SEN05717-01

Shop Manual

WHEEL LOADER

WA380 -6
WA380Z-6

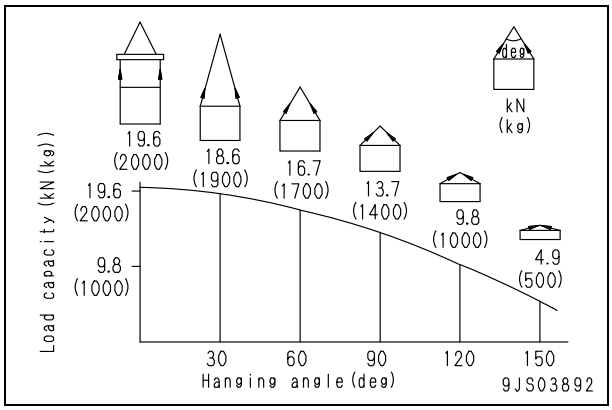
SERIAL NUMBERS WA380- 65001 and up
WA380Z- 66446

ecot3

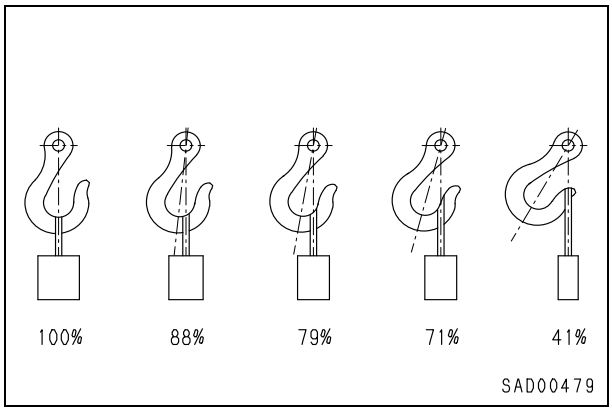
KOMATSU

4. Precautions for sling work and making signs

1) Only one appointed worker must make signs and co-workers must communicate with each other frequently. The appointed sign maker must make specified signs clearly at a place where he is well seen from the operator's seat and where he can see the working condition easily. The sign maker must always stand in front of the load and guide the operator safely.
   - Do not stand under the load.
   - Do not step on the load.
2) Check the slings before starting sling work.
3) Keep putting on gloves during sling work. (Put on leather gloves, if available.)
4) Measure the weight of the load by the eye and check its center of gravity.
5) Use 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.
6) Do not sling a load with 1 wire rope alone. If it is slung so, it may rotate and may slip out of the rope. Install 2 or more wire ropes symmetrically.
   ⚠ Slinging with 1 rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.
7) Limit the hanging angle to 60°, as a rule. Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with 2 or more ropes, the force subjected to each rope will increase with the hanging angle. The table below shows the variation of allowable load in kN {kg} when hoisting is made with 2 ropes, each of which is allowed to sling up to 9.8 kN {1,000 kg} vertically, at various hanging angles. When the 2 ropes sling a load vertically, up to 19.6 kN {2,000 kg} of total weight can be suspended. This weight is reduced to 9.8 kN {1,000 kg} when the 2 ropes make a hanging angle of 120°. If the 2 ropes sling a 19.6 kN {2,000 kg} load at a lifting angle of 150°, each of them is subjected to a force as large as 39.2 kN {4,000 kg}.



8) 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.
9) Use the specified eyebolts and fix wire ropes, chains, etc. to them with shackles, etc.
10) Apply wire ropes to the middle portion of the hook.
    - Slinging near the tip of the hook may cause the rope to slip off the hook during hoisting. The hook has the maximum strength at the middle portion.



11) Do not use twisted or kinked wire ropes.
12) When lifting up a load, observe the following.
    - Wind in the crane slowly until wire ropes are stretched. When settling the wire ropes with the hand, do not grasp them but press them from above. If you grasp them, your fingers may be caught.
    - After the wire ropes are stretched, stop the crane and check the condition of the slung load, wire ropes, and pads.

3. Color codes table

(Table 3)

Color Code	Color of wire	Color Code	Color of wire
B	Black	LgW	Light green & White
Br	Brown	LgY	Light green & Yellow
BrB	Brown & Black	LR	Blue & Red
BrR	Brown & Red	LW	Blue & White
BrW	Brown & White	LY	Blue & Yellow
BrY	Brown & Yellow	O	Orange
Ch	Charcoal	P	Pink
Dg	Dark green	R	Red
G	Green	RB	Red & Black
GB	Green & Black	RG	Red & Green
GL	Green & Blue	RL	Red & Blue
Gr	Gray	RW	Red & White
GR	Green & Red	RY	Red & Yellow
GW	Green & White	Sb	Sky Blue
GY	Green & Yellow	Y	Yellow
L	Blue	YB	Yellow & Black
LB	Blue & Black	YG	Yellow &Green
Lg	Light green	YL	Yellow & Blue
LgB	Light green & Black	YR	Yellow & Red
LgR	Light green & Red	YW	Yellow & White

Remarks: In a color code consisting of 2 colors, the first color is the color of the background and the second color is the color of the marking.
Example: “GW” means that the background is Green and marking is White.

4. Types of circuits and color codes

(Table 4)

Type of wire		AVS or AV						AEX	
Type of circuit	Charge	R	WG	–	–	–	–	R	–
	Ground	B	–	–	–	–	–	B	–
	Start	R	–	–	–	–	–	R	–
	Light	RW	RB	RY	RG	RL	–	D	–
	Instrument	Y	YR	YB	YG	YL	YW	Y	Gr
	Signal	G	GW	GR	GY	GB	GL	G	Br
	Others	L	LW	LR	LY	LB	–	L	–
		Br	BrW	BrR	BrY	BrB	–	–	–
		Lg	LgR	LgY	LgB	LgW	–	–	–
		O	–	–	–	–	–	–	–
		Gr	–	–	–	–	–	–	–
		P	–	–	–	–	–	–	–
		Sb	–	–	–	–	–	–	–
		Dg	–	–	–	–	–	–	–
		Ch	–	–	–	–	–	–	–

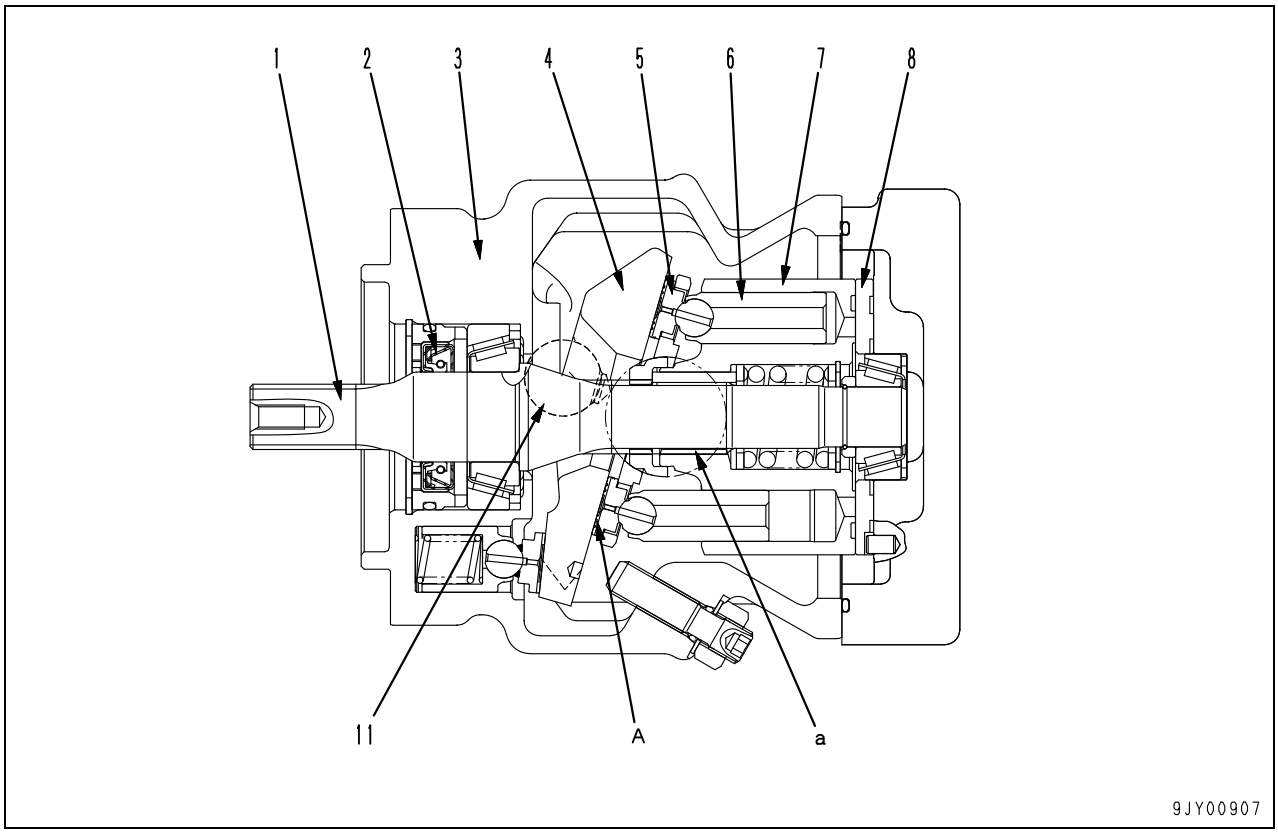
Specifications

(WA380-6)

Machine model name			WA380-6	
Serial number			65001 and up	
Weight	Machine weight	kg	16,485	
	Machine weight (Front wheel) in SAE travel posture	kg	7,595	
	Machine weight (Rear wheel) in SAE travel posture	kg	8,890	
Performance	Bucket capacity (Heaped)	m^3	3.3	
	Operating load	kg	5,280	
			E-mode	P-mode
	Travel speed (Forward 1st)	km/h	5.1	6.0
	(Forward 2nd)		8.8	10.6
	(Forward 3rd)		15.4	18.6
	(Forward 4th)		25.1	31.1
	(Reverse 1st)	km/h	5.5	6.5
	(Reverse 2nd)		9.4	11.3
	(Reverse 3rd)		16.3	19.9
	(Reverse 4th)		26.5	33.0
	Maximum drawbar pull (Forward)	kN {kg}	130 {13,200}	181 {18,400}
	(Reverse)		119 {12,100}	165 {16,860}
	Gradeability	deg.	25	
	Min. turning radius (Center of outside tire)	mm	6,320	
	Turning radius (Teeth edge/BOC tip) SAE travel posture	mm	7,190/7,220	
Dimension	Overall length (With BOC)	mm	8,195	
	Overall width (Machine body)	mm	2,695	
	Bucket width (With BOC)	mm	2,905	
	Overall height (Cab top)	mm	3,325	
	Overall height with bucket lifted up	mm	5,535	
	Wheelbase	mm	3,300	
	Tread	mm	2,160	
	Minimum ground clearance	mm	390	
	Max. hinge pin height	mm	4,030	
	Dumping clearance (*1) (Teeth edge/BOC tip)	mm	2,970/2,885	
	Dumping reach (*1) (Teeth edge/BOC tip)	mm	1,165/1,210	
	Steering angle	deg.	35	
	Bucket tilt-back angle (Operating posture)	deg.	50	
	(Max. height)		66	
	Bucket tilt-forward angle (Max. height)	deg.	49	
	Digging depth, 10° (Teeth edge/Edge tip)	mm	310/360	

*1: Indicates the value at the 45° bucket dump angle.

★ BOC: Abbreviation for Bolt-On Cutting edge



Function

- The rotation and torque of the engine are transmitted to the shaft of this pump. Then, this pump converts the rotation and torque into hydraulic energy and discharges hydraulic oil according to the load.
- It is possible to change the delivery by changing the swash plate angle.

Structure

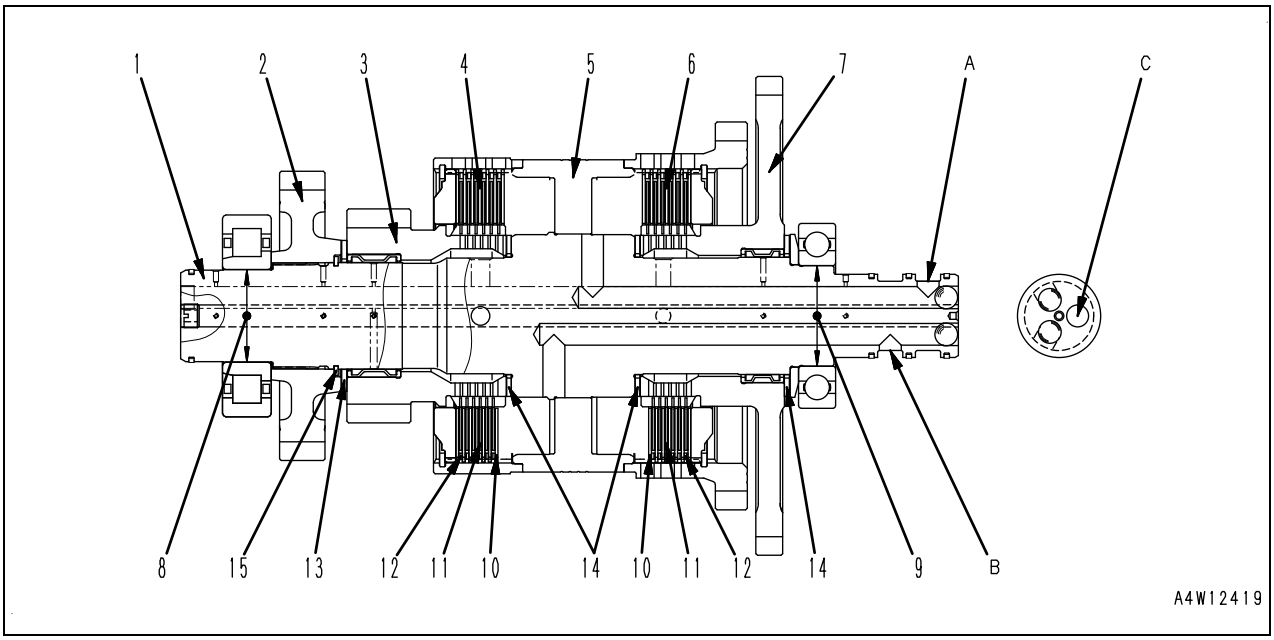
- Cylinder block (7) is supported to shaft (1) by spline (a), and shaft (1) is supported by the front and rear bearings.
- The tip of piston (6) is a concave ball, and shoe (5) is caulked to it to form one unit. Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has flat surface (A), and shoe (5) is always pressed against this surface as it slides in a circle. Rocker cam (4) also slides around ball (11) using it as fulcrum.
- Piston (6) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (7).
- Cylinder block (7) carries out rotation relative to valve plate (8) while sealing the pressurized oil, and this surface ensures that the hydraulic balance is maintained correctly.
- And oil in each cylinder chamber of cylinder block (7) is available for suction or discharge through valve plate (8).

Final drive..... 78

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
1	Clearance between PTO gear A bearing and rear case	110	0 –0.015	–0.006 –0.028	–0.028 – 0.009	—	
	Clearance between PTO gear A bearing and PTO gear A	60	+0.021 +0.002	0 –0.015	–0.036 – –0.002	—	
2	Clearance between input shaft bearing and front case	100	0 –0.015	+0.030 0	0 – 0.045	—	
3	Clearance between input shaft bearing and rear case	110	0 –0.015	+0.030 0	0 – 0.045	—	
4	Clearance between upper shaft bearing and front case	120	0 –0.015	+0.030 0	0 – 0.045	—	
5	Clearance between upper shaft bearing and rear case	110	0 –0.015	+0.030 0	0 – 0.045	—	
6	Clearance between lower shaft bearing and cage	120	0 –0.018	+0.035 0	0 – 0.053	—	
7	Clearance between lower shaft bearing and rear case	110	0 –0.018	+0.035 0	0 – 0.053	—	
8	Clearance between output shaft bearing and retainer	120	0 –0.018	–0.015 –0.040	–0.040 – 0.003	—	
	Clearance between output shaft bearing and output shaft	65	+0.030 +0.011	0 –0.015	–0.045 – –0.011	—	
9	Clearance between output shaft bearing and front case	140	0 –0.020	–0.018 –0.058	–0.058 – 0.002	—	
	Clearance between output shaft bearing and output shaft	65	+0.030 +0.011	0 –0.015	–0.045 – –0.011	—	
		Standard size	Tolerance		Repair limit		
10	Inside diameter of input shaft seal ring contact surface (front)	55	+0.05 0		55.1		Replace
	Width of input shaft seal ring groove (front)	3.2	+0.076 0		3.5		
11	Inside diameter of input shaft seal ring contact surface (rear)	60	+0.05 0		60.1		
	Width of input shaft seal ring groove (rear)	3.2	+0.076 0		3.5		
12	Inside diameter of upper shaft seal ring contact surface (front)	55	+0.05 0		55.1		
	Width of upper shaft seal ring groove (front)	3.2	+0.076 0		3.5		
13	Inside diameter of upper shaft seal ring contact surface (rear)	50	+0.05 0		50.1		
	Width of upper shaft seal ring groove (rear)	3.2	+0.076 0		3.5		
14	Inside diameter of lower shaft seal ring contact surface (front)	60	+0.03 0		60.1		
	Width of lower shaft seal ring groove (front)	3.2	+0.076 0		3.5		
15	Inside diameter of lower shaft seal ring contact surface (rear)	50	+0.05 0		50.1		
	Width of lower shaft seal ring groove (rear)	3.2	+0.076 0		3.5		
16	Outside diameter of front coupling oil seal contact surface	80	0 –0.074		79.8		
17	Outside diameter of rear coupling oil seal contact surface	80	0 –0.074		79.8		
18	Clearance between cage and case	Standard clearance			Clearance limit		
		1.19 – 1.95 (Standard shim thickness 1.4)			—		
19	Clearance between retainer and case	0.85 – 1.42 (Standard shim thickness 1.0)			—		
20	Free rotational torque of output shaft	0.74 – 1.46 Nm {0.076 – 0.149 kgm}					

1st and 4th clutches



A: 4th clutch oil port
B: 1st clutch oil port
C: Lubricating oil port

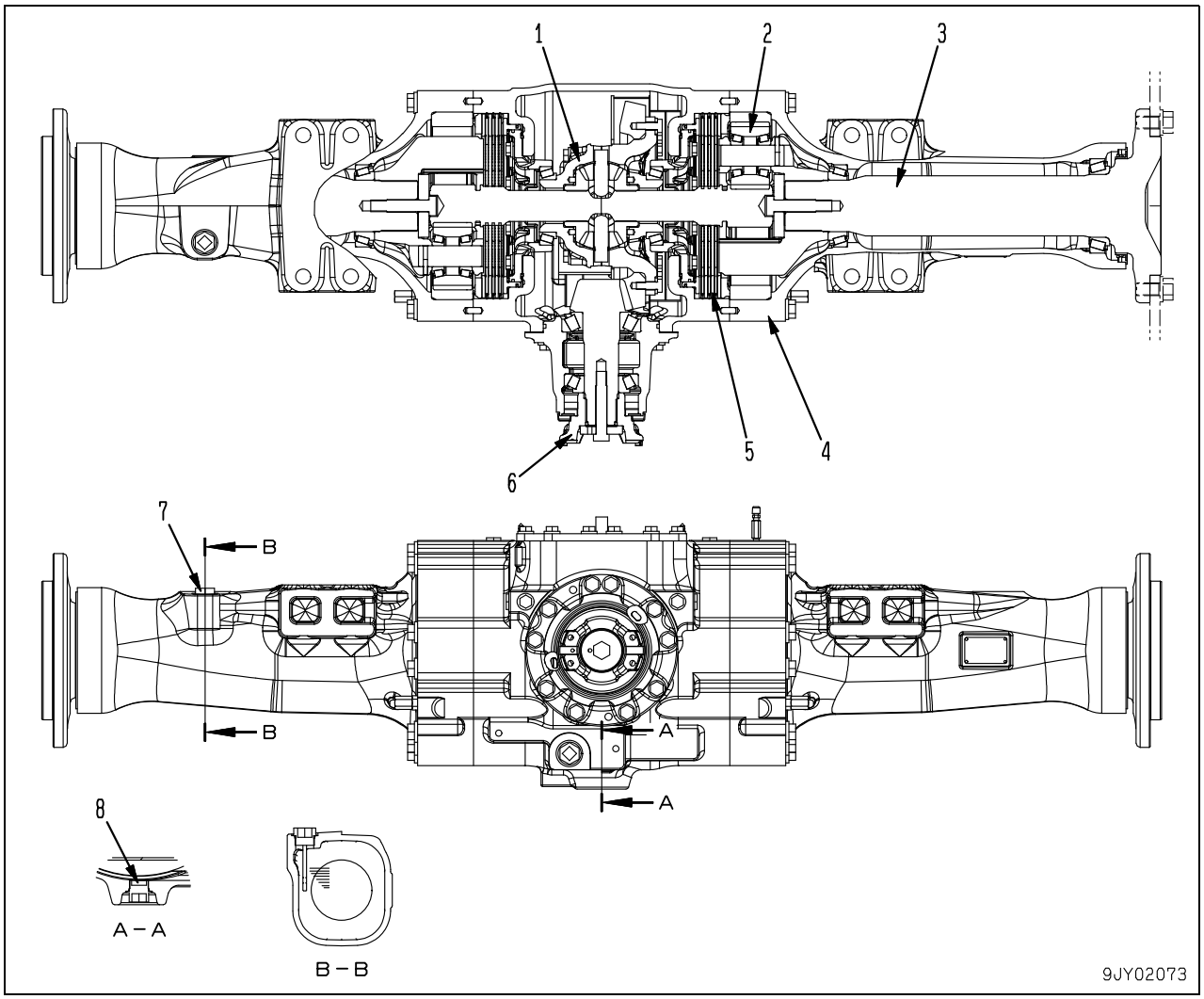
1. Upper shaft
2. Upper gear (Number of teeth: 36)
3. 1st clutch gear (Number of teeth: 25)
4. 1st clutch
5. 1st and 4th cylinders (Number of teeth: 49)
6. 4th clutch
7. 4th clutch gear (Number of teeth: 62)

Unit: mm

No.	Check item		Criteria					Remedy
8	Clearance between upper shaft bearing and upper shaft (front)		Standard size	Tolerance		Standard clearance	Clearance limit	Replace
				Shaft	Hole			
			55	+0.035 +0.025	0 -0.015	-0.050 – 0.025	—	
9	Clearance between upper shaft bearing and upper shaft (rear)		60	+0.039 +0.020	0 -0.015	-0.054 – 0.020	—	
10	Clutch plate	Thickness	Standard size: 1.7	Tolerance: ±0.05		Repair limit: 1.53		
		Strain	—: —	0.05		0.15		
11	Clutch disc	Thickness	2.2	±0.08		1.82		
		Strain	—	0.1		0.25		
12	Load of wave spring [Testing height: 2.2 mm]		1,010 N {103 kg}	±101 N {±10.3 kg}		859 N {87.6 kg}		
13	Thrust washer thickness (1st clutch)		3	±0.1		2.7		
14	Thrust washer thickness (1st and 4th clutches)		3	±0.1		2.7		
15	Snap ring		Reuse after disassembly not allowed					

Axle

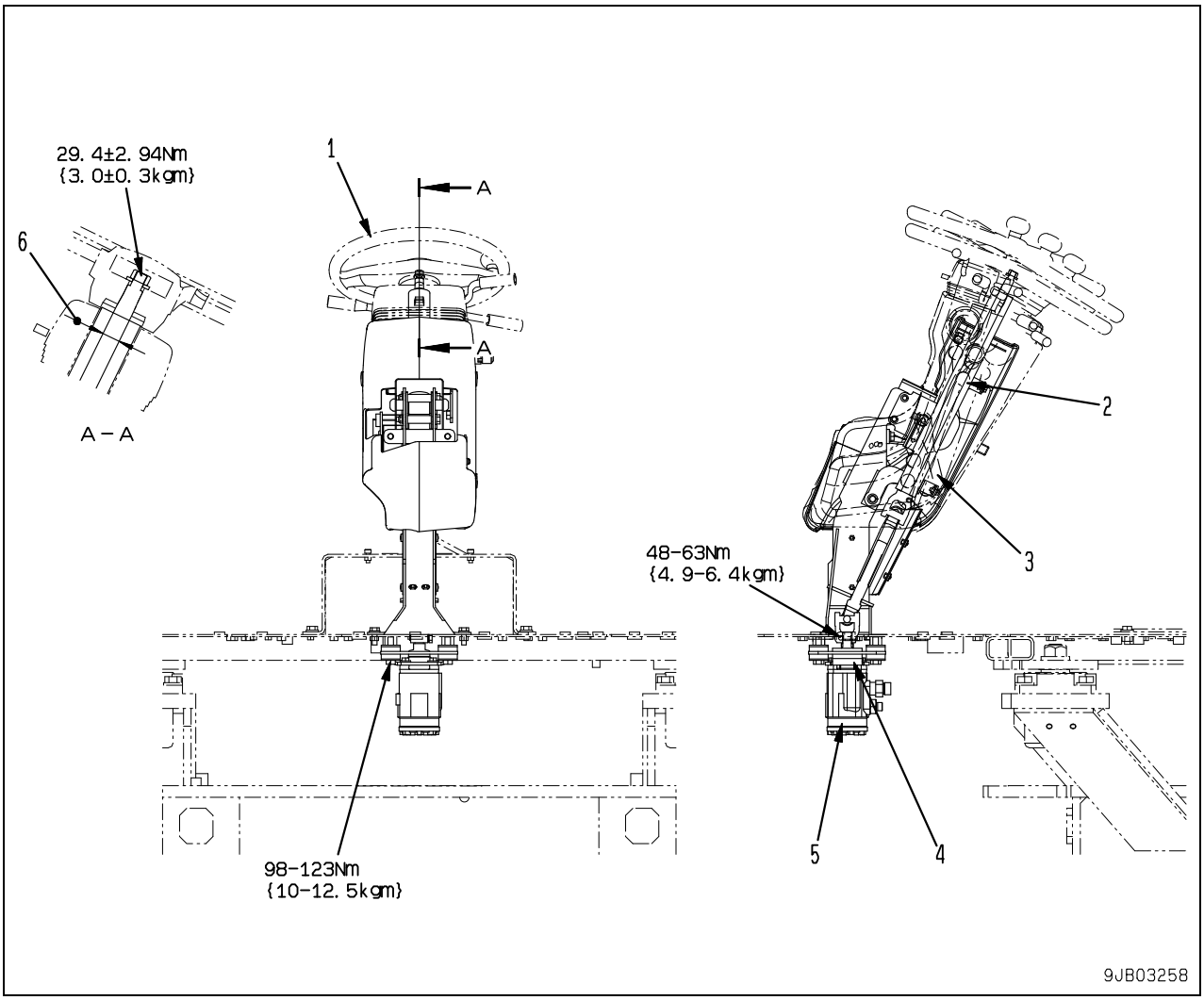
Front axle



1. Differential
2. Final drive
3. Axle shaft
4. Axle housing
5. Wet-type multi-disc brake
6. Coupling
7. Oil filler and level plug
8. Drain plug

Steering column

(WA380-6)



1. Steering wheel
2. Steering column
3. Steering tilt lock lever
4. Short column
5. Orbit-roll valve

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
6	Clearance between steering shaft and column bushing	19	0 –0.08	+0.15 +0.05	0.05 – 0.23	0.4	Replace

When balanced

(Fig. 3)

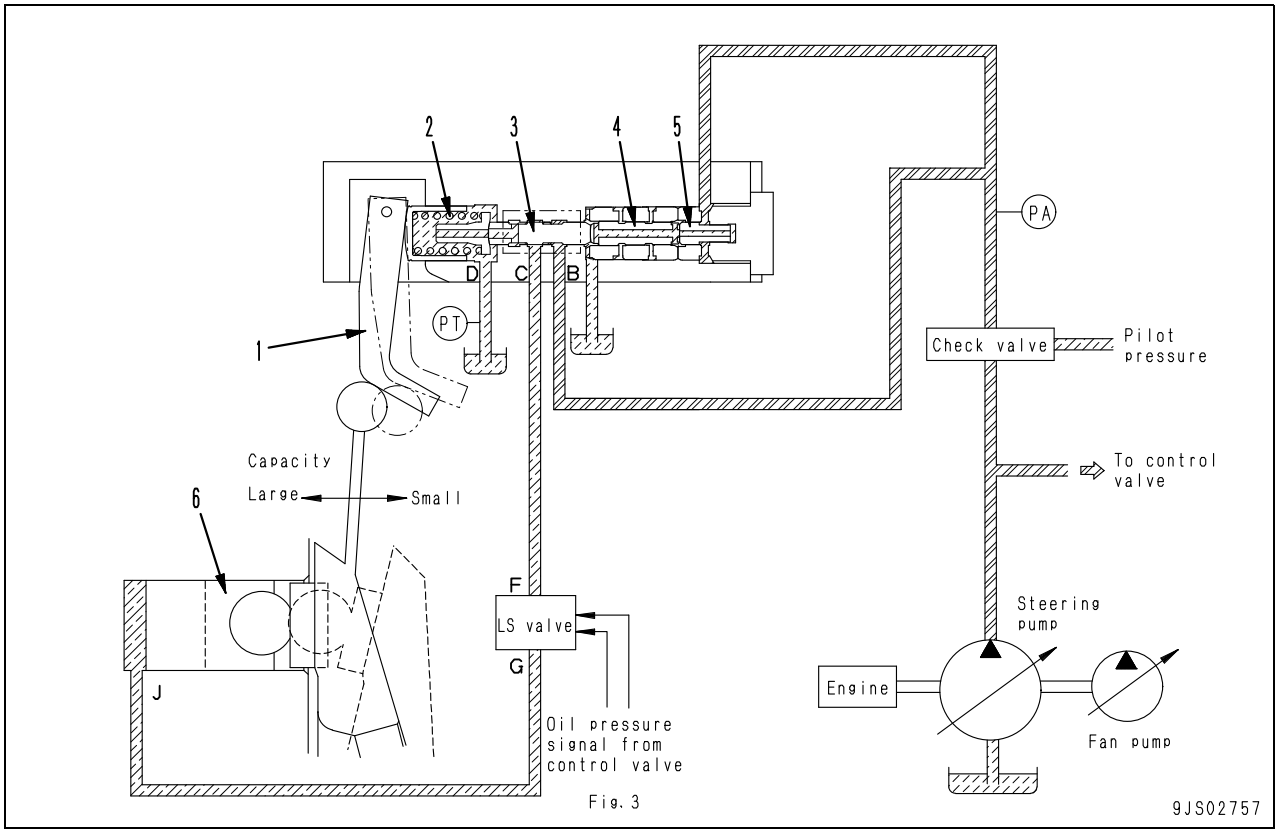


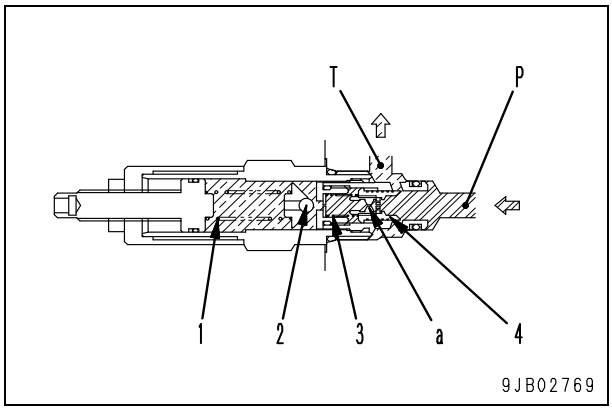
Fig. 3

- As the steering wheel is "turned left", spool (9) being connected to the drive shaft of the steering column is rotated counterclockwise.
- Since spool (9) and sleeve (8) are connected by centering spring(2), spool (9) compresses centering spring (2).
- An angular displacement corresponding to the amount of compression of centering spring (2) is generated between spool (9) and sleeve (8).
- Port (A) and vertical groove (B) are connected first being followed by the connection between vertical groove (B) and port (E), port (E) and vertical groove (C), and vertical groove (C) and port (G) to the L.H. steering circuit.
- Although the connection between vertical groove (B) and orifice (b) of port (J) to the priority valve is maintained, port (K) of sleeve (8) starts gradually closing vertical groove (M) and port (L).
- Port (F) of the R.H. steering circuit is connected to vertical groove (D) at the same time as port (A) and vertical groove (B) are connected.
- Due to connection and disconnection of the ports and vertical grooves, the oil from the pump flows from port (A) to vertical groove (B) then flows to port (E), starting rotation of the Gerotor. The oil discharged from the Gerotor flows to the L.H. steering cylinder head side through port (E), vertical groove (C) and port (G).
- Oil pressure of vertical groove (M) is transmitted to port (J) through orifice (b), then supplied from port (J) as the pilot pressure of the priority valve.
- The oil from the R.H. steering cylinder head is drained to the hydraulic tank through port (F), vertical groove (D) and port (H).

When steering wheel is at "stop" position

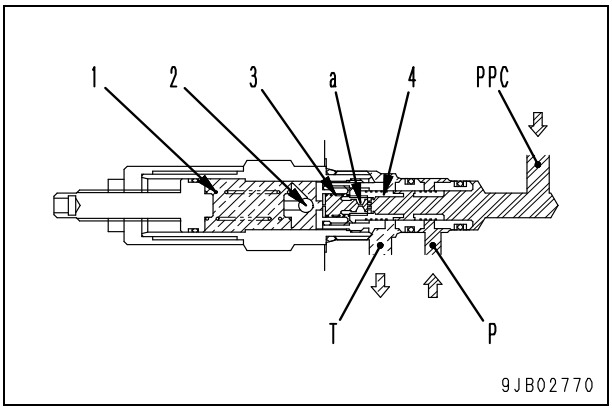
- As operation of the steering wheel is stopped, angular displacement between spool (9) and sleeve (8) disappears and the steering wheel is returned to the neutral position by the repulsive force of centering spring (2).

Main relief valve (R1)



- If the pressure in port (P) (pump pressure) rises above the set pressure, it compresses spring (1) and moves ball (2) to the left.
- The pressure of the oil from the pump is reduced through orifice (a), and the resulting pressure difference compresses spring (3) and moves valve (4) to the left a large amount.
- Port (P) being connected to port (T) drains the pump pressure and, thereby, regulates the maximum pressure in the charge circuit to protect the circuit.

PPC relief valve (R3)

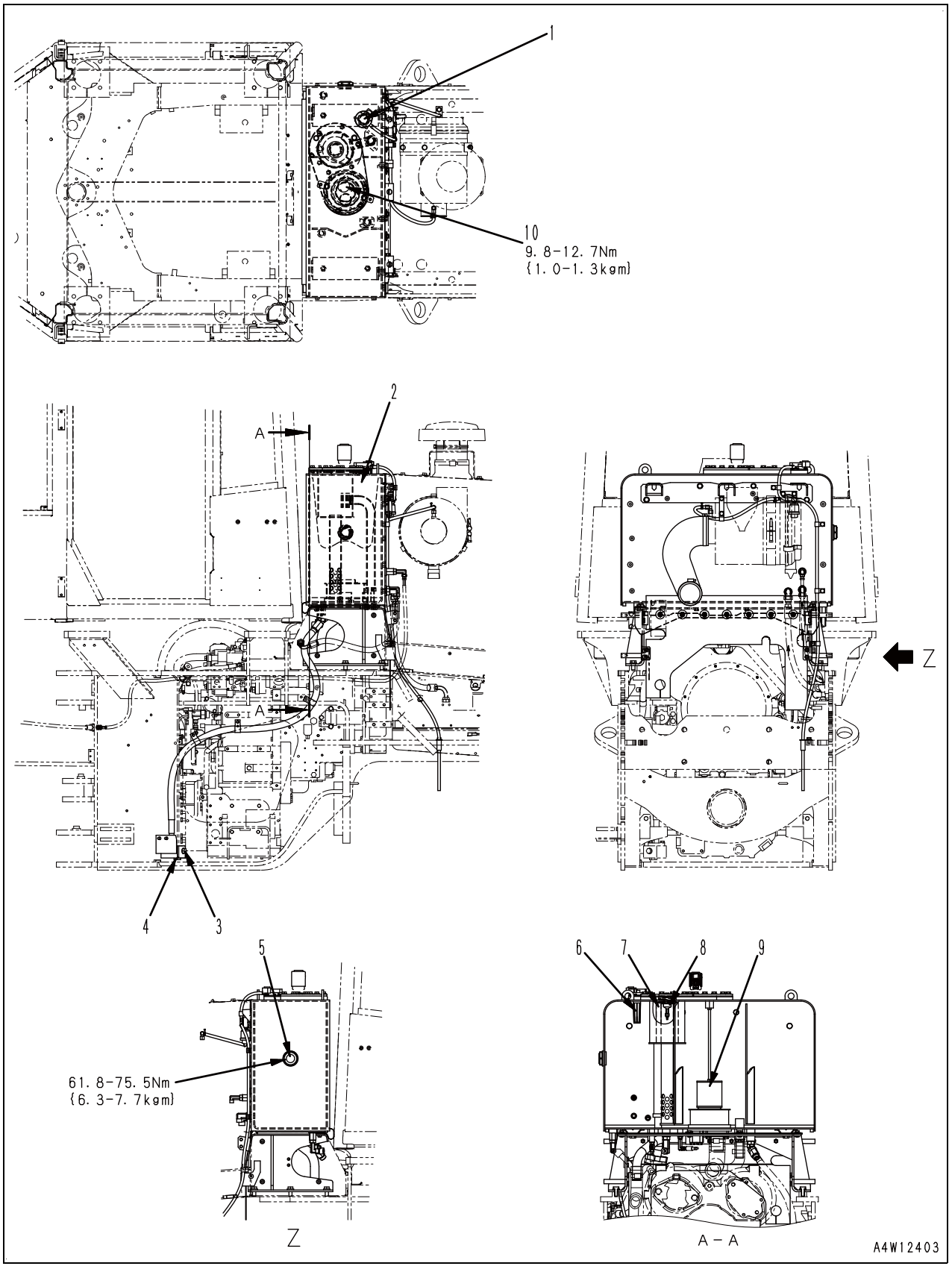


- If the pressure from port (PPC) (pilot pressure) rises above the set pressure, the oil from the pump compresses spring (1) and moves ball (2) to the left.
- The pressure of the oil from the pump is reduced when the oil flows through orifice (a), and the pressure difference compresses spring (3) and moves valve (4) to the left.
- Since the open area between port (PPC) and port (P) is reduced and the pressure drop results, the pressure in port (P) is at the current level without being not lowered to the set pressure of the relief valve.
- The pressure in port (PPC) is adjusted to a specific desired level according to the open area between port (PPC) and port (P) and supplied as the basic pressure of the pilot circuit.
- If abnormal pressure is generated in port (PPC), port (PPC) is connected to port (T) to release the abnormal pressure and protect the pilot circuit.

WA380-6, WA380Z-6 Wheel loader

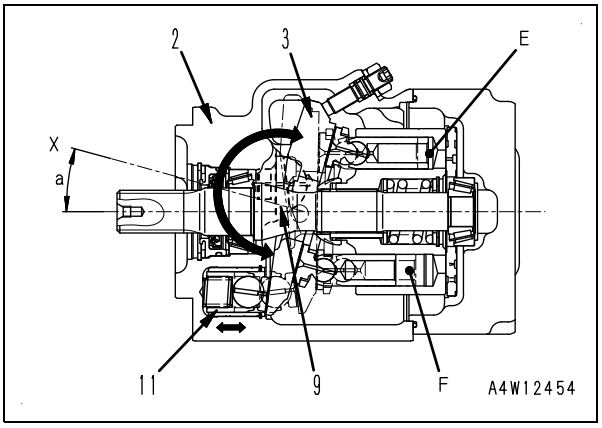
Form No. SEN05727-00

(WA380Z-6)


1
10
9.8-12.7Nm
{1.0-1.3kgm}
2
A
A
4
3
Z
5
61.8-75.5Nm
{6.3-7.7kgm}
Z
6
7
8
9
A-A
A4W12403

2. Control of delivery

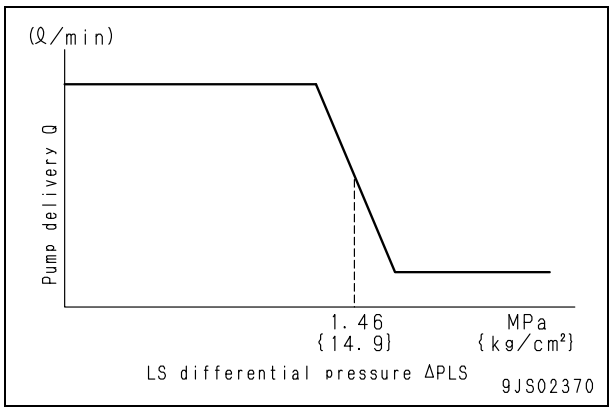
- If the swash plate angle (a) becomes larger, the difference between volumes (E) and (F) becomes larger and pump delivery (Q) increases.
- Servo piston (11) is used for changing swash plate angle (a).
- Servo piston (11) reciprocates straight according to the signal pressure of the PC valve and LS valve.
- This straight-line motion is transmitted to rocker cam (3).
- Rocker cam (3) supported on case (2) through ball (9) is tilted toward axial direction.



LS valve

Function

- The LS valve controls the pump delivery according to the stroke of the control lever, or the demand flow for the actuator.
- The LS valve detects the demand flow for the actuator from differential pressure (ΔPLS) between control valve inlet pressure (PPLS) and control valve outlet pressure (PLS) and controls main pump delivery (Q). ((PPLS) is called the LS pump pressure, (PLS) the LS pressure, and (ΔPLS) is the LS differential pressure.)
- In other words, the pressure loss caused by flow of oil through the opening of the control valve spool (= LS differential pressure ΔPLS) is detected, and then pump delivery (Q) is controlled to keep that pressure loss constant and supply the pump delivery according to the demand flow for the actuator.
- Main pump discharge pressure (PP), LS pump pressure (PPLS), and LS pressure (PLS) are led to the LS valve. The relationship between LS differential pressure (ΔPLS) and pump delivery (Q) changes as shown below.

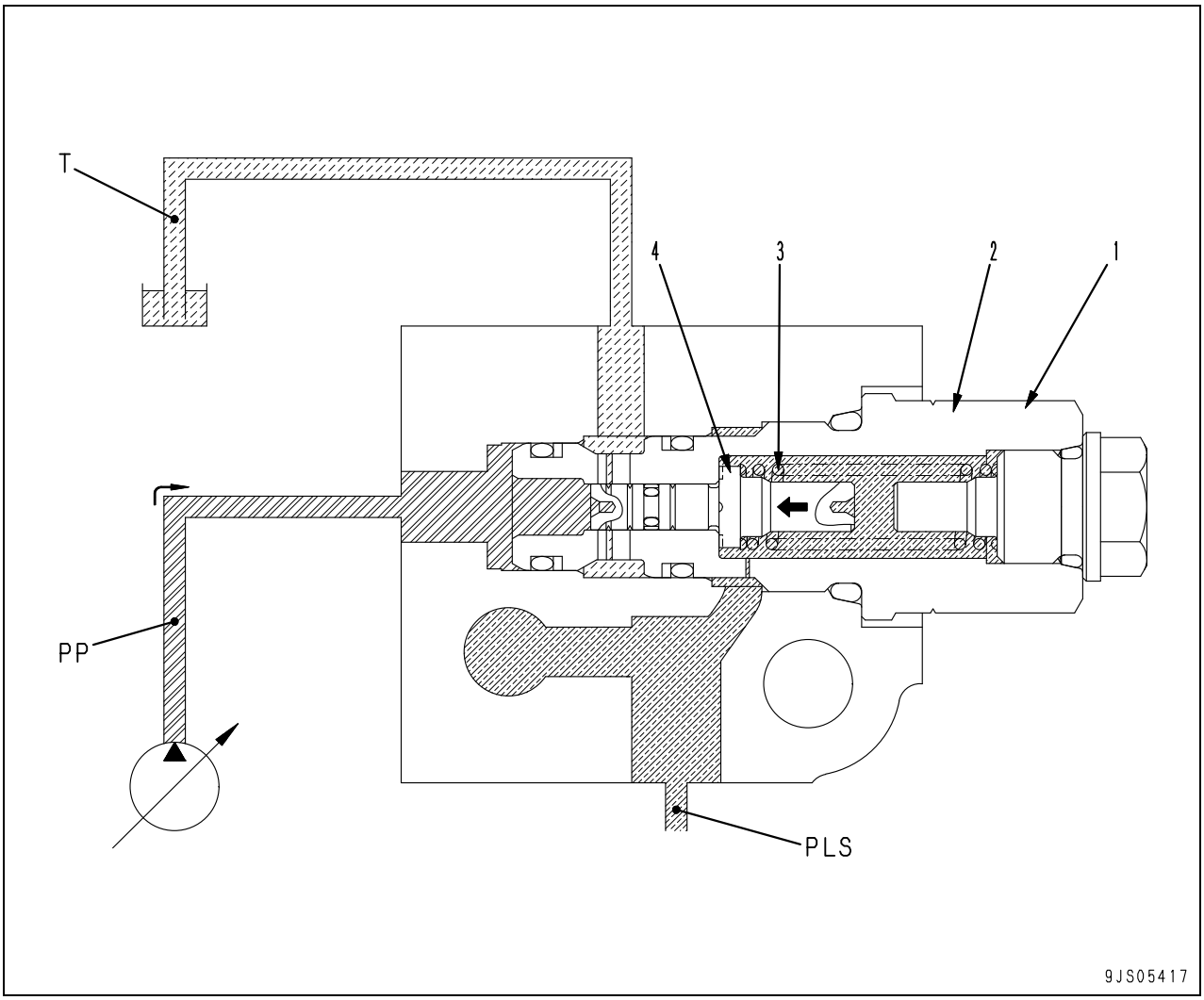


1. Suction valve (Lift arm bottom)
2. Safety-suction valve (Bucket bottom)
3. Safety-suction valve (Service actuator)
4. Safety-suction valve (Service actuator)
5. Safety-suction valve (Bucket head)
6. Suction valve (Lift arm head)
7. Variable back pressure valve (Lift check valve)

Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
8	Suction valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring
		46.8 x 7.5	40.6	5.50 N {0.56 kg}	—	4.40 N {0.45 kg}	

When control valve is operated



T: Tank circuit (pressure)
PP: Pump circuit (pressure)
PLS: LS circuit (pressure)

1. Unload valve
2. Sleeve
3. Spring
4. Spool

Function

- When the control valve is operated, if the demand flow for the actuator exceeds the delivery at the minimum pump swash plate angle, the oil flow to tank circuit (T) is stopped and all of pump delivery (Q) is supplied to the actuator circuit.

Operation

- If the control valve is operated fully, LS pressure (PLS) is generated and applied to the right end of spool (4). At this time, since the open area of the control valve is wide, the difference between LS pressure (PLS) and pump discharge pressure (PP) is a little.
- Since the differential pressure between pump discharge pressure (PP) and LS pressure (PLS) does not reach the spring load of 1.77 MPa {18.0 kg/cm^2} of spring (3), spool (4) is pushed to the left by spring (3).
- Pump circuit (PP) is disconnected from tank circuit (T) and all of pump delivery (Q) is supplied to the actuator circuit.

Function

- If the lift arm is raised and the bucket is operated simultaneously, the stroke of lift arm spool (3) is restricted and more oil flows to the bucket. As a result, the bucket tilting (dumping) speed is increased.

Operation

1. Single operation

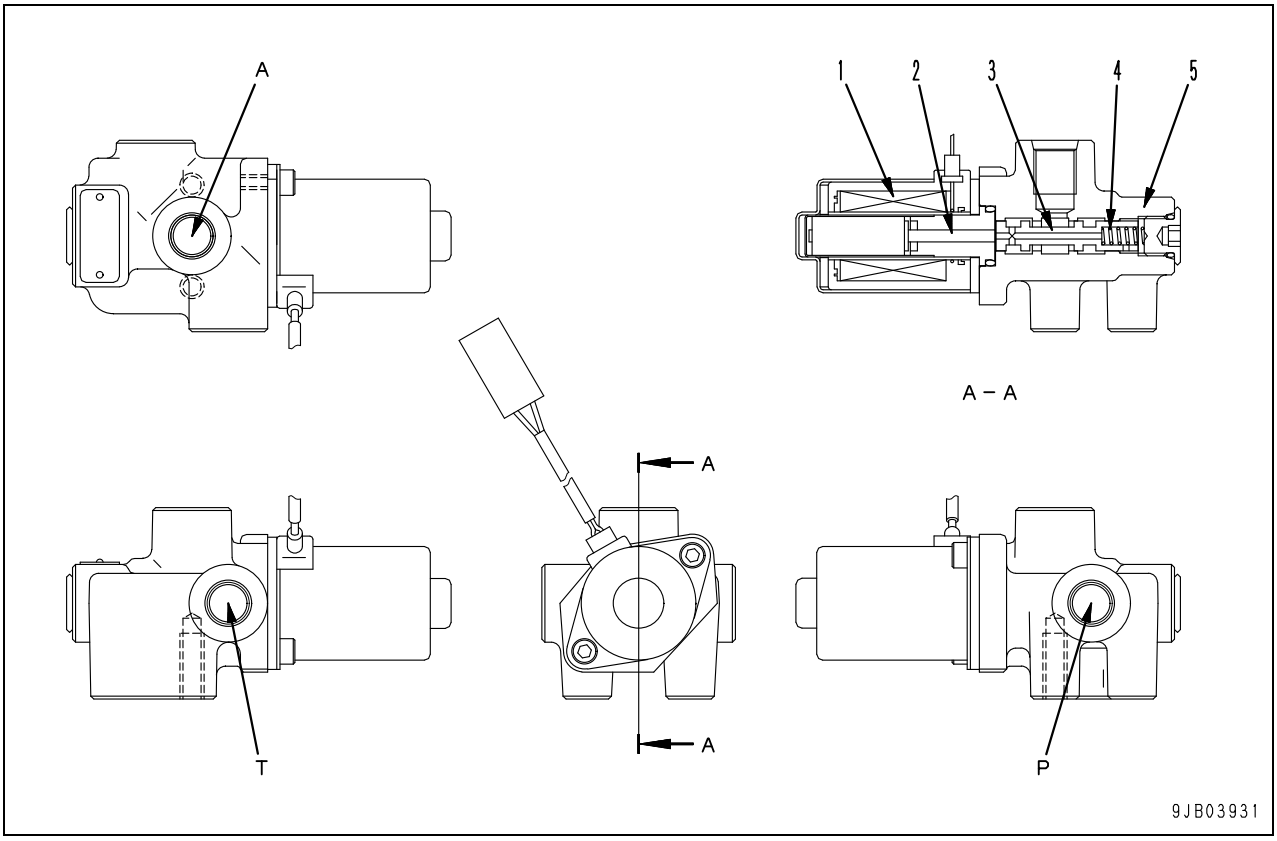
- When the lift arm is raised, the PPC pressure is supplied to (PA2) and lift arm spool (3) and piston (5) move to the right.

2. Compound operation

- When the lift arm is raised, if bucket dumping operation (PB3) is carried out, (PA3) is connected through the PPC valve to (T).
- Accordingly, ball (2) of shuttle valve (1) is pushed leftward, conducting pressure of (PB3) to passage (a).
- The pressure of (PB3) supplied to passage (a) pushes piston (5) to the left with the force of pressure receiving area piston (5) [$\pi/4$ (ϕd^2 – ϕc^2) x (PB3)].
- Accordingly, lift arm spool (3) is pushed leftward and then it balances at the stroke where the force is set to the following value. [ϕb^2 $\pi/4$ x (PA2)] = [(ϕd^2 – ϕc^2) $\pi/4$ x (PA3) + Force of springs (4) and (6)].
- As a result, the opening area of notch (e) is reduced and less oil is supplied to port (A2). The excessive pressure oil flows to (B3) and the dumping speed is increased.

Work equipment PPC cut-off solenoid valve

(WA380-6 only)
(If equipped)



P: From charge valve
A: To work equipment PPC valve port P
T: Drain

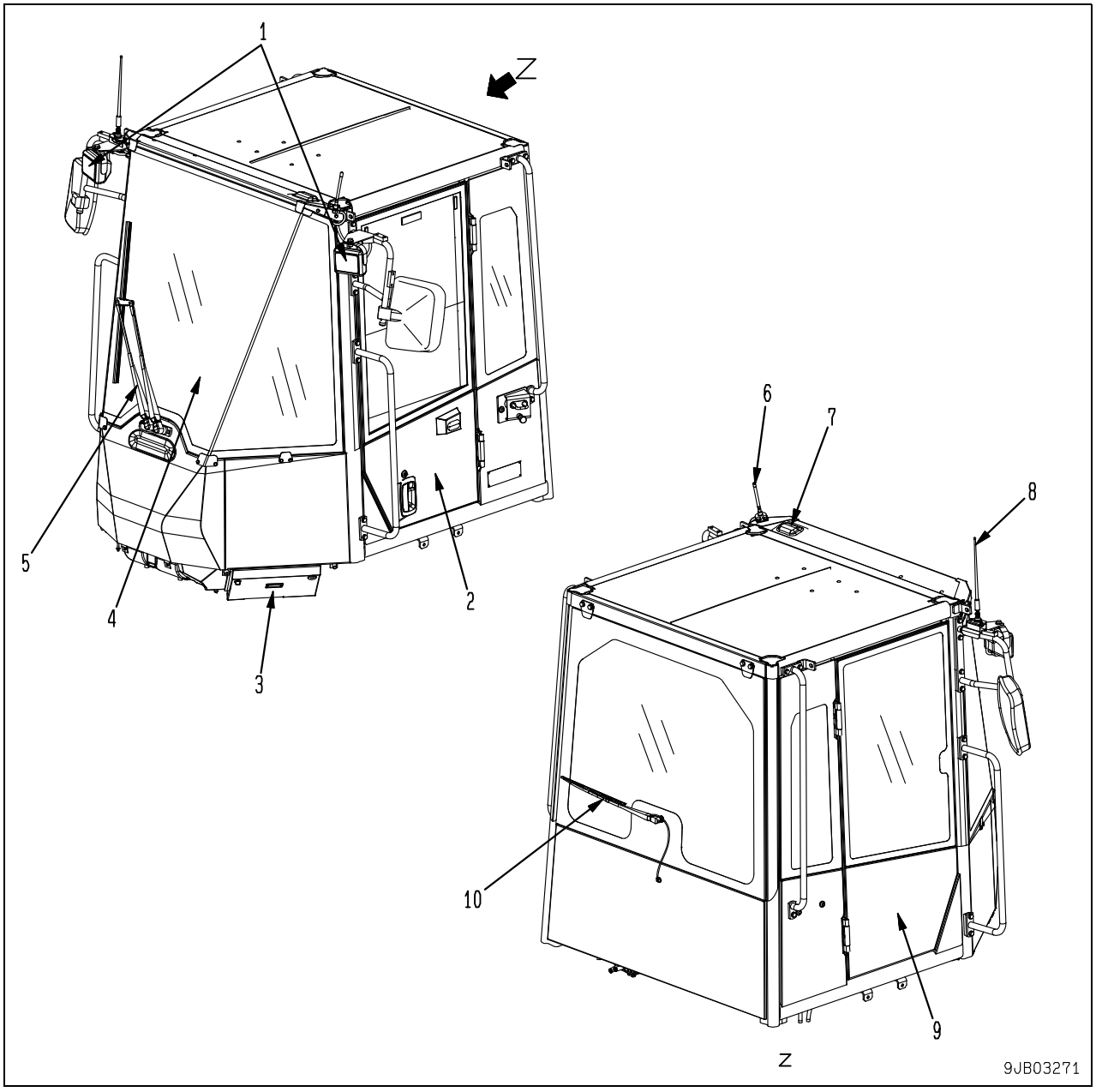
1. Coil (ON/OFF type)
2. Push pin
3. Spool
4. Spring
5. Block

Outline

- The work equipment PPC cut-off solenoid valve is installed between the charge valve and work equipment PPC valve. If the work equipment lock switch is in the “Lock” position, the solenoid is “de-energized” to cut off the oil flowing to the work equipment PPC valve, thus the operator cannot operate the work equipment.

Cab

(WA380-6)



1. Front working lamp
2. Door (left)
3. Air conditioner external air filter
4. Front glass
5. Front wiper
6. KOMTRAX communication antenna (if equipped)
7. KOMTRAX GPS antenna (if equipped)
8. Radio antenna
9. Door (right)
10. Rear wiper

Outline

- CPU (central processing unit) installed on the panel processes input signals from respective sensors and operation signals of the panel switches to display and output them.
- The self-diagnosis function of CPU makes the troubleshooting easier.

Input and output signals

JAE IL-AG5-14P [CN-C48]

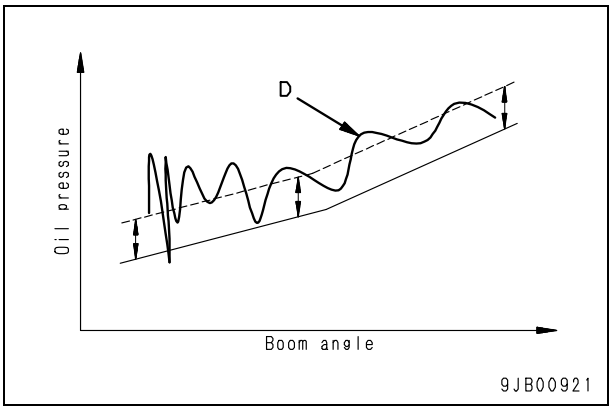
Pin No.	Signal name	Input and output signals
1	GND	—
2	Sensor ground	—
3	Internal/external air changeover damper actuator limiter	Input
4	External air temperature sensor	Input
5	Evaporator temperature sensor	Input
6	Internal air temperature sensor	Input
7	Starting switch (ON)	Input
8	Night lamp signal	Input
9	NC	—
10	NC	—
11	NC	—
12	NC	—
13	Sunlight sensor 2	Input
14	Sunlight sensor 1	Output

JAE IL-AG5-22P [CN-C47]

Pin No.	Signal name	Input and output signals
1	NC	—
2	NC	—
3	Blower motor relay	Input
4	Internal/external air changeover damper actuator output 1	Output
5	Internal/external air changeover damper actuator output 2	Output
6	Mode selector actuator output 2	Output
7	Mode selector actuator output 1	Output
8	Air mix damper actuator output 2	Output
9	Air mix damper actuator output 1	Output
10	Actuator potentiometer power supply (5 V)	—
11	NC	—
12	NC	—
13	NC	—
14	NC	—
15	Magnet clutch	Input
16	Air mix damper actuator limiter	Input
17	Mode selector actuator limiter	Input
18	Air mix damper actuator potentiometer	Input
19	Mode selector actuator potentiometer	Input
20	Blower gate	Input
21	Blower feedback	Input
22	Actuator potentiometer ground	—

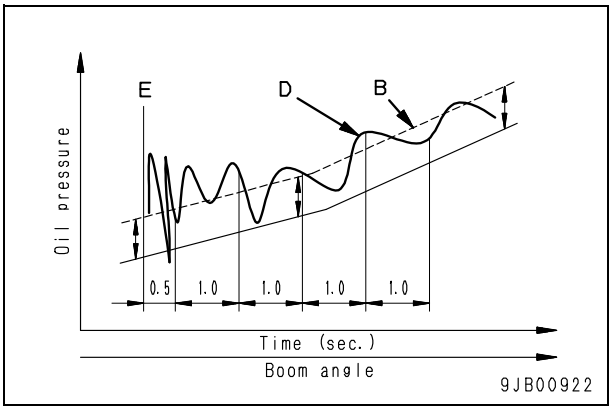
Category	No.	Check item Speedometer spec. (SPM) Load meter spec. (LDM)	Device	Operating condition	Detecting time (sec.)		Operating condition								Display color	Remarks
							Engine stopped				Engine is running					
					Detection	Reset	Alarm buzzer	Individual display	Central warning lamp	Display of message	Alarm buzzer	Individual display	Central warning lamp	Display of message		
Other symbols	68	Turn signal	LED	When turn signal lever and hazard lamp switch signal is input	0	0	—	○	—		—	○	—		Green	Hazard lamp operates when starting switch is turned “OFF”
	7	High beam of head lamp	LED	When the head lamp is set to high beam (When head lamp and dimmer switch are turned “ON”)	0	0	—	○	—		—	○	—		Blue	
	14	Brake oil pressure	LED	Normal oil pressure (CLOSED)			—	—	—		—	—	—		Red	
				Below set pressure (front) (OPEN) (Detect time continues) and 30 seconds after starting engine (No detection time)	5	1	—	○	—		◎	○	○	2G42ZG		
				Below set pressure (rear) (OPEN) (Detect time continues) and 30 seconds after starting engine (No detection time)	5	1	—	○	—		◎	○	○	2G43ZG		
				Below set pressure (front) (OPEN) (Detect time continues) and 30 seconds after starting engine (No detection time)	1	1	—	○	—		◎	○	○			
				Below set pressure (rear) (OPEN) (Detect time continues) and 30 seconds after starting engine (No detection time)	1	1	—	○	—		◎	○	○			
Other symbols	15	Engine oil pressure	LED	Normal oil pressure (CLOSED)			—	—	—		—	—	—		Red	
				Low oil pressure (OPEN)			◎	○	○	B@BAZG	◎	○	○	B@BAZG		
	16	Water separator	LED	Normal			—	—	—		—	—	—		Red	
				Water mixing with fuel			—	○	—	CA418	—	○	—	CA418		
	17	Engine oil level	LED	Normal oil level (CLOSED)			—	—	—		—	—	—		Red	If low level is detected when starting switch is turned “ON”, alarm is continued even after engine is started until adequate oil level is reached. Don’t check the oil level for 300 sec, after stopping the engine.
				Low oil level (OPEN)	2	1	—	○	—	B@BAZK	—	—	—			
	18	Radiator coolant level	LED	Normal coolant level (CLOSED)			—	—	—		—	—	—		Red	
				Low coolant level (OPEN)	30	1	—	○	—	B@BCZK	—	○	—	B@BCZK		
	20	Air cleaner clogging	LED	Normal (CLOSED)			—	—	—		—	—	—		Red	
				Clogging (OPEN)	2	1	—	—	—		—	○	—	AA1ANX		
	21	Parking brake	LED	Operation (OPEN)			—	○	—		—	○	—		Red	
				Released (CLOSED)			—	—	—		—	—	—			
				Engine is running, parking brake is ON and the directional lever is at other than “N”	0	0	—	—	—		☆	○	○			
	22	Brake oil temperature	LED	Other than below			—	—	—		—	—	—		Red	To be released if the oil temperature is detected consecutively at lower than 140°C for 5 sec.
				1. Oil temperature: Min. 140°C for 900 sec. continuously 2. Oil temperature: Min. 150°C for 20 sec. continuously	5	5	—	○	—	—	—	○	—	—		
				When abnormality is detected (disconnection)			—	—	—	DGR2KA	—	—	—	DGR2KA		
				When abnormality is detected (out of input signal range)			—	—	—	DGR2KX	—	—	—	DGR2KX		

Operation of tires and work equipment generates spring effect on the machine, however, the measured lift arm pressure (D) is provided with the characteristic shown in the figure below.



Lift arm pressure (D) measured during the lift arm raise operation is converted to calculated pressure (B) on the following calculation standard, from which the load weight is calculated.

- For 0.5 seconds after lift arm raise operation start (E), the lift arm state changes from the static state to operating state and the pressure largely fluctuates and is not stable. Therefore, it is not used for calculation of the calculated value (B).
- The spring effect of the machine is generated at interval of approx. 1 second. Therefore, the calculated value (B) is obtained based on the mean every 1 second during the period between the lift arm raise operation start and the operation end.



AMP070-12P(3) [CN-L56]

Pin No.	Specification	I/O	Group	Form of use	Signal name	Remarks
1	S_NET(+)	I/O	N	S-NET	—	
2	S_NET(+)	I/O	N	S-NET	—	
3	CAN(+)	I/O	P	CAN	CAN (+)	
4	S_NET(–)	O	N	S-NET	—	
5	S_NET(–)	O	N	S-NET	—	
6	GND	O	—	GND	GND	
7	GND	O	—	GND	—	
8	CAN(–)	I/O	P	CAN	CAN (–)	
9	(NC)	—	—	—	—	
10	(NC)	—	—	—	—	
11	(NC)	—	—	—	—	
12	(NC)	—	—	—	—	

AMP070-14P [CN-L57]

Pin No.	Specification	I/O	Group	Form of use	Signal name	Remarks
1	(NC)	—	—	—	—	
2	RS232C_1_RTS	I/O	Q	—	—	
3	RS232C_1_RD	I	Q	RD	Personal computer RX	For load meter and monitoring (PC)
4	(NC)	—	—	—	—	
5	(NC)	—	—	—	—	
6		I	—	—	Printer use signal	For load meter (if equipped)
7	(NC)	—	—	—	—	
8	RS232C_1_CTS	I/O	Q	—	—	
9	RS232C_1_TX	O	Q	TX	Printer & Personal computer TX	For load meter
10	RS232C_1_SG	O	Q	—	—	
11	(NC)	—	—	—	—	
12	(NC)	—	—	—	—	
13	(NC)	—	—	—	—	
14	(NC)	—	—	—	—	

Function of hunting prevention

- The transmission controller detects and prevents hunting that can result from shifting the gear from 2nd to 3rd and 3rd to 2nd in the auto shift mode.
- If a sequential gear shift of 2nd to 3rd, 3rd to 2nd, and 2nd to 3rd again (or 3rd to 2nd, 2nd to 3rd, and 3rd to 2nd again) is performed within 5 seconds from the previous gear shift, the controller judges that hunting has occurred, and selects the gear speed from 2nd or 3rd whichever used for longer time during the sequential gear shift.
- As the hunting prevention function is turned on, the shift point in the hunting prevention section in “Auto-shift points table” is applied to the next automatic gear shifting.
- Currently turned on hunting prevention function is reset as the next gear shifting (including the direction switching operation and kickdown operation) is done. As the hunting prevention function is reset, the ordinary auto shift point is restored.
- The transmission controller resets the lockup if ON/OFF of the 3rd lockup occurred consecutively within 5 seconds. For the next lockup, the transmission controller applies the lockup operating point in the hunting prevention section of “Lockup operating points table”.
- The hunting prevention function related to the lockup is turned on in the manual shift mode, too, if the controller judges hunting is present.

Transmission initial learning and ECMV current adjustment

- Adjusting the “Transmission initial learning setting” and “Transmission ECMV current adjustment” items by use of the adjustment function of the machine monitor allows correcting variations of the transmission itself as well as ECMV.
- Ignoring above adjustment can lead to generation of gear shifting shocks or time lag.

★ For the adjustment procedure, see “Special functions of machine monitor (EMMS)” in Testing and adjusting.

Changing shift points

- The transmission controller has the function of adjusting the gear shift points of “L-mode” in auto-shift.
- When hunting is induced by some conditions unique to a worksite, adjust the shift up and down travel speeds by adjusting the “Adjustment of transmission L-mode shift point” item by use of the adjustment function of the machine monitor.

★ For the adjustment procedure, see “Special functions of machine monitor (EMMS)” in Testing and adjusting.

4th gear speed derating function

- Restriction of operation at 4th gear speed becomes available by selecting “ADD” for “23: FORBID 4TH” item using the optional device selecting function of the machine monitor.

★ For the setting procedure, see “Special functions of machine monitor (EMMS)” in Testing and adjusting.

Operation of directional selector switch functions

- Turning the directional selector actuation switch “ON” sends the command current to the transmission controller, requesting it to enable the directional selection signal from the directional selector switch.
- Whenever operating the directional selector switch actuation switch, be sure to set the directional lever and the directional selector switch to “N (Neutral)”. It is an indispensable safety measure. If the directional selector switch actuation switch were operated when any of above switches is not set to “N (Neutral)”, the directional selector pilot lamp of the machine monitor starts flashing, triggering the alarm buzzer.
- When the directional selection from the directional selector switch is available, the machine monitor's directional selector pilot lamp and the pilot lamp contained in the directional selector switch actuation switch come on.
- When the directional selection from the directional selector switch is enabled, setting the directional lever to “F (Forward)” or “R (Reverse)” gives precedence to the directional selection by use of the directional lever. In this case, the system judges an abnormal directional selection is performed, flashing the machine monitor's directional selector pilot lamp and activating the alarm buzzer.
- Flashing of the machine monitor's directional selector pilot lamp and the alarm buzzer sounds can be reset only by setting both the directional lever and the direction selector switch to “N (Neutral)”. Until then, operation from the directional selector switch remains unacceptable.
- The following table shows the directional selection available from the lever and switches under respective operating conditions.

	Operating conditions			Direction selection operation	Function of directional selector switch	Machine monitor output	
	Directional lever	Directional selector switch	Directional selector switch actuation switch			Directional selector pilot lamp	Alarm buzzer
Directional lever operation	All range (F/N/R)	N	OFF	Precedence is given to directional lever	Disabled	OFF	Stopped
Direction selector switch operation	N	All range (F/N/R)	ON	Precedence is given to direction selector switch	Enabled	ON	Stopped
Precedence is given to directional lever	Other than N (F/R)	All range (F/N/R)	ON	Precedence is given to directional lever	Disabled	Blinks	Sounded
Directional lever operation error (Operational error)	All range (F/N/R)	Other than N (F/R)	OFF	Precedence is given to directional lever	Disabled	Blinks	Sounded
Actuation switch operation error (Operational error)	Other than N (F/R)	Other than N (F/R)	Alternate ON/ OFF operation	Precedence is given to directional lever	Disabled	Blinks	Sounded

Safety function at start of engine

- When the directional selector switch actuation switch is set to “ON” when starting of the engine, be sure to set the directional selector switch to “N (Neutral)”. Otherwise, the signal sent to the transmission controller neutral safety relay will cut off the starting motor circuit, disabling starting of the engine.

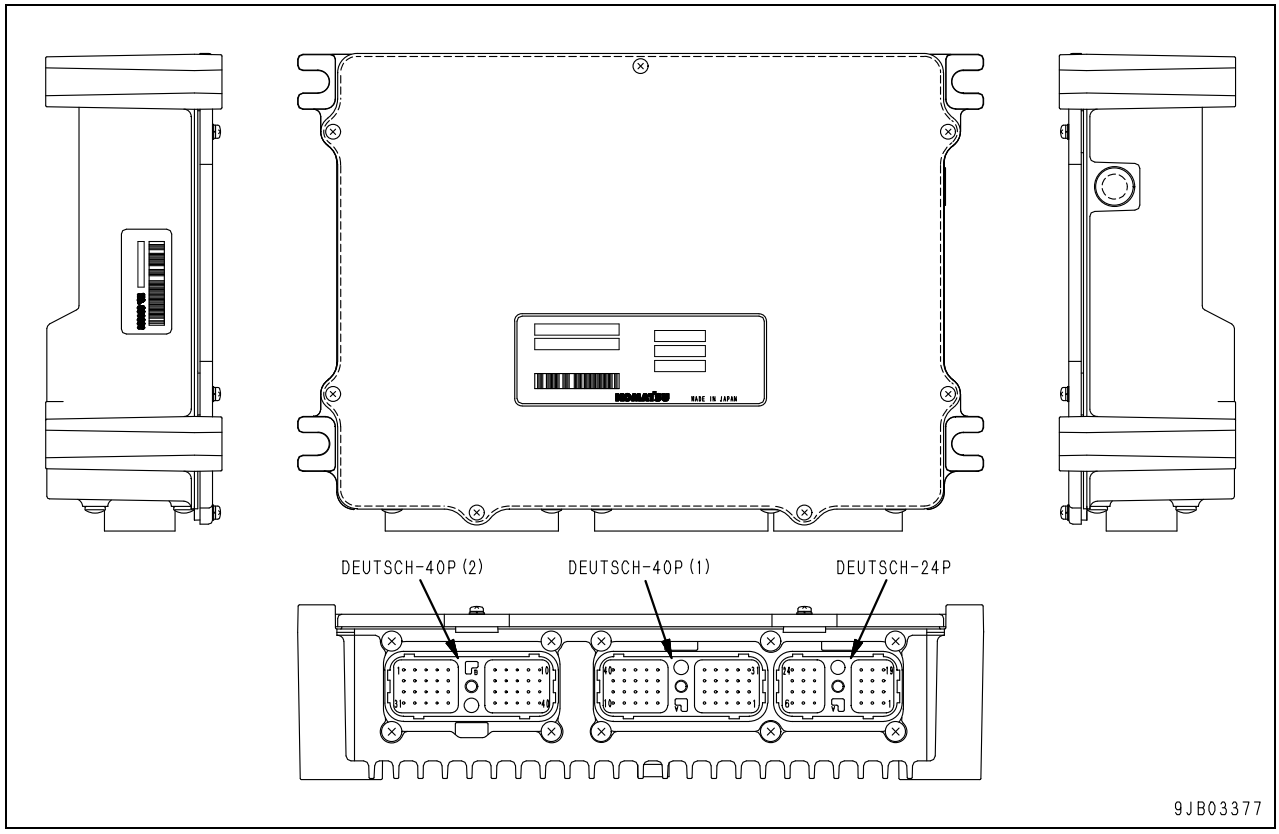
Setting method

- The directional selector switch can be enabled only when “FNR SW” is selected for “14: J/S-FNR SW” item using the optional device selecting function of the machine monitor.

★ For the setting procedure, see “Special functions of machine monitor (EMMS)” in Testing and adjusting.

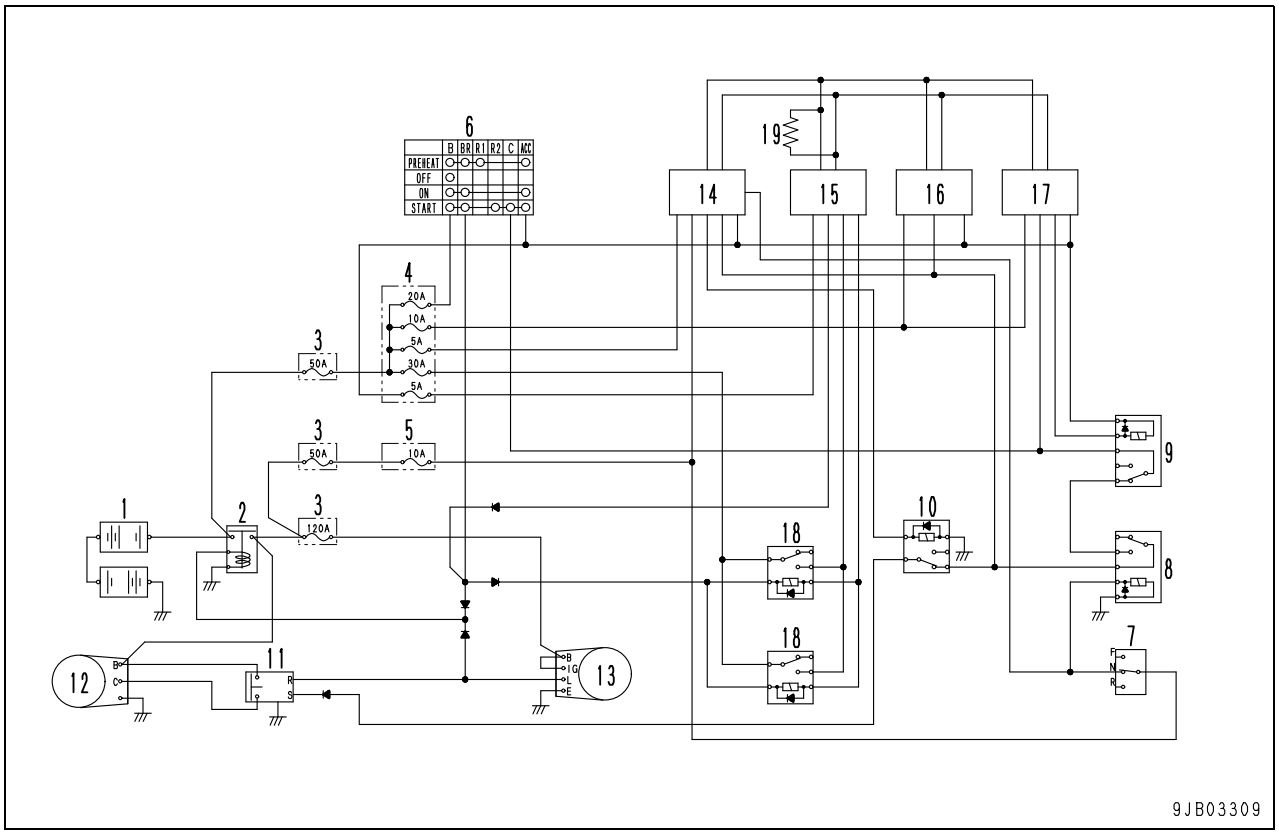
Work equipment controller

(WA380-6 only)



Engine stopping circuit

(WA380-6)



Operation

- Setting the starting switch to “OFF” cuts off ACC signal from the starting switch terminal ACC to the engine controller.
- Although ACC is cut off, the engine controller keeps the engine controller cut-off relay working to maintain the current flow to the engine controller until its internal processing is complete.
- As ACC signal is cut off, the engine lowers its speed and stops. At the same time, the alternator stops power generation. Thus, supply of voltage from the alternator terminal L is aborted.
  And the current from the starting switch terminal BR is also stopped and the contacts of the battery relay are opened. Consequently, the power supplied to each circuit of the machine is stopped.

Standard service value table for chassis

(WA380-6)

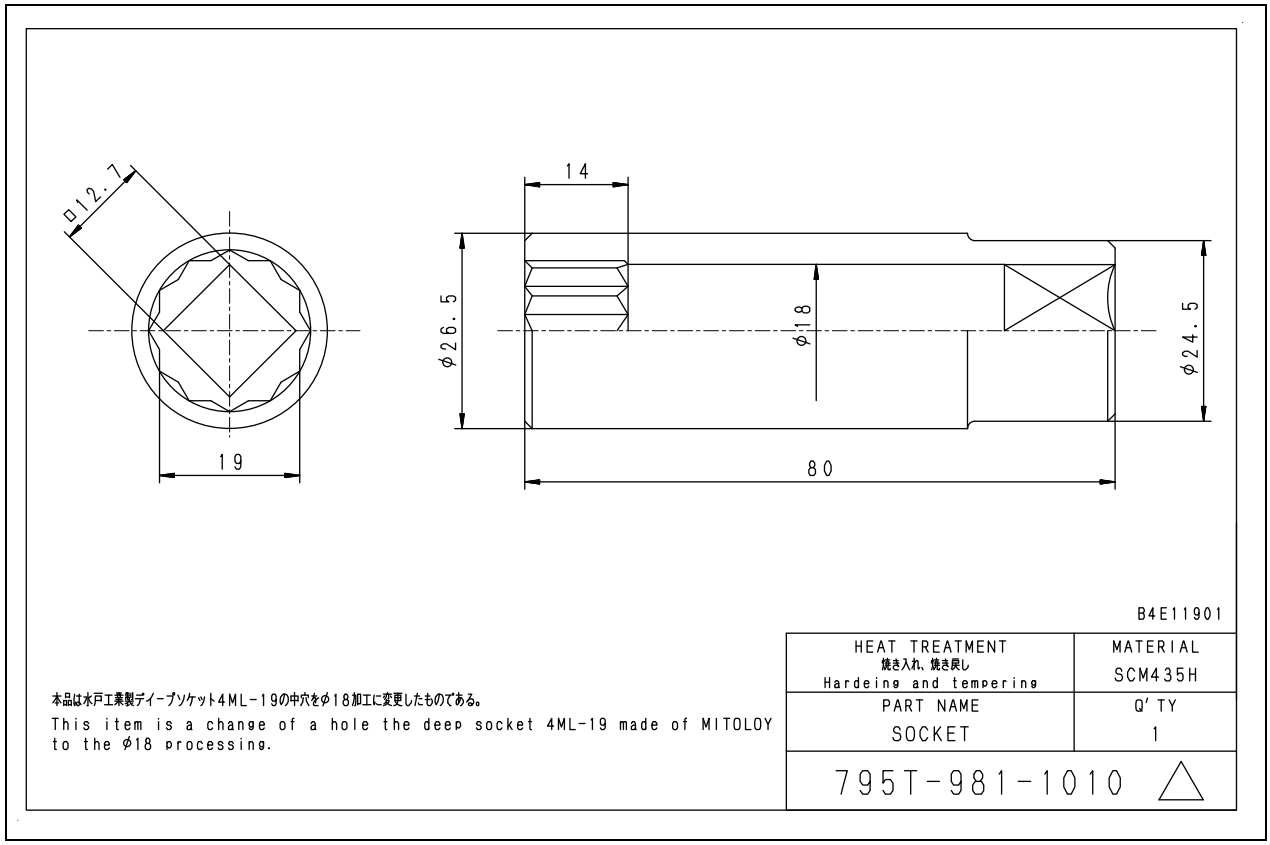
*: The value shows the value before the detent.

Machine model						WA380-6	
Category	Item			Measurement conditions	Unit	Standard value for new machine	Service limit value
Directional lever	Operating effort		N → FORWARD, REVERSE	• Engine stopped • Measure at center of lever knob	N {kg}	5.9 (+4.9/–3.0) {0.6 (+0.5/–0.3)}	Max. 16.7 {Max. 1.7}
	Stroke		N → FORWARD, REVERSE		mm	35 ± 10	35 ± 20
Gearshift lever	Operating effort		1st → 2nd	• Engine stopped • Measure at center of lever knob	N {kg}	5.9 (+4.9/–3.0) {0.6 (+0.5/–0.3)}	Max. 16.7 {Max. 1.7}
			2nd → 3rd			5.9 (+4.9/–3.0) {0.6 (+0.5/–0.3)}	Max. 16.7 {Max. 1.7}
			3rd → 4th			5.9 (+4.9/–3.0) {0.6 (+0.5/–0.3)}	Max. 16.7 {Max. 1.7}
	Stroke		1st ⟷ 2nd		mm	35 ± 10	35 ± 20
			2nd ⟷ 3rd			35 ± 10	35 ± 20
			3rd ⟷ 4th			35 ± 10	35 ± 20
Work equipment control lever	Operating effort	Lift arm	HOLD → RAISE	• Engine speed: Low idle • Hydraulic oil temperature: Within operating range	N {kg}	Max. 12.8 {Max. 1.3} (*)	Max. 19.6 {Max. 2.0} (*)
			RAISE → HOLD			Max. 14.7 {Max. 1.5}	Max. 22.6 {Max. 2.3}
			HOLD → LOWER			Max. 12.8 {Max. 1.3} (*)	Max. 19.6 {Max. 2.0} (*)
			LOWER → HOLD			—	—
			LOWER → FLOAT			Max. 15.7 {Max. 1.6}	Max. 23.5 {Max. 2.4}
			FLOAT → HOLD			Max. 14.7 {Max. 1.5}	Max. 22.6 {Max. 2.3}
		Bucket	HOLD → DUMP			Max. 17.7 {Max. 1.8}	Max. 26.5 {Max. 2.7}
			HOLD → TILT			Max. 12.8 {Max. 1.3} (*)	Max. 19.6 {Max. 2.0} (*)
			TILT → HOLD			Max. 14.7 {Max. 1.5}	Max. 22.6 {Max. 2.3}
	Stroke	Lift arm	HOLD ⟷ RAISE	• Engine speed: Low idle • Hydraulic oil temperature: Within operating range	mm	43 ± 9 (*)	43 ± 18 (*)
			HOLD ⟷ LOWER			43 ± 9 (*)	43 ± 18 (*)
			HOLD ⟷ FLOAT			50 ± 9	50 ± 18
		Bucket	HOLD → DUMP			50 ± 9	50 ± 18
			HOLD → TILT			43 ± 9 (*)	43 ± 18 (*)

Sketch of special tool

Note: Komatsu cannot accept any responsibility for special tools manufactured according to these drawings.

Socket



Handling fuel system equipment

★ Precautions for testing and maintaining fuel system
The common rail fuel injection system (CRI) consists of more precise parts than the conventional fuel injection pump and nozzle. If foreign matter enters this system, it can cause a trouble.
When testing and maintaining the fuel system, take care more than the past. If dust, etc. sticks to any part, wash that part thoroughly with clean fuel.

★ Precautions for replacement of fuel filter cartridge
The fuel filter cartridge used must be a genuine Komatsu part.
The fuel injection pump and nozzle of the common rail type fuel injection system (CRI) are consisted of more precision parts than those used for the current pumps and nozzles. This system, therefore, employs a special filter with highly efficient filtering performance to prevent mixing of foreign substances. Thus, substituting it with a non-genuine filter could cause troubles in the fuel system. It is strictly prohibited to use such part.

Releasing residual pressure in fuel system

★ Pressure is generated in the low-pressure circuit and high-pressure circuit of the fuel system while the engine is running.
Low-pressure circuit:
Feed pump – Fuel filter – Supply pump
High-pressure circuit:
Supply pump – Common rail – Injector

★ The pressure in both low-pressure circuit and high-pressure circuit lowers to a safety level automatically 30 seconds after the engine is stopped.

★ Before the fuel circuit is tested and its parts are removed, the residual pressure in the fuel circuit must be released completely. Accordingly, observe the following.

⚠ **Before testing the fuel system or removing its parts, wait at least 30 seconds after stopping the engine until the residual pressure in the fuel circuit is released. (Do not start the work just after stopping the engine since there is residual pressure.)**

Replacing alternator belt

(WA380-6)

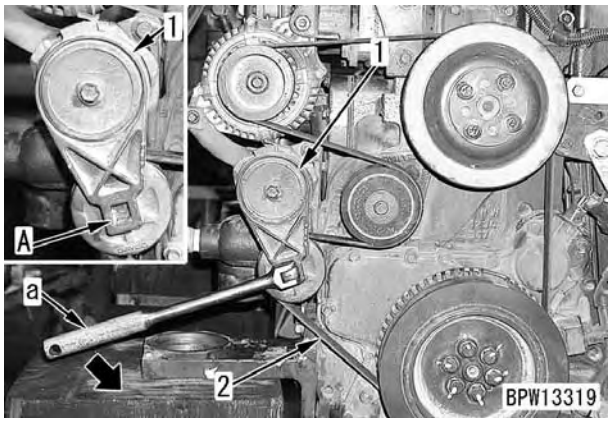
★ The auto-tensioner is provided for the alternator belt. Thus, testing and adjustment of the belt is usually no necessary.

★ Remove air conditioner compressor belt before replacing the alternator belt.

⚠ **Stop the machine on a flat ground and lower the work equipment to the ground.**

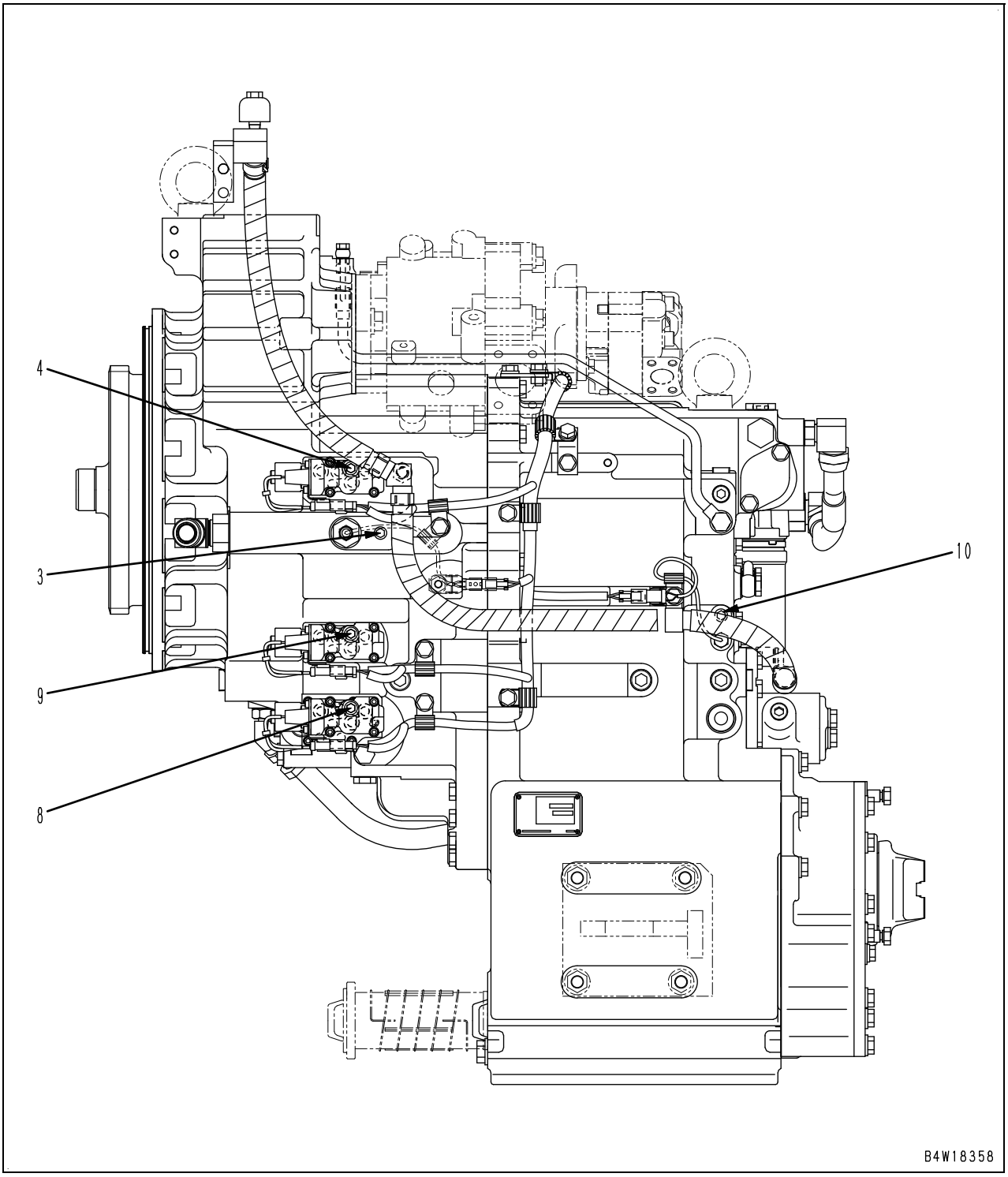
1. Open the engine left side cover.

2. Apply wrench (a) to part (A) (width across flats □ 12.7 mm) of tensioner assembly (1) and turn it in the arrow direction to decrease the tension of fan belt (2).
   ⚠ **Make sure that the wrench (a) is secured at portion (A) before rotating it. (The spring of tensioner assembly (1) is strong. If the wrench is loosely inserted, the wrench may accidentally come off while being rotated and it is extremely dangerous.)**
   ⚠ **After removing alternator belt (2), return tensioner assembly (1) slowly with care.**
   ⚠ **Be careful not to get your fingers caught between the pulley and alternator belt (2) during work.**



3. Replace alternator belt (2).

● Check each pulley for breakage and crack.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3
9
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10
B4W18358

Testing and adjusting steering wheel

★ Testing and adjusting device for steering wheel

Symbol	Part No.	Part name
M	79A-264-0021	Push-pull scale

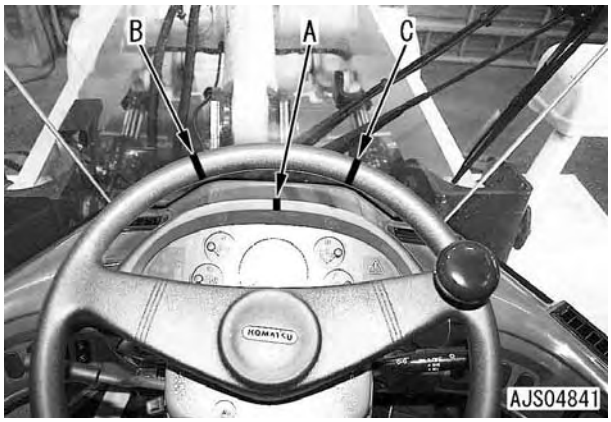
Measuring play of steering wheel

★ Measure the play of the steering wheel under the following condition.
- Engine: Stopped
- Position of machine: Straight travel condition

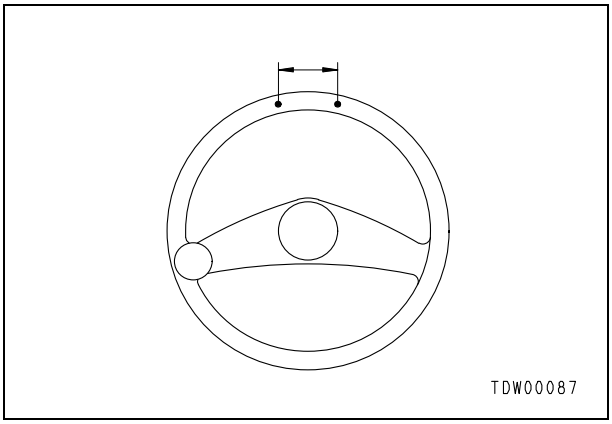
Measuring method

1. Move the steering wheel to the right and left 2 – 3 times and check that the steering mechanism is in neutral, and then make mark (A) on the machine monitor frame.

2. Turn the steering wheel to the right and make mark (B) at a position where the operating effort becomes heavy.



3. Turn the steering wheel to the left and make mark (C) at a position where the operating effort becomes heavy. Then, measure the straight distance between marks (B) and (C).



Measuring operating effort of steering wheel

★ Measure the operating effort of the steering wheel under the following condition.
- Road: Flat, level, paved, and dry road
- Engine coolant temperature: Within operating range
- Hydraulic oil temperature: Within operating range
- Tire inflation pressure: Specified pressure
- Engine: Low idle (No load on bucket)

Measuring method

1. Install push-pull scale **M** to the steering wheel knob.
   ★ Install push-pull scale **M** to the center.

2. Start the engine.
   ★ After starting the engine, raise the bucket about 400 mm and release the work equipment lock lever.

3. Pull push-pull scale **M** in the tangential direction and read it while the steering wheel is moving smoothly.
   ★ The operating effort is not the value indicated when the steering wheel starts moving.

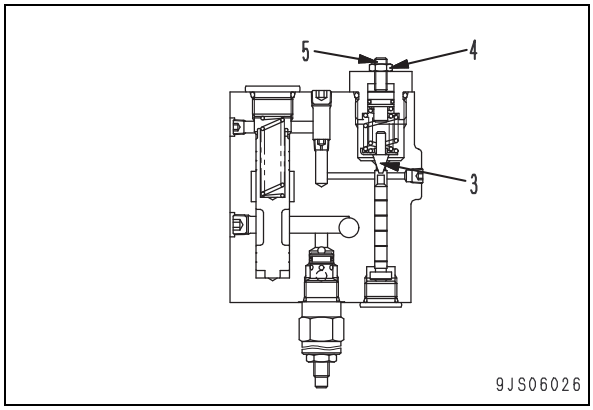
Adjusting

★ If the accumulator charge cut-out pressure is adjusted, the cut-in pressure changes according to the valve area ratio.

1. Loosen locknut (4) of unload relief valve (accumulator charge cut-out valve) (3) and turn adjustment screw (5) to adjust the pressure.
   ★ If the adjustment screw is
   - Turned to the right, the pressure rises.
   - Turned to the left, the pressure lowers.

   ★ Quantity of adjustment per turn of adjustment screw: 1.45 MPa {14.8 kg/cm^2}

   Locknut: **11.8 – 16.7 Nm {1.2 – 1.7 kgm}**



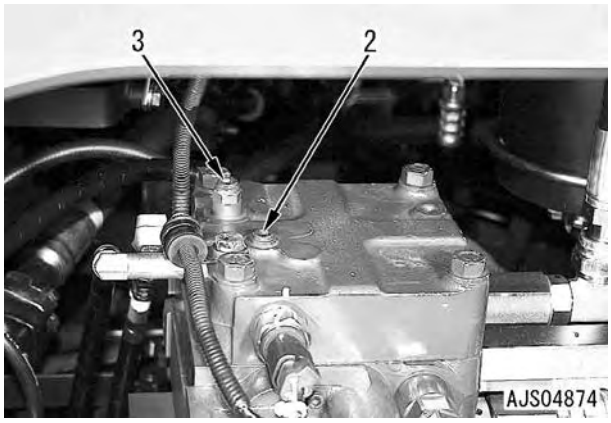
   ★ After finishing measurement, check the accumulator charge cut-in and cut-out pressures again according to the above measurement procedure.

4. Measuring work equipment LS differential pressure

★ Before measuring the LS control circuit pressure, check that the work equipment relief pressure and work equipment PPC oil pressure are normal.

★ To obtain the LS differential pressure, measure the pump discharge pressure and LS pressure (actuator load pressure) simultaneously and calculate the difference between them.

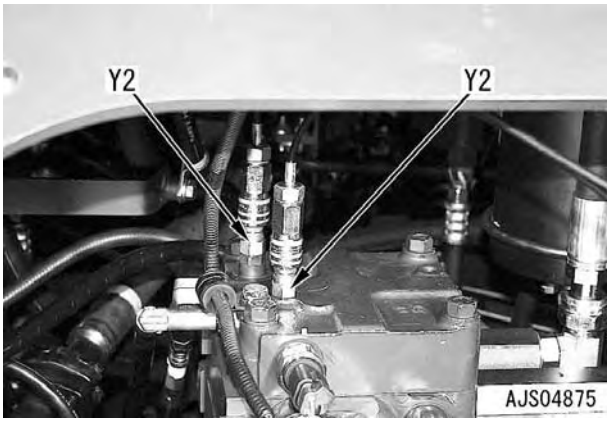
1) Remove pump pressure pickup plug (10 × 1.25 mm) (2) and LS pressure pickup plug (10 × 1.25 mm) (3) from the work equipment control valve.



2) Install nipple **Y2** and connect oil pressure gauge [1] of hydraulic tester **Y1** or differential pressure gauge **Y3**.

★ When using the differential pressure gauge, connect the high pressure side to the pump pressure side and connect the low pressure side to the LS pressure side.
Since the differential pressure gauge needs a 12V power source, connect it to a battery.

★ When using the oil pressure gauge, use the oil pressure gauge of 40 MPa {400 kg/cm^2}.
Since the differential pressure is about 2.4 MPa {25 kg/cm^2} at maximum, measure it by installing the same gauge to the pickup plugs alternately.



3) Start the engine and raise the lift arm about 400 mm.

4) While running the engine at high idle, when the following condition is satisfied, measure the pump pressure and LS pressure (actuator load pressure) simultaneously.

- When all the levers are in neutral and when the lift arm lever is moved halfway

★ While measuring, take care not to move the lift arm cylinder to the stroke end.

★ Calculation of LS differential pressure:
LS differential pressure = Pump discharge pressure – LS pressure

★ If the LS differential pressure is as follows, it is normal.

Position of lever	LS differential pressure
All levers in neutral	Unload pressure (See standard value)
Lift arm lever in LIFT position	Specified LS differential pressure (See standard value)

(WA380Z-6)

★ When carrying out troubleshooting for an electric circuit related to the machine monitor, transmission controller, work equipment controller, or KOMTRAX terminal, expose the related connectors according to the following procedure.

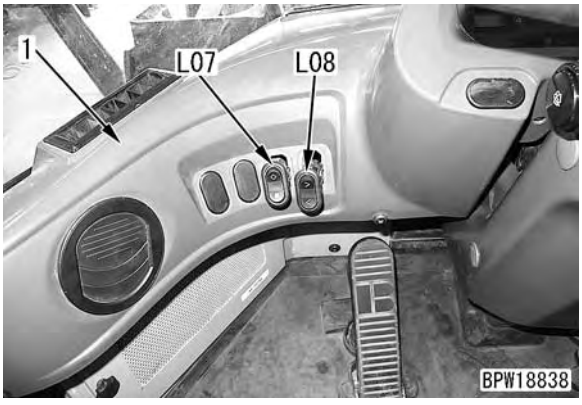
★ Disconnect and connect the connectors of special lock types according to the following procedure.

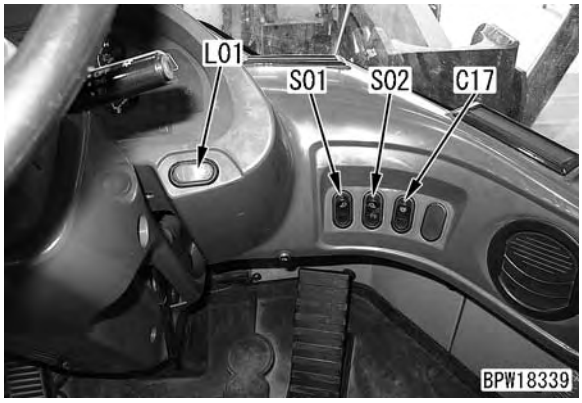
1. Machine monitor

1) Disconnect the following connectors from cover (1).
   - Connector **L01**:Parking brake switch
   - Connector **L07**:Machine monitor mode selector switch 1
   - Connector **L08**:Machine monitor mode selector switch 2
   - Connector **S01**:Front working lamp switch
   - Connector **S02**:Rear working lamp switch
   - Connector **S17**:Revolving yellow light switch (If equipped)

   ★ Pull the switch out of the cover and disconnect each connector.

   ★ If you insert your hands from under the cover and disconnect a connector forcibly, you many damage the connector or switch. Take care.





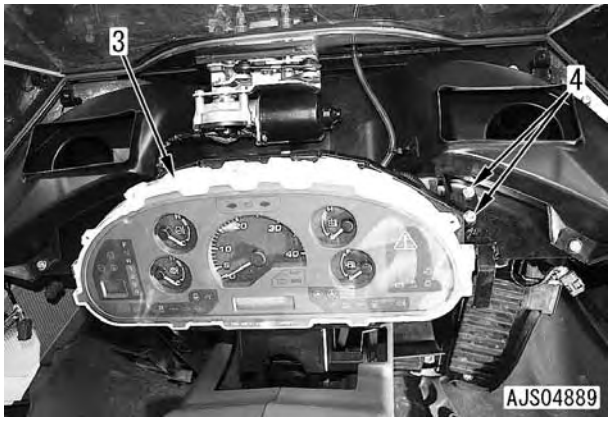
2) Remove interior cover (2) from the front left side. (ROPS Specification machine only)

   ★ Remove the cap and mounting bolts.

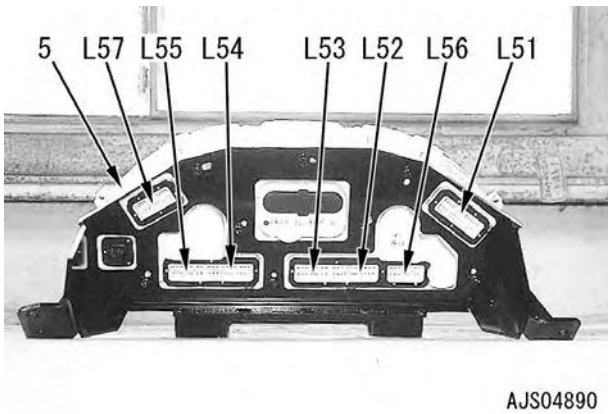
3) Remove cover (1).

4) Remove 3 bracket mounting bolts (4) of machine monitor (3) and reverse the machine monitor.

   ★ Take care not to pull the wiring harness forcibly.



5) Connect diagnosis T-adapters to connectors **L51**, **L52**, **L53**, **L54**, **L55**, and **L56** of machine monitor (5).

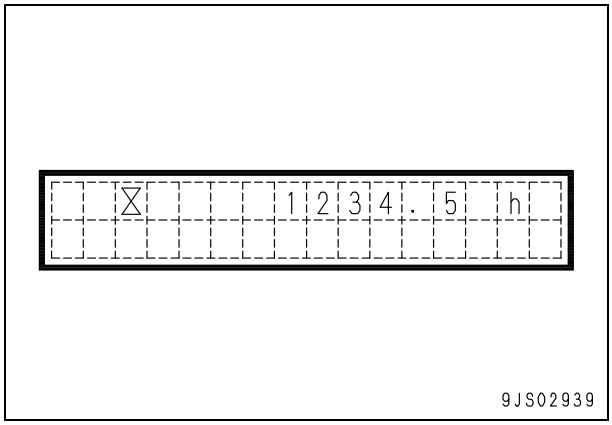


Operator mode

★ Following overviews the operator mode.
★ See the section “Structure, function and maintenance standard” or the Operation and maintenance manual for details of the operator mode.

1. Service meter/clock display function

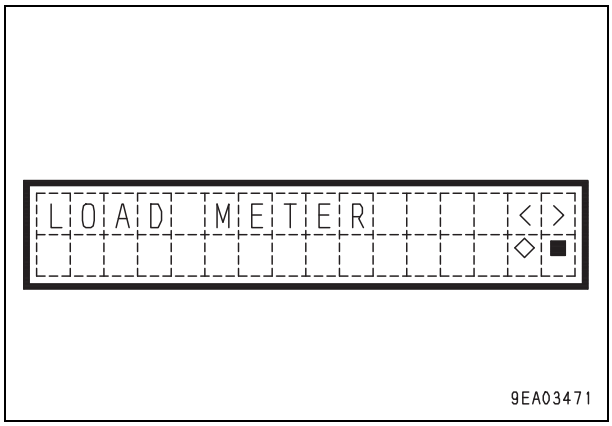
Turning on the starting switch displays the service meter in the upper space and the clock in the lower space.



2. Load meter function (if equipped) (WA380-6 only)

Press [◇] switch from the ordinary service meter and clock display screen to display the load meter function.

★ For more information, see the section Structure, function and maintenance standard, “Load meter function”, and Attachment options, “Using load meter” of the Operation and maintenance manual.

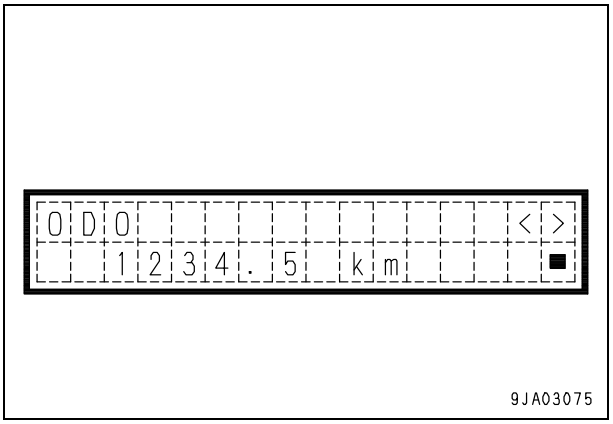


3. Odometer display function

Press [◇] switch from the ordinary service meter and clock display screen to display the odometer.

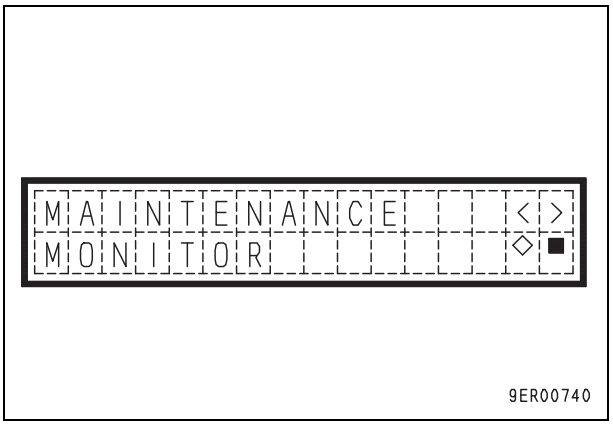
The load meter specifications displays the odometer as [<] switch is pressed succeeding to display of the load meter function.

★ For details, see the “Other functions of machine monitor” of the “Operation” section in the Operation and maintenance manual.



4. Maintenance monitoring function

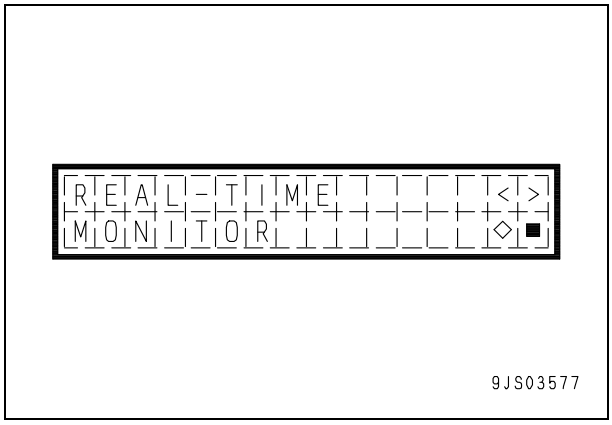
1) Filter, oil replacement time display (automatic display)
   As the filter or oil replacement time draws close, the machine monitor automatically displays its information to alert operator's attention.
2) Resetting replacement time (selection menu)
   As maintenance operation for a filter or oil is completed, the machine monitor allows resetting the time interval through the switch operation.



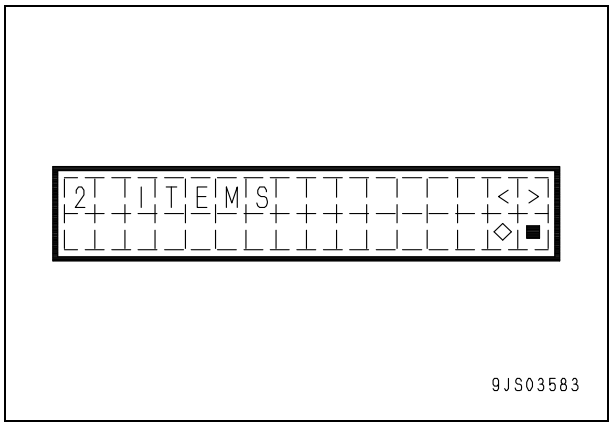
TRANSMISSION [Transmission controller system]				
No.	Monitoring code	Monitoring item (*1)	Indication item (*2)	Data indication range (*3)
42	40949	Output signal D_OUT_0-7	D-OUT-0------7	See separate table (Page 33)
43	40950	Output signal D_OUT_8-15	D-OUT-8-----15	See separate table (Page 34)
44	40951	Output signal D_OUT_16-23	D-OUT-16----23	See separate table (Page 34)
45	94100	Clutch trigger initial learning flag	TRIG FR1234	0/1(ON/OFF)

7-2-2. Preparations for transmission initial learning

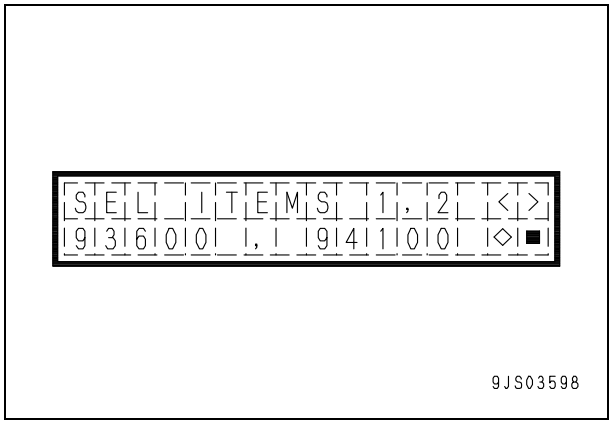
1) Display the REAL-TIME MONITOR from the menu screen of Service mode.



2) Press [◇] switch to display the sub menu, select 2 ITEMS using [<] or [>] switch and then settle the selection using [◇] switch. (SEL ITEMS 1,2 screen)

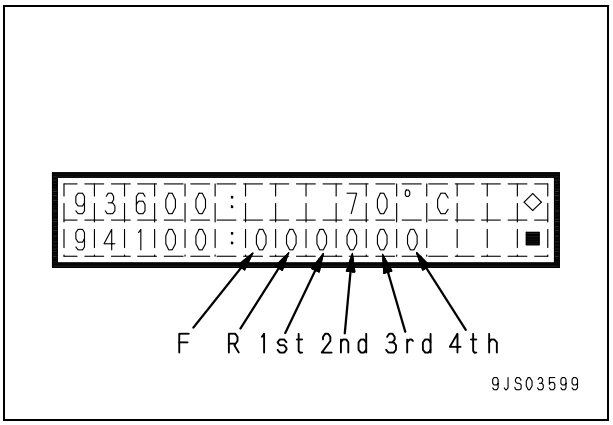


3) From the SEL ITEMS 1,2 screen, enter ID number 93600 of the transmission control oil temperature and ID number 94100 for displaying the trigger learning.
   ★ Referring to “4-5. Setting 2 items simultaneous monitoring”.



4) Using [◇] switch, settle 2 items display of the transmission control oil temperature and the trigger learning display.

★ Content of the trigger learning is displayed for each of F, R, 1st, 2nd, 3rd and 4th clutch in the figure.
- 0: Learning not done yet
- 1: Learning completed



7-2-3. Implementation of transmission initial learning

★ Before starting the transmission initial learning, be sure to implement “7-1 Adjustment of transmission ECMV current” and “7-2-1 Reset of initial learning”. Then start the initial learning according to the following procedure.

★ Implement the gearshift operation using actual travel, bench travel or while pressing the wheel brake.

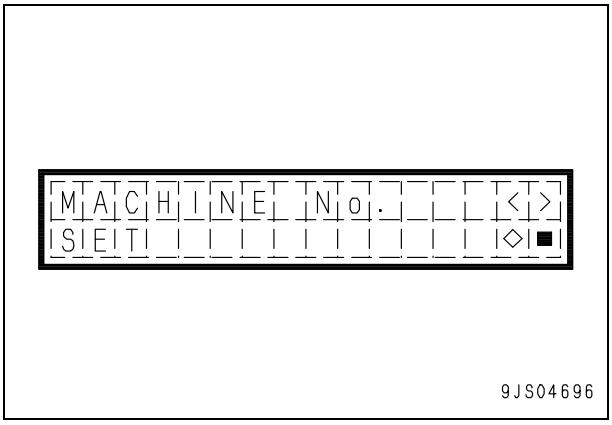
⚠ **When actual travel is employed for the operation, be sure to choose a spacious field while paying reasonable care to the environment.**

★ When executing the operation, the engine shall be set to low idle, manual switch to ON and lockup switch to OFF.

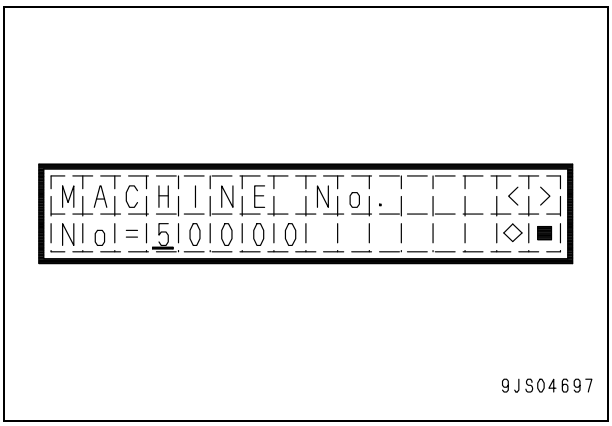
1) Start the engine, press the brake pedal fully and then release the parking brake.
2) Set the transmission shift mode in MANUAL, set the FNR (directional) lever or joystick steering FNR (directional) switch or right FNR (directional) switch in F (forward), and set the gearshift lever or gearshift switch in the 4th position.
3) Make sure from “7-2-2 Preparations for transmission initial learning” that the transmission control oil temperature is 55 – 70°C. If it is out of the range, stall the torque converter and adjust the temperature to 55 – 70°C. (If the initial learning is performed while the oil temperature is out of the specified range, time lags and gearshift shocks can result).

11. Machine serial number input function

1) Display the MACHINE No. SET screen from the menu screen of Service mode.



2) Press [◇] switch to display the MACHINE No. screen.
3) Enter the serial number according to the following procedure.
   - ★ The cursor is positioned at the highest-order digit.
   1] Pressing [<] or [>] switch increases or decreases the value at the cursor position. Select a desired value using these switches.
   2] Press [◇] switch to settle the selection.
   - ★ The cursor moves to the digit situated immediately on the right hand.
   3] Set the values up to the lowest digit in the same order as above and then press [◇] switch to settle.
   - ★ As the selection is settled, the immediately preceding screen is restored.
   - ★ Pressing [■] switch while entry is taking place will move the cursor the highest-order digit. In this case, repeat entry from the highest-order digit.
   - ★ If [■] switch is pressed while the cursor is at the highest-order digit, the immediately preceding screen will be restored.

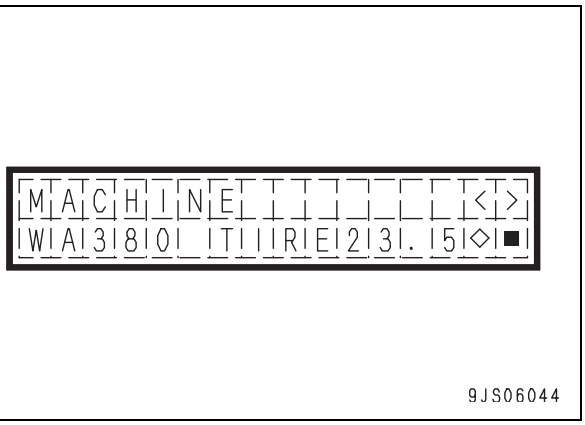


12. Machine model select function (MACHINE WA380, TIRE 23.5)

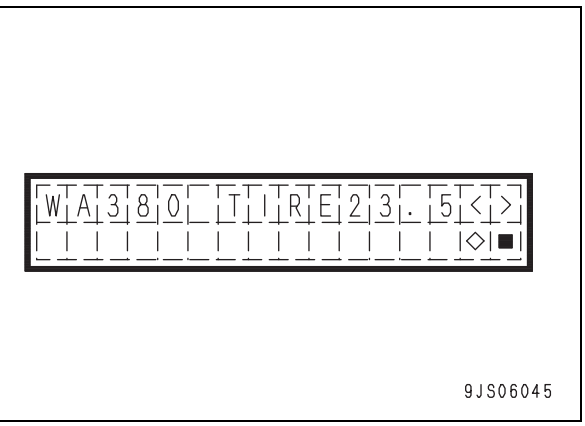
- ★ The setting of the machine model of the machine monitor can be changed with the machine model select function.
- ★ If the machine monitor is initialized, perform the machine model select operation first.
- ★ If the machine model select operation is performed, the setting of options is reset. Accordingly, start with the option select operation and select all the options.

12-1. Implementing the model change

1) Display the MACHINE screen from the menu screen of Service mode.
   - ★ The currently selected machine model and tire size are displayed on the lower line.
     - WA380Z TIRE 23.5
     - WA380Z TIRE 20.5
     - WA380 TIRE 23.5
     - WA380 TIRE 20.5
     - WA430 TIRE 26.5
     - WA430 TIRE 23.5
     - WA470 TIRE 26.5
     - WA470 TIRE 23.5
     - WA480 TIRE 26.5



2) Hold down [◇] switch for 5 seconds to display the model selection screen.



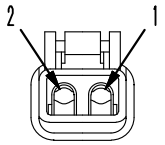
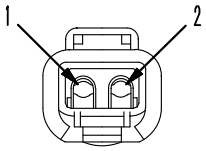
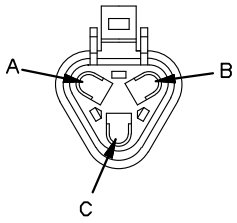
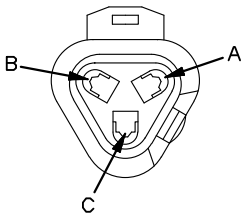
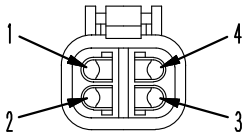
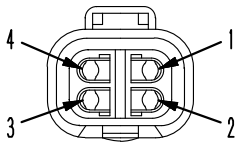
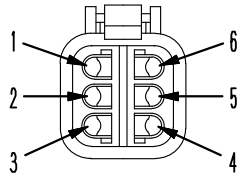
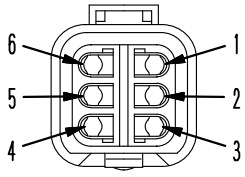
Failure code	Troubled part	Trouble	Controller	Action code	Category of record	Reference document No.
B@CENS	Torque converter oil	Overheating	MON	E02	Mechanical system	Troubleshooting by failure code, Part 2 SEN05746-00
B@HANS	Hydraulic oil	Overheating	MON	E02	Mechanical system	
CA111	Engine controller	Internal failure	ENG	E03	Electrical system	
CA115	Engine Ne, Bkup speed sensor	Abnormality	ENG	E03	Electrical system	
CA122	Charge pressure sensor	Abnormally high level	ENG	E03	Electrical system	
CA123	Charge pressure sensor	Abnormally low level	ENG	E03	Electrical system	
CA131	Throttle sensor	Abnormally high level	ENG	E03	Electrical system	
CA132	Throttle sensor	Abnormally low level	ENG	E03	Electrical system	
CA144	Coolant temperature sensor	Abnormally high level	ENG	E01	Electrical system	
CA145	Coolant temperature sensor	Abnormally low level	ENG	E01	Electrical system	
CA153	Charge temperature sensor	Abnormally high level	ENG	E01	Electrical system	
CA154	Charge temperature sensor	Abnormally low level	ENG	E01	Electrical system	
CA155	Charge temperature	Abnormally high level and derating engine speed	ENG	E03	Electrical system	
CA187	Sensor power supply 2	Voltage low error	ENG	E03	Electrical system	
CA221	Ambient pressure sensor	High error	ENG	E01	Electrical system	
CA222	Ambient pressure sensor	Low error	ENG	E01	Electrical system	
CA227	Sensor power supply 2	Voltage high error	ENG	E03	Electrical system	
CA234	Engine	Overspeed	ENG	E02	Mechanical system	
CA238	Ne speed sensor	Supply power voltage error	ENG	E03	Electrical system	
CA271	Short circuit in PCV1	IMV/PCV1 short circuit	ENG	E03	Electrical system	Troubleshooting by failure code, Part 3 SEN05747-00
CA272	Disconnection in PCV1	IMV/PCV1 disconnection	ENG	E03	Electrical system	
CA322	Circuit in injector #1 system	Disconnection or short	ENG	E03	Electrical system	
CA323	Circuit in injector #5 system	Disconnection or short	ENG	E03	Electrical system	
CA324	Circuit in injector #3 system	Disconnection or short	ENG	E03	Electrical system	
CA325	Circuit in injector #6 system	Disconnection or short	ENG	E03	Electrical system	

Related circuit diagram

This is the excerpted circuit diagram related to trouble

- **Connector No.: Indicates (Model – No. of pins) (Color)**
- **“Connector No. and pin No.” from each branching/ merging point: Shows the ends of branch or source of merging within the parts of the same wiring harness.**
- **Arrow (⟷): Roughly shows the location on the machine.**

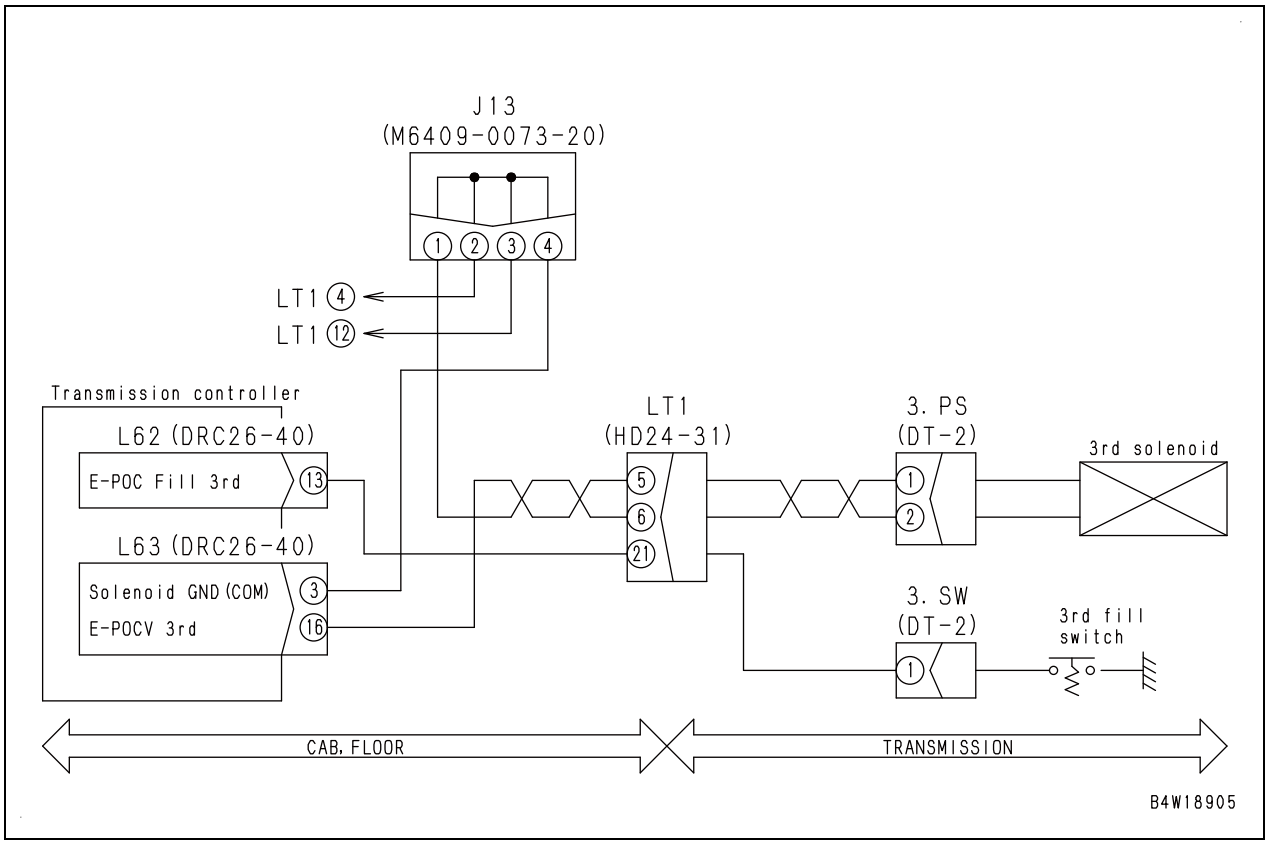
[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DT Series connector		
	Body (plug)	Body (receptacle)	Testing connection use special tool Part No.
2	 BWP05037	 BWP05038	799-601-9020 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-12200 (normal type) 08192-22200 (fine wire type)	Part No. :08192-12100 (normal type) 08192-22100 (fine wire type)	
3	 BWP05039	 BWP05040	799-601-9030 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-1A200 (normal type) 08192-2A200 (fine wire type)	Part No. :08192-13100 (normal type) 08192-23100 (fine wire type)	
4	 BWP05041	 BWP05042	799-601-9040 (T-adapter) 799-601-9890 (T-adapter)
	Part No. :08192-14200 (normal type) 08192-24200 (fine wire type)	Part No. :08192-14100 (normal type) 08192-24100 (fine wire type)	
6	 BWP05043	 BWP05044	799-601-9050 (T-adapter)
	Part No. :08192-16200 (normal type) 08192-26200 (fine wire type)	Part No. :08192-16100 (normal type) 08192-26100 (fine wire type)	

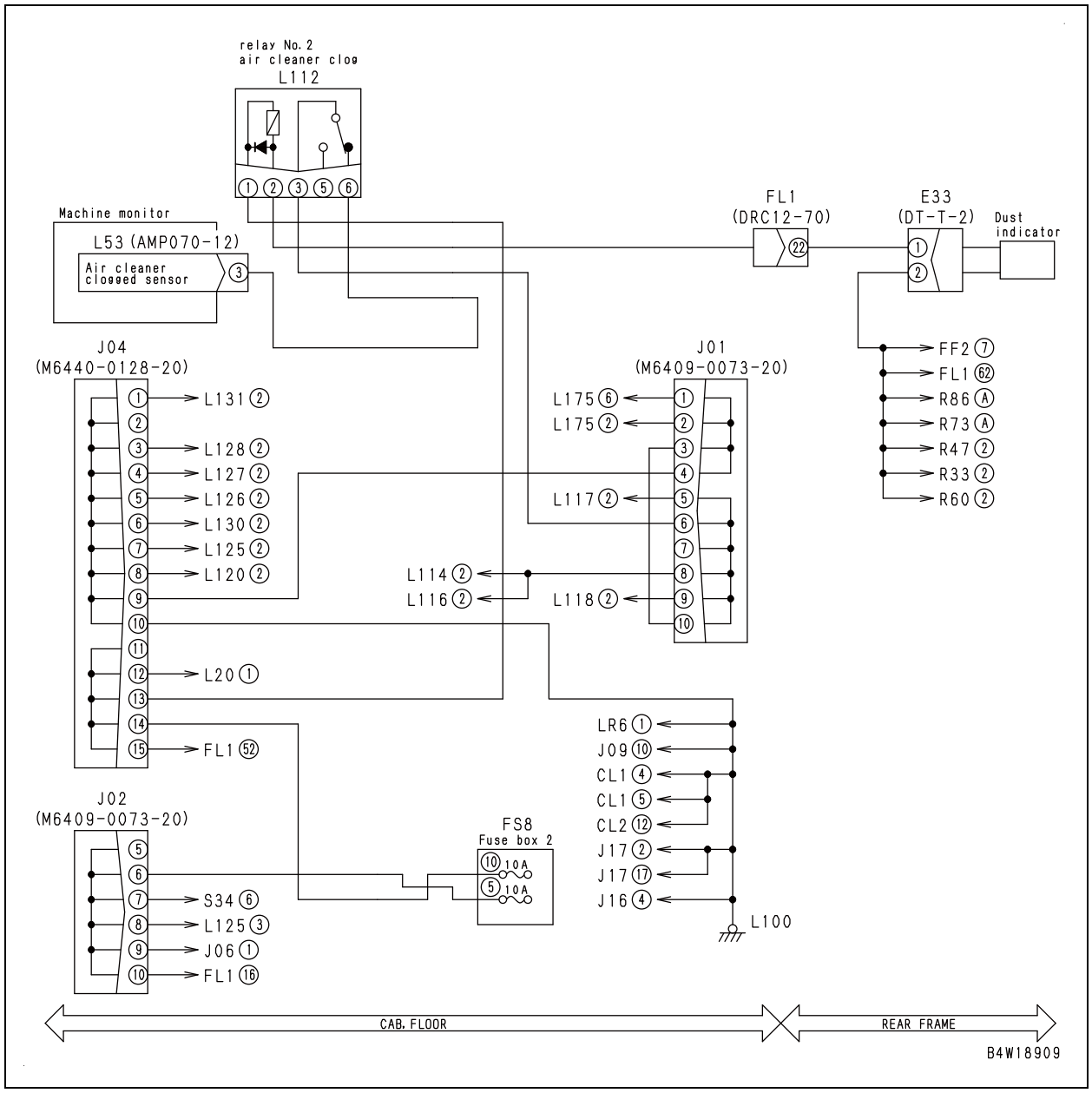
B4D18410

Failure code [2G43ZG] (Accumulator: Low oil pressure) 31
Failure code [44K0L4] (Bucket positioner: ON/OFF signals disagree) 35

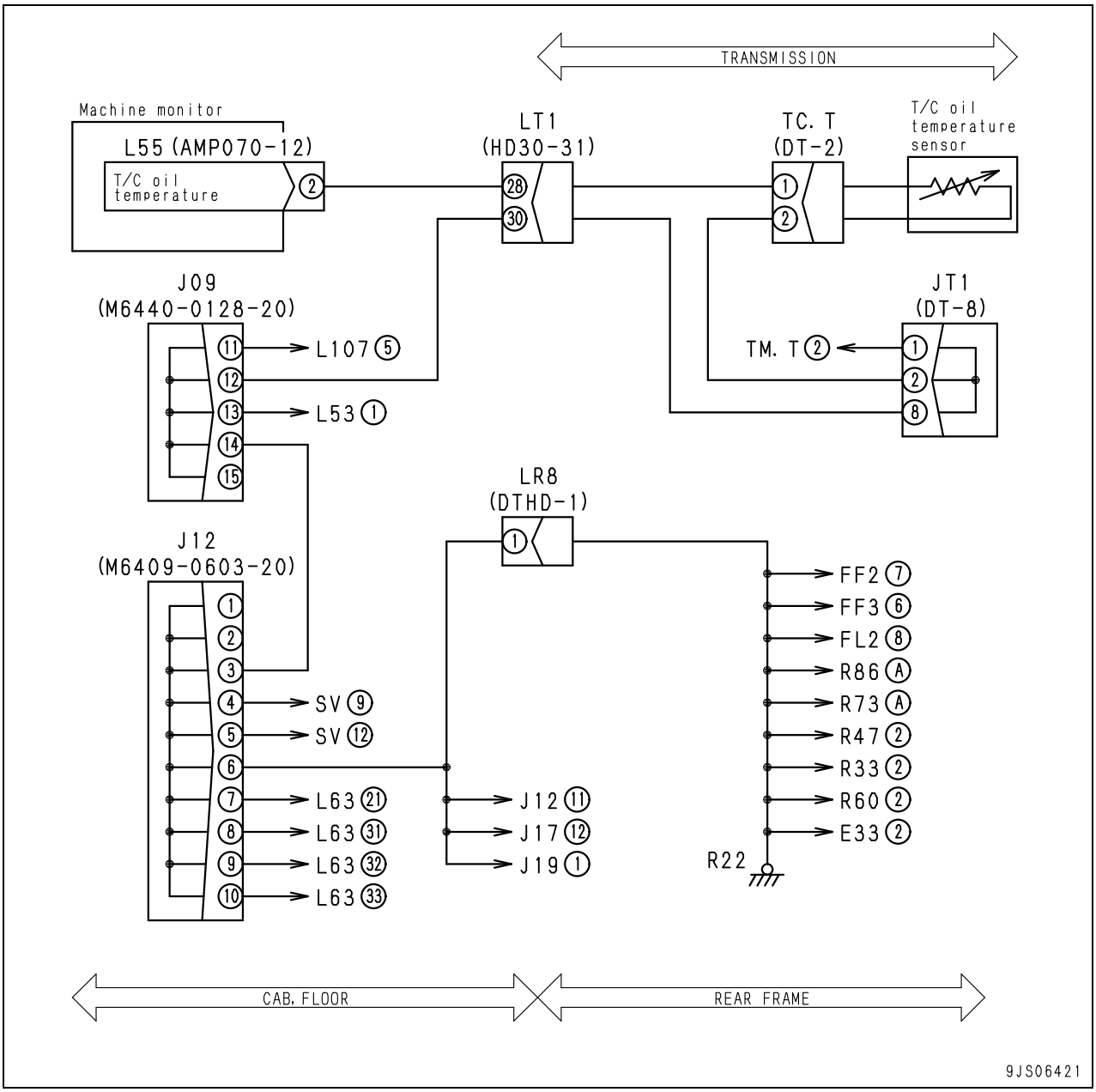
Circuit diagram related to transmission 3rd clutch



Circuit diagram related to dust indicator (WA380Z-6)



Circuit diagram related to torque converter oil temperature sensor (WA380-6)

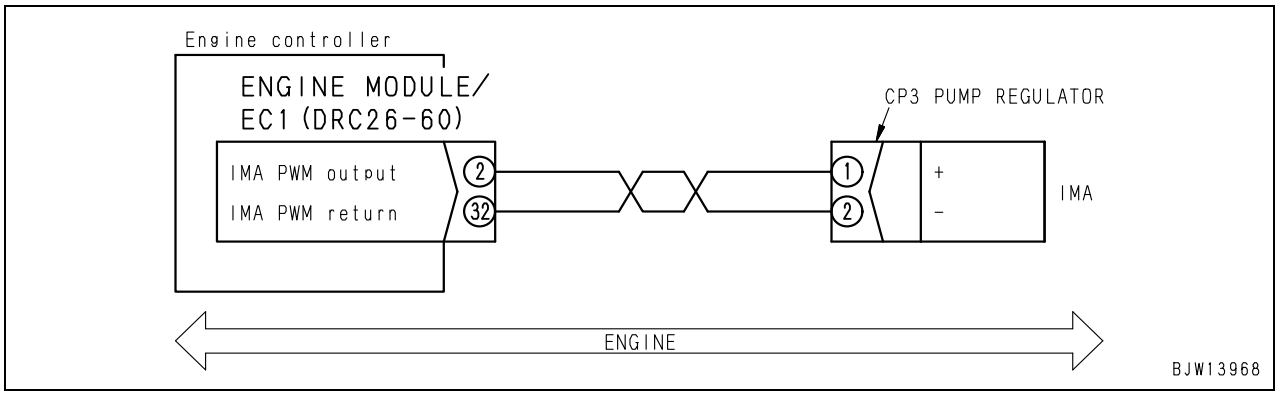


Failure code [CA153] (Charge temperature sensor high error)

Action code	Failure code	Trouble	Charge temperature sensor high error (Engine controller system)
E01	**CA153**		
Contents of trouble	• High voltage is detected in temperature signal circuit of boost pressure sensor and temperature sensor.		
Action of controller	• Fixes charge temperature and continues operation.		
Problem that appears on machine	• Exhaust smoke becomes white • Boost temperature-based engine protection function does not function. • Engine starting performance falls during low temperature.		
Related information	• The input state (temperature) from the charge temperature sensor (boost temperature sensor) can be checked with the monitoring function (Code: 18500, CHG TEMP). • The input state (voltage) from the charge temperature sensor (boost temperature sensor) can be checked with the monitoring function (Code: 18501, CHG TEMP). • Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective [temperature signal circuit] of boost pressure sensor, temperature sensor (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			BOOST PRESS & IMT (male)	Temperature	Resistance	
			Between (3) and (4)	0°C	29 – 36 kΩ	
				25°C	9 – 11 kΩ	
				40°C	4.9 – 5.8 kΩ	
				100°C	600 – 700 Ω	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between EC1 (female) (23) – BOOST PRESS & IMT (female) (3)		Resistance	Max. 10Ω
			Wiring harness between EC1 (female) (47) – BOOST PRESS & IMT (female) (4)		Resistance	Max. 10Ω
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness among all pins between EC1 (female) (23) – EC1 (female) (With all connectors of wiring harness disconnected)		Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts among boost pressure sensor/temperature sensor, engine wiring harness, and engine controller are suspected. Inspect them directly. • Loose connector, broken lock, broken seal • Corrosive, bent, broken, forced-in, or extended pin • Humidity in connector, entry of dirt or dust, poor insulation			
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			EC1 (female)	Temperature	Resistance	
			Between (23) and (47)	0°C	29 – 36 kΩ	
				25°C	9 – 11 kΩ	
				40°C	4.9 – 5.8 kΩ	
				100°C	600 – 700 Ω	

Circuit diagram related to supply pump actuator (metering unit)

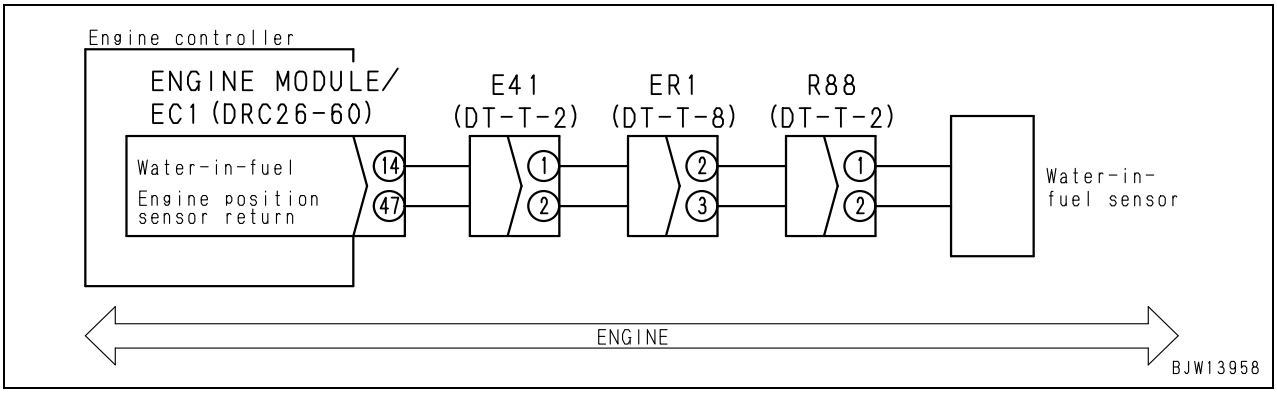


Failure code [CA428] (Abnormally high level in water sensor)

Action code	Failure code	Trouble	Abnormally high level in water sensor (Engine controller system)
E01	**CA428**		
Contents of trouble	• High voltage occurred in fuel water sensor		
Action of controller	• None in particular.		
Problem that appears on machine	• Water separator monitor does not indicate normally.		
Related information	• Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective fuel water sensor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			R88 (female)	Resistance	
			Between (1) and (2)	Max. 100 kΩ	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between EC1 (female) (14) – R88 (male) (1)	Resistance	Max. 10 Ω
			Wiring harness between EC1 (female) (47) – R88 (male) (2)	Resistance	Max. 10 Ω
	3	Short circuit in wiring harness (with another wiring harness)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness among all pins between EC1 (female) (14) – EC1 (female) (With all connectors of wiring harness disconnected)	Resistance	Min. 100 kΩ
	4	Defective wiring harness connector	Connecting parts among fuel water sensor, engine wiring harness, and engine controller are suspected. Inspect them directly. • Loose connector, broken lock, broken seal • Corrosive, bent, broken, forced-in, or extended pin • Humidity in connector, entry of dirt or dust, poor insulation		
	5	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			EC1 (female)	Resistance	
			Between (14) and (47)	Max. 100 kΩ	

Circuit diagram related to fuel water sensor



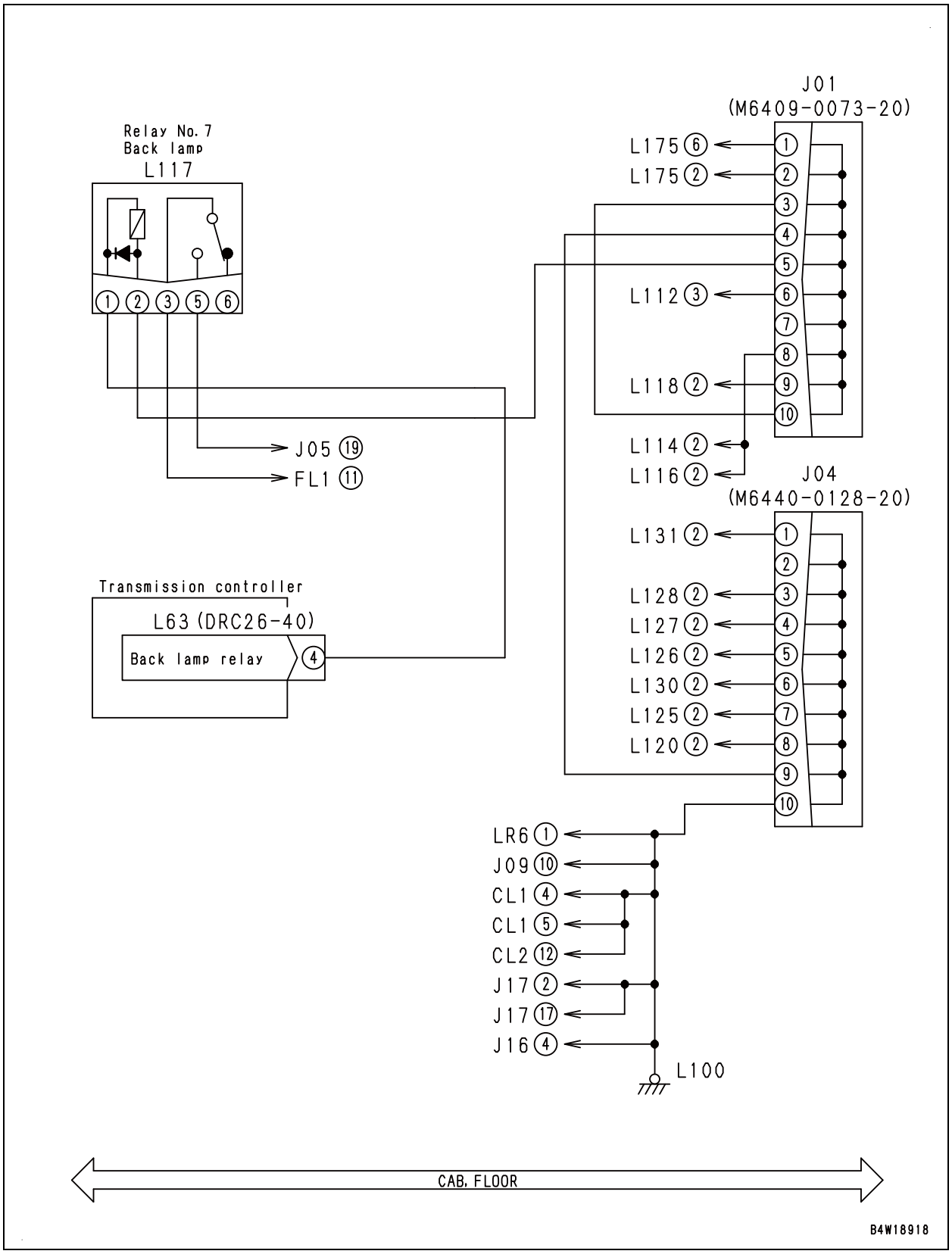
Failure code [CA488] (Derating of torque by abnormally high charge temperature)

Action code	Failure code	Trouble	Derating of torque by abnormally high charge temperature (Engine controller system)
E03	**CA488**		
Contents of trouble	• Temperature signal of boost pressure sensor and temperature sensor is above upper control limit.		
Action of controller	• Limits output and continues operation. • Turns the centralized warning lamp and alarm buzzer ON.		
Problem that appears on machine	• Engine output drops.		
Related information	• The input state (boost temperature) from the boost pressure and temperature sensors can be checked with the monitoring function (Code: 18500, CHG TEMP). • The input state (boost temperature sensor voltage) from the boost pressure and temperature sensors can be checked with the monitoring function (Code: 18501, CHG TEMP). • Method of reproducing failure code: Start engine		

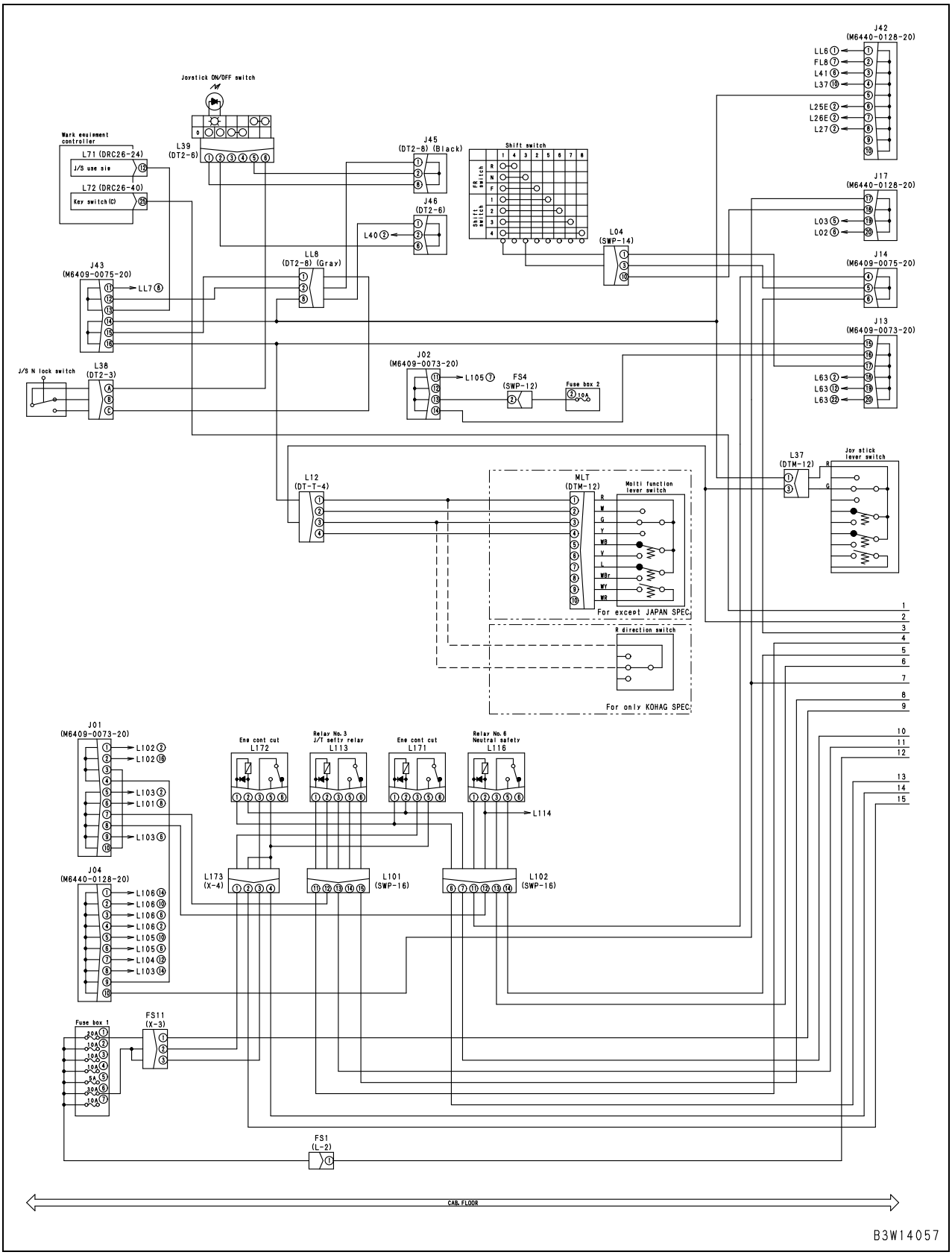
	Causes		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Drop in cooling performance of aftercooler	Inspect following directly. • Loose, broken fan belt • Insufficient cooling air • Clogged aftercooler fin
	2	Abnormally high temperature at turbocharger outlet	Inspect related parts directly.
	3	Defective engine controller	If causes 1 – 2 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)

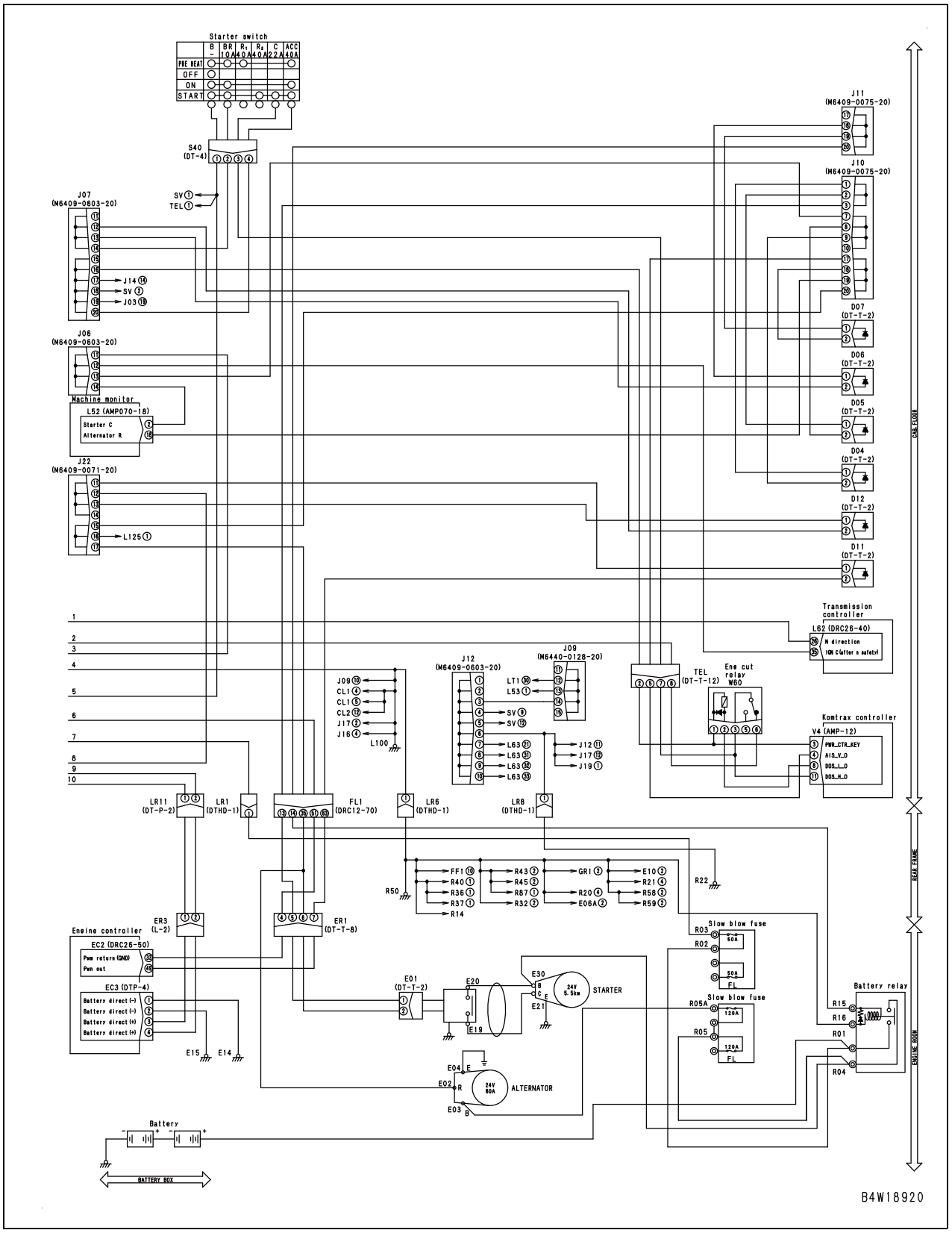
Failure code [D192KY] (ECSS solenoid: Short circuit with power supply line) 35
Failure code [D193KA] (Joystick steering solenoid cut relay: Disconnection) 36
Failure code [D193KB] (Joystick steering solenoid cut relay: Short circuit) 38
Failure code [D193KY] (Joystick steering solenoid cut relay: Short circuit with power supply line) 40
Failure code [D5ZHKA] (Terminal C signal: Disconnection) 43
Failure code [D5ZHKB] (Terminal C signal: Short circuit) 49
Failure code [D5ZHKZ] (Terminal C signal: Disconnection or short circuit) 54
Failure code [D5ZHL6] (Terminal C signal: Signal does not match engine running or stopped state) 61
Failure code [DA80L4] (Auto grease controller: ON/OFF signals disagree) 66
Failure code [DAF3KK] (Machine monitor: Low source voltage (input) 68
Failure code [DAF5KP] (Machine monitor: Low output voltage) 72
Failure code [DAFRKR] (CAN communication with machine monitor: Defective communication (Abnormality in target component system) 76

Circuit diagram related to backup lamp relay (WA380Z-6)



Circuit diagram related to engine starting system (C terminal signal) (WA380-6)




Starter switch
B
BR
R1
R2
C
ACC
PRE HEAT
OFF
ON
START
S40 (DT-4)
J07 (M6409-0603-20)
J08 (M6409-0603-20)
Machine monitor
L52 (AMP070-18)
Starter C
Alternator R
J22 (M6409-0071-20)
J11 (M6409-0075-20)
J10 (M6409-0075-20)
D07 (DT-T-2)
D06 (DT-T-2)
D05 (DT-T-2)
D04 (DT-T-2)
D12 (DT-T-2)
D11 (DT-T-2)
Transmission controller
L62 (DRC26-40)
N direction
Komtrax controller
V4 (AMP-12)
PWR_CTR_KEY
J09 (M6440-0128-20)
J12 (M6409-0603-20)
TEL (DT-T-12)
Ene cut relay W60
L100
LR11 (DT-P-2)
LR1 (DTHD-1)
FL1 (DRC12-70)
LR6 (DTHD-1)
ER3 (L-2)
ER1 (DT-T-8)
Engine controller
EC2 (DRC26-50)
EC3 (DTP-4)
Slow blow fuse
50A
120A
FL
Battery relay
E01 (DT-T-2)
E20
E19
E30
E21
STARTER
24V 5.5kw
E04
E02
E03
ALTERNATOR
24V 60A
Battery
BATTERY BOX
CAB FLOOR
REAR FRAME
ENGINE ROOM
B4W18920

(WA380Z-6)

Action code	Failure code	Trouble	Transmission controller: Low source voltage (Transmission controller)
E03	**DAQ0KK**		
Contents of trouble	• Voltage of constant power supply (battery direct power supply) of the transmission controller is low. • Voltage of constant power supply (battery direct power supply) is below 18 V and engine speed is above 500 rpm.		
Action of controller	• Cannot sense the input signals normally. • Turns the centralized warning lamp and alarm buzzer ON. • Sets all the controller output to OFF (neutral hold state). • Even if cause of failure disappears, system does not reset itself until FNR (directional) lever is set to N (Neutral).		
Problem that appears on machine	• The machine cannot move (transmission is stuck in Neutral).		
Related information	• Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective slow-blow fuse	If the slow-blow fuse is shut down, the circuit probably has a grounding fault, etc. (See cause 4.)		
	2	Defective fuse No. 5 of fuse box 1	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 4.)		
	3	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Battery relay R01 – slow-blow fuse R02	Resistance	Max. 1 Ω
			Wiring harness between slow-blow fuse R03 – fuse No. 5 of fuse box 1	Resistance	Max. 1 Ω
			Wiring harness between fuse No. 5 of fuse box 1 – L63 (female) (1), (11)	Resistance	Max. 1 Ω
	4	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Battery relay R01 – slow-blow fuse R02 and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between slow-blow fuse R03 – fuse No. 5 of fuse box 1 and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between fuse No. 5 of fuse box 1 – L63 (female) (1), (11), – circuit branch end and chassis ground	Resistance	Min. 1 MΩ
	5	Defective transmission controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			L63	Voltage	
			Between (1), (11) and (21), (31), (32), (33)	20 – 30 V	

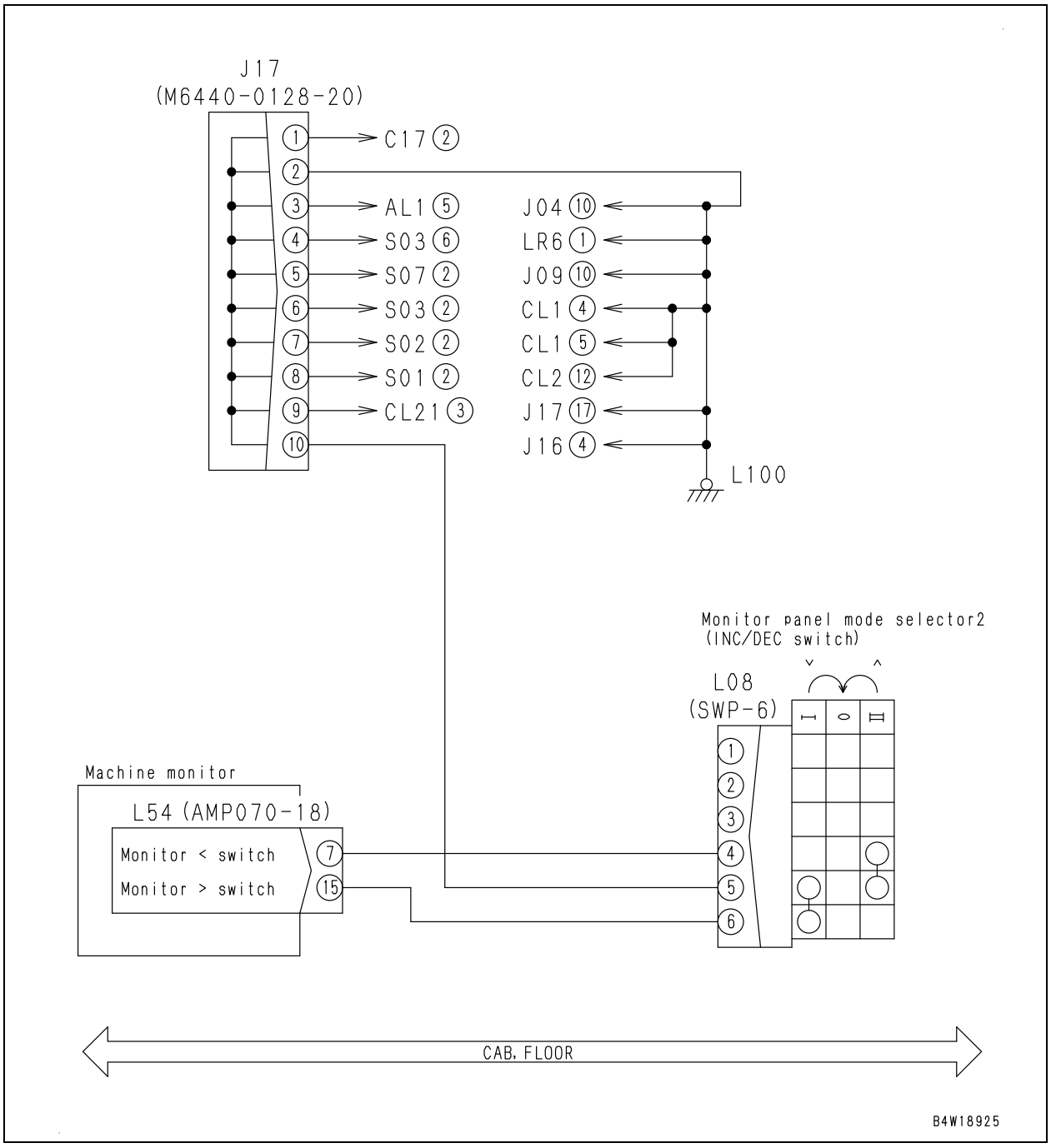
Failure code [DB92KK] Work equipment controller load power supply line: Low source voltage (input)

(WA380-6 only)

Action code	Failure code	Trouble	Work equipment controller load power supply line: Low source voltage (input) (Work equipment controller system)
E03	**DB92KK**		
Contents of trouble	• The voltage of the 24V solenoid power supply system is low. • Detection conditions: Terminal C input is turned OFF, constant power supply (battery direct power supply) is above 20 V and solenoid power supply is below 18 V		
Action of controller	• Cannot supply voltage to the solenoid. (If the voltage is below 18 V, all outputs are turned OFF.) • Turns the centralized warning lamp and alarm buzzer ON. • Even if cause of failure disappears, system does not reset itself until the joystick steering lever and work equipment lever are once set to N (Neutral).		
Problem that appears on machine	• Work equipment does not move • Machine cannot be steered with joystick lever.		
Related information	• Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective slow-blow fuse	If the slow blow fuse is shut down, the circuit probably has a grounding fault, etc. (See cause 4.)		
	2	Defective fuse No.5 of fuse box 2	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 4.)		
	3	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between battery R04 – slow-blow fuse R10	Resistance	Max. 1 Ω
			Wiring harness between slow-blow fuse R06A – fuse No. 5 of fuse box 2	Resistance	Max. 1 Ω
			Wiring harness between fuse No. 5 of fuse box 2 – L73 (female) (2), (12), (22)	Resistance	Max. 1 Ω
	4	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between battery relay R04 – slow-blow fuse R10 and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between slow-blow fuse R06A – fuse No. 5 of fuse box 2 and chassis ground	Resistance	Min. 1 MΩ
			Wiring harness between fuse No. 5 of fuse box 2 – L73 (female) (2), (12), (22) and chassis ground	Resistance	Min. 1 MΩ
	5	Defective work equipment controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			L73	Voltage	
			Between (2), (12), (22) and (21), (31), (32), (33)	20 – 30 V	

Circuit diagram related to > switch and < switch (WA380Z-6)



<table>
<tr><td rowspan="8">Possible causes and standard value in normal state</td><td colspan="2">Causes</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="3">3</td><td rowspan="3">Disconnection in wiring harness (Disconnection or defective contact)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="3">Wiring harness between L54 (female) (1) – PB.SW (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="3">Wiring harness between PB.SW (female) (2) – chassis ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">4</td><td rowspan="4">Defective transmission controller</td><td colspan="3">Wiring harness between L01 (female) (3) – L62 (female) (6)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.</td></tr>
<tr><td colspan="2">L62 (male)</td><td>Parking brake switch</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="2" rowspan="2">Between (6) and chassis ground</td><td>ON</td><td colspan="2">Max. 1 V</td></tr>
<tr><td>Turn on the starting switch and turn on the parking brake switch, then turn it off.</td><td colspan="2">20 – 30 V</td></tr>
</table>

(WA380Z-6)

Action code	Failure code	Trouble	FNR lever switch: Disconnection (Transmission controller system)
E03	**DDK6KA**		
Contents of trouble	• Since the FNR (directional) lever switch signal system is disconnected or shorted, all the lever signals are not input		
Action of controller	• Turns the centralized warning lamp and alarm buzzer ON. • Even if cause of failure disappears, system does not reset itself until FNR (directional) lever is set to N (Neutral).		
Problem that appears on machine	• Machine travel with the FNR (directional) lever switch is unavailable. • Shift lever position pilot lamp goes off.		
Related information	• The input state (ON/OFF) from the FNR (directional) lever switch can be checked with the monitoring function (Code: 40907, D-IN-20, D-IN-21 or D-IN-22). • Method of reproducing failure code: Turn the starting switch ON and operate FNR (directional) lever		

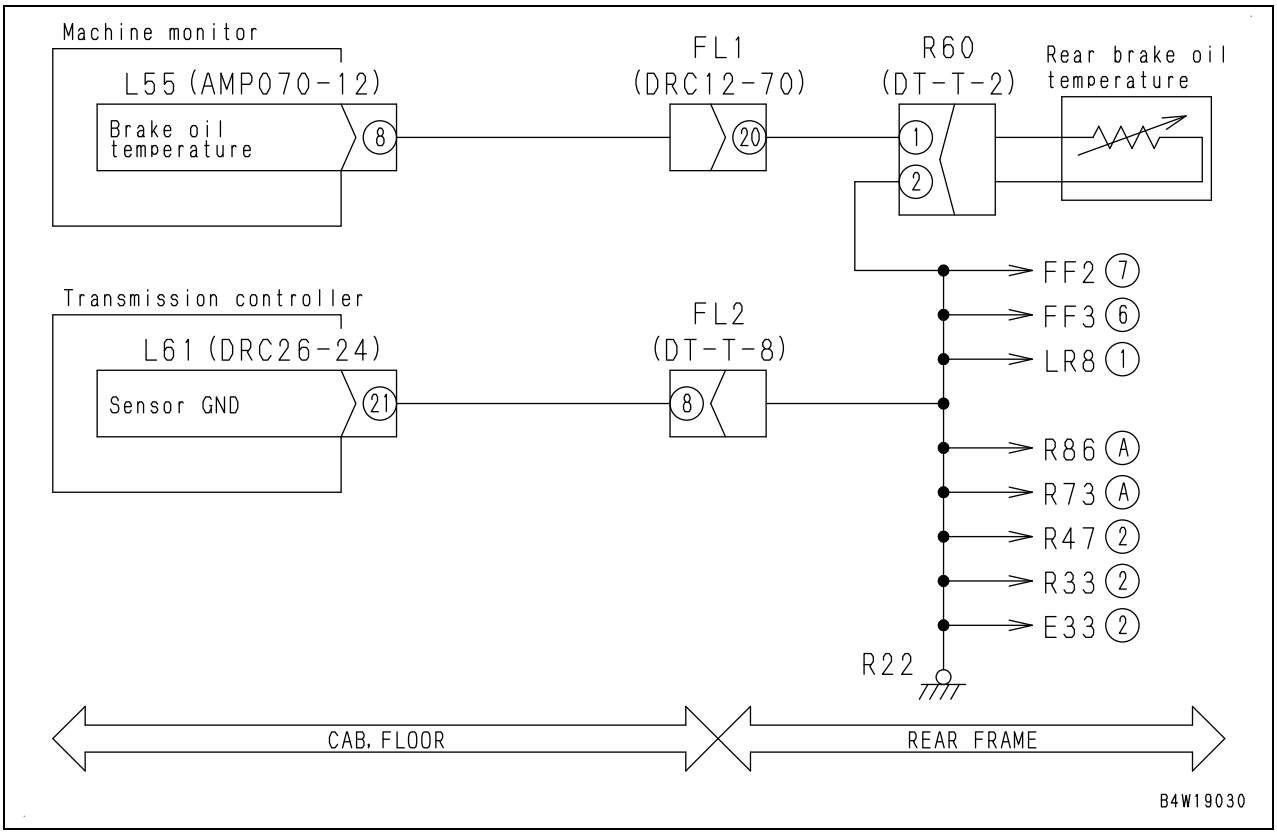
	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuse No. 2 of fuse box 2	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 4.)			
	2	Defective FNR (directional) lever switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L04	FNR (directional) lever	Voltage	
			Between (1) and (10)	Constant	20 – 30 V	
			Between (3) and (10)	N (Neutral)	20 – 30 V	
				Other than above	Max. 1 V	
			Between (2) and (10)	F (Forward)	20 – 30 V	
				Other than above	Max. 1 V	
			Between (4) and (10)	R (Reverse)	20 – 30 V	
				Other than above	Max. 1 V	
	3	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between fuse No. 2 of fuse box 2 – L04 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between L62 (female) (16) – L04 (female) (4)	Resistance	Max. 1 Ω	
			Wiring harness between L62 (female) (26) – L04 (female) (3)	Resistance	Max. 1 Ω	
			Wiring harness between L62 (female) (36) – L04 (female) (2)	Resistance	Max. 1 Ω	
			Wiring harness between L04 (female) (10) – chassis ground	Resistance	Max. 1 Ω	

Failure code [DDWLLD] (Hold switch: Switch is kept pressed for long time)

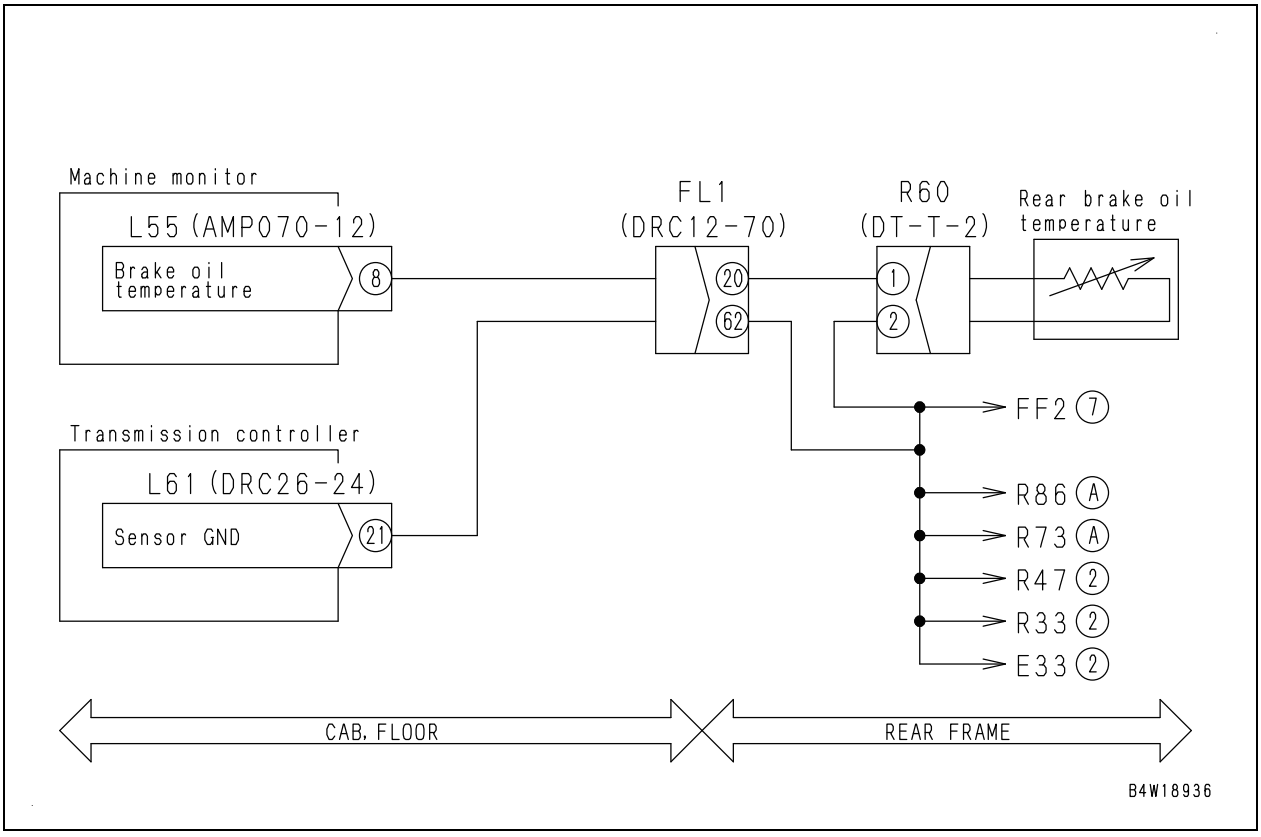
Action code	Failure code	Trouble	Hold switch: Switch is kept pressed for long time (Transmission controller system)
E01	**DDWLLD**		
Contents of trouble	• Since the hold switch system is shorted, holding of signals becomes unavailable.		
Action of controller	• Holds once when a grounding fault occurs, then does not control holding. • If cause of failure disappears, system resets itself.		
Problem that appears on machine	• When ground fault occurs, turns the hold switch once.		
Related information	• The input state (ON/OFF) from the hold switch can be checked with the monitoring function (Code: 40908, D-IN-31). • Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective hold switch (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L14 (male)	Hold switch	Resistance	
			Between (3) and (4)	ON	Max. 1 Ω	
				OFF	Min. 1 MΩ	
			Between (3), (4) and chassis ground	Constant	Min. 1 MΩ	
	2	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between L62 (female) (38) – L14 (female) (3) and chassis ground		Resistance	Min. 1 MΩ
	3	Defective transmission controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L62	Hold switch	Voltage	
			Between (38) and chassis ground	OFF	20 – 30 V	
				ON	Max. 1 V	

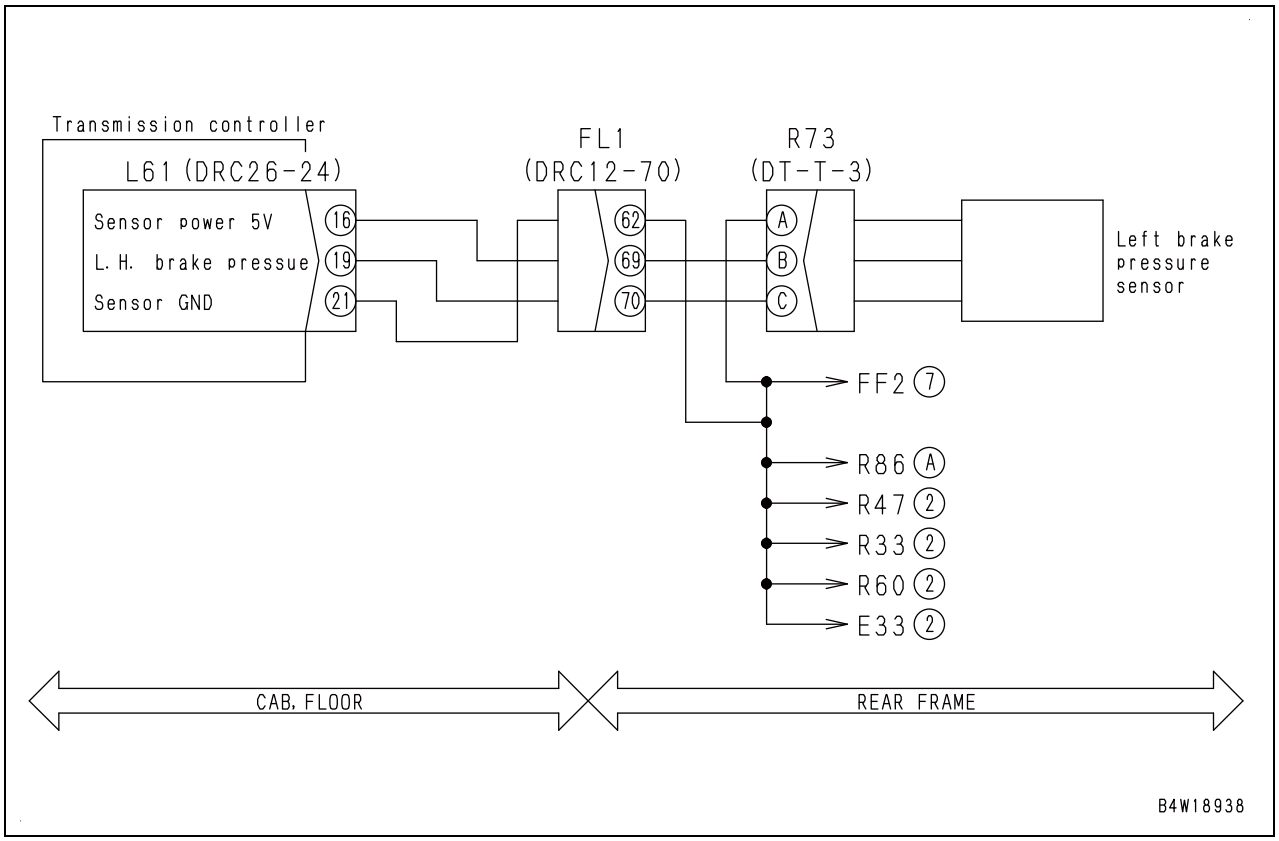
Circuit diagram related to rear brake oil temperature sensor (WA380-6)



Circuit diagram related to rear brake oil temperature sensor (WA380Z-6)

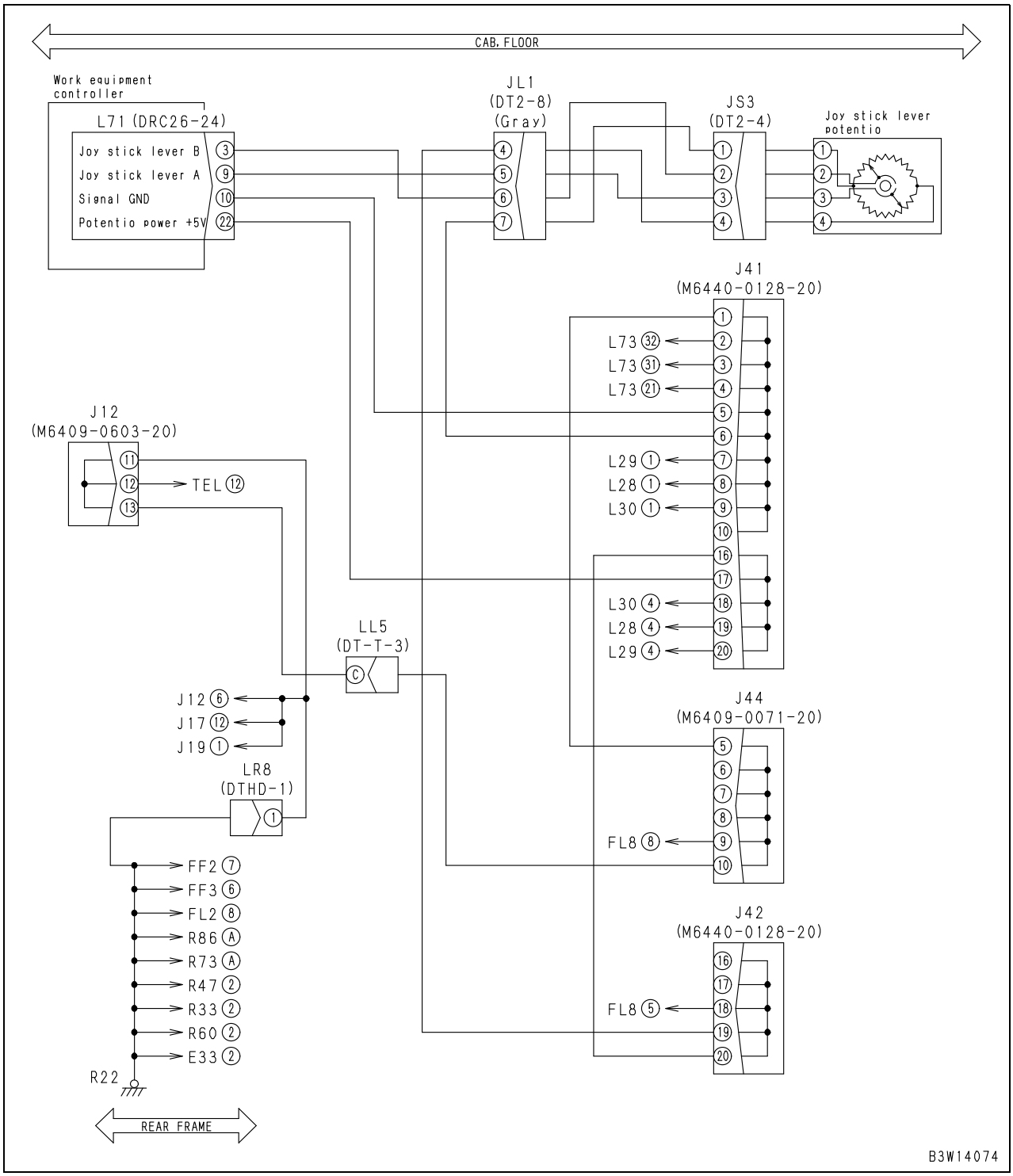


Circuit diagram related to transmission cut-off pressure sensor



<table>
<tr><td rowspan="6">Possible causes and standard value in normal state</td><td colspan="2">Causes</td><td colspan="5">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Grounding fault in wiring harness
(Contact with ground circuit)</td><td colspan="5">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">Wiring harness between L71 (female) (7) – L29 (female) (3) and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Wiring harness between L71 (female) (22) – L29 (female) (4), – circuit branch end and chassis ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Defective work equipment controller</td><td colspan="5">★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.
• Work equipment lock lever: Free</td></tr>
<tr><td colspan="2">L71</td><td>Bucket EPC lever</td><td colspan="2">Voltage</td></tr>
<tr><td colspan="2">Between (22) and (10)</td><td>Constant</td><td colspan="2">4.85 – 5.15 V</td></tr>
<tr><td rowspan="4">Between (7) and (10)</td><td>Lever at neutral</td><td colspan="2">2.40 – 2.60 V</td></tr>
<tr><td>Tilt operation (Before detent)</td><td colspan="2">3.69 – 4.09 V</td></tr>
<tr><td>Tilt operation (Detent position)</td><td colspan="2">3.95 – 4.35 V</td></tr>
<tr><td>Full dump operation</td><td colspan="2">0.65 – 1.05 V</td></tr>
</table>

Circuit diagram related to joystick steering EPC lever potentiometer



Failure code [DT20KB] (Transmission cut-off indicator lamp: Short circuit)

Action code	Failure code	Trouble	Transmission cut-off indicator lamp: Short circuit (Transmission controller system)
E01	**DT20KB**		
Contents of trouble	• Since the transmission cut-off indicator lamp system is shorted, output signals are not entered to the indicator lamp.		
Action of controller	• Turns off the transmission cut-off indicator lamp. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Transmission cut-off indicator lamp does not light up.		
Related information	• Method of reproducing failure code: Start engine and turn transmission cut-off switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective transmission cut-off indicator lamp (LED) (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			S03 (male)		Resistance	
			Between (2) and (1)		Min. 1 MΩ (No continuity)	
			Between (1), (2) and chassis ground		Min. 1 MΩ	
	2	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between L63 (female) (8) – S03 (female) (1) and chassis ground		Resis-tance	Min. 1 MΩ
	3	Defective transmission controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L63	Transmission cut-off switch	Voltage	
			Between (8) and chassis ground	ON	Max. 1 V	
				OFF	20 – 30 V	

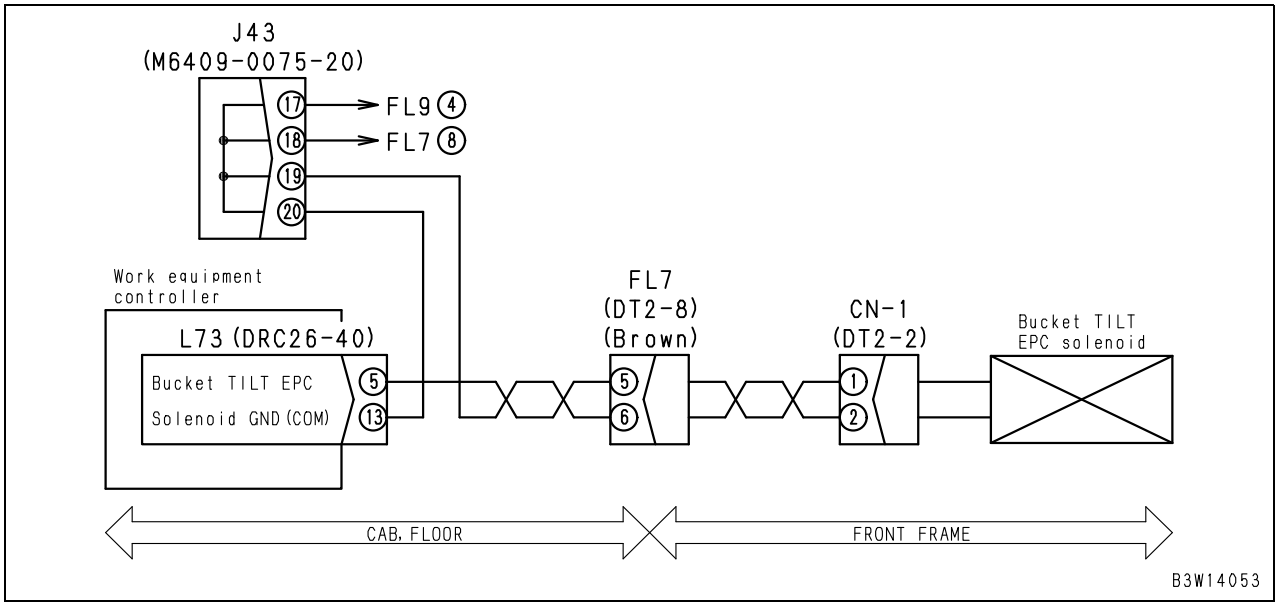
Failure code [DW4RKB] (Bucket tilt EPC solenoid: Short circuit)

(WA380-6 only)

Action code	Failure code	Trouble	Bucket tilt EPC solenoid: Short circuit (Work equipment controller system)
E03	**DW4RKB**		
Contents of trouble	• Since the bucket tilt EPC solenoid signal system is shorted, abnormal current flows when the bucket tilt EPC solenoid output is ON.		
Action of controller	• Stops outputting the signal to the bucket tilt EPC solenoid. • Stops outputting the signal to the bucket tilt detent. • Turns the centralized warning lamp and alarm buzzer ON. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Bucket does not tilt.		
Related information	• The output state (current value) to the bucket tilt EPC solenoid can be checked with the monitoring function (Code: 41902, TILT EPC DIR). • Method of reproducing failure code: Start engine and tilt the bucket.		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
	1	Defective bucket tilt EPC solenoid (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CN-1 (male)	Resistance	
			Between (1) and (2)	5 – 15 Ω	
			Between (1), (2) and chassis ground	Min. 1 MΩ	
	2	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between L73 (female) (5) – CN-1 (female) (1) and chassis ground	Resistance	Min. 1 MΩ
	3	Defective work equipment controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L73 (female)	Resistance	
			Between (5) and (13)	5 – 15 Ω	
			Between (5), (13) and chassis ground	Min. 1 MΩ	

Circuit diagram related to bucket tilt EPC solenoid



Failure code [DWM1KY] (Work equipment neutral lock solenoid: Short circuit with power supply line)

(WA380-6 only)

Action code	Failure code	Trouble	Work equipment neutral lock solenoid: Short circuit with power supply line (Work equipment controller system)
E01	**DWM1KY**		
Contents of trouble	• Since the work equipment neutral lock solenoid system is shorted with power source, abnormal voltage is applied when the work equipment neutral lock solenoid output is OFF.		
Action of controller	• Turns off the output to the work equipment neutral lock solenoid. • Stops outputting the signal to the work equipment solenoid according to an input signal from the work equipment lock lever. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• All work equipment do not move.		
Related information	• Removing (disconnecting) the connector of the work equipment neutral lock solenoid enables operating the work equipment. • The output state (ON/OFF) to the work equipment neutral lock solenoid can be checked with the monitoring function (Code: 40952, D-OUT-0). • Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective work equipment neutral lock solenoid (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			F26 (male)		Resistance	
			Between (1) and (2)		35 – 45 Ω	
			Between (1), (2) and chassis ground		Min. 1 MΩ	
	2	Defective diode (F27) (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			F27 (male)	Diode range	Continuity	
			Between (2) and (1)	Measured from (2) side	Continuity	
			Between (1) and (2)	Measured from (1) side	No continuity	
	3	Hot short in wiring harness (Contact with 24V circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between L73 (female) (7) – F26 (female) (1) and chassis ground		Voltage	Max. 1 V
	4	Defective work equipment controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L73 (female)		Resistance	
			Between (7) and chassis ground		35 – 45 Ω	

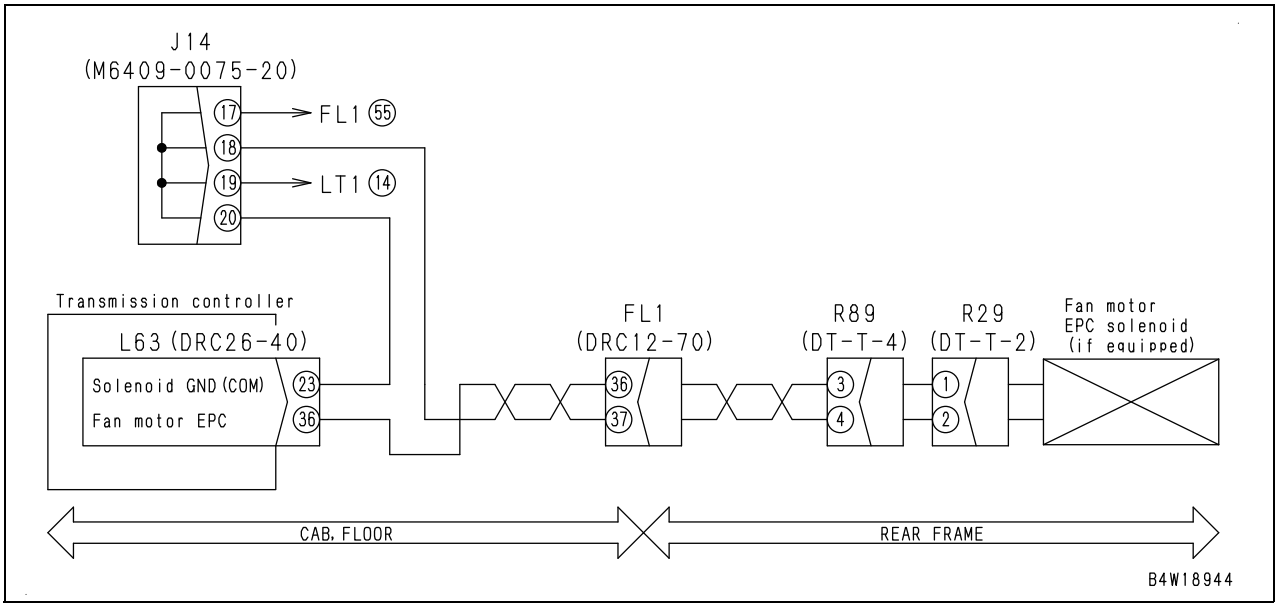
Failure code [DX16KA] (Fan motor EPC solenoid: Disconnection)

(WA380Z-6)

Action code	Failure code	Trouble	Fan motor EPC solenoid: Disconnection (Transmission controller system)
E01	**DX16KA**		
Contents of trouble	• Since the fan motor EPC solenoid system is disconnected, no current flows when the fan motor EPC solenoid output is ON.		
Action of controller	• Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• The fan speed is set to the maximum.		
Related information	• The output state (current) to the fan motor EPC solenoid can be checked with the monitoring function (Code: 41400, FAN EPC DIR). • Method of reproducing failure code: Turn the starting switch ON.		

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective fan motor EPC solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			R29 (male)	Resistance	
			Between (1) and (2)	5 – 10 Ω	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between L63 (female) (23) – R29 (female) (2)	Resistance	Max. 1 Ω
			Wiring harness between L63 (female) (36) – R29 (female) (1)	Resistance	Max. 1 Ω
	3	Defective transmission controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L63 (female)	Resistance	
			Between (36) and (23)	5 – 10 Ω	

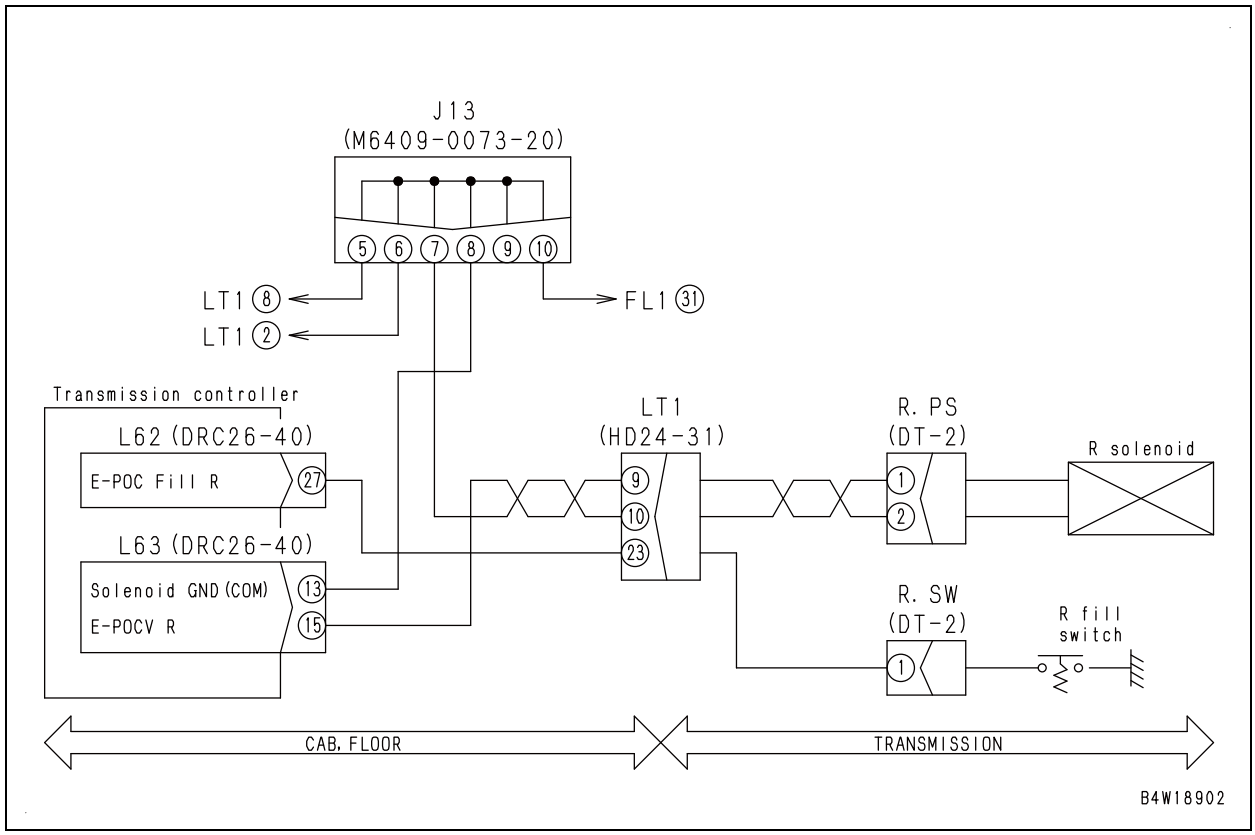
Circuit diagram related to fan motor EPC solenoid



WA380-6, WA380Z-6 Wheel loader

Form No. SEN05753-00

Circuit diagram related to R (Reverse) clutch ECMV solenoid



Failure code [DXHMKB] (Joystick steering left EPC solenoid: Short circuit)

(WA380-6 only)

Action code	Failure code	Trouble	Joystick steering left EPC solenoid: Short circuit (Work equipment controller system)
E03	**DXHMKB**		
Contents of trouble	• Since the joystick steering left EPC solenoid system is shorted, abnormal current flows when the joystick steering left EPC solenoid output is ON.		
Action of controller	• Stops outputting the signal to the joystick steering right and left EPC solenoids. • Stops outputting the signal to the joystick steering solenoid cut-off relay. • Turns the centralized warning lamp and alarm buzzer ON. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Steering control with the joystick steering becomes unavailable (steering control from the handle mode is available). • Wiring harness or controller may burn.		
Related information	• The output state (current) to the joystick steering left EPC solenoid can be checked with the monitoring function (Code: 41905, J/S EPC DIR LH). • Method of reproducing failure code: Start the engine and steer to the left using the joystick steering.		

	Causes		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective joystick steering left EPC solenoid (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L36 (male)	Resistance		
			Between (1) and (2)	5 – 15 Ω		
			Between (1), (2) and chassis ground	Min. 1 MΩ		
	2	Defective joystick steering cut-off relay (L41) (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L41 (male)	Resistance		
			Between (5) and (6)	200 – 400 Ω		
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			When joystick steering cut-off relay (L41) is replaced with a relay of the same type, if the condition becomes normal, the joystick steering cut-off relay is defective.			
	3	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between L73 (female) (38) – L36 (female) (1) and chassis ground	Resistance	Min. 1 MΩ	
	4	Defective work equipment controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L73 (female)	Resistance		
			Between (38) and (23)	5 – 15 Ω		
			Between (23), (38) and chassis ground	Min. 1 MΩ		

(WA380Z-6)

Connection table of fuse box and slow blow fuse

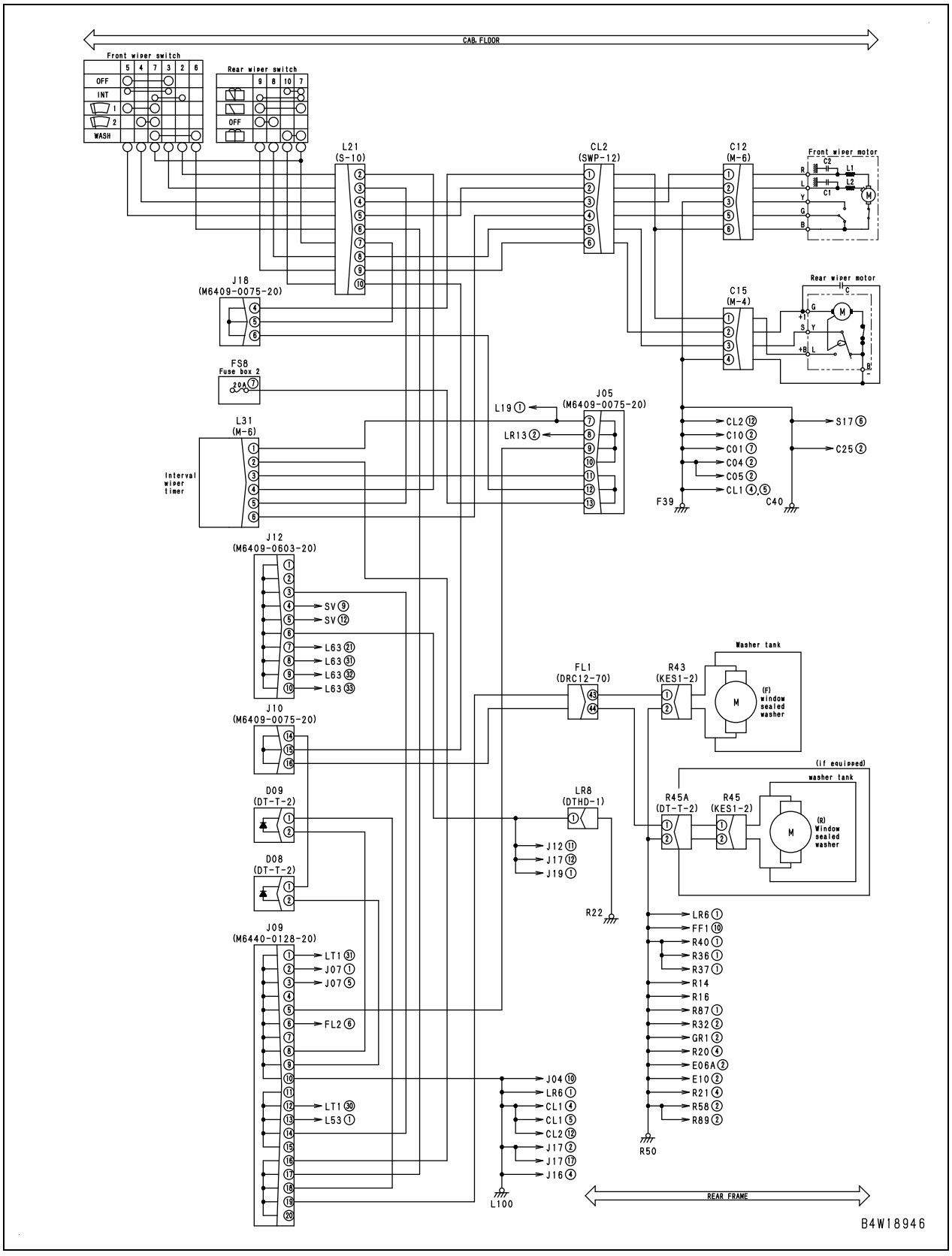
★ This connection table indicates the devices to which the power of the fuse box and slow blow fuse is supplied. (A switch power supply is a device which supplies power while the starting switch is in the ON position and a constant power supply is a device which supplies power while the starting switch is in the OFF and ON positions).

★ When carrying out troubleshooting related to the electrical system, you should check the fuse box and slow blow fuse to see if the power is supplied normally.

Fuse box 1

Type of power supply	Fuse No	Capacity of fuse	Destination of power
Constant power supply Slow-blow fuse (50 A)	1	20 A	KOMTRAX circuit, Starting switch terminal (B) circuit
	2	10 A	Hazard lamp circuit
	3	10 A	Machine monitor (B) circuit
	4	10 A	Room lamp circuit
	5	5 A	Transmission controller (B) circuit, Work equipment controller (B) circuit (if equipped)
	6	30 A	Engine controller (A) circuit
	7	10 A	Spare 1
Switch power supply Slow-blow fuse (50 A)	8	10 A	Front working lamp circuit
	9	10 A	Rear working lamp circuit
	10	20 A	Car radio circuit
	11	10 A	Turn signal lamp circuit
	12	20 A	Yellow rotary lamp circuit (if equipped)
	13	10 A	Air suspension seat circuit (if equipped)
	14	5 A	Spare 2
Switch power supply Starting switch ACC	15	5 A	Engine controller (B) circuit

Circuit diagram related to wiper (WA380Z-6)



E-5 Working lamp does not light up or go off

(WA380-6)

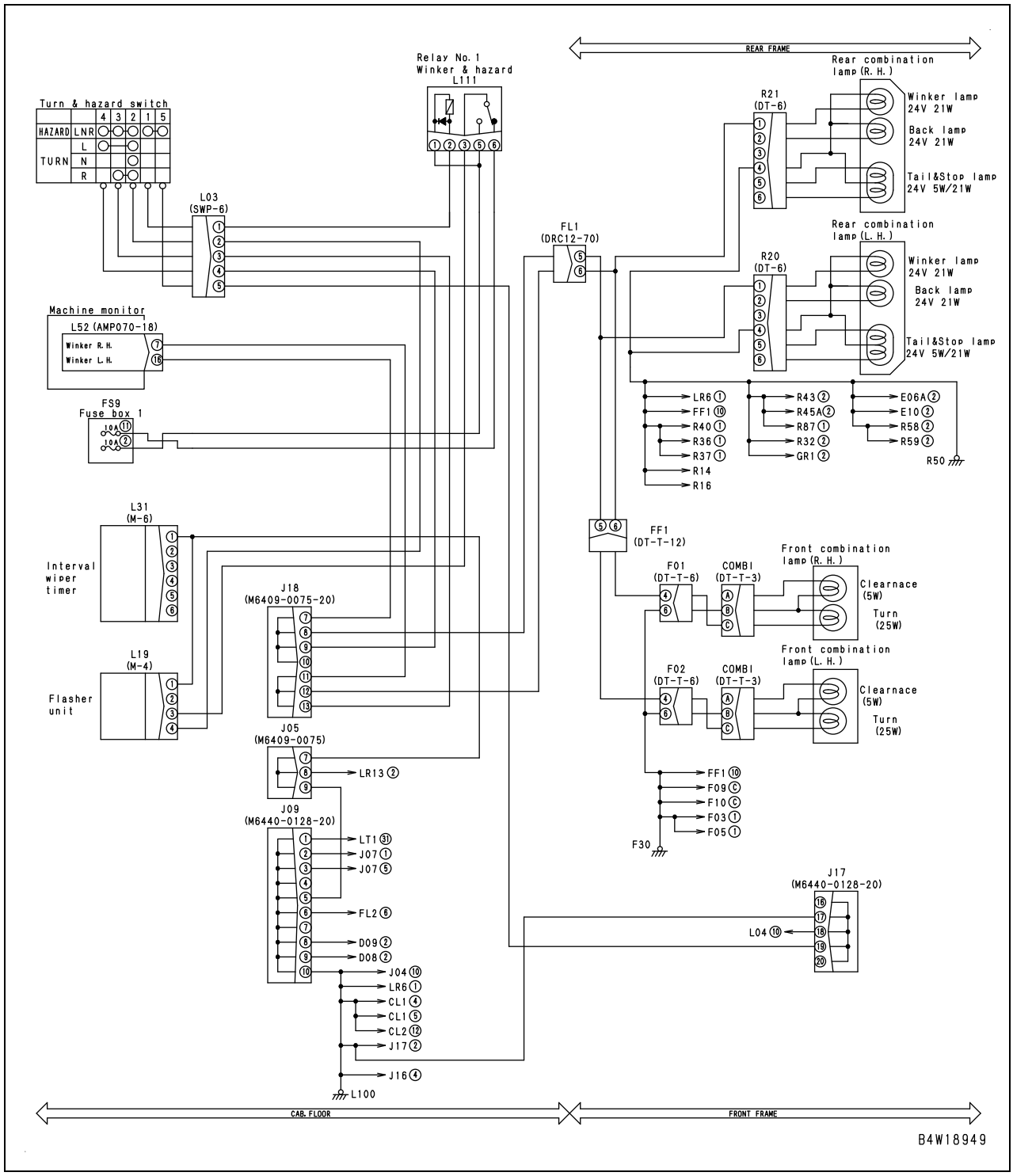
Contents of trouble	(1) Either of front working lamp and rear working lamp does not light up.
Related information	• The working lamp system power supply wiring harness is disconnected or shorted with the chassis ground. • If the clearance lamp does not light up or go off either, carry out troubleshooting for the clearance lamp first.

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between L02 (female) (5) – fuse No. 11 of fuse box 2	Resistance	Max. 1 Ω
			Wiring harness between fuse No. 11 of fuse box 2 – J16 (female) (1)	Resistance	Max. 1 Ω

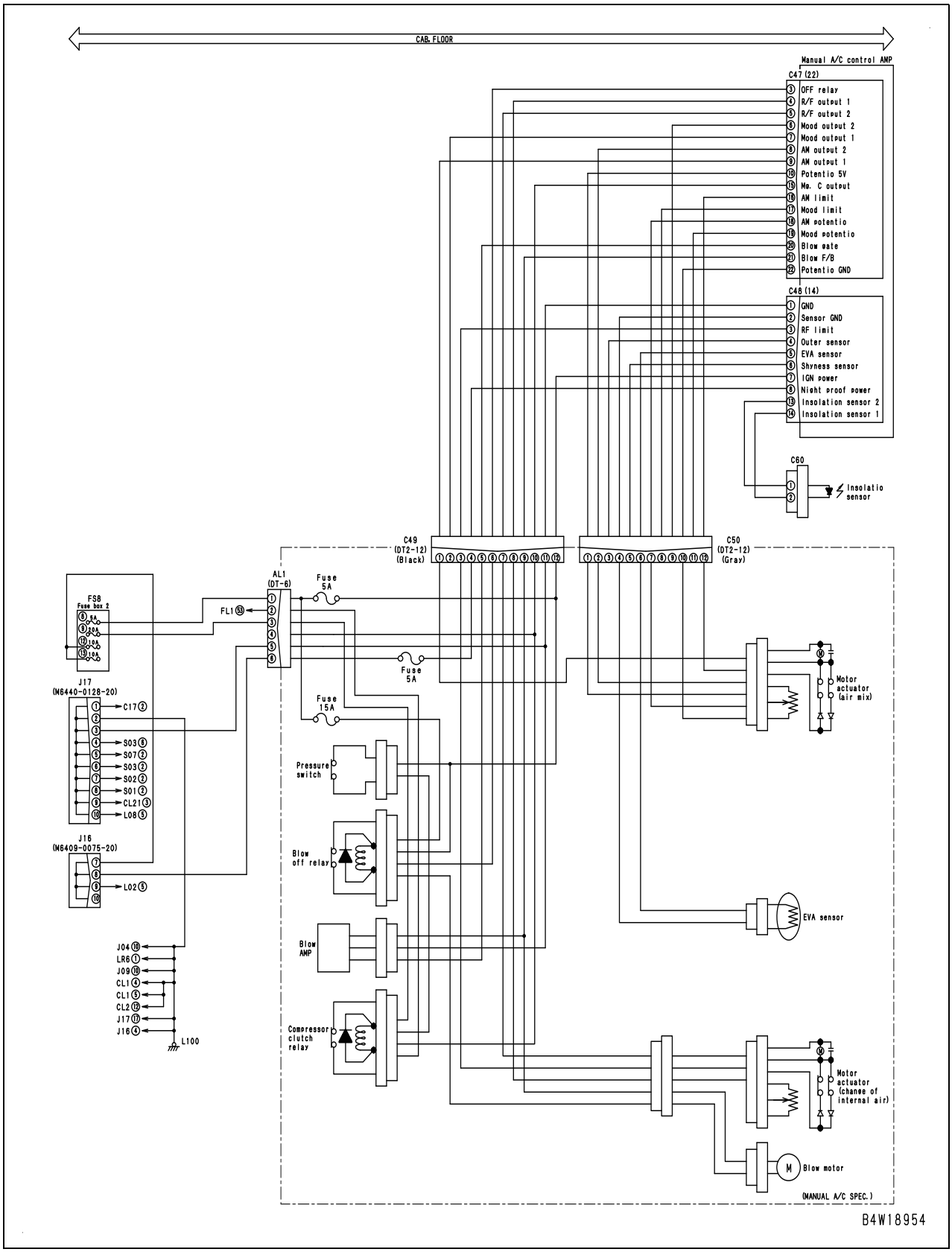
Contents of trouble	(2) Front working lamp does not light up or go off.
Related information	• The switch, lamp, or wiring harness of the front working lamp system is defective • When the rear working lamp lights up (goes off) • If the clearance lamp does not light up or go off either, carry out troubleshooting for the clearance lamp first.

	Causes		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Broken bulb	If a specific working lamp does not light up, its bulb may be broken or may have a defective contact. Check the bulb directly.		
	2	Defective fuse No. 8 of fuse box 1	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 6.)		
	3	Defective front working lamp relay (L127)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L127 (male)	Resistance	
			Between (1) and (2)	200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			When front working lamp relay (L127) is replaced with a relay of the same type, if the condition becomes normal, the front working lamp relay is defective.		
	4	Defective front working lamp switch (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			S01 (male)	Front working lamp switch	Resistance
			Between (5) and (6)	ON	Max. 1 Ω
				OFF	Min. 1 MΩ
			Between (5), (6) and chassis ground	Constant	Min. 1 MΩ

Circuit diagram related to turn signal lamp and hazard lamp



Circuit diagram related to air conditioner (WA380Z-6)



E-20 Fan reverse function cannot be used or reset

(WA380-6 only)

Contents of trouble	• Fan reverse function cannot be used or reset.
Related information	• The fan reverse switch system is disconnected, shorted with the chassis ground, or shorted with the power source. (The fan reverse operation cannot be turned ON (Disconnection or grounding fault). The fan reverse operation cannot be turned OFF (Short circuit with power source).) • If failure code [DW7BKA] or [DW7BKB] is displayed, carry out troubleshooting for it first.

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective fuse (5) of fuse box 2	If the fuse is broken, the circuit probably has a grounding fault, short circuit, etc. (See cause 5.)			
	2	Defective kick-down switch (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.			
			S16 (male)	Fan reverse switch	Resistance	
			Between (5) and (6)	ON	Max. 1 Ω	
				OFF	Min. 1 MΩ	
			Between (5) or (6) and chassis ground	Constant	Min. 1 MΩ	
	3	Disconnection in wiring harness (Disconnection or defective contact of connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.			
			Wiring harness between L61 (female) (7) – S16 (female) (6)		Resistance	Max. 1 Ω
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between S16 (female) (6) and chassis ground.		Voltage	20 – 30 V
	4	Short circuit with power source (Contact with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Between L61 (female) (7) – S16 (female) (6) wiring harness and chassis ground		Voltage	Max. 1 V
	5	Grounding fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.			
			Between L61 (female) (7) – S16 (female) (6) wiring harness and chassis ground		Resistance	Min. 1 MΩ
	6	Defective transmission controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			L61	Fan reverse switch	Voltage	
			Between (7) and chassis ground	ON	20 – 30 V	
				OFF	Max. 1 V	

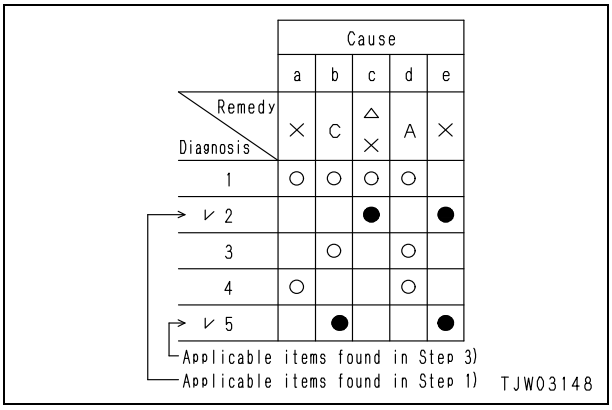
E-28 Torque converter oil temperature gauge does not rise and torque converter oil temperature caution lamp does not light up

Contents of trouble	• Torque converter oil temperature gauge does not rise and torque converter oil temperature caution lamp does not light up.
Related information	• The torque converter oil temperature sensor circuit is disconnected. • When the torque converter oil temperature rises, the torque converter oil temperature gauge does not rise. • When the torque converter oil temperature rises to 120°C, the torque converter oil temperature caution lamp does not light up. • The input state (oil temperature) from the torque converter oil temperature sensor can be checked with the monitoring function (Code: 40100, TC OIL TEMP).

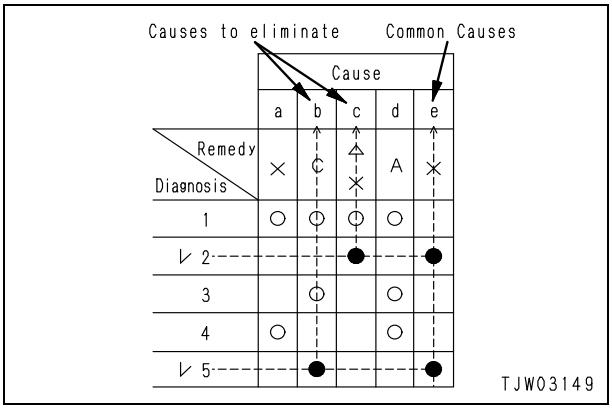
<table>
<tr><td rowspan="10">Possible causes and standard value in normal state</td><td colspan="2">Cause</td><td colspan="4">Standard value in normal state/Remarks on troubleshooting</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">Defective torque converter oil temperature sensor (Internal defect)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.</td></tr>
<tr><td>TC-T (male)</td><td>Torque converter oil temperature</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Between (1) and (2)</td><td>Normal temperature (25°C)</td><td colspan="2">35 – 50 kΩ</td></tr>
<tr><td>100°C</td><td colspan="2">3.1 – 4.5 kΩ</td></tr>
<tr><td rowspan="2">2</td><td rowspan="2">Grounding fault in wiring harness (Contact with ground circuit)</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.</td></tr>
<tr><td colspan="2">Wiring harness between L55 (female) (2) – TC-T (female) (1)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Defective machine monitor</td><td colspan="4">★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch.</td></tr>
<tr><td>L55 (female)</td><td>Torque converter oil temperature</td><td colspan="2">Resistance</td></tr>
<tr><td rowspan="2">Wiring harness between (2) and chassis ground</td><td>Normal temperature (25°C)</td><td colspan="2">35 – 50 kΩ</td></tr>
<tr><td>100°C</td><td colspan="2">3.1 – 4.5 kΩ</td></tr>
</table>

3. Operate the machine and carry out troubleshooting of the items not checked in Step 1. Operate the machine in the same way as in Step 1, and if any problem occurs, put a check against the item. (In Troubleshooting item 5 in the diagram below, the problem was re-enacted.)

4. Find the matching cause in the Cause column. In the same way as in Step 2), if a problem is found, the ○ marks on the same line for the troubleshooting item are the causes. (In Diagnosis item 5 in the diagram below the cause is (b) or (e).)

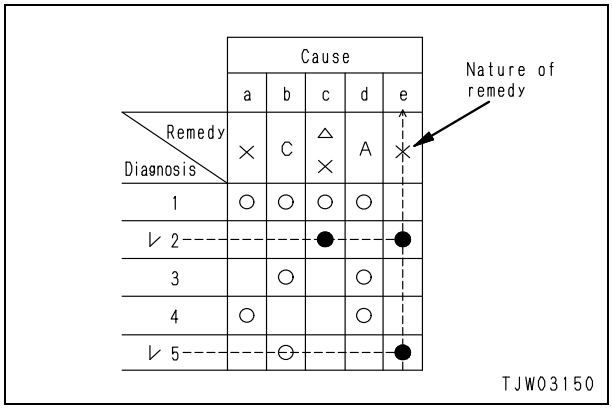


5. Narrow down the causes.
Of the causes found in Step 2) and Step 4), there are common items (○ marks on the line for each Diagnosis item and in the same Cause column as each other) that have causes common with the problem items found in the troubleshooting in Step 1) and Step 3).
★ The items that are not common (items that do not have ○ marks in the same cause common as each other) are probably not the cause, so they can be eliminated. (The causes for Diagnosis item 2 in the diagram below are (c) or (e), and the causes in Diagnosis item 5 are (b) or (e), so Cause (e) is the common cause.)



6. Repeat the operation in Steps 3, 4, and 5 until the cause is narrowed down to 1 item (1 common item).
★ If cause items are 2 or more, continue until number of items becomes minimum.

7. Remedy
After narrowing down the common causes, take the action given in the remedy line.
Marks and remedies in remedy line
×: Replace △: Repair A: Adjust C: Clean



H-8 Steering does not turn

Ask the operator about the following questions.

- Did the problem suddenly start? → **Breakage of related equipment**
  Did the machine cause any abnormal noise at the time and where?

Testing before troubleshooting

- Is oil level in hydraulic tank correct? Is the type of oil correct?
- Is the steering shaft broken?
- Is the steering stop valve properly adjusted?
- Has the lock bar been removed from the frame?

No.	Diagnosis \ Remedy		Causes: Hydraulic pump a: The PTO is defective	Hydraulic pump b: Clogging or air intake on pump suction side	Hydraulic pump c: Defective steering pump	Hydraulic pump d: Defective brake pump	Charge valve e: Defective accumulator charge valve	Orbit-roll f: Defective Orbit-roll	Stop valve g: Defective stop valve	Steering valve h: Malfunction of flow control spool	Steering valve i: Defective actuation of steering spool	Steering valve j: Defective overload relief valve	Hydraulic cylinder k: Defect in steering cylinder (defective piston seal)
	Remedy		△ x	△	△ x	△ x	△ x	△ x	△ x	△ x	△ x	x	x
1	Steering does not turn in both directions (left and right)		○	○	○	○	○	○		○	○		○
2	Steering turns only in one direction (left or right)								○			○	
3	Steering is heavy when turned in both directions (left and right)					○	○	○			○		
4	Steering wheel is heavy in one direction (left or right)								○				
5	Work equipment moves				○			○	○	○	○	○	○
6	Work equipment does not move		○	○		○	○						
7	Abnormal noise comes from around PTO		○										
8	Abnormal noise comes from fan pump or hydraulic tank			○		○							
9	When steering relief pressure is measured	Oil pressure is low or there is no oil pressure in both directions (left and right)	○	○	○	○	○	○		○	○		○
10		Oil pressure is low or there is no oil pressure in one direction (left or right)							○			○	
11	When Orbit-roll output pressure is measured, oil pressure is found to be low or there is no oil pressure		○	○		○	○	○					
12	When Orbit-roll basic pressure is measured	Oil pressure is low	○	○		○	○						
13		There is no oil pressure	○	○		○							

★ There is a close connection between the steering circuit and the work equipment circuit, so if any abnormality is left in the steering, check the operation of the work equipment also.

WA380-6, WA380Z-6 Wheel loader

Form No. SEN05756-00

S-14 Coolant temperature rises too high (Overheating)

General causes why coolant temperature rises too high
- Lack of cooling air (deformation, damages of fan)
- Drop in heat dissipation efficiency
- Defect in the coolant circulation system
- Hydraulic oil temperature on the applicable machine side is rising
  → Carry out troubleshooting from H-mode

			Causes												
			Broken cylinder head, head gasket	Holes made by pitting	Clogged, broken oil cooler	Lack of coolant	Broken water pump	Defective operation of thermostat	Clogged, crushed radiator fins	Clogged radiator core	Defective radiator cap (pressure valve)	Slipping fan belt, worn fan pulley	Defective coolant temperature gauge	Rise of hydraulic oil temperature
Questions	Check recent repair history													
	Degree of machine operation	Machine operated for long period	△	△					△	△				
	Condition overheating	Suddenly overheated				○	◎					○		
		Always tends to overheat						○	◎	◎		○		
	Coolant temperature gauge (when installed with coolant temperature gauge)	Rises quickly				○		◎						
		Does not go down from red range											◎	
Check items	Radiator coolant level monitor indicates drop of coolant level					◎								
	Engine oil level has risen, oil is milky			◎	○									
	Fan belt tension is low											◎		
	When fan pulley is turned, it has play						◎							
	Milky oil is floating on coolant				◎									
	There are excessive air bubbles in radiator, coolant spurts back		◎											
	When light bulb is held behind radiator core, no light passes through								◎					
	Radiator shroud and undercover are clogged with dirt or mud								◎			◎		
	Coolant is leaking because of cracks in hose or loose clamps					◎								
	Coolant flows out from radiator overflow hose										◎			
	Fan belt whines under sudden acceleration											◎		
	Hydraulic oil temperature gauge indicates the red range faster than engine coolant temperature gauge													◎
Troubleshooting	When compression pressure is measured, the oil pressure is low		●											Carry out troubleshooting from H-mode
	Inspect cylinder liner directly			●										
	Inspect oil cooler directly				●									
	Temperature difference between upper and lower tanks of radiator is large						●							
	When operation of thermostat is carried out, it does not open at cracking temperature							●						
	Temperature difference between upper and lower tanks of radiator is slight								●					
	Inspect radiator core directly									●				
	When operation of radiator cap is carried out, its cracking pressure is low										●			
	Inspect fan belt, pulley directly											●		
	When coolant temperature is measured, it is fount to be normal												●	
		Remedy	Replace	Replace	Replace	Add	Replace	Replace	Correct	Correct	Replace	Correct	Replace	—

Removal and installation of fuel supply pump assembly

Special tools

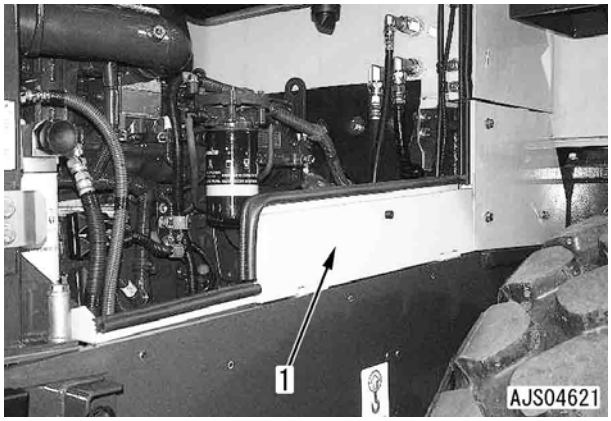
Symbol		Part number	Part name	Necessity	Q'ty	N/R	Sketch
A	3	795-799-6130	Support	■	1		

Removal

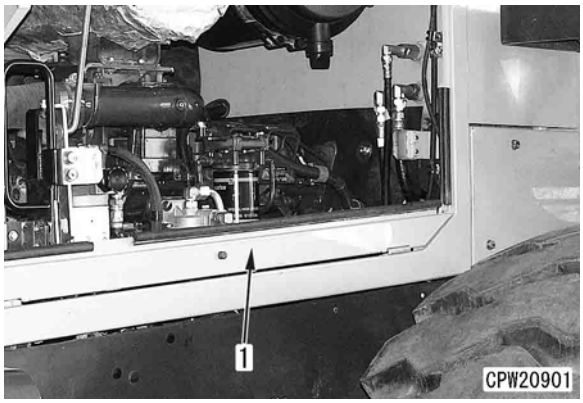
⚠ **Disconnect the cable from the negative (–) terminal of the battery.**

1. Open the right side of the engine hood.

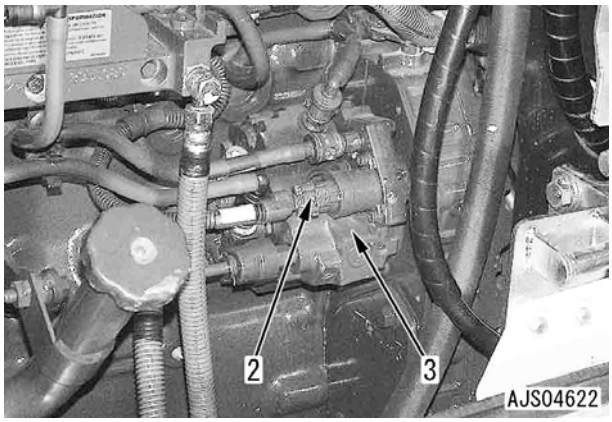
2. Remove right cover (1).
(WA380-6)



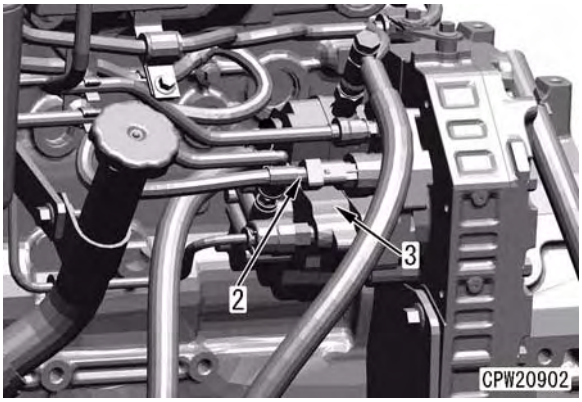
(WA380Z-6)



3. Disconnect connector (2) from fuel supply pump (3).
(WA380-6)

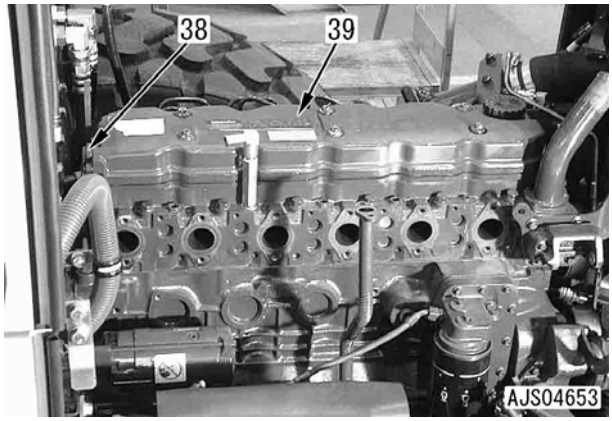


(WA380Z-6)

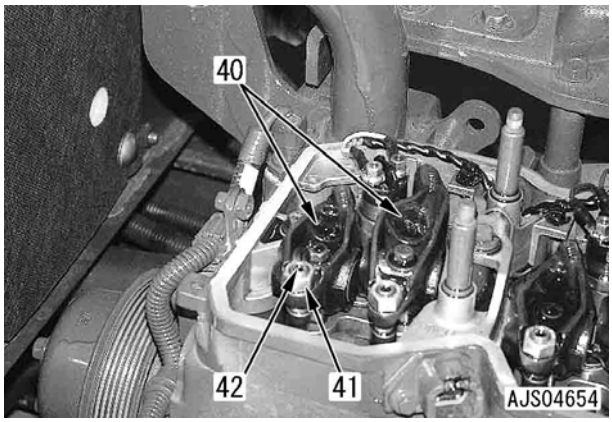


4. Disconnect fuel filter hoses (4) and (5) from fuel supply pump (3).
   - ★ Remove mud from each hose joint in advance (to prevent it from sticking lock (L)).
   - ★ Pull out lock (L) of each hose joint by pressing it from both sides.
   - ★ Put plugs in the adapters of the disconnected hoses to prevent fuel from flowing out.
   - ★ Do not use wooden plugs since chips may be left in the fuel line.

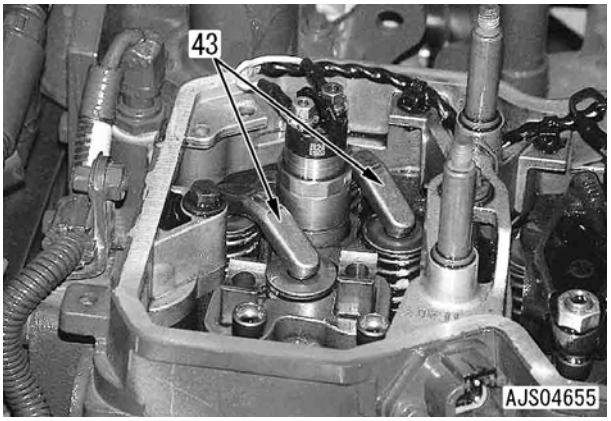
27. Remove head cover (39). [*11]
    ★ Clean around the head cover in advance so that sticking mud etc. will not enter the engine.

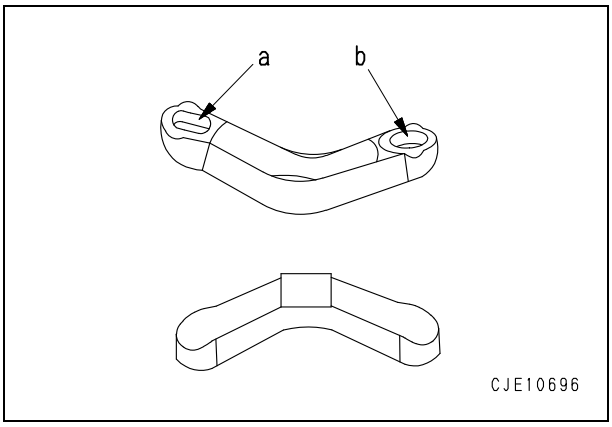


28. Remove the mounting bolts and rocker arms (40).
    ★ Loosen locknut (41) and then loosen adjustment screw (42) by 2 – 3 turns so that an excessive force will not be applied to the push rod when the rocker arm is installed.



29. Remove crossheads (43).
    ★ Record the position and direction (shapes of holes (a) and (b)) of each crosshead. (Reinstall each crosshead in the same direction.)



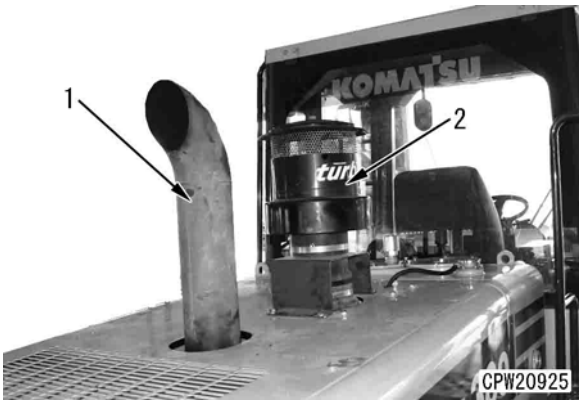


(WA380Z-6)

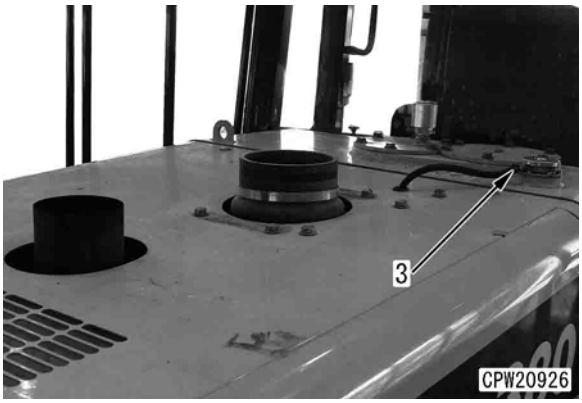
Removal

⚠ Disconnect the cable from the negative (-) terminal of the battery.

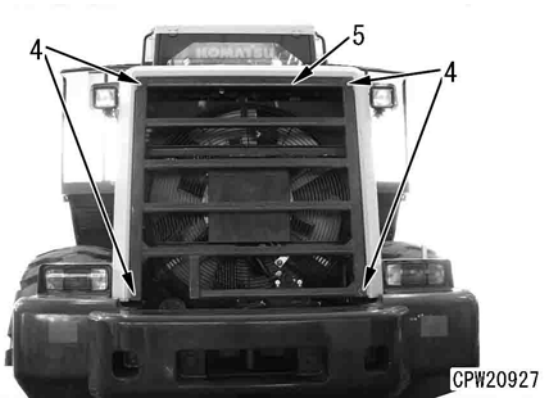
1. Remove exhaust pipe (1).
2. Remove pre-cleaner (2).



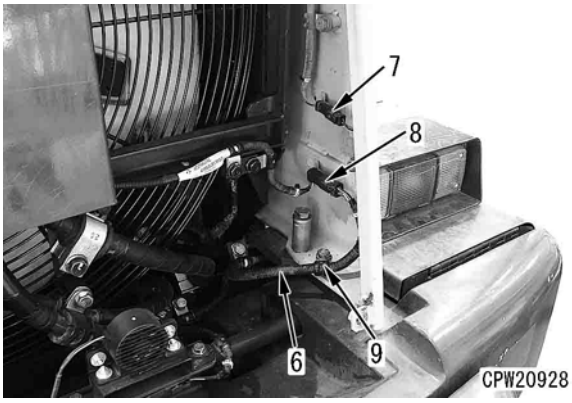
3. Disconnect breather drain hose (3).



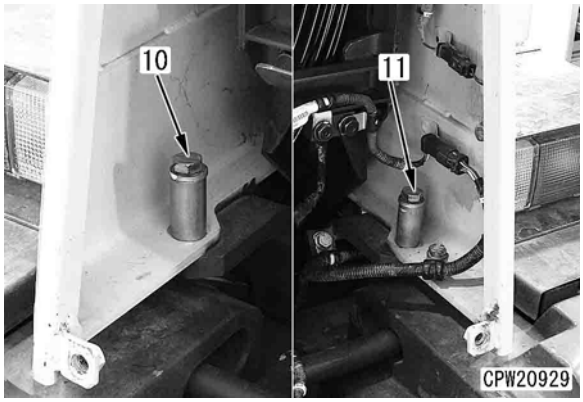
4. Remove four radiator guard mounting bolts (4).
5. Remove radiator guard (5).



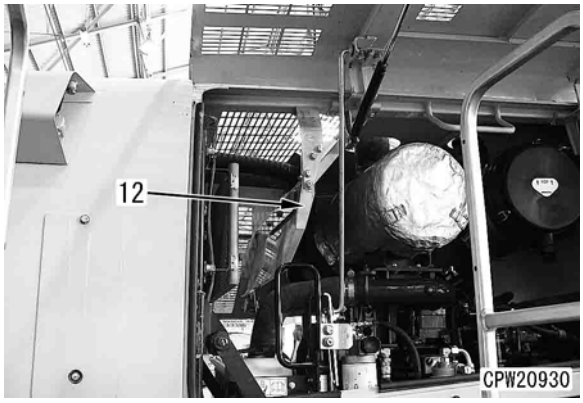
6. Disconnect connectors GR1 (7) and R89 (8) and wiring harness clamp (9) of wiring harness (6).



7. Remove left mounting bolt (10) and right one (11) for the engine hood and frame.

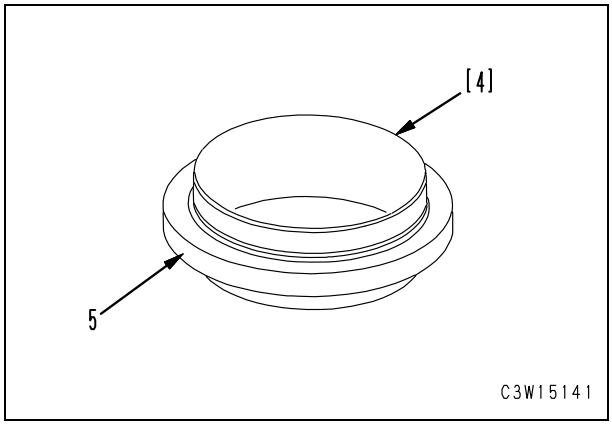


8. Remove partition plate (12).



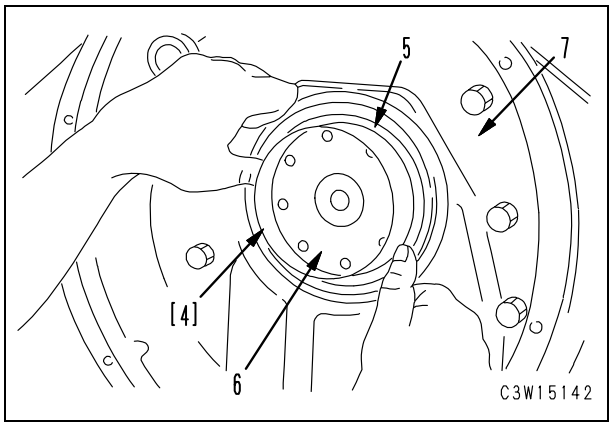
Installation

1. Keep pilot [4] installed to engine rear oil seal (5) until it is inserted in the crankshaft.
- ★ Before installing the engine rear oil seal, check that crankshaft end corners and seal lip sliding surfaces are free from housing flaw, burr, fin, rust, etc.
- ★ Before installing the engine rear oil seal, degrease, clean, and dry the seal contact faces of the crankshaft and the seal lip surfaces to prevent oil leakage.
- ★ When installing the engine rear oil seal, do not apply oil or grease to the crankshaft and seal lip.

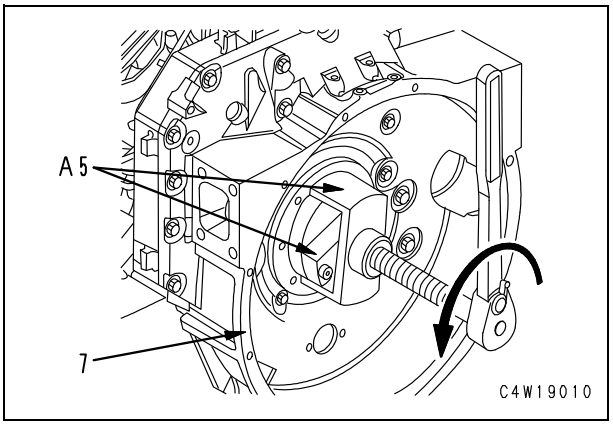


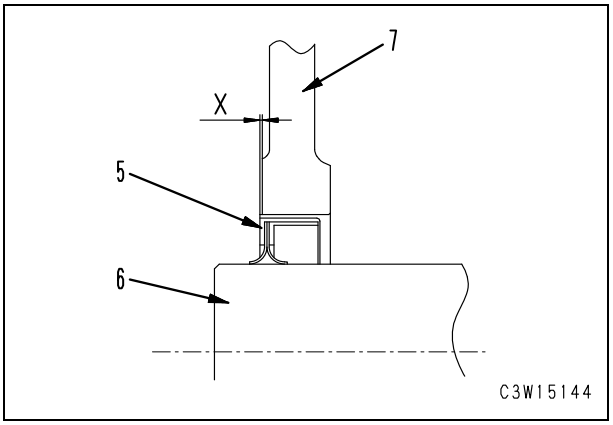
2. Insert pilot [4] in crankshaft (6) and push engine rear oil seal (5) into flywheel housing (7).

3. Push in engine rear oil seal (5) further and then pull out pilot [4].



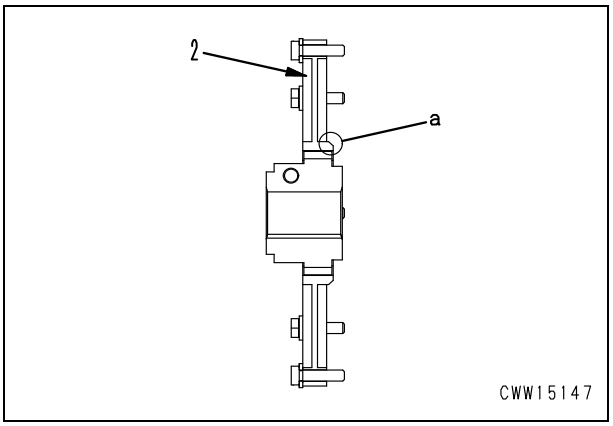
4. Using tool **A5**, install engine rear oil seal (5) to flywheel housing (7).
- ★ When installing engine rear oil seal (5), take care not to bend it.
- ★ Extrusion of engine rear oil seal (5) (x): **Max. 0.38 mm**





- Carry out the following installation in the reverse order to removal.

[*1]
★ When installing damper flange (2), direct part (a) as shown below.



Damper flange mounting bolt (1): **Adhesive (LT-2)**

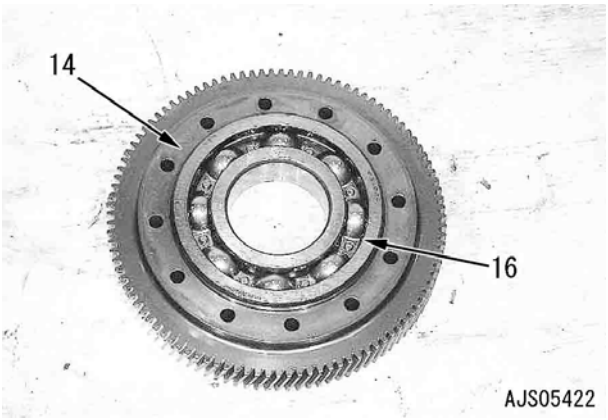
Damper flange mounting bolt (1): **44.1 – 53.9 Nm {4.5 – 5.5 kgm}**

Assembly

1. Bearing

Install bearing (16) to gear (14).

Bearing: **Transmission oil**

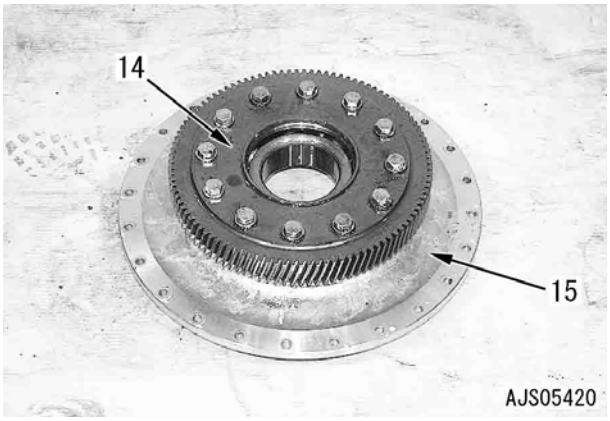


2. Gear

Install gear (14) to pump (15).

Mounting bolt:

58.8 – 73.5 Nm {6.0 – 7.5 kgm}

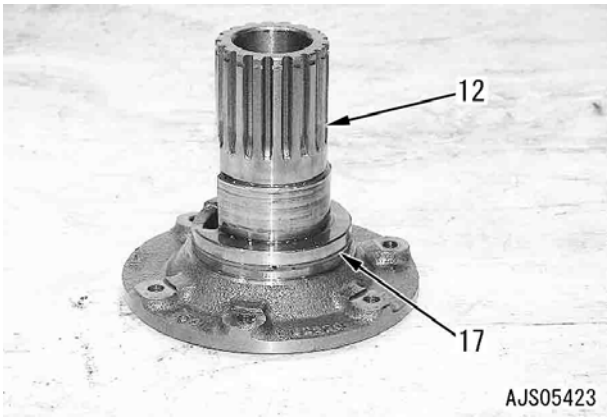


3. Stator shaft

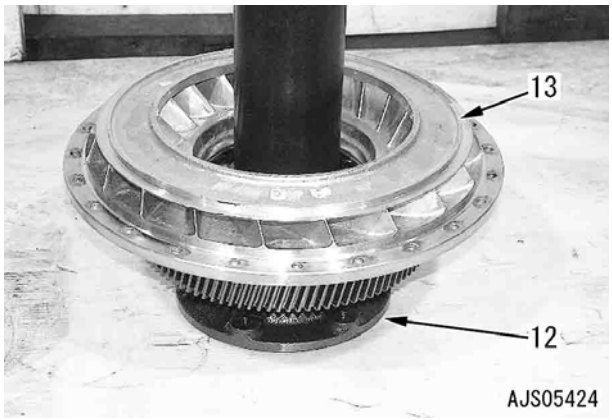
1) Install seal ring (17) to stator shaft (12).

Seal ring: **Grease (G2-LI)**

★ Project the seal ring evenly.

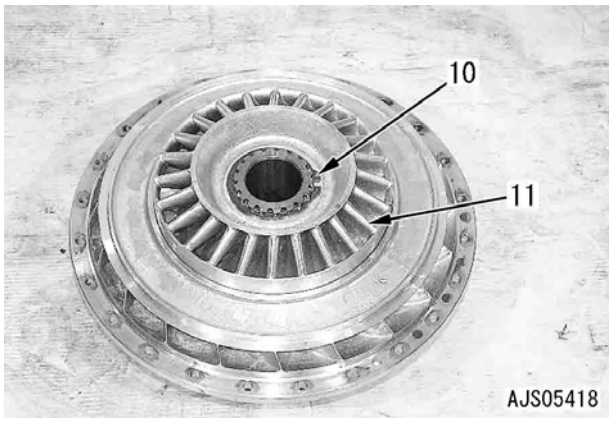


2) Push the inner race side of the bearing to install pump assembly (13) to stator shaft (12).



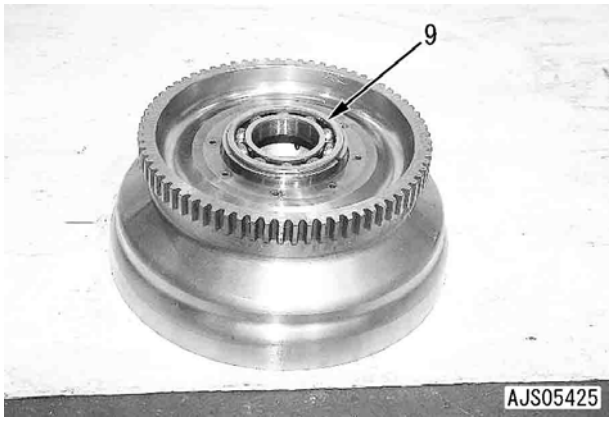
4. Stator

1) Install stator (11).
2) Install snap ring (10).



5. Turbine and case assembly

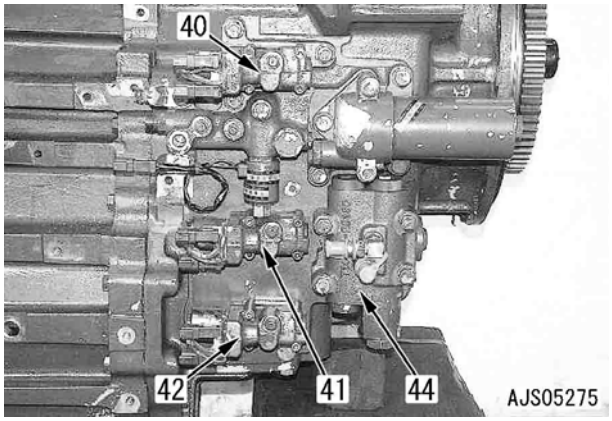
1) Assemble the turbine and case assembly according to the following procedure.
   1] Install bearing (9) to the case.
      ★ Press fit the bearing until the ring touches the case.



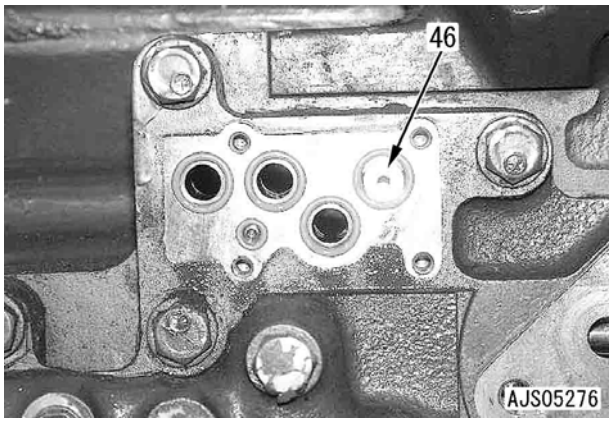
10. Install main relief and torque converter relief valve (44).
Mounting bolt:
44.1 – 53.9 Nm {4.5 – 5.5 kgm}

11. Install valve assembly (reverse ECMV, last chance filter, and parking brake solenoid (40).
Mounting bolt: **59 – 74 Nm {6 – 7.5 kgm}**

12. Install 1st ECMV (41) and 2nd ECMV (42).
ECMV mounting bolt:
7.8 – 9.8 Nm {0.8 – 1.0 kgm}



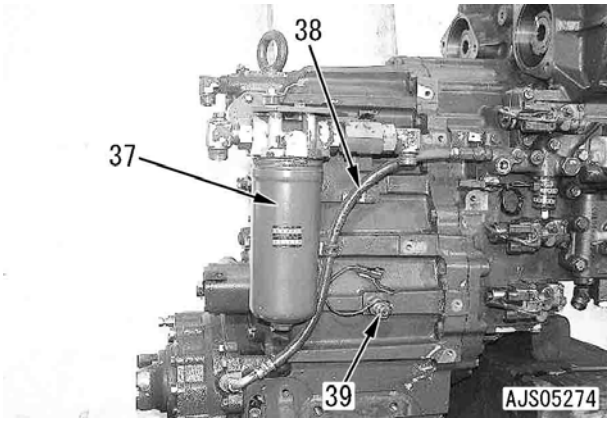
★ When installing each ECMV, be sure to install orifice (46).



13. Install transmission speed sensor (39).
★ See Testing and adjusting, “Adjusting transmission speed sensor”.

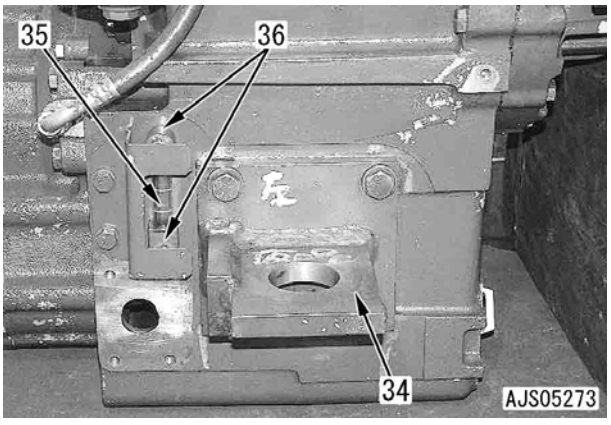
14. Install parking brake hose (38).
Brake hose: **35 – 63 Nm {3.5 – 6.5 kgm}**

15. Install transmission filter assembly (37).



16. Install transmission case oil level gauge (35).
★ When removing the bolt, lock upper and lower holders (36) with a spanner.
Mounting bolt: **Adhesive (LT-2)**
Mounting bolt:
12.7 – 13.7 Nm {1.3 – 1.4 kgm} (WA380-6)
Plug:
19.6 – 29.4 Nm {2.0 – 3.0 kgm}
★ WA380Z-6 does not have upper and lower holders (36) of oil level gauge (35).
Plug (36a) is installed.

17. Install left transmission mount (34).
(WA380-6)



[3rd clutch side]

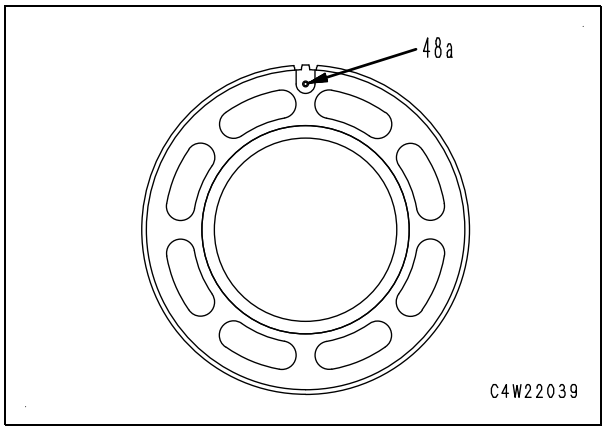
7. 3rd piston

1) Similarly to the 2nd clutch, fit the piston seal for the piston and install it to piston (48).
2) Similarly to the piston on the 2nd clutch side, install piston (48).

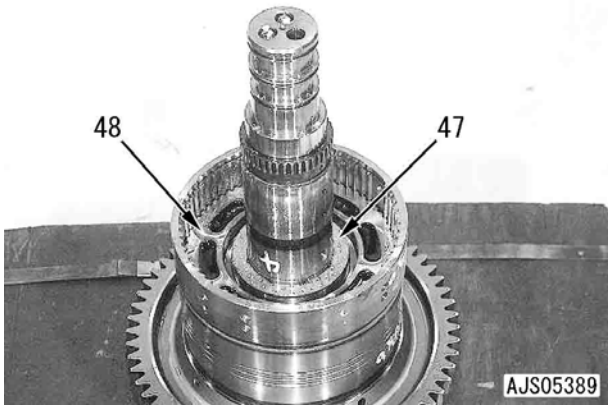
Sliding surfaces of piston seal:

Power train oil

★ WA380Z-6 has a bleed hole (48a) in 4th piston (48).



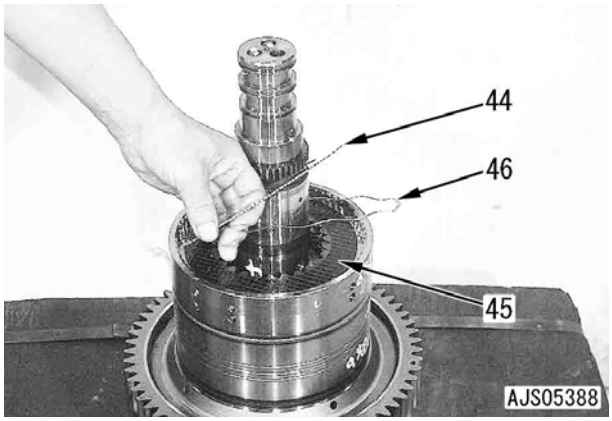
3) Install thrust washer (47).



8. Clutch plate

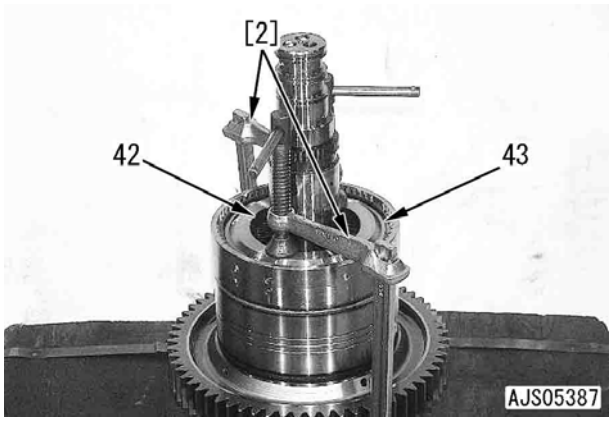
Install plate (44), disc (45), and spring (46) in order alternately.

★ Install these parts similarly to those on the 2nd clutch side.



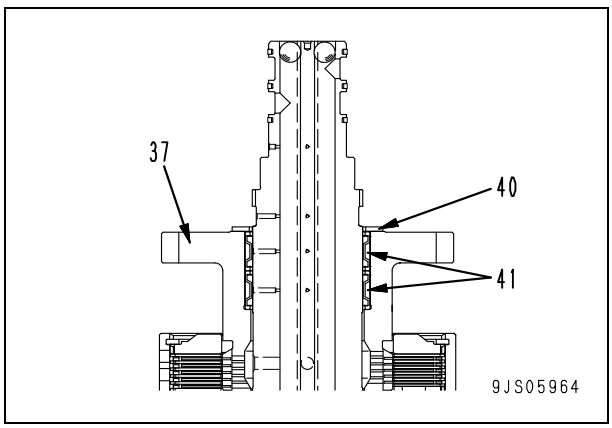
9. End plate

1) Install end plate (42).
2) Press end plate (42) with C-clamps [2] and install snap ring (43).



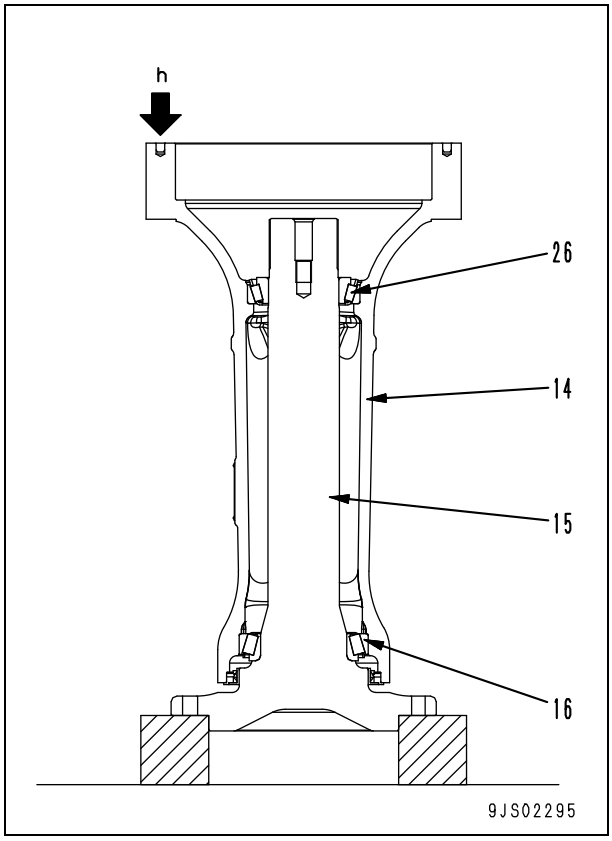
10. 3rd gear

1) Install needle roller bearings (41) to 3rd gear (37) and install them, meshing the gear with the internal teeth of the disc.
2) Install thrust washer (40).



3. Selection of shim

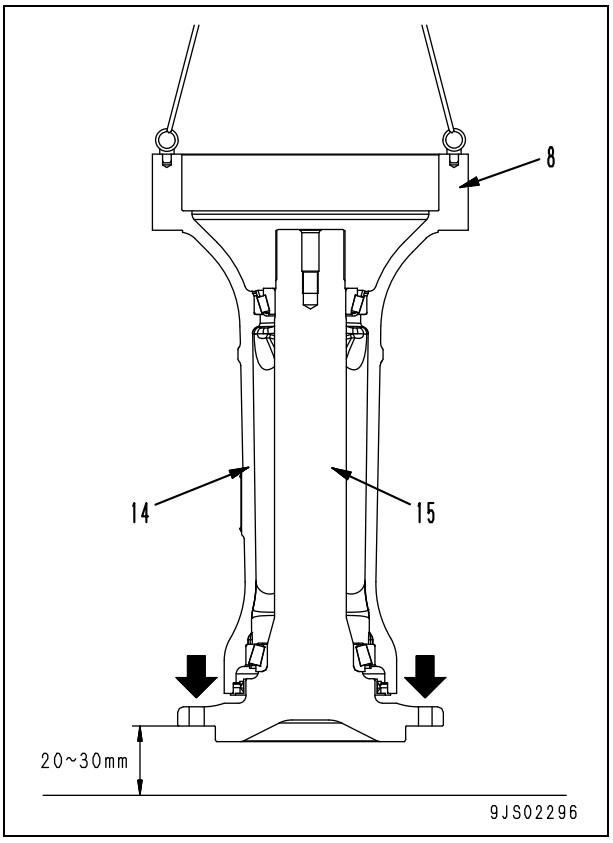
1) After fitting bearings (16) and (26) thoroughly, measure the starting force at hole (h) of axle housing (14).
   - Starting force: **44.1– 93.1 N {4.5 – 9.5 kg} (Front, rear)**
   - ★ Do not install planetary carrier (20) at this time.
   - ★ The starting force shall include the sealing resistance.



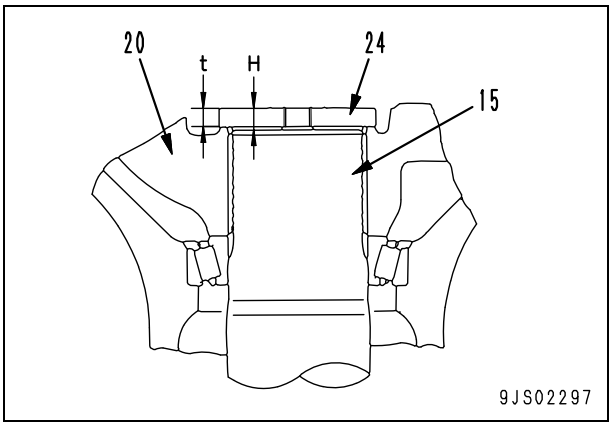
★ If the starting force is less than the standard value, press fit the bearings again and repeat the work of step 1).

★ If the starting force exceeds the standard value, adjust it according to the following procedure.

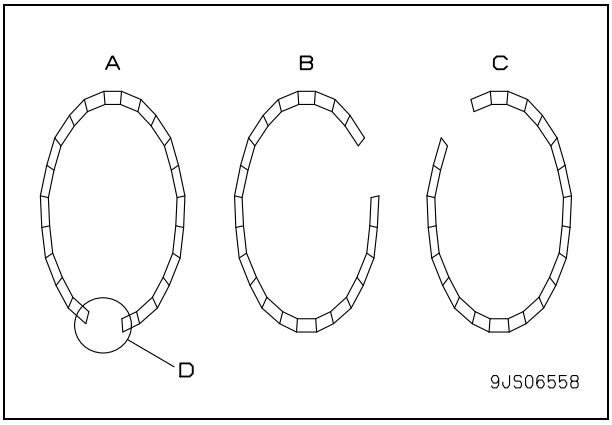
2) Sling axle shaft and housing assembly (8) 20 – 30 mm by installing wire ropes to 2 parts, similarly to installation of the axle housing.
3) While rotating axle shaft (15), hit the flange with a copper hammer in the direction of the arrow several times to drive out axle shaft (15) from axle housing (14).
4) Repeat step 1) so that the starting torque will be in the standard range.



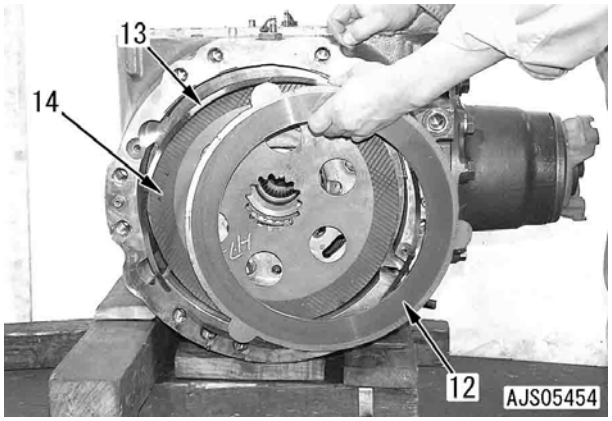
5) Install planetary carrier (20) to the spline of axle shaft (15) without the gear and place spacer (24) on it.
   - ★ Just place spacer (24) on planetary carrier (20). Do not bolt it.
6) Using a depth micrometer, measure distance (H) from the end of spacer (24) to the end of the axle shaft.
   Set the value obtained by subtracting thickness (t) of spacer (24) from dimension (H) as (H – t).
   - Thickness of shim: (H-t)(0/-0.05)
   - Normal range of shim thickness: 0.25 to 2.05 mm
7) After deciding the thickness of the shim, remove spacer (24) and planetary carrier (20).



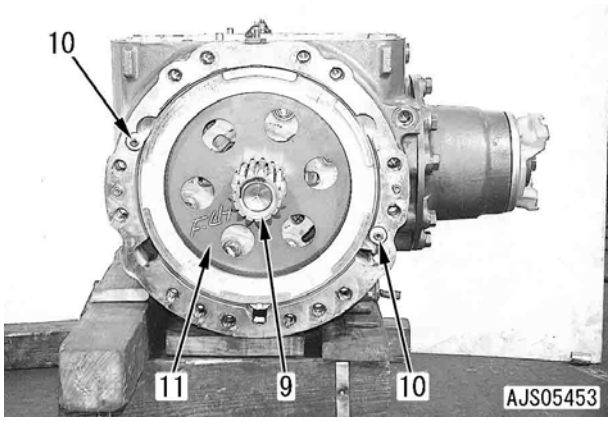
★ The springs must be shifted from each other by 120° in the circumferential direction.



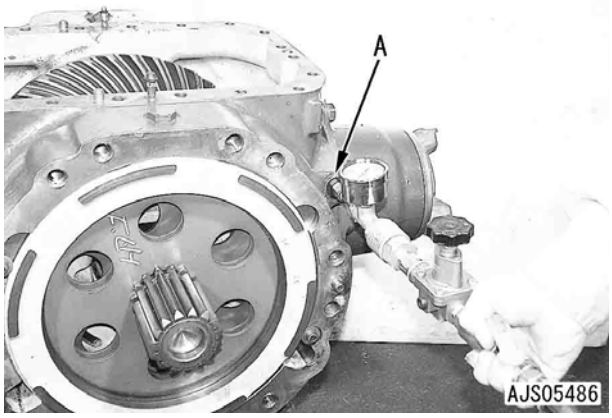
A: 1st line
B: 2nd line
C: 3rd line
D: Opening of spring



3) Install outer plate (11) and shaft (9) and tighten bolts (10).



4) Supply compressed air into brake oil port (A) to fit the piston.

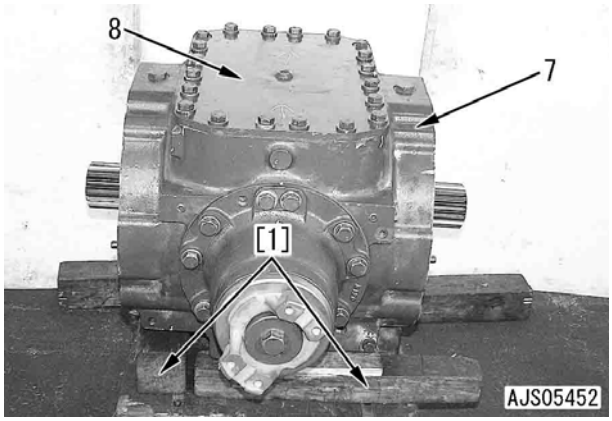


13. Cover

Install cover (8) to differential case (7).

Cover mounting face:
Gasket sealant (LOCTITE 515)

Mounting bolt:
157 – 196 Nm {16 – 20 kgm}



14. Axle housing

Install the right and left axle housing assemblies. For details, see “Disassembly and assembly of axle housing assembly”.

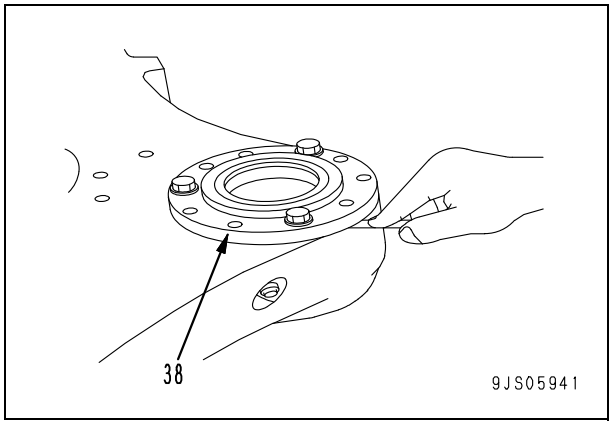
15. Testing brake oil leakage

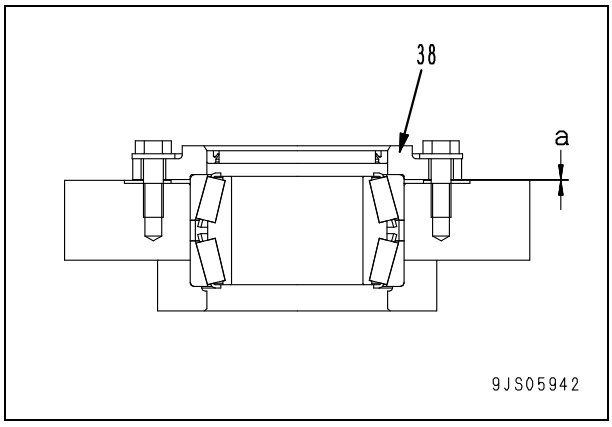
1) Install tools **H2-1** and **H2-2** to brake tube adapter (A) of differential case (7) and bleed air from the cylinder.
2) Operate tool **H2-4** to raise the pressure to 98 kPa {1.0 kg/cm^2}.
   ★ Leave the system at 98 kPa {1.0 kg/cm^2} for 5 minutes and check that the pressure does not lower at all.
3) If oil leakage is not detected by the above test, raise the pressure to 4.9 MPa {50 kg/cm^2}.
   ★ Leave the system at 4.9 MPa {50 kg/cm^2} for 5 minutes and check that the pressure does not drop more than 98 kPa {1.0 kg/cm^2}.

7. Adjust the shim of the retainer (on the upper side).
   1) Install retainer (38), tighten the 3 mounting bolts evenly, and insert the shim so that clearance (a) between the retainer and hinge will be 0.1 mm or less.
      - Set shim thickness:

        0.1 mm, 0.5 mm, 1.0 mm

      Mounting bolt: **20 ± 2 Nm {2.0 ± 0.2 kgm} (For adjusting shim)**





   2) After adjusting the shim, tighten all the retainer mounting bolts to the specified torque.

      Mounting bolt:

      Adhesive (LOCTITE 2701 or equivalent)

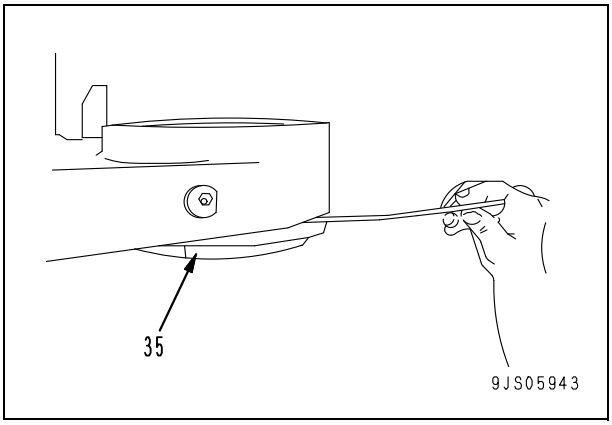
      Mounting bolt:

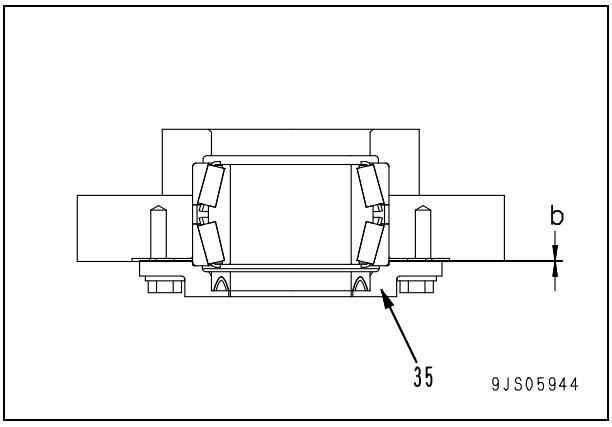
      98 – 123 Nm {10.0 – 12.5 kgm}

8. Adjust the shim of the retainer (on the lower side).
   1) Install retainer (35), tighten the 3 mounting bolts evenly, and insert the shim so that clearance (b) between the retainer and hinge will be 0.1 mm or less.
      - Set shim thickness:

        0.1 mm, 0.5 mm, 1.0 mm

      Mounting bolt: **20 ± 2 Nm {2.0 ± 0.2 kgm} (For adjusting shim)**





   2) After adjusting the shim, tighten all the retainer mounting bolts to the specified torque.

      Mounting bolt:

      Adhesive (LOCTITE 2701 or equivalent)

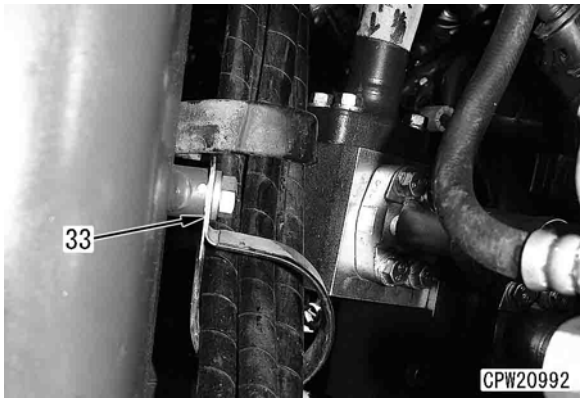
      Mounting bolt:

      98 – 123 Nm {10.0 – 12.5 kgm}

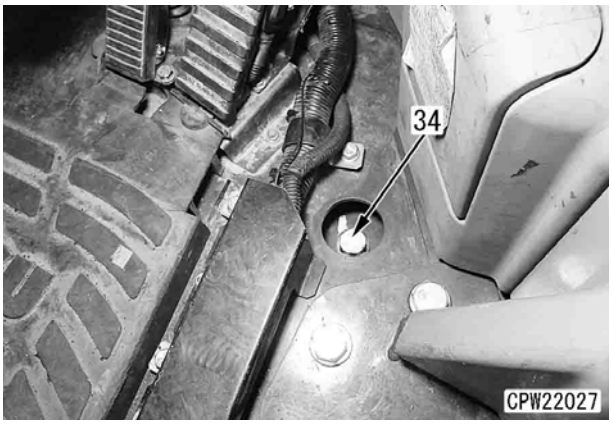
WA380-6, WA380Z-6 Wheel loader

Form No. SEN05765-00

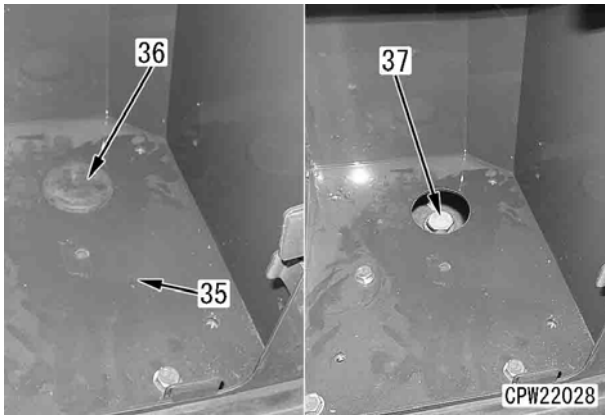
17. Remove three clamps (33) installed to the rear frame.



18. Remove the floor mat, and remove two front mounting bolts (34) of the operator's cab and floor frame assembly.



19. Remove grommet (36) inside the shoes box (35), and remove mounting bolts (37) of operator's cab and floor frame assembly.

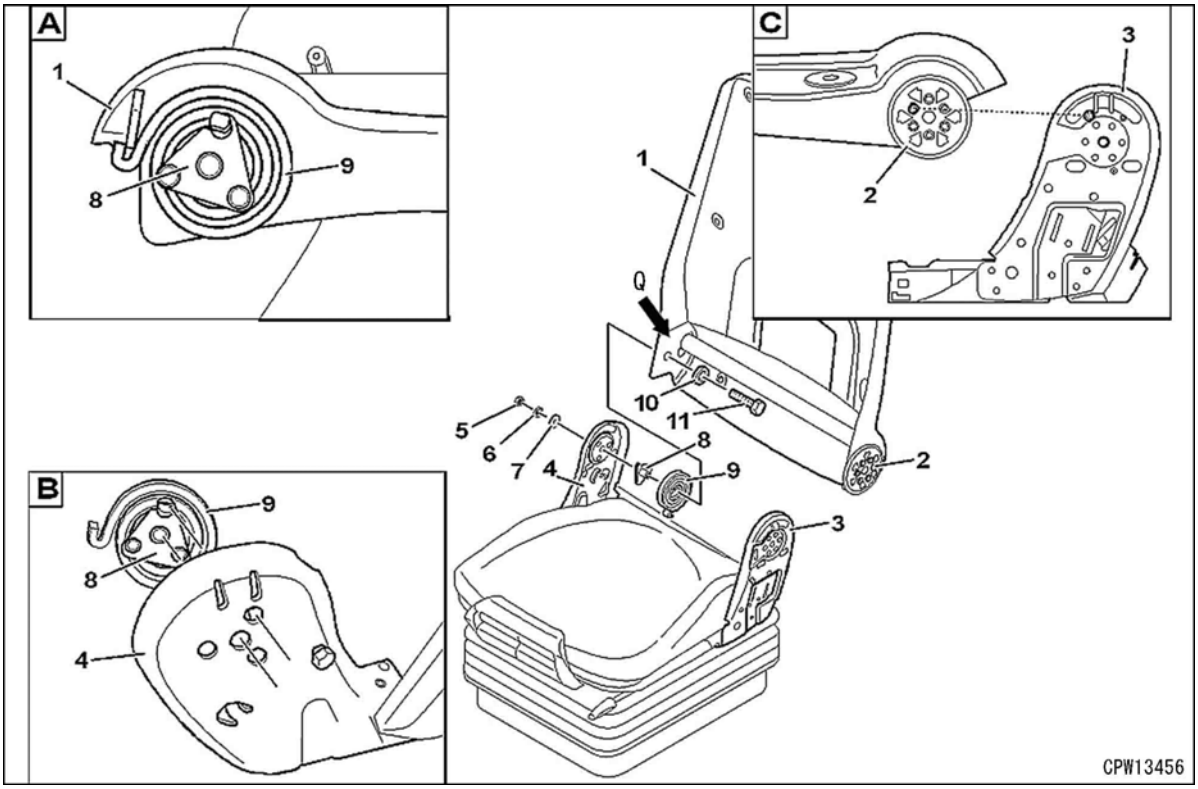


20. Sling and remove operator's cab and floor frame assembly (38).
    ★ Before removing the assembly, check that all wiring and piping are disconnected.

    Operator's cab and floor frame assembly:

    1,000 kg

5. Disassembly and assembly of backrest



Removal

1) Detach the storage box by referring to "1. Removal and installation of storage box".
2) Remove the backrest upholstery by referring to "2. Removal and installation of seat pad and backrest upholstery".
3) Remove the armrests by referring to "4. Removal and installation of armrests". (If equipped)
4) Disassemble the backrest adjustment by referring to "6. Disassembly and assembly of backrest adjustment".
5) Unscrew the hexagon nut (5) and remove the washers (6) and (7).
6) Remove the hexagon bolt (11) and the washer (10).
7) Press the backrest (1) slightly to the left and take it off upwards.
8) Remove the bearing (8) and the torsion spring (9) from the backrest (1).

Installation

1) Install the bearing (8) and the torsion spring (9) to the backrest (1).
   ★ Oil the bearing point (Q) on the backrest (1) for the bearing (8) with acid-free multiple-purpose lubricant.
   ★ Insert the bearing (figure B/8) into the upper hole on the backrest support on the right side (figure B/4).
2) Press the backrest (1) slightly to the left and install it.
   ★ The big cylindrical stamping on the backrest adjustment (figure C/2) must engage into the big positional bore hole on the backrest support on the left side (figure C/3).
   ★ The integral catch on the backrest (figure A/1) must engage into the torsion spring (figure A/9).
3) Put the washer (10) and tighten the hexagon bolt (11).
4) Put the washers (6) and (7), and tighten the hexagon nut.
   Hexagon nuts: **25 Nm {2.6 kgm}**
5) Assemble the backrest adjustment by referring to "6. Disassembly and assembly of backrest adjustment".
6) Install the armrests by referring to "4. Removal and installation of armrests". (If equipped)

7) Install the 2 air input hoses, compressed-air hose and air input hose with angle to the pneumatic spring (6) by referring to "8. Removal and installation of compressed-air hoses".
8) Install the bellows by referring to "3. Removal and installation of bellows".
9) Install the top cover by referring to "1. Removal and installation of top cover".
10) Install the upper part of the seat by referring to "I. Upper seat".

Automatic greasing circuit diagram

(WA380-6 only)
(If equipped)