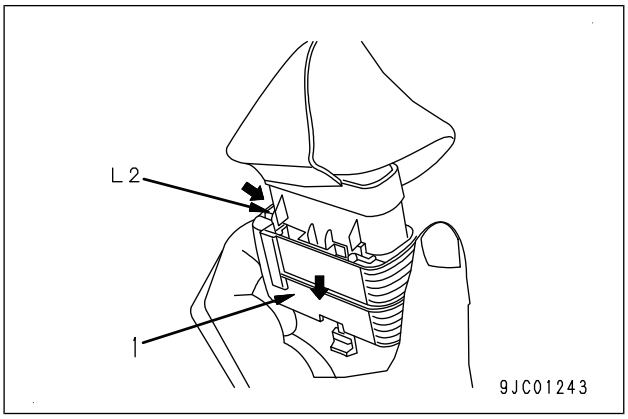
(FRAMATOME-24)

Disconnection

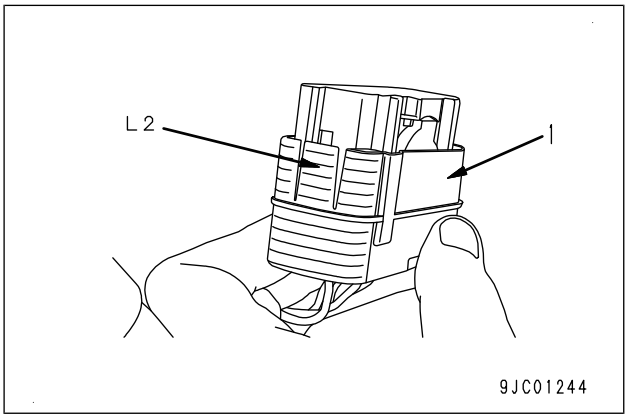
1. Slide down lock (red) (L1).



2. While pressing lock (L2), pull out connector (1).



★ Lock (L2) is located in the back of connector (1).



Connection

1. Insert the connector securely until a click is heard.

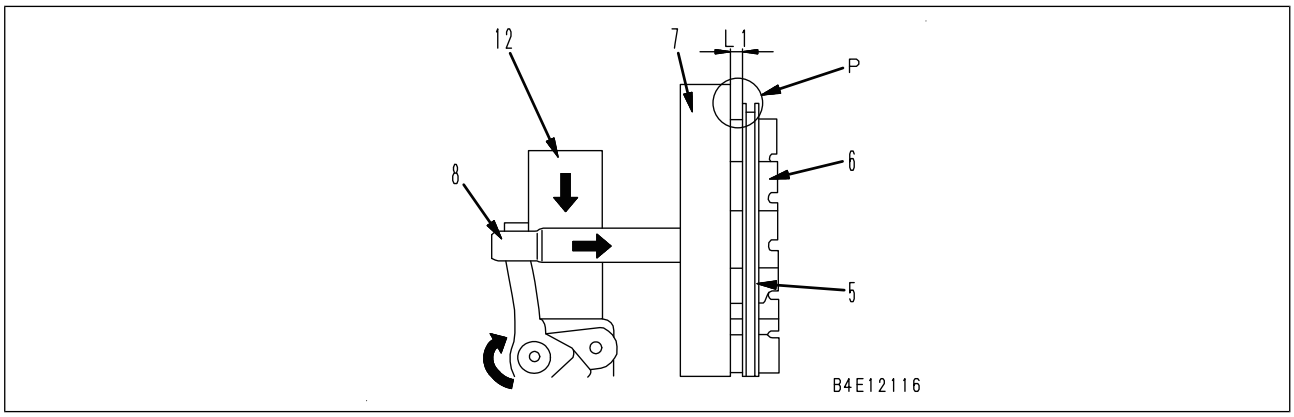
Pull lock type
(PACKARD-2)

Disconnection

1. Disconnect the connector (2) by pulling lock (B) (on the wiring harness side) of connector (2) outward.

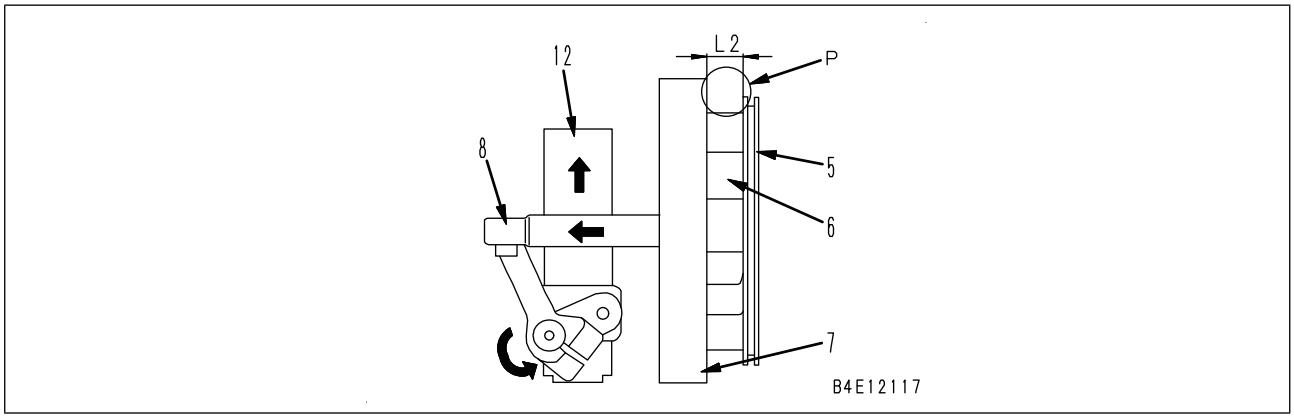
Abbreviation	Actual word spelled out	Purpose of use (major applicable machine (*), or equipment/device)	Explanation
ECMV	Electronic Control Modulation Valve	Transmission (D, HD, WA, etc.)	Proportional electromagnetic valve that gradually increases oil pressure to engage clutch and reduces transmission shock.
ECSS	Electronically Controlled Suspension System	Travel (WA)	This system ensures smooth high-speed travel by absorbing vibration of machine during travel with hydraulic spring effect of accumulator.
ECU	Electronic Control Unit	Electronic control system	Electronic control device uses the signals from the sensors on the machine. This signal indicates the optimum actuation to the actuators. (Same as E.C.M.)
EGR	Exhaust Gas Recirculation	Engine	This function recirculates part of exhaust gas to combustion chamber in order to reduce combustion temperature, controls emission of NOx.
EMMS	Equipment Management Monitoring System	Machine monitor	This system allows data (filter, oil replacement interval, malfunctions on machine, failure code, and failure history) from each sensor on the machine to be checked on the monitor.
EPC	Electromagnetic Proportional Control	Hydraulic system	This mechanism allows actuators to be operated in proportion to the current supplied.
FOPS	Falling Object Protective Structure	Cab and canopy	This structure protects the operator's head from falling objects. (Falling Object Protective Structure) This performance is standardized as ISO 3449.
F-N-R	Forward-Neutral-Reverse	Operation	Forward-Neutral-Reverse
GNSS	Global Navigation Satellite System	Communication	A general term for positioning system using satellites such as GPS, GALILEO, etc.
GPS	Global Positioning System	Communication (KOMTRAX, KOMTRAX Plus)	This system uses satellites to determine the current location on the earth.
HSS	Hydrostatic Steering System	Steering (D)	This function uses a combination of hydraulic motor and bevel shaft to control difference in travel speed of right and left tracks. Accordingly machine can turn without using steering clutch.
HST	Hydro Static Transmission	Transmission (D, WA)	This function uses a combination of hydraulic pump and hydraulic motor to shift the speed range steplessly without using gears.
ICT	Information and Communication Technology	Intelligent Machine Control	A general term for the engineering and its socially applied technology of information processing and communication.
IMA	Inlet Metering Actuator	Engine	This valve is installed at inlet port of pump, and it adjusts fuel intake amount in order to control fuel discharge of supply pump. Same as I.M.V.
IMU	Inertial Measurement Unit	Intelligent Machine Control	This is a device to detect the angular velocity and acceleration of the 3 axes that control motions.
IMV	Inlet Metering Valve	Engine	This valve is installed at inlet port of pump, and it adjusts fuel intake amount in order to control fuel discharge of supply pump. Same as I.M.V. (I.M.A.)
KCCV	Komatsu Closed Crankcase Ventilation	Engine	This mechanism separates oil in blowby gas and returns it to the intake side to afterburn it there. It primarily consists of filters.

Machine model	Unit	WA270-7
Serial No.		80001 and up
Hydraulic system		
Steering cylinder		
Type	-	Double-acting piston type
Cylinder bore	mm	70
Piston rod diameter	mm	40
Stroke	mm	453
Max. distance between pins	mm	1,271
Min. distance between pins	mm	818
Lift cylinder		
Type	-	Double-acting piston type
Cylinder bore	mm	110
Piston rod diameter	mm	70
Stroke	mm	717
Max. distance between pins	mm	1,950.5
Min. distance between pins	mm	1,233.5
Bucket cylinder		
Type	-	Double-acting piston type
Cylinder bore	mm	140
Piston rod diameter	mm	100
Stroke	mm	480
Max. distance between pins	mm	1,815
Min. distance between pins	mm	1,335
Work equipment		
Link type	-	PZ link
Shape of bucket cutting edge	-	Straight cutting edge with BOC



When nozzle ring is open

- At high engine speeds, exhaust gas inlet passage (P) is widened (L2).
- As the engine speed and the turbine inlet pressure (exhaust gas pressure) increases, exhaust gas inlet passage (P) widens (L2) to effectively apply the exhaust gas pressure to turbine impeller (11).



★ Nozzle ring (7), vane (6), and push rod (8) are integrated and slide together but do not rotate.

★ KVGT position sensor is installed to hydraulic actuator (3). The KVGT position sensor is calibrated together with the variable mechanism in the KVGT, and values are stored in the memory inside the KVGT position sensor. If any of the hydraulic actuator (3), KVGT position sensor, or KVGT body fails, replace the whole KVGT.

9. Aftercooler inlet hose
10. Condenser
11. Condenser opening and closing bracket
12. Radiator outlet hose
13. Aftercooler outlet hose
14. Transfer oil cooler inlet
15. Transfer oil cooler outlet
16. Reservoir tank
17. Brake accumulator charge valve
18. Strainer
19. Cooling fan motor
20. Fan guard
21. Transfer oil cooler
22. Oil cooler outlet hose
23. Cooling fan

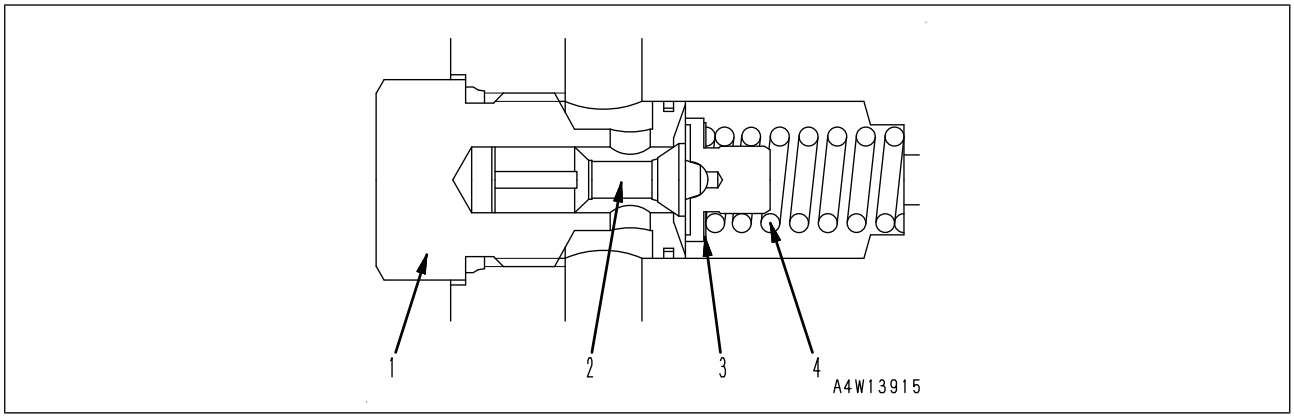
Outline

- Cooling fan motor (19) installed to the rear of the machine is driven by the solenoid valve in the cooling fan motor with oil pressure from brake/ cooling fan pump (2).

Specifications *(WA270-B000-030-K-00-A)*

	Radiator	Oil cooler	Aftercooler
Core type	Rectangle corrugated aluminum 4 row	Rectangle corrugated aluminum	Rectangle corrugated aluminum
Fin pitch (mm)	6.0/2	6.0/2	6.0/2
Total heat dissipation area (m^2)	34.48	4.57 x 2	8.19
Pressure valve cracking pressure (kPa {kg/cm^2})	70 ± 15 {0.7 ± 0.15}	-	-
Vacuum valve cracking pressure (kPa {kg/cm^2})	0 to 5 {0 to 0.05}	-	-

Low pressure oil relief valve *(WA320-C2Y5-041-K-00-A)*

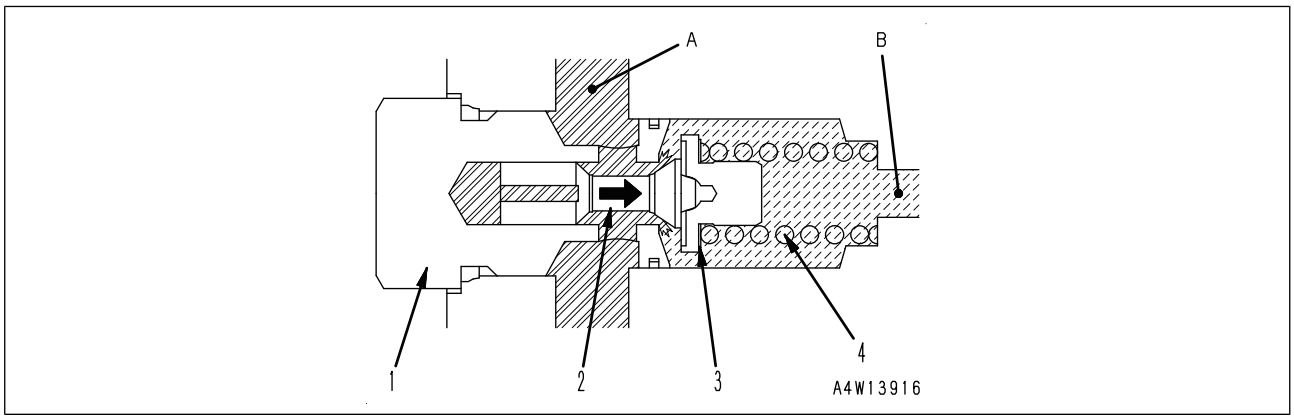


1. Plug
2. Valve Piston
3. Shim
4. Spring

Function *(WA320-C2Y5-042-K-00-A)*

- This valve is installed to the HST pump and drains the oil into the hydraulic tank when the oil pressure in the low-pressure side circuit between the HST pump and HST motor increases above the set pressure. By this operation, the HST pump charge circuit pressure is set for protection of the circuit.

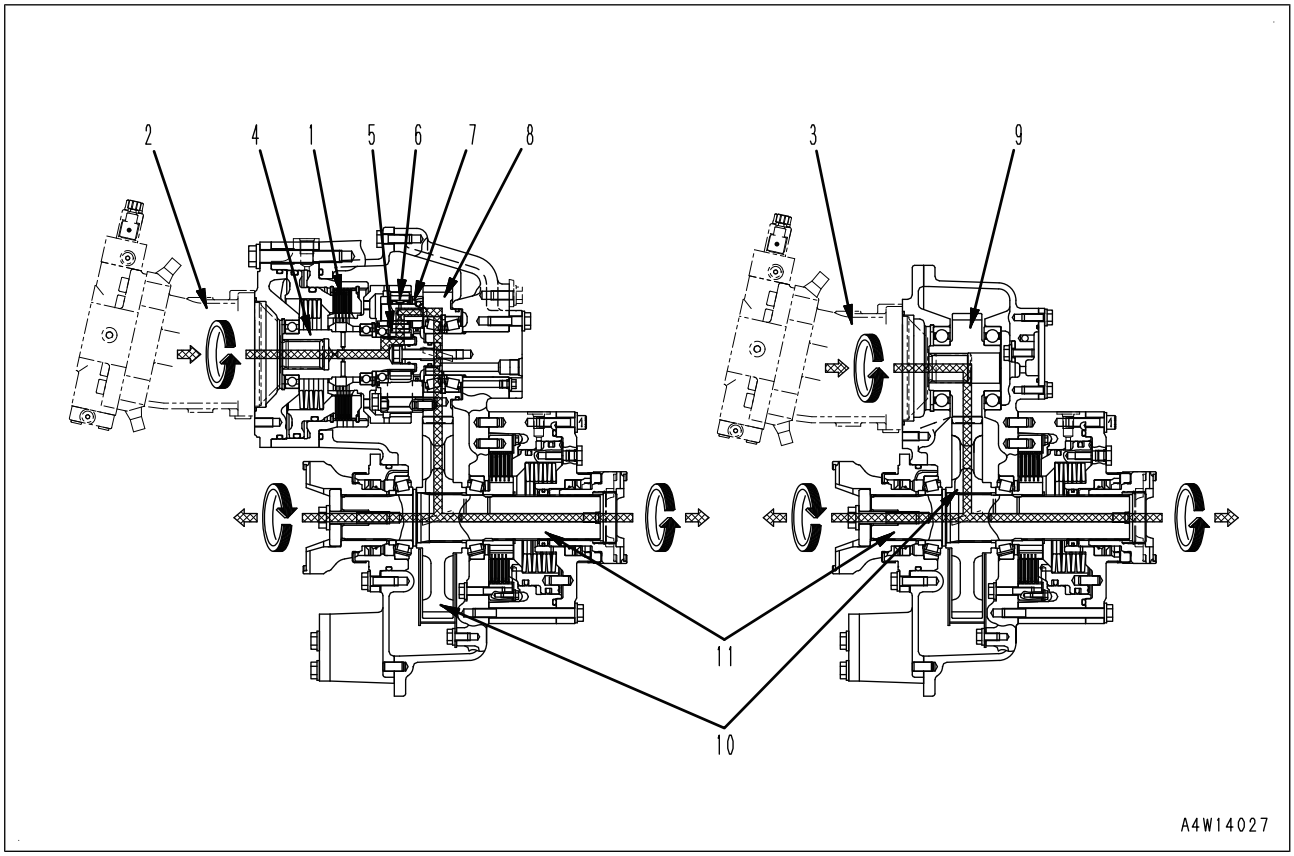
Operation *(WA320-C2Y5-044-K-00-A)*



- Port (A) is connected to HST pump charge circuit and port (B) is connected to the drain circuit.
- When port (A) is below the set pressure, no oil flows into port (B).
- When the oil pressure in port (A) exceeds the set pressure, valve piston (2) is pushed to the right to relieve the oil pressure in chamber (A) to port (B) and decrease the oil pressure in chamber (A).
- The set pressure is adjustable by increasing or decreasing the reaction force of spring (4).
- To change the set pressure, loosen plug (1) and adjust shim (3). If shims are increased, the set pressure rises. If shims are reduced, the set pressure lowers.

Power transmitting route *(HM300-CF60-001-K-01-A)*

Low speed mode *(WA270-CF60-052-K-00-A)*

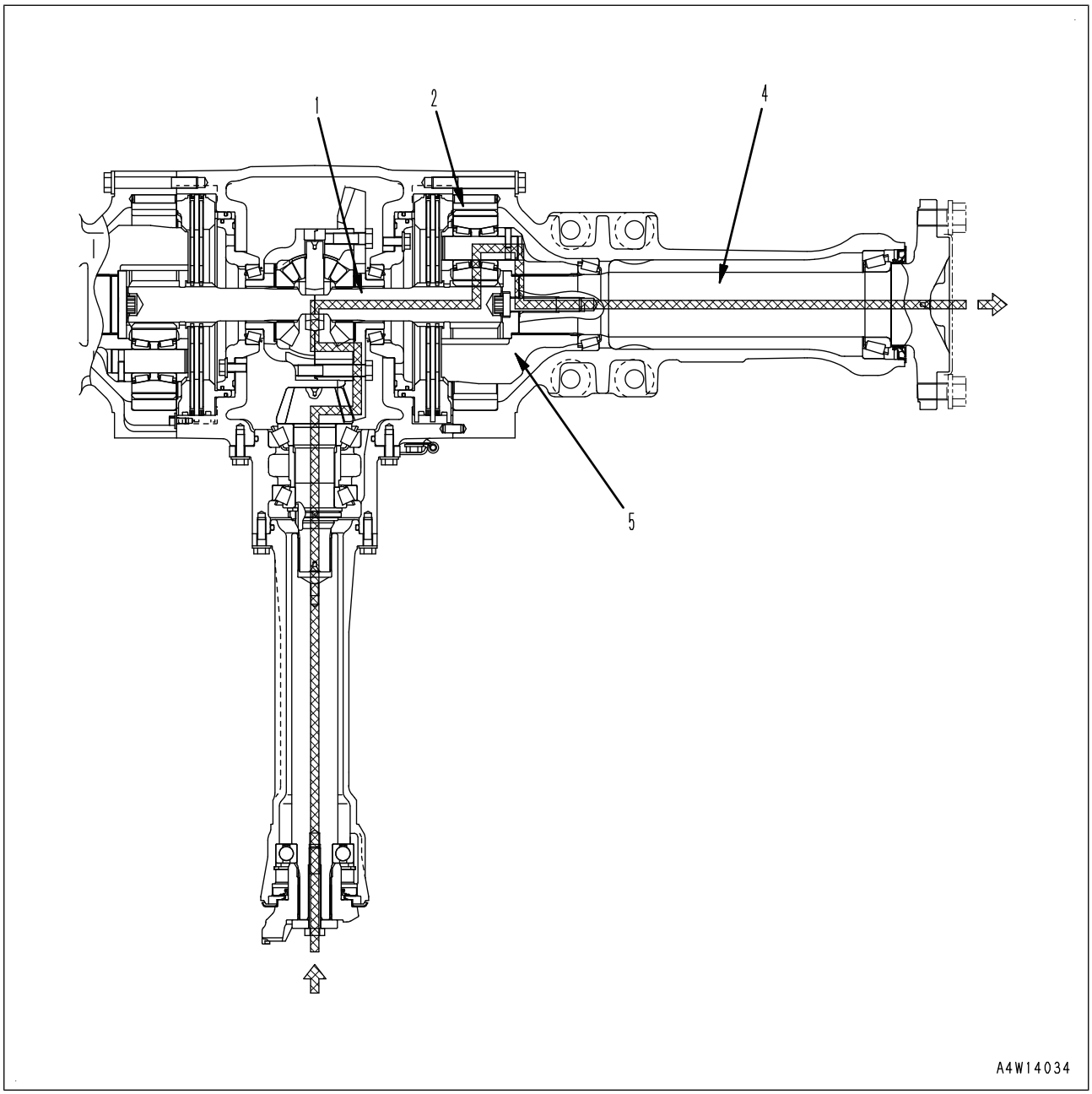


Transfer clutch (1) is engaged to transmit the power of both HST motor 1 (2) and HST motor 2 (3).

Power of HST motor 1 (2)	Power of HST motor 2 (3)
↓	↓
Input shaft (4)	↓
↓	↓
Sun gear (5)	↓
↓	↓
Planetary pinion (6)	↓
↓	↓
Carrier (7)	↓
↓	↓
Motor 1 gear (8)	Motor 2 gear (9)
↓	↓
Output gear (10) ←	←
↓	
Output shaft (11)	

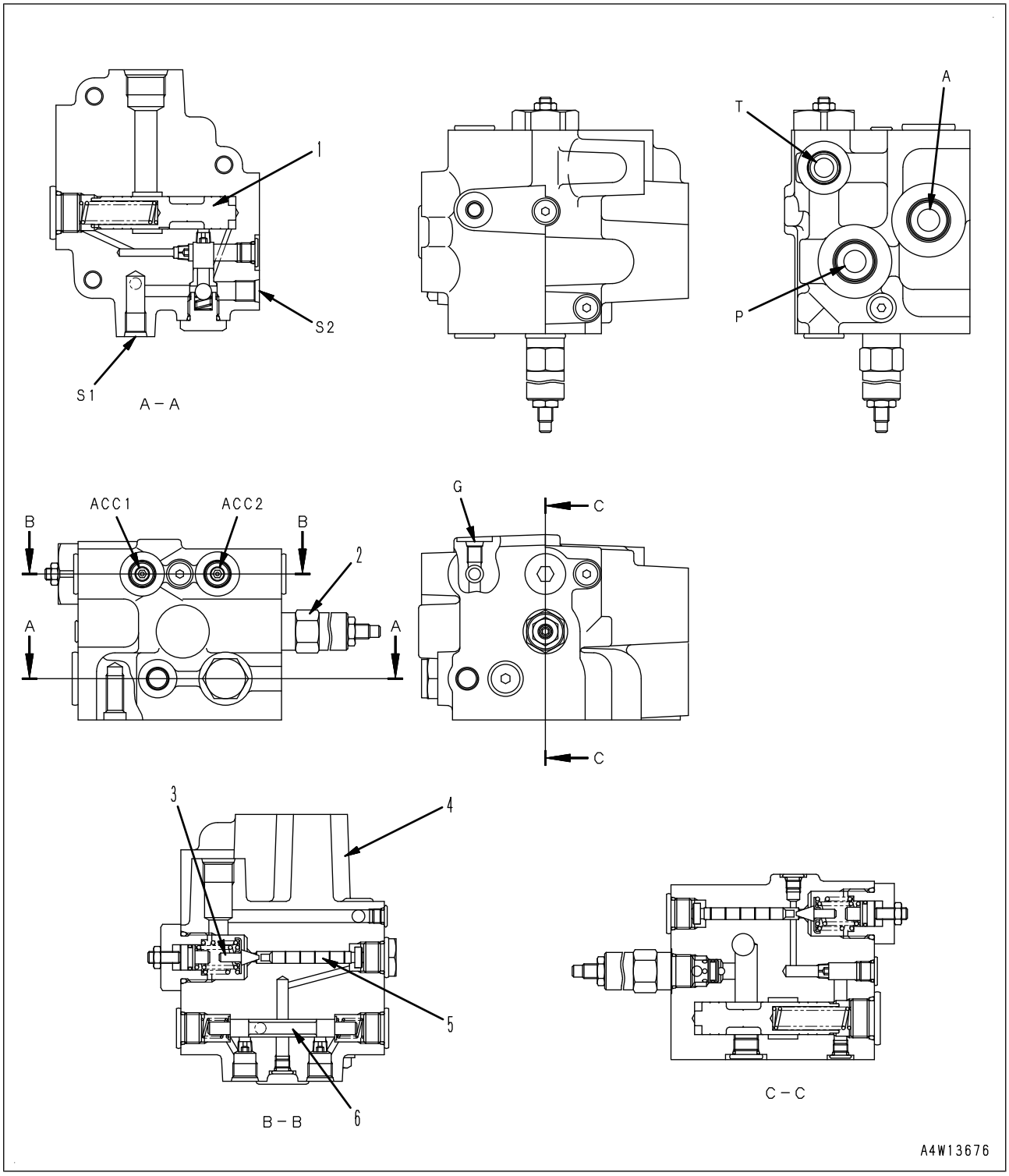
Operation *(WA270-DF10-044-K-00-A)*

★ The figure shows the front axle.



- The final drive finally reduces the speed to transmit the power from the engine and increases in drive power.
- Ring gear (2) is press-fitted to the axle housing and fixed with the pin.
- The power transmitted from the differential through sun gear shaft (1) is reduced in speed and increased in drive power by the planetary gear mechanism.
- The increased drive power is transmitted through planetary carrier (5) and axle shaft (4) to the tires.

Brake accumulator charge valve *(WA320-G2H0-041-K-00-A)*

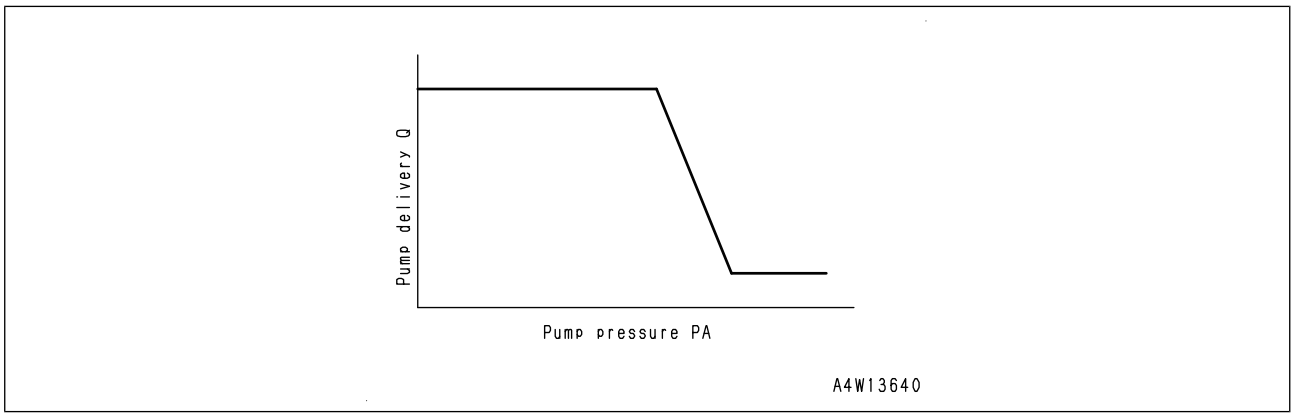


A: To cooling fan motor
ACC1: To accumulator (front side)
ACC2: To accumulator (rear side)
G: Gauge port
P: From brake and cooling fan pump
S1: To accumulator
S2: To parking brake solenoid
T: To hydraulic tank

Structure

Front axle
- Since front axle (1) receives forces directly during operation, it is fixed directly to front frame (2) with tension bolts (8).

Rear axle
- Rear axle (6) rocks around its center so that each tire keeps in contact with the ground surface even when the machine travels on soft ground.



Operation *(WA320-C2K0-044-K-00-A)*

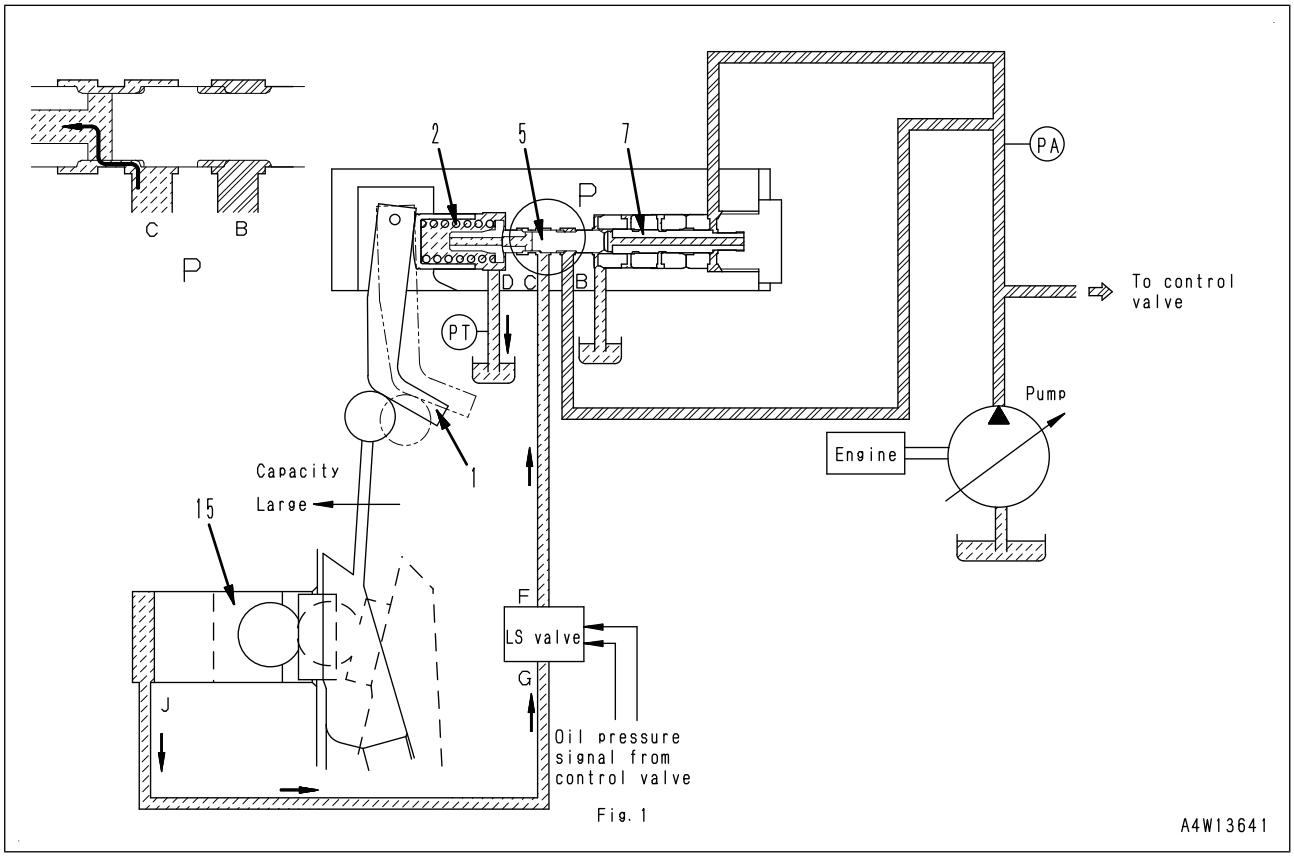
Action of spring

- The spring force of spring (2) in the PC valve is determined by the angle of the swash plate.
- When servo piston (15) moves to the right, spring (2) is compressed through lever (1) and the spring force changes.

When pump pressure (PA) is low

When load is light

(Fig. 1)

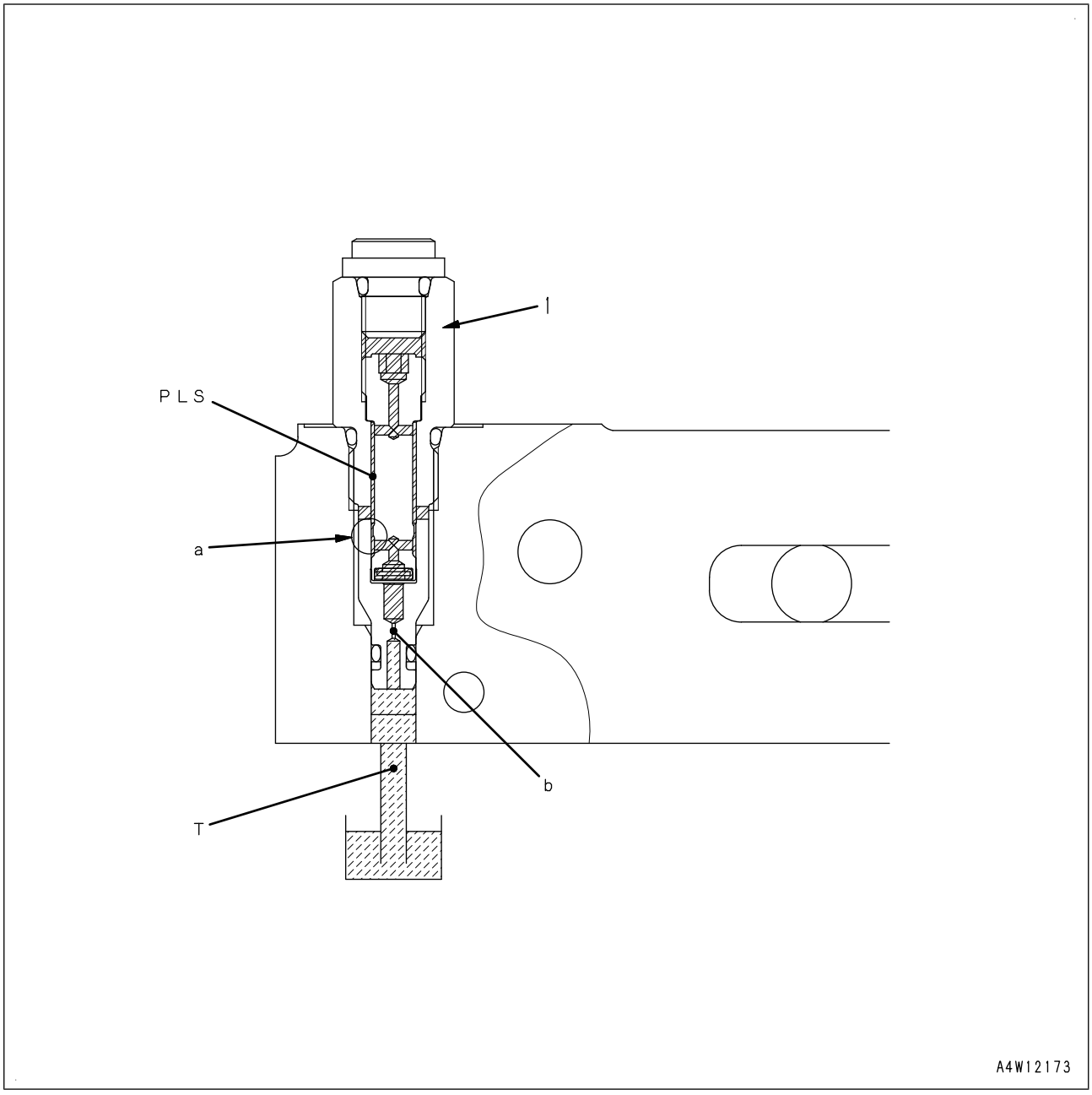


- The pressing force of piston (7) is decreased and spool (5) is a little closer to the right (Fig. 1). At this time, port (C) is connected to port (D) and the pressure transmitted to the LS valve becomes drain pressure (PT).
- When port (F) is connected to port (G) of the LS valve, the pressure in port (J) becomes drain pressure (PT) and servo piston (15) moves to the left.
- Consequently, the pump discharge is increased.

Operation *(WA380-PQ10-044-K-01-A)*

- When spool (1) is operated, pump delivery pressure (PP) is transmitted from flow control valve (2) and notch (a) in the spool through bridge passage (b) to actuator circuit (A).
- At the same time, pressure reducing valve (3) moves to the right, so pump delivery pressure (PP) is reduced due to the pressure loss at notch (c) and then transmitted through LS circuit (PLS) to spring chamber (PLS1).
- At this time, LS circuit (PLS) is connected to tank circuit (T) through LS bypass plug (4). (See LS bypass plug)
- Actuator circuit pressure (A) is applied to the left side of pressure reducing valve (3) and reduced pump pressure (PP) is applied to the opposite side.
- Pressure reducing valve (3) is balanced in a position where actuator circuit pressure (A) and the pressure of spring chamber (PLS) are the same. Pump delivery pressure (PP) reduced at notch (c) becomes actuator circuit pressure (A) and is transmitted into LS circuit (PLS).

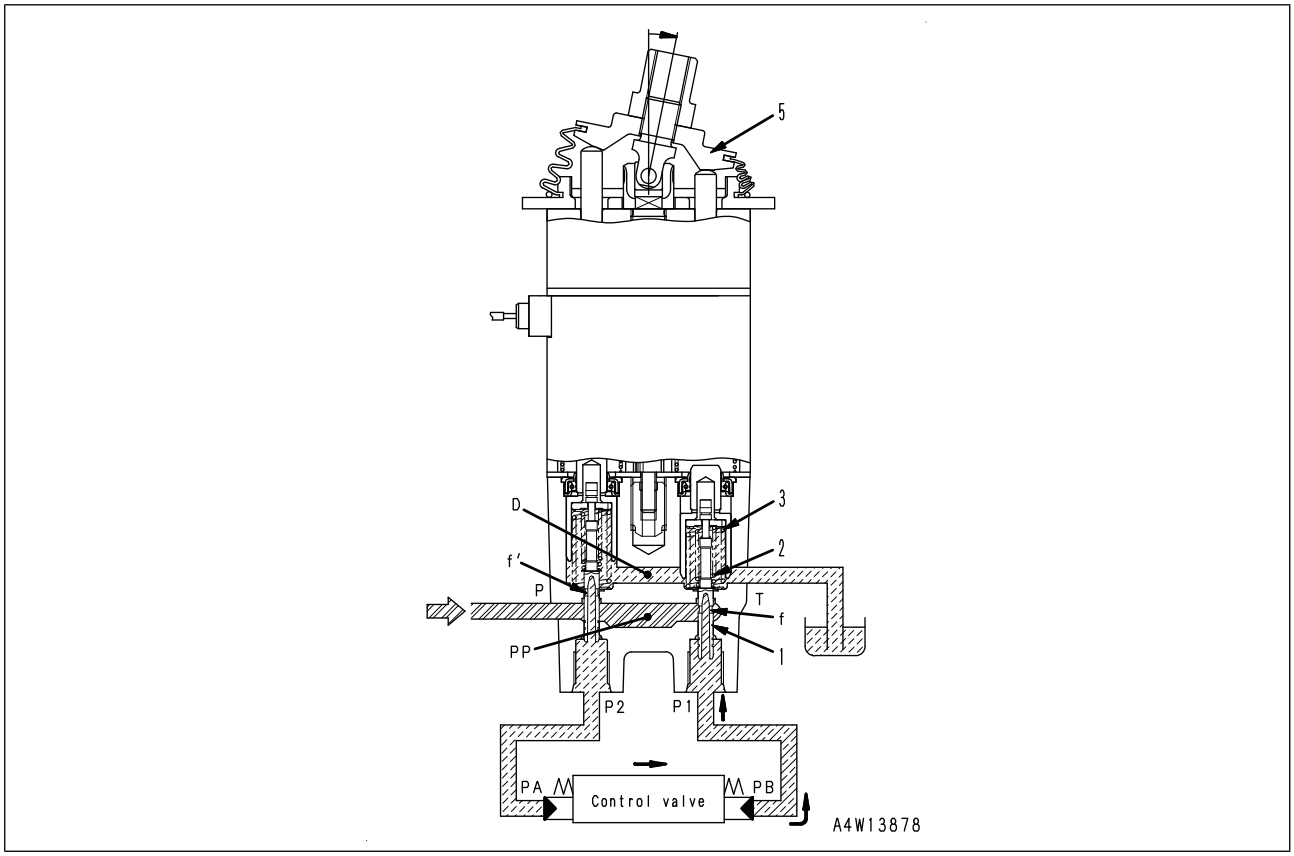
LS bypass plug *(WA380-PNSH-041-K-00-A)*



T: Tank circuit

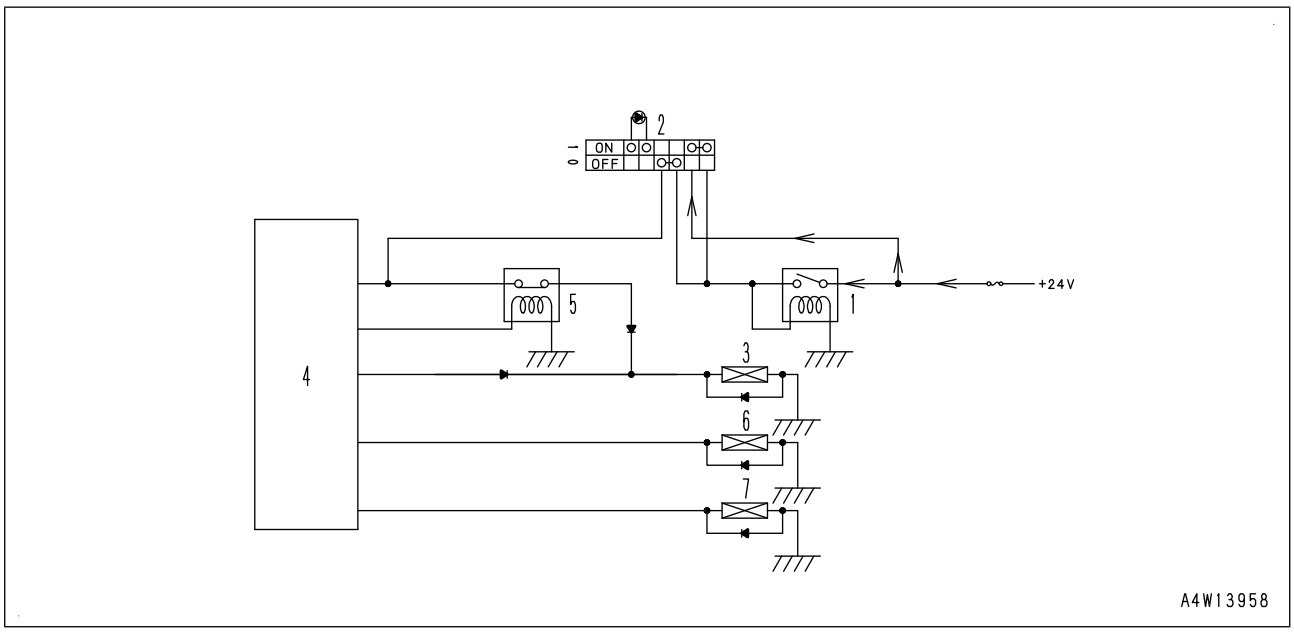
PLS: LS circuit

When in fine control range (control lever is returned)



- When disc (5) begins to return, spool (1) is pushed up by the force of centering spring (3) and the pressure in port (P1).
- Fine control hole (f) is connected to drain chamber (D), and the pressurized oil in port (P1) is released.
- When the pressure in port (P1) decreases too much, spool (1) is pushed down by metering spring (2).
- Fine control hole (f) is disconnected from drain chamber (D) and connected to pump pressure chamber (PP) almost at the same time.
- The pump pressure is supplied until the pressure in port (P1) recovers to the pressure corresponding to the lever position.
- When the spool of control valve returns, the pressurized oil in drain chamber (D) flows in through fine control hole (f') in the valve on the side that is not operated. The oil passes through port (P2) and flows into chamber (PA) to replenish the port with pressurized oil.

When parking brake switch is turned to "OFF (releasing)" position before starting switch is turned to "ON" position



- When parking brake switch (2) is turned to "OFF (release)" position, no current flows in parking brake relay (1) and the relay contacts are open.
- Even if starting switch is turned to "ON" position, no current flows to parking brake solenoid valve (3). Accordingly, the parking brake is not released automatically.
- HST controller (4) stops outputting a signal to forward solenoid (6) or reverse solenoid (7) of HST pump to prevent dragging of the parking brake.

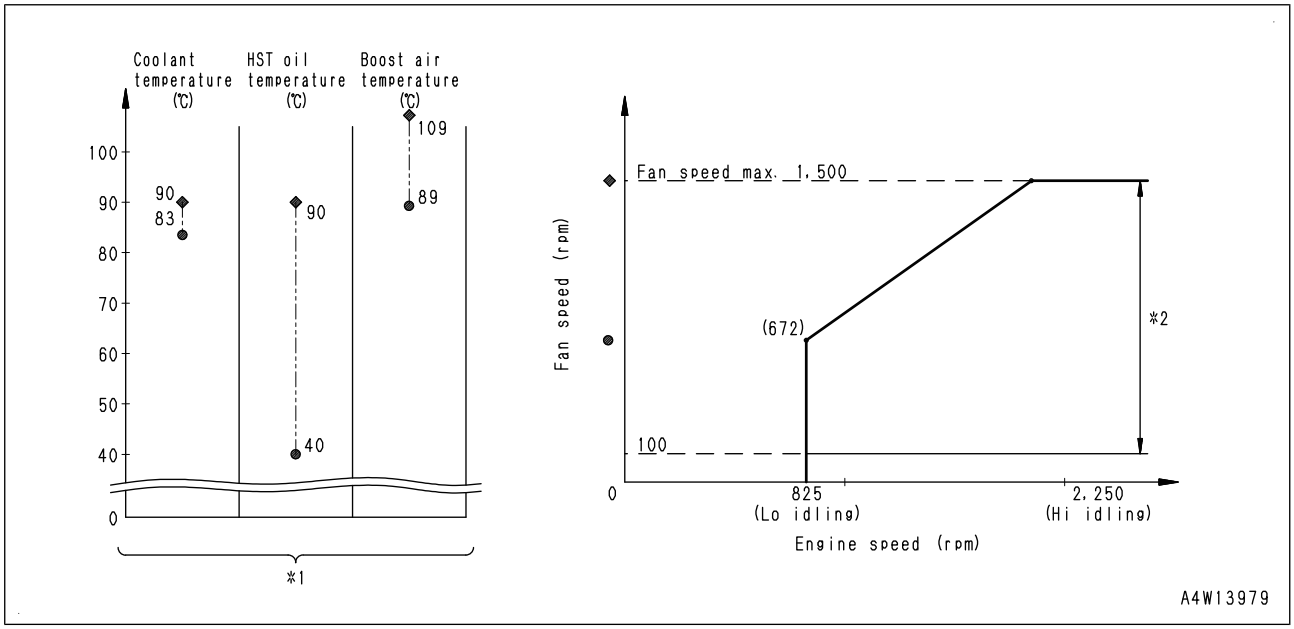
j. Boost pressure and temperature signal

k. CAN signal

Fan control

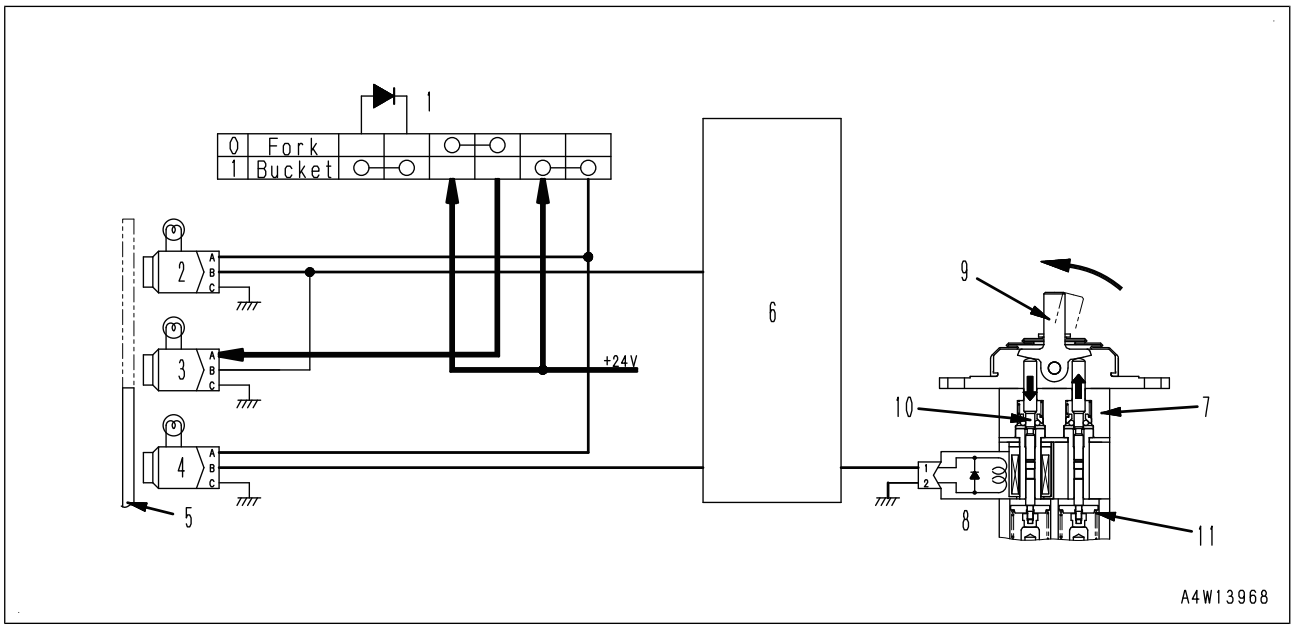
- The hydraulic cooling fan is employed and the discharge of the hydraulic pump is controlled to reduce the horsepower loss and noise at low temperature and shorten the warm-up time at low temperatures.
- HST controller (1) receives the following information via the network; Engine speed, coolant temperature, boost temperature, and operating condition of the air conditioner received by the engine controller (4). HST controller (1) receives information of HST oil temperature directly.
- The HST controller (1) sends the signal current to the fan motor EPC solenoid valve on the basis of the received information and sets the fan speed corresponding to each temperature and engine speed by controlling the motor flow rate.

Fan speed and temperature



*1: The target fan maximum speed is decided by the highest temperature information among the coolant temperature, HST oil temperature, and boost temperature.

*2: In this range, the fan speed corresponds to the coolant temperature, HST oil temperature, boost temperature, and operation state of the air conditioner.



- When the fork is tilted more than the position set by the fork positioner, namely, when trip bar (5) is apart from above the sensing face of fork positioner proximity switch (3), the lamp of fork positioner proximity switch (3) goes out.
  By this operation, the circuit from HST controller to tilt detent solenoid valve (8) of work equipment PPC valve (7) is cut out and the coil is de-energized. As a result, held spool (10) receives the reaction force of spring (11) and returns work equipment (bucket) control lever (9) to "HOLD" position.

Operation of fork positioner proximity switch

When sensor unit is on sensing face of proximity switch

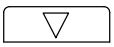
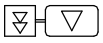
Pilot lamp of fork positioner proximity switch	Lights up
Output signal to HST controller	ON
Output to work equipment PPC valve detent solenoid circuit	ON (*1)
Work equipment PPC valve detent solenoid	Energized (*1)

*1: When the followings are recognized; The engine is running, the work equipment lock switch is released, and the bucket is tilted from the bucket tilt PPC pressure sensor reading.

When sensor unit is separated from above sensing face of proximity switch

Pilot lamp of fork positioner proximity switch	Goes out
Output signal to HST controller	OFF
Output to work equipment PPC valve detent solenoid circuit	OFF
Work equipment PPC valve detent solenoid	De-energized

Guidance icon *(WA270-Q1L3-043-K-01-A)*

Monitor display	Item	Function (Action that starts when corresponding switch is pressed)	Display location
 A4W12258	User menu selection	<When KDPF soot accumulation caution lights up> Moves to user menu "KDPF Regeneration" <When maintenance caution lights up> Moves to user menu "Maintenance"	• Standard screen (when KDPF soot accumulation caution lights up) • Standard screen (when maintenance caution lights up)
 A4W12259	Display of occurred error list	Displays occurred error list	• Standard screen (when failure occurs)
 9JC01196	Move between items (upper)	<In user menu or service menu> Moves to upper item <When value is input> Increases value	• Overall user menu • Overall service menu
 9JC01197	Move between items (lower)	<In user menu or service menu> Moves to upper item <When value is input> Decreases value	• Overall user menu • Overall service menu
 9JC01195	Return	<In user menu or service menu> Returns to previous screen or standard screen <When Yes/No is selected> Selects "No"	• Overall user menu • Overall service menu
 9JC01194	Enter	<In user menu or service menu> Moves to upper item <When Yes/No is selected> Selects "Yes"	• Overall user menu • Overall service menu
 A4W12260	Move between tabs (right)	Moves to right tab <In service menu> Selects monitoring item tab	• User menu • Service menu"Monitoring / Custom"
 A4W12261	Move between pages (upper)	Moves to upper page (Moves to bottom page from top page)	• Occurred error list • User menu"ECO Guidance"→ "Operation Records", "ECO Guidance Records" • Service menu "Monitoring / Pre-defined" • Service menu "Abnormality Record"→"Mechanical Systems"
 A4W12262	Move between pages (lower)	Moves to lower item (Moves to top page from bottom page)	• Occurred error list • User menu"ECO Guidance" →"Operation Records", "ECO Guidance Records" • Service menu"Monitoring / Pre-defined" • Service menu "Abnormality Record" → "Mechanical Systems"

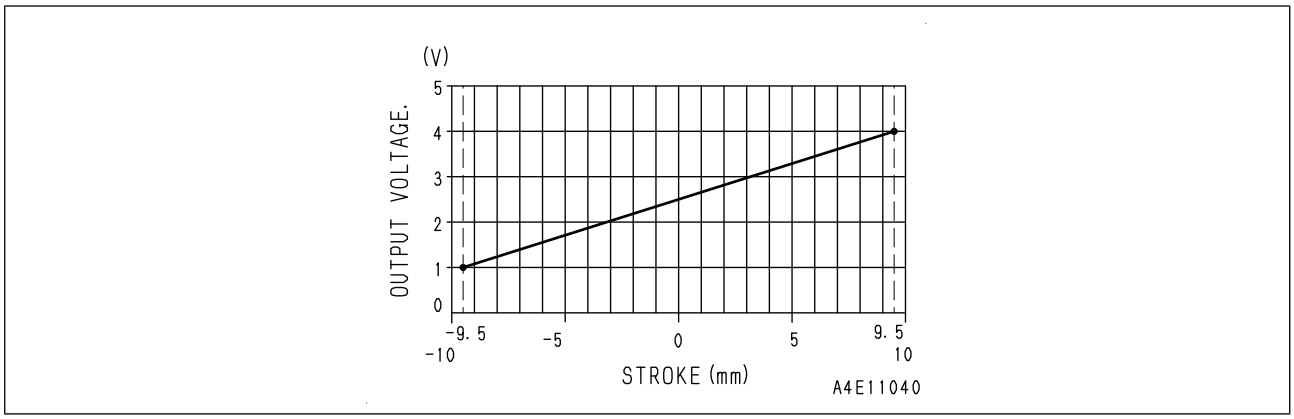
Pin No.	Signal name	Input/output signal
20	Alarm buzzer	Output
21	(*1)	-
22	(*1)	-
23	(*1)	-
24	Starting switch ACC signal	Input
25	(*1)	-
26	(*1)	-
27	Brake oil temperature sensor	Output
28	Signal GND	-
29	Seat belt	Input
30	Unit selection	Input
31	Engine shutdown secondary switch	Input
32	(*1)	-
33	Monitor brightness selector switch	Input
34	Clearance lamp switch	Input
35	Multi-coupler release	Input
36	(*1)	-
37	(*1)	-
38	(*1)	-
39	(*1)	-
40	(*1)	-
41	(*1)	-
42	(*1)	-
43	Starting switch ACC signal	Input
44	(*1)	-
45	(*1)	-
46	(*1)	-
47	(*1)	-
48	Coolant level sensor	Input
49	Headlamp high beam	Input
50	HST Oil Filter Clogging	Input
51	(*1)	-
52	Emergency HST pump drive switch	Input
53	Air cleaner clogging sensor	Input
54	(*1)	-
55	(*1)	-
56	Travel speed signal (pulse)	Output
57	System operating lamp	Output
58	Work equipment lock pilot monitor	Output
59	(*1)	-
60	(*1)	-
61	(*1)	-
62	External starting signal	Input
63	(*1)	-
64	(*1)	-
65	(*1)	-
66	(*1)	-
67	Load meter subtotal switch	Input
68	Load meter sub cancel switch	Input
69	Engine oil level sensor	Input
70	(*1)	-
71	Parking brake oil pressure switch	Input

Function *(ENG125-A9S2-042-K-00-A)*

- The sensor, installed to EGR valve on the engine, detects the EGR valve opening to output the corresponding variable voltage.

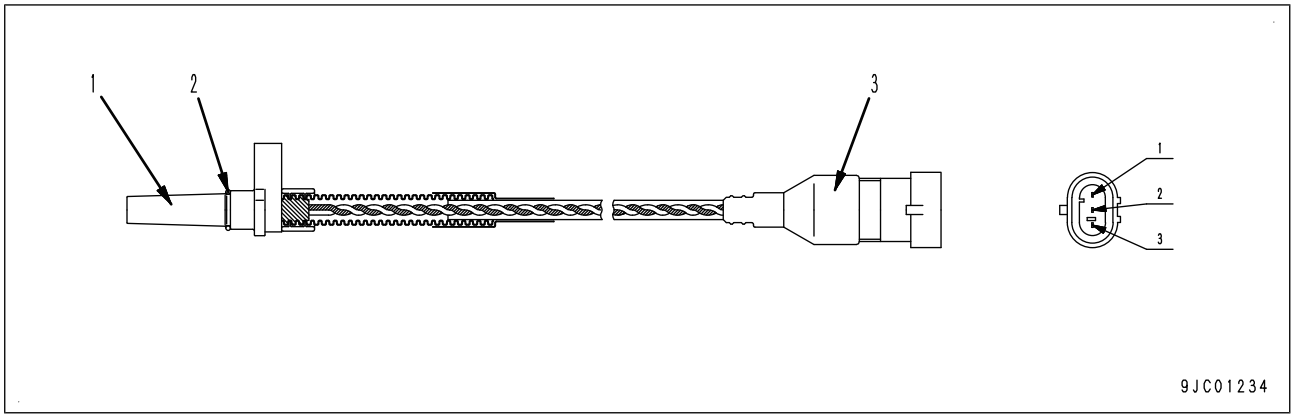
Output characteristics

- The relation between stroke and output voltage is as shown in the following graph.



KVGT speed sensor *(ENG-AAQ4-041-K-00-A)*

KVGT: Abbreviation for KOMATSU Variable Geometry Turbocharger



1. Sensor
2. O-ring
3. Connector

Function *(ENG-AAQ4-042-K-00-A)*

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

★ The 3-pole connector is applied for this sensor, however, available pins are the pin No. 1 and No. 2 only, and it has no pin No. 3.

Standard value table for machine *(WA270_7-0000-033-K-00-A)*

Machine model			WA270-7	
Item	Measurement condition	Unit	Standard value for new machine	Repair limit
Engine speed				
Engine high idle	• Coolant temperature: 60 to 100°C • HST oil temperature: 45 to 55°C	rpm	2,225(+70/–50)	2,225(+70/–50)
Engine low idle			825(+25/–50)	825(+25/–50)
HST stall			2,165 ± 100	2,165 (+115/–200)
Hydraulic stall			2,200 ± 100	2,200 (+150/–200)
HST stall and hydraulic stall			2,145 ± 100	2,145 (+150/–200)
Directional lever				
Operating effort NEUTRAL ⟷ FORWARD/ REVERSE	• Engine stopped • Measure at center of lever knob stem. • Measure at 10 mm from lever top. • Tilt angle of steering column: Deepest position (monitor side)	N {kg}	6.7 to 8.17 {0.68 to 0.83}	6.0 to 8.17 {0.61 to 0.83}
Stroke NEUTRAL ⟷ FORWARD/ REVERSE		mm	39 ± 6	39 ± 12
Gear speed switch				
Operating effort 1st ⟷ 2nd	• Engine stopped	Nm {kgm}	0.39 ± 0.03 {0.04 ± 0.003}	0.36 ± 0.12 {0.037 ± 0.012}
2nd ⟷ 3rd			0.39 ± 0.03 {0.04 ± 0.003}	0.36 ± 0.12 {0.037 ± 0.012}
3rd ⟷ 4th			0.39 ± 0.03 {0.04 ± 0.003}	0.36 ± 0.12 {0.037 ± 0.012}
Rotation angle 1st ⟷ 2nd		deg.	20 ± 2	20 ± 4
2nd ⟷ 3rd			20 ± 2	20 ± 4
3rd ⟷ 4th			20 ± 2	20 ± 4

Machine monitor *(WA320-Q170-033-K-00-A)*

<table>
<tr><th>Equipment name</th><th colspan="4">Procedure, measuring location, criteria and remarks</th></tr>
<tr><td rowspan="2">Alternator</td><td colspan="4">1. Turn starting switch to OFF position.
2. Insert T-adapter into connector TEL.
3. Start engine. (Engine speed: Middle or faster)</td></tr>
<tr><td>Voltage</td><td colspan="2">Between TEL (5) and ground</td><td>26 to 30.5 V</td></tr>
<tr><td rowspan="2">Preheating</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect heater relay terminal E07A.
★ To prevent current from flowing through heater when starting switch is turned to HEAT position for checking.
3. Turn starting switch to the HEAT position (connect R1).</td></tr>
<tr><td>Voltage</td><td colspan="2">Between heater relay terminal E06 and ground</td><td>20 to 30 V</td></tr>
<tr><td rowspan="3">Fuel level sensor</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect connector R21, and connect T-adapter to male side.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between R21 (male) (1) and (2)</td><td>Fuel level: Full</td><td>Max. 12 Ω</td></tr>
<tr><td>★ Fuel level sensor characteristics</td><td>Fuel level: Empty</td><td>80 to 100 Ω</td></tr>
</table>

Testing compression pressure *(WA380-A000-001-K-01-A)*

★ Testing tools

Symbol		Part No.	Part name
E	1	795-502-1590	Gauge assembly
	2	795-799-6700	Puller
	3	795-790-4411	Adapter
	4	6754-11-3130	Gasket
	5	Commercially available	Hose (inside diameter: approximately 15 mm)

⚠ **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 LOCK position, stop the engine, and chock the wheels.**

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

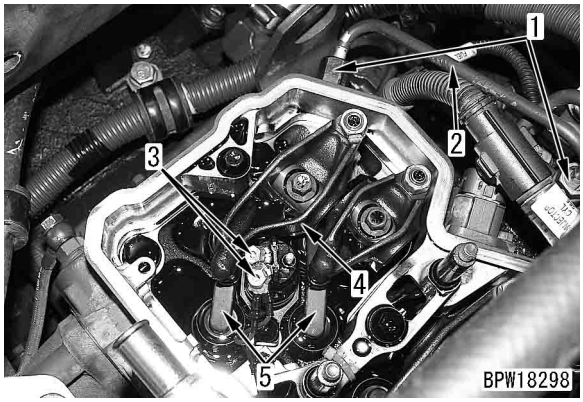
⚠ **When testing the compression pressure, be careful not to burn yourself by touching the exhaust manifold or KDPF, or get caught in a rotating part.**

★ Check this item under the following conditions.
- Engine oil temperature: 40 to 60°C

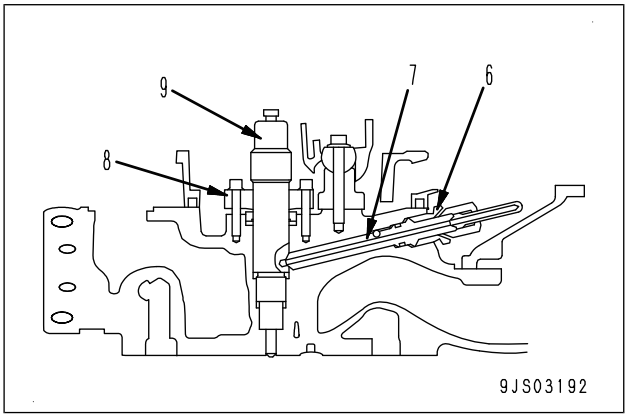
Testing *(WA380-A000-36B-K-00-A)*

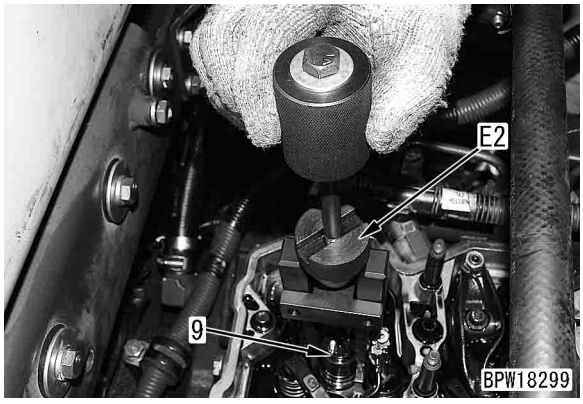
1. Remove the cylinder head cover and set the piston in the target cylinder of testing to the compression top dead center. For details, see "Testing and adjusting valve clearance".
   ★ Check that both the intake rocker arm and exhaust rocker arm at the compression top dead center are movable by hand by the distance equivalent to the valve clearance.
2. After removing the fuel spray prevention cap, remove sleeve nut (1) and disconnect high-pressure pipe (2).
   ★ When measuring the compression pressure, the fuel spurts out of the disconnected part on the common rail side. So install hose E5 to drain the fuel to a container.

   ⚠ **Do not bend the high-pressure pipe for use.**
3. Loosen injector terminal nuts (3) and remove the harness terminals from the injector.
   ★ Insulate the terminals with tape etc. so that the adjacent ones of them do not touch each other.
4. Remove rocker arm assembly (4).
   ★ When removing rocker arm assembly (4), be careful not to drop the support and shaft.
5. Remove crossheads (5).



6. Remove retaining nut (6) and remove inlet connector (7).
   ★ Before removing the inlet connector, clean and remove dirt, etc, attached around the inlet connector and dust so that they do not enter the inlet connector mounting holes.
7. Remove holder (8).
8. Remove injector (9).
   ★ Remove injector (9) with the impacts of the slide hammer by using puller E2.
   ★ Do not pry the top of injector (9) to remove.





9. Install gasket E4 to the tip of adapter E3 and insert them into the injector mounting portion.
10. Fix adapter E3 with mounting holders (8) for the injector.

Handling no-injection cranking operation *(PC-A000-25L-K-00-A)*

★ No injection cranking means to crank the engine by using the starting motor while all the injections are stopped electrically. The purpose and effect of this operation are as follows.

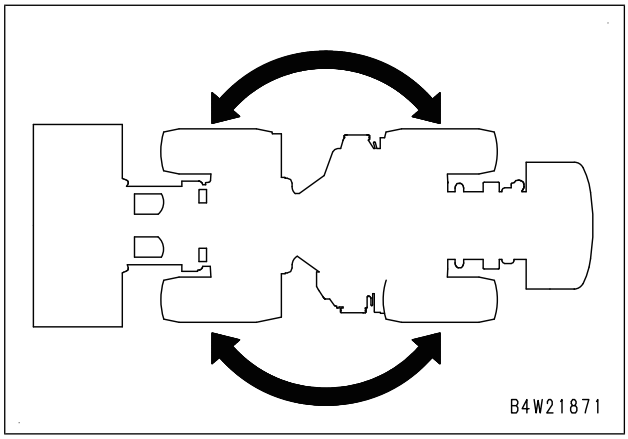
No injection cranking is performed to lubricate the engine parts and to protect them from seizure. It is performed before the engine is started, or after the machine has been stored for a long period.

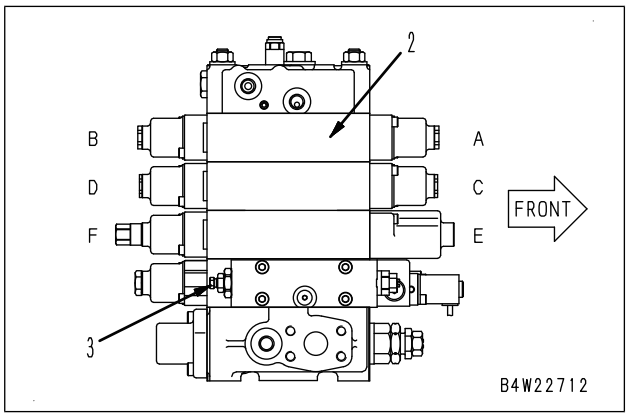
★ When performing no injection cranking operation, see "Special functions of machine monitor".

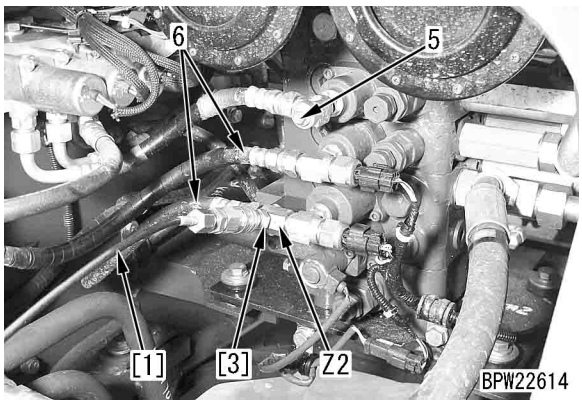
Bleeding air from steering cylinder circuit *(WA320-F210-360-K-01-A)*

Bleeding air *(WA320-F210-231-K-00-A)*

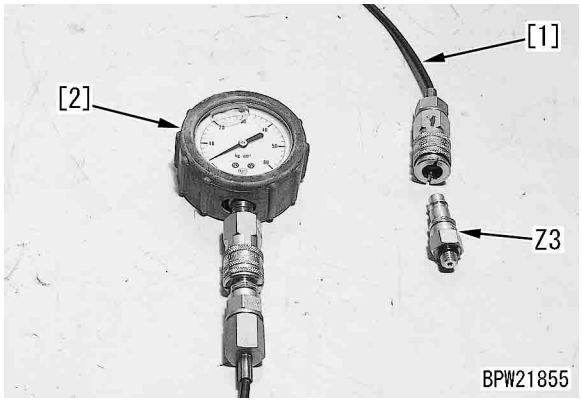
1. Start engine, run engine at low idle for 5 minutes.
2. Run the engine at low idle, and turn the steering wheel 4 to 5 times to the right and left.
   - ★ Stop the piston rod approximately 100 mm before each stroke end and be careful not to relieve the circuit.
3. Run the engine at high idle and then, perform the operation of Step 2.
4. Run the engine at low idle and operate the piston rod to the end of its stroke to relieve the circuit.







3. Install adapter Z2, nipple [3], hose [1] and gauge [2] of hydraulic tester Z1 to hose if hose is disconnected. Install nipple Z3 and hose [1] of hydraulic tester Z1, and connect gauge (2) if it is measured with pressure pickup port plug.
   - ★ The hose of digital hydraulic tester Z1 can also be used.
   - ★ Use the oil pressure gauge of 6 MPa {60 kg/cm^2}.



4. Start the engine, run it at high speed, move the work equipment lever to measure the PPC valve output pressure.
   - ★ For standard values, see "Standard value table for machine".
   - ★ The pressure does not rise and stays at 0 MPa {0 kg/cm^2} when work equipment lever is at NEUTRAL.
5. After finishing the test, remove the testing tools and restore the machine.

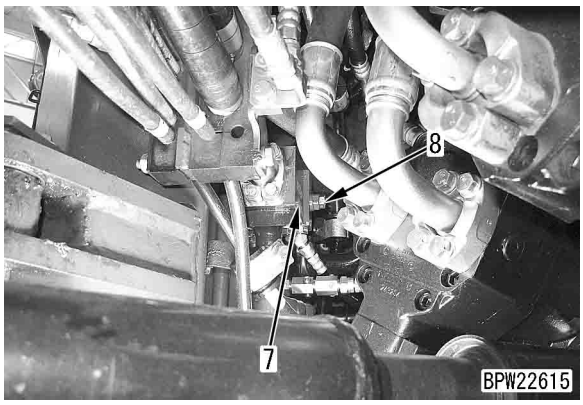
Adjusting *(WA270-PL10-270-K-00-A)*

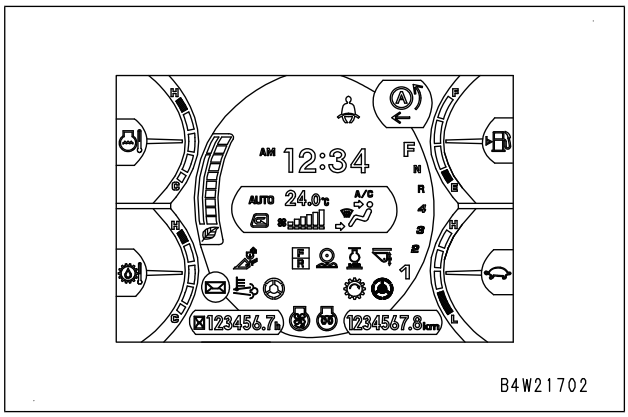
★ The PPC relief valve is not adjustable.

1. Replace self-pressure reducing valve assembly (7). Or, replace PPC relief valve (8) of self-pressure reducing valve (7).

   PPC relief valve assembly:
   24.5 to 34.3 Nm {2.5 to 3.5 kgm}

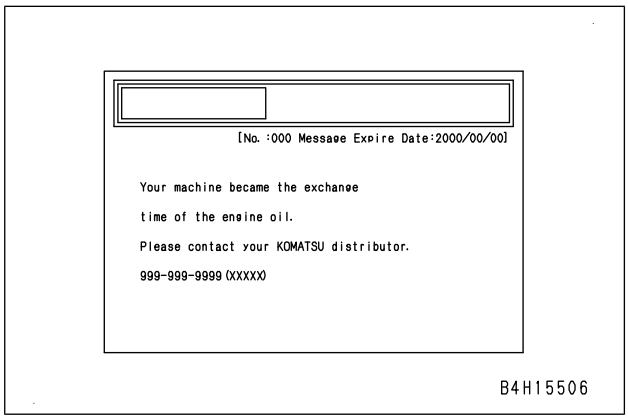
   - ★ After the replacement, measure the PPC oil pressure again.



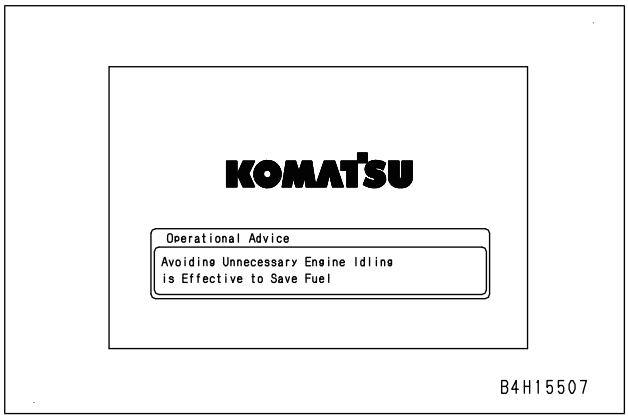


Display of end screen *(HM300-Q180-044-K-08-A)*
Turning the starting switch to OFF position closes the screen.

★ If a KOMTRAX message or one point advice on ECO guidance are prepared, they are displayed on the end screen for 5 seconds.

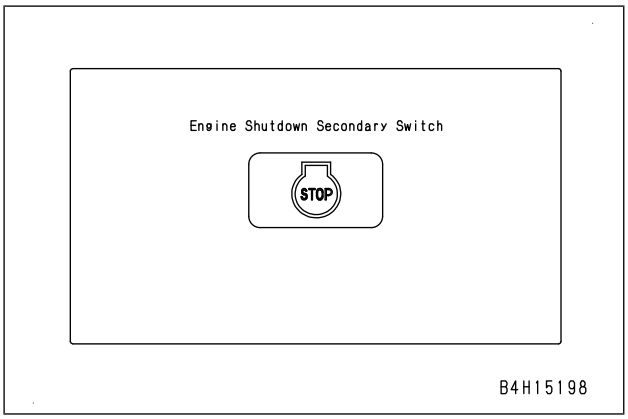


★ On monitor screen described above displays sentence having been inputted directly at the distributor.



Display of operation screen for engine shutdown secondary switch *(WA380-AKHL-100-K-00-A)*
3 seconds after you turn the engine shutdown secondary switch to ON position, "Engine Shutdown Secondary Switch Activated" screen is displayed on every screen except the end screen.

★ The engine shutdown secondary switch is provided on the left wall of the front console. This switch is used to stop the engine when it does not stop after the starting switch is turned to OFF position.

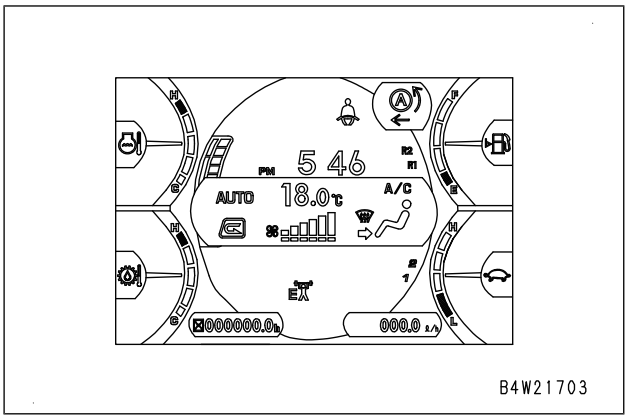


If you turn the engine shutdown secondary switch to OFF position, the KOMATSU logo appears once, and then the display changes to the standard screen.

Operation of air conditioner *(WA320-K500-100-K-00-A)*
Operating the air conditioner switch on the standard screen pops up the air conditioner display, allowing you to adjust the air conditioner.

Operating the air conditioner switch in user menu pops up the air conditioner adjustment screen, allowing you to adjust the air conditioner.

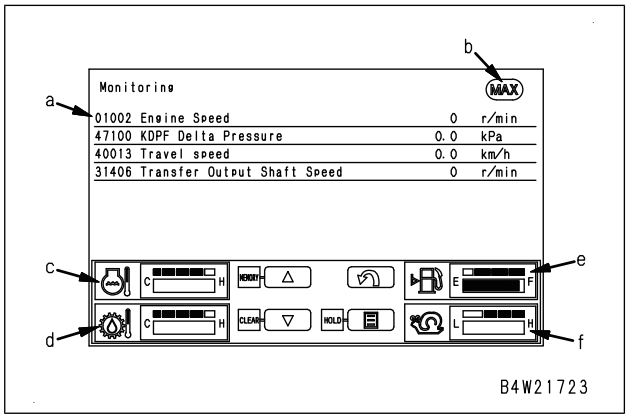
★ If other display is popped up by user menu, the air conditioner adjustment screen does not appear and operation of the air conditioner becomes unavailable.



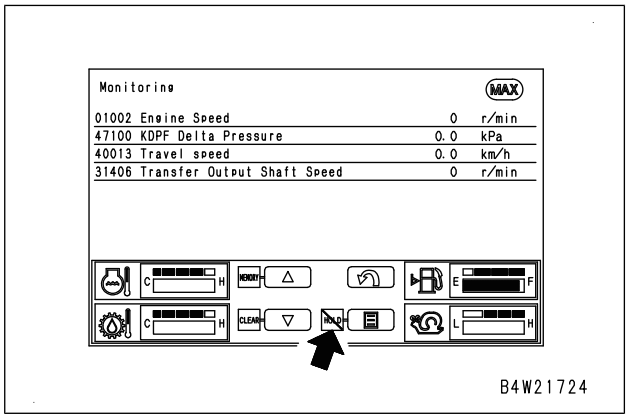
4. Executing monitoring
   After "Monitoring" screen is displayed, perform the necessary operation of the machine and check the monitoring information.
   "Monitoring" screen displays the following information.

   ★ Monitoring information is indicated by value, ON/OFF, or special display.

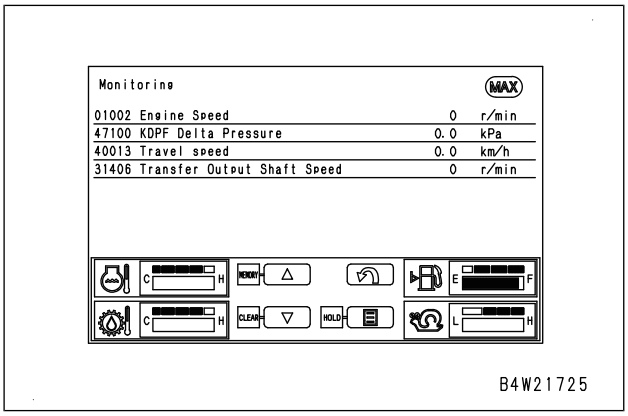
   ★ The unit to be displayed can be set to "SI" or "Non-SI" with the "Default" function in Service Menu.



5. Holding monitoring information
   In the monitoring information, Hold and Hold releasing can be made.
   Menu switch (E): Switches between the Hold and the Releasing hold
   (If the Hold is selected, a diagonal line is drawn on the HOLD part.)
   Return switch (C): Returns the display to the selection menu screen of "Monitoring"



6. Saving of monitoring item
   A selected monitoring item can be saved or cleared.
   Up switch (A): MEMORY (saves the selected item)
   Down switch (B): CLEAR (clears the selected item)



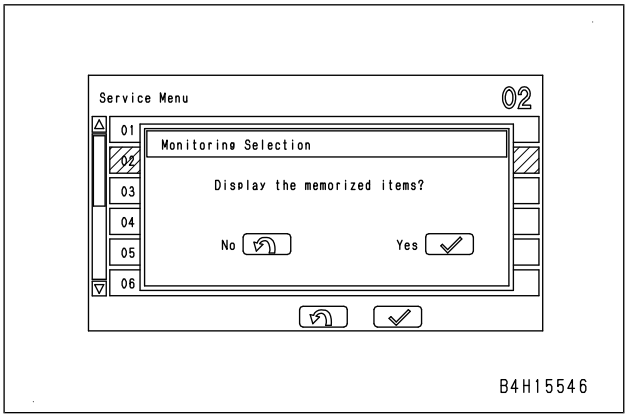
★ When a monitoring item is saved, a confirmation screen appears asking whether the saved item should be displayed or not, if "Monitoring" is selected again.

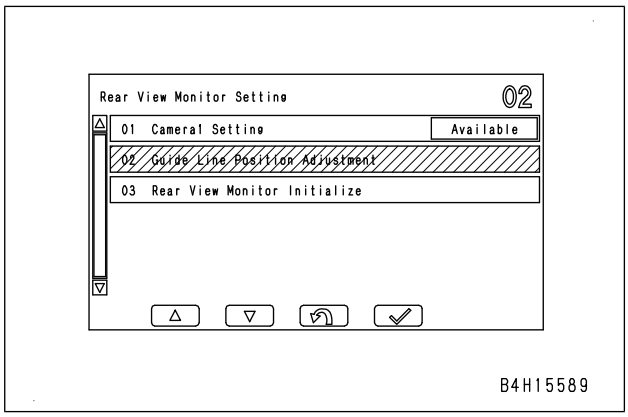
★ When an item is saved, it can be displayed as many times as required unless it is cleared.

★ If another item is saved while having the previous item saved, the previously saved item is overwritten by the latest one.

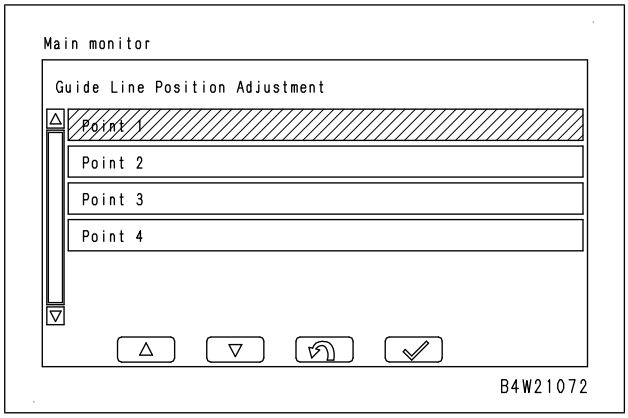
★ The saved monitoring item can be cleared by the Down switch, and by the following setting change as well. Validating operation also clears the selected item.

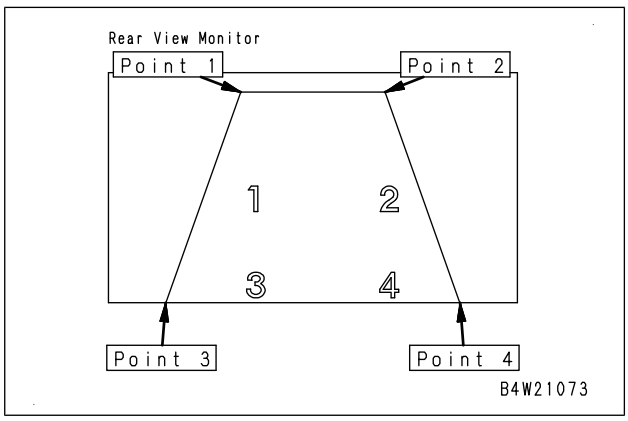
- Default (Machine Model Select)
- Default (Option Select)



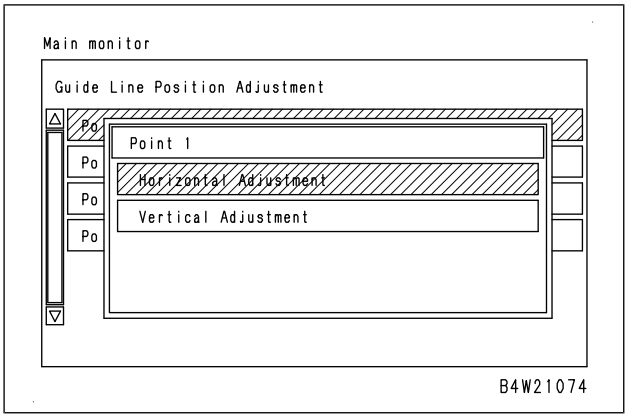


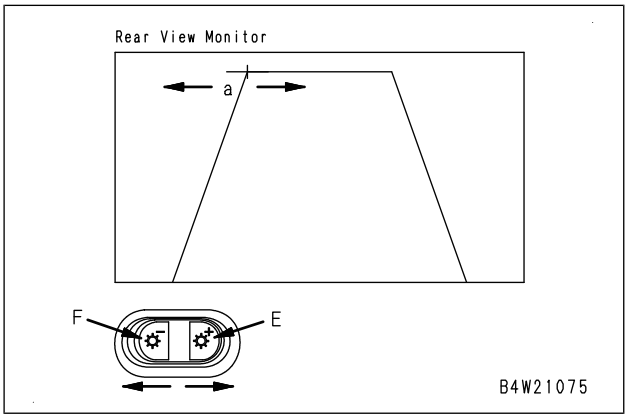
2) After "Guide Line Position Adjustment" screen is displayed, adjust the horizontal and vertical positions at each point of the guide line displayed on the rearview monitor according to the following procedure.
   1] Select point 1 from the "Guide Line Position Adjustment" screen.
   Up switch (A): Moves the selection up by one item
   Down switch (B): Moves your selection to the item directly below the current one
   Return switch (C): Cancels the selection and returns the display to "Rear View Monitor Setting" screen
   Enter switch (D): Validates your selection and returns the display to the Point Position Adjustment screen



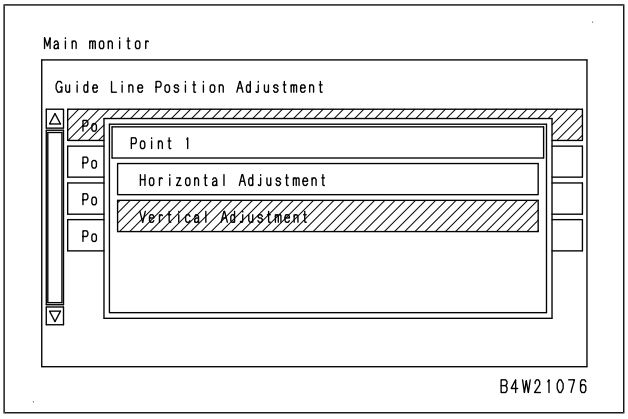


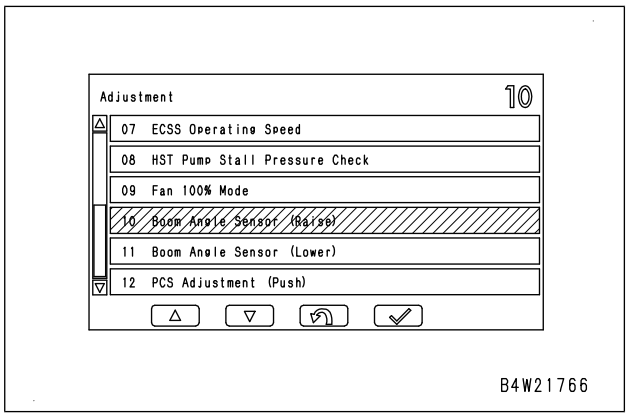
   2] This screen allows adjusting the horizontal position of "Point 1". So, using the brightness adjustment switch of the rearview monitor, align (a) portion with the outside width of the tire.
   Brightness adjustment switch + (E): Moves the point rightward.
   Brightness adjustment switch - (F): Moves the point leftward.



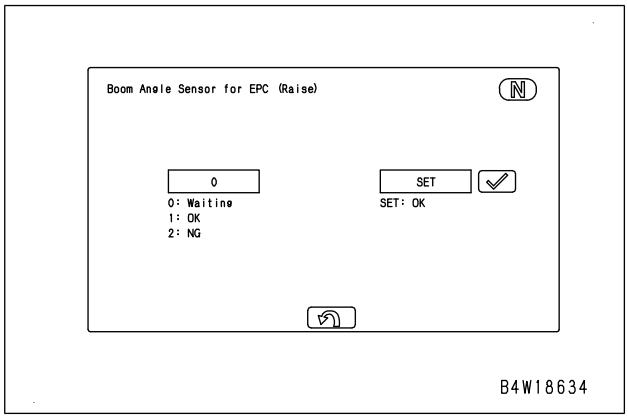


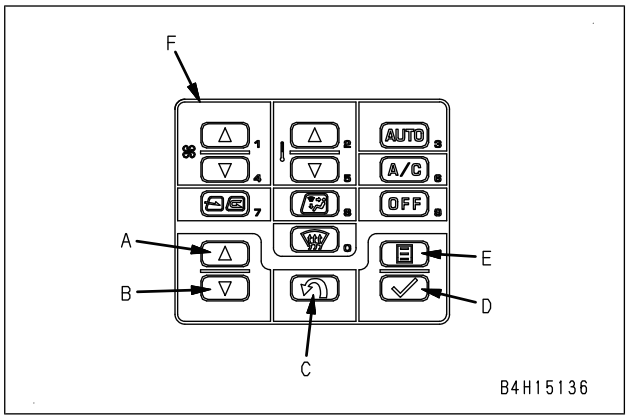
   3] Validate the setting with the enter switch (D).
   4] Above operation allows you to adjust the vertical position of "Point 1". So, by using the brightness adjustment switch of the rearview monitor, align (b) portion at 1.5 m from the rear edge of the machine.
   Brightness adjustment switch + (E): Moves the point upward.
   Brightness adjustment switch - (F): Moves the point downward.



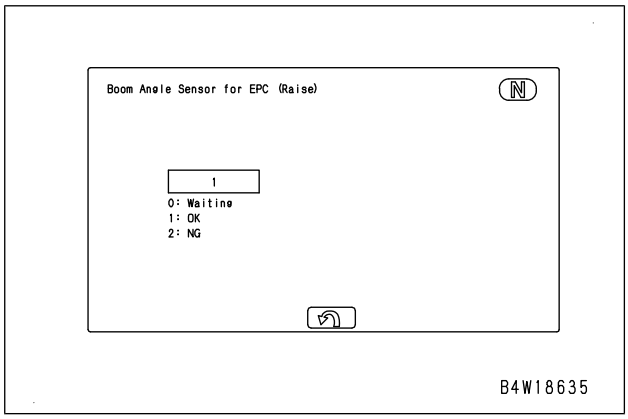


3. Press Enter switch (D) after raising the boom to the upper limit position (cylinder stroke end).



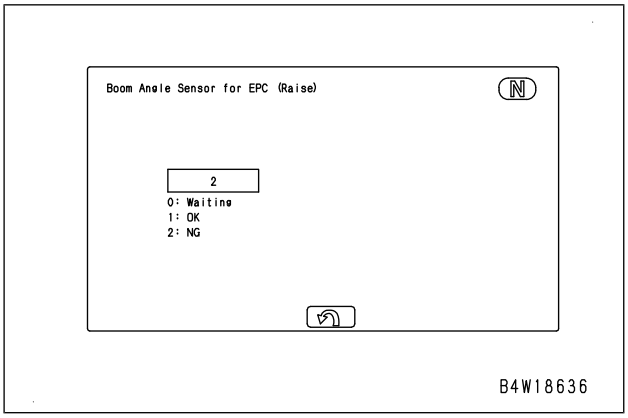


4. If the display in the left window changes to "1", adjustment is complete.



5. 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.

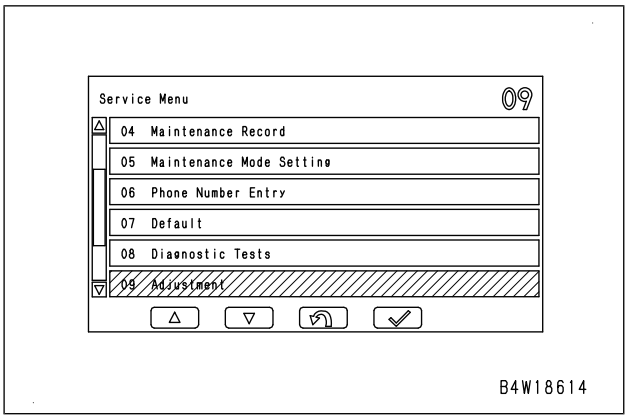


6. When the adjustment does not end successfully, check the boom angle sensor voltage on "Monitoring/Custom" screen.
7. Adjust the installed position of the boom angle sensor so that the voltage displayed on "Monitoring/Custom" screen is within the following range, and then perform the sensor adjustment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

Boom specification	Boom position	Voltage range	Machine model
STD	Top	3.86 ± 0.3 V	WA270–7
		3.83 ± 0.3 V	WA320–7

Adjustment (Boom Angle Sensor (Lower)) *(WA320-CN2C-270-K-00-A)*

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



2. Selecting a sub menu
   After "Adjustment" screen is displayed, select "Boom Angle Sensor (Lower)".

2. HST

Item	Condition		Unit	Standard value for new machine	Repair limit	Test results	Accept-able	Unaccept-able
High cut-off oil pressure (*1)(*3)	HST oil tempera-ture: 45 to 55°C	• Engine is at full throttle • Travel speed range selector switch: 2nd • Traction control switch: "ON" • Directional lever: Measure both Forward and Reverse	MPa {kg/cm^2}	44.0 to 46.0 {449 to 469}	42.0 to 46.0 {428 to 469}			
Low relief pressure (*4)		• Engine is at full throttle • Directional lever: NEUTRAL		1.9 to 2.1 {19 to 21}	1.8 to 2.2 {18 to 22}			
Servo piston operating oil pressure		• Travel speed range selector switch: 1st • Directional lever: Forward and reverse • Travel speed control dial: turtle mark side (see standard value table for the detail of setting position) • Measure during travel at Maximum speed (approximately 5 km/h)		Min. 2.0 {20.5}	Min. 2.0 {20.5}			
Transfer clutch control pressure		• Directional lever: Forward • Travel speed range selector switch: 3rd or 4th • Measure during travel at a speed more than 10km/h		2.9 to 3.3 {30 to 34}	2.5 to 3.3 {26 to 34}			

*1: These items can be measured on the machine monitor.
*3: A value indicated on the machine monitor has an accuracy error of approximately ±0.75 MPa {7.6 kg/cm^2}.
*4: A value indicated on the machine monitor has an accuracy error of approximately ±0.5 MPa {5.1 kg/cm^2}.

Inspection procedure before troubleshooting *(ALL-5150-001-A-00-A)*

Walk-around check *(WA320-5150-289-A-00-A)*

Before starting the engine, look around and under the machine to check for any loose nuts or bolts, leakages of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system.

Check the connectors for looseness, wiring harnesses for play, and accumulation of dust in places that reach high temperatures.

⚠ **Any accumulation of flammable materials, or leakage of fuel or oil, around the battery, engine itself, KDPF, turbocharger, or other high temperature engine parts can cause the machine to catch fire. Check carefully, and if any problem is found, repair it.**

★ a1, a2, ... b1, b2, ... , etc. correspond to the symbol in the table of the previous page.

a1. and b1. Check for unusual sounds and smells

Check for unusual sounds or smells.

If the machine is operated under the unusual sounds or smells, the cause of it may damage the machine, so stop the operation immediately once you recognize it.

a2. Check around engine and dirt removal

Check and remove any accumulated dirt around the engine and any combustibles (dead leaves, twigs, etc.) on hot engine parts such as the KDPF, turbocharger, etc.

a3. Check for water leakage around engine

a4. Check for oil leakage around engine

Check for oil leakage from engine and coolant leakage from cooling system. If any, repair it.

a5. Check for leakage from fuel line

Check for fuel leakage, check hoses and pipes for damage. If any, repair it.

a6. Check for radiator and dirt removal

Check and remove any accumulated dirt and any combustibles (dead leaves, twigs, etc.) around the radiator.

For removal of dirt from the radiator, see the Operation and Maintenance Manual, "Testing and cleaning of radiator fins, oil cooler fins, aftercooler fins, fuel cooler fins and air conditioner condenser fins".

a14. Check around the KDPF and dirt removal

Check and remove any accumulated dirt and any combustibles (dead leaves, twigs, etc.) around the KDPF.

a15. Check for gas leakage around the KDPF

Check the pipe between the KDPF and turbocharger, and also the KDPF connection for leakage of exhaust gas (or sticking of soot, etc.). If any, repair it.

b1. Check of work equipment, cylinders, linkage and hoses for breakage, wear and clearance

Check the work equipment, cylinders, linkage, and hoses for breakage, wear, and clearance. If any, repair it.

b2. Check of hydraulic equipment, hydraulic tank, hoses and joints for oil leakage

Check and repair any oil leaks.

b7. Bleeding air

For the bleeding air from the fuel system, see Testing and adjusting, "Bleeding air from fuel circuit".)

For the bleeding air from the hydraulic system, see Testing and adjusting, "Bleeding air from each part".)

c16. Check and clean rearview camera

Check the rearview camera for failure. If any, repair it.

d1. Check of wheels (tires, axles) for abnormality, wear, looseness of bolts, and oil leakage

If any abnormality is found, repair it.

d2. Check of handrails and steps for abnormality and looseness of bolts

If any abnormality is found, repair it and tighten any loose bolts.

d3. Check and clean rearview mirrors

Check rearview mirror for abnormality. If any, repair it.

Clean the mirror surface and adjust the mirror angle so that the rear of the machine can be seen from the operator's seat.

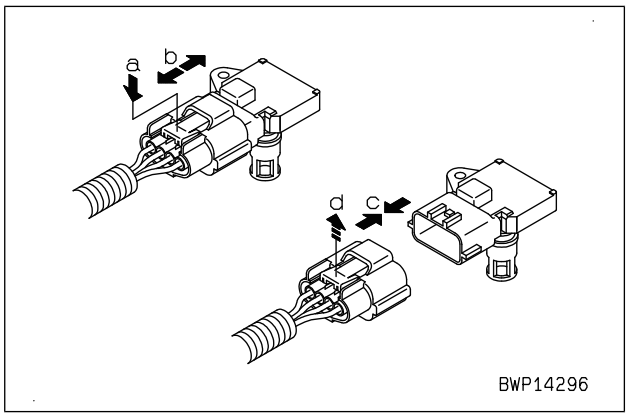
e1. Check of gauges and monitors for abnormality

Check gauges and monitors in the operator's cab for abnormality. If any, replace it with new one.

Clean up the surfaces.

e2. Check of seat belt and mounting hardware

Check hook, lock and hook mounting part for damage. If any, repair it.



★ Removal and installation of sensor body

Since a torque wrench is necessary when removing and installing the charge (boost) pressure and temperature sensor, see "Tools for testing, adjusting, and troubleshooting".

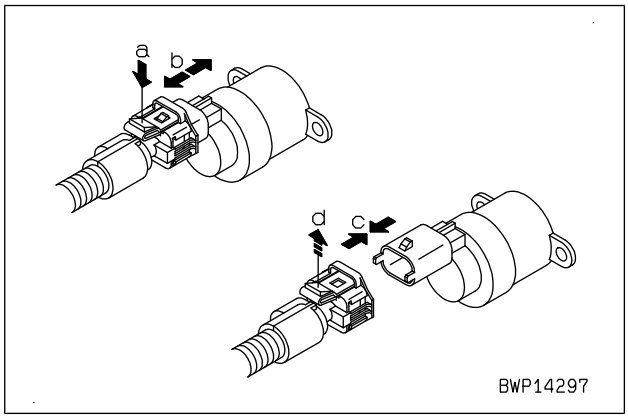
3) Supply pump IMV solenoid (INLET METERING VALVE)

★ Disconnection and connection of connectors

Since connectors of the supply pump IMV have a special lock mechanism, disconnect them in the order of (a) and (b) and connect them in the order of (c) and (d) as shown in the following figure.

Disconnection: (a) Unlock and (b) disconnect the connectors.

Connection: (c) Connect the connectors and (d) engage the lock.



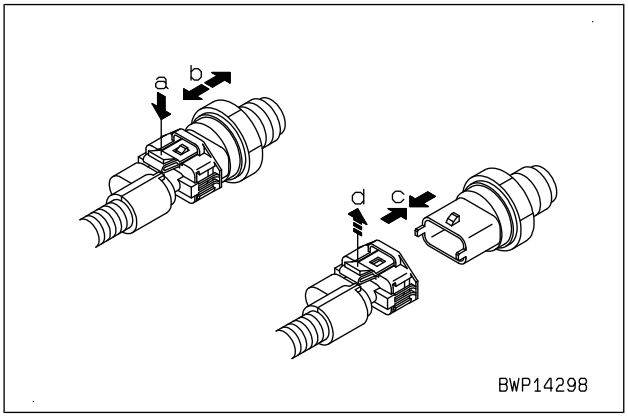
4) Common rail pressure sensor (FUEL RAIL PRESS)

★ Disconnection and connection of connectors

Since the connectors of common rail pressure sensor have a special lock mechanism, disconnect them in the order of (a) to (b), and connect them in the order of (c) to (d) as shown in the following figure.

Disconnection: (a) Unlock and (b) disconnect the connectors.

Connection: (c) Connect the connectors and (d) engage the lock.

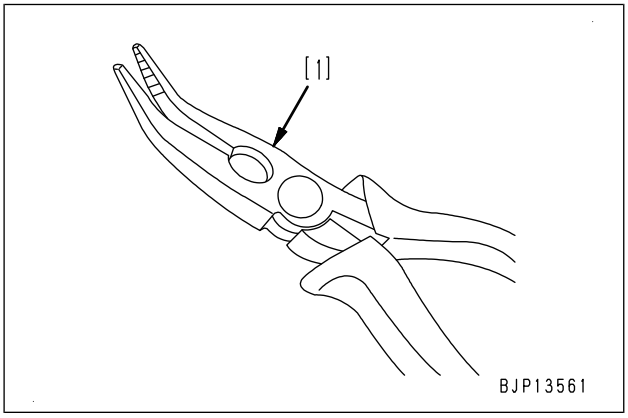


★ Precautions for disconnection of connectors

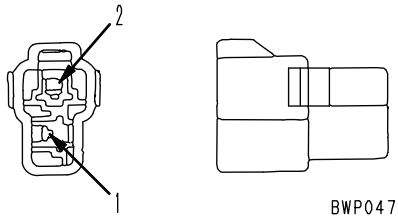
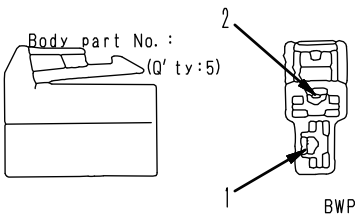
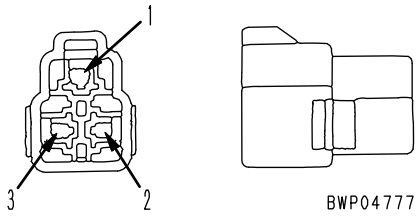
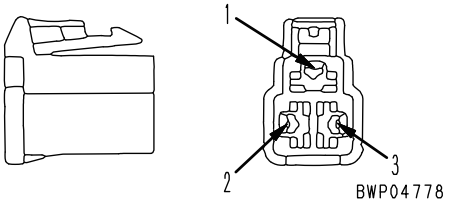
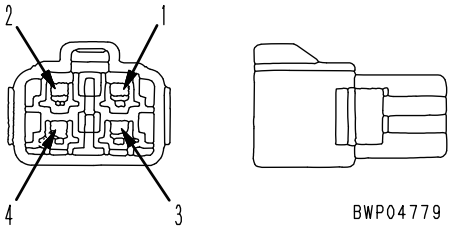
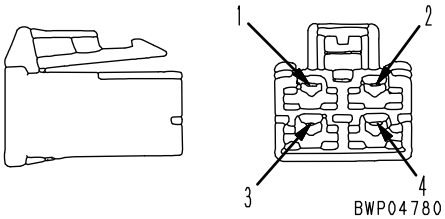
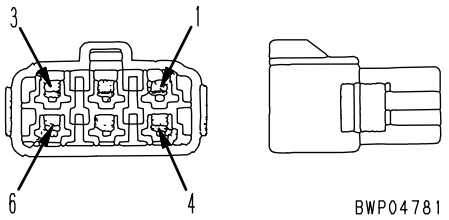
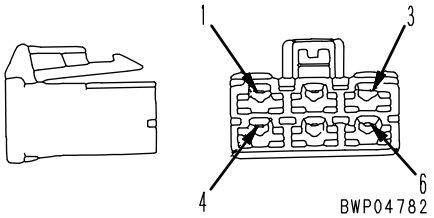
The direction of the lock for connector may be changed toward the difficult direction (facing to the bottom or to the engine side) for unlocking depending on the position where the sensor is screwed in.

In such a case, turn the lock to the direction (a) by using a tool such as needle nose pliers with curved tip (commercially available) [1], then the lock can be released easily.

Since the lock is canceled with "click" sound, listen to the sound and disconnect the connectors.



Connector No.	Connector type	Number of pins	Equipment name	Address
T15A	DT	2	Diode	AH-8
T18	DT	2	Parking brake pressure switch	AH-8
T19	DT	2	Work equipment lock solenoid	AE-4
T19A	DT	2	Diode	AE-8
TEL	DT	12	Intermediate connector	Q-9
TEMP	FRAMATOME	2	KDOC inlet temperature sensor	AO-9
TEMP1	FRAMATOME	2	KDPF outlet temperature sensor	AO-9
TEMP3	FRAMATOME	2	KDPF outlet temperature sensor	AO-9
TERMINATOR PORT	DT	3	CAN terminating resistor	AO-1
TOOL PORT	DT	3	CAN_C	AL-1
VGT-SOL	DT	3	KVGT actuator	AL-9
VGT REV	AMP	3	KVGT speed sensor	AL-9

No. of pins	KES 1 (Automobile) connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
2			—
	Part No. : 08027-10210 (Natural color) 08027-10220 (Black)	Part No. : 08027-10260 (Natural color) 08027-10270 (Black)	
3			—
	Part No. : 08027-10310	Part No. : 08027-10360	
4			—
	Part No. : 08027-10410 (Natural color) 08027-10420 (Black)	Part No. : 08027-10460 (Natural color) 08027-10470 (Black)	
6			—
	Part No. : 08027-10610 (Natural color) 08027-10620 (Black)	Part No. : 08027-10660 (Natural color) 08027-10670 (Black)	

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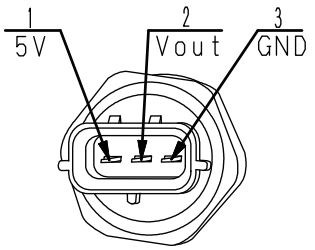
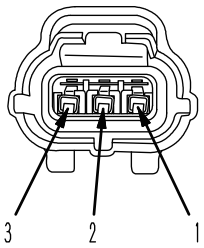
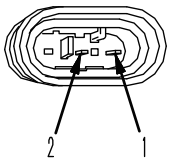
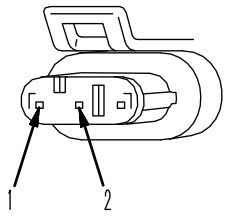
AMP connelor for engine

No. of pins	Common rail (fuel) pressure sensor (95, 125, 140 engine)		
	Sensor side (plue)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-9420 (T-adapter) (kit:799-601 -4101) (kit:799-601 -4201)
	—	—	

No. of pins	Turbocharger speed sensor (107, 114 engine)		
	Sensor side (plue)	Harness side (receptacle)	
3			799-601-4660 (Socket) (kit:799-A65 -4600)
	☆ Without pin (3)	☆ Without pin (3)	

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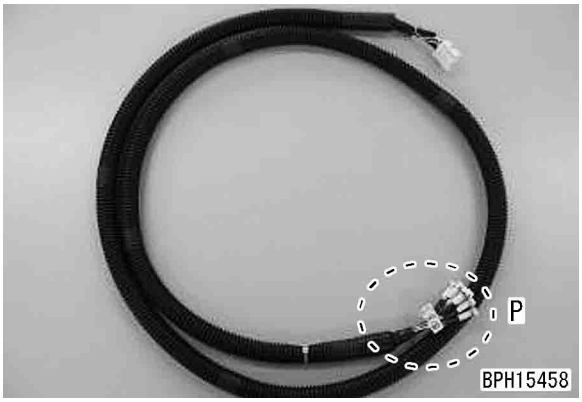
- Cut off the wiring harness at the connector (having no crimped portion), install a heat shrink tube to each cable to prevent short circuit, and then install a check pin to each cable.

Finished harness checker



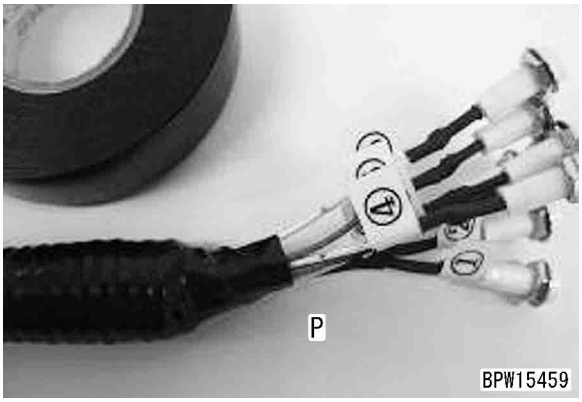
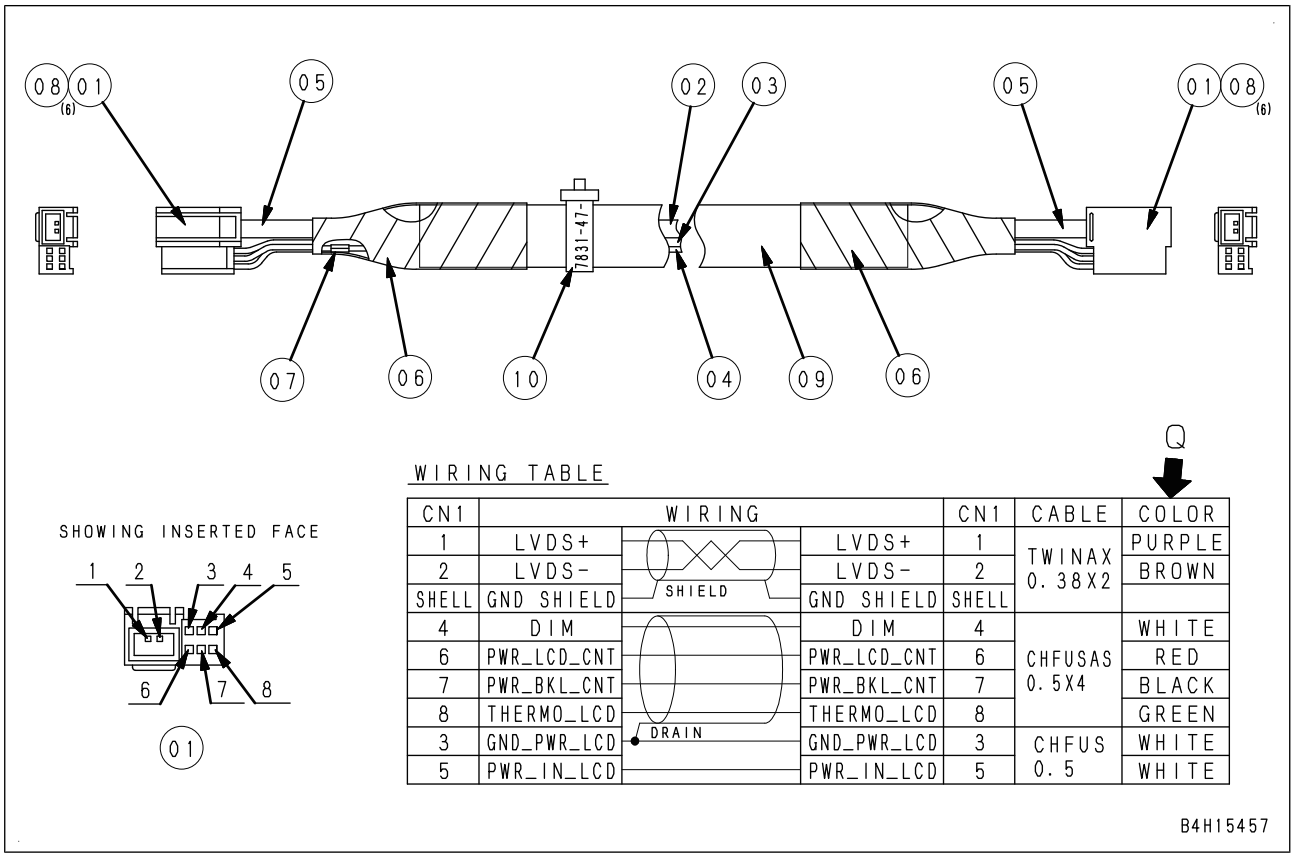


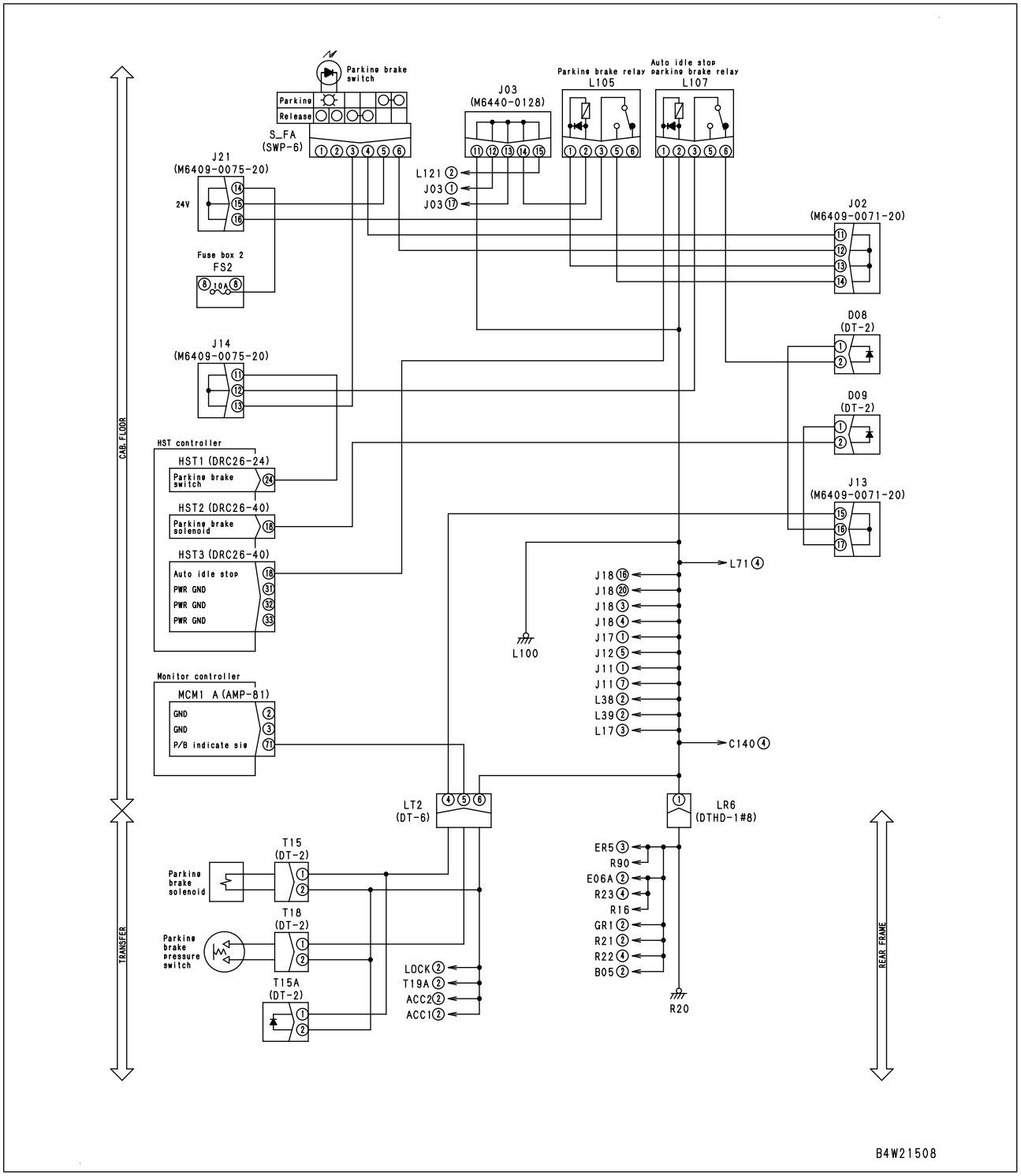
Fig. 1 Mass-produced harness between machine monitor LCD unit and monitor controller: 7831-47-8710

★ Determine the pin number of each check pin by checking the cable color indicated at portion Q in the figure or by checking the number of pin on the opposite side to which the cable is connected.



CN1	WIRING			CN1	CABLE	COLOR
1	LVDS+		LVDS+	1	TWINAX 0.38X2	PURPLE
2	LVDS-		LVDS-	2		BROWN
SHELL	GND SHIELD	SHIELD	GND SHIELD	SHELL		
4	DIM		DIM	4		WHITE
6	PWR_LCD_CNT		PWR_LCD_CNT	6	CHFUSAS 0.5X4	RED
7	PWR_BKL_CNT		PWR_BKL_CNT	7		BLACK
8	THERMO_LCD		THERMO_LCD	8		GREEN
3	GND_PWR_LCD	DRAIN	GND_PWR_LCD	3	CHFUS 0.5	WHITE
5	PWR_IN_LCD		PWR_IN_LCD	5		WHITE

Circuit diagram related to parking brake



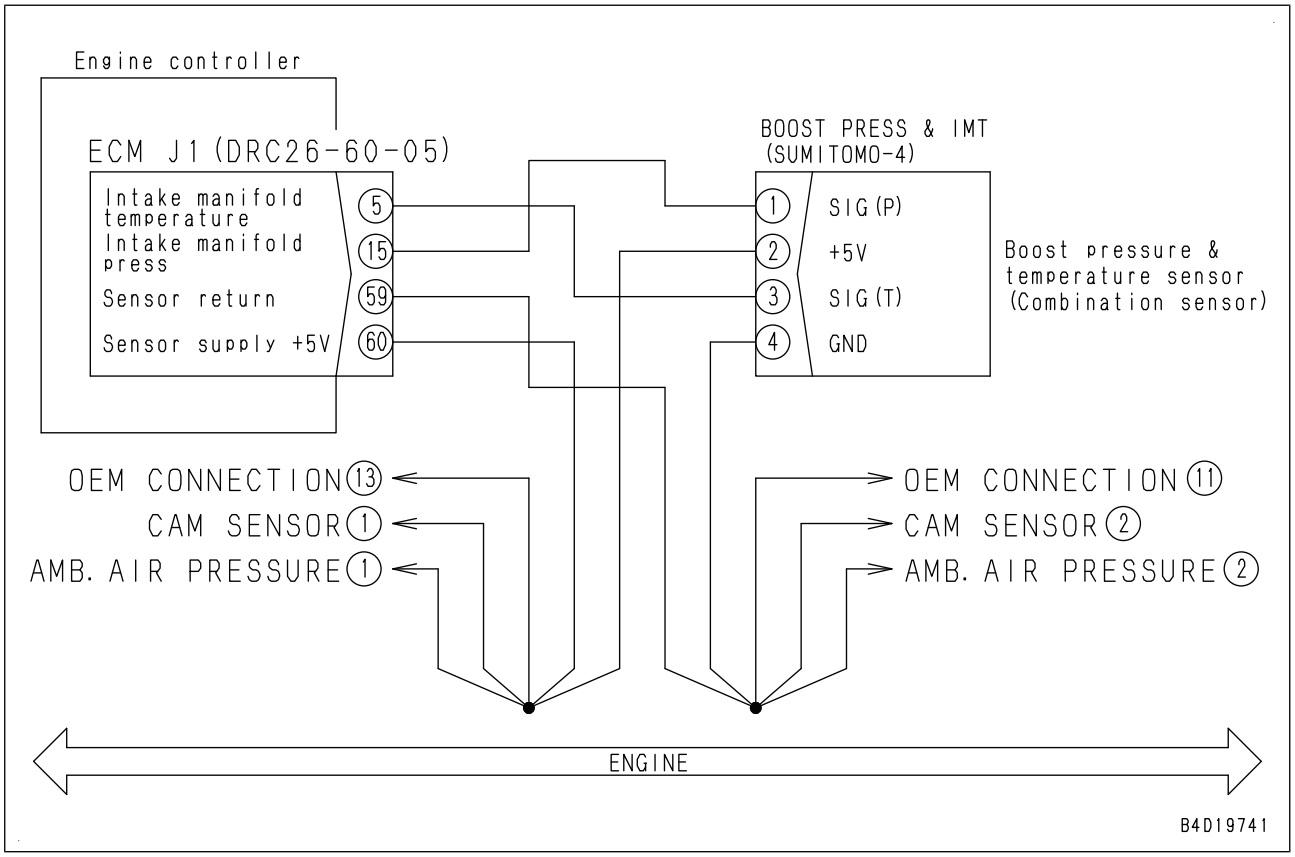
Failure code [879CKB] Ventilating Sensor Short Circuit *(WA380_7-879CKB-441-A-Z0-A)*

See "Failure code [879CKB] Ventilating Sensor Short Circuit" in chapter 80 of "Others".

★ The ventilating sensor means the evaporator temperature sensor.

*: See "Troubleshooting method for open circuit in wiring harness of pressure sensor system" of "General information on troubleshooting".

Circuit diagram related to boost pressure sensor



Failure code [CA234] Eng Overspeed *(PC400-CA234-400-A-Z0-A)*

Action level	Failure code	Failure	Engine Overspeed (Engine controller system)
L02	CA234		
Detail of failure	• Engine speed exceeds its operating range.		
Action of controller	• Regulates fuel injection rate so that engine speed lowers within operating range.		
Problem on machine	• Engine speed fluctuates.		
Related information	• Engine speed can be checked with monitoring function. (Code: 01002 (rpm)) • Method of reproducing failure code: Start engine and run at high idle.		

No.	Cause	Procedure, measuring location, criteria, and remarks
1	Improper fuel is used.	Fuel used may be improper. Check it.
2	Defective relevant system	If other failure codes are also displayed, perform troubleshooting for them.
3	Improper machine usage	Method of using machine may be improper, so instruct operator on how to use machine properly.
4	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 [CA343] ECM Critical Internal Failure *(PC400-CA343-400-A-Z0-A)*

Action level	Failure code	Failure	ECM Critical Internal Failure
L04	CA343		(Engine controller system)
Detail of failure	• Engine controller has internal defect.		
Action of controller	• None in particular		
Problem on machine	• Engine continues to run normally, but it may stop during running or may not be able to start if it is stopped.		
Related information	• Power supply voltage of engine controller can be checked with monitoring function. (Code: 03203) • Method of reproducing failure code: Turn starting switch to ON position		

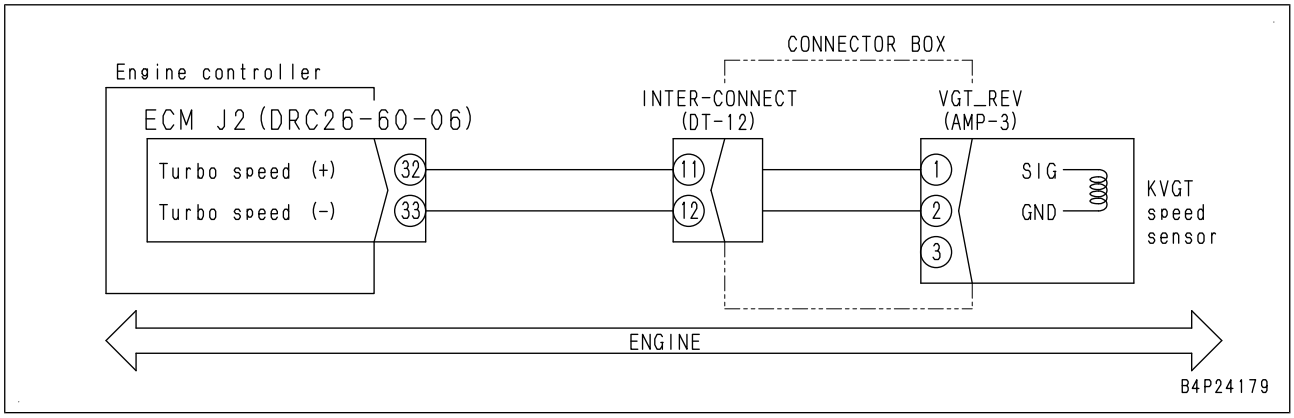
No.	Cause	Procedure, measuring location, criteria and remarks
1	Defective engine controller system	Perform troubleshooting for failure code [CA441].

Failure code [CA441] Battery Voltage Low Error *(WA320_7-CA441-400-A-Z0-A)*

Action level	Failure code	Failure	Battery Voltage Low Error (Engine controller system)
L04	CA441		
Detail of failure	• Low voltage occurs in engine controller power supply circuit.		
Action of controller	• Sets power supply voltage to fixed value (24 V) and runs engine.		
Problem on machine	• Engine continues to run normally, but it may stop during running or may not be able to restart if it is stopped.		
Related information	• Power supply voltage of engine controller can be checked with monitoring function. (Code: 03203 Battery voltage) • Method of reproducing failure code: Turn starting switch to ON position • Since T-adapter is not provided for alternator connector, operating voltage cannot be measured. • 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	Loose or corroded battery terminal	Battery terminal may be loose or corroded. Check it directly.		
2	Loose terminal or partial open circuit at terminal	1. Turn starting switch to OFF position.		
		Check terminals of alternator, battery relay, ground (E14, E15, R20), etc.		
3	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "Related information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code is not displayed, wiring harness connector is defective. ★ If this failure code is displayed, perform following checks.		
4	Improper battery voltage	1. Turn starting switch to OFF position, then perform troubleshooting. 2. Measure voltage while cranking engine.		
		Voltage	Between battery terminals (+) and (-).	20 to 30 V
5	Defective alternator	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector TEL. 3. Start engine. (Engine speed: Middle or faster)		
		Voltage	Between TEL (5) and ground	26 to 30.5 V
6	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.) • Reference 1. Turn starting switch to OFF position, and set battery disconnect switch to OFF position. 2. Insert T-adapter into EC3. 3. Set battery disconnect switch to ON position. 4. Measure voltage with starting switch at OFF position and when starting engine.		
		Voltage	Between EC3 (1) and (21)	20 to 30 V
			Between EC3 (2) and (22)	20 to 30 V
			Between EC3 (11) and (31)	20 to 30 V
			Between EC3 (12) and (32)	20 to 30 V

Circuit diagram related to turbocharger speed sensor



Failure code [CA1691] Regeneration Ineffective *(D65-CA1691-400-A-Z0-A)*

Action level	Failure code	Failure	Regeneration Ineffective (Engine controller system)
L03	CA1691		
Detail of failure	• Efficiency (catalyst action) of KDOC is degraded (During regeneration, normal KDOC inlet temperature is approximately 250 to 400°C and normal KDOC outlet temperature is approximately 450 to 550°C. KDOC outlet temperature does not increase to normal range to burn the soot in KCSF.)		
Action of controller	• Closes EGR valve. • Limits engine output and runs engine. • Stops KDPF regeneration control.		
Problem on machine	• Engine output lowers.		
Related information	⚠ **Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.** • Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) • Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) • Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) • Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) • Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) • Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) • KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature when engine is at idle (KDPF regeneration is not executed) are approximately 100 to 250°C, and difference between these temperatures is approximately 10°C. (KDOC inlet temperature > KDOC outlet temperature > KDPF outlet temperature) • During manual stationary regeneration (normal mode), KDOC inlet temperature is approximately 250 to 400°C, and KDOC outlet temperature and KDPF outlet temperature are both approximately 450 to 550°C. • When manual stationary regeneration without injecting dosing fuel (KDOC drying) is in progress, KDOC inlet temperature, KDOC outlet temperature, and KDPF outlet temperature are all approximately 250 to 400°C. • KDOC inlet temperature sensor connector label "TEMP1" expressed in black embossed letters is seen on KDPF temperature sensor consolidating box (KDOC outlet temperature sensor connector label "TEMP2" and KDPF outlet temperature sensor connector label "TEMP3" are shown similarly to "TEMP1"). ★ When KDOC in KDPF is changed, perform reset procedure for KDOC change and then finish repair. • How to perform regeneration for service ★ When soot accumulation is at level 3 or lower, the manual stationary regeneration can be performed only from "Regeneration for Service". 1. Start the engine. 2. Make sure that machine is in safe condition. 3. From service menu of machine monitor, select "Diagnostic Tests", open "02 Regeneration for Service", and then perform "Manual Stationary Regeneration (manual stationary regeneration will be completed in approximately 40 minutes). ★ Failure code [CA2637] may be displayed at the same time, however, perform troubleshooting for this failure code. • Method of reproducing failure code: When KDOC is changed, there is no need to check completion of repair. When KDOC is not changed, start engine and turn manual stationary regeneration switch ON. (See cause 6.)		

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

Failure code [CA2288] Turbo Speed High Error 1 *(D65-CA2288-400-A-Z0-A)*

Action level	Failure code	Failure	Turbocharger Speed High Error 1 (Engine controller system)
L01	CA2288		
Detail of failure	• Turbocharger runs at abnormally high speed.		
Action of controller	• Restricts engine output and allows engine to run.		
Problem on machine	• Engine output lowers.		
Related information	• Speed sensed by turbocharger speed sensor can be checked with monitoring function. (Code: 48100 (rpm)) • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks
1	Increased turbocharger speed	Turbocharger speed may increase abnormally high. Check it.
2	Defective turbocharger	Turbocharger may be defective. Check it.
3	Defective turbocharger speed sensor	If no failure is found by check on cause 1, turbocharger speed sensor system may be defective. Perform troubleshooting for failure code [CA687].

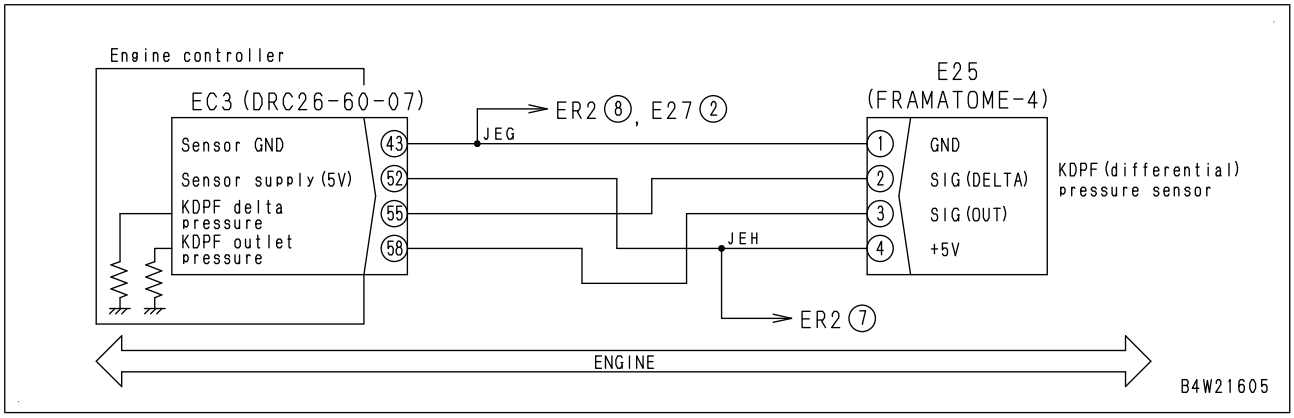
Failure code [CA2383] KVGT Solenoid Open Error *(D65-CA2383-400-A-Z0-A)*

Action level	Failure code	Failure	KVGT Solenoid Open Error (Engine controller system)
L03	CA2383		
Detail of failure	• Open circuit is detected in KVGT solenoid drive circuit.		
Action of controller	• Closes EGR valve. • Limits engine output and runs engine. • Stops KDPF regeneration control.		
Problem on machine	• Engine output lowers.		
Related information	• Signal current to KVGT solenoid can be checked with monitoring function. (Code: 48800 (mA)) • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria and remarks		
1	Defective harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check it. 2. Turn starting switch to ON position.		
		If this failure code disappears, harness connector is defective. ★ If this failure code appears, perform following checks.		
2	Defective KVGT solenoid (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector VGT-SOL and connect T-adapters to male side.		
		Resistance	Between VGT-SOL (male) (1) and (2)	5 to 10 Ω
3	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ECM J2 and connect T-adapters to female side. ★ To measure resistance of KVGT valve solenoid		
		Resistance	Between ECM J2 (female) (10) and (20)	5 to 10 Ω
4	Ground fault in wiring harness (contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ECM J2 and VGT-SOL, and connect T-adapters to either female side.		
		Resistance	Between ground and ECM J2 (female) (10) or VGT-SOL (female) (1)	Min. 100 kΩ
5	Open circuit in connector box (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 VGT-SOL and INTER-CONNECT, and connect T-adapters to INRER-CONNECT male side and VGT-SOL female side.		
		Resistance	Between INTER-CONNECT (male) (6) and VGT-SOL (female) (1)	Max. 10 Ω
			Between INTER-CONNECT (male) (7) and VGT-SOL (female) (2)	Max. 10 Ω
6	Ground fault in connector box (contact with ground circuit)	★ If no failure is found by check on cause 4, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors VGT-SOL and INTER-CONNECT, and connect T-adapters to INRER-CONNECT male side or VGT-SOL female side.		
		Resistance	Between INTER-CONNECT (male) (6) or VGT-SOL (female) (1), and ground.	Min. 100 kΩ

No.	Cause	Procedure, measuring location, criteria, and remarks		
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and E25, and connect T-adapter to female side of EC3. ★ Check by using multimeter in continuity mode.		
		Continuity	Between EC3 (female) (58) and each pin other than pin (58)	No continuity (No sound is heard.)
6	Defective KDPF outlet pressure sensor	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector E25. 3. Turn starting switch to ON position.		
		Voltage	Between E25 (3) and (1)	0.5 to 4.5 V
7	Defective engine controller	1. Turn starting switch to ON position.		
		If this failure code is displayed and no failure is found by above checks, engine controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to KDPF outlet pressure sensor



Failure code [CA3311] KDOC Outlet Temp High Error 2 *(WA320_7-CA3311-400-A-Z0-A)*

Action level	Failure code	Failure	KDOC Outlet Temperature High Error 2 (Engine controller system)
L03	CA3311		
Detail of failure	• KDOC outlet temperature remains extremely high relative to KDOC inlet temperature.		
Action of controller	• Closes EGR valve. • Limits engine output and runs engine. • Stops KDPF regeneration control. ★ Above measures can be canceled by "turning starting switch to OFF position once, then turning starting switch to ON position" after failure code is generated.		
Problem on machine	• Engine output reduces.		
Related information	⚠ **Since KDPF and KDOC are heated to 500°C or above, take care not to get burn injury.** • Signal voltage from KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47301 (V)) • Temperature sensed by KDOC inlet temperature sensor can be checked with monitoring function. (Code: 47300 (°C)) • Signal voltage from KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47401 (V)) • Temperature sensed by KDOC outlet temperature sensor can be checked with monitoring function. (Code: 47400 (°C)) • Signal voltage from KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47201 (V)) • Temperature sensed by KDPF outlet temperature sensor can be checked with monitoring function. (Code: 47200 (°C)) • As to procedure for accessing KDPF temperature sensor, see 50 Disassembly and assembly, "Removal and installation of KDPF assembly" and "Disassembly and assembly of KDPF assembly". • Engine controller stops approximately 30 seconds after starting switch is turned to OFF position. So when you restart engine, wait 1 minute or more before turning starting switch to ON position again.		
Machine operation for clearing failure code	• When this failure code appears, perform troubleshooting according to the following work flow. A. Identification of cause and repair ↓ C. Machine operation for confirming completion of repair ★ This failure code disappears when starting switch is turned from OFF position to ON position after repair. However, following machine operation must be done to confirm completion of repair.		

A. Identification of cause and repair

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective KDOC outlet temperature sensor	If failure code [CA3316], [CA3317], or [CA3318] appears, perform troubleshooting for [CA3316], [CA3317] or [CA3318] first.		
2	Defective wiring harness connector	1. See descriptions of wiring harness and connectors in "c: Electrical equipment" in "Checks before troubleshooting" of "Related information on troubleshooting", and check it and repair as needed.		
3	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors EC3 and TEMP2 (KDOC outlet temperature sensor), and connect T-adapter 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)

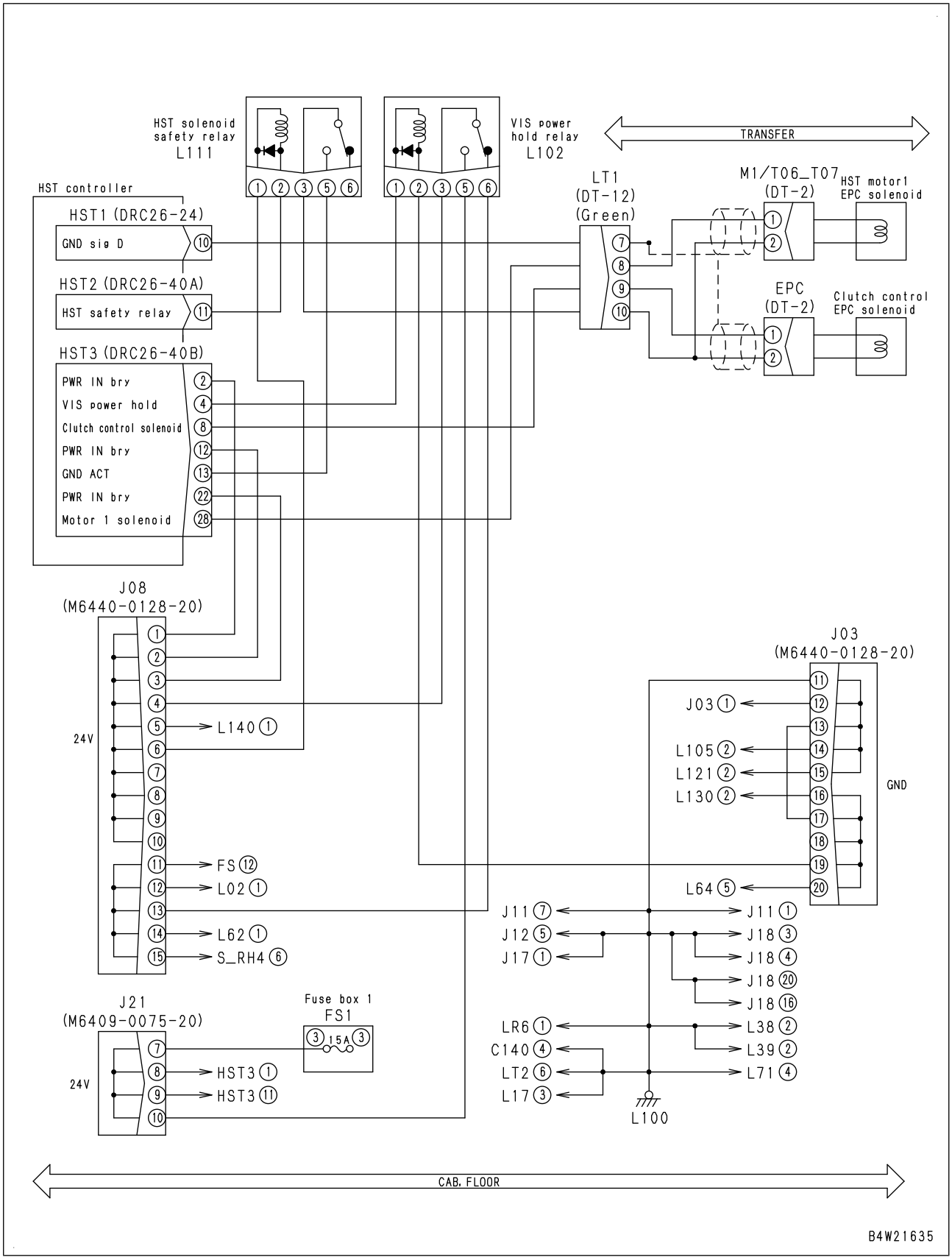
<table>
<tr><th>No.</th><th>Cause</th><th colspan="4">Procedure, measuring location, criteria, and remarks</th></tr>
<tr><td rowspan="8"></td><td rowspan="8"></td><td colspan="4">★ If this failure code remains displayed, wiring harness or engine controller is defective.</td></tr>
<tr><td colspan="4">• Reference
1. Turn starting switch to OFF position.
2. Disconnect connector TEMP2 and connect T-adapter to female side.</td></tr>
<tr><td rowspan="6">Resistance</td><td rowspan="6">Between TEMP2 (female) (1) and (2)
★ Temperature-Resistance characteristics</td><td>-10°C</td><td>33 to 65 kΩ</td></tr>
<tr><td>0°C</td><td>25 to 47 kΩ</td></tr>
<tr><td>50°C</td><td>7.8 to 12.2 kΩ</td></tr>
<tr><td>100°C</td><td>3.2 to 4.5 kΩ</td></tr>
<tr><td>400°C</td><td>200 to 240 Ω</td></tr>
<tr><td>700°C</td><td>64 to 69 Ω</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Open or short circuit in wiring harness
(Including wiring harness in KDPF temperature sensor consolidating box)</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect connectors EC3 and connect T-adapter to female side.</td></tr>
<tr><td>Resistance</td><td colspan="2">Between EC3 (48) and (43)
★ Use temperature-resistance characteristics table shown above.</td><td>64 Ω to 65 kΩ</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Open circuit in wiring harness
(Wire breakage or defective contact of connector)
(Including wiring harness in KDPF temperature sensor consolidating box)</td><td colspan="4">★ 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 EC3 and TEMP2, and connect T-adapters to female side of EC3 and male side of TEMP2.</td></tr>
<tr><td rowspan="2">Resistance</td><td colspan="2">Between EC3 (female) (48) and TEMP2 (male) (1)</td><td>Max. 10 Ω</td></tr>
<tr><td colspan="2">Between EC3 (female) (43) and TEMP2 (male) (2)</td><td>Max. 10 Ω</td></tr>
<tr><td rowspan="3">5</td><td rowspan="3">Short circuit in wiring harness
(Including wiring harness in KDPF temperature sensor consolidating box)</td><td colspan="4">1. Turn starting switch to OFF position.
2. Disconnect connectors EC3 and TEMP2, and connect T-adapter to female side of EC3.
★ Check by using multimeter in continuity mode.</td></tr>
<tr><td>Continuity</td><td colspan="2">Between EC3 (female) (48) and each pin other than pin (48)</td><td>No continuity
(No sound is heard.)</td></tr>
<tr><td></td></tr>
<tr><td rowspan="4">6</td><td rowspan="4">Defective KDPF temperature sensor consolidating box</td><td colspan="4">★ If no failure is found by checks on causes 3 to 5, this check is not required.
1. Turn starting switch to OFF position.
2. Disconnect connector E27 and connect T-adapter to male side.
3. Disconnect connectors TEMP1, TEMP2, and TEMP3, and connect T-adapter to male side of TEMP2.</td></tr>
<tr><td rowspan="3">Resistance</td><td colspan="2">★ If no failure is found by check on cause 3 or 4, this check is not required.
Between E27 (male) (2) and TEMP2 (male) (2)</td><td>Max. 10 Ω</td></tr>
<tr><td colspan="2">★ If no failure is found by check on cause 3 or 4, this check is not required.
Between E27 (male) (1) and TEMP2 (male) (1)</td><td>Max. 10 Ω</td></tr>
<tr><td colspan="2">★ If no failure is found by check on cause 5, this check is not required.
Between E27 (male) (1) and each pin other than pin (1)</td><td>Min. 100 kΩ</td></tr>
</table>

Failure code [CA3741] Rail Press Valve Trip Error *(D65-CA3741-400-A-Z0-A)*

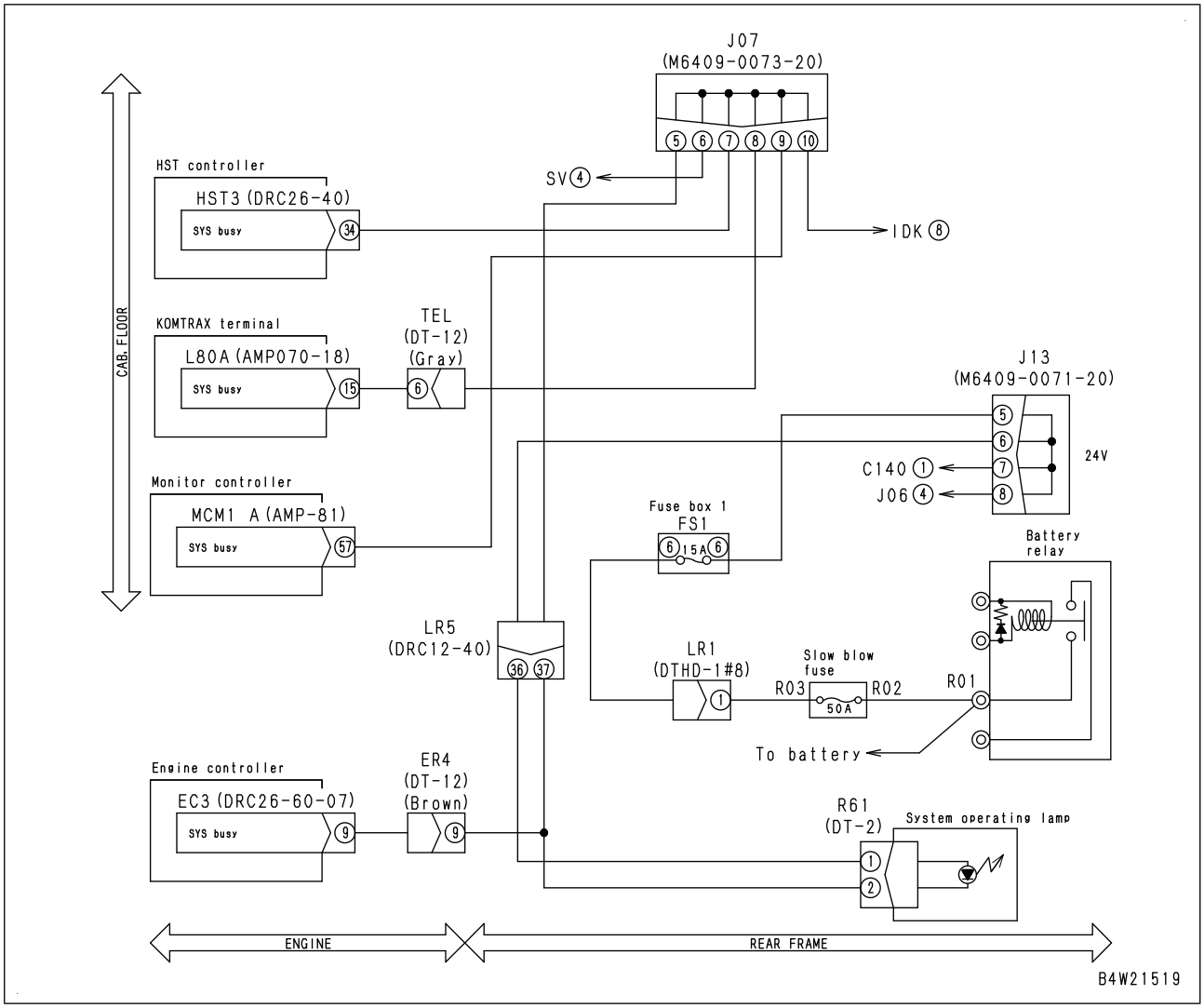
Action level	Failure code	Failure	Rail Pressure Valve Trip Error (Engine controller system)
L03	**CA3741**		
Detail of failure	• Engine controller determines that common rail pressure limiter valve opens.		
Action of controller	• Lowers indication of common rail pressure. • Limits engine output and runs engine.		
Problem on machine	• Engine output lowers. Engine may not start again.		
Related information	• Signal voltage from common rail pressure sensor can be checked with monitoring function. (Code: 36401 (V)) • 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.		

No.	Cause	Procedure, measuring location, criteria, and remarks
1	Common rail pressure limiter valve is open.	Perform troubleshooting for failure code [**CA449**].

Circuit diagram related to HST safety relay



Circuit diagram related to system operating lamp



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria, and remarks</th></tr>
<tr><td rowspan="4">5</td><td rowspan="4">Ground fault in wiring harness
(Contact with ground circuit)</td><td colspan="3">★ If slow-blow fuse is blown, replace it in advance.
1. Turn the battery disconnect switch to OFF position.
2. Turn starting switch to OFF position.
3. Remove all fuses in fuse box 2.
4. Disconnect connector HST3, and connect T-adapter to female side.</td></tr>
<tr><td rowspan="2">Resistance</td><td>Between battery (-) terminal and ground</td><td>Min. 1 MΩ</td></tr>
<tr><td>Between ground and HST3 (female) (1) or (11)</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="2">6</td><td rowspan="2">Defective HST controller</td><td colspan="3">1. Turn starting switch to OFF position.
2. Turn the battery disconnect switch to OFF position.
3. Insert T-adapter into connector HST3.
4. Turn battery disconnect switch to ON position.
5. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between HST3 (1) and each of (21), (31), (32), and (33), and between HST3 (11) and each of (21), (31), (32), and (33)</td><td>20 to 30 V</td></tr>
</table>

Failure code [DAJLKB] Operating Lamp Short Circuit (HST) *(WA320_7-DAJLKB-400-A-Z0-A)*

Action level	Failure code	Failure	Operating Lamp Short Circuit (HST)
—	DAJLKB		(HST controller system)
Detail of failure	• HST controller determines that output circuit to system operating lamp shorts because voltage of output circuit does not become Low level while HST controller drives system operating lamp.		
Action of controller	• Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	• When controller drives system operating lamp, large current may flow through circuit causing burnout of controller. • System operating lamp may not light up while controller is performing end processing ★ While controller is performing end processing, if battery disconnect switch is set to OFF position, fan stops suddenly and may be damaged. In addition, initial learning data are not saved resulting in increased shifting shocks.		
Related information	• Method of reproducing failure code: Turn starting switch to ON position. • Although KOMTRAX terminal is not able to light up system operating lamp, no trouble will result unless battery disconnect switch is turned to OFF position. • When controller lights up system operating lamp, output circuit voltage is at low level. ★ Since the voltage between pin (2) of female side and ground becomes 20 V or above after turning starting switch to ON position when connector R61 is open, the check of hot short circuit cannot be performed.		

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Remove fuse-6 in fuse box 1. 4. Disconnect connectors MCM1 A, HST3, L80A, EC3, R61, and connect T-adapter to female side of R61.		
		Resistance	Between R61 (female) (1) and (2)	Min. 1 MΩ
		1. Turn starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Disconnect connector R61. 4. Disconnect connectors MCM1 A, HST3, L80A, and EC3, and connect T-adapters to each female side.		
		Continuity	Between HST3 (female) (34) and each pin other than pin (34)	No continuity
			Between L80A (female) (15) and each pin other than pin (15)	No continuity
			Between MCM1 A (female) (57) and each pin other than pin (57)	No continuity
			Between EC3 (female) (9) and each pin other than pin (9)	No continuity
2	Defective HST controller	If no failure is found by above checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Failure code [DDB2L4] Stop Lamp Switch Signal Malfunction *(WA320_7-DDB2L4-400-A-Z0-A)*

Action level	Failure code	Failure	Stop Lamp Switch Signal Malfunction
L01	DDB2L4		(HST controller system)
Detail of failure	• Disagreement between input (ON/OFF) from stop lamp switch and voltage of inching pedal angle sensor is detected.		
Action of controller	• None in particular		
Problem on machine	• Stop lamps may not light up when brake pedal is depressed, or stop lamps may light up when brake pedal is not depressed.		
Related information	• Input voltage from inching pedal sensor can be checked with monitoring function. (Code: 44107) • Stroke of inching pedal can be checked with monitoring function. (Code: 44108) • Input (ON/OFF) from stop lamp switch can be checked with monitoring function. (Code: 02228) • When inching sensor voltage ≧ 4.1 V, input from stop lamp switch is ON (when normal). • When inching sensor voltage ≦ 1.2 V, input from stop lamp switch is OFF (when normal). ★ Since the voltage between pin (2) of female side and ground becomes 20 V or above after turning starting switch to ON position when connector L09 is open, the check of hot short circuit cannot be performed.		

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective inching pedal angle sensor system	When failure code [DK70KA] or [DK70KY] is displayed, perform troubleshooting for [DK70KA] or [DK70KY] first.			
2	Defective stop lamp switch (Internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector L09, and connect T-adapter to male side.			
		Resistance	Between L09 (female) (1) and (2)	Brake: Fully depressed	Max. 1 Ω
				Brake: Released	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 HST1 and L09, and connect T-adapter to each female side.			
		Resistance	Between HST1 (female) (18) and L09 (female) (2)		Max. 1 Ω
4	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors HST1 and L09, and connect T-adapter to either female side.			
		Resistance	Between ground and HST1 (female) (18) or L09 (female) (2)		Min. 1 MΩ
5	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors HST1 and L09, and connect T-adapter to female side of HST1. 3. Turn starting switch to ON position.			
		Continuity	Between HST1 (female) (18) and each pin other than pin (18)		No continuity
6	Defective inching pedal angle sensor	If no failure is found by above checks,inching pedal angle sensor is defective.			
7	Defective HST controller	If no failure is found by above checks, HST controller is defective. (Since this is an internal defect, troubleshooting cannot be performed.)			

Failure code [DF10KA] Disconnection of Speed Range Input *(WA320_7-DF10KA-400-A-Z0-A)*

Action level	Failure code	Failure	Disconnection of Speed Range Input
L03	DF10KA		(HST controller system)
Detail of failure	• No speed range selector switch signal is input due to open circuit or ground fault in speed range selector switch signal input circuit.		
Action of controller	• Fixes speed range to that before occurrence of failure. • If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Transmission is not set to selected gear speed. • Shift lever position pilot lamp indicates shift range before occurrence of failure.		
Related information	• Input (ON/OFF) from each shift switch (speed range selector switchs 1, 2, 3, and 4) can be checked with monitoring function. (Code: 02226) • Method of reproducing failure code: Turn starting switch to ON position and operate gear speed range selector switch.		

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective operation of speed range selector switch	• Force may be applied to depress switch while speed range selector switch is not operated.			
2	Defective fuse -12 in fuse box 1	If fuse is burnt out, circuit may have ground fault, etc. (See check on Cause 5.)			
3	Defective gear speed range selector switch	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector L02. 3. Turn starting switch to ON position. 4. Operate gear speed range selector switch to perform troubleshooting.			
		Voltage	Between L02 (1) and (9)	Continuous	20 to 30 V
			Between L02 (5) and (9)	Gear speed range: 1st	20 to 30 V
				Gear speed range: Other than 1st	Max. 1 V
			Between L02 (6) and (9)	Gear speed range: 2nd	20 to 30 V
				Gear speed range: Other than 2nd	Max. 1 V
			Between L02 (7) and (9)	Gear speed range: 3rd	20 to 30 V
				Gear speed range: Other than 3rd	Max. 1 V
			Between L02 (8) and (9)	Gear speed range: 4th	20 to 30 V
				Gear speed range: Other than 4th	Max. 1 V
		If wiring harness is normal and voltage in each selected range is below standard value, power supply for gear speed range selector switch or ground circuit is defective.			
4	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Remove fuse 12 of fuse box 1. 3. Disconnect connectors HST1 and L02, and connect T-adapters to each female side.			
		Resistance	Between fuse 12 of fuse box 1 and L02 (female) (1)		Max. 1 Ω
			Between HST1 (female) (23) and L02 (female) (5)		Max. 1 Ω
			Between HST1 (female) (17) and L02 (female) (6)		Max. 1 Ω
			Between HST1 (female) (11) and L02 (female) (7)		Max. 1 Ω
			Between HST1 (female) (5) and L02 (female) (8)		Max. 1 Ω
			Between L02 (female) (9) and ground		Max. 1 Ω

Failure code [DHPCKA] Failure of Boom Press. Sensor (Bottom) *(WA320_7-DHPCKA-400-A-Z0-A)*

Action level	Failure code	Failure	Failure of Boom Pressure Sensor (Bottom) (HST controller system)
L01	DHPCKA		
Detail of failure	• Due to open circuit or ground fault in boom cylinder bottom pressure sensor system, boom cylinder oil pressure signal voltage is lower than the normal range. (Boom cylinder bottom oil pressure sensor signal voltage: Less than 0.3 V)		
Action of controller	• If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Fuel consumption increases since Komatsu SmartLoader Logic does not work. • Eco guidance function does not work normally. • Traction force during digging with auto traction can be different than usual when traction control is set.		
Related information	• Input voltage from boom cylinder bottom pressure sensor can be checked with monitoring function. (Code: 40404) • Oil pressure sensed by boom cylinder bottom pressure sensor can be checked with monitoring function. (Code: 40403) • Method of reproducing failure code: Start engine.		

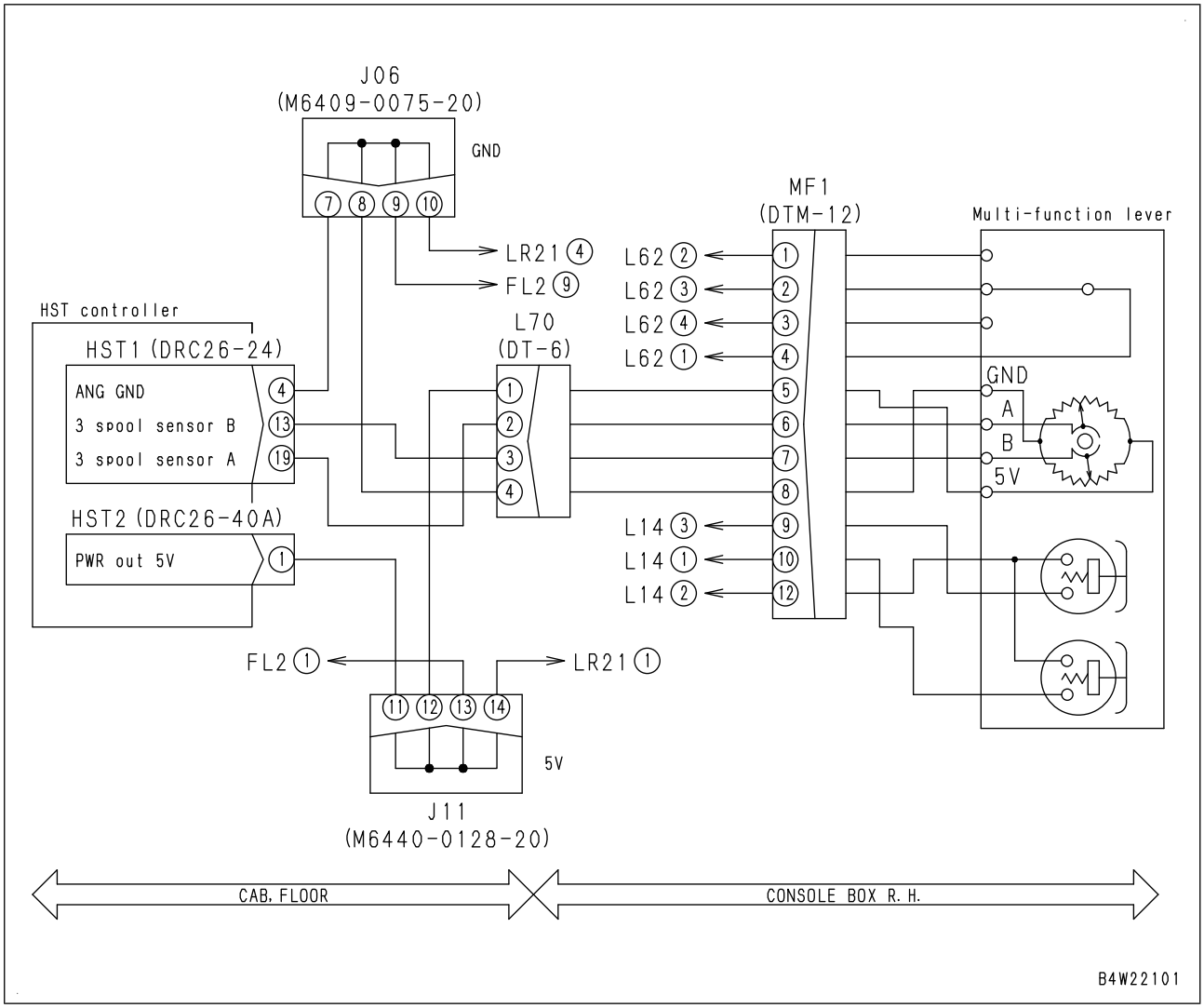
No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective power supply system of boom cylinder bottom pressure sensor	★ If failure code [DAJ6KX] is also displayed, perform troubleshooting for it first.			
		1. Turn starting switch to OFF position. 2. Disconnect connector F16, and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between F16 (female) (3) and (1)	Power supply input	4.8 to 5.2 V
2	Defective boom cylinder bottom pressure sensor (internal open or short circuit)	★ Replace sensor and check whether failure code disappears. 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector F16. 3. Start engine, and move lever to boom RAISE to perform troubleshooting.			
		Voltage	Between F16 (2) and (1)	Continuous	0.50 to 4.40 V
				Boom: At Neutral	0.50 to 0.90 V
				Boom cylinder bottom: Hydraulic relief	2.80 to 3.20 V
		Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check harness for failure, and then determine whether sensor is defective or not.			
3	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors HST1, HST2, F16, and connect T-adapters to each female side.			
		Resis-tance	★ If no failure is found by check on cause 1, this check is not required. Between HST2 (female) (1) and F16 (female) (3)		Max. 1 Ω
			Between HST2 (female) (6) and F16 (female) (2)		Max. 1 Ω
			★ If no failure is found by check on cause 1, this check is not required. Between HST1 (female) (4) and F16 (female) (1)		Max. 1 Ω

Failure code [DHSNKA] Failure of Bucket Tilt PPC Sens. Circuit *(WA320_7-DHSNKA-400-A-Z0-A)*

Action level	Failure code	Failure	Failure of Bucket Tilt PPC Sensor Circuit
L01	DHSNKA		(HST controller system)
Detail of failure	• Due to open circuit or ground fault in bucket tilt PPC pressure sensor system, bucket tilt PPC pressure signal voltage is lower than the normal range. (HST pump pressure sensor signal voltage: Max. 0.3 V)		
Action of controller	• Assumes bucket tilt PPC pressure to be 0 M, and performs operation. (assumes bucket tilt to be not operating). • If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Boom cylinder bottom pressure may exceed the allowable value according to the contents of work. • ECSS works even if bucket TILT is in operation.		
Related information	• Input voltage from bucket tilt PPC pressure sensor can be checked with monitoring function. (Code: 07801) • Oil pressure (bucket lever tilt PPC pressure) from bucket tilt PPC pressure sensor can be checked with monitoring function. (Code: 07800) • Method of reproducing failure code: Start engine.		

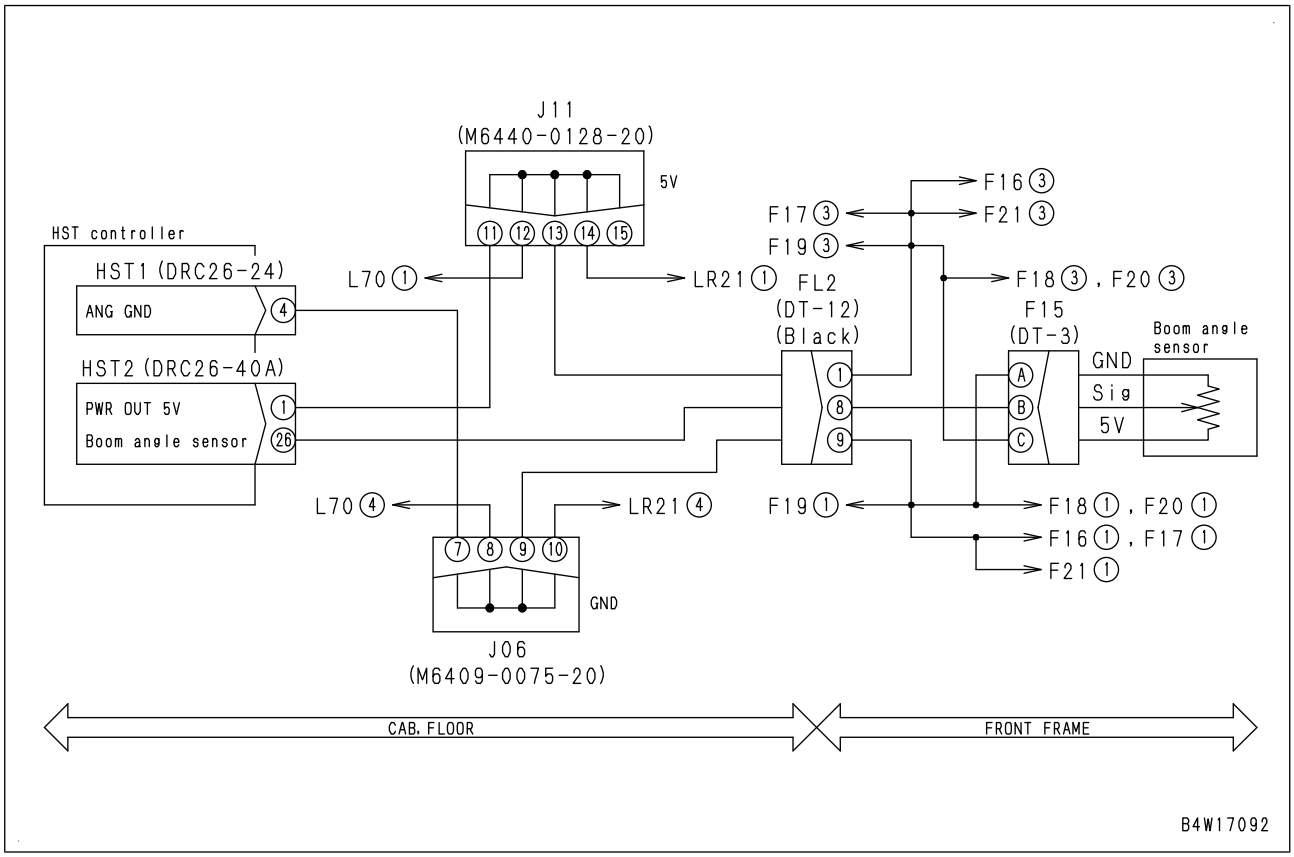
No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective power supply system of bucket tilt PPC pressure sensor	★ If failure code [DAJ6KX] is also displayed, perform troubleshooting for it first.			
		1. Turn starting switch to OFF position. 2. Disconnect connector F20, and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between F20 (female) (3) and (1)	Power supply input	4.8 to 5.2 V
2	Defective bucket tilt PPC pressure sensor (Internal open or short circuit)	★ Replace sensor and check whether failure code disappears. 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector F20. 3. Start engine.			
		Voltage	Between F20 (2) and (1)	Bucket lever: Continuous	0.50 to 4.40 V
				Bucket lever: NEUTRAL	0.50 to 0.90 V
				Bucket lever: TILT	2.80 to 3.20 V
		Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check harness for failure, and then determine whether sensor is defective or not.			
3	Open circuit in wiring harness (Wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors HST1, HST2, F20, and connect T-adapters to each female side.			
		Resistance	Between HST2 (female) (25) and F20 (female) (2)		Max. 1 Ω
			★ If no failure is found by check on cause 1, this check is not required. Between HST1 (female) (4) and F20 (female) (1)		Max. 1 Ω
			★ If no failure is found by check on cause 1, this check is not required. Between HST2 (female) (1) and F20 (female) (3)		Max. 1 Ω

Circuit diagram related to 3rd valve (PCS) potentiometer



No.	Cause	Procedure, measuring location, criteria, and remarks			
3	Defective HST controller	If no failure is found by above checks, HST controller is defective. • Reference 1. Turn starting switch to OFF position. 2. Insert T-adapters into connectors HST1 and HST2. 3. Turn starting switch to ON position. 4. Operate boom lever to perform troubleshooting.			
		Voltage	Between HST2 (26) and HST1 (4)	Continuous	1.13 to 4.02 V
				RAISE stroke end	3.52 to 4.02 V
				LOWER stroke end	1.13 to 1.63 V

Circuit diagram related to boom angle sensor



Failure code [DPQ3KR] LIN Discon (Rear View Monitor) *(WA320_7-DPQ3KR-400-A-Z0-A)*

Action level	Failure code	Failure	LIN Disconnection (Rear View Monitor)
L01	DPQ3KR		(Machine monitor system)
Detail of failure	• Update of data received from rear view monitor through LIN communication line is stopped.		
Action of controller	• If cause of failure disappears, machine becomes normal by itself.		
Problem on machine	• Various setting functions relevant to display of images from rear view camera (guide line display, reverse-interlock mode selection, guide line position adjustment, and initialization of rear view monitor) are unavailable.		
Related information	• Since signal of active LIN communication line is pulse voltage, it cannot be measured by using multimeter. • If failure codes [DPQ1KR] and [DPQ2KR] are also displayed, LIN communication line probably has ground fault or hot short circuit. • Method of reproducing failure code: Turn starting switch to ON position.		

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective fuse-4 in fuse box 1	If fuse is blown, circuit may have ground fault. (See check on cause 5.)		
2	Defective engine shutdown secondary switch system	If failure code [DDAAL6] is also displayed, perform troubleshooting for [DDAAL6] first.		
3	Defective power supply line	1. Turn starting switch to OFF position. 2. Disconnect connector RVM1, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between RVM1 (female) (1) and (2)	20 to 30 V
			Between RVM1 (female) (12) and (2)	20 to 30 V
4	Hot short circuit in wiring harness (LIN communication line) (contact with 24 V circuit)	★ If failure codes [DPQ1KR] and [DPQ2KR] are not displayed together with this failure code, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connector RVM1, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between RVM1 (female) (9) and (2)	Approx. 9 V
5	Ground fault in wiring harness (contact with ground circuit)	★ If failure codes [DPQ1KR] and [DPQ2KR] are not displayed together with this failure code, this check is not required. ★ If no failure is found by check on cause 4, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 B, MDM2, MOM1, and RVM1, and connect T-adapter to any female side.		
		Resistance	Between ground and MCM1 B (female) (108), MDM2 (female) (3), MOM1 (female) (3) or RVM1 (female) (9)	Min. 1 MΩ
6	Defective switch panel (operation switches of machine monitor)	• Perform this check when failure codes [DPQ1KR] and [DPQ2KR] are also displayed. 1. Turn starting switch to OFF position. 2. Disconnect connector RVM1. 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 [DPQ2KR] 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.		

Failure code [DW4RKA] Disconnection of Bucket EPC Sol. (Tilt) *(WA320_7-DW4RKA-400-A-Z0-A)*

Action level	Failure code	Failure	Disconnection of Bucket EPC Solenoid (Tilt) (HST controller system)
L03	DW4RKA		
Detail of failure	• Due to open circuit in signal output circuit to bucket TILT EPC solenoid, no current flows when controller drives bucket TILT EPC solenoid.		
Action of controller	• 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	• PZ auto tilt-in does not work		
Related information	• Output current value to bucket TILT EPC solenoid can be checked with monitoring function. (Code: 41922) • Method of reproducing failure code: Start engine and perform bucket TILT operation.		

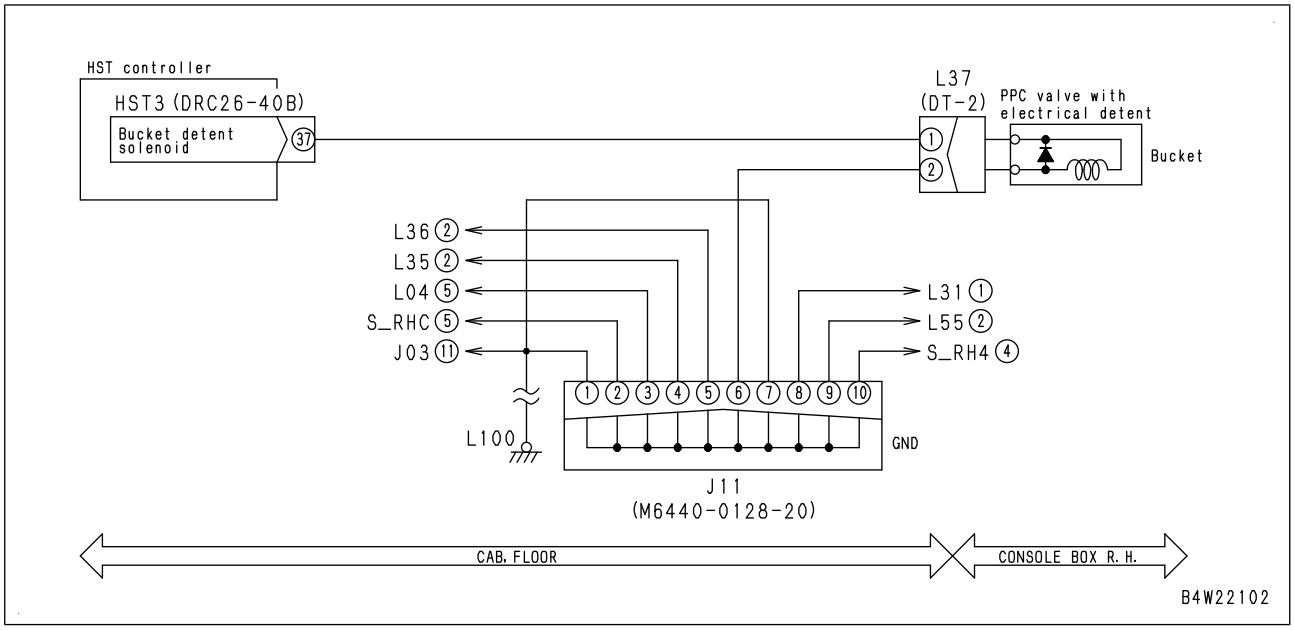
No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective bucket TILT EPC solenoid (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector F32, and connect T-adapter to male side.		
		Resistance	Between F32 (male) (1) and (2)	5 to 15 Ω
2	Open circuit, short circuit, ground fault, hot short circuit of wiring harness, or defective HST controller	1. Turn starting switch to OFF position. 2. Disconnect connector F32, and connect T-adapter to female side. 3. Turn starting switch to ON position. ★ Shake the wiring harness by hand while measuring the voltage. If the voltage drops to approximately 0 V during shaking, circuit is open around this point.		
		Voltage	Between F32 (female) (1) and (2)	1 to 4.5 V
3	Open or short circuit in wiring harness	★ If no failure is found by check on cause 2, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connector HST3, and connect T-adapter to female side. ★ If resistance is 1 MΩ or higher, wiring harness has open circuit. If resistance is 1 Ω or below, wiring harness has short circuit.		
		Resistance	Between HST3 (female) (27) and (23)	5 to 15 Ω
4	Open circuit in wiring harness (Wire breakage or defective contact of connector)	★ If no failure is found by check on cause 3, this check is not required. 1. Turn starting switch to OFF position. 2. Disconnect connectors HST3 and F32, and connect T-adapters to each female side.		
		Resistance	Between HST3 (female) (23) and F32 (female) (2)	Max. 1 Ω
			Between HST3 (female) (27) and F32 (female) (1)	Max. 1 Ω
5	Defective HST controller	If no failure is found by above checks, HST controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Failure code [DWN8KY] Hot Short of Detent Solenoid (Bucket) *(WA320_7-DWN8KY-400-A-Z1-A)*

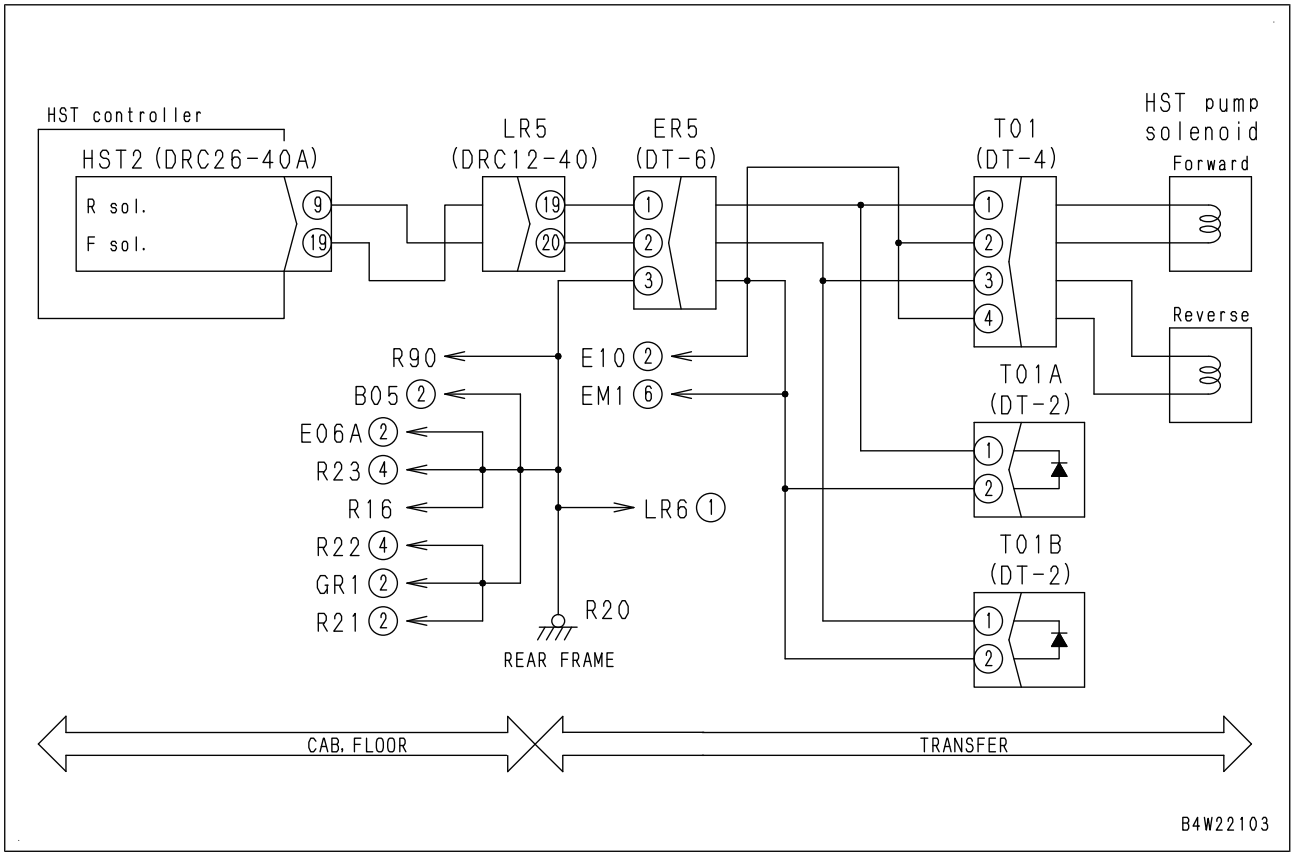
Action level	Failure code	Failure	Hot Short of Detent Solenoid (Bucket) (HST controller system)
L01	DWN8KY		
Detail of failure	• Due to hot short circuit in bucket TILT magnet detent solenoid power supply system, abnormal voltage appears when controller does not drive bucket TILT magnet detent solenoid.		
Action of controller	• Stops driving bucket TILT magnet detent solenoid. • Even if cause of failure disappears, machine does not become normal until starting switch is turned to OFF position.		
Problem on machine	• When bucket is put in TILT detent condition, bucket is not automatically released from detent condition (it can be released manually). • When bucket is out of detent condition, bucket lever does not return to NEUTRAL position smoothly due to attraction of magnet (lever operability is degraded).		
Related information	• Output condition (ON/OFF) to bucket TILT magnet detent solenoid can be checked with monitoring function. (Code: 03714) • Method of reproducing failure code: Start engine.		

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective bucket magnet detent solenoid (internal open circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector L37, and connect T-adapter to male side.			
		Resistance	Between L37 (male) (1) and (2)		35 to 45 Ω
2	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector L37, and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Voltage	Between L37 (female) (1) and (2)		Max. 4.5 V
3	Defective HST controller	1. Turn starting switch to OFF position. 2. Insert T-adapter into connector HST3. 3. Start engine. 4. Set work equipment lock switch to LOCK position. 5. Operate bucket lever to perform troubleshooting.			
		Voltage	Between HST3 (37) and ground	Bucket lever: NEUTRAL	Max. 4.5 V
				Bucket lever: TILT (at detent position)	20 to 30 V

Circuit diagram related to bucket magnet detent solenoid



Circuit diagram related to HST pump solenoid (reverse)

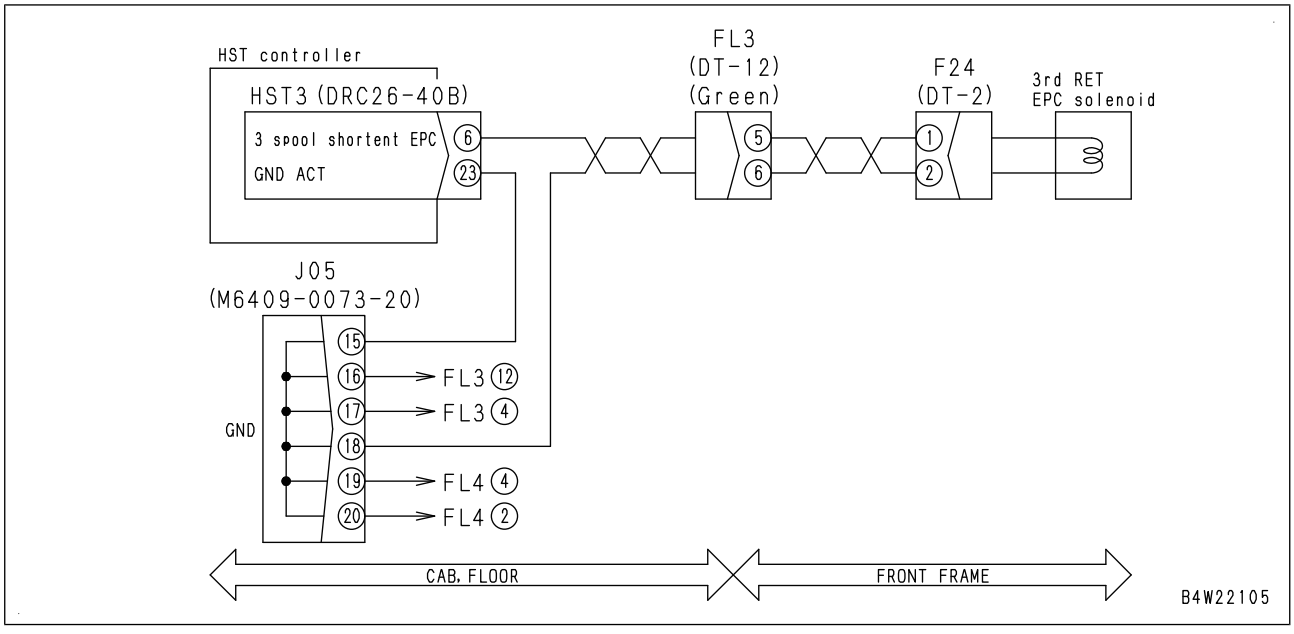


Failure code [DXHKKY] Hot Short of 3rd EPC Solenoid (RET) *(WA320_7-DXHKKY-400-A-Z0-A)*

Action level	Failure code	Failure	Hot Short of 3rd EPC Solenoid (Retract)
L03	DXHKKY		(HST controller system)
Detail of failure	• Due to hot short circuit in output signal circuit to 3rd valve (PCS) RETRACT EPC solenoid, abnormal voltage appears when controller does not drive 3rd valve (PCS) RETRACT EPC solenoid.		
Action of controller	• Drives work equipment neutral lock solenoid. • Stops driving 3rd valve (PCS) EXTEND and RETRACT EPC solenoids. • Stops driving every work equipment detent. • 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	• Cylinder connected to 3rd valve (PCS) does not retract. • 3rd valve (PCS) RETRACT EPC solenoid may be burnt out.		
Related information	• This failure code does not appear on a machine that is not equipped with 3rd valve (PCS). If this failure code is displayed on the machine that is not equipped with 3rd valve (PCS), select "None" for 3rd (PCS) lever setting on option setting screen of machine monitor. • Output current value to 3rd valve (PCS) RETRACT EPC solenoid can be checked with monitoring function. (Code: 41924) • Only for machines equipped with 3rd valve (PCS) • Method of reproducing failure code: Start engine.		

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective 3rd valve (PCS) RETRACT EPC solenoid (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector F24 and connect T-adapter to male side.		
		Resistance	Between F24 (male) (1) and (2)	5 to 15 Ω
2	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector F24, and connect T-adapter to female side. 3. Turn starting switch to ON position.		
		Voltage	Between F24 (female) (1) and (2)	Max. 4.5 V
3	Defective HST controller	If no failure is found by above checks, HST controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		

Circuit diagram related to 3rd valve (PCS) RETRACT EPC solenoid

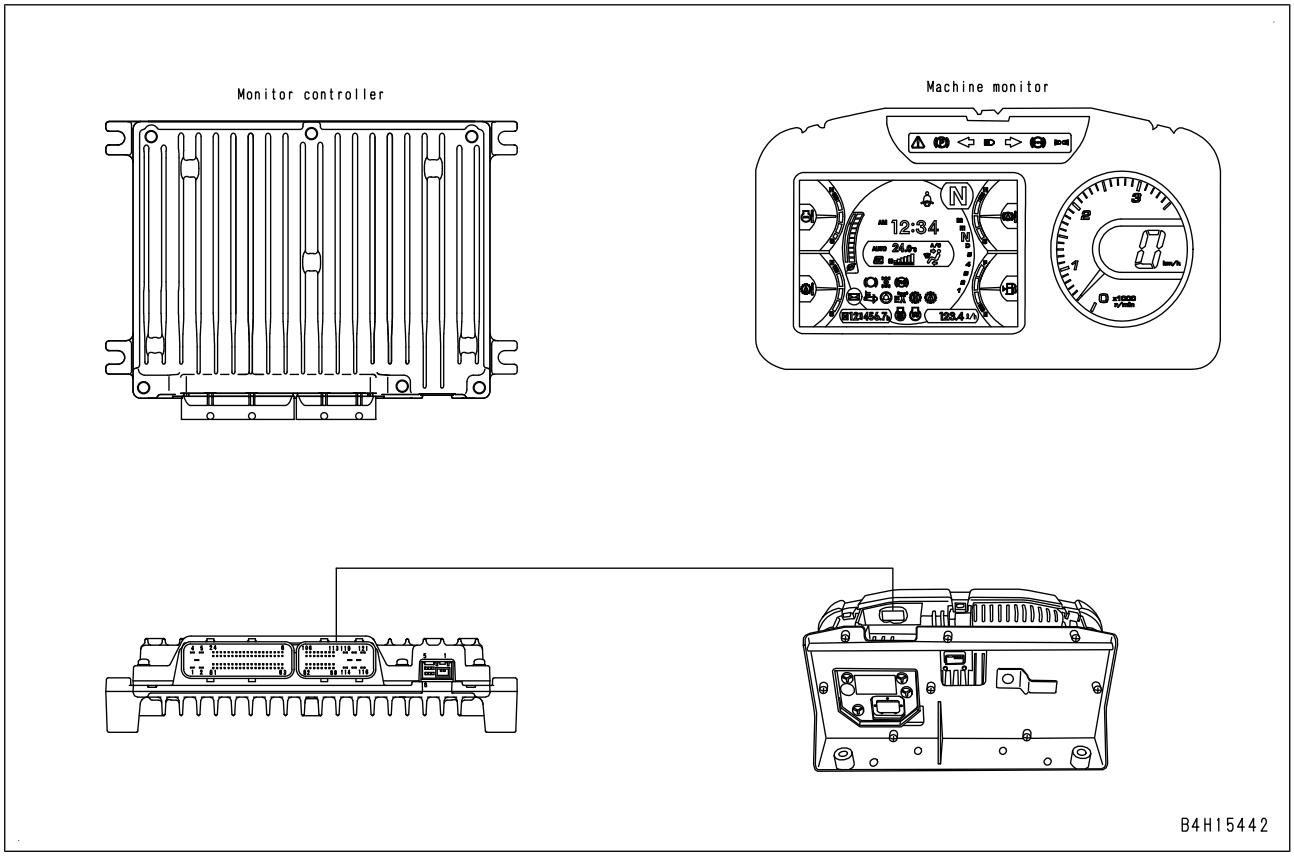


E-3 Automatic preheating system does not work *(WA320_7-FE1-400-A-Z0-A)*

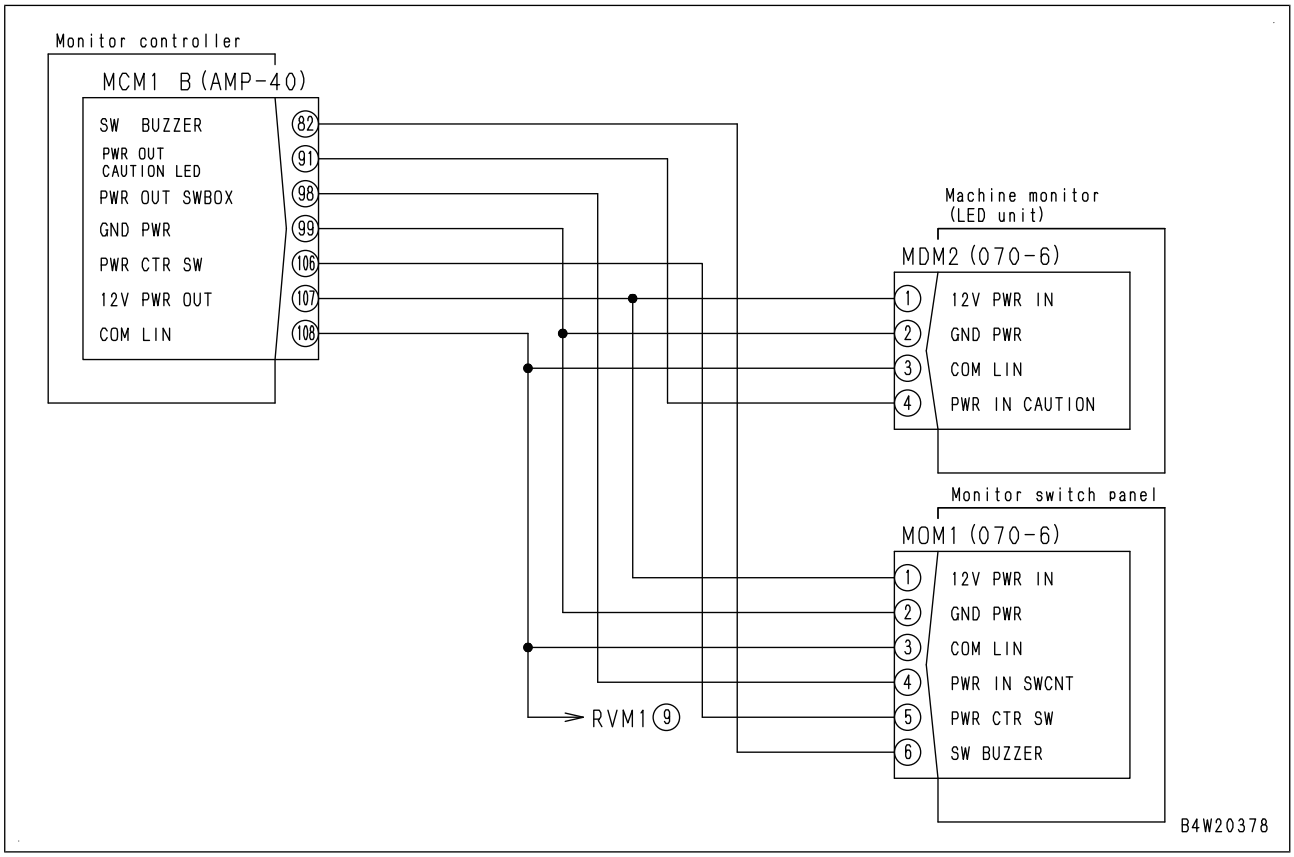
Failure	Automatic preheating system does not work.
Related information	• Automatic preheating starts when coolant temperature is below -5°C. (Code: 04107 Engine coolant temperature) • If automatic preheating function does not work, check whether manual preheating function works first. • Engine controller checks primary (coil) side of preheating relay (connector L130) and generates failure code [CA2555] or [CA2556] if it is defective. • Engine controller checks engine coolant temperature sensor and generates failure code [CA144] or [CA145] if it is defective.

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective slow-blow fuse	If slow-blow fuse is blown out, circuit may have ground fault. In this case, perform check on cause 6 first.		
2	Defective fuse-4 in fuse box 1 (FS1)	If fuse-4 in fuse box 1 (FS1) is blown, circuit may have ground fault. In this case, perform check on cause 6 first.		
3	Defective preheating relay L130 (internal open or short circuit)	1. Turn starting switch to OFF position. 2. Replace preheating relay (connector L130) with horn relay (connector L116). 3. Turn starting switch to ON position.		
		If automatic preheating starts when engine coolant temperature is below -5° C, original preheating relay is defective.		
4	Open circuit or ground fault in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors MCM1 A and L130, and connect T-adapter to female side of L130. ★ If resistance is 1 MΩ or higher, harness has open circuit. If it is 1 Ω or below, harness has short circuit. ★ Heater relay coil resistance		
		Resistance	Between L130 (female) (5) and ground	Approxi-mately 20 Ω
5	Open circuit in wiring harness (Wire breakage or defective contact of connector)	★ If slow-blow fuse is blown, replace it in advance. 1. Turn starting switch to OFF position. 2. Check that system operating lamp is not lit, and then turn battery disconnect switch to OFF position. 3. Disconnect connectors L130 and MCM1 A, and connect T-adapter to female side of L130.		
		Resistance	Between L130 (female) (3) and terminal R01 of battery relay	Max. 1 Ω
		Resistance	★ If no failure is found by check on cause 4, this check is not required. Between L130 (female) (5) and terminal E06 of heater relay	Max. 1 Ω
6	Ground fault in wiring harness (Contact with ground circuit)	If slow-blow fuse or fuse is not blown, this check is not required. ★ If slow-blow fuse is blown, replace it in advance. 1. Turn starting switch to OFF position. 2. Remove fuses 1 to 7 in fuse box 1. 3. Disconnect connectors MCM1 A, L130, and EC3, and connect T-adapter to female side of L130.		
		Resistance	Between L130 (female) (3) and ground	Min. 1 MΩ

Wiring harness between monitor controller and LED unit of machine monitor



Circuit diagram between monitor controller and LED unit of machine monitor



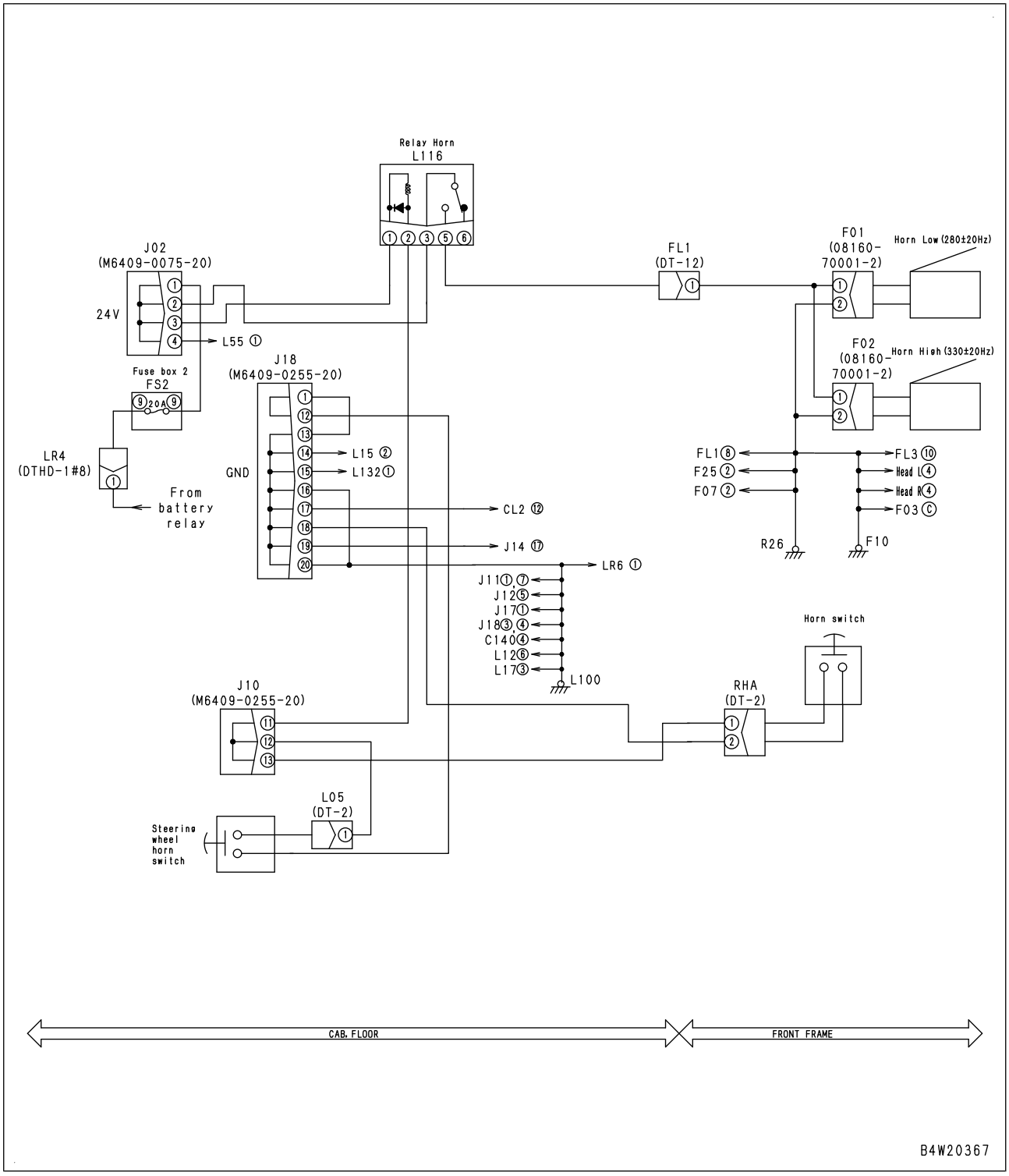
E-20 Parking brake indicator lamp does not light when the parking brake is set to ON (Parking) position *(WA320_7-HP6-400-A-Z0-A)*

⚠ Be sure to chock the wheels. When performing troubleshooting with parking brake released, be sure to depress foot brake pedal (two persons required for this work).

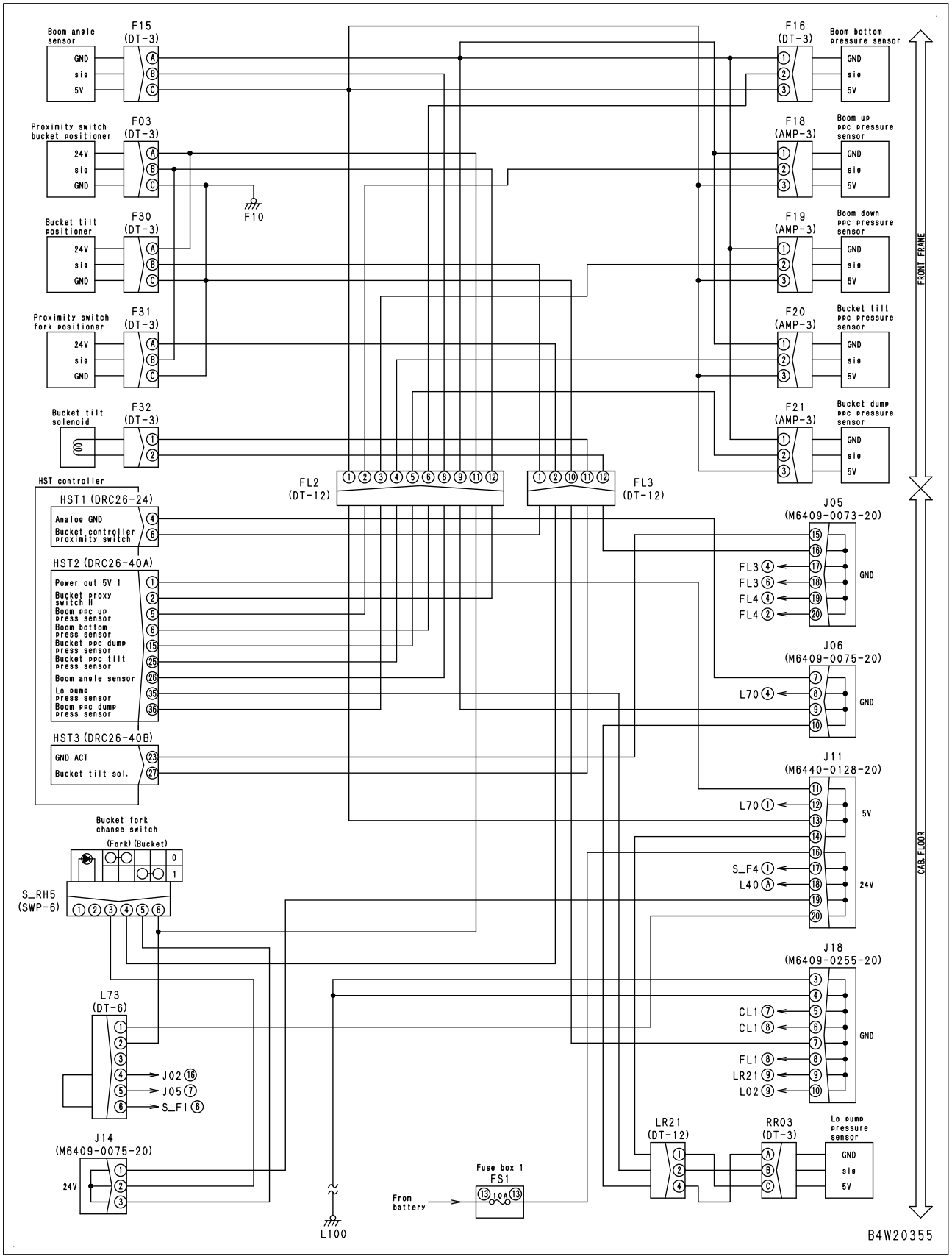
Failure	• Parking brake indicator lamp does not light when the parking brake is set to ON (Parking) position. • Short circuit or ground fault of parking brake indicator switch circuit • The parking brake detector circuit (MCM1 A (71 pin)) is at GND level even when the parking brake switch is operated. • The parking brake cannot be applied.
Related information	• If normal, the parking brake indicator (oil pressure) switch turns OFF when the parking brake switch is set to ON (Parking) because oil pressure will not act on the switch. • When 24 V is applied to parking brake solenoid, parking brake is released. • Since T-adapter for monitor controller connector is "socket-type box", operating voltage cannot be measured at monitor controller connector. • For operation of parking brake relay (L105), see failure code [2F00MA]. • Make sure that fuse-8 of fuse box 2 is not blown. • Input signal (ON/OFF) from parking brake indicator switch can be checked as parking brake oil pressure switch with monitoring function. (Code: 04510) • Input signal (ON/OFF) (neutralizer signal) from the parking brake switch can be checked with monitoring function. (Code: 02228) • See E-34.

No.	Cause	Procedure, measuring location, criteria, and remarks		
1	Defective parking brake relay (L105)	1. Turn starting switch to OFF position. 2. Interchange relay L105 with horn relay L116. 3. Turn starting switch to ON position. 4. Turn parking brake switch to PARK position. 5. Start engine.		
		• If parking brake indicator lamp lights up, original relay L105 is defective.		
2	Defective auto idle stop parking brake relay (L107)	• When failure code [D1E6KA], [D1E6KB] or [D1E6KY] is displayed, perform troubleshooting for it first. 1. Turn starting switch to OFF position. 2. Interchange relay L107 with horn relay L116. 3. Turn starting switch to ON position. 4. Turn parking brake switch to PARK position. 5. Start engine.		
		• If parking brake indicator lamp lights up, original relay L107 is defective.		
3	Defective parking brake indicator (oil pressure) switch (Internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector T18, and connect T-adapter to male side.		
		Resis-tance	Between T18 (male) (1) and (2)	Min. 1 MΩ
			Between ground and each of T18 (male) (1) and (2)	Min. 1 MΩ

Circuit diagram related to horn



Circuit diagram related to PZ auto tilt-in



<table>
<tr><th>No.</th><th>Cause</th><th colspan="3">Procedure, measuring location, criteria, and remarks</th></tr>
<tr><td rowspan="11">6</td><td rowspan="11">Open circuit in wiring harness
(Wire breakage or defective contact of connector)</td><td colspan="3">★ If no failure is found by above checks, this check is not required.
• Primary side of front working lamp relay L122
1. Turn starting switch to OFF position.
2. Disconnect connector S_F1, and connect T-adapter to female side.
★ Coil resistance of front working lamp relay L122</td></tr>
<tr><td>Resis-tance</td><td>Between S_F1 (female) (5) and ground</td><td>200 to 400 Ω</td></tr>
<tr><td colspan="3">★ If no failure is found by above checks, this check is not required.
• Secondary side of front working lamp relay L122
1. Turn starting switch to OFF position.
2. Disconnect connector L122, and connect T-adapter to female side.
3. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between L122 (female) (3) and (2)</td><td>20 to 30 V</td></tr>
<tr><td colspan="3">★ If no failure is found by above checks, this check is not required.
• Front working lamp line
1. Turn starting switch to OFF position.
2. Disconnect connector L122, and connect T-adapter to female side.
★ Since the resistance of each working lamp is approximately 8 Ω and 2 lamps are connected in parallel, the standard value is approximately 4 Ω.
★ If the reading is approximately 8 Ω one of the circuits is open. If the reading is above 1 MΩ, both circuits are open.
★ If 4 front working lamps are equipped, the standard value will be approximately 2 Ω.</td></tr>
<tr><td>Resis-tance</td><td>Between L122 (female) (5) and ground</td><td>Approxi-mately 4 Ω</td></tr>
<tr><td colspan="3">★ If no failure is found by above checks, this check is not required.
• Input line of the switch.
1. Turn starting switch to OFF position.
2. Disconnect connector S_F1, and connect T-adapter to female side.
3. Turn starting switch to ON position.</td></tr>
<tr><td>Voltage</td><td>Between S_F1 (female) (6) and ground</td><td>20 to 30 V</td></tr>
<tr><td colspan="3">★ If no failure is found by above checks, this check is not required.
1. Turn starting switch to OFF position.
2. Remove fuse-12 in fuse box 2 (FS2).
3. Disconnect connectors S_F1, L122, C04, and C05, and connect T-adapters to each female side.</td></tr>
<tr><td rowspan="5">Resis-tance</td><td>Between S_F1 (female) (5) and L122 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between L122 (female) (2) and ground</td><td>Max. 1 Ω</td></tr>
<tr><td>Between FS2-12 and L122 (female) (3)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between L122 (female) (5) and C04 (female) (1)</td><td>Max. 1 Ω</td></tr>
<tr><td>Between L122 (female) (5) and C05 (female) (1)</td><td>Max. 1 Ω</td></tr>
</table>

No.	Cause	Procedure, measuring location, criteria, and remarks		
7	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Turn the battery disconnect switch to OFF position. 3. Disconnect connectors L109, HST2, G01, R23, R22 and RVM1A, and connect T-adapter to any of female sides.		
		Resis-tance	Between ground and L109 (female) (5) or R22 (female) (2) or R23 (female) (2) or G01 (female) (1) or RVM1A(female)(4)	Min. 1 MΩ
			Between ground and HST2 (female) (21) or L109 (female) (2) • If a failure occurs, failure code [D160KB] is displayed.	Min. 1 MΩ
8	Hot short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors L09, L109, R23, R22, G01 and RVM1A and connect T-adapter to any of female sides. 3. Turn starting switch to ON position.		
		Voltage	Between ground and L109 (female) (5) or R22 (female) (1) or R23 (female) (1) or G01 (female) (1) or RVM1A(female)(4)	Max. 1 V
9	Defective HST controller	1. Turn starting switch to OFF position. 2. Disconnect connector L109, and connect T-adapter to female side. 3. Turn starting switch to ON position. 4. Set the directional lever to R position.		
		Voltage	Between L109 (female) (1) and (2)	20 to 30 V
10	Defective rearview monitor (internal short circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector RVM1. 3. Turn starting switch to ON position. 4. Set the directional lever to R position.		
		If backup lamp becomes normal, the rearview monitor is defective.		

Failure	Component causing failure	Steering component							Work equipment and hydraulic component												Troubleshooting No.
		Steering cylinder	Cushion valve	Steering LS lin (between priority valve and Orbitrol)	Pump coupling	Steering and work equipment pump	Steering and work equipment pump strainer	Steering and work equipment pump suction piping	Back pressure valve (return circuit to hydraulic tank)	Boom control valve (spool)	Bucket control valve (spool)	Main relief valve	Boom pressure compensation valve	Bucket pressure compensation valve	Boom suction valve	Boom suction safety valve	Bucket suction safety valve	ECSS selector valve (spool)	Travel damper charge valve	Travel damper solenoid valve	
Symptom related to HST	Machine neither travels forward nor backward				●	●	●	●				●									H-1
	Machine does not travel forward (Machine travels backward normally)																				H-2
	Machine does not travel backward (Machine travels forward normally)																				H-3
	Machine neither travels forward nor backward fast						●	●				●									H-4
	Machine does not travel forward fast (Machine travels backward fast)																				H-5
	Machine does not travel backward fast (Machine travels forward fast)																				H-6
	Machine lacks power when traveling forward and backward						●	●				●									H-7
	Machine lacks power when traveling forward (Machine has sufficient power when traveling backward)																				H-8
	Machine lacks power when traveling backward (Machine has sufficient power when traveling forward)																				H-9
	Engine stalls during travel or engine speed drops significantly																				H-10
Steering	Steering wheel is too heavy to turn	●			●	●	●	●													H-11
	Steering wheel is heavy to turn				●	●	●	●													H-12
	Machine sways or large shocks are made while machine turns	●	●																		H-13
	Machine unintentionally turns when machine travels	●	●																		H-14
Brake system	Brake does not operate or does not work well																				H-15
	Brake is not released or drags																				H-16
	Parking brake does not work or it is weak.																				H-17
	Parking brake is not released or drags.																				H-18
Work equipment system and hydraulic component	Boom does not rise.			●	●	●	●	●		●		●	●		●						H-19
	Boom moves slow or boom lacks lifting force			●		●	●	●	●	●	●	●	●	●	●				●		H-20
	Rising boom slows down at certain height																				H-21
	Lift cylinders do not serve to hold bucket (bucket rises off ground)								●							●					H-22
	Hydraulic drift of boom is large									●					●			●			H-23
	Boom moves up and down during operation.								●							●					H-24
	Bucket does not tilt.			●	●	●	●	●			●	●		●			●				H-25
	Bucket moves slow or lacks tilt force			●		●	●	●	●	●	●	●	●	●			●		●		H-26
	Bucket decelerates during tilt operation																				H-27
	Bucket cylinder does not hold bucket on ground.								●								●				H-28
	Hydraulic drift of bucket is large.										●						●				H-29
	Bucket tilts back and forth during carrying load (work equipment valve in NEUTRAL)								●								●				H-30
	Boom and bucket control levers do not move smoothly and heavy to move																				H-31
	Operating work equipment causes engine speed to lower significantly or engine to stall.					●						●									H-32
	Large shocks are made when work equipment starts to move and stops.									●	●										H-33
	When single work equipment is relieved hydraulically, other work equipment moves.									●	●										H-34
	ECSS (travel damper) does not work and machine pitches and bounces.																	●	●	●	H-35

H-10 Engine stalls during travel or engine speed drops significantly *(WA270_7-CG2-400-A-Z0-A)*

Failure	Engine stalls during travel or engine speed drops significantly
Related information	• If any failure code is displayed, perform troubleshooting for that failure code first. • HST oil pressure (MB) and HST oil pressure (MA) can be checked with monitoring function. (Monitoring code: 32606 (MB), 32608 (MA)) ★ When checking by using the monitor, note that an error within ±0.5 MPa can be included in the reading due to tolerance of the sensor. • Engine speed can be checked with monitoring function. (Monitoring code: 01002) • Check if "Reverse Speed Limit" is selected in service menu "Machine Setting / Information" of the monitor.

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective oil pressure in HST circuit	★ Select "HST Pump Stall Pressure Check" with service mode "Adjustment", set speed range selector switch to 2nd, set traction control switch to MAX, set directional lever to F. Depress brake pedal, and then gradually increase engine speed from low idle.			
		HST oil pressure (MB)	Engine speed	Low idle	2.0 (±0.2) MPa {20 (±2.0) kg/cm²}
				1,460 ± 20 rpm	35.7 (+0.5/-2.5) MPa {350 (+5/-27) kg/cm²}
				Min. 2,000 rpm	45 (+1.0/-3.3) MPa {459 (+10/-33) kg/cm²}
		• If HST oil pressure (MB) is higher than normal value when engine speed is increased, HST pump (body, high-pressure cut-off valve, EV valve) may have failure.			
2	Defective HST pump high-pressure cut-off valve	If maximum pressure is higher than normal value in check on Cause (1), HST pump high-pressure cut-off valve may be defective and does not work when HST circuit pressure is high.			
3	Defective HST pump EV valve	• If HST oil pressure (MB) is higher than normal value when engine speed is low in check on cause (1), EV valve may be defective, causing high pressure in HST pump servo piston. • Be careful that if HST oil pressure (MB) is approximately 4.0 MPa {408 kg/cm²} or higher, machine may move when directional lever is set to F or R while engine is running at low idle.			
4	Clogging in HST pump directional selector solenoid valve orifice	If values in check on Cause (1) are normal but engine speed significantly drops when travel load increases, check for clogging in orifice of T-circuit attached to directional selector solenoid valve of HST pump.			
5	Defective HST pump high pressure relief valve	• If no failure is found by checks on Causes (1) to (4) but engine stalls or engine speed drops significantly only during travel, high-pressure relief valve of HST pump may have failure.			
6	Defective HST pump body	• If no failure is found by checks on Causes (1) to (4), HST pump body may have failure.			
7	Defective engine system	• If no failure is found by checks on Causes (1) to (4), engine performance may lower. Perform troubleshooting by referring to "S mode" troubleshooting.			
8	Engine stalls or engine speed drops significantly during simultaneous operation of travel and work equipment	If engine stalls or engine speed drops significantly when work equipment is operated while traveling, also refer to "H-30 Operating work equipment causes engine speed to lower significantly or engine to stall".			

H-26 Bucket moves slow or lacks tilt-back force *(WA270_7-D85-400-A-Z0-A)*

Failure	Bucket moves slow or lacks tilt back force
Related information	• Check that oil level in hydraulic tank is normal. • If any failure code is displayed, perform troubleshooting for that failure code first. • PPC valve output pressure can be checked with monitoring function. (Monitoring code: 07800) • Steering and work equipment pump pressure can be checked with monitoring function. (Monitoring code: 95304) • Check that engine high idle speed is normal with monitoring function. (Monitoring code: 01002) (Engine high idle speed:2,175 to 2,295 rpm)

No.	Cause	Procedure, measuring location, criteria, and remarks			
1	Defective strainer of steering and work equipment pump	Check strainer for clogging.			
2	Air sucked in on suction side of steering and work equipment pump	Check suction piping for cracks, etc.			
3	Defective self-pressure reducing valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Self-pressure reducing valve output pressure	All control levers (including steering wheel)	NEUTRAL	2.5 to 3.3 MPa {26 to 34 kg/cm²}
		• Output pressure of self-pressure reducing valve is source pressure of pilot pressure for bucket control valve (TILT and DUMP).			
4	Malfunction of bucket TILT BACK PPC valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		PPC valve output pressure	Bucket control lever	Tilt control	2.5 to 3.3 MPa {26 to 34 kg/cm²}
5	Malfunction of work equipment lock solenoid valve (for pilot circuit of controll valve)	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		If output pressures of all EPC valves including bucket (TILT) control PPC valve are below standard value in check on cause (4), work equipment lock solenoid valve may malfunction. Check work equipment lock solenoid valve spool for sticking.			
		Lock lever	Solenoid output pressure		
		When locked	0 MPa {0 kg/cm²}		
		When torque converter lockup clutch is disengaged	2.5 to 3.3 MPa {26 to 34 kg/cm²}		
6	Defective priority valve (unload valve)	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Steering and work equipment pump pressure	All control levers (including steering wheel)	NEUTRAL	4.3 to 5.9 MPa {40 to 60 kg/cm²}
7	Defective controll valve main relief valve	★ Be ready with engine stopped, then perform troubleshooting with engine at high idle.			
		Steering and work equipment pump pressure	Bucket control lever	Bucket TILT relief	31.4 (+1.6/-3.9) MPa {320 (+16/-40) kg/cm²}
		If relief pressure does not rise to approximately 9.8 MPa {100 kg/cm²} and above after main relief valve is adjusted, unload valve may remain opened.			

S-5 Engine does not pick up smoothly *(WA380_7-A30-400-A-Z0-A)*

Failure	Engine does not pick up smoothly.
Related information	• If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Insufficient fuel in tank	• Fuel tank is empty.	Add fuel.
2	Clogged air breather hole in fuel tank cap	• 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 in fuel drained from fuel tank.	Replace fuel.
5	Air in fuel piping system	• Air is bled during air bleeding of fuel system. (Reference: See Testing and adjusting, "Bleeding air from fuel system".)	Perform air bleeding. Repair or replace fuel piping.
6	Leakage from fuel piping system	• Fuel leaks from fuel piping. (Reference: See Testing and adjusting, "Checking fuel circuit for leakage".)	Repair or replace fuel piping related parts.
7	Defective supply pump	• See Testing and adjusting, "Measuring fuel delivery, return and leakage".	Replace supply pump or pressure limiter.
8	Abnormally high crankcase pressure	• When crankcase pressure high error (failure code: CA555) is still displayed even after KCCV filter is replaced, blowby pressure is probably high (see Testing and adjusting, "Measuring blowby pressure"). In this case, KVGT may be seized or damaged.	Perform following checks on causes 10 and after.
9	Defective injector	• Some cylinder is found to be cool when exhaust manifolds are touched by hand immediately after engine is started. • When engine is run in cylinder cutout mode with some cylinder cut out, engine speed does not change. (Reference: See Testing and adjusting, "Handling cylinder cutout mode operation".)	Replace injector.
10	Seized or broken KVGT	• Unusual noise is heard from KVGT. • Check whether KVGT shaft rotates. (Move KVGT vanes with hand in axial and radial directions to make judgement.)	Replace KVGT.
11	Incorrect valve clearance	• When engine is cranked, unusual noise is heard from around cylinder head. • Check valve clearance. (Reference: See Testing and adjusting, "Testing and adjusting valve clearance".)	Adjust valve clearance.
12	Defective engine controller	Since this is an internal defect, troubleshooting cannot be performed.	Replace engine controller.

S-20 Air cannot be bled from fuel circuit *(WA380_7-A29-400-A-Z0-A)*

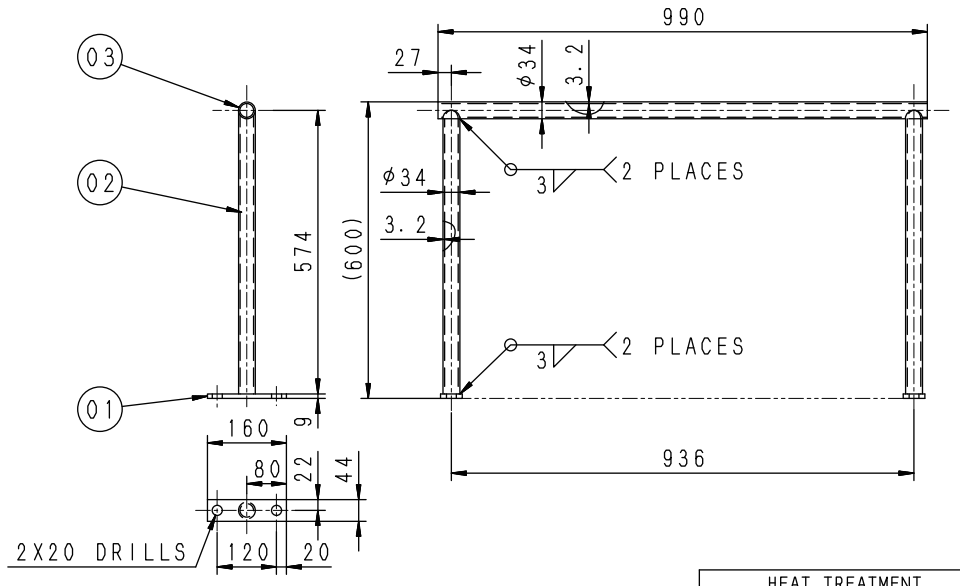
Failure	Air cannot be bled from fuel circuit.
Related information	• If any failure code is displayed, perform troubleshooting for that code first.

No.	Cause	Point to check, remarks	Remedy
1	Insufficient fuel in tank	• Fuel tank is empty.	Add fuel.
2	Loosened drain valve of fuel pre-filter	• Check drain valve of fuel pre-filter for looseness. (Air enters fuel circuit from loosened drain valve.)	Close drain valve.
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	Air in fuel piping system	• Air is bled during air bleeding of fuel system. (Reference: See Testing and adjusting, "Bleeding air from fuel system".)	Repair or replace fuel piping.
5	Leakage from fuel piping system	• Fuel leaks from fuel piping. (Reference: See Testing and adjusting, "Checking fuel circuit for leakage".)	Repair or replace fuel piping related parts.

Sketches of special tools *(WA270-3531-066-A-00-A)*

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

A8: Lifting tool

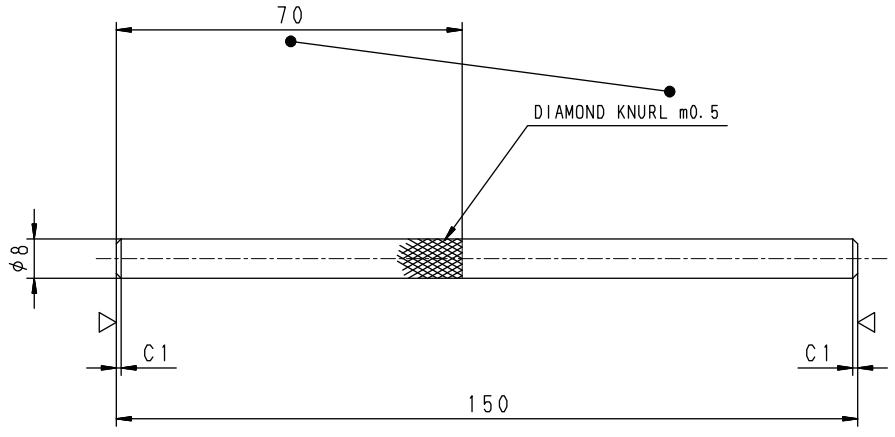


C4W24399

SYM.	PART NAME	MATERIAL	QTY/SET	MASS (kg)	REMARKS
03	PIPE	STKM13A	1	2.41	φ34Xt3.2
02	PIPE	STKM13A	2	1.40	φ34Xt3.2
01	PLATE	SS400F	2	0.45	t9X44

HEAT TREATMENT	MATERIAL
----	WELD
PART NAME	Q'TY
LIFTING TOOL	1
793T-418-1110 △	

D9: Bar



C4W24329

HEAT TREATMENT	MATERIAL
----	S45C-D
PART NAME	Q'TY
BAR	1
793T-417-1220 △	

Removal and installation of injector assembly *(WA270-AE60-924-K-00-A)*

★ Special tools

Sym-bol		Part No.	Part name	Necessity	Q'ty
A	3	795-799-6700	Puller	■	1
	4	795-799-1131	Gear	■	1

⚠ Place the machine on a level ground, and turn the parking brake switch to ON position.

⚠ Set the frame lock bar to LOCK position, and chock the wheels.

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

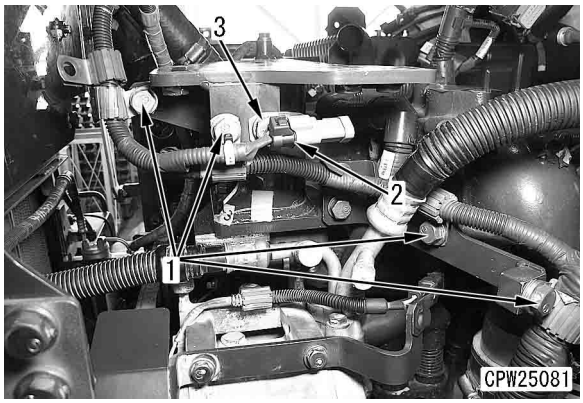
⚠ Turn the starting switch to OFF position, and stop the engine.

⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and adjusting, "Handling battery disconnect switch".)

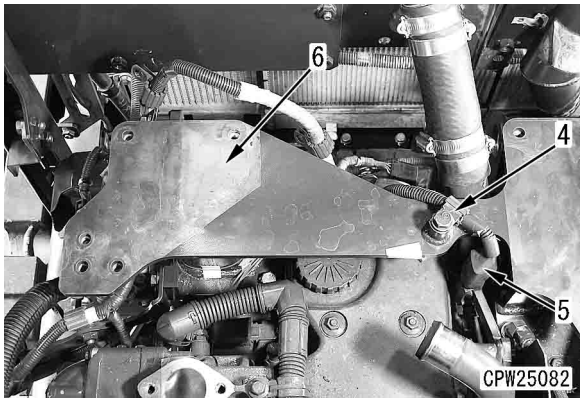
★ When removing and installing the fuel piping, be careful to prevent foreign matters from entering into the fuel piping. If dust, etc. sticks to any part, wash that part thoroughly with clean fuel.

Removal *(WA270-AE60-520-K-00-A)*

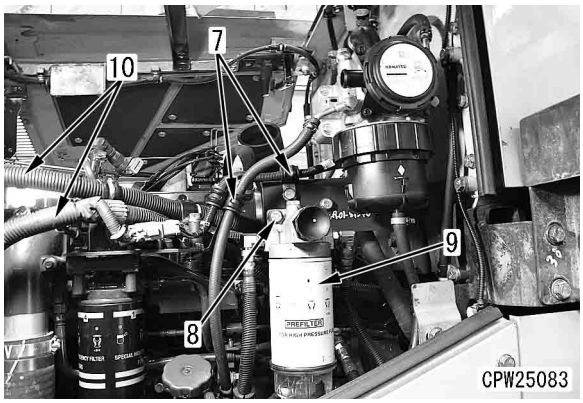
1. Remove the engine hood assembly. For details, see "Removal and installation of engine hood assembly".
2. Remove the air cleaner assembly. For details, see "Removal and installation of air cleaner assembly".
3. Remove KDPF assembly. For details, see "Removal and installation of KDPF assembly".
4. Remove EGR valve assembly. For details, see "Removal and installation of EGR valve assembly."
5. Remove clamp (1) (4 pieces), and disconnect connector (CAN1) (2) from clip (3).



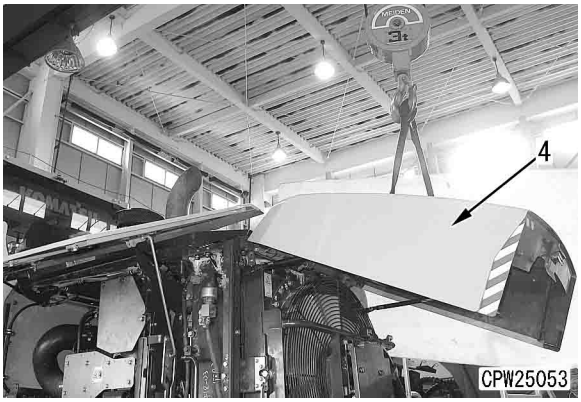
6. Remove clamp (4), and disconnect exhaust manifold pressure sensor connector (EXHAUST PRESSURE) (5).
7. Remove bracket (6).



8. Disconnect clamps (7).
9. Remove mounting bolts (8) (2 pieces), and move fuel prefilter (9) to the machine side.
10. Disconnect clamps (6 pieces) of wiring harnesses (10), and move the wiring harness to the machine side.



11. Disconnect connectors E07B (11) and EM1 (12).

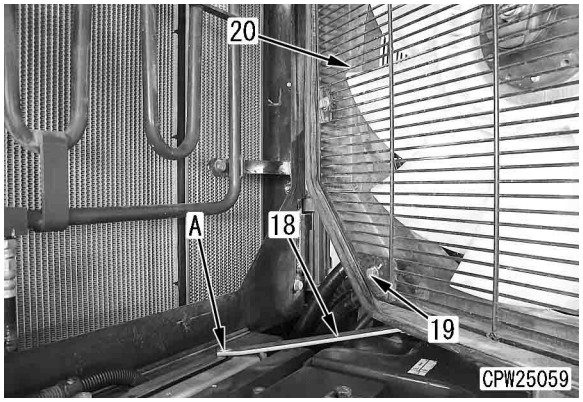


Installation *(WA270-H54E-720-K-00-A)*

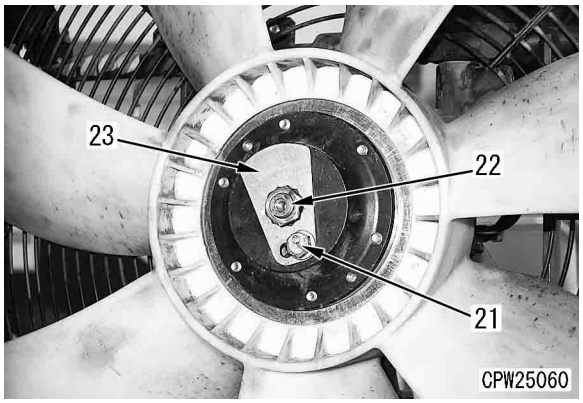
- Perform installation in the reverse order to removal.

[*1]

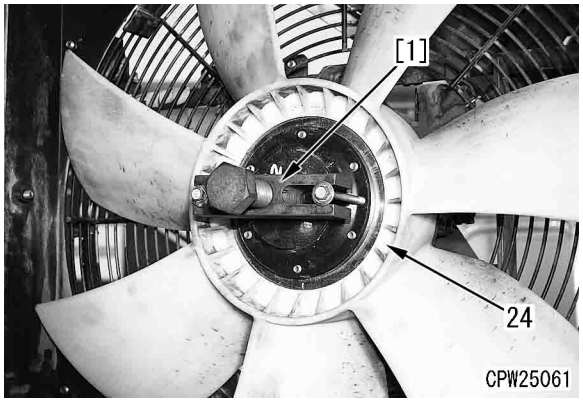
★ Install the cotter pin securely.



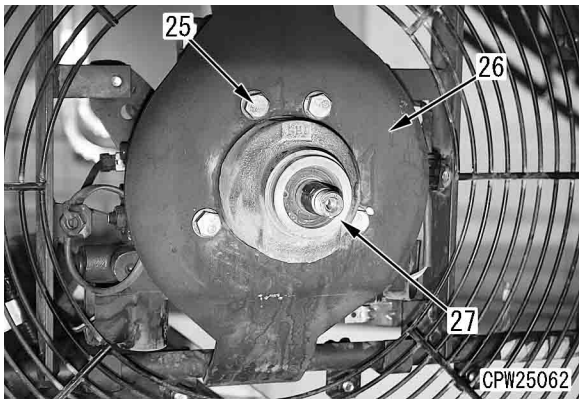
11.Remove mounting bolt (21), and remove nut (22), and stopper plate (23). [*1]



12.Remove cooling fan assembly (24) by using puller [1]. [*2]



13.Remove mounting bolts (25) (4 pieces), and remove fan motor assembly (27) from bracket (26). [*3]



Installation *(WA270-B5L0-720-K-00-A)*

- Perform installation in the reverse order to removal.

[*1]

Nut (22):
132 to 157 Nm {13.5 to 16 kgm}

★ Align the installation position of stopper plate (23) in the tightening direction of nut (22).

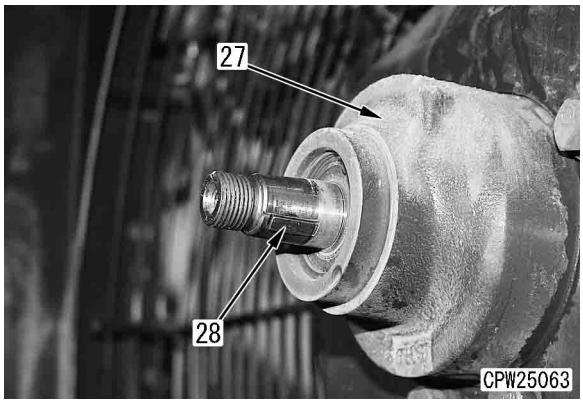
Mounting bolt (21):
Adhesive (LT-2)

Mounting bolt (21):
59 to 74 Nm {6 to 7.5 kgm}

[*2]

★ Check that key (28) is securely fitted in the key way of the shaft of fan motor assembly (27).

★ Align key (28) position with the key groove of cooling fan assembly (24), and install it.



[*3]

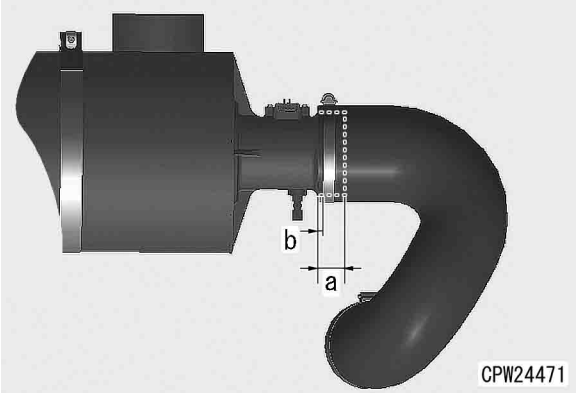
- Refilling with oil
  Refill with oil to the specified level through the oil filler port of the hydraulic tank. Run the engine to circulate the oil through the piping. Then check the oil level again.

Hydraulic tank: Only necessary quantity

[*2]

★ Install hoses and clamp in the dimensions shown in the following figure.
- Dimension (a): 32 mm
- Dimension (b): 7 mm

Clamp of hose (16):
10.5 ± 0.5 Nm {1.07 ± 0.05 kgm}



[*3]

Hose (21) sleeve nut:
15 ± 1 Nm {1.53 ± 0.10 kgm}

Hose (22) sleeve nut:
25 ± 1.5 Nm {2.55 ± 0.15 kgm}

[*4]

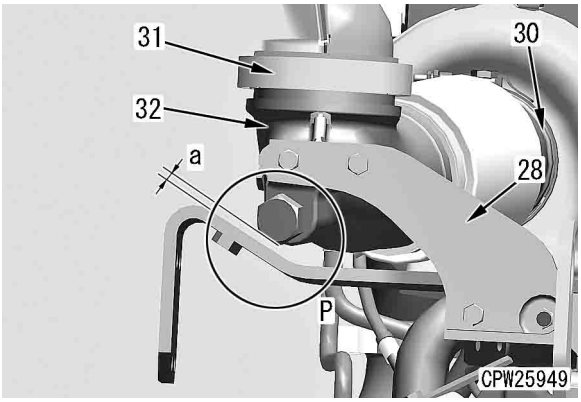
Sleeve nut of tube (23):
35 ± 5 Nm {3.6 ± 0.5 kgm}

[*5]

★ Install tube (32) according to the following procedure.

1. Lightly install the mounting bolts of bracket (28) and clamps (30) and (31).
2. Adjust clearance (a) between the exhaust elbow of tube (32) and bracket (34) to the following dimension.
   - Dimension (a): 6 mm or more
3. Tighten mounting bolts of bracket (28) and clamps (30) and (31) to the specified torque.

Clamps (30) and (31):
13.6 ± 0.5 Nm {1.4 ± 0.05 kgm}



[*6]

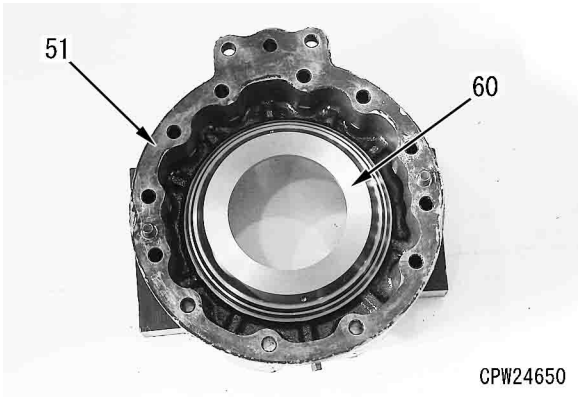
Mounting nut (33) of KVGT assembly (27):
Seizure prevention compound (LC-G)

Mounting nut (33) of KVGT assembly (27):
43 ± 6 Nm {4.4 ± 0.6 kgm}

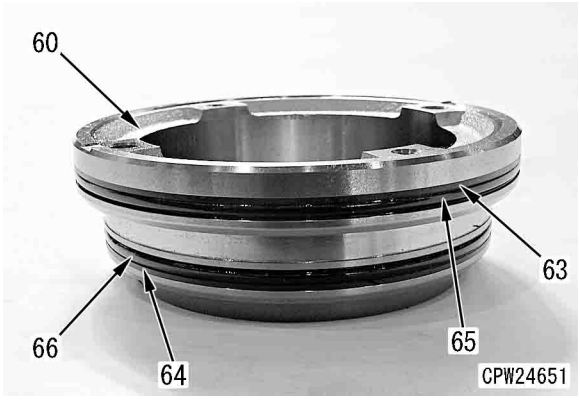
- Refilling with coolant
  Refill with coolant to the specified level through the coolant filler port of the radiator. Run the engine to circulate the coolant. Then check the coolant level again.

Radiator:
28 ℓ

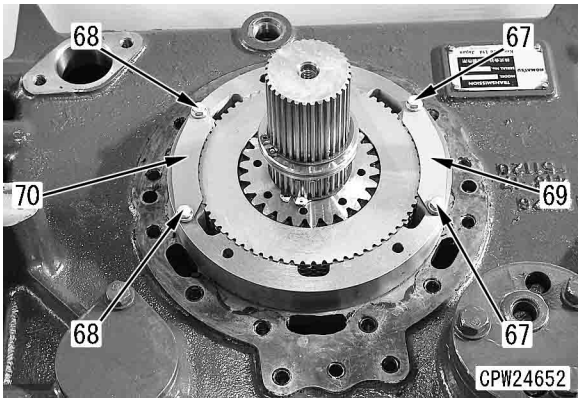
9) Push parking brake piston (60) from inside of parking brake housing (51), and remove it.



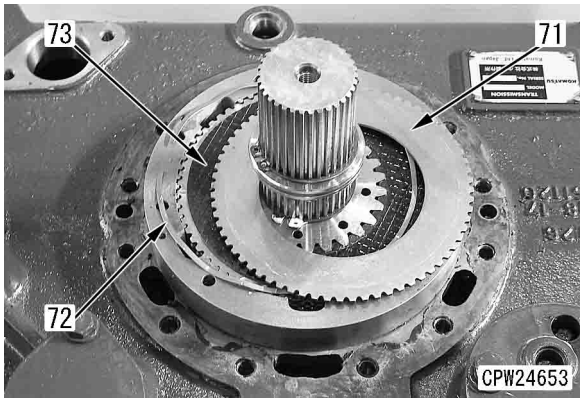
10)Remove backup rings (63) and (64), and D rings (65) and (66) from parking brake piston (60).



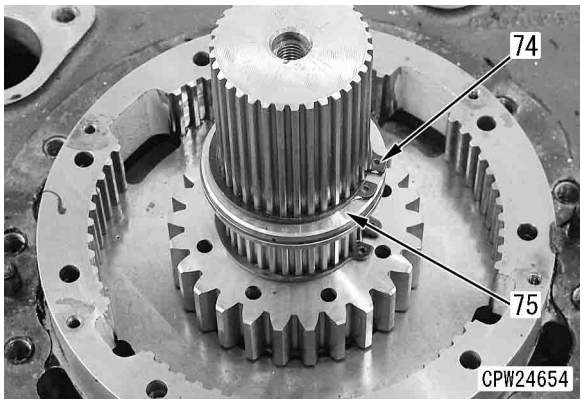
11)Remove mounting bolts (67) and (68), and remove plates (69) and (70).



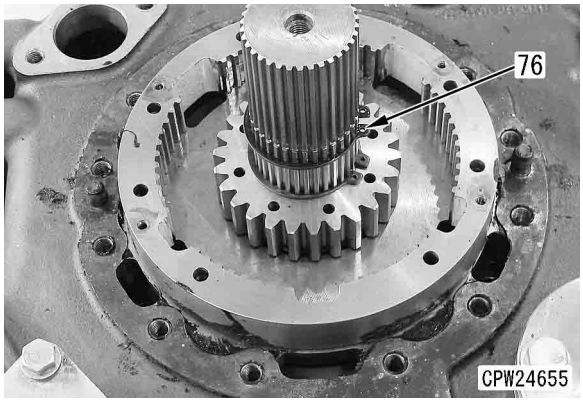
12)Remove parking brake clutch plates (71) (6 pieces), wave springs (72) (5 pieces), and discs (73) (5 pieces).



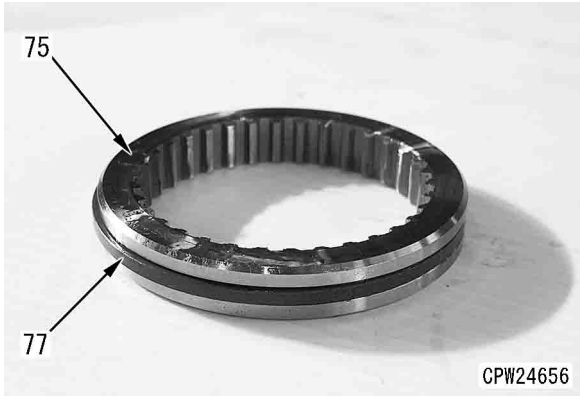
13)Remove snap ring (74), and remove spacer (75) of output shaft.



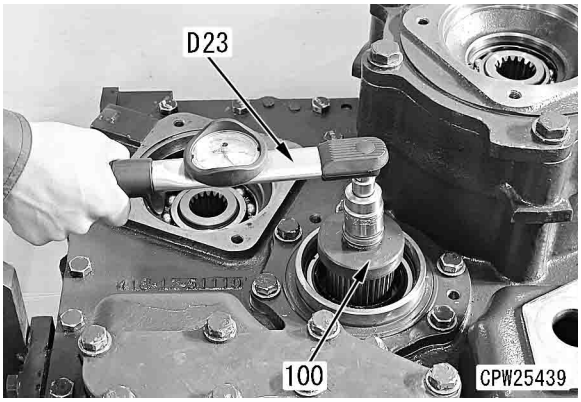
14)Remove snap ring (76) from the output shaft.



15)Remove seal ring (77) from spacer (75).



16)Remove snap ring (78) , and remove parking brake hub (79).



9) Determine whether the preload adjustment is done appropriately or not.
When increment in the rotating torque (B)–(A) before and after tightening the output cage mounting bolts is within the following range, preload adjustment is complete.
- Rotating torque (B)–(A): 0.3 to 0.98 Nm {0.03 to 0.1 kgm}

★ If the increment in the rotating torque is less than 0.3 Nm {0.03 kgm}, reduce the shim thickness, and repeat from step 6).

★ If the increment in the rotating torque is more than 0.98 Nm {0.1 kgm}, add the shim thickness, and repeat from step 6).

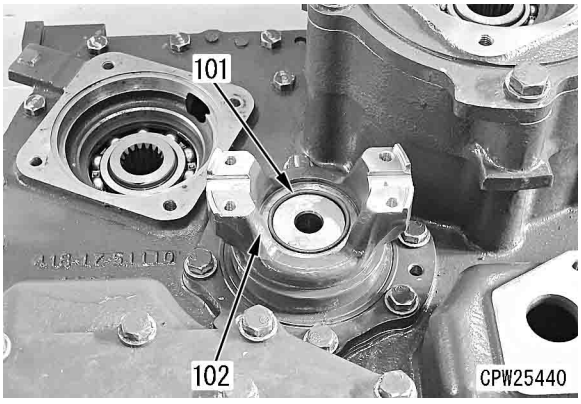
23.Front coupling

1) Install front coupling (102).

Coupling spline area:
Molybdenum disulfide lubricant (LM-S)

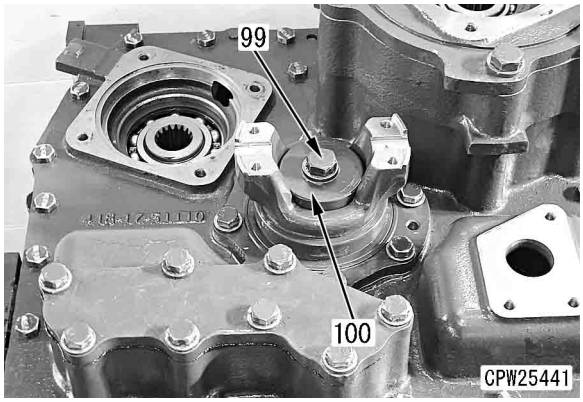
2) Install O-ring (101).

O-ring:
Grease (G0-LI or G2-LI)



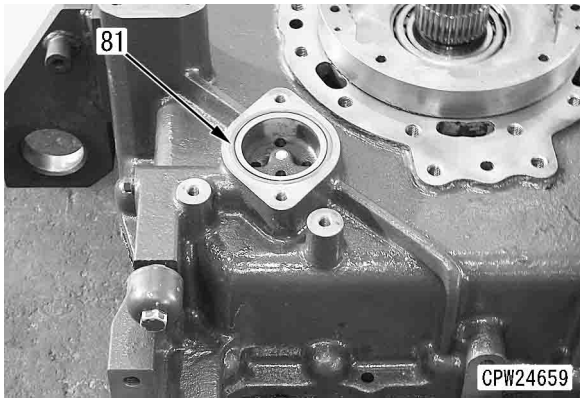
3) Install holder (100), and lightly tighten mounting bolt (99).

★ Tighten the holder mounting bolt (99) to the specified torque after assembling the parking brake (step 26).



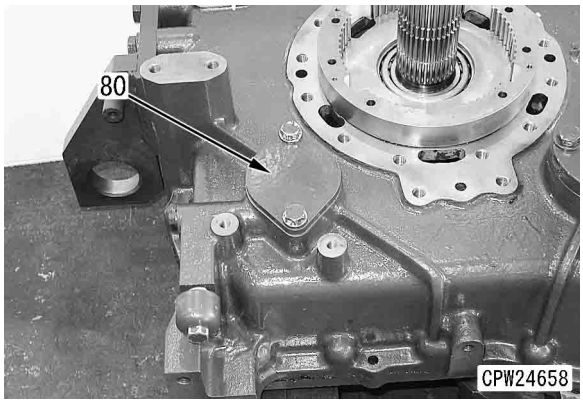
24.Plate

1) Turn over the transfer assembly and set it on the block so that the parking brake side faces up.
2) Install O-ring (81) to the rear case.



3) Install plate (80).

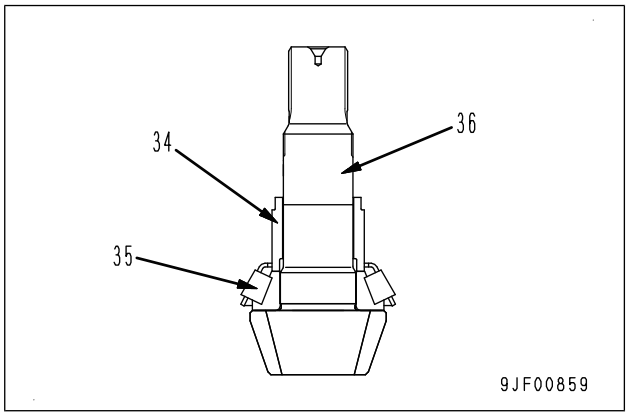
Plate mounting bolt:
59 to 74 Nm {6 to 7.5 kgm}



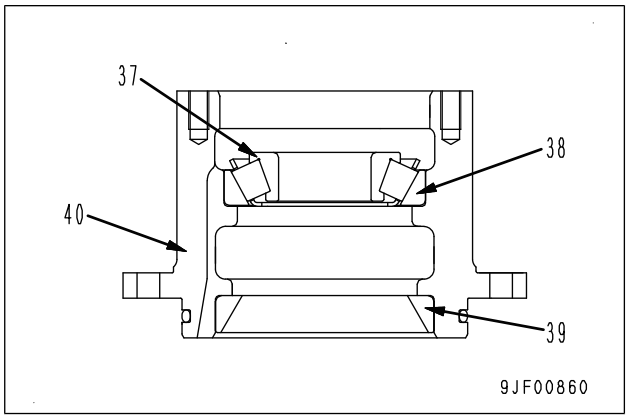
25.Assembly of parking brake

1) Install parking brake hub (79) to the output shaft, and install snap ring (78).

Parking brake hub spline area:
Molybdenum disulfide lubricant (LM-S)



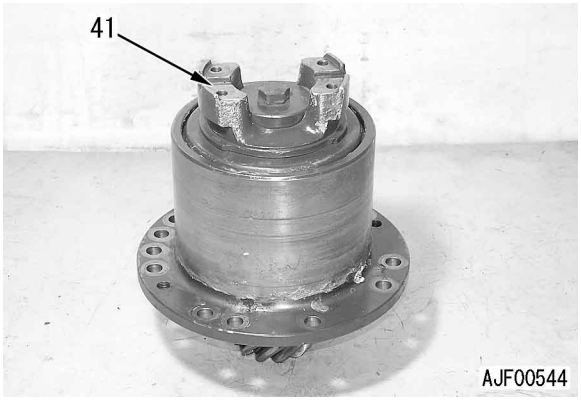
4) Remove bearing (37), outer races (38), (39) from cage (40).



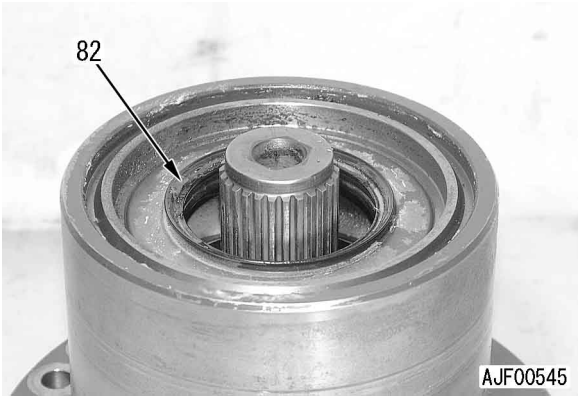
15.Assembling rear cage assembly (for rear differential)

1) Remove coupling (41).

★ Do not remove the protector from the coupling except when necessary.



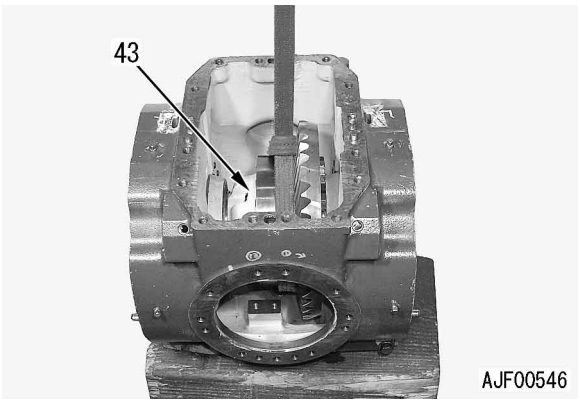
2) Remove oil seal (82).



3) For disassembly procedure of rear cage assembly hereafter, see "14. Disassembling of front cage assembly", 2) to 4) previously described.

16.Bearing carrier

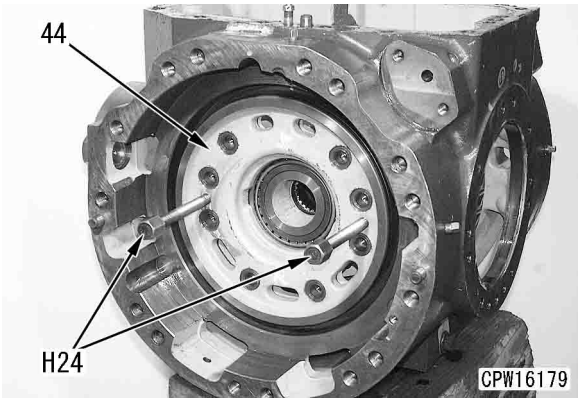
1) Sling differential carrier assembly (43).



2) Remove the mounting bolts and bearing carriers (44) on the right and left by using tool H24.

★ Make bearing carriers on the right and left sides identifiable to prevent confusion.

★ Check the thickness and quantity of the installed shims, and record them.



3) Remove seal (84) and ring (85) from bearing carrier (44).

4) Remove outer race (86).

Removal and installation of front axle assembly *(WA320-DA20-924-K-00-A)*

⚠ Place the machine on a level ground and set the frame lock bar to LOCK position, and chock the wheels.

⚠ Place the machine on a level ground, turn parking brake switch to ON position, and chock wheels.

Removal *(WA270-DA20-520-K-00-A)*

1. Lift the front of the machine by using the work equipment, and set support stands [1] on the frame bottom of the rear side of the front wheel to keep the front side of the machine lifted.

   ⚠ Release the remaining pressure in the brake accumulator circuit. For details, see Testing and adjusting, "Releasing remaining pressure from brake accumulator circuit".

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

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

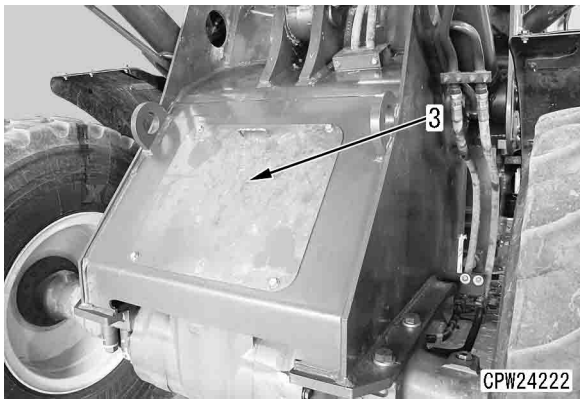
   ⚠ Turn the battery disconnect switch to OFF position, and remove the key. (For details, see Testing and adjusting, "Handling battery disconnect switch".)

2. Sling and remove front wheel (1). [*1]

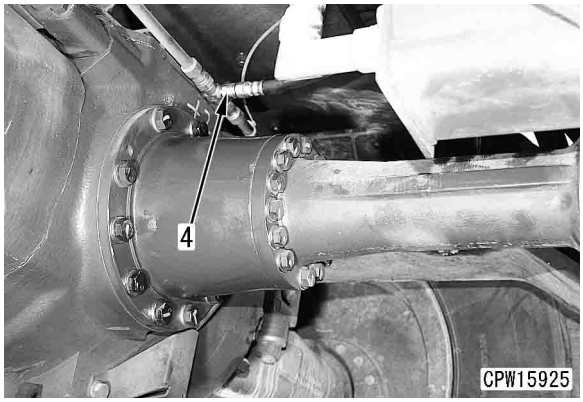
   ★ Remove them on the opposite side according to the same procedure.

   Front wheel (1 side):
   340 kg

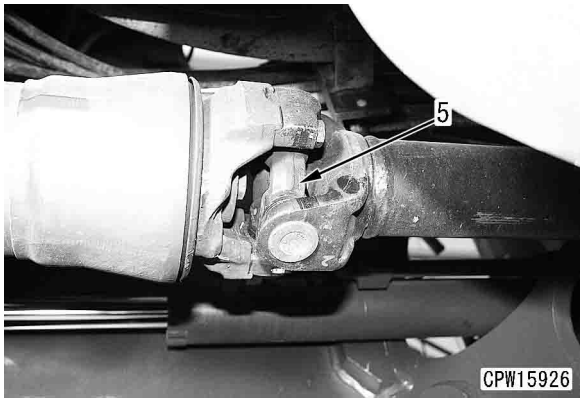
3. Remove cover (3) on the control valve.



4. Disconnect brake hose (4).

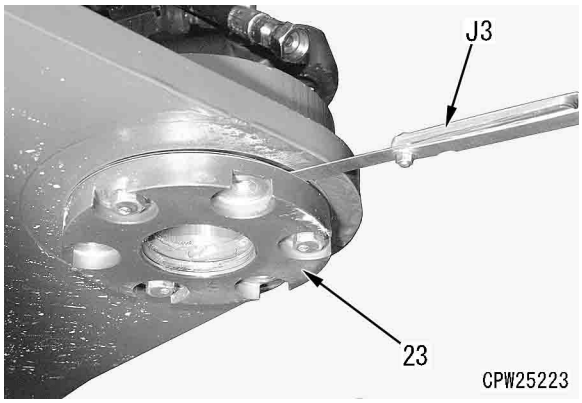


5. Disconnect front drive shaft (5). [*2]



6. Sling front axle assembly (6), support the front axle bottom by using jack [2], remove the

- Type of shim thickness: 0.1 mm, 0.2 mm, and 0.5 mm



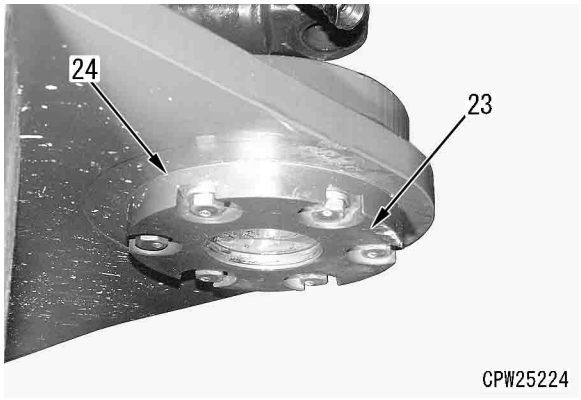
6) Install selected shims (24) and tighten retainer (23) with the mounting bolts (6 pieces).

Threaded part of retainer mounting bolts:

Adhesive (Loctite #2701)

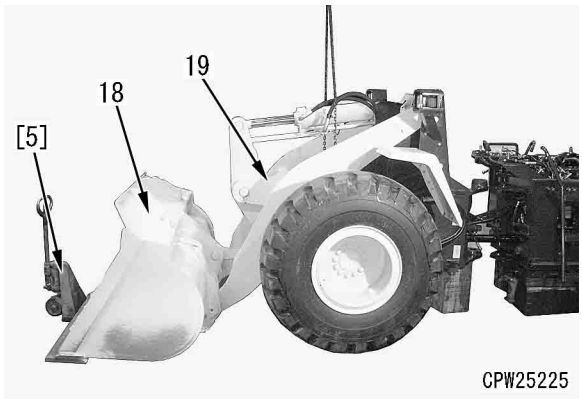
Retainer mounting bolt:

59 to 74 Nm {6 to 7.5 kgm}



★ Install the upper hinge pin and lower hinge pin according to the following procedure.

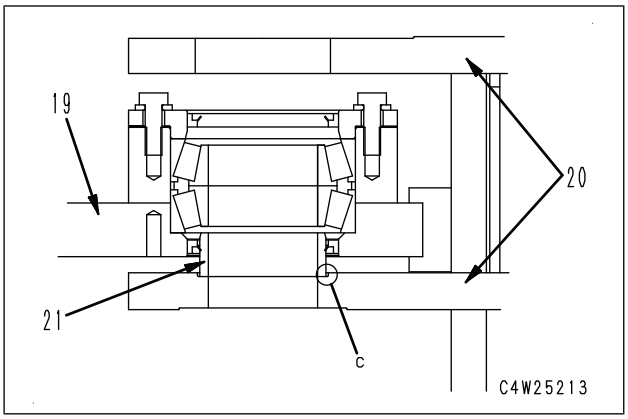
1. Set pallet jack [5] at the bottom of bucket (18), rotate the tire, and move front frame assembly (19) to the rear frame side.



2. Lift front frame assembly (19) 2 to 3mm up by using a bar, etc., and align spacer (21) with the spacer position of rear frame assembly (20).

★ Check that the bottom of upper hinge lower spacer (21) is securely fitted to step (c) of rear frame assembly (20).

★ When a large crane is available, it is also allowed to sling front frame assembly approximately 2 to 3 mm up.



3. Align upper and lower pin hole positions.

★ Adjust the height of front and rear frames by using a hydraulic jack, and align pin hole positions.

⚠ When aligning pin holes, use a bar, etc. Never insert your finger into the holes.

4. Install upper spacer (17).

★ Install so that chamfered surface part faces the bearing.

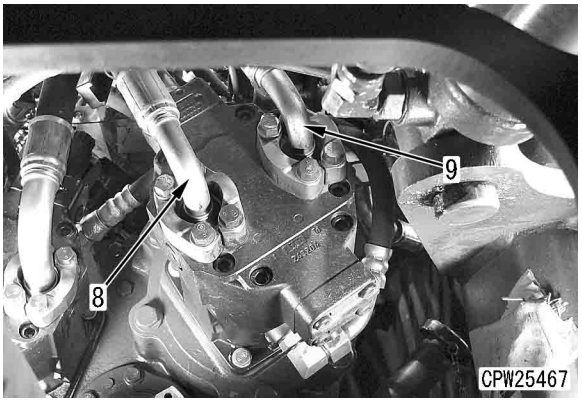
Both end and inside of upper spacer (17):

Molybdenum disulfide lubricant (LM-P)

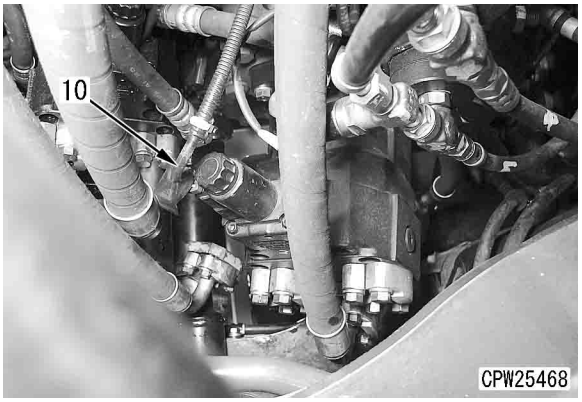
5. Insert lower hinge pin (11) and upper hinge pin (15) until they reaches to the end.

★ Install lower hinge pin (11) with expansion fit (cool it down below -40°C for 10 hours or more)

★ Do not insert shims for the upper hinge pin.

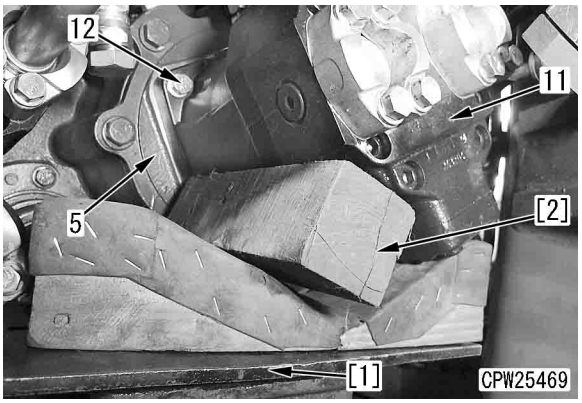


5. Disconnect connector HST-M (10).



6. Remove HST motor 1 assembly according to the following procedure.
   1) Set transmission jack [1] at the bottom of HST motor 1 assembly (11).
   2) Remove mounting bolts (12) (4 pieces), and disconnect it from transfer (5). [*2]
   3) Disconnect HST motor 1 assembly (11) while gradually lowering transmission jack [1].
      ★ Since the bottom of HST motor 1 assembly (11) is not flat, use block [2], etc. to stabilize it on the jack [1].

HST motor 1 assembly (11): 40 kg



Installation *(WA270-C173-720-K-00-A)*

- Perform installation in the reverse order to removal.

[*1]

Front drive shaft (4) mounting bolt:
59 to 74 Nm {6.0 to 7.5 kgm}

★ Precautions for installation of front drive shaft
Check that key of spider cap is completely fitted to key groove of the mating yoke, and tighten the mounting bolt.

[*2]

HST motor 1 assembly mounting bolt (12):
98 to 123 Nm {10 to 12.5 kgm}

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

Hydraulic tank:
78 ℓ

engine to circulate the coolant. Then check the coolant level again.

Radiator:

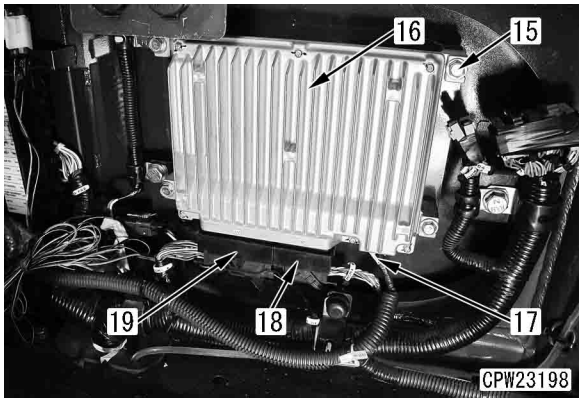
Only necessary quantity

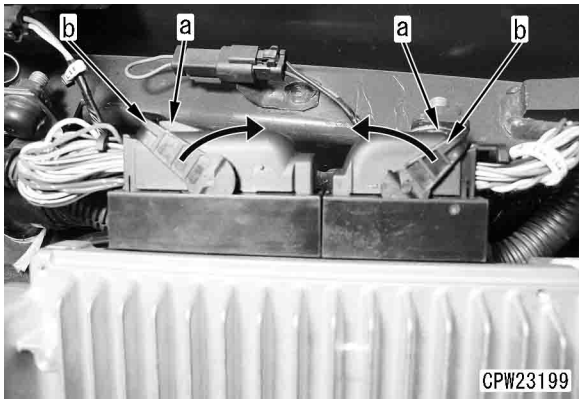
- Refilling with oil
  Refill with oil to the specified level through the oil filler port of the hydraulic tank. Run the engine to circulate the oil through the piping. Then check the oil level again.

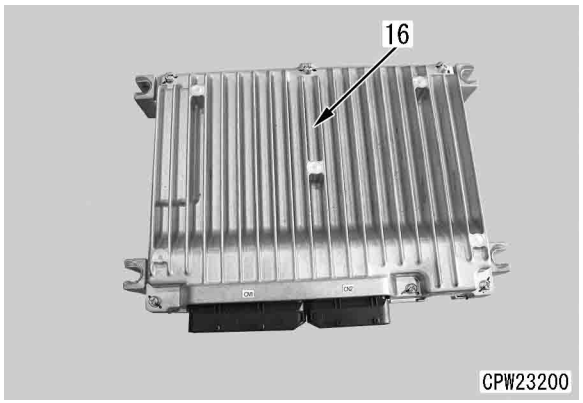
Hydraulic tank:

Only necessary quantity

- Bleed air from the wheel brake circuit. For details, see Testing and adjusting "Bleeding air from wheel brake circuit".
- Bleed air from the steering cylinder circuit. For details, see Testing and adjusting, "Bleeding air from steering cylinder circuit".







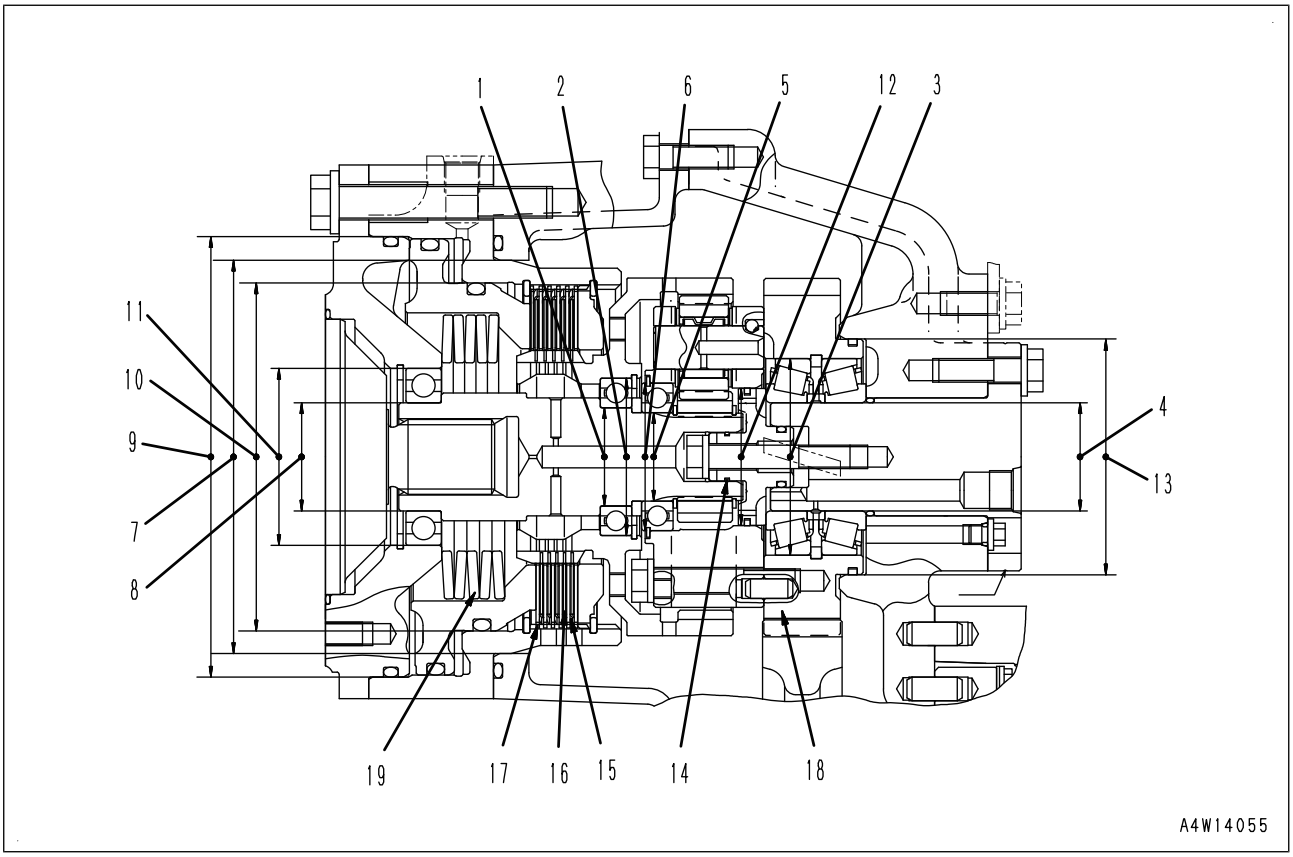
Installation *(WA320-Q180-720-K-00-A)*

- Perform installation in the reverse order to removal.

[*1]

★ For connectors MCM1B (18) and MCM1A (19), securely lock tab (a).

Input shaft

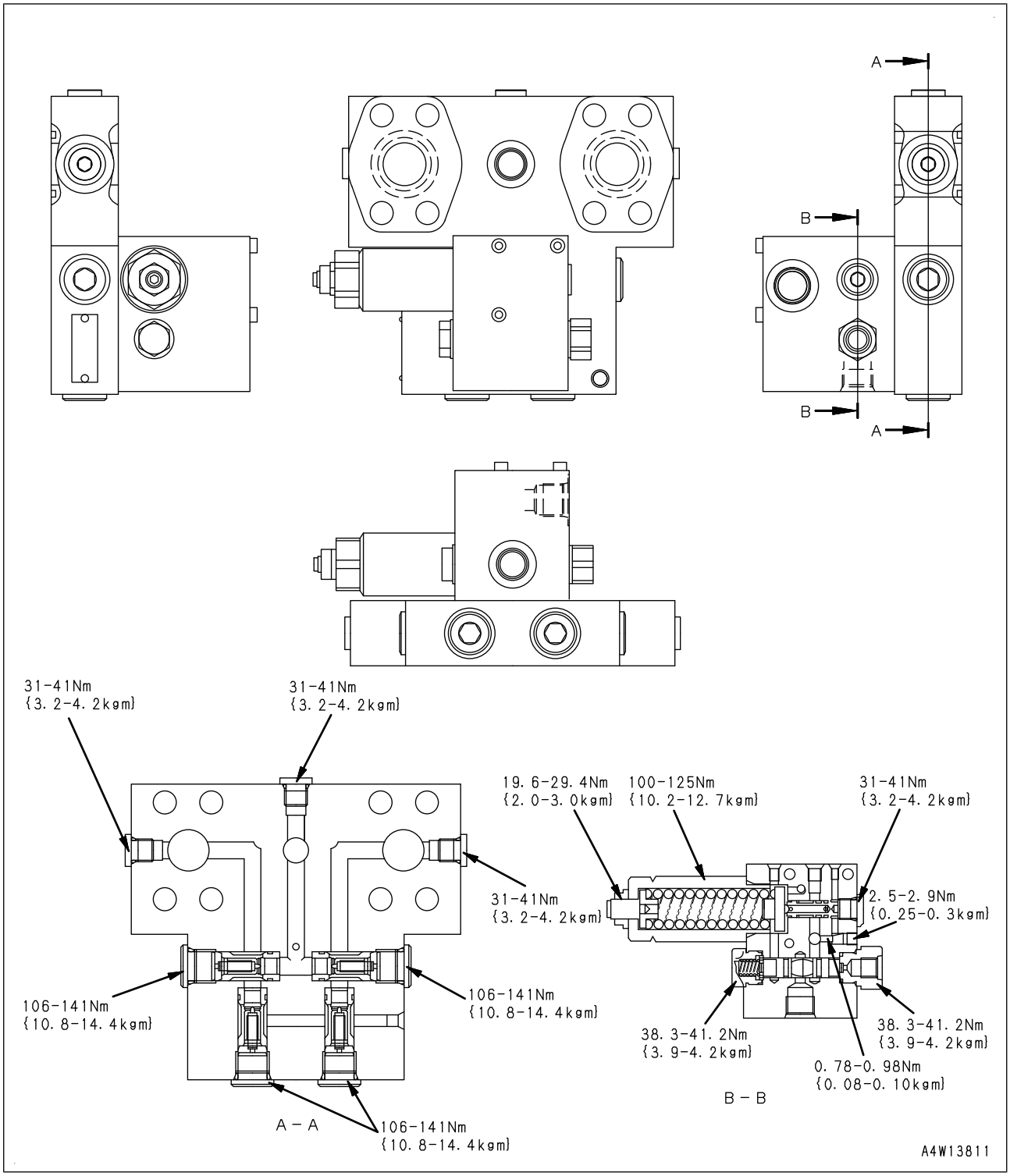


Unit: mm

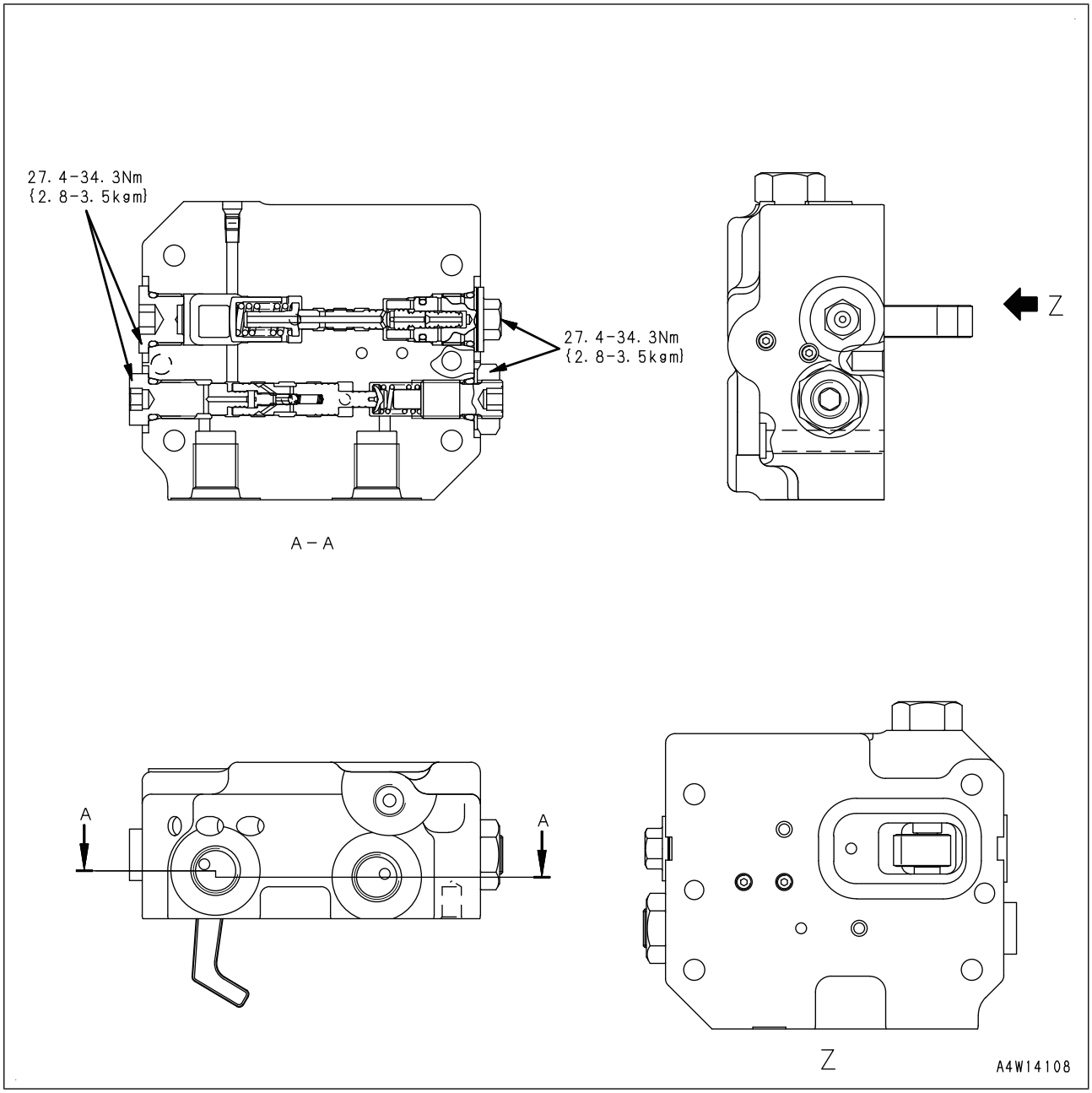
No.	Item	Criteria					Remedy
		Standard dimension	Tolerance		Standard clearance	Allowable clearance	
			Shaft	Hole			
1	Clearance between input shaft and bearing (center)	50	+0.011 –0.005	0 –0.012	–0.023 to 0.005	-	Replace
2	Clearance between input shaft bearing and ring gear (center)	80	0 –0.013	+0.013 –0.006	–0.006 to 0.026	-	
3	Clearance between press-fitted shaft bearing and motor 1 gear	100	0 –0.018	–0.016 –0.038	–0.038 to 0.002	-	
4	Clearance between press-fitted shaft and bearing	55	+0.039 +0.020	0 –0.015	–0.054 to –0.020	-	
5	Clearance between input shaft and bearing (rear)	45	+0.011 –0.005	0 –0.012	–0.023 to 0.005	-	
6	Clearance between input shaft bearing and carrier (rear)	75	0 –0.013	+0.013 –0.006	–0.006 to 0.026	-	
7	Clearance between cage and front case	200	0 –0.046	+0.046 0	0 to 0.092	-	
8	Clearance between input shaft and bearing (front)	55	+0.012 –0.007	0 –0.012	–0.024 to 0.007	-	
9	Clearance between piston and cage (large diameter)	222	–0.100 –0.200	+0.046 0	0.100 to 0.246	-	

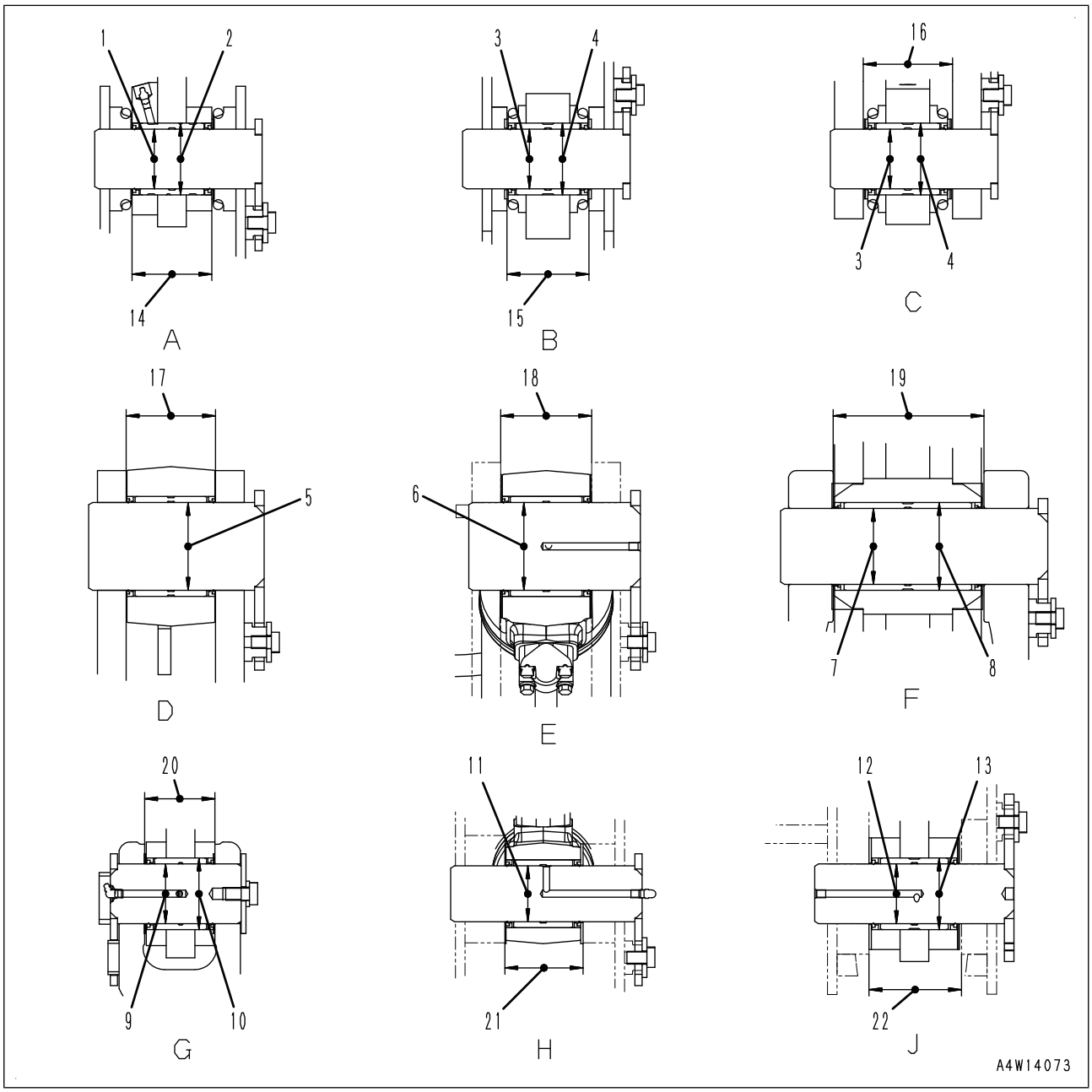
Emergency steering valve *(WA320-F960-034-K-00-A)*

(with emergency steering system)



Servo valve *(WA270-C2B0-034-K-00-A)*

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A4W14073

Functions of major components *(ALL-K540-001-K-00-A)*

★ For details of the numbers in the following sentence, see “Air conditioner unit”.

Evaporator *(WA380-K549-042-K-00-A)*

- Evaporator (1) is cooled by low-pressure and low-temperature refrigerant gas sent from expansion valve (3).
- The air sent by blower motor (4) is cooled and dehumidified as well when the air passes through the fins of the evaporator.

Heater core *(WA380-K547-042-K-00-A)*

- Heater core (2) is heated by hot water (engine coolant) sent from the engine.
- Air sent by blower motor (4) is heated when it passes through the fins of the heater core (2).

Evaporator temperature sensor *(WA380-K5FF-042-K-00-A)*

- Evaporator temperature sensor (14) is installed to evaporator (1) with the holder and changes its resistance according to the temperature of the evaporator (1).
- The air conditioner controller determines the evaporator temperature from the voltage value of the evaporator temperature sensor (14) and turns the compressor on/off to prevent freeze of the evaporator (1).
- Resistance value between terminals
  At 0 °C: 6.65 kΩ
  At 25 °C: 2.0 kΩ

Inner sensor *(WA380-K55W-042-K-00-A)*

- The inner sensor (inside air temperature sensor) (15) is installed at the recirculation air suction port of the air conditioner unit and changes the resistance of its resistor according to the temperature inside the cab.
- The air conditioner controller converts this resistance value into the voltage value to determine the temperature inside the cab.
  Resistance: At 0 °C: 7.2 kΩ
  At 25 °C: 2.2 kΩ

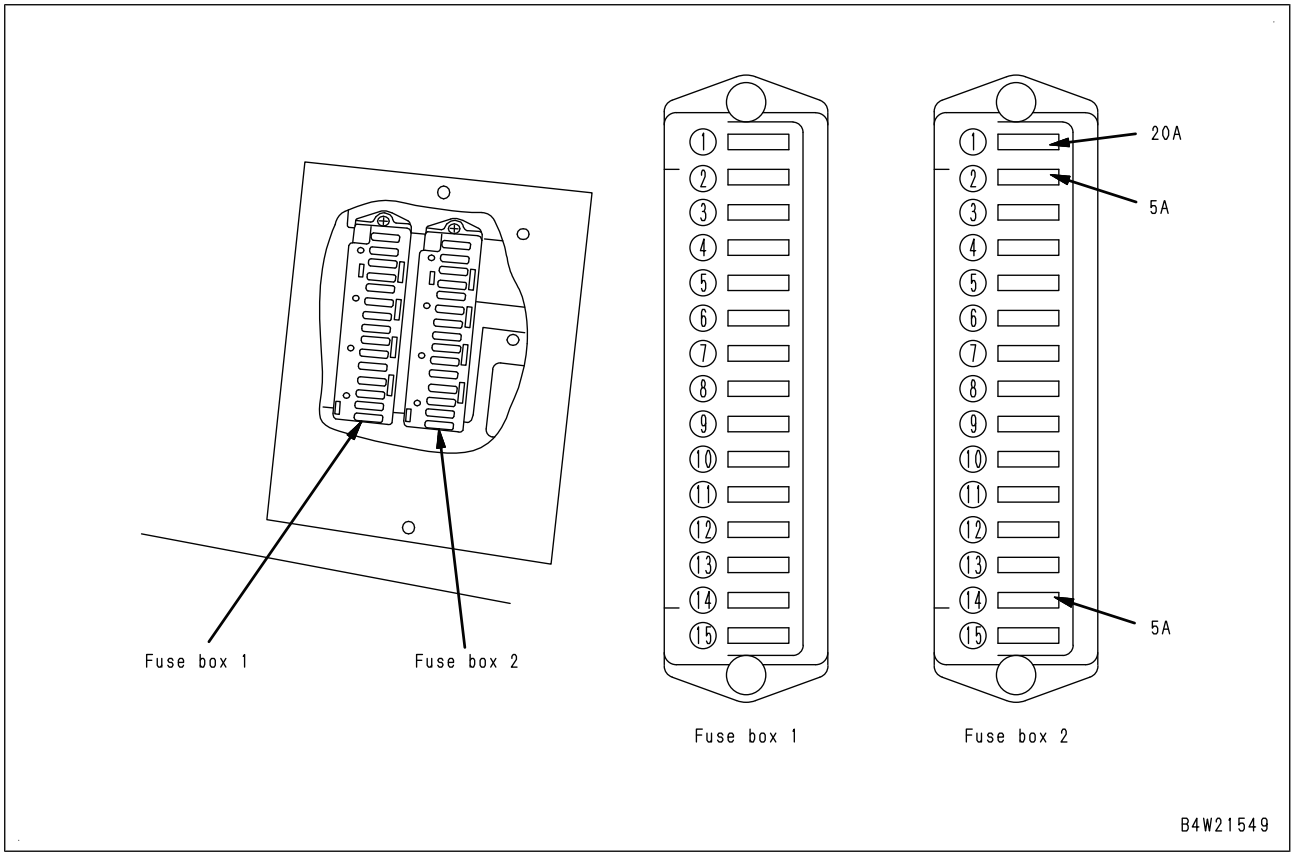
Blower amplifier *(WA380-K55Z-042-K-00-A)*

- The blower amplifier (13) receives signal current from the air conditioner controller and controls the speed of blower motor (4) .

[3] Sunlight sensor connector
[4] Inside air temperature sensor connector
[5] Evaporator temperature sensor connector
[6] outside air temperature sensor connector
[7] Air mix actuator connector
[8] Vent mode actuator connector
[9] FRESH/RECIC air changeover actuator connector
[11] Pressure switch connector
[12] Blower OFF relay connector
[13] Blower amplifier connector
[14] Compressor clutch relay connector

★ Fuses are provided at two locations; inside the air conditioner unit (harness) and the fuse box at rear left of operator's seat (double arrangement).

1. Open the cover of fuse box at the rear left of the operator's seat. (See Troubleshooting, "Location of fuses".)
   - Fuse No. 1 in fuse box 2: 20 A
     For power supply of blower (fan)
   - Fuse No. 2 in fuse box 2: 5 A
     For air conditioner compressor
   - Fuse No. 14 in fuse box 2: 5 A
     For power supply of air conditioner unit
   - Part No. of fuse
     5 A: 08041-00500
     20 A: 08041-02000



2. Remove cover (1).

Information in troubleshooting table *(ALL-5170-421-A-03-A)*

Information in troubleshooting table

★ The following information is summarized in the troubleshooting table. Before performing troubleshooting, understand that information fully.

Failure	Failure symptom that appears on machine
Related information	Information on occurred failure or troubleshooting

Cause		Procedure, measuring location, criteria and remarks
1	Probable cause of failure (Perform troubleshooting according to these.)	[Information described] • Procedure • Measuring location ★ "Between A and B" denotes measuring voltage or resistance, etc. between A and B. • Criteria to determine probable causes • Remarks for judgment of Good or No good [Notes on troubleshooting] (1) pin number description sequence and tester lead handling For troubleshooting, connect the plus (+) and minus (-) tester leads as shown below unless otherwise specified. • Connect the plus (+) lead to a pin or harness indicated in the front. • Connect the minus (-) lead to a pin or harness indicated in the rear. (2) Example of troubleshooting done by testing multiple items ★ Normal in 1 but abnormal in 2 At this time, "Defective component" shown at left 3 is applied.
2		
3	Defective —	

★ If a wiring harness is burnt, replace it.

[Defective wiring harness]

- Open circuit
  Connection of connector is defective or wiring harness is broken.
- Ground fault
  A harness not to be connected to the ground (earth) circuit comes into contact with the ground (earth) circuit or chassis accidentally.
- Hot short circuit
  A harness not to be connected to the power (24V) circuit comes into contact with the power (24V) circuit accidentally.
- Short circuit
  An independent wire in the harness abnormally comes into contact with another independent wire. (poor insulation at connector and others)

Related circuit diagram

This is the extracted circuit diagram related to failure

- Indicates connector No., and pin No.
- See "Circuit diagram and arrangement of connector pins" and "Parts and connectors layout" for connector location
- The circuit diagram shows the size and colors of wires.
  W: White, B: Black, R: Red, G: Green, Y: Yellow, L: Blue, V: Purple, P: Pink, O: Orange, Br: Brown, Gr: Gray, Sb: Sky blue, Lg: Light green, Dg: Dark green, Ch: Dark brown

  ★ When there are two colors
  Example: WY: Yellow line on white background

  ★ The number before the wire color indicates the wire size.
- N.C.: Normally closed (Normally ON)
- [1], [2], ... are numbers of unlabeled connectors.
- The arrow (⟷) indicates their rough installation position on the machine.