

Shop Manual

WHEEL LOADER

WA250 -6

WA250PZ-6

SERIAL NUMBERS

WA250- 75001

WA250PZ- 75001

and up

ecot3

KOMATSU

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2. Standard clearance and standard value

- The clearance made when new parts are assembled is called the “standard clearance”, which is indicated by the range from the minimum clearance to the maximum clearance.
- When some parts are repaired, the clearance is generally adjusted to the standard clearance.
- A value of performance and function of new products or equivalent is called the “standard value”, which is indicated by a range or a target value.
- When some parts are repaired, the value of performance/function is set to the standard value.

3. Standard interference

- When the diameter of a hole of a part shown in the given standard size and tolerance table is smaller than that of the mating shaft, the difference between those diameters is called the “interference”.
- The range (A – B) from the difference (A) between the minimum size of the shaft and the maximum size of the hole to the difference (B) between the maximum size of the shaft and the minimum size of the hole is the “standard interference”.
- After repairing or replacing some parts, measure the size of their hole and shaft and check that the interference is in the standard range.

4. Repair limit and allowable value or allowable dimension

- The size of a part changes because of wear and deformation while it is used. The limit of changed size is called the “repair limit”.
- If a part is worn to the repair limit, it must be replaced or repaired.
- The performance and function of a product lowers while it is used. A value which the product can be used without causing a problem is called the “allowable value” or “allowable dimension”.
- If a product is worn to the allowable value, it must be checked or repaired. Since the permissible value is estimated from various tests or experiences in most cases, however, it must be judged after considering the operating condition and customer's requirement.

5. Clearance limit

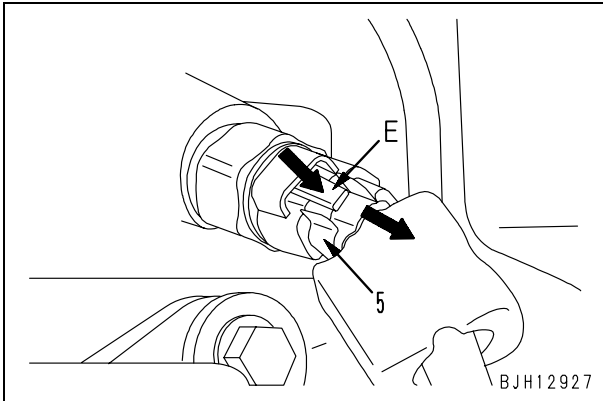
- Parts can be used until the clearance between them is increased to a certain limit. The limit at which those parts cannot be used is called the “clearance limit”.
- If the clearance between the parts exceeds the clearance limit, they must be replaced or repaired.

6. Interference limit

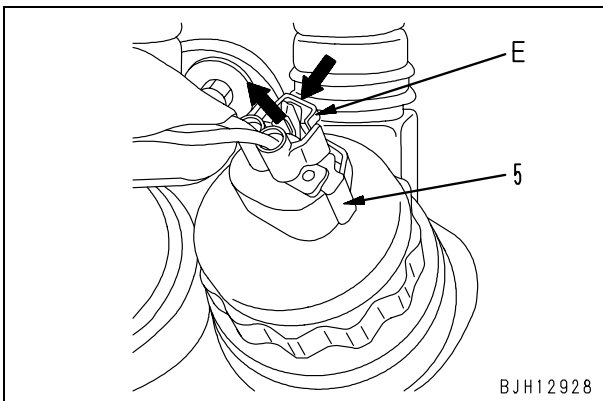
- The allowable maximum interference between the hole of a part and the shaft of another part to be assembled is called the “interference limit”.
- The interference limit shows the repair limit of the part of smaller tolerance.
- If the interference between the parts exceeds the interference limit, they must be replaced or repaired.

- 95, 125 – 170, 12V140 engines
- 4) While pressing lock (E) of the connector, pull out connector (5) in the direction of the arrow.

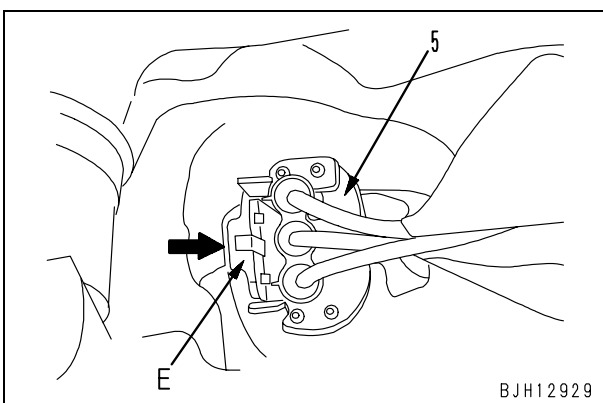
Example)
Fuel pressure sensor in common rail:
PFUEL etc. (**AMP-3**)



Example)
Injection pressure control valve of fuel supply pump: PCV (**SUMITOMO-2**)



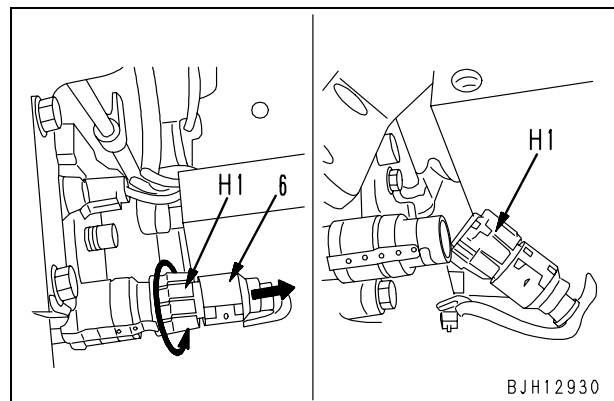
Example)
Speed sensor of fuel supply pump:
G (**SUMITOMO-3**)
★ Pull the connector straight up.



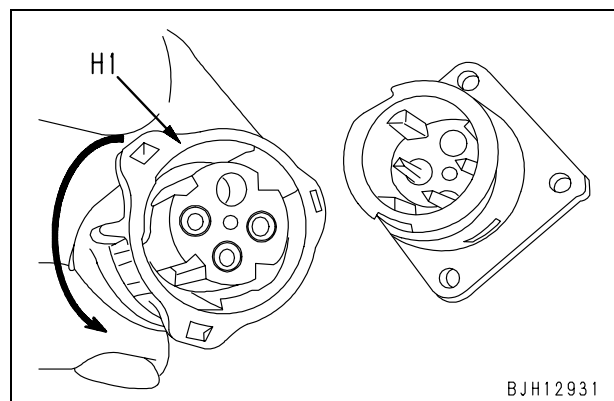
4. Turn-housing type (Round green connector)

- 140 engine
Example)
Intake air pressure sensor in intake manifold (CANNON-04): PIM etc.

- 1) Disconnect connector (6) according to the following procedure.
 - 1] Turn housing (H1) in the direction of the arrow.
 - ★ When connector is unlocked, housing (H1) becomes heavy to turn.
 - 2] Pull out housing (H1) in the direction of the arrow.
 - ★ Housing (H1) is left on the wiring harness side.



- 2) Connect the connector according to the following procedure.
 - 1] Insert the connector to the end, while setting its groove.
 - 2] Turn housing (H1) in the direction of the arrow until it "clicks".



5. Table of tightening torques for hoses (taper seal type and face seal type)

- ★ Unless there are special instructions, tighten the hoses (taper seal type and face seal type) to the torque below.
- ★ Apply the following torque when the threads are coated (wet) with engine oil.

Nominal No. of hose	Width across flats	Tightening torque Nm {kgm}		Taper seal Thread size (mm)	Face seal	
		Range	Target		Nominal No. – Number of threads, type of thread	Thread diameter (mm) (Reference)
02	19	34 – 54 { 3.5 – 5.5 }	44 { 4.5 }	–	9/16-18UN	14.3
		34 – 63 { 3.5 – 6.5 }		14	–	–
03	22	54 – 93 { 5.5 – 9.5 }	74 { 7.5 }	–	11/16-16UN	17.5
	24	59 – 98 { 6.0 – 10.0 }	78 { 8.0 }	18	–	–
04	27	84 – 132 { 8.5 – 13.5 }	103 { 10.5 }	22	13/16-16UN	20.6
05	32	128 – 186 { 13.0 – 19.0 }	157 { 16.0 }	24	1-14UNS	25.4
06	36	177 – 245 { 18.0 – 25.0 }	216 { 22.0 }	30	1-3/16-12UN	30.2
(10)	41	177 – 245 { 18.0 – 25.0 }	216 { 22.0 }	33	–	–
(12)	46	197 – 294 { 20.0 – 30.0 }	245 { 25.0 }	36	–	–
(14)	55	246 – 343 { 25.0 – 35.0 }	294 { 30.0 }	42	–	–

6. Table of tightening torques for face seal joints

- ★ Tighten the face seal joints (sleeve nut type) made of plated steel pipes for low pressure service to be used for engines etc. to the torque shown in the following table.
- ★ Apply the following torque to the face seal joint while their threaded parts are coated with engine oil (wetted).

Outer diameter of pipe (mm)	Width across flats (mm)	Tightening torque Nm {kgm}		Face seal	
		Range	Target	Nominal No. – Number of threads, type of thread	Thread diameter (mm) (Reference)
8	19	14 – 16 { 1.4 – 1.6 }	15 { 1.5 }	9/16-18UN	14.3
10	22	24 – 27 { 2.4 – 2.7 }	25.5 { 2.6 }	11/16-16UN	17.5
12	24 (27)	43 – 47 { 4.4 – 4.8 }	45 { 4.6 }	13/16-16UN	20.6
15 (16)	30 (32)	60 – 68 { 6.1 – 6.8 }	64 { 6.5 }	1-14UN	25.4
22 (20)	36	90 – 95 { 9.2 – 9.7 }	92.5 { 9.4 }	1-3/16-12UN	30.2

Reference: The face seal joints of the dimensions in () are also used, depending on the specification.

7. Table of tightening torques for 102, 107 and 114 engine series (Bolts and nuts)

- ★ Unless there are special instructions, tighten the metric bolts and nuts of the 102, 107 and 114 engine series to the torque below.

Thread size mm	Tightening torque	
	Bolts and nuts	
	Nm	kgm
6	10 ± 2	1.02 ± 0.20
8	24 ± 4	2.45 ± 0.41
10	43 ± 6	4.38 ± 0.61
12	77 ± 12	7.85 ± 1.22
14	—	—

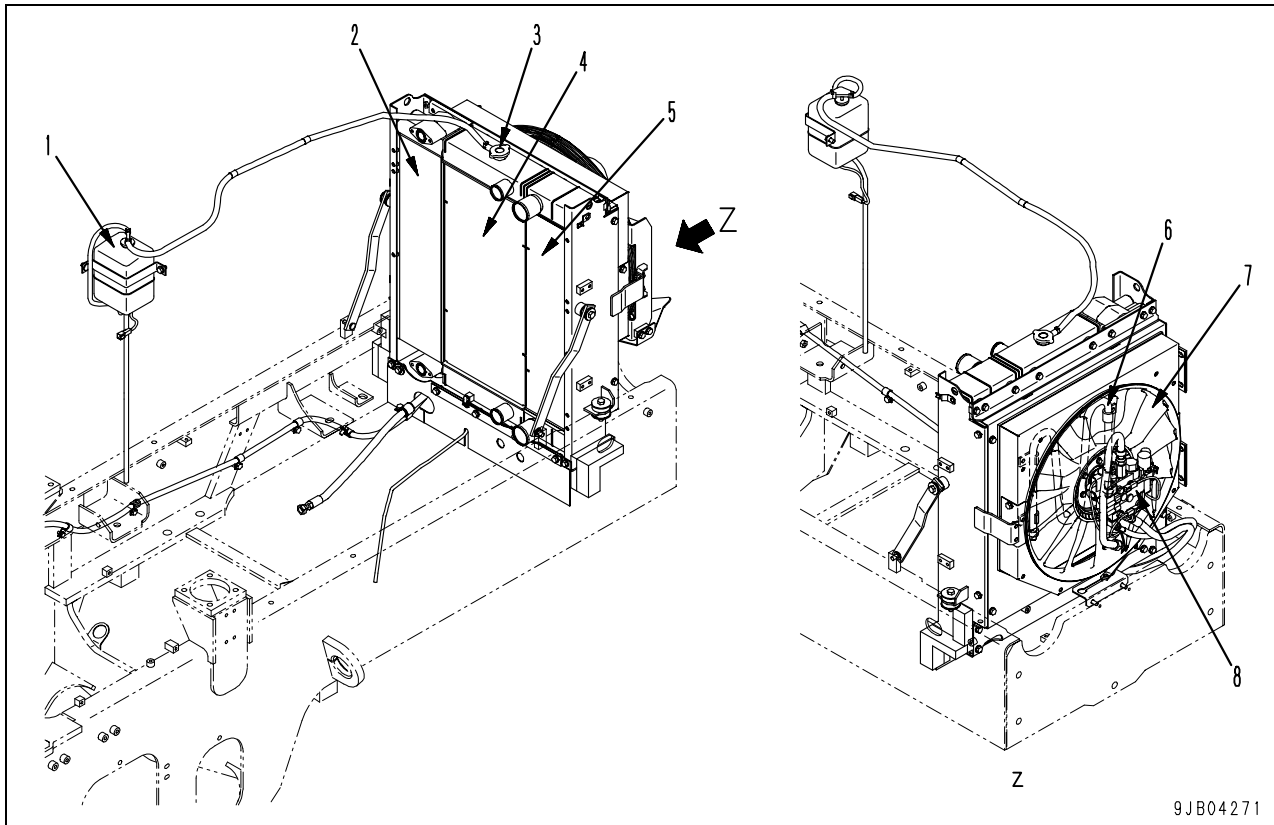
Specifications

Machine model name			WA250-6	WA250PZ-6
Serial No.			75001 and up	75001 and up
Weight	Machine weight	kg	11,520	12,725
	Machine weight (front wheel) in SAE travel posture	kg	4,485	5,670
	Machine weight (rear wheel) in SAE posture	kg	7,035	7,055
Performance	Bucket capacity (heaped)	m ³	2.3	2.2
	Normal load	kN {kg}	36.1 {3,680}	36.1 {3,680}
	Travel speed	km/h	4.0 – 13.0	4.0 – 13.0
	• Forward 1st		13.0	13.0
	• Forward 2nd		18.0	18.0
	• Forward 3rd		38.0	38.0
	• Forward 4th	km/h	4.0 – 13.0	4.0 – 13.0
	• Reverse 1st		13.0	13.0
	• Reverse 2nd		18.0	18.0
	• Reverse 3rd		38.0	38.0
• Reverse 4th	kN{kg}	98 {10,000}	98 {10,000}	
Max. traction force		98 {10,000}	98 {10,000}	
• Forward				
• Reverse				
Gradeability	deg.	25	25	
Min. turning radius (center of outside tire)	mm	5,175	5,175	
Turning radius (cutting edge/BOC tip), SAE travel posture	mm	5,985/6,010	5,855/5,875	
Dimension	Overall length (with BOC)	mm	6,995	7,550
	Overall width (chassis)	mm	2,470	2,470
	Bucket width (with BOC)	mm	2,685	2,685
	Overall height (cab top)	mm	3,200	3,200
	Overall height with bucket lifted up	mm	5,065	5,265
	Wheelbase	mm	2,900	2,900
	Tread	mm	1,930	1,930
	Minimum ground clearance	mm	465	465
	Max. hinge pin height	mm	3,795	3,965
	Dumping clearance (*1) (cutting edge/BOC tip)	mm	2,935/2,850	2,785/2,845
	Dumping reach (*1) (cutting edge/BOC tip)	mm	945/985	1,125/1,100
	Steering angle	deg.	38 (frame stopper 40)	38 (frame stopper 40)
	Bucket tilt angle (operating posture/max. height)	deg.	48/66	47/66
	Bucket dump angle (max. height)	deg.	45	48
	Digging depth, 10° (cutting edge/BOC tip)	mm	215/265	350/375

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

★ BOC: Abbreviation for Bolt-On Cutting edge

Cooling system



9JB04271

- | | |
|-------------------|------------------------|
| 1. Reservoir tank | 5. Aftercooler |
| 2. Oil cooler | 6. Transfer oil cooler |
| 3. Radiator cap | 7. Cooling fan |
| 4. Radiator | 8. Cooling fan motor |

Specifications

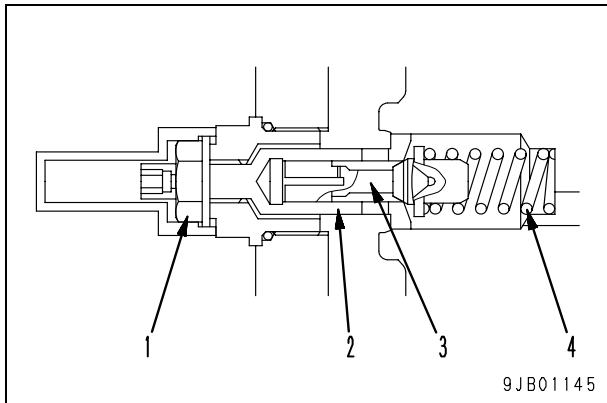
	Radiator	Oil cooler	Aftercooler
Core type	AL WAVE-4	CF40-1	AL WAVE
Fin pitch (mm)	3.5/2	3.5/2	4.0/2
Total heat dissipation area (m ²)	29.86	4.15 x 2	10.87
Pressure valve cracking pressure (kPa {kg/cm ² })	68.6 {0.7}	—	—
Vacuum valve cracking pressure (kPa {kg/cm ² })	0 – 4.9 {0 – 0.05}	—	—

WA250-6, WA250PZ-6 GALEO Wheel loader

Form No. SEN03825-00

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Low-pressure relief valve

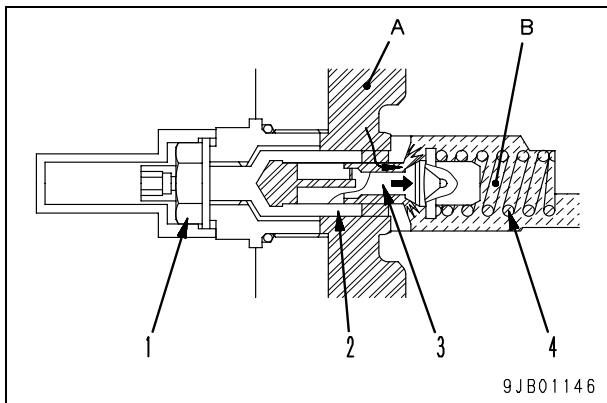


- 1. Locknut
- 2. Adjustment screw
- 3. Piston
- 4. Spring

Function

- This valve is installed on the HST pump. If the oil pressure on the low pressure circuit side across the HST pump and HST motor goes beyond the set pressure, it drains the oil to the hydraulic tank. This valve sets the oil pressure of the HST pump charge circuit in this manner to protect the circuit.

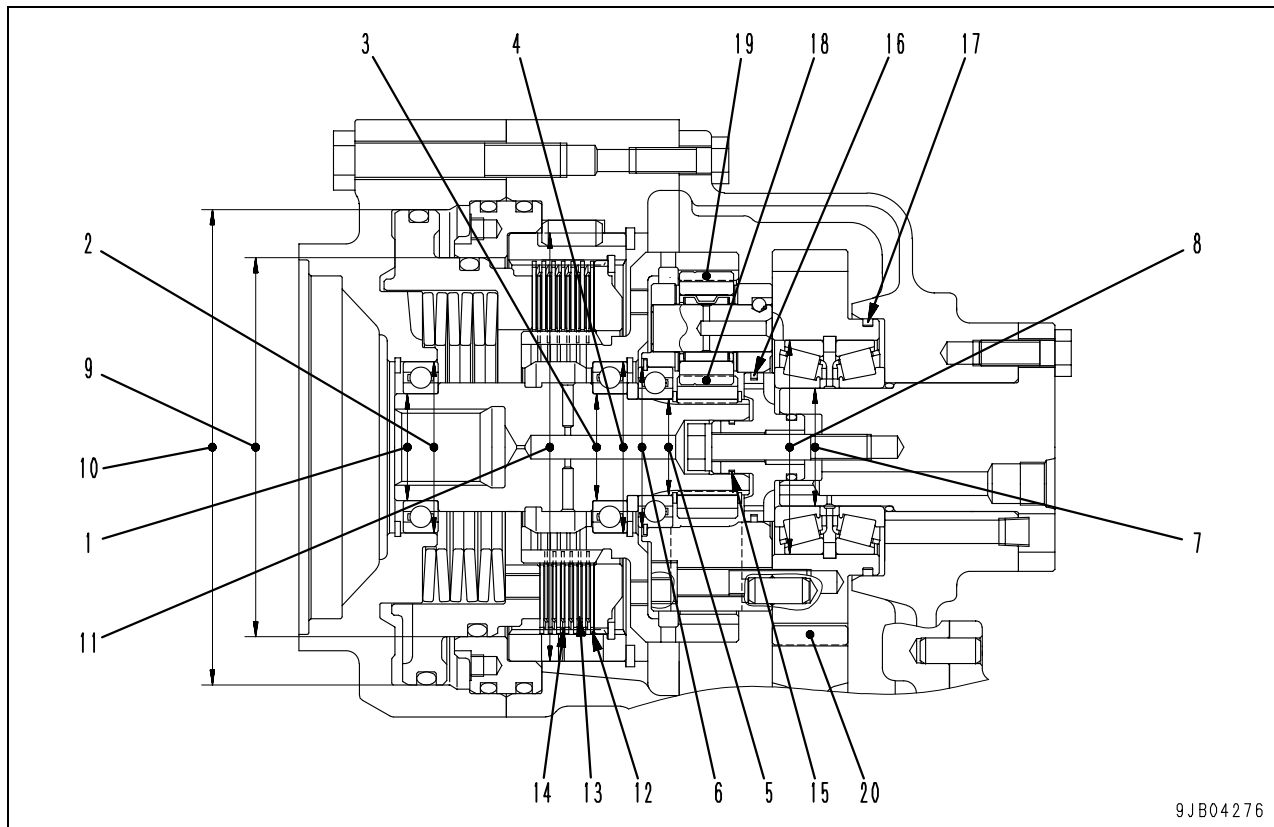
Operation



- Port (A) is connected to the HST pump charge circuit and port (B) is connected to the drain circuit.
- As long as port (A) is below the set pressure, oil does not flow to port (B).
- If oil pressure in port (A) goes beyond the set pressure, piston (3) is pushed in the right direction. As a result, the oil pressure in port (A) is released to port (B) and the oil pressure in port (A) is decreased.
- Increasing or decreasing the repulsive force of spring (4) allows adjusting the set pressure.

- When increasing the set pressure, loosen locknut (1) and screw adjustment screw (2). When decreasing, loosen the adjustment screw.

Input shaft



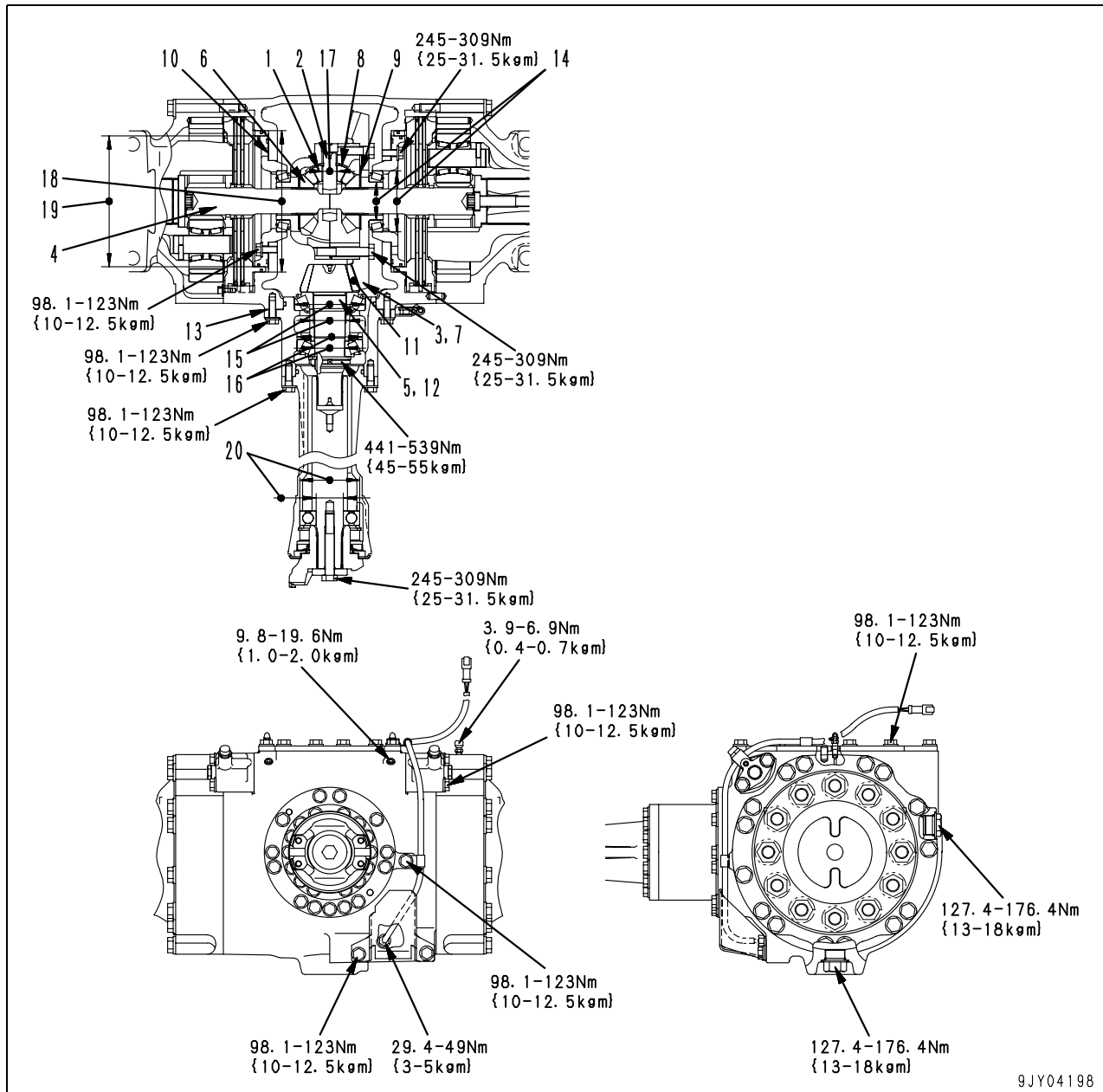
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Unit: mm

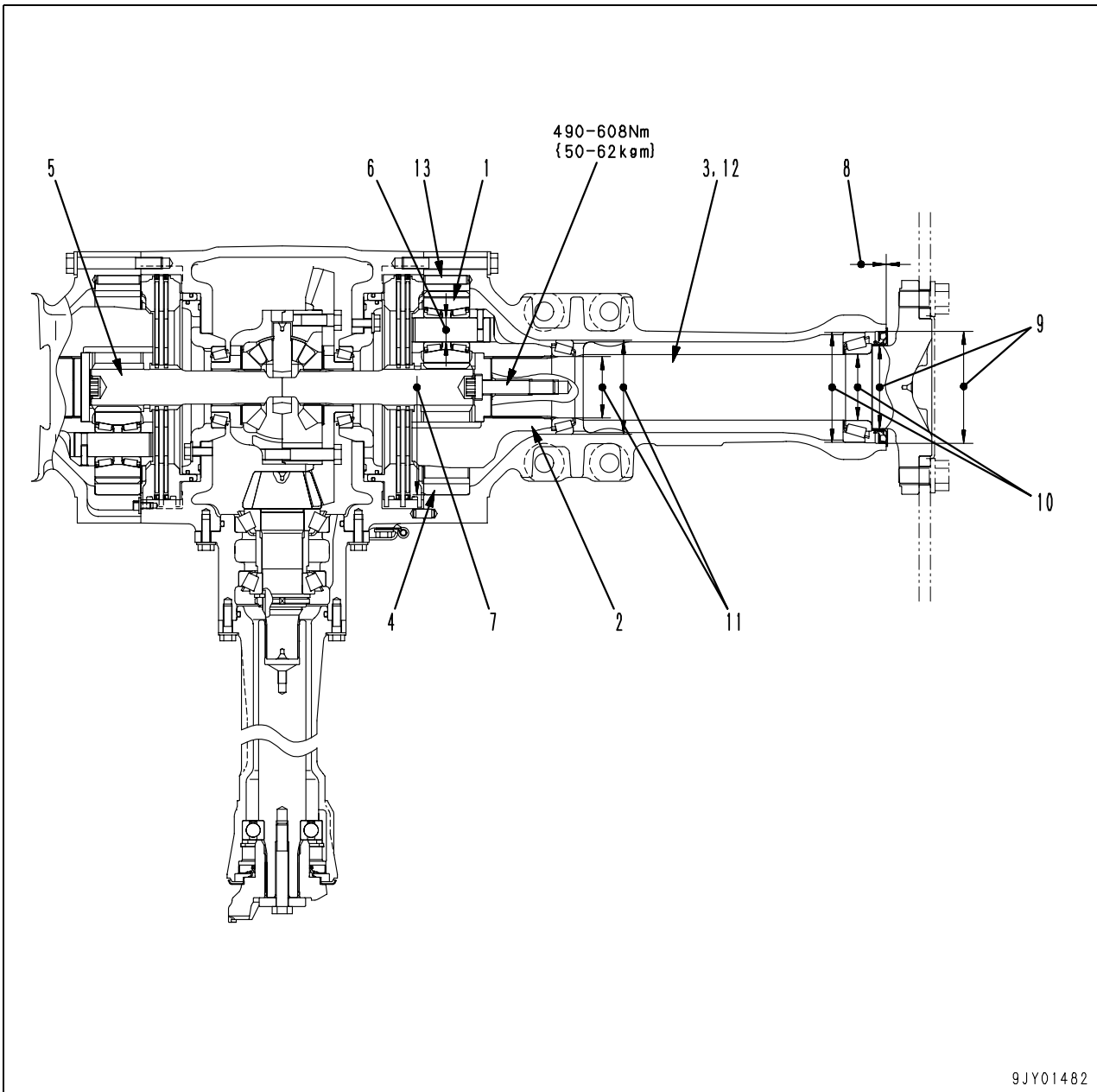
No.	Check item	Criteria				Remedy
		Standard size	Tolerance		Standard clearance	
Shaft	Hole					
1	Clearance between input shaft and bearing (front)	50	+0.011 -0.005	0 -0.012	-0.023 – 0.005	—
2	Clearance between input shaft bearing and cage (front)	80	0 -0.013	+0.013 -0.006	-0.006 – 0.026	—
3	Clearance between input shaft and bearing (middle)	50	+0.011 -0.005	0 -0.012	-0.023 – 0.005	—
4	Clearance between input shaft bearing and ring gear (middle)	80	0 -0.013	+0.013 -0.006	-0.006 – 0.026	—
5	Clearance between input shaft and bearing (rear)	45	+0.011 -0.005	0 -0.012	-0.023 – 0.005	—
6	Clearance between input shaft bearing and carrier (rear)	75	0 -0.013	+0.013 -0.006	-0.006 – 0.026	—
7	Clearance between press fitting shaft and bearing	55	+0.039 +0.020	0 -0.015	-0.054 – -0.020	—
8	Clearance between press fitting shaft bearing and motor 1 gear	100	0 -0.018	-0.016 -0.038	-0.038 – 0.002	—
9	Clearance between piston and spacer	177	-0.085 -0.125	+0.040 0	0.085 – 0.165	—
10	Clearance between piston and cage	222	-0.550 -0.650	+0.046 0	0.550 – 0.696	—
11	Clearance between clutch housing and front case	200	+0.061 +0.015	+0.046 0	-0.061 – 0.031	—

Differential

Front differential



- 1. Pinion (number of teeth: 9)
- 2. Shaft
- 3. Bevel gear (number of teeth: 43)
- 4. Sun gear shaft
- 5. Bevel pinion (number of teeth: 12)
- 6. Side gear (number of teeth: 12)

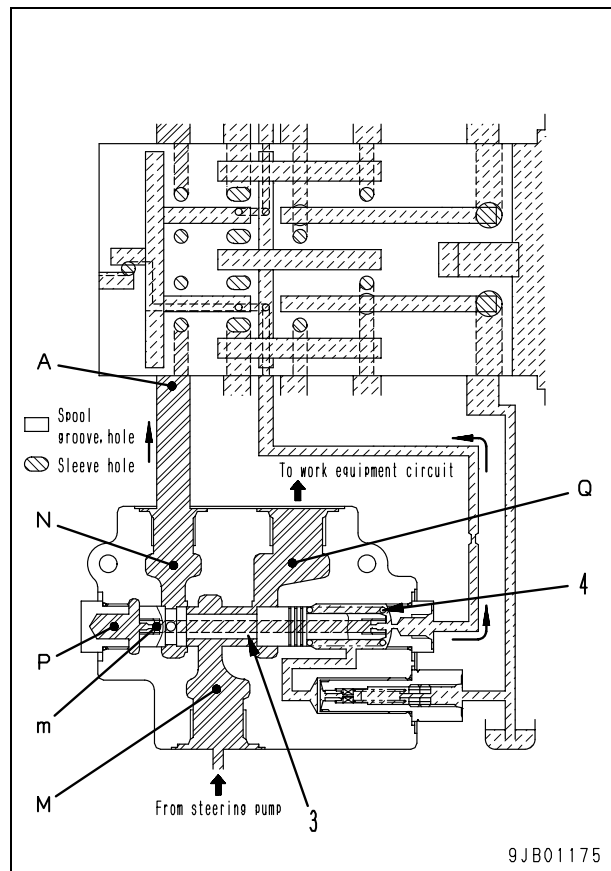
Final drive**Front final drive**

1. Planetary gear (number of teeth: 26)
2. Planetary carrier
3. Axle shaft
4. Ring gear (number of teeth: 69)
5. Sun gear shaft (number of teeth: 15)

Outline

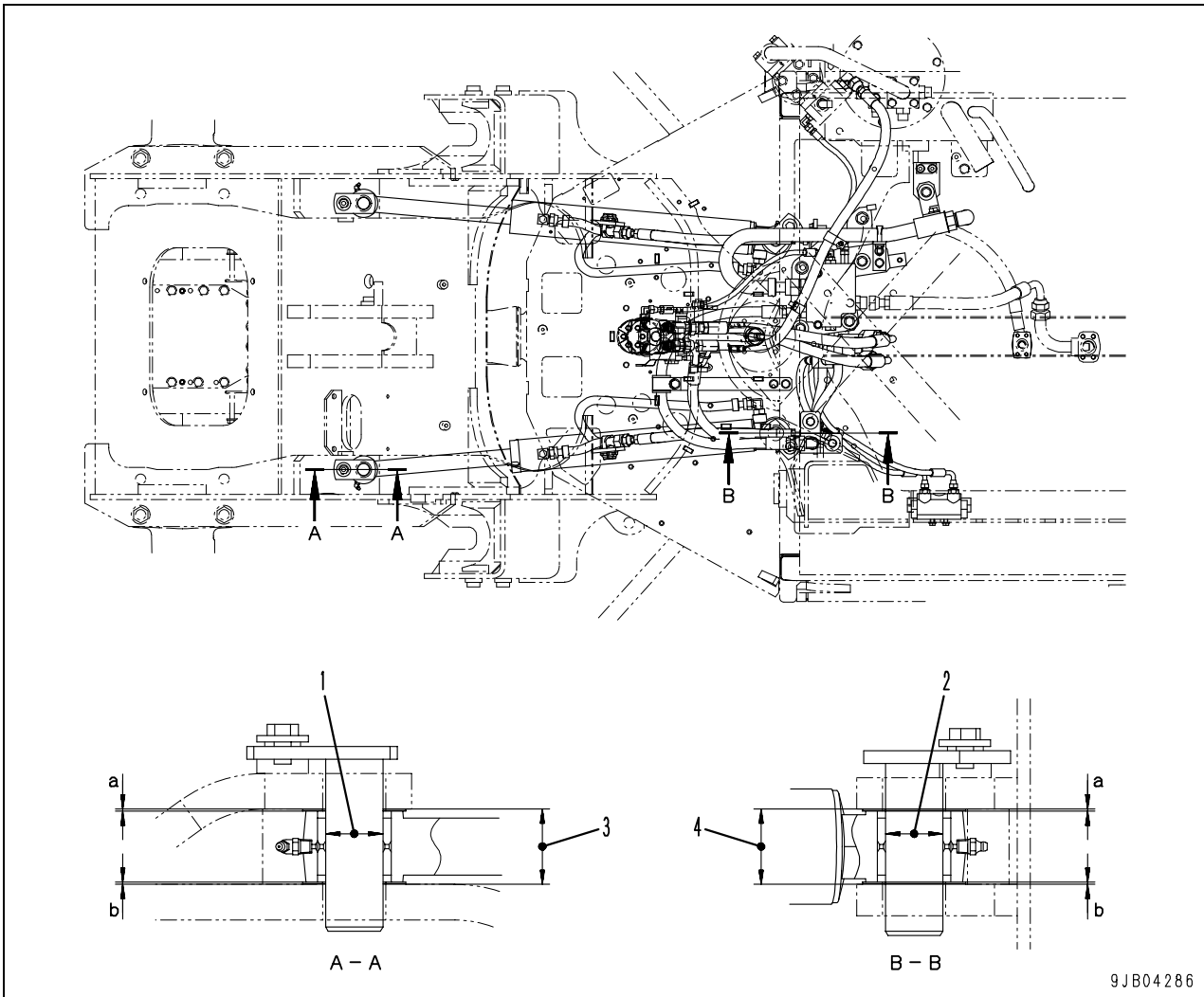
- The priority valve is installed between the steering pump and Orbit-roll valve and work equipment control valve. It diverges the oil from the steering pump to the steering circuit or work equipment circuit. It is also used for controlling the oil pressure from the priority valve to the Orbit-roll valve in order to protect the circuit.

Set pressure: 18.6 MPa {190 kg/cm²}

Operation**When steering wheel is at "neutral" position**

- When the engine is stopped, spool (3) is pushed in the left direction by the repulsive force of spring (4). Thus, port (M) and port (N) are fully opened and port (M) and port (Q) are closed.
- Starting the engine starts the steering pump rotation, and the oil from the pump flows to port (A) of the Orbit-roll valve through port (M) and port (N).
- The oil that flew to chamber (P) through orifice (m) of spool (3) pushes spool (3) in the right direction by compressing spring (4).
- Port (M) and port (Q) are opened and port (M) and port (N) are almost closed to stabilize spool (3).
- Most of the oil from the pump flows to the work equipment circuit through port (Q).

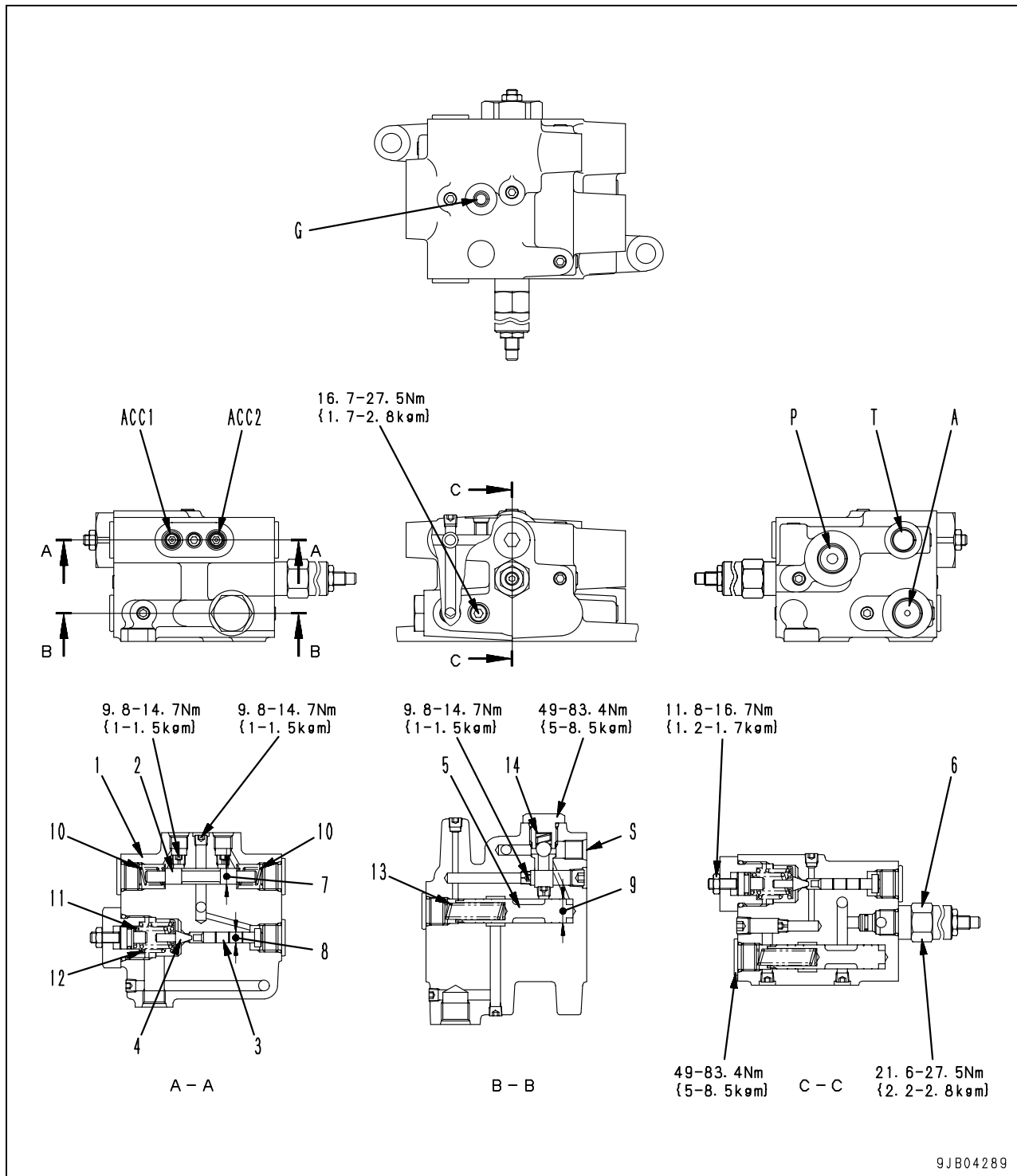
Steering cylinder



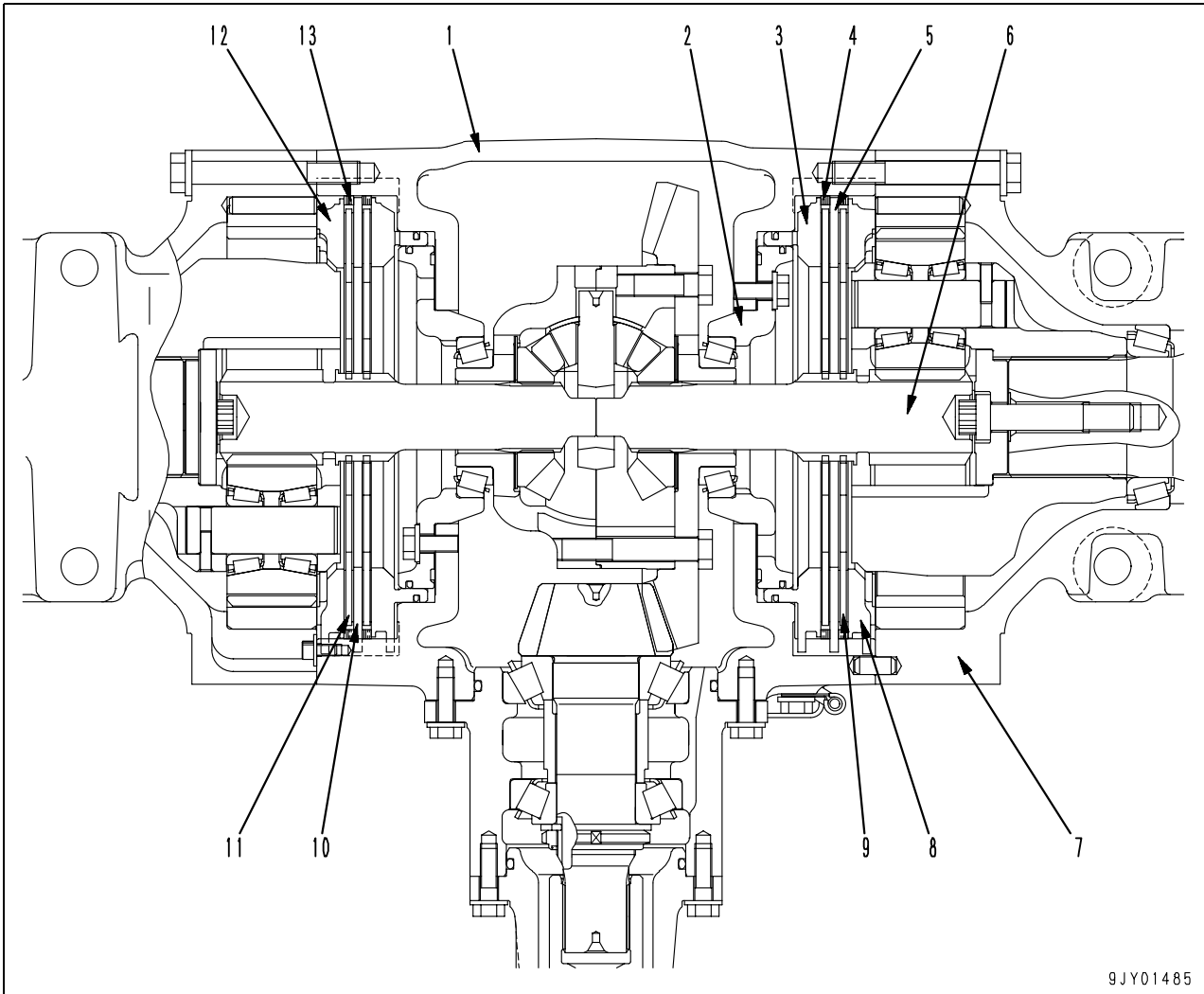
Unit: mm

No.	Check item	Criteria				Remedy
		Standard size	Tolerance		Standard clearance	
Shaft	Hole					
1	Clearance between bushing in cylinder rod frame connecting part and mounting pin	40	0 -0.025	+0.180 +0.042	0.042 – 0.205	Replace
2	Clearance between bushing in cylinder bottom frame connecting part and mounting pin	40	0 -0.025	+0.180 +0.042	0.042 – 0.205	
3	Connecting part of steering cylinder and front frame	Width of boss	Width of hinge		Standard (a + b) clearance Max. 0.5 (after shim is adjusted)	
		50	53			
4	Connecting part of steering cylinder and rear frame	50	53		Max. 0.5 (after shim is adjusted)	

Charge valve

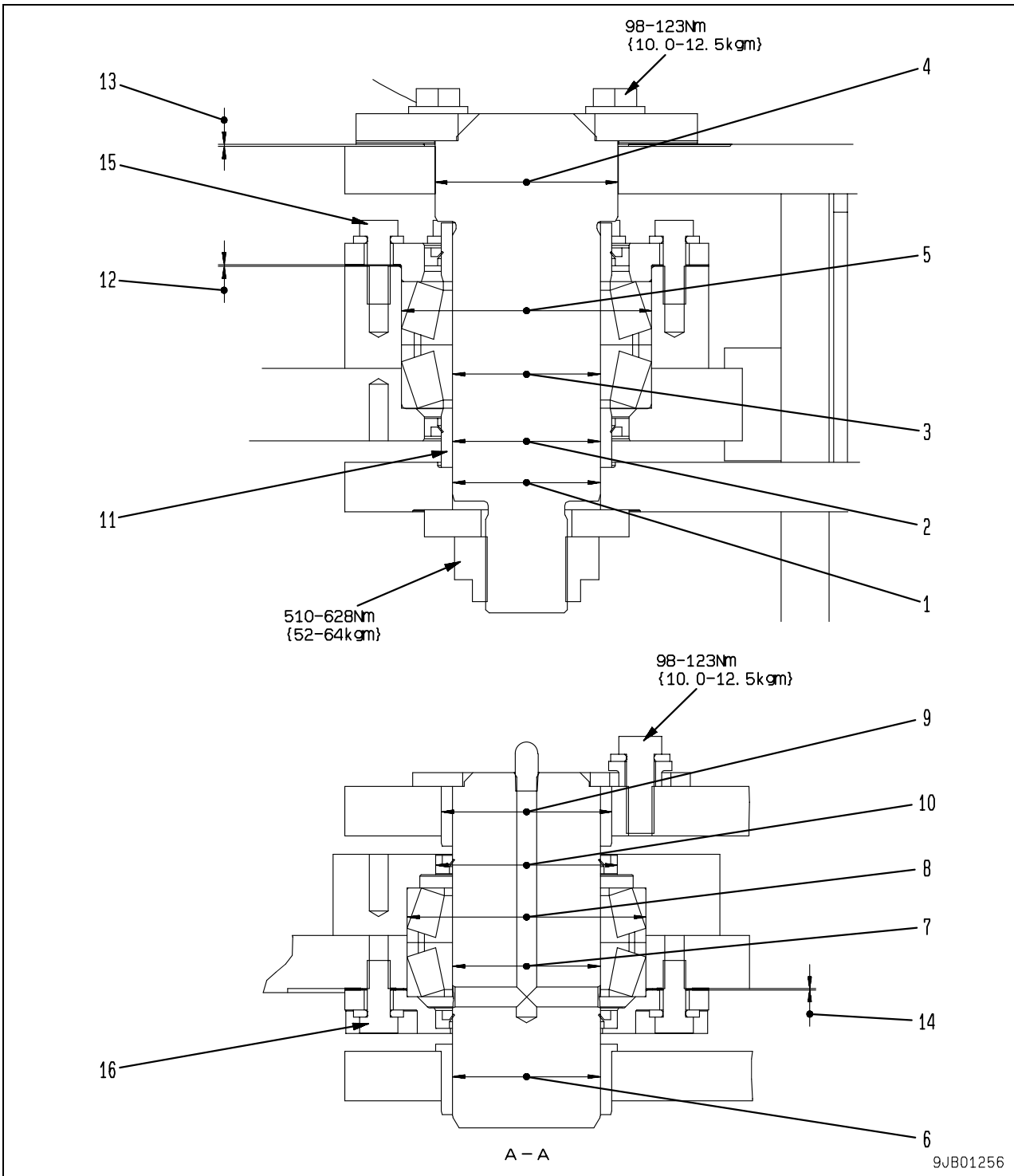


Brake
Front brake



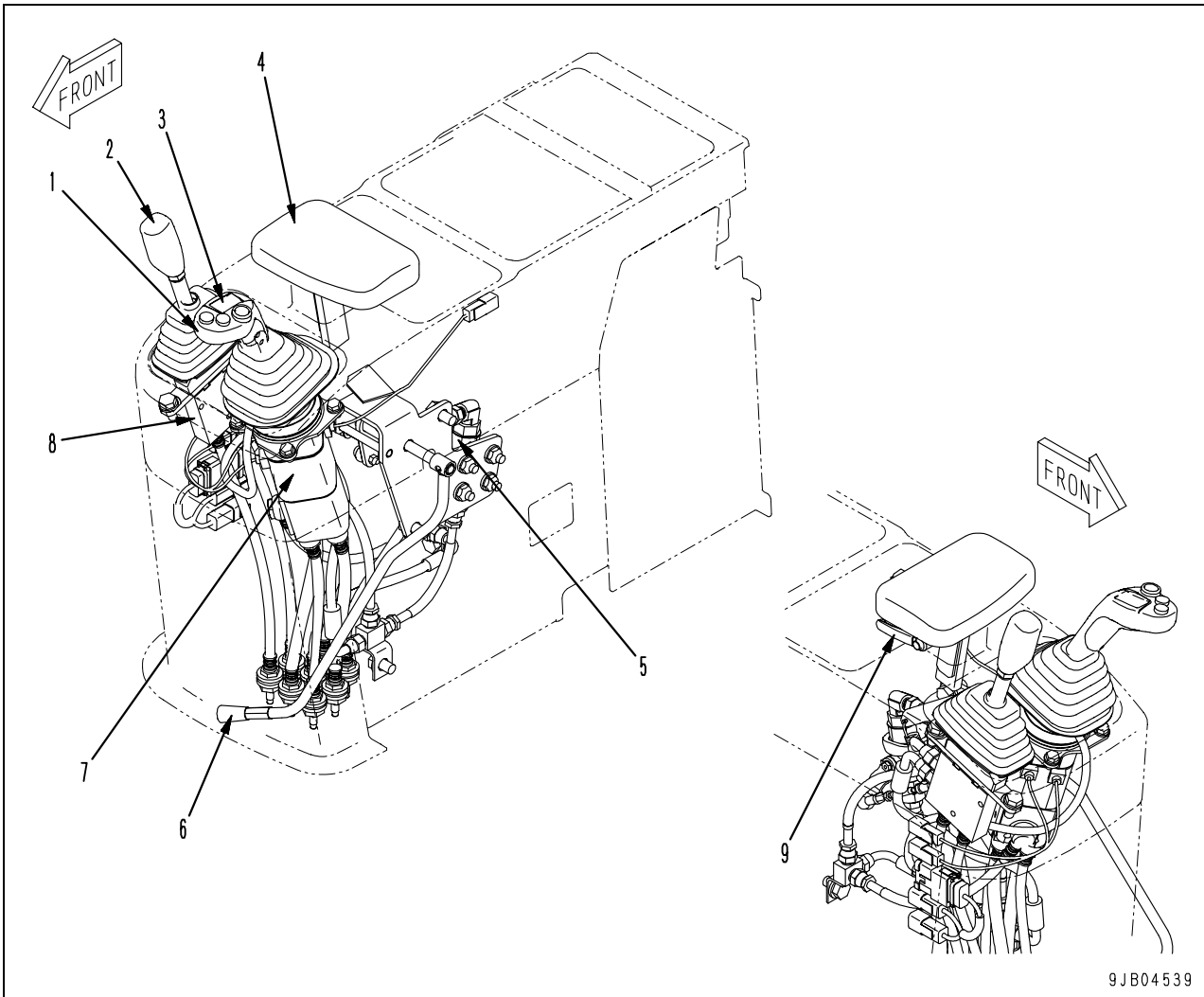
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- 1. Differential housing
- 2. Bearing carrier
- 3. Piston
- 4. Spring
- 5. Inner ring
- 6. Sun gear shaft
- 7. Axle housing
- 8. Outer ring
- 9. Disc (2 pieces)



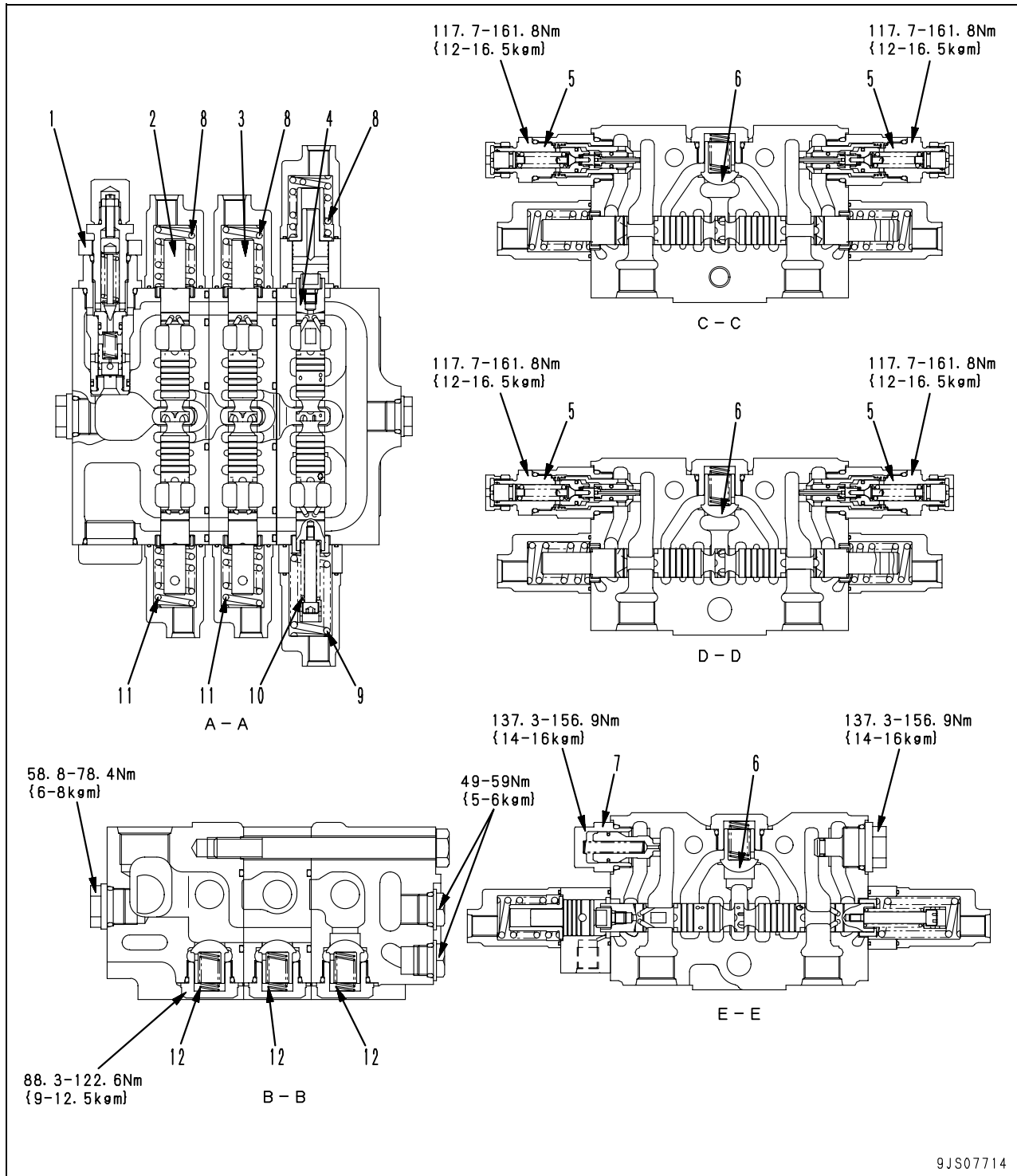
WA250PZ-6

Multi-function mono-lever type

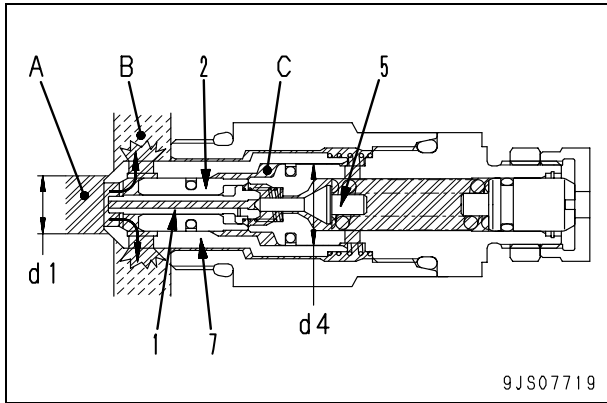


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- 1. Work equipment control lever
- 2. Auxiliary control lever
- 3. Directional selector switch
- 4. Wrist rest
- 5. Lock valve
- 6. Work equipment lock lever
- 7. Work equipment PPC valve
- 8. Attachment PPC valve
- 9. Wrist rest height adjustment lever

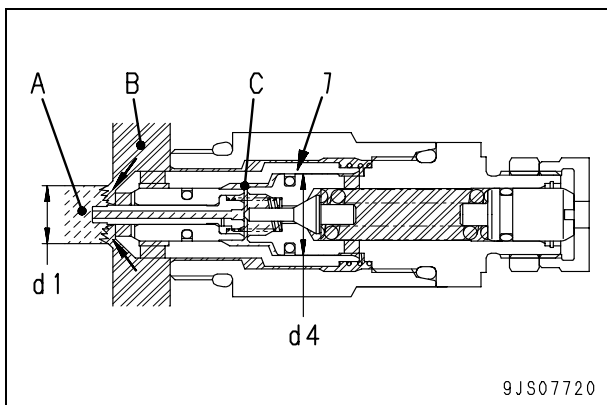


- Since the pressure in port (C) is lower than that in port (A), main valve (2) moves to the right and the pressurized oil is conducted from port (A) to port (B) to prevent generation of abnormal pressure.
- Even if abnormal pressure is generated, suction valve (7) with the large cross sectional diameter remains not operated because of the relation $(d1) < (d4)$.

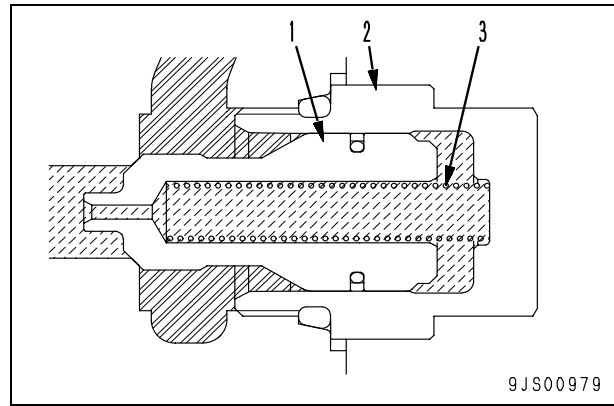


2. Operation as suction valve

- If negative pressure is generated on the cylinder circuit, negative pressure is set on both port (A) and port (C) because they are connected to each other. Suction valve (7) receives the pressurized oil by the difference in area between $(d4)$ and $(d1)$.
- When the differential pressure between port (B) and port (A) increases beyond the set pressure, suction valve (7) moves to the right. Thus the pressurized oil flows from port (B) to port (A) to prevent generation of negative pressure in port (A).



Suction valve



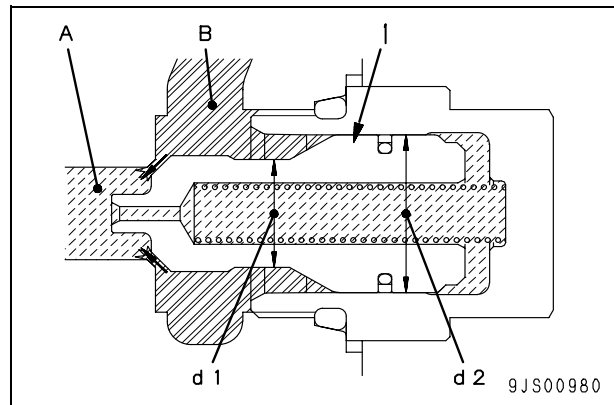
- 1. Main poppet
- 2. Sleeve
- 3. Spring

Function

- This valve prevents to generate negative pressure on the circuit.

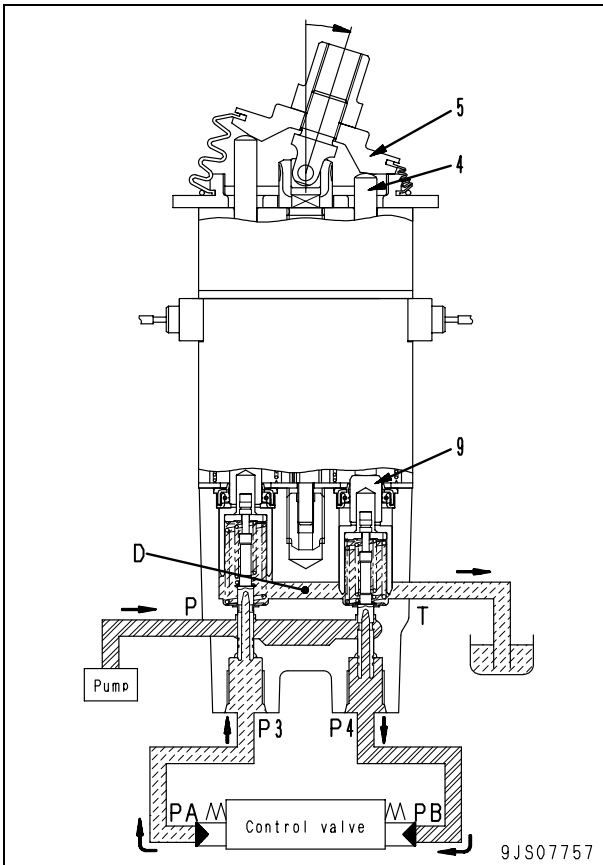
Operation

- If negative pressure is generated in port (A) (lift arm cylinder head) [if a pressure lower than that in the tank circuit port (B) is generated], main poppet (1) is opened by the difference in area between $(d1)$ and $(d2)$, and the pressurized oil flows to cylinder port (A) from tank port (B).



5. When lift arm is "float"

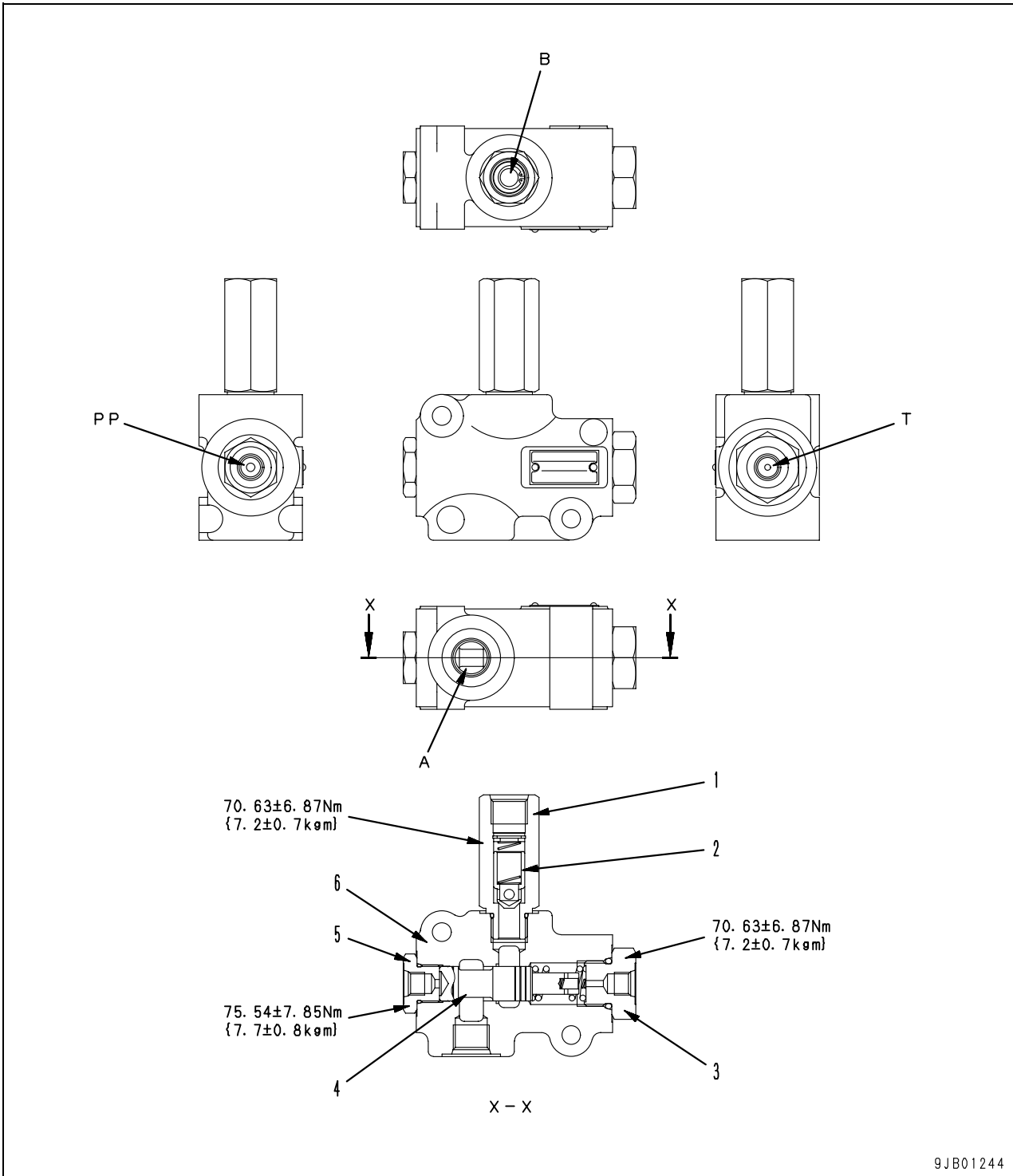
- If disc (5) pushes down rod (4) and piston (9) on port (P4) "lower" side, the detent starts operation before the stroke end. (the operating effort of the lever becomes heavy.)
- If rod (4) is pushed down further, the detent operates to keep the lift arm in "float" state even if the lever is released.
- At the same time, the control valve is also moved to the "float" position to keep the lift arm in float condition.

**6. When "float" state of lift arm is reset**

- When returning disc (5) from the "float" position, the rod is pushed down with a force larger than absorptive power of the solenoid.
- The "float" state also can be reset and the lever can be returned to the "neutral" position by turning off the current in the solenoid (de-energizing the solenoid).
- The lift arm raise and bucket tilt operations are carried out similarly to the above.

Bypass valve

WA250PZ-6

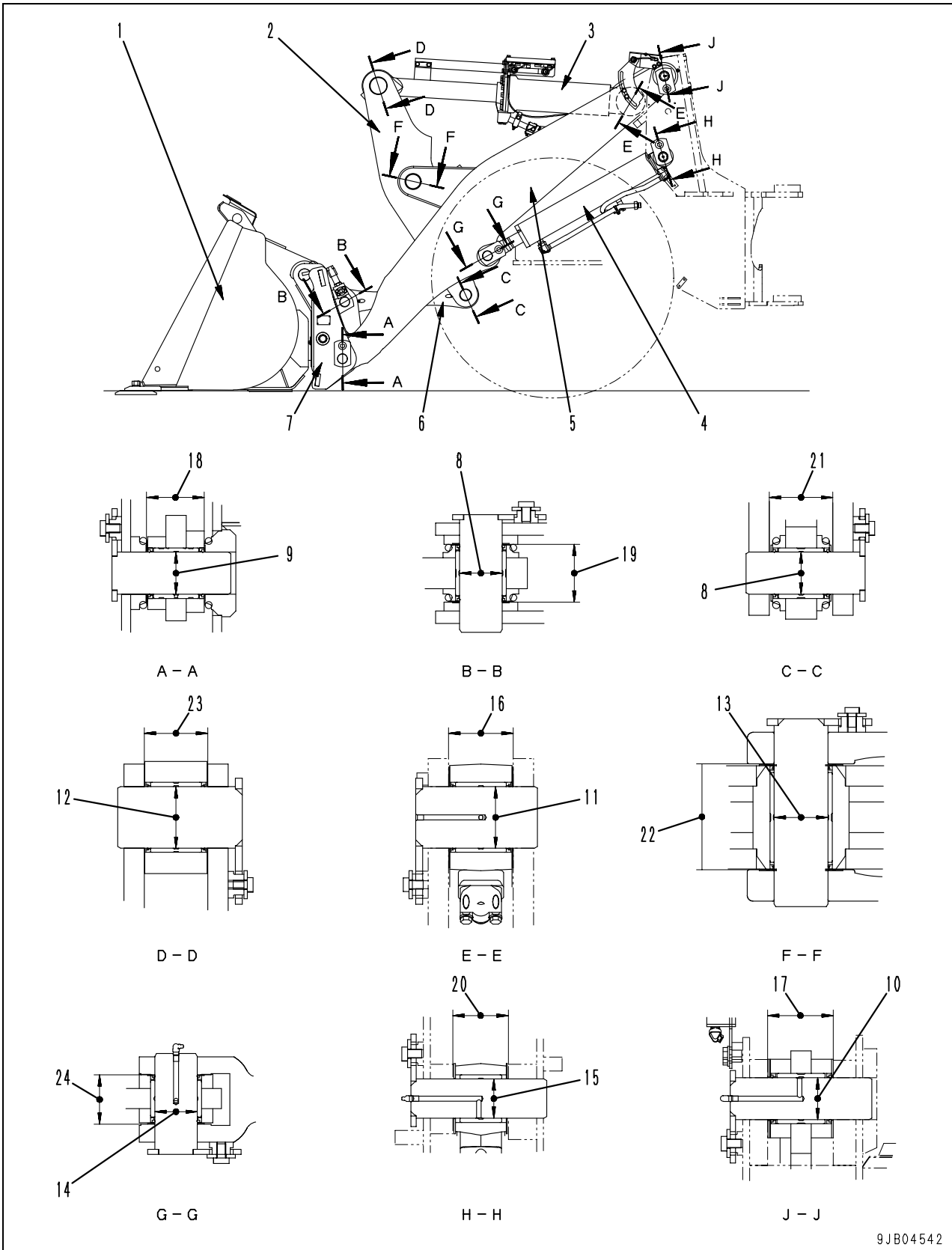


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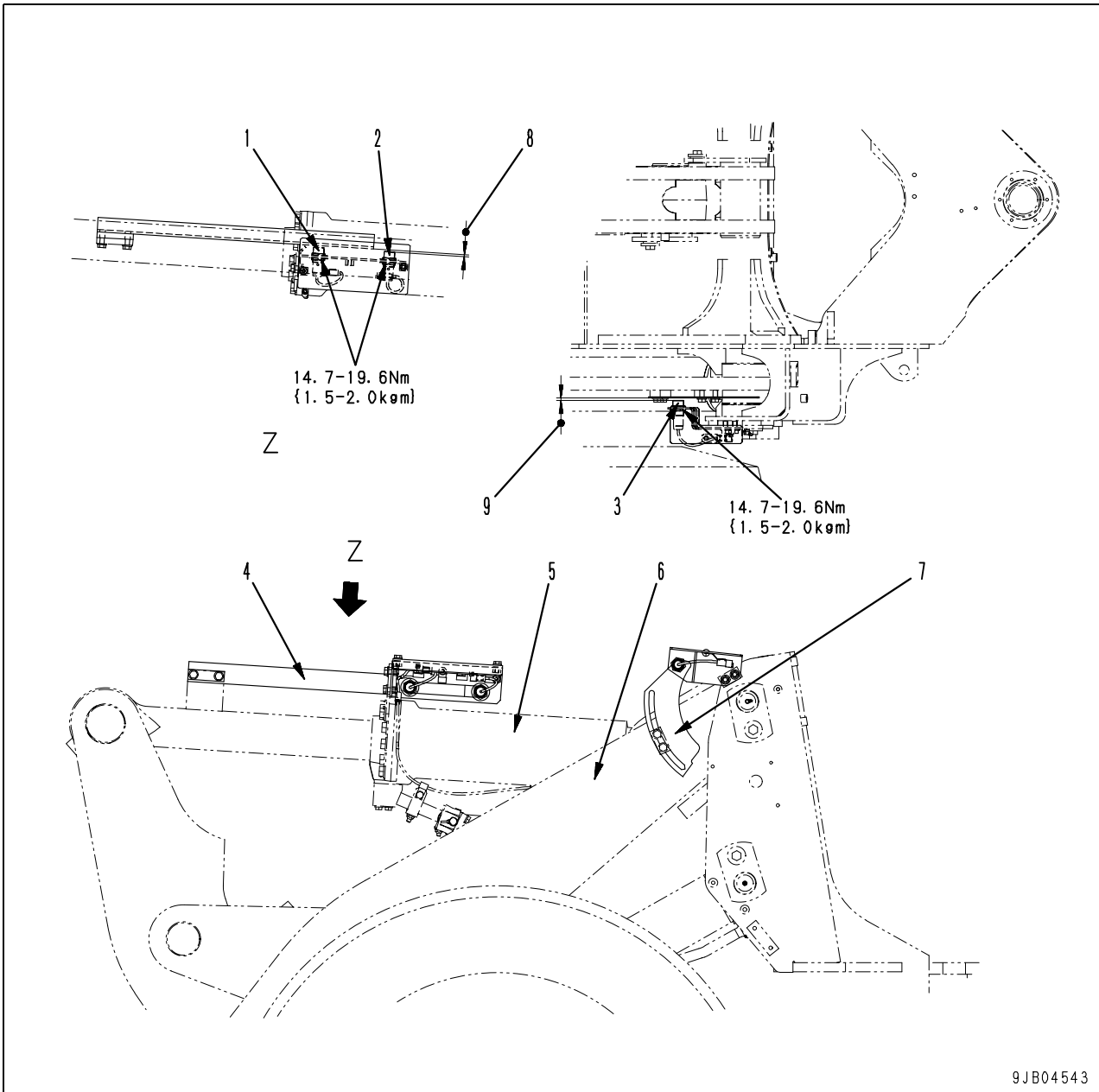
PP: From work equipment PPC valve port P4
 T: From work equipment PPC valve port P3
 A: To lift cylinder bottom side
 B: To lift cylinder head side

1. Body
2. Plunger
3. Plug
4. Spool
5. Plug
6. Body

WA250PZ-6



WA250PZ-6

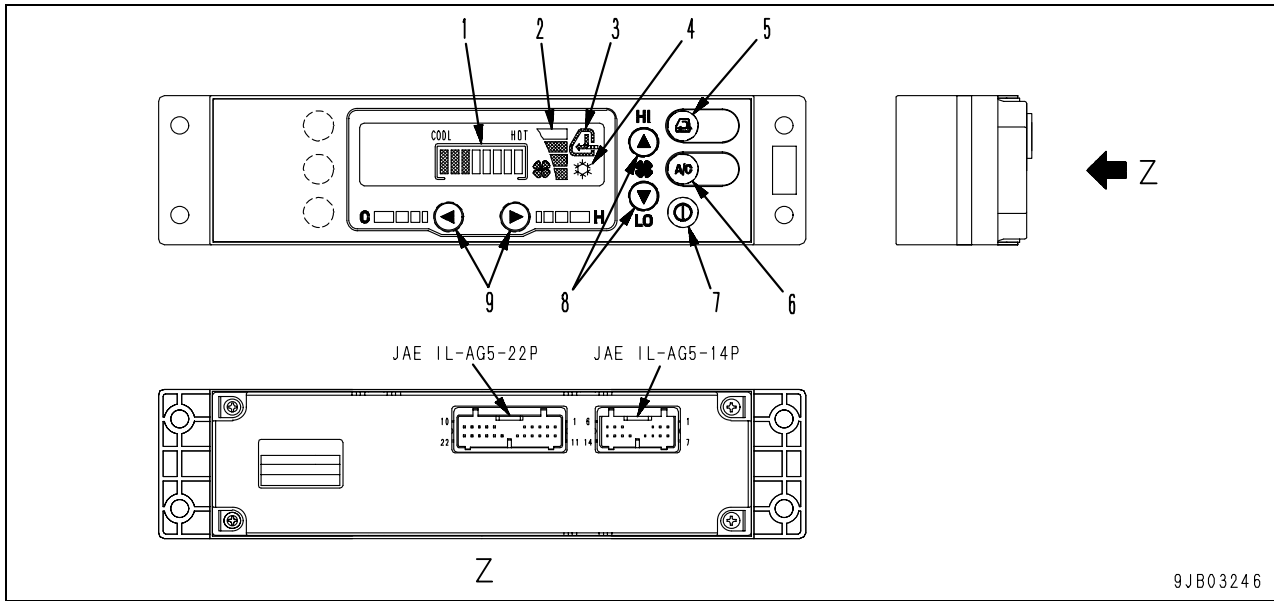


- 1. Fork positioner proximity switch
- 2. Bucket positioner proximity switch
- 3. Boom kick-out proximity switch
- 4. Bar
- 5. Bucket cylinder
- 6. Lift arm
- 7. Plate

Unit: mm

No.	Check item	Criteria	Remedy
8	Clearance on bucket positioner proximity switch	3-5	Adjust
9	Clearance on boom kick-out proximity switch	3-5	

Air conditioner panel



Display unit

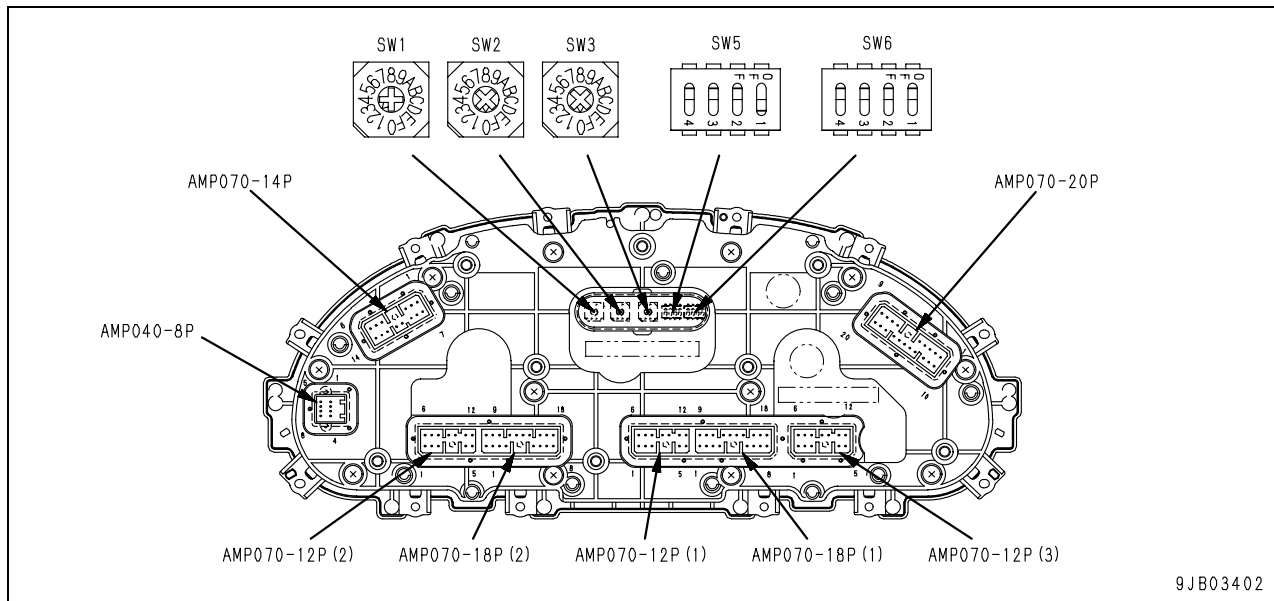
No.	Display category	Display items	Display range	Display method	Display color	Remarks
1	Gauge	Spurting out temperature	See above drawing	All segments below applicable level come on (8-step display)	Black	Liquid crystal
2		Air blasting volume	See above drawing	All segments below applicable level come on (4-step display)		
3	Pilot	Circulation of internal air and introduction of external air	When circulating internal air and introducing external air	The display indicates which is currently taking place - internal air circulation or external air introduction - responding to the operation of the internal/external air changeover switch.		
4		Air conditioner	When air conditioner switch is "ON"	Turns "ON" air conditioner switch, this lamp lights up.		

Switch block

No.	Switch name	Function	Operation
5	Internal/external air changeover switch	This switch is used to select either the circulation of internal air or introduction of external air (pilot display on the display unit is switched depending on the switch setting)	Circulation of internal air ↑ ↓ Introduction of external air
6	Air conditioner switch	It turns on or off the cooling and the dehumidifying heating function.	OFF ↔ ON
7	Main power switch	It turns on or off main power supply of the air conditioner. ON: Settings done during "OFF" are indicated on the display unit. OFF: Turns off the display unit lamp and stops the fan.	OFF ↔ ON
8	Fan switch	It controls volume of air sent from the fan. (adjusted in 4 steps [LO, M1, M2 and HI])	LO ↔ HI
9	Temperature adjusting switch	It controls the spurting out temperature (8-step adjustment)	Low temperature ↑ ↓ High temperature

Category	No.	Item	Device	Operating condition	Detecting time (sec)		Operating condition								Display color	Remarks
					Detection	Reset	Engine stopped				Engine is running					
							Alarm buzzer	Individual display	Central warning lamp	Display of message	Alarm buzzer	Individual display	Central warning lamp	Display of message		
Other symbols	30	Preheating	LED	Other than below			—	—	—		—	—	—		Red	
				When preheater is turned on	0	0	—	○	—		—	○	—			
	31	Directional selector switch actuation	LED	When directional lever is used			—	—	—		—	—	—		Green	This function can be enabled when "ADD" is selected for "3. EMERG S/T" from the "Optional device selecting function" of the machine monitor. Not to be displayed when error is made in communication.
				When directional selector switch is used	0	0	—	○	—		—	○	—			
				Directional lever priority caution	0	0	☆	⊙	○		☆	⊙	○			
				Directional selector switch neutral caution	0	0	☆	⊙	○		☆	⊙	○			
	32	Economy operation	LED	Other than below	0	0	—	—	—		—	—	—		Green	
				Economy mode operation	0	0	—	○	—		—	○	—			
	34	S mode operation	LED	Other than below			—	—	—		—	—	—		Green	The lamp goes off when traction control is reset from max. traction switch. When traction control is reset with max. traction switch, the lamp is lit again when directional lever position is switched.
				S mode operation is selected	0	0	—	○	—		—	○	—			
	35	Traction control operation	LED	Other than below			—	—	—		—	—	—		Green	
				Traction control operation is turned on	0	0	—	○	—		—	○	—			

Input and output signals

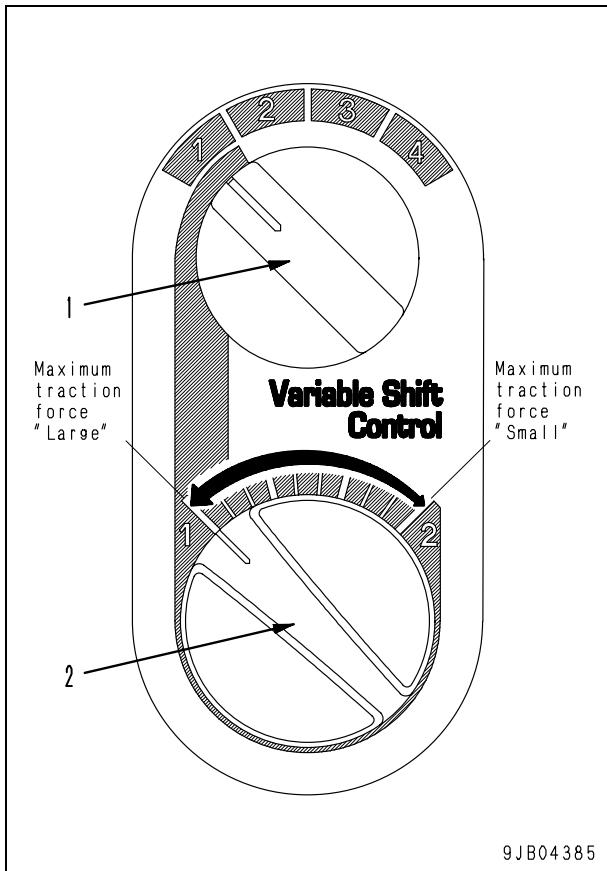


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AMP070-20P[CN-L24]

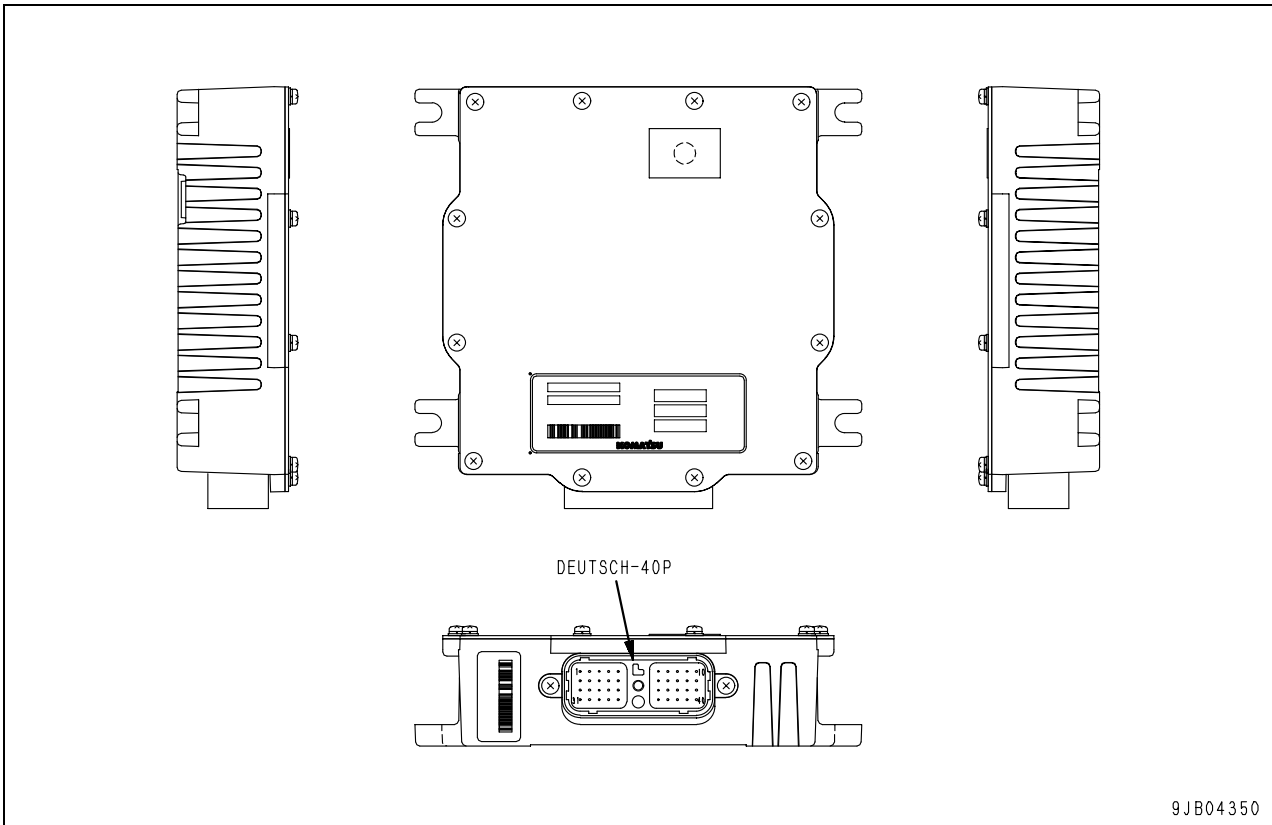
Pin No.	Specifications	I/O	Group	Form of use	Signal name	Remarks
1	(NC)	—	—	—	—	
2	(NC)	—	—	—	—	
3	(NC)	—	—	—	—	
4	NSW power supply (+24 V)	I	—	Constant power supply (+24 V)	NSW power supply (+24 V)	
5	NSW power supply (+24 V)	I	—	Constant power supply (+24 V)	NSW power supply (+24 V)	
6	SW power supply (+24 V)	I	—	Power supply (+24 V)	SW power supply (+24 V)	
7	SW power supply (+24 V)	I	—	Power supply (+24 V)	SW power supply (+24 V)	
8	(NC)	—	—	—	—	
9	GND	I	—	GND	GND	
10	GND	I	—	GND	GND	
11	D_OUT_3 (+24 V, sink 200 mA)	O	A	D/O sink	ECSS relay	If equipped
12	D_OUT_2 (+24 V, sink 200 mA)	O	A	D/O sink	Back-up lamp	
13	D_OUT_1 (NC)	—	—	—	—	
14	D_OUT_0 (+24 V, sink 200 mA)	O	A	D/O sink	Alarm buzzer	
15	(NC)	—	—	—	—	
16	(NC)	—	—	—	—	
17	GND	I	—	GND	GND	
18	GND	I	—	GND	GND	
19	GND	I	—	GND	GND	
20	GND	I	—	GND	GND	

The maximum traction force available when the travel speed range selector switch is set to "1st" and the traction control switch is set to "ON"



- When the travel speed range selector switch (1) is set to "1st" and the variable shift control switch (2) is turned fully to the left, setting the traction control switch to the ON position does not reduce the maximum traction force. In this case, the maximum traction force remains at the same level as when the traction control switch is set to the "OFF" position.
- As clockwise turning of the variable shift control switch (2) is continued, the traction force approaches the maximum traction force being set from the "Traction level selecting function" of the machine monitor.
- It is possible to obtain the maximum traction force, which has been set from the traction control switch and "Traction level selecting function" of the machine monitor, by turning the variable shift control switch (2) fully to the right.

HST controller



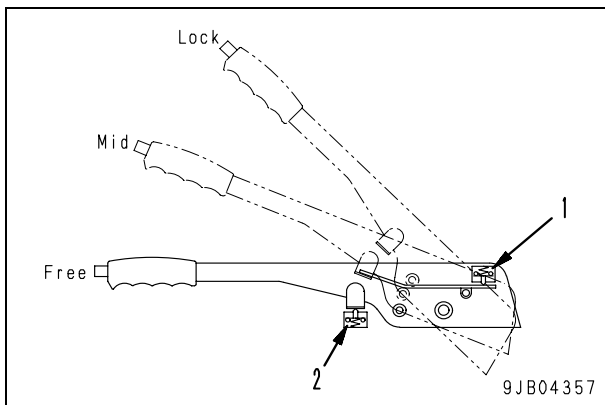
Input and output signals

DEUTSCH-40P [CN-HST]

Pin No.	Signal name	Input/Output signal	Pin No.	Signal name	Input/Output signal
1	VB (controller power)	Input	21	GND (controller GND)	—
2	Starting switch ACC signal	Input	22	HST sensor power 5V	Input
3	Wake up	Input	23	Travel speed adjusting dial	Input
4	Directional selector switch F	Input	24	Directional selector switch R	Input
5	Directional lever N	Input	25	Directional selector switch operating switch	Input
6	Parking brake lever intermediate switch	Input	26	Speed sensor A	Input
7	HST controller power holding relay	Output	27	HST motor 2 solenoid relay	Output
8	NC	—	28	CAN0_H	Input/Output
9	Clutch solenoid	Output	29	Cooling fan motor flow rate control EPC	Output
10	HST pump F solenoid	Output	30	VIS (solenoid power)	Input
11	VB (controller power)	Input	31	GND (controller GND)	—
12	Starting switch ACC signal	Input	32	GND (sensor GND)	—
13	Alternator L signal	Input	33	HST oil pressure sensor	Input
14	Directional selector switch N	Input	34	Directional lever F	Input
15	Directional lever R	Input	35	Traction control switch	Input
16	Parking brake lever bottom switch	Input	36	Speed sensor B	Input
17	HST safety relay	Output	37	Cooling fan motor reverse rotation solenoid relay	Output
18	NC	—	38	CAN0_L	Input/Output
19	HST motor 1 solenoid	Output	39	Travel speed range selector switch	Input
20	HST pump R solenoid	Output	40	SOL_COM (solenoid common GND)	—

Operation

Starting switch position	OFF			ON					
State of engine	Stopped						Running		
Parking brake lever area	Free	Mid	Lock	Free	Mid	Lock	Free	Mid	Lock
Parking brake lever intermediate switch (1)	Close		Open	Close		Open	Close		Open
Parking brake lever bottom switch (2) [for parking brake pilot lamp operation]	Close	Open		Close	Open		Close	Open	
Parking brake reminder caution lamp (Alarm buzzer)	[*1], [*2] ON (Sounded)		OFF (Reset)	[*1] ON (Sounded)		OFF (Reset)	OFF (Reset)		
Parking brake pilot lamp	OFF			OFF	ON		OFF	ON	



When the parking brake lever is set to "Free" position

- When the parking brake lever is set to the free position, the intermediate switch (1) and bottom switch (2) are both closed.
 - The parking brake pilot lamp goes off independent of the given state.
 - The parking brake is released.
- *1: When the starting switch is turned from "ON" to "OFF":
- The parking brake reminder caution lamp turns on and the alarm buzzer sounds.
 - The HST controller power holding relay remains turned on, conducting current to the HST controller and maintaining the HST motor 1 solenoid valve and clutch solenoid valve being activated. Thus, the machine is protected from slipping through a slope.
- *2: If the parking brake lever is set to any position other than "Lock" when the starting switch is at "OFF", the parking brake reminder caution lamp remains turned off and the alarm buzzer is also not activated. And HST motor 1 solenoid valve and clutch solenoid valve remain inactivated.

When the parking brake lever is set to "Mid" position

- When the parking brake lever is set to the mid position, the bottom switch (2) is open but intermediate switch (1) is closed.
 - The parking brake pilot lamp comes on only when the starting switch is "ON".
 - As bottom switch (2) opens, the output to the forward and reverse solenoid valves of HST pump is stopped to prevent dragging of the parking brake. And, at the same time, the directional lever and the directional selector switch are disabled to turn on the machine travel in both the forward and reverse direction.
- *1: When the starting switch is turned from "ON" to "OFF":
- The parking brake reminder caution lamp turns on and the alarm buzzer sounds.
 - The HST controller power holding relay remains turned on, conducting current to the HST controller and maintaining the HST motor 1 solenoid valve and clutch solenoid valve being activated. Thus, the machine is protected from slipping through a slope.

WA250-6, WA250PZ-6 GALEO Wheel loader

Form No. SEN03834-01

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Replacing alternator belt 36

Adjusting valve clearance

★ Necessary tools

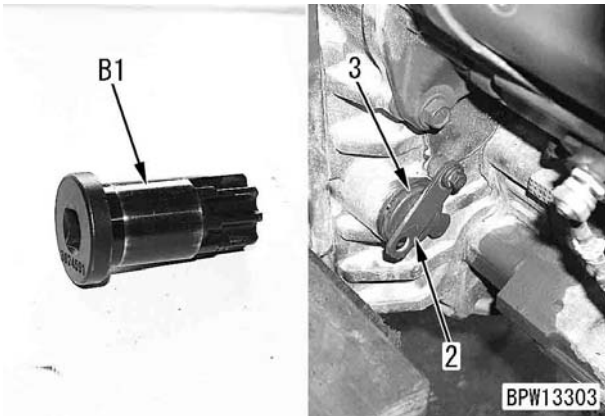
Symbol	Part No.	Part Name	
B	1	795-799-1131	Gear
	2	Commercially available	Clearance gauge

- ★ Adjust the valve clearance under the following condition.
- Engine coolant temperature: Normal temperature

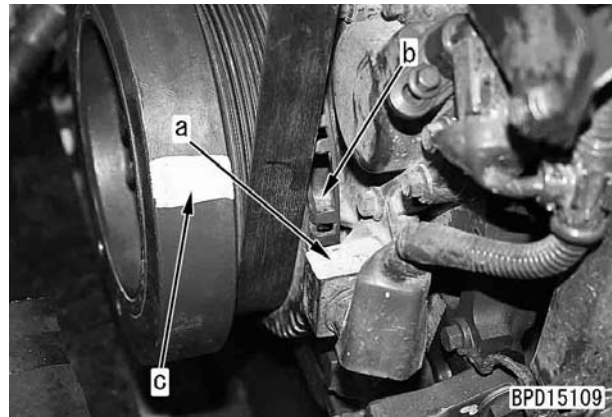
1. Remove cylinder head cover (1). For details, see Disassembly and assembly, "Removal and installation of cylinder head assembly".
 - ★ Removal of the engine hood is unnecessary.



2. Remove plate (2) and plug (3) at the bottom of the starting motor and insert gear B1.

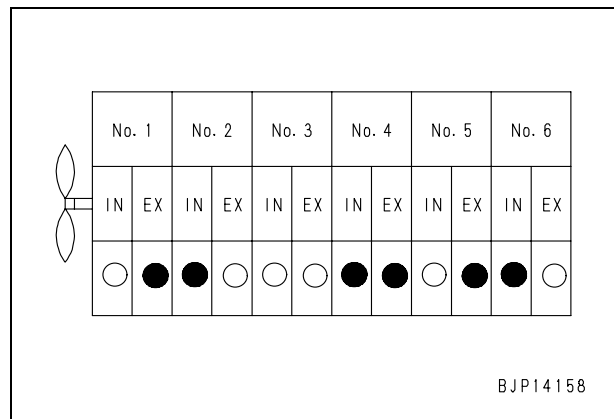


3. Rotate the crankshaft forward (clockwise, seeing from the fan) with gear B1 and set wide slit (b) of the rotation sensor ring to projection top (a) of front cover.
 - ★ Projection top (a) must be within the range of wide slit (b) when it is seen from the air conditioner compressor side.
 - ★ If you can see the yellow marks (c) of projection top (a) and the damper periphery, you may set them to each other.
 - ★ After the above positioning, the No. 1 cylinder or No. 6 cylinder is not at the top dead center (TDC). Take care. (The cylinder is at 76 – 88° before the top dead center.)



4. Check the movement of the rocker arm of the No. 1 cylinder to judge the valve to be adjusted.

- ★ If you can move the rocker arms of air intake valves (IN) with the hand by the valve clearance, adjust the valves marked with ○ in the valve arrangement drawing.
- ★ If you can move the rocker arms of exhaust valves (EX) with the hand by the valve clearance, adjust the valves marked with ● in the valve arrangement drawing.
- ★ Valve arrangement drawing



Measuring fuel return rate and leakage

★ Necessary tools

Symbol	Part No.	Part name	
H	1	795-790-4700 Tester kit	
	2	795-790-6700 Adapter	
	3	6754-71-5340	Connector
		6754-71-5350	Washer
	4	Commercially available	Measuring cylinder
	5	Commercially available	Stopwatch
6	Commercially available	Hose (Inside diameter 14 mm)	

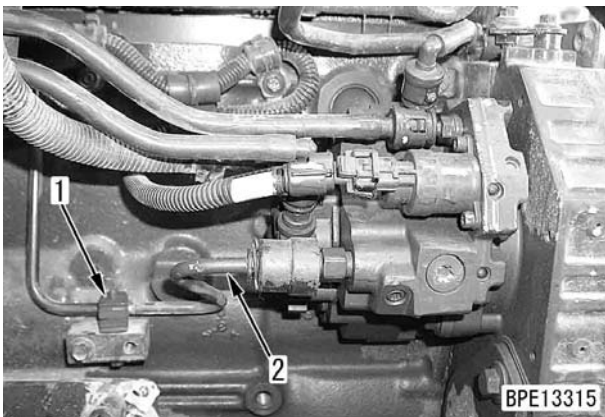
★ Prepare receiving pan of about 20 liters to receive the fuel flowing out during measurement.

⚠ Put chocks under the tires securely.

⚠ When measuring, check that there are no persons around the machine.

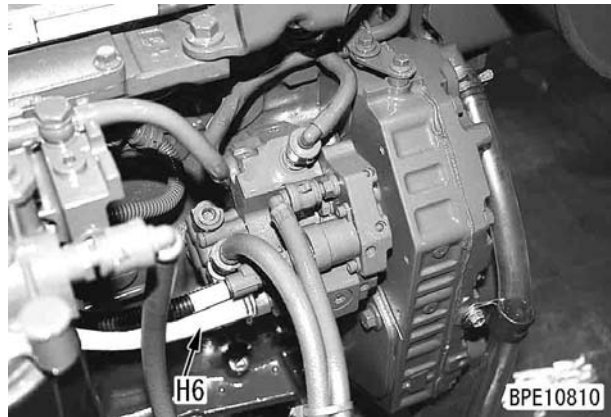
1. Measuring supply pump delivery

- 1) Open the engine right side cover.
- 2) Loosen clamp (1) of supply pump discharge tube (2) and disconnect the tube.



- 3) Install test hose H6 to the nipple on the discharge side of the supply pump.

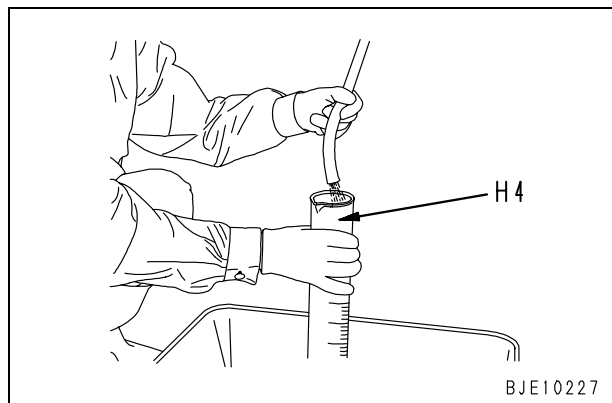
- ★ Fix the hose with a wire etc.
- ★ Adjust the route of the test hose so that it will not slacken and put its end in receiving pan.



- 4) Crank the engine for 30 seconds and measure the delivery with measuring cylinder H4.

- ★ Adjust the route of the test hose so that it will not slacken and put its end in receiving pan.
- ★ Do not crank the engine for more than 30 seconds to protect the starting motor in any case other than this measurement.
- ★ If the supply pump delivery is in the following standard range, it is normal.

At cranking speed (125 rpm)	Min. 75 cc
At cranking speed (150 rpm)	Min. 90 cc



- 5) After finishing measurement, remove the measuring instruments and return the removed parts.

⌘ Tube sleeve nut:

35 ± 4 Nm {3.6 ± 0.4 kgm}

⌘ Clamp mounting bolt:

10 ± 2 Nm {1.0 ± 0.2 kgm}

WA250-6, WA250PZ-6 Wheel loader

Form No. SEN03836-01

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Testing and adjusting steering oil pressure

Necessary tools

Symbol	Part No.	Part Name
P	799-101-5002	Analog type hydraulic tester
	790-261-1204	Digital type hydraulic tester

★ Measuring condition

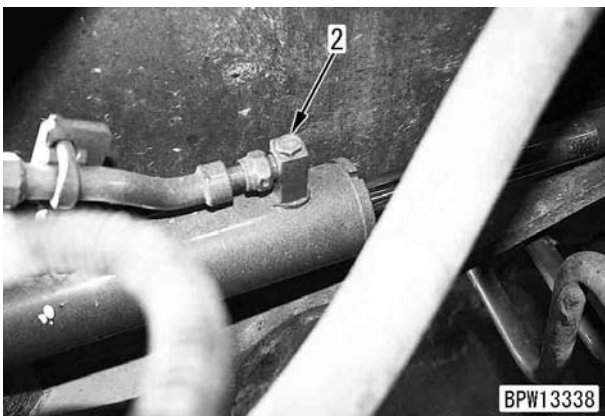
- Hydraulic oil temperature: 45 – 55°C
- Engine speed: High idle

Measuring main relief pressure

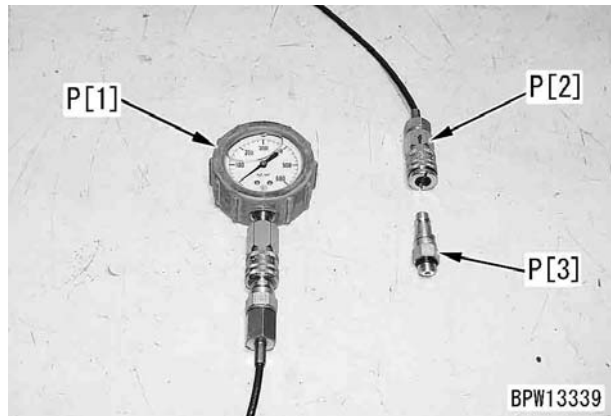
1. Fit frame lock bar (1) to the frame.



2. Remove oil pressure pickup plug (2) of the steering cylinder circuit.

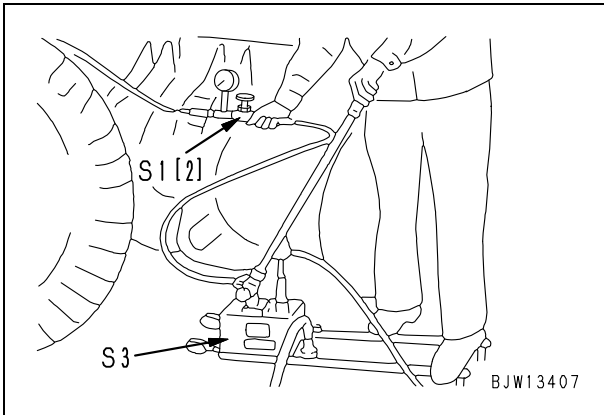


3. Fit a nipple P [3] to the steering circuit pressure measurement plug hole, then install oil pressure gauge P [1], P [2] (40 MPa {400 kg/cm²}).



4. Start the engine, run the engine at high idle, then turn the steering wheel to the left or right and measure the pressure when the relief valve is actuated.

6. Tighten bleeder screw (4), operate pump **S3** to increase the pressure to 4.1 MPa {42 kg/cm²}, and tighten stop valve [2] (a component part of **S1**).



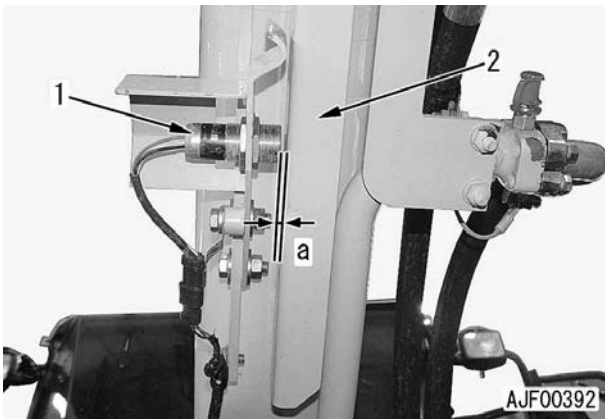
7. Leave the brake circuit pressurized for 5 minutes and check lowering of the pressure.
 - ★ If the hose is moved while the pressure is measured, the pressure fluctuates. Accordingly, do not move the hose.
 - ★ After testing the pressure, operate pump **S3** to lower the pressure in brake test kit **S1**, and then remove brake test kit **S1**.
 - ★ After finishing testing, install the brake tube and bleed air from the brake circuit.
8. After finishing the work, remove the measuring instruments and return the removed parts.

Testing and adjusting bucket positioner

- ★ Measuring condition
 - Engine coolant temperature: White range of engine coolant thermometer
 - Hydraulic oil temperature: 45 – 55°C

Testing

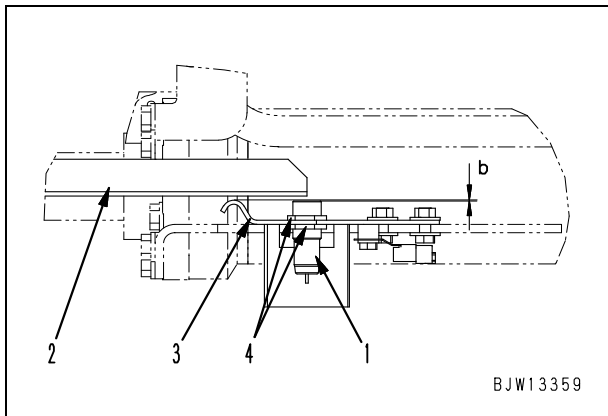
1. Stop the engine and check that clearance (a) between proximity switch (1) and detection bar (2) is in the standard range.
 - ★ Standard clearance (a): 3 – 5 mm



2. Run the engine at same as usual working speed and check the operating point. (Measure 3 times and obtain the average.)

Adjusting

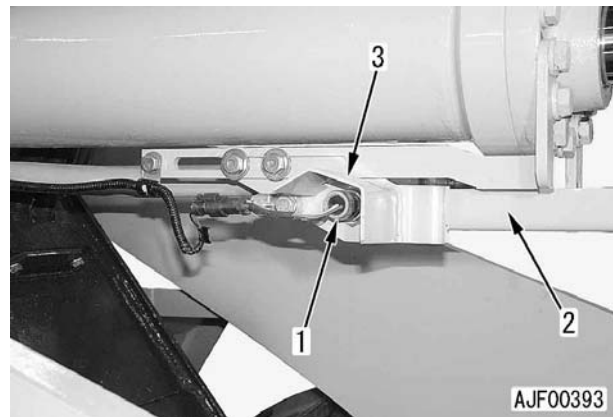
1. Adjusting clearance.
 - 1) Adjust and secure clearance (b) between the tip of switch protector (3) and the sensitive surface of the switch to the standard range with switch nuts (4).
 - ★ Standard clearance (b): 0.5 – 1.0 mm
 - ⌘ Mounting nut: **14.7 – 19.6 Nm {1.5 – 2.0 kgm}**



- 2) Adjust and secure clearance (a) between the sensitive surface of proximity switch (1) and detection bar (2) to the standard range with the shim and mounting bolt of the proximity switch bracket.
 - ★ Standard clearance (a): 3 – 5 mm
 - ★ Adjust detection bar (2) with the shim so that clearance (a) will be in the standard range through the stroke of the detection bar (2).

2. Adjusting installing position (stopping position).

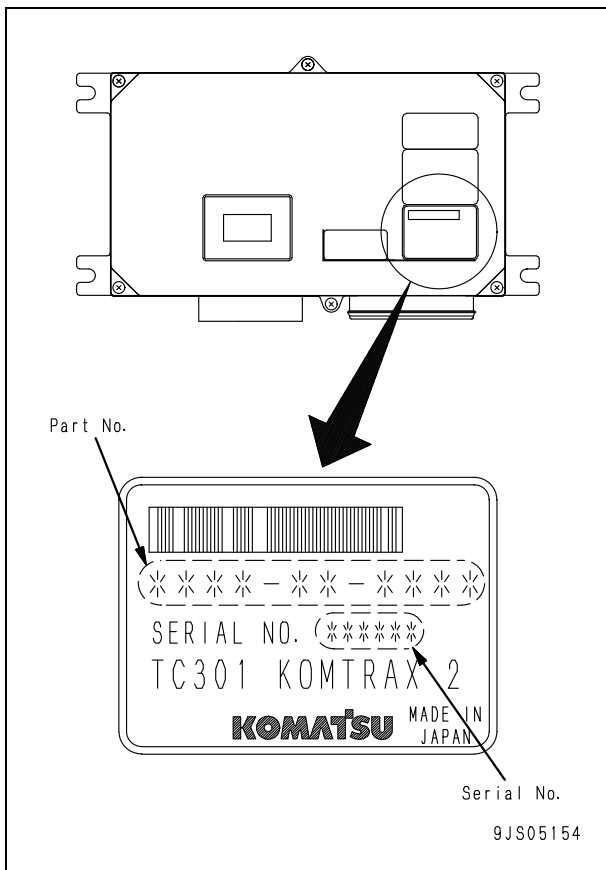
- 1) Lower the bucket to the ground and set it to a desired digging angle, then return the lever to the holding position and stop the engine.
- 2) Adjust with switch mounting nut (4) so that clearance (b) of the detection bar (2) of proximity switch (1) is within the standard value, then secure in position.
 - ⌘ Switch mounting nut: **14.7 – 19.6 Nm {1.5 – 2.0 kgm}**
 - The installing position may be checked by checking the operation of the pilot lamp of the proximity switch with the starting switch at the ON position.
 - ★ For ON/OFF of the pilot lamp, see "Checking proximity switch working pilot lamp".



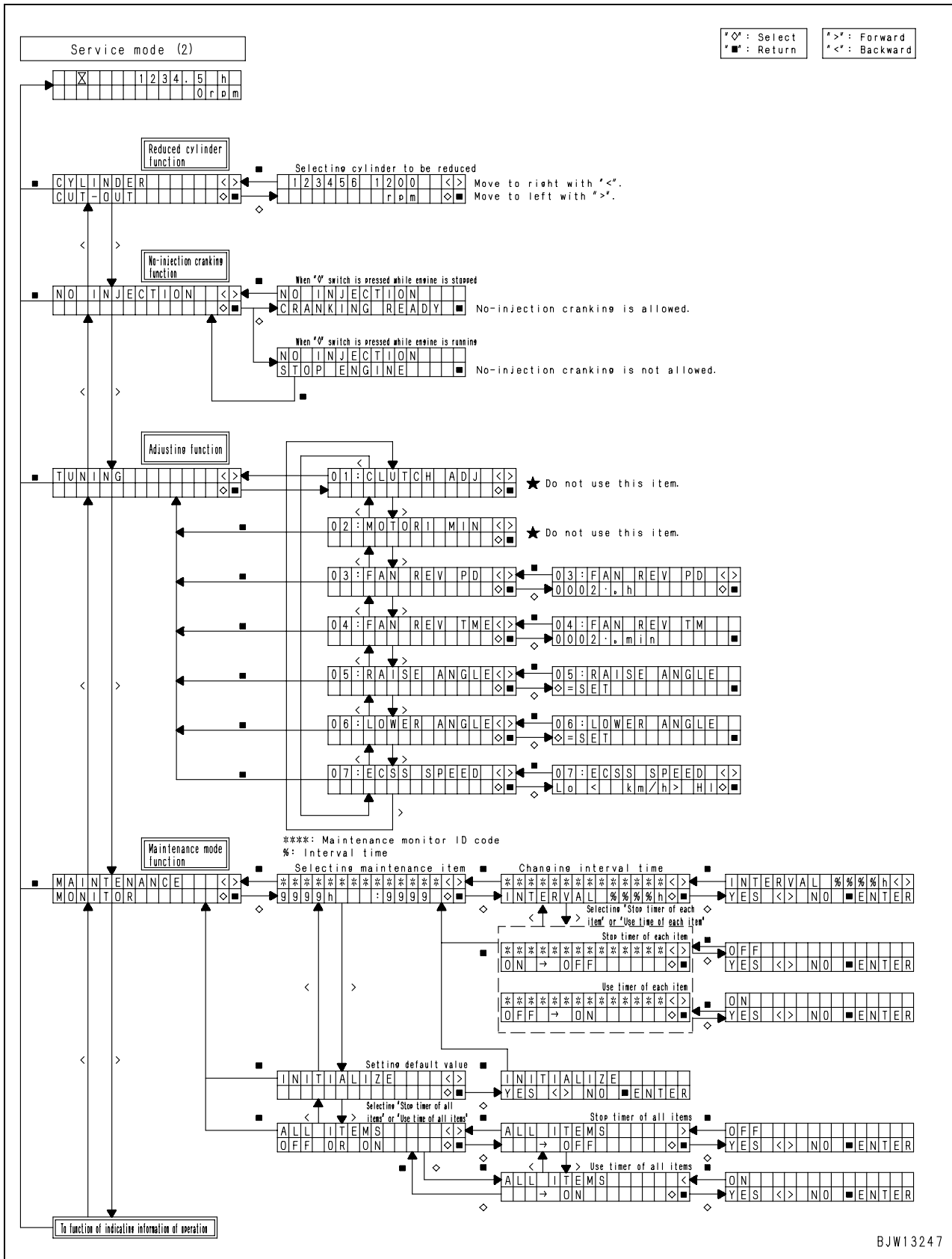
- ★ After adjusting, start the engine and operate the work equipment control lever to check that the bucket positioner operates at the desired position.

2. Application for the start of use

- ★ Application for the start of use should be made only after the sign-up test is finished.
- 1) Notify the KOMTRAX operations administrator of the following information about the machine that completed the station opening check in the machine side.
 - 1] Information (model, part number, and serial number) about the machine that completed the station opening check in the machine side
 - 2] Part number and serial number of KOMTRAX terminal
 - 3] Value of service meter when the KOMTRAX terminal was installed (in 0.1 hours)



- 2) The KOMTRAX operations administrator shall use a KOMTRAX client PC to register the machine.
 - ★ Refer to “Manual for KOMTRAX operations administrator” for the procedure.
 - ★ Now the terminal is ready for use.



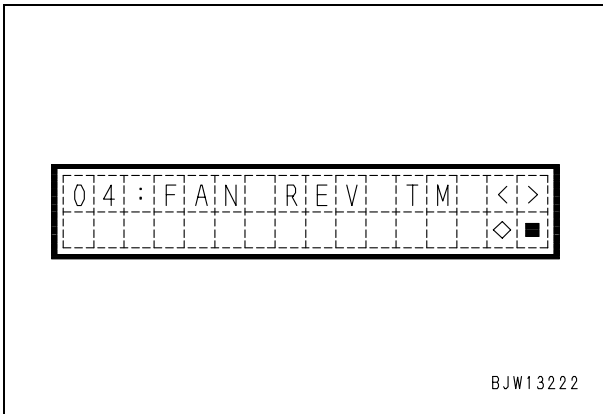
Failure code	Troubled part/item	Trouble	Controller	Action code	Category of record
CA234	Engine	Overspeed	ENG	E02	Mechanical system
CA238	Ne speed sensor power supply	Abnormality	ENG	E03	Electrical system
CA271	IMV (IMA)	Short circuit	ENG	E03	Electrical system
CA272	IMV (IMA)	Disconnection	ENG	E03	Electrical system
CA322	Injector #1 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA323	Injector #5 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA324	Injector #3 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA325	Injector #6 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA331	Injector #2 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA332	Injector #4 system	Disconnection/Short circuit	ENG	E03	Electrical system
CA342	Engine controller	Data mismatching	ENG	E03	Electrical system
CA351	Injector drive circuit	Abnormality	ENG	E03	Electrical system
CA352	Sensor power supply 1	Abnormally low level	ENG	E03	Electrical system
CA386	Sensor power supply 1	Abnormally high level	ENG	E03	Electrical system
CA428	Water sensor	Abnormally high level	ENG	E01	Electrical system
CA429	Water sensor	Abnormally low level	ENG	E01	Electrical system
CA431	Idle validation switch	Abnormality	ENG	E01	Electrical system
CA432	Idle validation switch	Abnormal remedy	ENG	E03	Electrical system
CA435	Engine oil pressure switch	Abnormality	ENG	E01	Electrical system
CA441	Power supply voltage	Abnormally low level	ENG	E03	Electrical system
CA442	Power supply voltage	Abnormally high level	ENG	E03	Electrical system
CA449	Common rail pressure	Abnormally high pressure 2	ENG	E03	Electrical system
CA451	Common rail pressure sensor	Abnormally high level	ENG	E03	Electrical system
CA452	Common rail pressure sensor	Abnormally low level	ENG	E03	Electrical system
CA488	Charge temperature	Abnormally high torque derate	ENG	E03	Electrical system

MONITOR PANEL [Machine monitor system]

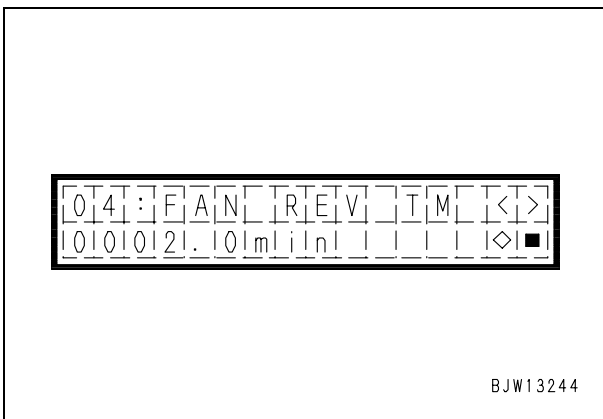
No.	Monitoring code	Input/Output signal	Displayed item	Contents of ON/OFF switch
1	40900	D-IN-0	Headlamp	Headlamp lighting = ON (24 V)/OFF (OPEN)
		D-IN-1	Cooling fan reverse switch	Switch = ON (24 V)/OFF (OPEN)
		D-IN-2	Starting switch C	Starting motor operation = ON (24 V)/OFF (OPEN)
		D-IN-3	—	—
		D-IN-4	—	—
		D-IN-5	—	—
		D-IN-6	Multi-coupler solenoid (Machine with optional multi-coupler spec.)	Multi-coupler solenoid = ON (24 V)/OFF (OPEN)
		D-IN-7	—	—
2	40901	D-IN-8	ECSS switch (Machine with optional ECSS spec.)	ECSS switch = ON (24 V)/OFF (OPEN)
		D-IN-9	Cooling fan automatic reverse switch	Cooling fan automatic reverse setting = ON (24 V)/OFF (OPEN)
		D-IN-10	—	—
		D-IN-11	—	—
		D-IN-12	Right winker	Right winker lighting = ON (GND)/OFF (OPEN)
		D-IN-13	Left winker	Left winker lighting = ON (GND)/OFF (OPEN)
		D-IN-14	◇ switch	Pressing switch = ON (24 V)/OFF (OPEN)
		D-IN-15	■ switch	Pressing switch = ON (24 V)/OFF (OPEN)
3	40902	D-IN-16	Brake oil pressure	Normal oil pressure = ON (GND)/OFF (OPEN)
		D-IN-17	—	—
		D-IN-18	—	—
		D-IN-19	—	—
		D-IN-20	—	—
		D-IN-21	—	—
		D-IN-22	—	—
		D-IN-23	—	—
4	40903	D-IN-24	HST filter clogging	Clogging detection = ON (GND)/OFF (OPEN)
		D-IN-25	—	—
		D-IN-26	Parking brake	Resetting parking brake = ON (GND)/OFF (OPEN)
		D-IN-27	Engine coolant level	Normal coolant level = ON (GND)/OFF (OPEN)
		D-IN-28	Omission of applying parking brake	Resetting parking brake = ON (GND)/OFF (OPEN)
		D-IN-29	—	—
		D-IN-30	Normal emergency steering (Machine with optional emergency steering)	Low emergency steering pressure = ON (GND)/OFF (OPEN)
		D-IN-31	—	—

*: "1" is displayed when ON and "0" is displayed when OFF.

- 3) With the [<] and [>] switches, select 04: FAN REV PD screen.



- 4) Press the [◇] switch to settle.
★ If the [◇] switch is pressed, the screen to adjust the continuance of fan automatic reverse operation is displayed.
- 5) With the [<] and [>] switches, select a continuance in the range from "0.5" to "10" (Unit: minute).
- 6) Press the [■] switch to settle the setting.
★ The selected continuance of fan automatic reverse operation is not changed to a value longer than 1/2 of the interval of the fan automatic reverse operation.



- 7-3. Adjustment of lift arm angle sensor (upper) (Load meter specification)

★ This item is not used.

- 7-4. Adjustment of lift arm angle sensor (lower) (Load meter specification)

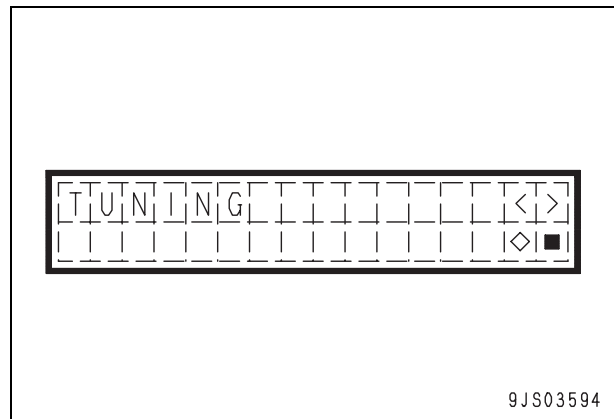
★ This item is not used.

- 7-5. Adjustment of ECSS operation travel speed (if equipped)

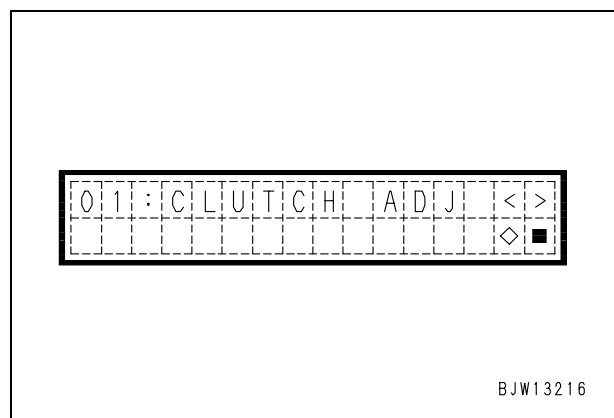
- ★ This function is used to adjust the ECSS operation/reset travel speed.
- ★ The initial ECSS operation travel speed is 5 km/h (3.1 MPH).
- ★ The ECSS reset travel speed is the ECSS operation travel speed minus 1 km/h (0.6 MPH).

Example: ● If the ECSS operation travel speed is 5 km/h (3.1 MPH), the ECSS reset travel speed is 4 km/h (2.5 MPH).
● If the ECSS operation travel speed is 8 km/h (5.0 MPH), the ECSS reset travel speed is 7 km/h (4.4 MPH).

- 1) Display the "TUNING" screen from the menu screen of Service mode.

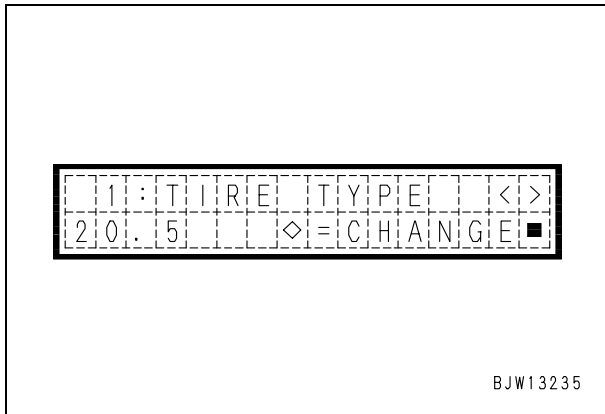


- 2) Hold down the [◇] switch for at least 5 seconds to display the next screen.
★ Do not use this item.



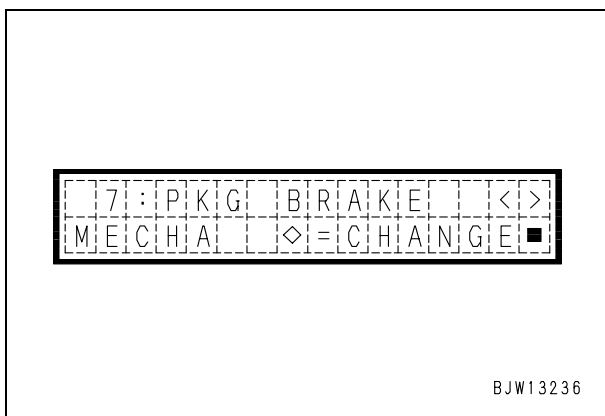
10-2. Selection of optional tire type

- ★ Select "1: TIRE TYPE" from "Optional device installation setting table".
Reference: This screen appears first when the screen is changed from the "OPTIONAL SELECT" screen.
- ★ Each time [◇] switch is pressed, the tire type changes from small to large.
Selectable size: 17.5 and 20.5 (default)
- ★ If the tire type is changed, the operation acceptance tone (peep) sounds.



10-3. Selection of optional parking brake

- ★ Select "7: PKG BRAKE" from "Optional device installation setting table".
- ★ Each time [◇] switch is pressed, the parking brake type changes.
Selectable item: MECHA (Mechanical: Default), ELEC (Electric)
- ★ If the parking brake type is changed, the operation acceptance tone (peep) sounds.



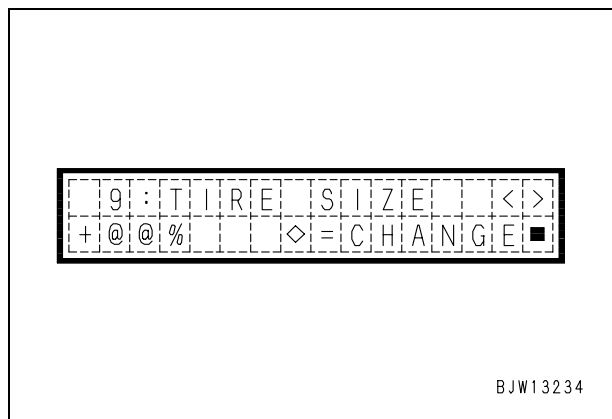
10-4. Setting tire deflection option

- ★ Select 9: TIRE SIZE from the list of installed optional devices and their setting.
- ★ Pressing [◇] switch sequentially displays [@@]% in the following order.
- ★ The display progresses from +00 through -10. Pressing [◇] switch at this point returns the display to +00.

Order	No.1	No.2	No.3	No.4	No.5	No.6	No.7
@@	+00	+02	+04	+06	+08	+10	+12

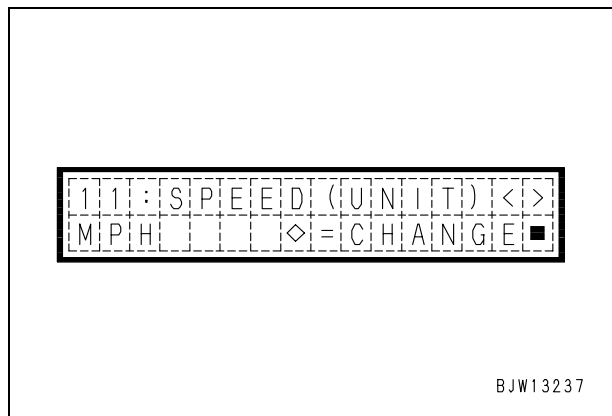
Order	No.8	No.9	No.10	No.11	No.12	No.13	No.14
@@	-02	-4	-6	-8	-10	-12	+00

- ★ As the display is switched, the sound (beep) indicating acceptance of the operation will be generated.



10-5. Selection of optional travel speed unit

- ★ If the SI unit specification is selected when delivered, this menu is not displayed. (Unit is fixed to km/h.)
- ★ Select "11: SPEED UNIT" from "Optional device installation setting table".
- ★ Each time [◇] switch is pressed, the speed unit changes.
Selectable item: MPH (default), km/h
- ★ If the unit is changed, the operation acceptance tone (peep) sounds.



Failure code	Troubled part	Trouble	Controller	Action code	Category of record	Reference document No.
DF10KA	Travel speed range selector switch	Disconnection/Ground fault	HST	E01	Electrical system	Troubleshooting by failure code (Display of code), Part 6 SEN03846-00
DF10KB	Travel speed range selector switch	Hot short	HST	E01	Electrical system	
DGH1KX	HST oil temperature sensor	Ground fault	MON	E01	Electrical system	
DGR2KB	Brake oil temperature sensor	Ground fault	MON	E01	Electrical system	
DGR2KZ	Brake oil temperature sensor	Disconnection/Hot short	MON	E01	Electrical system	
DHH1KX	HST oil pressure sensor	Disconnection/Ground fault	HST	E03	Electrical system	
DHH1KY	HST oil pressure sensor	Hot short	HST	E03	Electrical system	
DHTCL6	HST filter clogging sensor	Functional defect	MON	E01	Electrical system	
DJF1KA	Fuel level sensor	Disconnection/Hot short	MON	E01	Electrical system	
DLT3KX	Travel speed sensor B	Abnormality	HST	E03	Electrical system	
DLT4KX	Travel speed sensor A	Abnormality	HST	E03	Electrical system	
DLT4LC	Travel speed sensor A & B	Abnormality	HST	E03	Electrical system	
DV00KY	Alarm buzzer	Hot short	MON	E01	Electrical system	
DW26KA	Motor 2 solenoid	Disconnection/Ground fault	HST	E01	Electrical system	
DW26KY	Motor 2 solenoid	Hot short	HST	E01	Electrical system	
DW7BKY	Fan reverse solenoid circuit	Hot short	HST	E01	Electrical system	
DW7BKZ	Fan reverse solenoid circuit	Disconnection/Ground fault	HST	E01	Electrical system	
DX16KA	Fan EPC solenoid	Disconnection	HST	E01	Electrical system	Troubleshooting by failure code (Display of code), Part 7 SEN03847-00
DX16KB	Fan EPC solenoid	Ground fault	HST	E01	Electrical system	
DX16KY	Fan EPC solenoid	Hot short	HST	E01	Electrical system	
DX19KA	Motor 1 solenoid	Disconnection	HST	E03	Electrical system	
DX19KB	Motor 1 solenoid	Ground fault	HST	E03	Electrical system	
DX19KY	Motor 1 solenoid	Hot short	HST	E03	Electrical system	
DX20KA	Clutch solenoid	Disconnection	HST	E03	Electrical system	

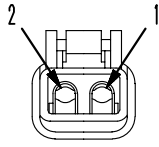
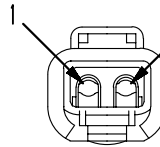
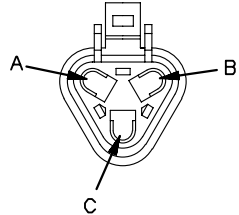
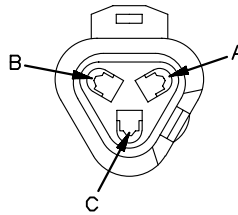
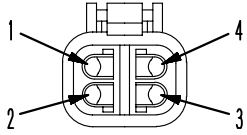
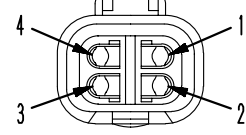
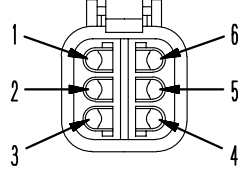
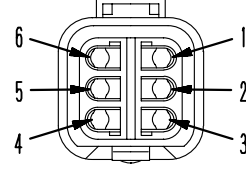
Phenomena looking like troubles and troubleshooting Nos.

No.	Phenomena looking like trouble	Troubleshooting			
		Code display	E-mode	H-mode	S-mode
Phenomena related to action codes and failure codes					
1	Action codes are displayed on machine monitor	Check failure code			
2	If failure code display function is checked, failure codes are displayed	●			
Phenomena related to engine					
3	Engine does not start easily (Starting performance is poor)				S-1
4	Engine does not start	Engine does not turn	E-1		S-2 a)
5		Engine turns but no exhaust smoke comes out			S-2 b)
6		Exhaust smoke comes out but engine does not start (Fuel is injected)			S-2 c)
7	Engine does not pick up smoothly				S-3
8	Engine stops during operation			H-4	S-4
9	Engine does not rotate smoothly				S-5
10	Engine lacks output (or lacks power)				S-6
11	Exhaust smoke is black (Incomplete combustion)				S-7
12	Oil consumption is excessive (or exhaust smoke is blue)				S-8
13	Oil becomes contaminated quickly				S-9
14	Fuel consumption is excessive				S-10
15	Oil is in coolant (or coolant spurts back or coolant level goes down)				S-11
16	Oil pressure drops				S-12
17	Oil level rises (Entry of coolant or fuel)				S-13
18	Coolant temperature becomes too high (overheating)				S-14
19	Abnormal noise is made				S-15
20	Vibration is excessive				S-16
21	Preheater does not operate normally		E-2		
Phenomena related to power train					
22	The machine does not start			H-1	
23	The travel speed is slow			H-2	
24	The traction force is weak			H-3	
25	Engine stalls when traveling or engine speed drops excessively			H-4	
26	The gear is not shifted			H-5	
27	Travel direction selection system does not function		E-6		
Phenomena related to steering					
28	The steering wheel does not turn			H-6	
29	The steering wheel is heavy			H-7	
30	Steering wheel shakes or jerks			H-8	
31	Machine deviates naturally to one side when traveling			H-9	
Phenomena related to brake					
32	The brake does not work or does not work well			H-10	
33	The brake is not released or is dragged			H-11	

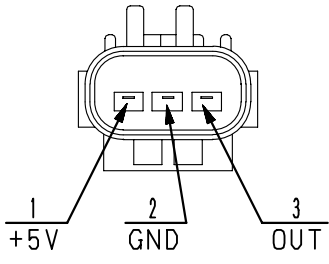
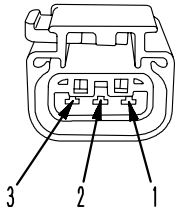
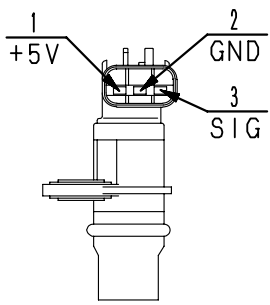
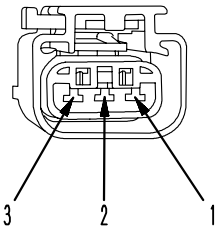
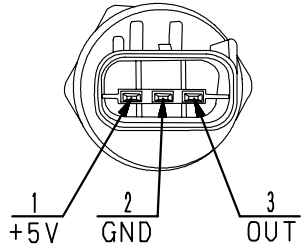
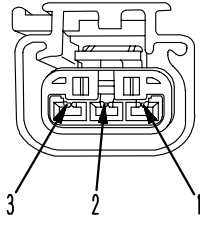
No. of pins	AMP040 type connector		
	Male (female housing)	Female (male housing)	Testing connection use special tool Part No.
8	<p>BWP04751</p>	<p>BWP04752</p>	799-601-7180 (T-adapter)
	—	Housing part No. : 79A-222-3430 (Q' ty:5)	
12	<p>BWP04753</p>	<p>BWP04754</p>	799-601-7190 (T-adapter)
	—	Housing part No. : 79A-222-3440 (Q' ty:5)	
16	<p>BWP04755</p>	<p>BWP04756</p>	799-601-7210 (T-adapter)
	—	Housing part No. : 79A-222-3450 (Q' ty:5)	
20	<p>BWP04757</p>	<p>BWP04758</p>	799-601-7220 (T-adapter)
	—	Housing part No. : 79A-222-3460 (Q' ty:5)	

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[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	 <p style="text-align: center;">BWP05037</p>	 <p style="text-align: center;">BWP05038</p>	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	 <p style="text-align: center;">BWP05039</p>	 <p style="text-align: center;">BWP05040</p>	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	 <p style="text-align: center;">BWP05041</p>	 <p style="text-align: center;">BWP05042</p>	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	 <p style="text-align: center;">BWP05043</p>	 <p style="text-align: center;">BWP05044</p>	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)	

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FRAMATOME connector for engine			
No. of pins	Ambient pressure sensor (107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-4140 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
—	—	—	—
No. of pins	NE speed sensor (95, 107, 114, 125, 140, 170, 12V140 engine) and CAM sensor (95, 107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-4130 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
—	—	—	—
No. of pins	EGR gas pressure sensor (125, 140 engine)		
	Sensor side (plug)	Harness side (receptacle)	Testing connection use special tool Part No.
3			799-601-4180 (T-adapter) (Kit: 799-601-4101) (Kit: 799-601-4201)
—	—	—	—

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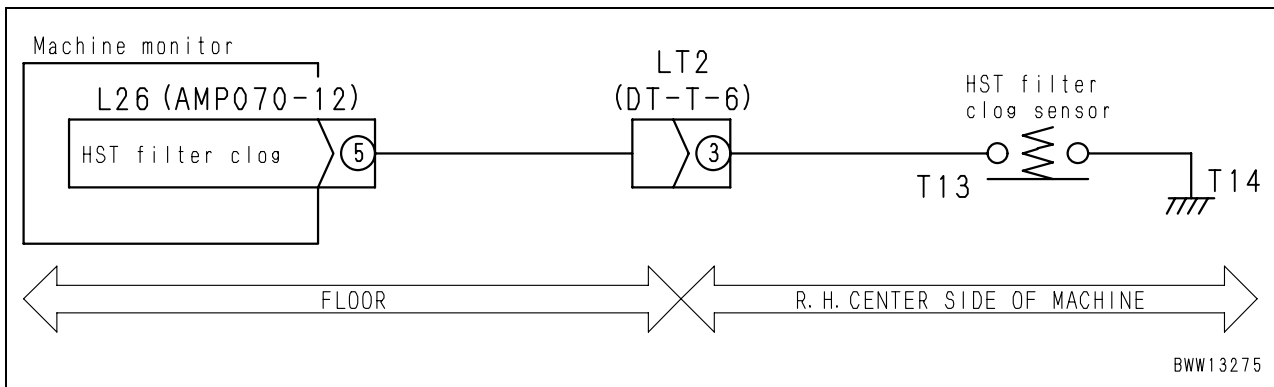
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Failure code [6091NX] HST filter: Clogging

Action code	Failure code	Trouble	HST filter: Clogging (Machine monitor system)
E01	6091NX		
Contents of trouble	<ul style="list-style-type: none"> When HST oil temperature was above 50°C, HST oil filter clogging sensor signal circuit was closed (in contact with GND). 		
Action of machine monitor	<ul style="list-style-type: none"> Turns HST clogging caution lamp ON. if cause of failure disappears, system resets itself. 		
Problem that appears on machine	<ul style="list-style-type: none"> If machine is used as it is, foreign matter may enter HST circuit. 		
Related information	The input state from the HST oil filter clogging sensor can be checked with monitoring function (Monitoring code: MONITOR PANEL – 40903 – D-IN-24)		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
		1	Clogged HST oil filter	System is normal. ★ Check HST oil filter directly.	
2		Defective HST oil filter clogging sensor (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			T13	Filter condition	Resistance
			Between T13 – ground	Not clogged (Normal)	Min. 1 MΩ
			Clogged	Max. 1 Ω	
3		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between T13 – L26 (female) (5)	Resistance	Max. 1 Ω
			Wiring harness between HST oil filter clogging sensor body – ground	Resistance	Max. 1 Ω
4		Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			L26	Filter condition	Voltage
	Between (5) – ground		Not clogged (Normal)	20 – 30 V	
		Clogged	Max. 1 V		

Related circuit diagram



Failure code [B@C6NS] Front brake: High oil temperature

Action code	Failure code	Trouble	Front brake: High oil temperature (Machine monitor system)
E02	B@C6NS		
Contents of trouble	<ul style="list-style-type: none"> • Front brake (axle) high oil temperature was detected (Details are as follows). • Oil temperature above 130°C (when travel speed was below 35 km/h) or above 125°C (when travel speed was above 35 km/h) was detected for 5 seconds continuously. 		
Action of machine monitor	<ul style="list-style-type: none"> • Turns central warning lamp and caution buzzer ON. • Turns brake oil temperature caution lamp ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> • If machine is used as it is, brake may be damaged. 		
Related information	<ul style="list-style-type: none"> • If temperature above 120°C is detected for 5 seconds continuously, only caution lamp is turned ON as preliminary warning. • Brake oil temperature can be checked with monitoring function. (Monitoring code: MONITOR PANEL – 30201 – F BRAKE OIL (°C)) (Monitoring code: MONITOR PANEL – 30204 – F BRAKE OIL (V)) 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting
	1	Front brake (Axle) high oil temperature	System is normal. ★ Front brake (Axle) oil may be overheated. Remove cause of over-heat.
2	Defective brake oil temperature sensor	If cause 1 is not detected, brake oil temperature sensor system may be defective. Carry out troubleshooting for failure codes [DGR2KB] and [DGR2KZ].	
3	Defective machine monitor	If causes 1 and 2 are not detected, machine monitor may be defective. Carry out troubleshooting for failure codes [DGR2KB] and [DGR2KZ].	

Failure code [CA131] Throttle sensor high error

Action code	Failure code	Trouble	Throttle sensor high error (Engine controller system)
E03	CA131		
Contents of trouble	<ul style="list-style-type: none"> High voltage was detected in the throttle sensor signal circuit. 		
Action of controller	<ul style="list-style-type: none"> Runs the engine at position of throttle 0% when accelerator pedal is OFF and at 50% when it is ON. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> The engine does not reach full throttle. 		
Related information	<ul style="list-style-type: none"> The input state (accelerator pedal opening ratio) from the throttle sensor can be checked with the monitoring function (Code: ENGINE, 31701, THROTTLE POS). The input state (voltage) from the throttle sensor can be checked with the monitoring function (Code: ENGINE, 31707, THROTTLE POS). Method of reproducing failure code: Turn the starting switch ON. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
		1	Defective throttle sensor power supply system	If failure code [CA2185] is indicated simultaneously, carry out troubleshooting for it first.		
2		Defective accelerator pedal (Internal trouble)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			PD1	Accelerator pedal	Voltage	
			Between (1) and (3)	All range (Power supply)	4.75 – 5.25 V	
			Between (2) and (3)	When released	0.50 – 0.80 V	
				When pressed	3.70 – 4.00 V	
Sensor voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller for another cause of trouble before judgment						
3		Hot short (Short circuit with 5V, 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Wiring harness between EC2 (female) (9) – PD1 (female) (2) and ground	Voltage	Max. 1 V	
4		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 between EC2 (female) (9) – PD1 (female) (2), EC2 (female) (22) – PD1 (female) (1)	Resistance	Min. 100 kΩ	
5		Defective wiring harness connector	Connecting parts among accelerator pedal, engine unit wiring harness, and engine controller are suspected. Inspect them directly. <ul style="list-style-type: none"> Loose connector, broken lock, broken seal Corrosive, bent, broken, forced-in, or extended pin Humidity in connector, entry of dirt or dust, poor insulation 			
6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.				
		EC2	Accelerator pedal	Voltage		
		Between (22) and (23)	All range (Power supply)	4.75 – 5.25 V		
		Between (9) and (23)	When released	0.50 – 0.80 V		
When pressed	3.70 – 4.00 V					

Failure code [CA155] Derating of speed by abnormally high charge temperature

Action code	Failure code	Trouble	Derating of speed by abnormally high charge temperature (Engine controller system)
E03	CA155		
Contents of trouble	<ul style="list-style-type: none"> Temperature signal of boost pressure sensor and temperature sensor is above upper control limit. 		
Action of controller	<ul style="list-style-type: none"> Limits output and continues operation. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Engine output drops. Engine stops 		
Related information	<ul style="list-style-type: none"> The input state (temperature) from the charge temperature sensor (boost temperature sensor) can be checked with the monitoring function (Code: ENGINE, 18500, CHG TEMP). The input state (voltage) from the charge temperature sensor (boost temperature sensor) can be checked with the monitoring function (Code: ENGINE, 18501, CHG TEMP). Method of reproducing failure code: Start engine 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting
	1	Drop in cooling performance of aftercooler	Cooling performance deterioration of the after cooler is suspected. Inspect the following points directly. <ul style="list-style-type: none"> Malfunction of hydraulic drive fan Lack of 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 [CA272] IMV (IMA) Disconnection

Action code	Failure code	Trouble	IMV (IMA) Disconnection (Engine controller system)
E03	CA272		
Contents of trouble	<ul style="list-style-type: none"> There is disconnection in supply pump actuator drive circuit. 		
Action of controller	<ul style="list-style-type: none"> Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Engine speed runs, but in unstable condition. Common rail fuel pressure is above command value. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn the starting switch ON. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
		1	Defective supply pump actuator	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
CP3 PUMP REGULATOR (male)				Resistance	
Between (1) and (2)				Max. 5 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) (2) – CP3 PUMP REGULATOR (female) (1)	Resistance	Max. 10 Ω
			Wiring harness between EC1 (female) (32) – CP3 PUMP REGULATOR (female) (2)	Resistance	Max. 10 Ω
3		Hot short (Short circuit with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Wiring harness between EC1 (female) (2) – CP3 PUMP REGULATOR (female) (1) and ground	Voltage	Max. 3 V
4		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) (2) – EC1 (female) (With all connectors of wiring harness disconnected)	Resistance	Min. 100 kΩ
5		Defective wiring harness connector	Connecting parts among supply pump actuator, engine wiring harness, and engine controller are suspected. Inspect them directly. <ul style="list-style-type: none"> Loose connector, broken lock, broken seal Corrosive, bent, broken, forced-in, or extended pin Humidity in connector, entry of dirt or dust, poor insulation 		
6		Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
	EC1 (female)		Resistance		
	Between (2) and (32)		Max. 5 Ω		

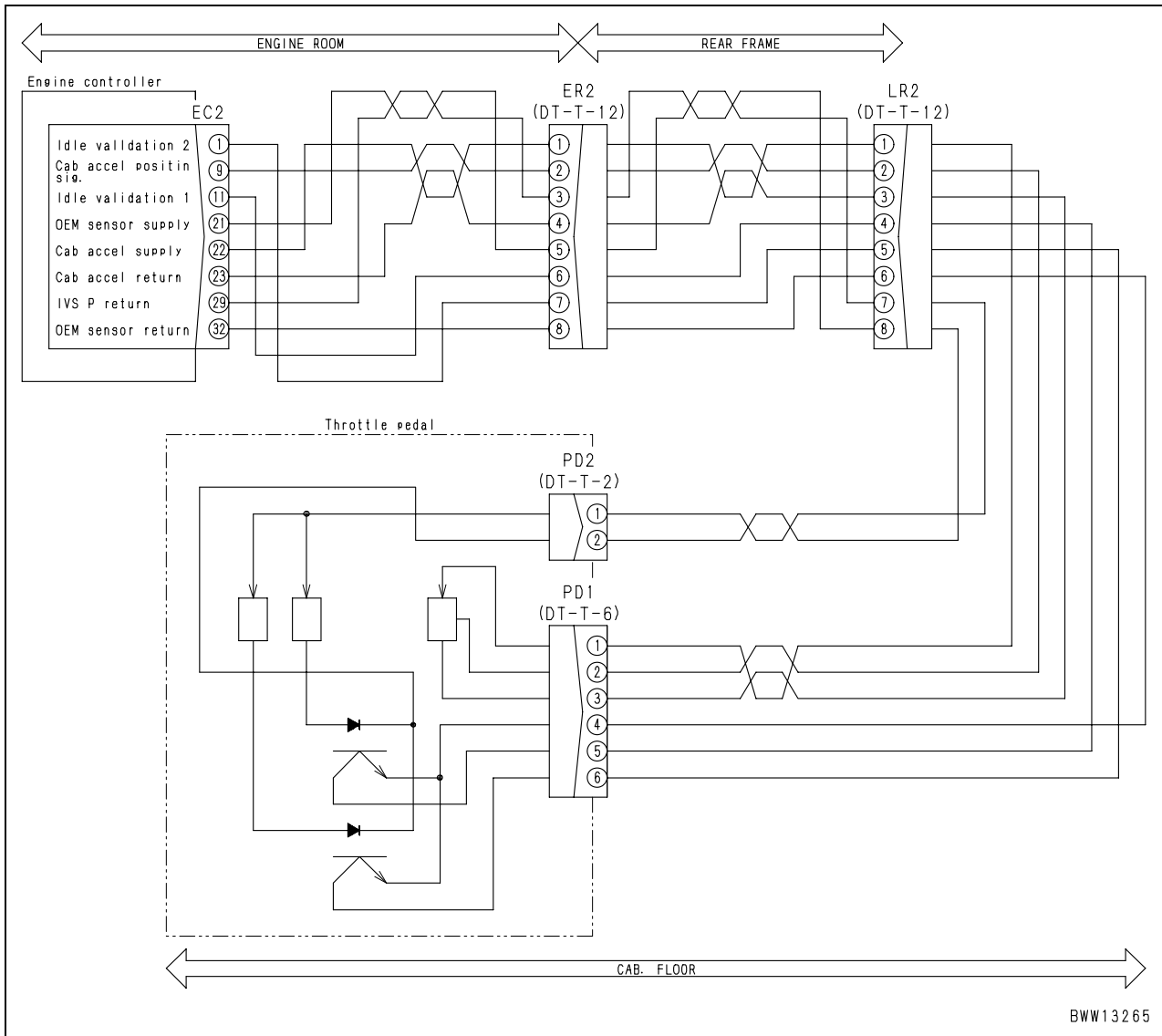
Failure code [CA332] Injector #4 open/short error

Action code	Failure code	Trouble	Injector #4 open/short error (Engine controller system)
E03	CA332		
Contents of trouble	<ul style="list-style-type: none"> There is disconnection or short circuit in drive circuit of injector No. 4. 		
Action of controller	<ul style="list-style-type: none"> Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> There is irregular combustion or hunting. Engine output drops. 		
Related information	<ul style="list-style-type: none"> 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	Defective injector No. 4	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
INJ CYL 4				Resistance	
Between (1) and (2)				Max. 2 Ω	
Between (2) and ground				Min. 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) (56) – INJ CYL 4 (1)	Resistance	Max. 2 Ω
			Wiring harness between EC1 (female) (58) – INJ CYL 4 (2)	Resistance	Max. 2 Ω
3		Ground 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 EC1 (female) (56) – INJ CYL 4 (1) and ground	Resistance	Max. 2 Ω
4		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) (56) – EC1 (female) (With all connectors of wiring harness disconnected)	Resistance	Min. 100 kΩ
			Wiring harness among all pins between EC1 (female) (58) – EC1 (female) (With all connectors of wiring harness disconnected)	Resistance	Min. 100 kΩ
5		Defective wiring harness connector	Connecting parts among injector No. 4, engine wiring harness, and engine controller are suspected. Inspect them directly. <ul style="list-style-type: none"> Loose connector, broken lock, broken seal Corrosive, bent, broken, forced-in, or extended pin Humidity in connector, entry of dirt or dust, poor insulation 		
6		Defective other cylinder injector or harness	If other failure codes are indicated simultaneously, carry out troubleshooting for them.		
7	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
		EC1 (female)		Resistance	
		Between (56) and (58)		Max. 2 Ω	
		Between (56) and ground		Min. 100 kΩ	

Failure code [CA2311] Abnormality in IMV (IMA) solenoid	50
Failure code [CA2555] Intake heater relay disconnection error	52
Failure code [CA2556] Intake heater relay short circuit error.....	54

Related circuit diagram



Failure code [CA452] Common rail pressure sensor low error

Action code	Failure code	Trouble	Common rail pressure sensor low error (Engine controller system)
E03	CA452		
Contents of trouble	<ul style="list-style-type: none"> Low voltage occurred in common rail pressure sensor. 		
Action of controller	<ul style="list-style-type: none"> Limits output and continues operation. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> The engine does not start. Engine speed or output drops. 		
Related information	<ul style="list-style-type: none"> The input state (common rail pressure) from the common rail pressure sensor can be checked with the monitoring function (Code: ENGINE, 36400, RAIL PRESS). The input state (voltage) from the common rail pressure sensor can be checked with the monitoring function (Code: ENGINE, 36402, RAIL PRESS). Method of reproducing failure code: Turn the starting switch ON. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
	Possible causes and standard value in normal state	1	Defective sensor power supply 2 system	If failure code [CA187] is indicated simultaneously, carry out troubleshooting for it first.	
2		Defective common rail pressure sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			FUEL RAIL PRESS		Voltage
			Between (3) and (1)	Power supply	4.75 – 5.25 V
Voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.					
3		Ground fault in wiring harness (Contact with ground circuit)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
	Wiring harness between EC1 (female) (25) – FUEL RAIL PRESS (female) (2) and ground		Resistance	Min. 100 kΩ	
4	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 between EC1 (female) (25) – FUEL RAIL PRESS (female) (2), EC1 (female) (37) – FUEL RAIL PRESS (female) (3)	Resistance	Min. 100 kΩ	
5	Defective wiring harness connector	Connecting parts among common rail pressure sensor, engine wiring harness, and engine controller are suspected. Inspect them directly. <ul style="list-style-type: none"> Loose connector, broken lock, broken seal Corrosive, bent, broken, forced-in, or extended pin Humidity in connector, entry of dirt or dust, poor insulation 			
6	Defective engine controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
		EC1		Voltage	
Between (37) and (47)		Power supply	4.75 – 5.25 V		

Failure code [CA778] Engine Bkup speed sensor error

Action code	Failure code	Trouble	Engine Bkup speed sensor error (Engine controller system)
E03	CA778		
Contents of trouble	<ul style="list-style-type: none"> Abnormality is detected in signals of engine Bkup speed sensor. 		
Action of controller	<ul style="list-style-type: none"> Controls Bkup speed sensor with signals of Ne speed sensor. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Starting performance is poor Engine output lowers. 		
Related information	<ul style="list-style-type: none"> 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	Defective sensor power supply 2 system	If failure code [CA187] is indicated simultaneously, carry out troubleshooting for it first.	
2		Defective engine Bkup speed sensor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			CAM SENSOR		Voltage
			Between (1) and (2)	Power supply	4.75 – 5.25 V
Voltage is measured with wiring harness connected. Accordingly, if voltage is abnormal, check wiring harness and controller, too, for another cause of trouble, and then judge.					
3		Broken engine Bkup speed sensor or defective clearance	Inspect engine Bkup speed sensor directly for breakage or clearance.		
4		Broken rotation sensing ring	Inspect it for breakage directly.		
5		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) (26) – CAM SENSOR (female) (3)	Resistance	Max. 10 Ω
6		Ground 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 EC1 (female) (26) – CAM SENSOR (female) (3) and ground		Resistance	Min. 100 kΩ	
7	Hot short (Contact with 5V, 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
		Wiring harness between EC1 (female) (26) – CAM SENSOR (female) (3) and ground	Voltage	Max. 1 V	
8	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 between EC1 (female) (26) – CAM SENSOR (female) (3), EC1 (female) (37) – CAM SENSOR (female) (1)	Resistance	Min. 100 kΩ	
		Wiring harness between EC1 (female) (26) – CAM SENSOR (female) (3), EC1 (female) (47) – CAM SENSOR (female) (2)	Resistance	Min. 100 kΩ	

Failure code [CA2311] Abnormality in IMV (IMA) solenoid

Action code	Failure code	Trouble	Abnormality in IMV (IMA) solenoid (Engine controller system)
E03	CA2311		
Contents of trouble	<ul style="list-style-type: none"> Resistance in supply pump actuator circuit is abnormally high or low. 		
Action of controller	<ul style="list-style-type: none"> Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Engine output drops. 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Start engine 		

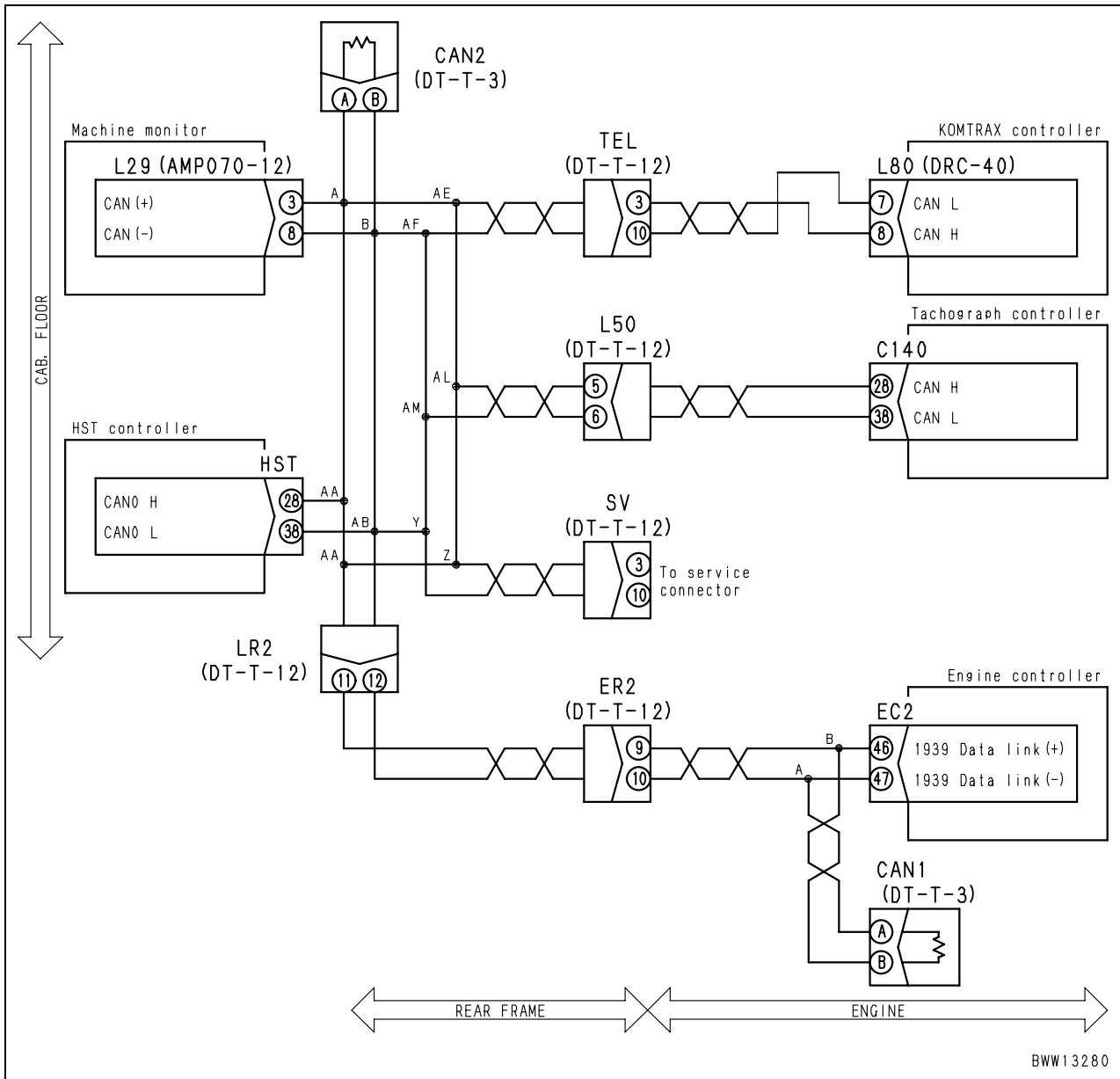
	Causes		Standard value in normal state/Remarks on troubleshooting		
	Possible causes and standard value in normal state	1	Defect in related system	If another code is displayed, carry out troubleshooting for it.	
2		Defective supply pump actuator	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CP3 PUMP REGULATOR (male)	Resistance	
			Between (1) and (2)	Max. 5 Ω	
			Between (1) and ground	Min. 100 kΩ	
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 EC1 (female) (2) – CP3 PUMP REGULATOR (female) (1)	Resistance	Max. 5 Ω
			Wiring harness between EC1 (female) (32) – CP3 PUMP REGULATOR (female) (2)	Resistance	Max. 5 Ω
4		Ground 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 EC1 (female) (2) – CP3 PUMP REGULATOR (female) (1) and ground	Resistance	Min. 100 kΩ
5		Defective wiring harness connector	Connecting parts among supply pump actuator, engine wiring harness, and engine controller are suspected. Inspect them directly. <ul style="list-style-type: none"> Loose connector, broken lock, broken seal Corrosive, bent, broken, forced-in, or extended pin Humidity in connector, entry of dirt or dust, poor insulation 		
6		Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
	EC1 (female)		Resistance		
	Between (2) and (32)		Max. 5 Ω		
		Between (2) and ground	Min. 100 kΩ		

Failure code [D1B0KA] HST safety relay: Disconnection

Action code	Failure code	Trouble	HST safety relay: Disconnection (HST controller system)
E03	D1B0KA		
Contents of trouble	<ul style="list-style-type: none"> Disconnection was detected in HST safety relay circuit when starting switch is turned ON. 		
Action of machine monitor	<ul style="list-style-type: none"> Turns clutch EPC solenoid output OFF. Turns motor 1 solenoid output OFF. Turns HST safety relay output OFF. Even if trouble disappears, system does not reset itself until starting switch is turned OFF. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Traction force decreases. Travel speed is not limited with speed range selector switch and travel speed control dial. If engine is stopped without applying parking brake securely on slope, machine moves down suddenly. 		
Related information	<ul style="list-style-type: none"> If [DAJ2L3] or [DAJ2L4] is displayed, carry out troubleshooting for it first. Following output command values can be checked with monitoring function. Motor 1 solenoid output: HST – 80000 – MOTOR SOL DIR (mA) HST safety relay output: HST – 40979 – D_OUT_15 (ON/OFF) Clutch EPC solenoid output: HST – 80100 – CLUTCH SOL DIR (mA) 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
	Possible causes and standard value in normal state	1	Defective HST safety relay (Internal defect)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.		
Replace HST safety relay (L111) with another relay.				Condition becomes normal.	Relay (L111) is defective.	
				Condition does not become normal.	Relay (L111) is normal.	
★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.						
Between L111 (male) (1) – (2)		Resistance	200 – 400 Ω			
2		Defective VIS power supply holding relay (Internal short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			Replace VIS power supply holding relay (L102) with another relay.	Condition becomes normal.	Relay (L102) is defective.	
				Condition does not become normal.	Relay (L102) is normal.	
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
Between L102 (male) (1) – (2)		Resistance	200 – 400 Ω			
3		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between HST (female) (17) – L111 (female) (2)		Resistance	Max. 1 Ω
	Wiring harness between L102 (female) (3) – L111 (female) (1)		Resistance	Max. 1 Ω		
	Wiring harness between fuse FS1 (No. 3) – L102 (female) (5)		Resistance	Max. 1 Ω		
4	Defective HST controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.				
		HST		Voltage		
		Between (17) – ground		Max. 1 V		

Related circuit diagram



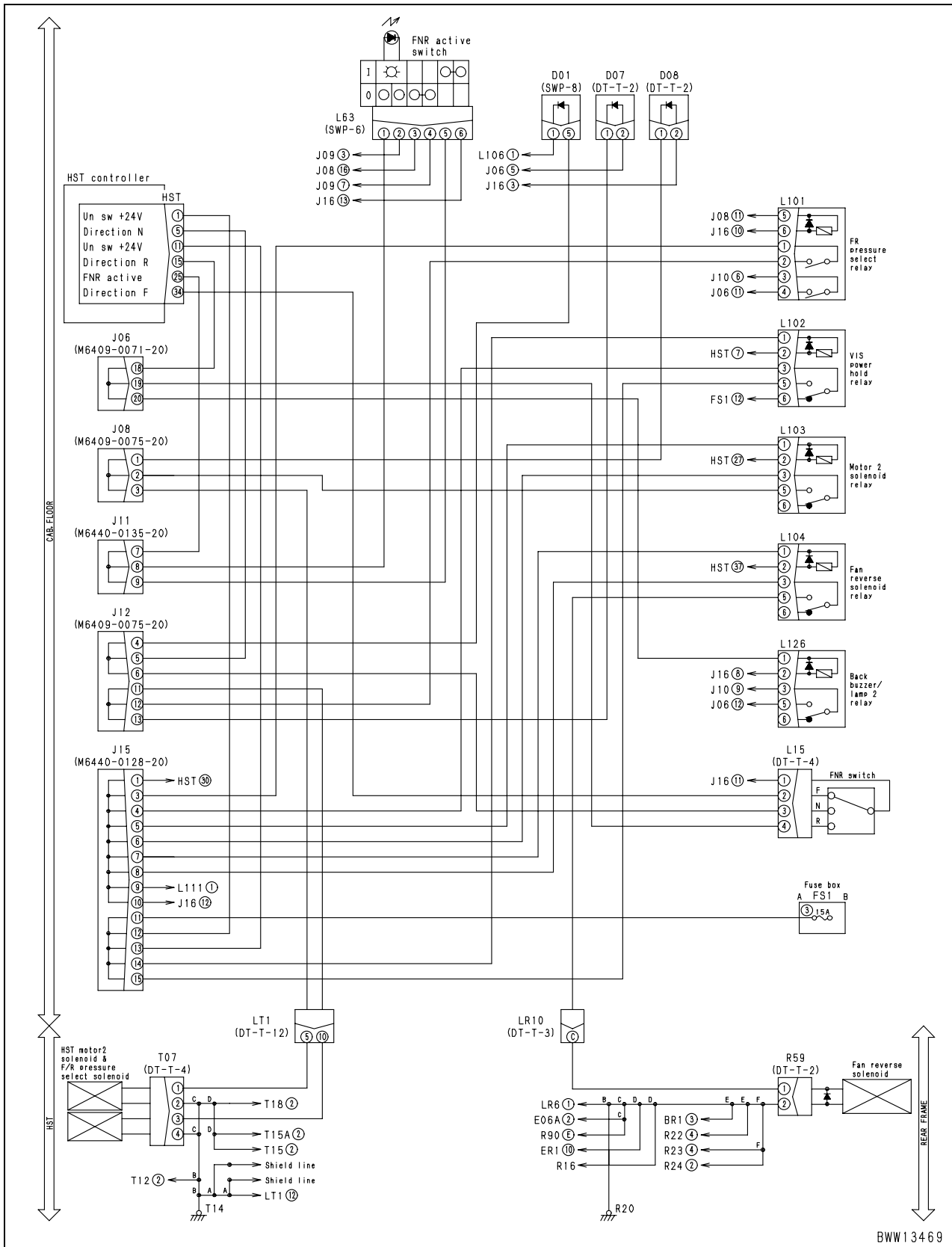
BWW13280

Failure code [DAJ2L3] HST controller load power supply holding line: Hot short in wiring harness

Action code	Failure code	Trouble	HST controller load power supply holding line: Hot short in wiring harness (HST controller system)
E01	DAJ2L3		
Contents of trouble	<ul style="list-style-type: none"> Hot short was detected in HST controller load power supply holding line. (When output command was ON, output terminal voltage above 5.7 V was detected.) 		
Action of machine monitor	<ul style="list-style-type: none"> Turns output OFF (Control protection function works). 		
Problem that appears on machine	<ul style="list-style-type: none"> When starting switch is turned OFF, parking brake check cannot be controlled and machine moves down. If starting switch is turned OFF while fan is rotating in reverse, peak pressure may occur. 		
Related information			

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
		1	Defective VIS power supply holding relay (Internal defect)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
Replace VIS power supply holding relay (L102) with another relay.				Condition becomes normal.	Relay (L102) is defective.	
				Condition does not become normal.	Relay (L102) is normal.	
★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.						
Between L102 (male) (1) – (2)		Resistance	200 – 400 Ω			
2		Hot short (Contact with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Between wiring harness HST (female) (7) – L102 (female) (2) and ground	Voltage	Max. 1 V	
3		Defective HST controller	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			HST	Voltage		
			Between (7) – ground	Max. 1 V		

Related circuit diagram (When HST controller power supply circuit is defective)



BWW1 34 69

Failure code [DD1NLD] Fan reverse switch signal: Abnormality

Action code	Failure code	Trouble	Fan reverse switch signal: Abnormality (HST controller system)
E01	DD1NLD		
Contents of trouble	<ul style="list-style-type: none"> Since the fan manual reverse switch system is shorted with the power source, the fan manual reverse switch remains at ON position. (Continuation for 30 seconds determines fault) 		
Action of controller	<ul style="list-style-type: none"> None in particular. 		
Problem that appears on machine	<ul style="list-style-type: none"> Fan remains in the reverse rotation 		
Related information	<ul style="list-style-type: none"> The input state (ON/OFF) from the fan manual reverse switch can be checked with the monitoring function (Code: HST – 93400 – FAN REVERSE SW). (Code: MONITOR PANEL – 40900 – D-IN-1). Method of reproducing failure code: Turn the starting switch ON. 		

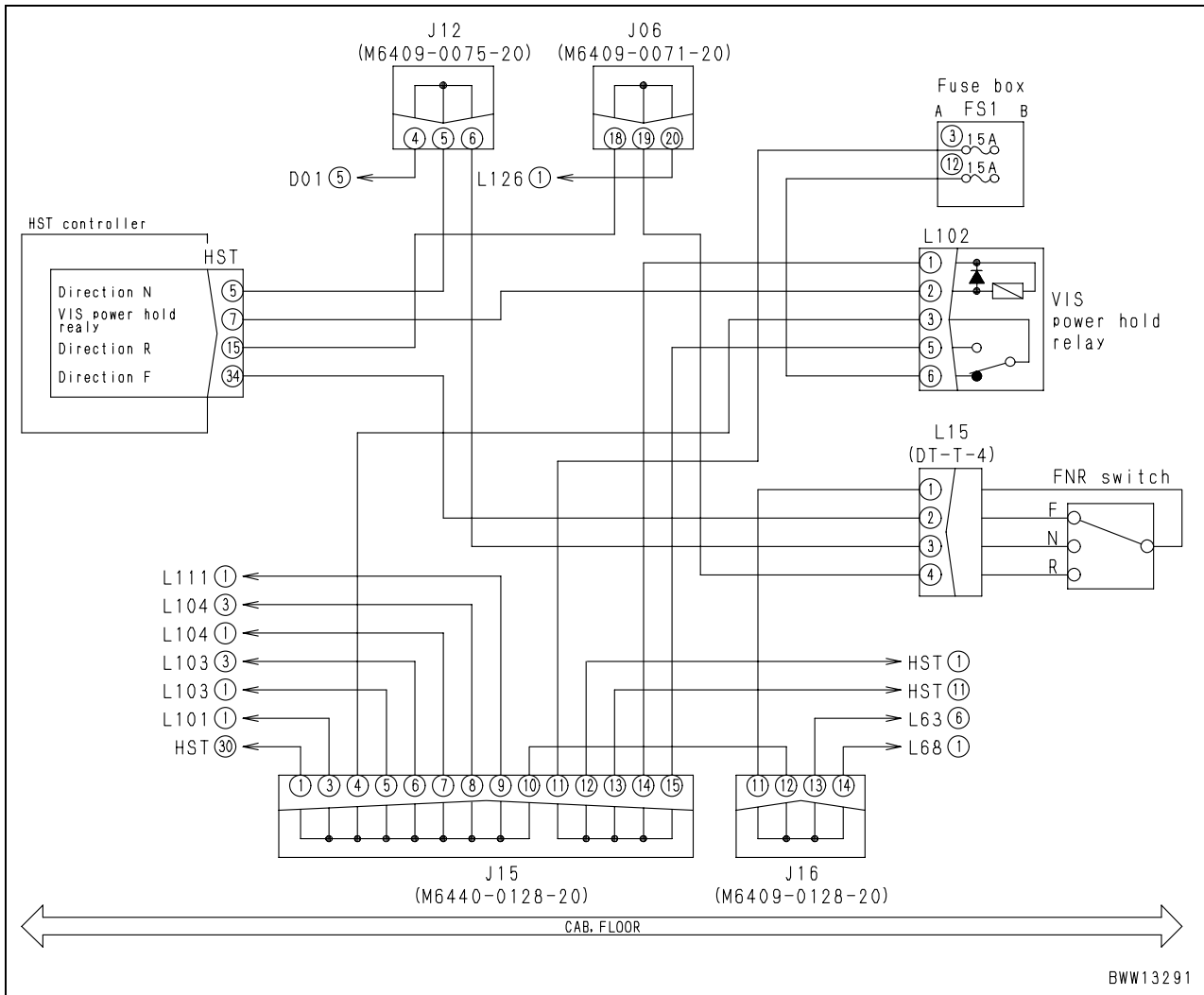
	Causes		Standard value in normal state/Remarks on troubleshooting		
	Possible causes and standard value in normal state	1	Defective fan reverse switch (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
L69 (male)				Fan manual reverse switch	Resistance
Between (5) – (1), (16)				ON	Max. 1 Ω
				OFF	Min. 1 MΩ
2		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 L25 (female) (10) – L69 (female) (1), (6) and ground	Voltage	Max. 1 V
3		Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			L25 (male)	Fan manual reverse switch	Voltage
			Between (10) and ground	ON	20 – 30 V
				OFF	Max. 1 V

Failure code [DDD7KX] Travel speed control dial signal: Disconnection/ Ground fault

Action code	Failure code	Trouble	Travel speed control dial signal: Disconnection/Ground fault (HST controller system)
E01	DDD7KX		
Contents of trouble	<ul style="list-style-type: none"> Travel speed control dial signal voltage lowered below 0.3 V. 		
Action of controller	<ul style="list-style-type: none"> Continue controls on assumption that travel speed control dial is set to minimum speed side. Even if trouble disappears, system does not reset itself until starting switch is turned OFF. 		
Problem that appears on machine	<ul style="list-style-type: none"> Travel speed cannot be adjusted with travel speed control dial. If speed range selector switch is set in 1st, travel speed is set to about 4 km/h. 		
Related information	<ul style="list-style-type: none"> If failure code [DAJ5KX] is also displayed, carry out troubleshooting for it first. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
		1	Defective travel speed control dial (Internal defect)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.	
Between L54 (female) (A) – (C)				Voltage	4.7 – 5.3 V
Between L54 (female) (B) – (C) (Max. speed side of dial)				Voltage	0.3 – 0.9 V
Between L54 (female) (B) – (C) (Min. speed side of dial)				Voltage	4.1 – 4.7 V
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between HST (female) (23) – L54 (female) (B)	Resistance	Max. 1 Ω
			Wiring harness between HST (female) (22) – L54 (female) (A)	Resistance	Max. 1 Ω
3		Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Between wiring harness HST (female) (23) – L54 (female) and ground	Resistance	Min. 1 MΩ
4		Defective HST controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			HST (female)	Resistance	
			Between (32) – ground	Max. 1 Ω	
	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.				
	HST (female)		Voltage		
Between (22) – ground	4.7 – 5.3 V				
Between (23) – ground	0.3 – 4.7 V				

Related circuit diagram



Failure code [DF10KB] Travel speed range selector switch: Hot short

Action code	Failure code	Trouble	Travel speed range selector switch: Hot short (HST controller system)
E01	DF10KB		
Contents of trouble	<ul style="list-style-type: none"> Multiple travel speed range selector switch signal is input because of hot short in travel speed range selector switch input signal system. 		
Action of controller	<ul style="list-style-type: none"> Fixes gear to speed range before error occurrence. If trouble disappears, system resets itself. 		
Problem that appears on machine	<ul style="list-style-type: none"> Once starting switch is turned OFF, gear speed is assumed to be 4th for control, regardless of selected speed range. Gear is not set in selected speed range. Indicator displays range before error occurrence. (Once starting switch is turned OFF, 4th gear is displayed) 		
Related information	<ul style="list-style-type: none"> Method of reproducing failure code: Turn starting switch ON + Operate speed range selector switch. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
	1	Defective travel speed range selector switch (Internal defect)		★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
L03 (female)				Switch position	Resistance
Between (1) – (2)				2nd	Max. 1 Ω
				Other than above	Min. 1 MΩ
Between (1) – (3)				1st	Min. 1 MΩ
				2nd	Min. 1 MΩ
				3rd	Max. 1 Ω
				4th	Max. 1 Ω
Between (1) – (4)				4th	Max. 1 Ω
				Other than above	Min. 1 MΩ
Between (2) – (3)				– (Anytime)	Min. 1 MΩ
Between (2) – (4)				– (Anytime)	Min. 1 MΩ
Between (3) – (4)				1st	Max. 1 Ω
				2nd	Min. 1 MΩ
				3rd	Min. 1 MΩ
	4th	Max. 1 Ω			
2	Defective travel speed range selector resistor (Internal defect)		★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			L70 (male)	Resistance	
			Between (1) – (5)	100 Ω ± 1%	
			Between (2) – (6)	220 Ω ± 1%	
			Between (3) – (7)	330 Ω ± 1%	
Between (4) – (8)	470 Ω ± 1%				
3	Hot short (Contact with 24V circuit) in wiring harness		★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Between wiring harness HST (female) (32) – L70 (female) (7) and ground	Voltage	Max. 1 V
			Between wiring harness HST (female) (39) – L03 (female) (3), L70 (female) (5), (3) and ground	Voltage	Max. 1 V
			Between wiring harness L03 (female) (1) – L70 (female) (6) and ground	Voltage	Max. 1 V

Failure code [DJF1KA] Fuel level sensor: Disconnection/Hot short

Action code	Failure code	Trouble	Fuel level sensor: Disconnection/Hot short (Machine monitor system)
E01	DJF1KA		
Contents of trouble	<ul style="list-style-type: none"> Voltage above 4 V was detected in fuel level sensor signal circuit. 		
Action of machine monitor	<ul style="list-style-type: none"> None in particular. 		
Problem that appears on machine	<ul style="list-style-type: none"> Fuel level gauge does not indicated normally (but keeps indicating "empty"). 		
Related information	<ul style="list-style-type: none"> Input signal from fuel level sensor can be checked with monitoring function. (Monitoring code: MONITOR PANEL – 04200 – FUEL SENSOR (V)) (Monitoring code: MONITOR PANEL – 04202 – FUEL SENSOR (%)) Method of reproducing failure code: Turn starting switch ON. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
		1	Defective fuel level sensor (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
R21 (male)				Fuel level	Resistance
Between (1) – (2)				When full	7 – 11 Ω
				When 1/2	25 – 35 Ω
		When empty	60 – 95 Ω		
2		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between L28 (female) (1) – R21 (female) (1)	Resistance	Max. 1 Ω
			Wiring harness between L26 (female) (6) – R21 (female) (2)	Resistance	Max. 1 Ω
3		Hot short (Contact with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			Between wiring harness L28 (female) (1) – R21 (female) (1) and ground (Value is upper limit when empty.)	Voltage	Max. 2 V
			Wiring harness between L26 (female) (6) – R21 (female) (2)	Voltage	Max. 1 V
4		Defective machine monitor	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
	L26, L28		Fuel level	Voltage	
	Between L28 (1) – L26 (6)		When full	0.1 – 0.4 V	
			When 1/2	0.7 – 1.0 V	
When empty		1.4 – 2.0 V			

Failure code [DW26KA] Motor 2 solenoid: Disconnection/Ground fault

Action code	Failure code	Trouble	Motor 2 solenoid: Disconnection/Ground fault (HST controller system)
E01	DW26KA		
Contents of trouble	<ul style="list-style-type: none"> Motor 2 cannot be controlled because of disconnection or ground fault in motor 2 solenoid relay output system. 		
Action of controller	<ul style="list-style-type: none"> Keeps output to motor 2 solenoid relay turned OFF (If there is ground fault, output cannot be turned OFF actually). Even if trouble disappears, system does not reset itself until starting switch is turned OFF. 		
Problem that appears on machine	<ul style="list-style-type: none"> When there is disconnection: Travel speed is not limited and maximum speed is equivalent to 4th gear speed in 3rd speed range. When there is ground fault: Travel speed is set equivalent to 3rd gear speed in 4th speed range. 		
Related information	<ul style="list-style-type: none"> Output state (ON/OFF) to motor 2 solenoid relay can be checked with monitoring function. (Monitoring code: HST – 40980 – D-OUT-16) Method of reproducing failure code: Travel at speed above about 11 km/h in 4th speed range. 		

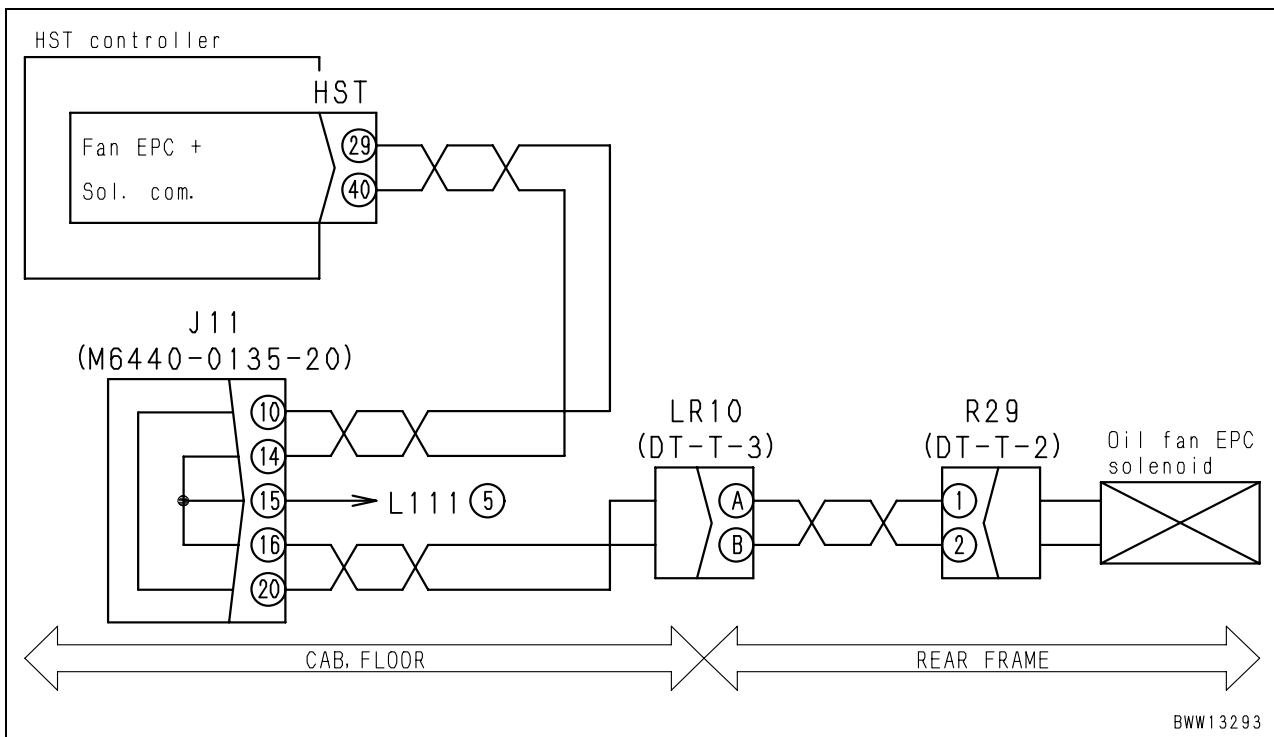
Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
		1	Defective motor 2 solenoid relay (Internal defect)	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
Replace motor 2 solenoid relay (L103) with another relay.				Condition becomes normal	Relay (L103) is defective	
				Condition does not become normal	Relay (L103) is normal	
★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.						
Between L103 (male) (1) – (2)				Resistance	200 – 400 Ω	
2		Defective VIS power supply holding relay (Internal short circuit)	★ Prepare with starting switch OFF, then start engine and carry out troubleshooting.			
			Replace VIS power supply holding relay (L102) with another relay.	Condition becomes normal.	Relay (L102) is defective.	
				Condition does not become normal.	Relay (L102) is normal.	
			★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between L102 (male) (1) – (2)		Resistance	200 – 400 Ω
3		Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Wiring harness between HST (female) (27) – L103 (female) (2)		Resistance	Max. 1 Ω
			Wiring harness between L103 (female) (1) – L102 (female) (3)		Resistance	Max. 1 Ω
4		Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Between wiring harness HST (female) (27) – L103 (female) (2) and ground		Resistance	Min. 1 MΩ
5	Defective HST controller	★ Prepare with starting switch OFF, then start engine, travel, and carry out troubleshooting.				
		HST	Condition	Voltage		
		Between (27) – ground	Stopped	Max. 1 V		
Speed range: 4th Travel speed: Above 11 km/h	20 – 30 V					

Failure code [DX16KY] Fan EPC solenoid: Hot short

Action code	Failure code	Trouble	Fan EPC solenoid: Hot short (HST controller system)
E01	DX16KY		
Contents of trouble	<ul style="list-style-type: none"> Since the fan EPC solenoid system is shorted with the power source, abnormal voltage is applied when the fan EPC solenoid output is OFF. 		
Action of controller	<ul style="list-style-type: none"> Turns the output to the fan EPC solenoid OFF. If problem is removed, system is returned to normal operating state. 		
Problem that appears on machine	<ul style="list-style-type: none"> The fan speed is minimized. 		
Related information	<ul style="list-style-type: none"> The output state (current) to the fan EPC solenoid can be checked with the monitoring function (Code: HST – 41400 – FAN EPC DIR). Method of reproducing failure code: Turn the starting switch ON. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
		1	Defective fan EPC solenoid (Internal short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
R29 (male)				Resistance	
Between (1) – (2)				5 – 10 Ω	
Between (1), (2) and ground		Min. 1 MΩ			
2		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 HST (female) (29) – R29 (female) (1) and ground	Voltage	Max. 1 V
3	Defective HST controller	<ul style="list-style-type: none"> If causes 1 – 2 are not detected, HST controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.) 			

Related circuit diagram



Failure code [DX20KY] Clutch EPC solenoid: Hot short

Action code	Failure code	Trouble	Clutch EPC solenoid: Hot short (HST controller system)
E03	DX20KY		
Contents of trouble	<ul style="list-style-type: none"> Hot short was detected in clutch EPC solenoid circuit. 		
Action of controller	<ul style="list-style-type: none"> Turns clutch EPC solenoid output OFF. Turns motor 1 solenoid output OFF. Turns HST safety relay output OFF. Even if trouble disappears, system does not reset itself until starting switch is turned OFF. Turns the centralized warning lamp and alarm buzzer ON. 		
Problem that appears on machine	<ul style="list-style-type: none"> Traction force is decreased. Travel speed is not limited with speed range selector switch and travel speed control dial. If engine is stopped without applying parking brake securely on slope, machine moves down suddenly. 		
Related information	<ul style="list-style-type: none"> Following output command values can be checked with monitoring function. Motor 1 solenoid output: HST – 80000 – MOTOR SOL DIR (mA) HST safety relay output: HST – 40979 – D_OUT_15 (ON/OFF) Clutch EPC solenoid output: HST – 80100 – CLUTCH SOL DIR (mA) [DX19KA], [DX19KY] or [DX20KA] may be also displayed, depending on condition when error was detected. 		

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
		1	Defective clutch EPC solenoid (Internal defect)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
T05 (male)				Resistance		
Between (1) – (2)				5 – 15 Ω		
Between (1), (2) – ground				Min. 1 MΩ		
2		Hot short (Contact with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			Between wiring harness HST (female) (9) – T05 (female) (1) and ground	Voltage	Max. 1 V	
			Between wiring harness L111 (female) (3) – T05 (female) (2)	Voltage	Max. 1 V	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting (Troubleshoot with traction switch OFF and machine is stopped (do not travel))			
Between wiring harness HST (female) (9) – T05 (female) (1) and ground		Voltage	10 – 15 V			
3		Defective HST controller	<ul style="list-style-type: none"> If causes 1 – 2 are not detected, HST controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.) 			

WA250-6, WA250PZ-6 GALEO Wheel loader

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b) Preheater operates constantly

Contents of trouble	<ul style="list-style-type: none"> Preheater operates constantly.
Related information	<ul style="list-style-type: none"> If failure code [CA144] or [CA145] is displayed, carry out troubleshooting for it first. Engine boost air temperature can be checked with monitoring function. (Monitoring code: ENG-18500-CHG TEMP (°C)) (Monitoring code: ENG-18501-CHG TEMP (V))

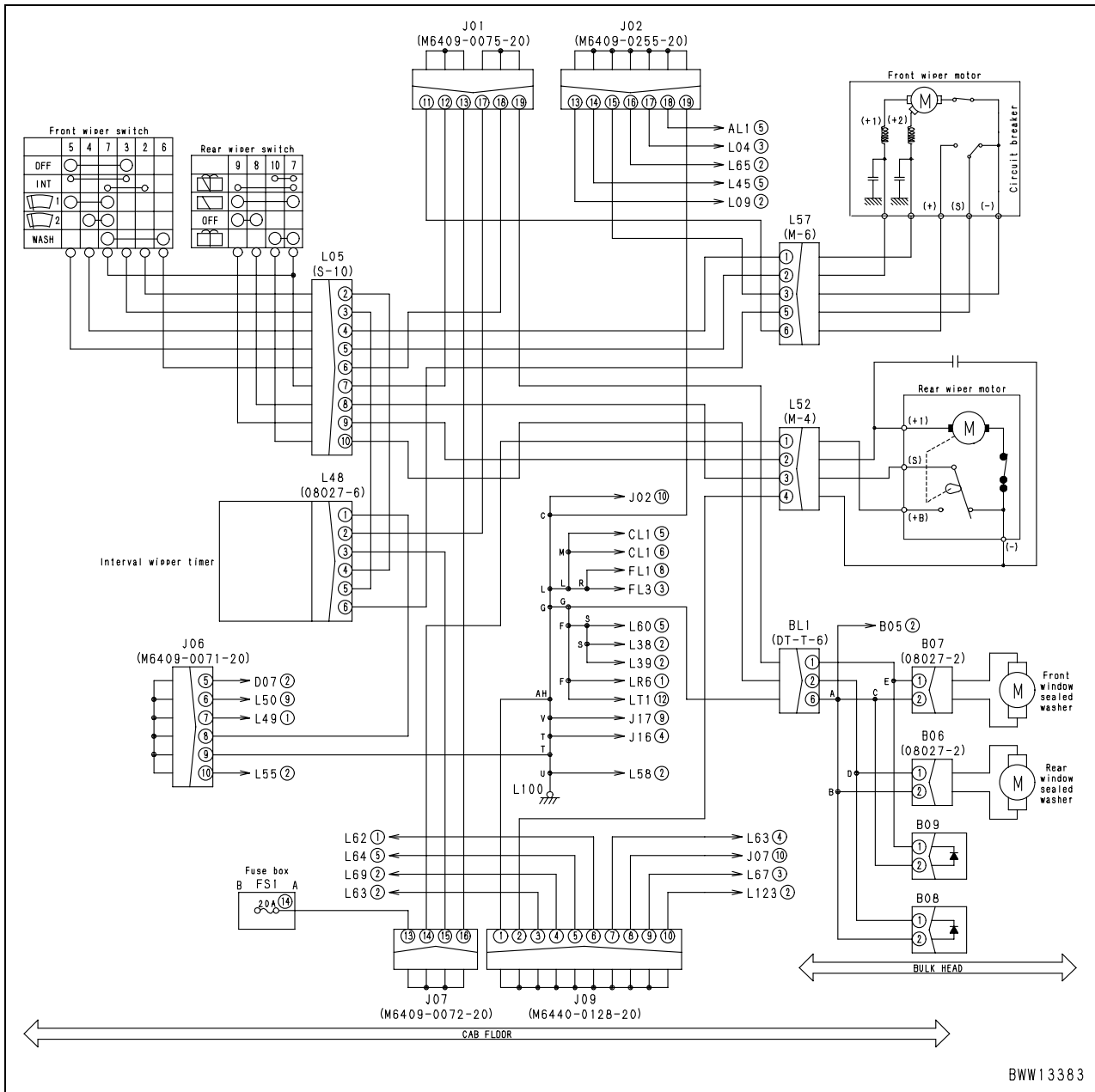
Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting				
	Possible causes and standard value in normal state	1	Defective heater relay (Internal defect)	★ Turn starting switch OFF and remove heater relay. ★ Check heater relay unit.			
Heater relay				E06 – R90		Resistance	
Between E05 – E07A				When 24 V is applied (When relay is "ON")		Max. 1 Ω	
				Other than above (When relay is "OFF")		Min. 1 MΩ	
Between E06 – R90		19 – 25 Ω					
2		Ground fault in wiring harness (Contact with GND circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.				
			Between wiring harness EC2 (40) – E06 (5) and ground	Resistance	Min. 1 MΩ		
3		Hot short (Contact with 24V circuit) in wiring harness	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.				
			Between wiring harness E07A – E07B and ground	When preheater is ON	Voltage	20 – 30 V	
				When preheater is OFF	Voltage	Max. 1 V	
4		Defective engine controller	If cause 1 – 3 are not detected, engine controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)				

Related circuit diagram

★ See the circuit diagram in “E-2 a) Preheater does not operate”.

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting		
	7	Hot short-circuiting between harnesses (Contact with 24V circuit)	<p>★ Prepare with starting switch OFF, then turn starting switch ON, operate lift arm FLOATING, and carry out troubleshooting.</p> <p>Wiring harness between F04 (female) (B) – L113 (female) (2) and ground</p> <p>★ In this case, lift arm FLOATING detent does not function (lever returns to neutral).</p>	Voltage	Max. 1 V

Related circuit diagram



BWW13383

Contents of trouble	(2) Rear working lamp does not light up or go off.
Related information	<ul style="list-style-type: none"> The switch, lamp, or wiring harness of the rear working lamp system is defective. When the front working lamp is normal If the clearance lamp does not light up or go off either, carry out troubleshooting for the clearance lamp first.

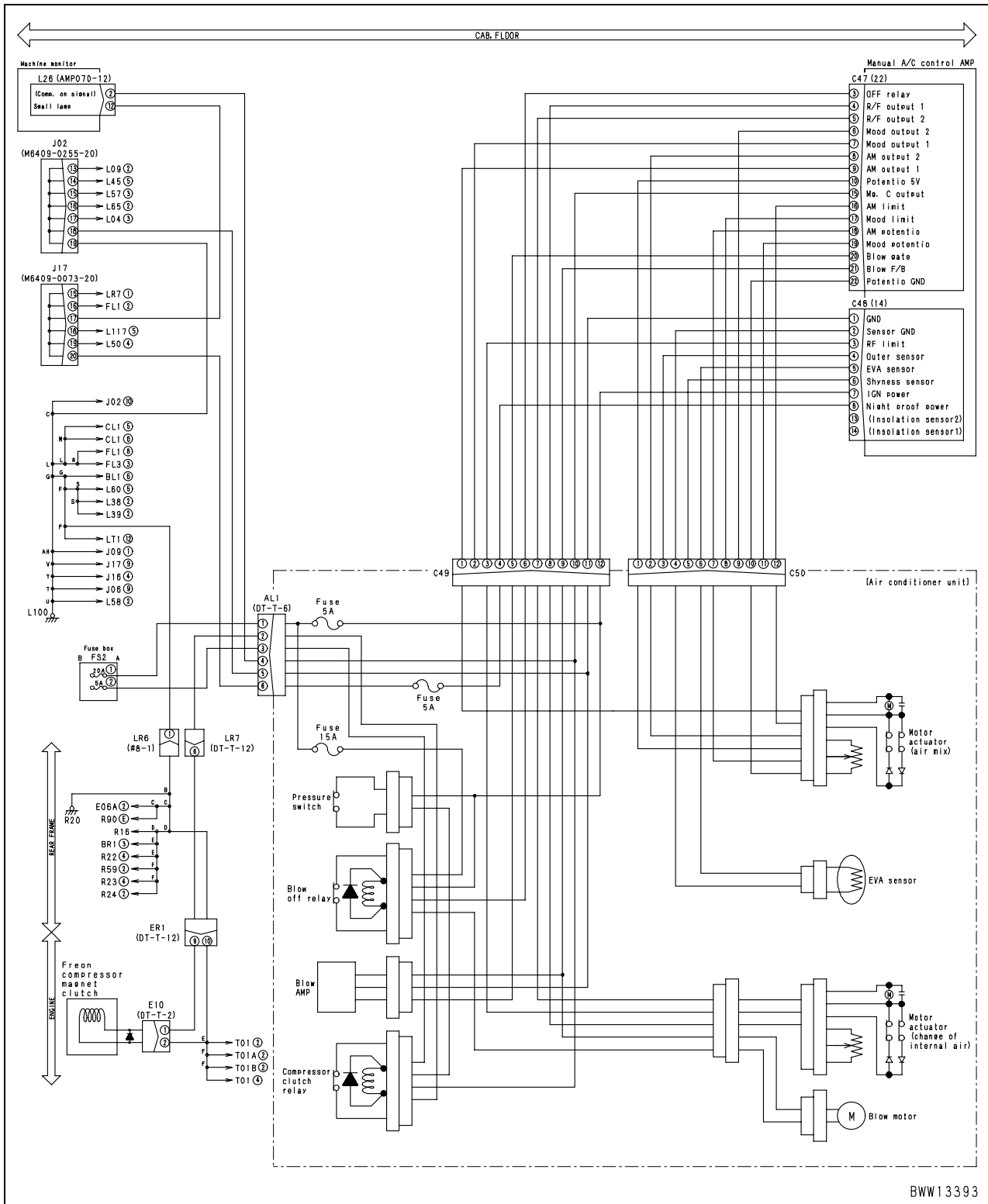
	Causes		Standard value in normal state/Remarks on troubleshooting			
	Possible causes and standard value in normal state	1	Broken bulb	If a specific working lamp does not light up, its bulb may be broken or may have a defective contact. Check the bulb directly.		
2		Defective fuse No. 13 of fuse box (FS2)	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 6.)			
3		Defective rear working lamp relay (L123) (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L123 (male)	Resistance		
			Between (1) and (2)	200 – 400 Ω		
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
When rear working lamp relay (L123) is replaced with a relay of the same type, if the condition becomes normal, the rear working lamp relay is defective.						
4		Defective rear working lamp switch (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L08 (male)	Rear working lamp switch	Resistance	
			Between (5) and (6)	ON	Max. 1 Ω	
				OFF	Min. 1 MΩ	
Between (5), (6) and ground		Constant	Min. 1 MΩ			
5		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 L08 (female) (5) – L123 (female) (1)	Resistance	Max. 1 Ω	
			Wiring harness between L123 (female) (2) – ground	Resistance	Max. 1 Ω	
	Wiring harness between fuse No. 13 of fuse box (FS2) – L08 (female) (6), L123 (female) (3)		Resistance	Max. 1 Ω		
	Wiring harness between L123 (female) (5) – B01 (female) (1), – B02 (female) (1)		Resistance	Max. 1 Ω		
	Wiring harness between B01 (female) (2), B02 (female) (2) – ground		Resistance	Max. 1 Ω		

E-13 Backup lamp does not light or it keeps lighting up

Contents of trouble	Backup lamp does not light or it keeps lighting up.
Related information	<ul style="list-style-type: none"> The machine monitor monitors the primary circuit of the backup lamp relay for a trouble. (If hot short occurs in the primary side of the back lamp relay, failure code [D160KY] is indicated. Carry out troubleshooting for it first.) If another failure code is displayed, carry out troubleshooting for it first.

Possible causes and standard value in normal state	Causes		Standard value in normal state/Remarks on troubleshooting			
		1	Broken bulb	If a specific backup lamp does not light up, its bulb may be broken or may have a defective contact. Check the bulb directly.		
2		Defective fuse No.14 of fuse box (FS2)	If the fuse is burn, the circuit probably has a grounding fault, etc. (See cause 7.)			
3		Defective backup lamp 1 relay (L109) (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L109 (male)	Resistance		
			Between (1) and (2)		200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			When backup lamp 1 relay (L109) is replaced with a relay of the same type, if the condition becomes normal, the backup lamp 1 relay is defective.			
4		Defective backup lamp 2 relay (L126) (Internal disconnection or short circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L126 (male)	Resistance		
			Between (1) and (2)		200 – 400 Ω	
			★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
			When backup lamp 2 relay (L126) is replaced with a relay of the same type, if the condition becomes normal, the backup lamp 2 relay is defective.			
5		Defective FR pressure select relay (L101) (Internal trouble)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			L101 (male)	Resistance		
			Between (1) and (2)		200 – 400 Ω	
	★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.					
	When FR pressure select relay (L101) is replaced with a relay of the same type, if the condition becomes normal, the FR pressure select relay is defective.					

Related circuit diagram



H-1 The machine does not start

Ask the operator about the following:

- Has the machine come not start suddenly?
→ **Breakage of HST pump and motor related equipment**
- Was there any problem of not traveling before?
→ **Internal wear of HST pump and motor related equipment, defective seal**

Inspection before diagnosis

- Are the oil level in the hydraulic tank and the oil type appropriate?
- Is inching valve linkage properly adjusted?
- Is the any external oil leak found around the hydraulic piping, pump and motor?

		Cause														
		Damper	HST pump						HST motor 2	HST motor 1	Others					
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
		Damper	Pump body (Piston pump end)	Pump body (Charge pump end)	High pressure relief valve	High pressure cut-off valve	Low pressure relief valve (Charge relief valve)	DA valve	Directional solenoid valve	Motor body	Motor body	Inching valve	Inching valve linkage	Clutch solenoid	Clutch	Transfer
No.	Diagnosis	△	△	△	△	△	△	△	△	△	△	△	△	△	△	△
1	Does not travel forward or in reverse	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	Does not travel forward (reverse is normal)				○				○							
3	Does not start at reverse (Forward is normal)				○				○							
4	Does not travel forward or in reverse, motor makes sound of rotation													○	○	○

H-14 When rising, the lift arm comes to move slowly at specific height

Inspection before diagnosis

- Deformation of lift arm cylinder in appearance

Cause

- Expansion of lift arm cylinder tube or damage inside
- ★ For other abnormal phenomena during lift arm rise, see “H-13. The lift arm moves slowly or the lift arm rising force is insufficient.”

H-15 The lift arm cylinder cannot hold down the bucket (The bucket rises in the air)

See “H-13. The lift arm moves slowly or the lift arm rising force is insufficient.”

Inspection before diagnosis

- Is the stroke of the lift arm control lever appropriate?

Cause

- Defective seat of suction valve on the lift arm cylinder rod side of work equipment valve
- Oil leak from lift arm cylinder piston seal

H-16 Hydraulic drifts of the lift arm occur often

Ask the operator about the following:

- Have hydraulic drifts come to occur often suddenly? → **Wastes pinched in valve or damage of parts**
- Have hydraulic drifts come to occur often gradually? → **Wear of parts**

Inspection before diagnosis

- Is the lift arm spool at the neutral position? → The spool detent is defective

Diagnosis and Cause

- Does any leaking noise occur inside the lift arm cylinder when hydraulic drift is measured? → The cylinder packing is defective

H-17 The lift arm wobbles during operation

The bucket and the lift arm moves up and down as the topography goes in digging or leveling with the lift arm control lever in the “HOLD” position.

Diagnosis and Cause

Check at first the hydraulic drift and if the lift arm cylinder can lift the machine

1. When the hydraulic drift is more than the standard value, see “H-16. Hydraulic drifts of the lift arm occur often.”
2. When the lift arm cylinder cannot lift the machine, see “H-15. The lift arm cylinder cannot hold down the bucket.”
3. When the lift arm cylinder comes to enable to lift the machine after the lift arm is operated several times with the normal hydraulic drift and after the lift arm cylinder operates to full stroke → The cause is vacuum generated inside the cylinder

- ★ Frequent hydraulic drifts → The suction valve on the lift arm cylinder rod side is defective

<Example of troubleshooting> Exhaust gas is black

Let us assume that [Clogged air cleaner] is taken to be the cause of black exhaust gas. 3 symptoms have causal relationship with this problem: [Color of exhaust gas gradually became black], [Power was lost gradually], and [Air cleaner clogging caution lamp is flashing].

S-7 Exhaust smoke is black (incomplete combustion)

General causes why exhaust smoke is black

- Insufficient intake of air
- Defective condition of fuel injection
- Excessive injection of fuel

Causes											
Seized turbocharger, interference	Clogged air cleaner element	Worn piston ring, cylinder	Clogged, seized fuel injection nozzle	Defective fuel injection timing	Defective fuel injection pump (Excessive injection)	Improper valve clearance	Crushed, clogged muffler	Leakage of air between turbocharger and cylinder head	Defective contact of valve and valve seat	Defective fuel injection pump (Seized rack and plunger)	

Questions												
	Confirm recent repair history											
Degree of use of machine	Operated for long period		△	△	△							△
Color of exhaust gas	Suddenly became black	◎			○							○
	Gradually became black		◎		○						○	
	Blue under light load			◎								
Engine oil must be added more frequently			◎									
Power was lost	Suddenly	◎			○			○				○
	Gradually		○	○							○	○
Non-specified fuel has been used				○								○
Noise of interference is heard from around turbocharger	◎											
Air cleaner clogging caution lamp is flashing		◎										
Blow-by gas is excessive			◎									
Engine pickup is poor and combustion is irregular	○			◎				○	○	○		○
When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low				◎								○
Mating mark of fuel injection pump is not in position					◎							
Seal of fuel injection pump has come off						◎						
Clanging sound is heard from around cylinder head							◎					
Exhaust noise is abnormal	○		○						◎			
Muffler is crushed								◎				
Air leaks between turbocharger and cylinder head, clamp is loosened									◎			

Troubleshooting													
	When turbocharger is rotated by hand, it is found to be heavy	●											
	When air cleaner is inspected directly, it is found to be clogged		●										
	When compression pressure is measured, it is found to be low			●							●		
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change				●								
	When fuel injection timing is checked by delivery method, it is out of order					●							
	When fuel pump is tested, fuel injection rate is improper						●						
	When valve clearance is checked directly, it is improper							●					
	When muffler is removed, exhaust gas color improves								●				
	When control rack is pressed, it is heavy, does not return											●	
Remedy	Replace	Clean	Replace	Replace	Adjust	Adjust	Adjust	Replace	Correct	Replace	Replace		

S-9 Oil becomes contaminated quickly

General causes why oil becomes contaminated quickly

- Entry of exhaust gas into oil due to internal wear
- Clogging of lubrication passage
- Use of improper fuel
- Use of improper oil
- Operation under excessive load

		Causes								
		Defective seal at turbocharger turbine end	Worn valve, valve guide	Worn piston ring, cylinder	Clogged breather, breather hose	Clogged oil cooler	Clogged oil filter	Defective oil filter safety valve	Clogged turbocharger lubrication drain tube	Exhaust smoke is bad
Questions	Confirm recent repair history									
	Degree of use of machine	Operated for long period	△	△	△					
	Non-specified fuel is being used			○			○			
	Oil must be added more frequently			◎						
	Metal particles are found when oil filter is drained			○	○		◎			
	Inside of exhaust pipe is dirty with oil			◎						
	Engine oil temperature rises quickly					◎				
Check items	Color of exhaust gas is	Blue under light load			◎					
		Black								◎
	Amount of blow-by gas	Excessive	○	○	◎				○	
		None				◎				

Troubleshooting	Excessive play of turbocharger shaft	●								
	When compression pressure is measured, it is found to be low		●	●						
	Check breather and breather hose directly				●					
	Inspect oil cooler directly					●				
	Inspect oil filter directly						●			
	Spring of oil filter safety valve is hitched or broken							●		
	Inspect turbocharger lubrication drain tube directly								●	
	Remedy	Replace	Replace	Replace	Clean	Clean	Replace	Replace	Clean	—

See S-7

Coating materials list

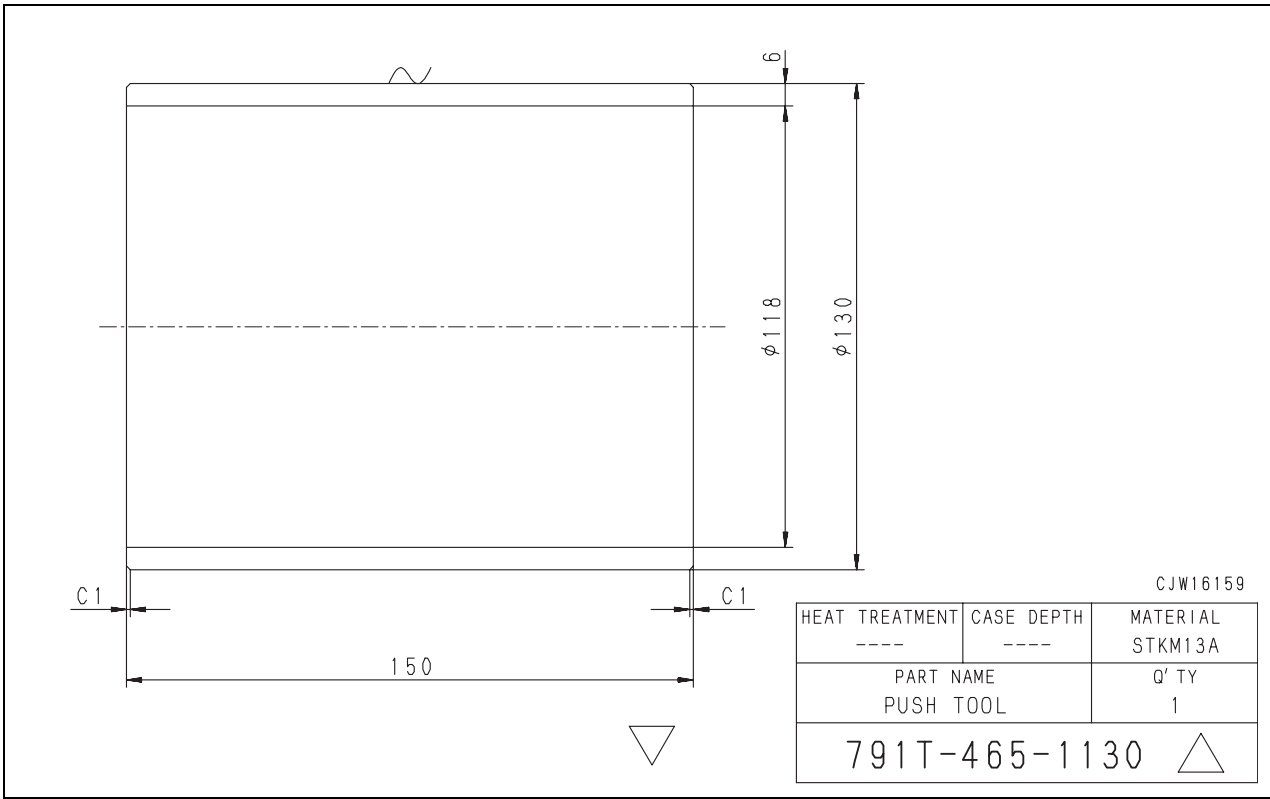
(Rev. 2009.02)

- ★ The recommended coating materials such as adhesives, gasket sealants, and greases used for disassembly and assembly are listed below.
- ★ For coating materials not listed below, use the equivalent of products shown in this manual.

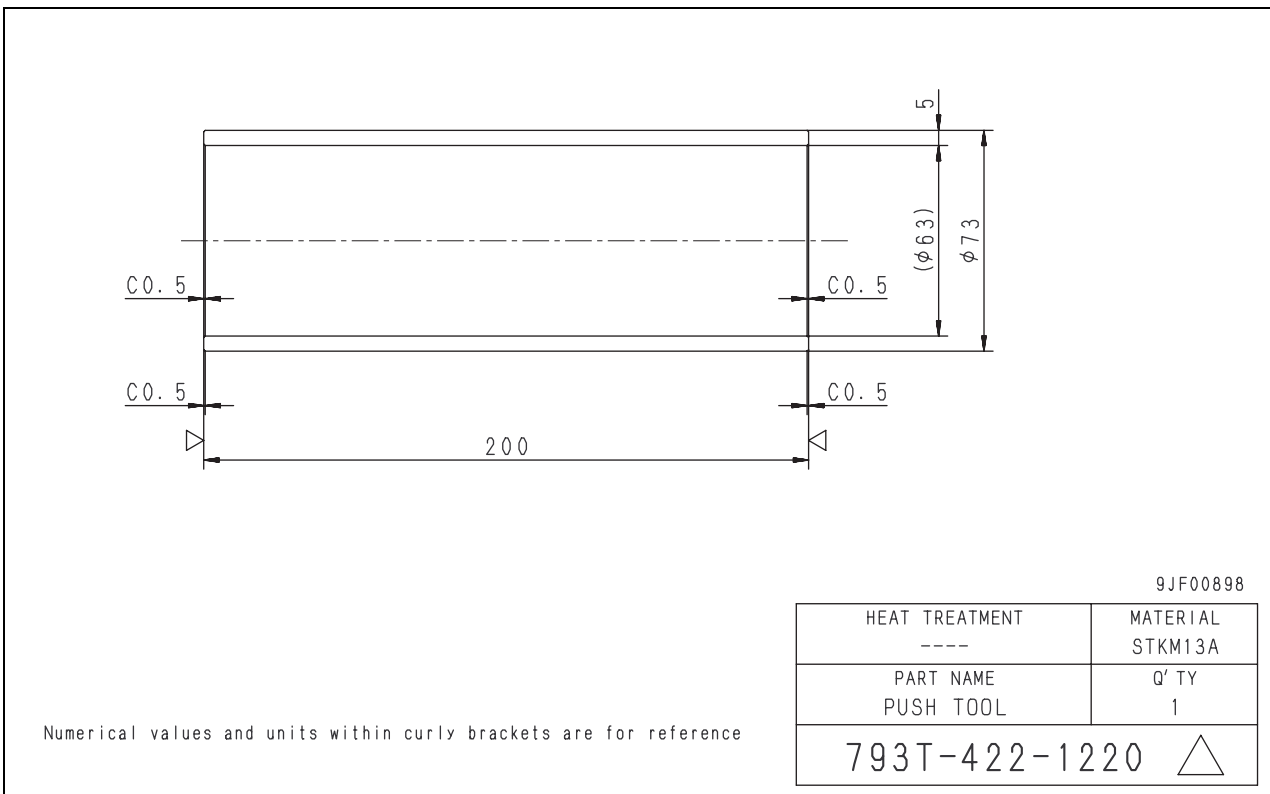
Category	Komatsu code	Part number	Q'ty	Container	Main features and applications
Adhesive	LT-1A	790-129-9030	150 g	Tube	<ul style="list-style-type: none"> • Used to prevent rubber gaskets, rubber cushions, and cork plugs from coming out.
	LT-1B	790-129-9050	20 g (2 pcs.)	Polyethylene container	<ul style="list-style-type: none"> • Used for plastic (except polyethylene, polypropylene, tetrafluoroethylene and vinyl chloride), rubber, metal, and non-metal parts which require immediate and strong adhesion.
	LT-2	09940-00030	50 g	Polyethylene container	<ul style="list-style-type: none"> • Features: Resistance to heat and chemicals. • Used to fix and seal bolts and plugs.
	LT-3	790-129-9060 (Set of adhesive and hardener)	Adhesive: 1 kg Hardener: 500 g	Can	<ul style="list-style-type: none"> • Used to stick and seal metal, glass, and plastics.
	LT-4	790-129-9040	250 g	Polyethylene container	<ul style="list-style-type: none"> • Used to seal plugs.
	Holtz MH 705	790-129-9120	75 g	Tube	<ul style="list-style-type: none"> • Heat-resistant seal used to repair engines.
	ThreeBond 1735	790-129-9140	50 g	Polyethylene container	<ul style="list-style-type: none"> • Quick-setting adhesive. • Setting time: Within 5 sec. to 3 min. • Used mainly to stick metals, rubbers, plastics, and woods.
	Aron-alpha 201	790-129-9130	2 g	Polyethylene container	<ul style="list-style-type: none"> • Quick-setting adhesive. • Quick-setting type. (max. strength is obtained after 30 minutes) • Used mainly to stick rubbers, plastics, and metals.
	Loctite 648-50	79A-129-9110	50 cc	Polyethylene container	<ul style="list-style-type: none"> • Features: Resistance to heat and chemicals. • Used for fitted portions used at high temperatures.
Gasket sealant	LG-5	790-129-9080	1 kg	Polyethylene container	<ul style="list-style-type: none"> • Used to seal various threaded portions, pipe joints, and flanges. • Used to seal tapered plugs, elbows, and nipples of hydraulic piping.
	LG-6	790-129-9160	200 g	Tube	<ul style="list-style-type: none"> • Features: Silicon-based heat and cold-resistant sealant. • Used to seal flange surfaces and threaded portions. • Used to seal oil pan, final drive case, etc.
	LG-7	790-129-9170	1 kg	Tube	<ul style="list-style-type: none"> • Features: Silicon-based quick-setting sealant. • Used to seal flywheel housing, intake manifold, oil pan, thermostat housing, etc.
	LG-8 ThreeBond 1207B	419-15-18131	100 g	Tube	<ul style="list-style-type: none"> • Features: Silicon-based, heat and cold-resistant, vibration-resistant, impact-resistant sealant. • Used to seal transfer case, etc.
	LG-9 ThreeBond 1206D	790-129-9310	200 g	Tube	<ul style="list-style-type: none"> • Used for rough surfaces such as the circle gear top seal which does not need to be clamped, water resistance of the clearance at the welded area, etc. • Can be coated with paint.

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

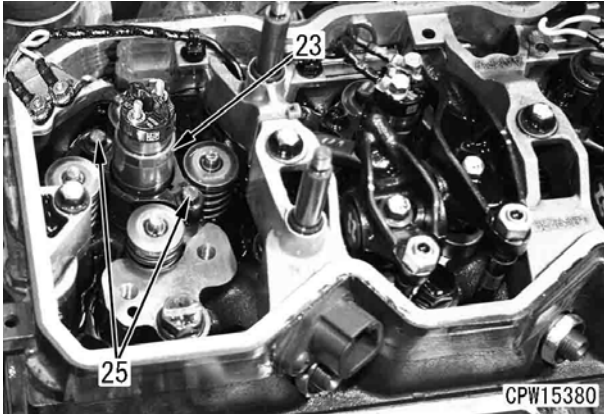
H8 Push tool



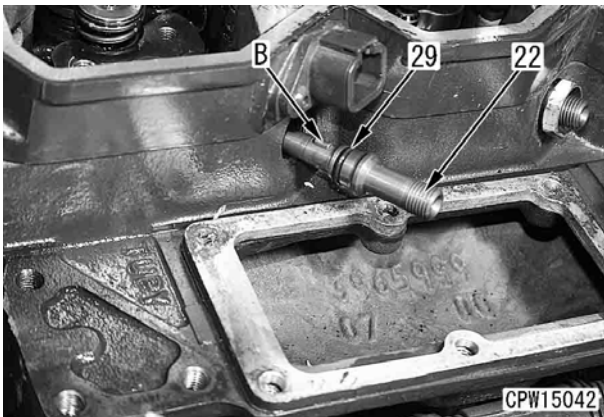
H16 Push tool



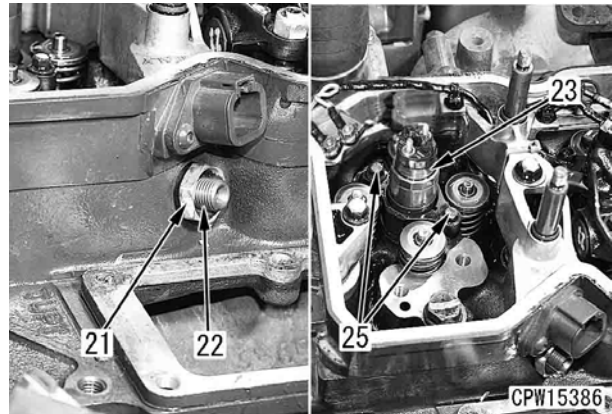
- 4) Insert fuel injector (23) in the cylinder head, directing its fuel inlet hole toward the air intake manifold.
- 5) Tighten 2 mounting bolts (25) of fuel injector (23) by 3 – 4 turns.



- 6) Apply engine oil (For details, see "Table of fuel, coolant and lubricants") to the mounting hole of inlet connector (22) on the cylinder head side.
- 7) Apply engine oil (For details, see "Table of fuel, coolant and lubricants") to O-ring (29) of inlet connector (22).
- 8) Insert inlet connector (22) perfectly, while setting part (B) to the groove on the cylinder head side.



- 9) Secure inlet connector (22) by tightening retaining nut (21) lightly.
 - ☞ Retaining nut (21):
15 ± 5 Nm {1.5 ± 0.5 kgm}
- 10) Tighten 2 mounting bolts (25) of fuel injector (23) alternately.
 - ☞ Fuel injector mounting bolt (25):
8.0 ± 0.8 Nm {0.8 ± 0.08 kgm}
- 11) Tighten retaining nut (21).
 - ☞ Retaining nut (21):
50 ± 5 Nm {5.1 ± 0.5 kgm}

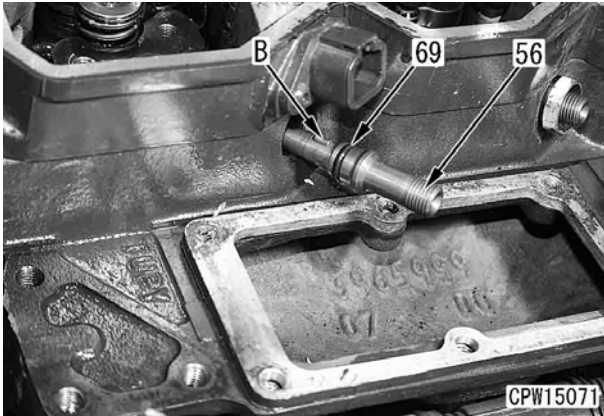


- 12) Install the wiring harnesses to fuel injector (23) and tighten 2 mounting nuts (24).
 - ☞ Wiring harness mounting nut (24):
1.5 ± 0.25 Nm {0.15 ± 0.03 kgm}
- ★ Installed positions of wiring harnesses

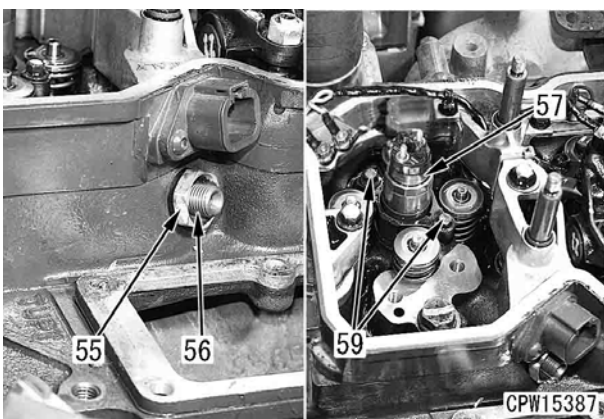
Wiring harness color	Cylinder No.
White	1, 3, 5
Black	2, 4, 6



- 8) Apply engine oil (For details, see "Table of fuel, coolant and lubricants") to the mounting hole of inlet connector (56) on the cylinder head side.
- 9) Apply engine oil (For details, see "Table of fuel, coolant and lubricants") to O-ring (69) of inlet connector (56).
- 10) Insert inlet connector (56) perfectly, while setting part (B) to the groove on the cylinder head side.

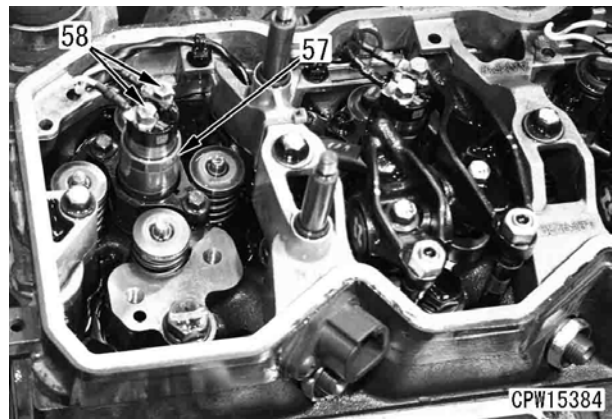


- 11) Secure inlet connector (56) by tightening retaining nut (55) lightly.
 - ⊞ Retaining nut (55):
15 ± 5 Nm {1.5 ± 0.5 kgm}
- 12) Tighten 2 mounting bolts (59) of fuel injector (57) alternately.
 - ⊞ Fuel injector mounting bolt (59):
8.0 ± 0.8 Nm {0.8 ± 0.08 kgm}
- 13) Tighten retaining nut (55).
 - ⊞ Retaining nut (55):
50 ± 5 Nm {5.1 ± 0.5 kgm}



- 14) Install the wiring harnesses to fuel injector (57) and tighten 2 mounting nuts (58).
 - ⊞ Wiring harness mounting nut (58):
1.5 ± 0.25 Nm {0.15 ± 0.03 kgm}
 - ★ Installed positions of wiring harnesses

Wiring harness color	Cylinder No.
White	1, 3, 5
Black	2, 4, 6




Removal and installation of hydraulic oil cooler assembly

Removal

- ⚠ Stop the machine on a level ground and set the lock bar to the frame to fix the front and rear frames.
- ⚠ Lower the work equipment to the ground, stop the engine, apply the parking brake, and put chocks under the tires.
- ⚠ Disconnect the cable from the negative (-) terminal of the battery.
- ⚠ If the radiator coolant temperature is high, you may scald yourself with the hot coolant. Wait until the coolant is cooled, and then drain the coolant.

1. Loosen the radiator cap to drain the coolant.

 Radiator: **Approx. 22 l**

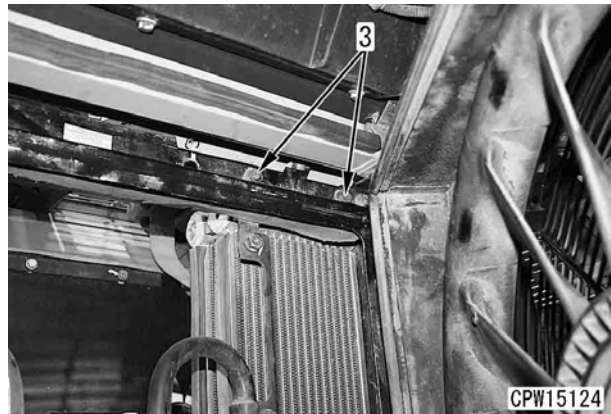
2. Remove the radiator. For details, see "Removal and installation of radiator".
3. Disconnect hydraulic oil cooler upper hose (1).
★ Plug the disconnected hose to prevent oil leakage.



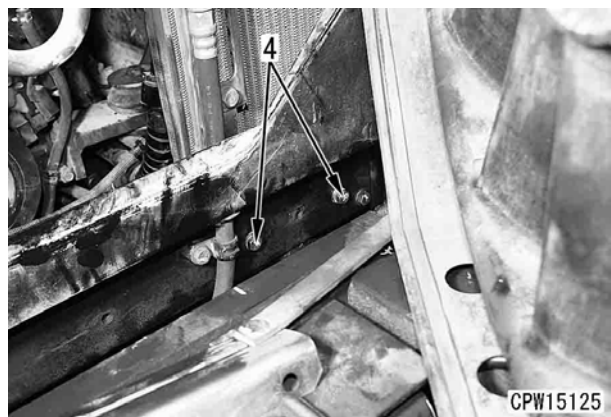
4. Disconnect hydraulic oil cooler lower hose (2).
★ Plug the disconnected hose to prevent oil leakage.



5. Remove upper 2 hydraulic oil cooler mounting bolts (3).

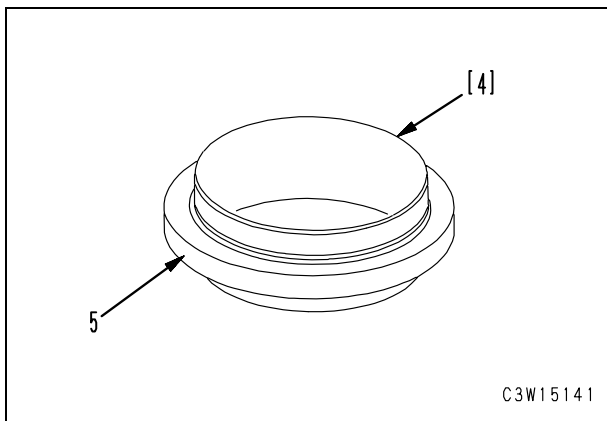


6. Remove lower 2 hydraulic oil cooler mounting bolts (4).

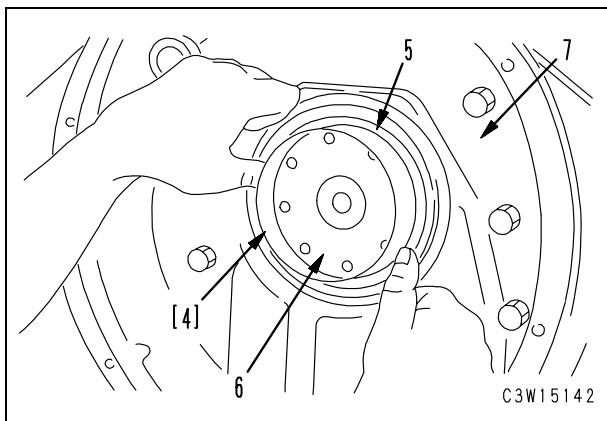


Installation

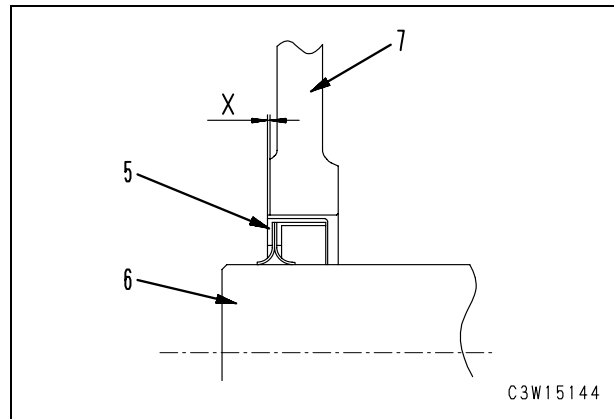
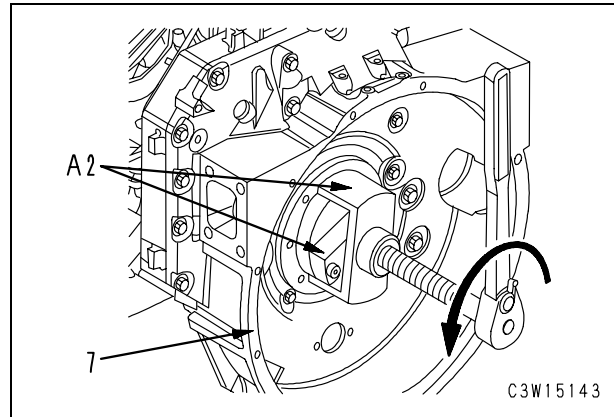
1. Keep pilot [4] installed to engine rear oil seal (5) until it is inserted in the crankshaft.
 - ★ Before installing the engine rear oil seal, check that crankshaft end corners and seal lip sliding surfaces are free from a housing flaw, burr, fin, rust, etc.
 - ★ Before installing the engine rear oil 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].



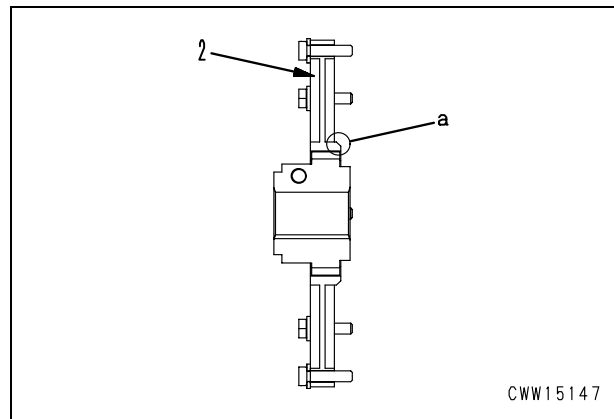
4. Using tool **A2**, install engine rear oil seal (5) to flywheel housing (7).
 - ★ When installing engine rear oil seal (5), take care not to bend it.
 - ★ Projection of engine rear oil seal (5) (x): Max. 0.38 mm





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

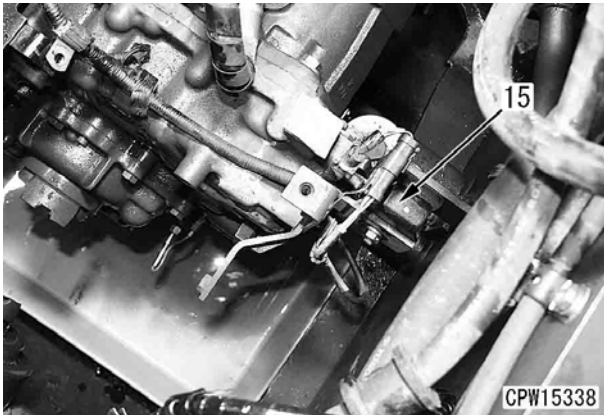
[*1]

- ★ When installing damper flange (2), direct part (a) as shown below.

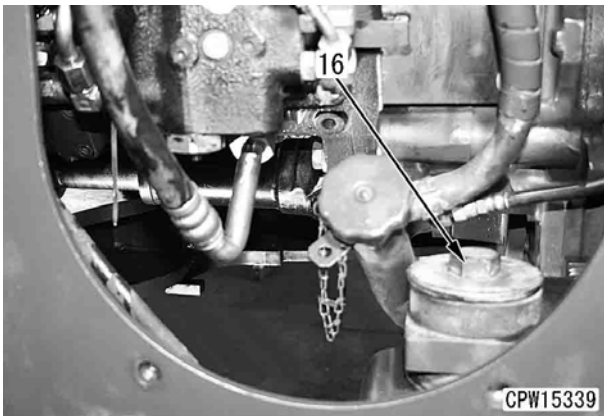


-  Damper flange mounting bolt (1): **Adhesive (LT-2)**
-  Damper flange mounting bolt (1): **44.1 – 53.9 Nm {4.5 – 5.5 kgm}**


18. Remove right and left transfer cushions (15).
[*4]

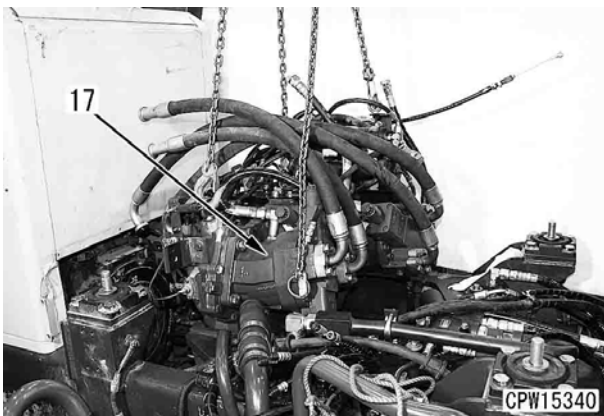


19. Remove right and left transfer mounting bolts (16).
[*5]



20. Lift off transfer and HST motor assembly (17).
★ Check that all the wiring and piping are disconnected.

 Transfer and HST motor assembly:
380 kg





Installation


- Carry out installation in the reverse order to removal.

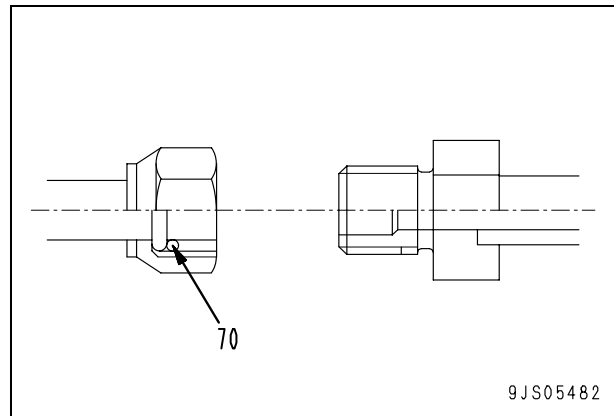
[*1]

- ★ When installing the hoses of the air conditioner circuit, take care that dirt, dust, water, etc. will not enter them.
- ★ When installing each air conditioner hose, check that O-ring (70) is fitted to it.
- ★ Check O-ring (70) for a flaw and deterioration.
- ★ When connecting each refrigerant pipe, apply compressor oil for new refrigerant (R134a) (DENSO: ND-OIL8 or ZEXEL ZXL100PT (equivalent to PAG46) to O-ring (70).

 Threaded part of hose (M16 × 1.5):
12 – 15 Nm {1.2 – 1.5 kgm}


 Threaded part of hose (M22 × 1.5):
20 – 25 Nm {2.0 – 2.5 kgm}

 Threaded part of hose (M24 × 1.5):
30 – 35 Nm {3.0 – 3.5 kgm}

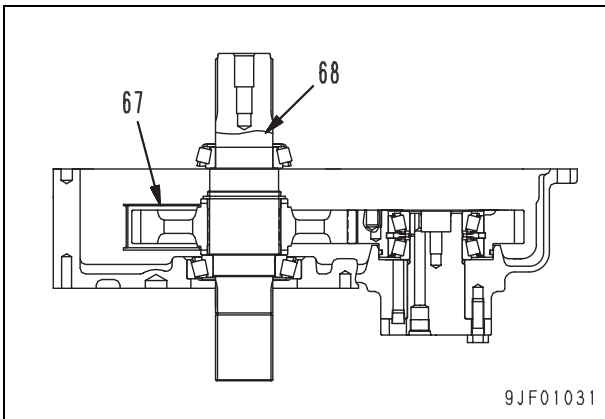


- **Charging with refrigerant (R134a)**
Charge the air conditioner circuit with refrigerant (R134a).
★ Charge capacity: 1,200 ± 50 g

[*2], [*3]

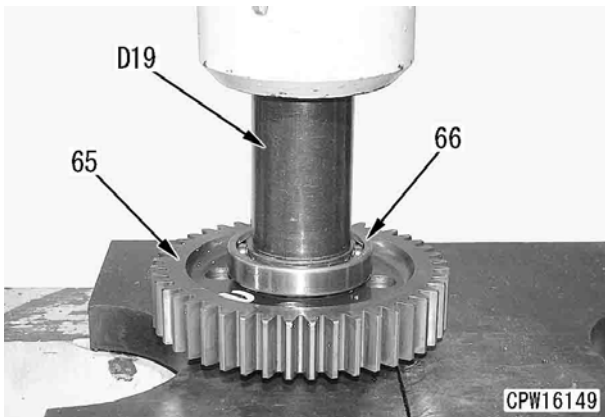
 Drive shaft mounting bolt:
59 – 74 Nm {6.0 – 7.5 kgm}

- ★ **Precautions for installing rear drive shaft**
 - 1) Check that the key of the spider cap is fitted to the key way of the mating yoke and then tighten the mounting bolts.
 - 2) Check that the lateral runout of the rear axle and transfer from each other is 3 mm or less.
 - 3) If the runout in 2) is 3 mm or larger, adjust the transfer cushion and transfer mount to reduce the runout.



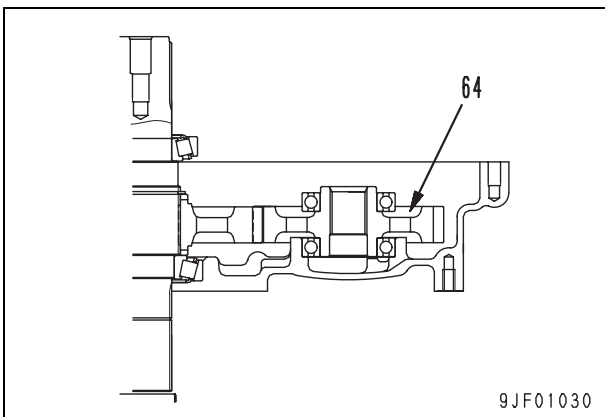
4. Assembly of HST motor 2 gear and bearing assembly

- 1) Using tool **D19**, press fit 2 bearings (66) to HST motor 2 gear (65).
 - ★ After press fitting the bearings, apply power train oil (for details, see "Table of fuel, coolant and lubricants") to them and rotate them.



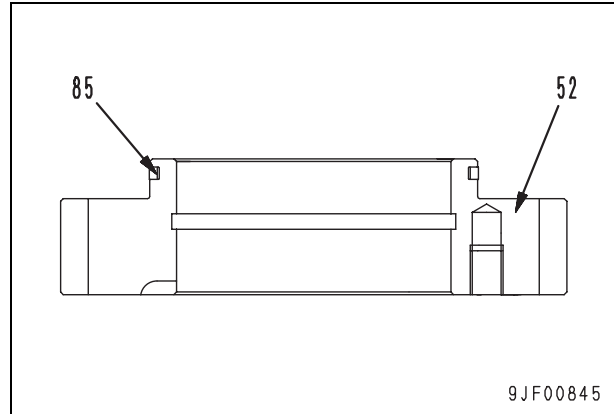
5. Installation of HST motor 2 gear and bearing assembly

- 1) Install HST motor 2 gear and bearing assembly (64).

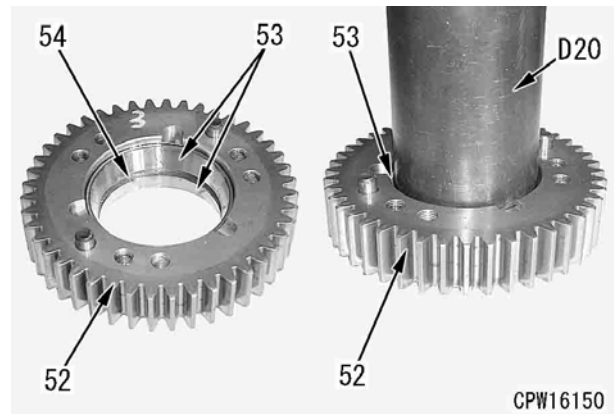


6. Assembly of HST motor 1 gear and outer races

- 1) Install seal ring (85) to HST motor 1 gear (52).
 - 🔧 Seal ring: **Grease (G2-LI)**

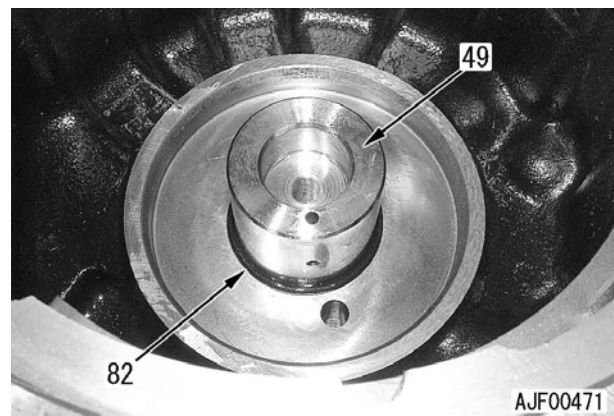


- 2) Install spacer (54) to HST motor 1 gear (52).
- 3) Using tool **D20**, press fit 2 outer races (53) to HST motor 1 gear (52).



7. Installation of HST motor 1 gear and outer races

- 1) Install O-ring (82) to shaft (49).
 - 🔧 O-ring: **Grease (G2-LI)**



Disassembly and assembly of parking brake assembly

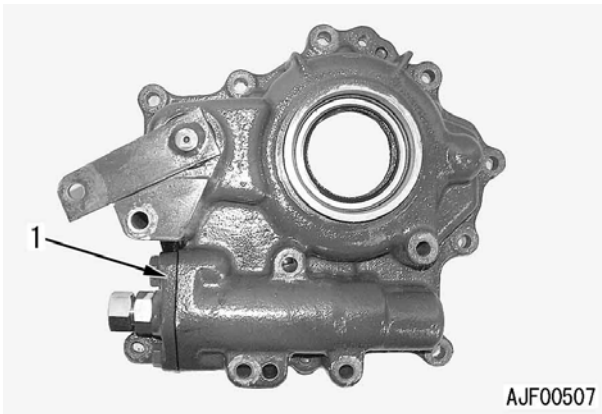
Special tools

Symbol	Part No.	Part name	Necessity	Q'ty	New/Remodel	Sketch
D	3	790-101-5201	■	1		
		790-101-5311		1		
		790-101-5221		1		
		01010-51225		1		
	4	793T-417-1120	■	1		○
		790-101-5221	■	1		
		01010-81225	■	1		
	24	790-434-1470	■	1		

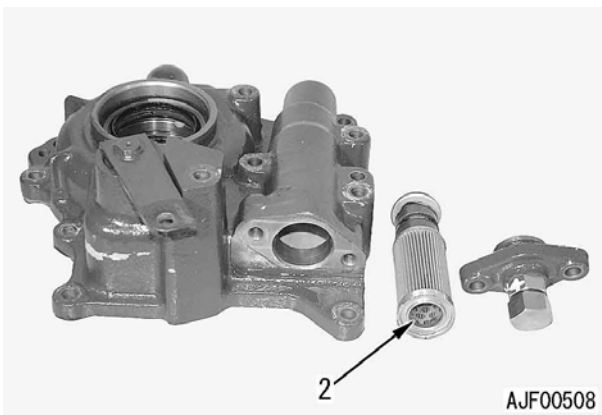
Disassembly

1. Strainer

- 1) Remove cover (1).



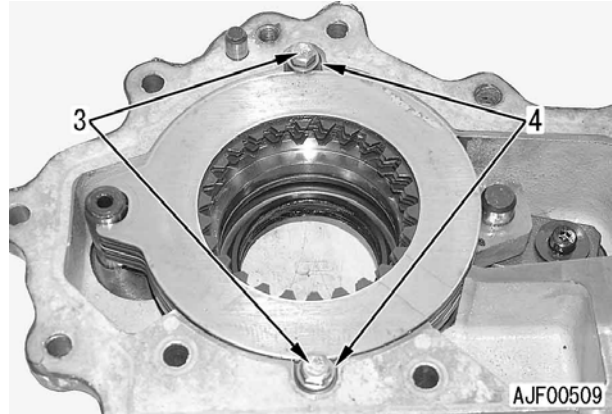
- 2) Remove strainer (2).



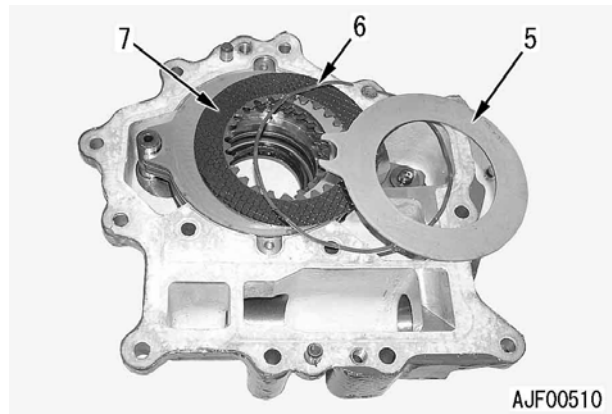
2. Plates, discs, and springs

- 1) Remove 2 clamping bolts (3) and 2 spacers (4).

★ Since the spring tension is applied, loosen the 2 clamping bolts evenly.

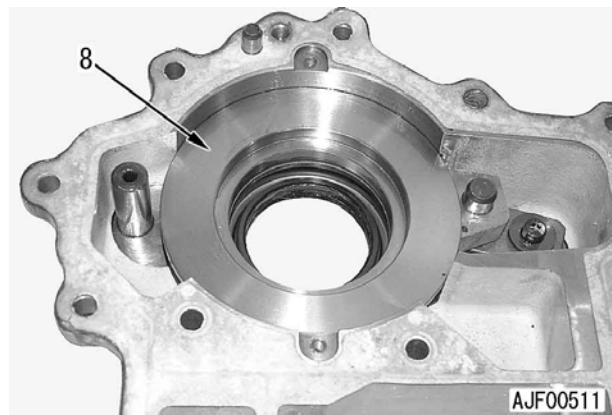


- 2) Remove 5 plates (5), 4 wave springs (6), and 4 discs (7).



3. Cam plate


- 1) Remove cam plate (8).



Installation


- Carry out installation in the reverse order to removal.

[*1]



 Rear wheel mounting bolt:
785 – 980 Nm {80 – 100 kgm}

[*2]


- ★ Check that the radial runout of the rear axle from the transfer in lateral direction is not larger than 3 mm. If it is larger than 3 mm, reduce it by moving the transfer mount.
- ★ When installing the drive shaft, check that the key way of the spider cap is fitted to the key way of the mating yoke, and then tighten the mounting bolts.

 Rear drive shaft mounting bolt:
59 – 74 Nm {6.0 – 7.5 kgm}

[*3]

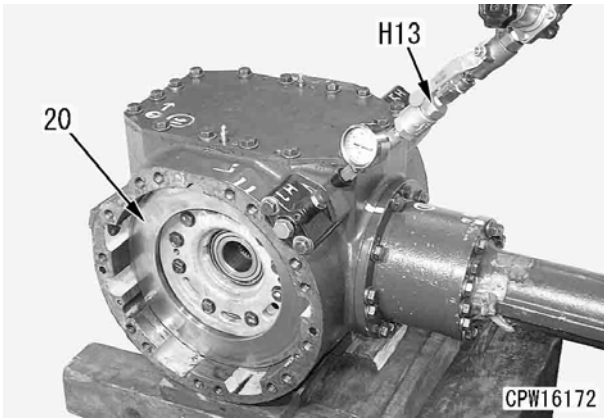
 Coupling mounting bolt: **Adhesive (LT-2)**
 Coupling mounting bolt:
245 – 309 Nm {25.0 – 31.5 kgm}

[*4]

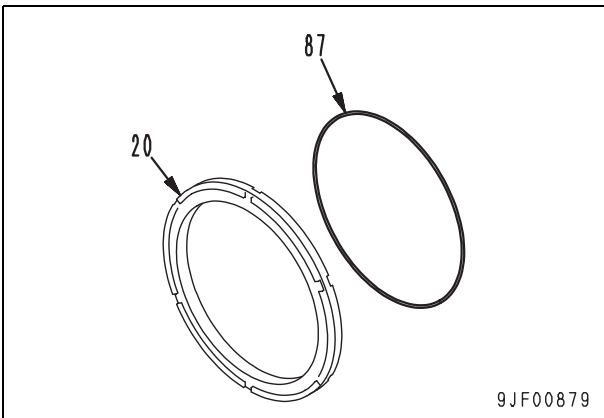
 Support mounting bolt:
785 – 980 Nm {80 – 100 kgm}

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

- 4) Using tool **H13**, supply air to the brake port to remove piston (20).
 - ⚠ **Do not stand in front of the piston.**
(Check that there is no person in front of the piston.)
 - ★ Supply air slowly.



- 5) Remove seal (87) from piston (20).

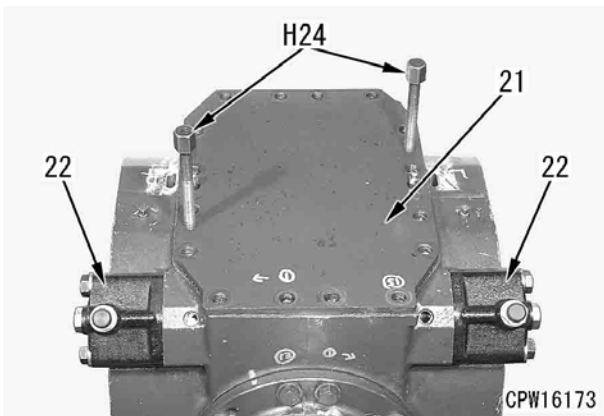


8. Top cover

- 1) Remove the mounting bolts, and then remove top cover (21), using tool **H24**.

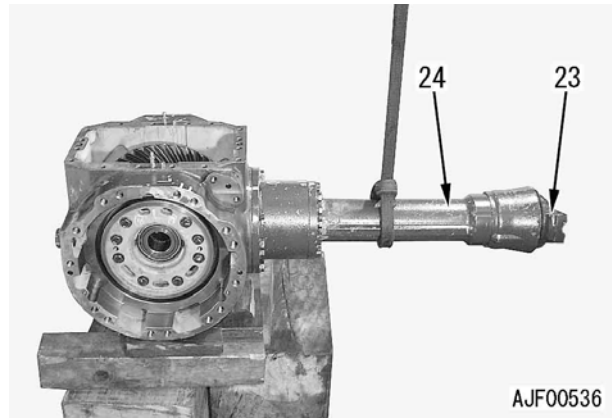
9. Slack adjuster

- 1) Remove 2 slack adjusters (22).



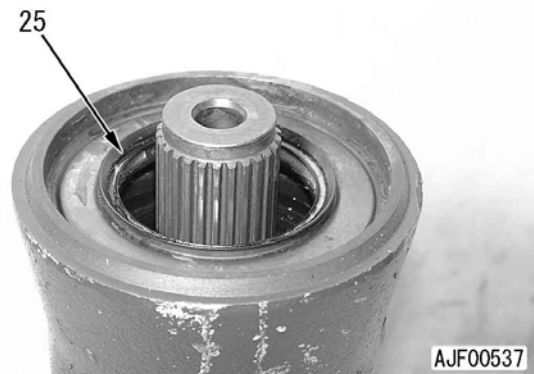
10. Removal of long cage assembly (Only front differential)

- 1) Remove coupling (23).
 - ★ Remove the coupling protector only when it needs to be removed.
- 2) Remove long cage assembly (24).

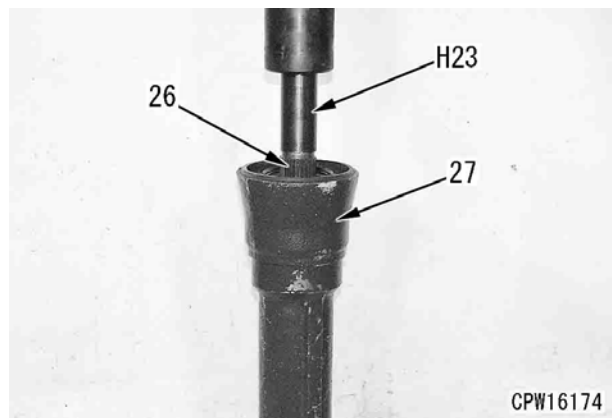


11. Disassembly of long cage assembly (Only front differential)

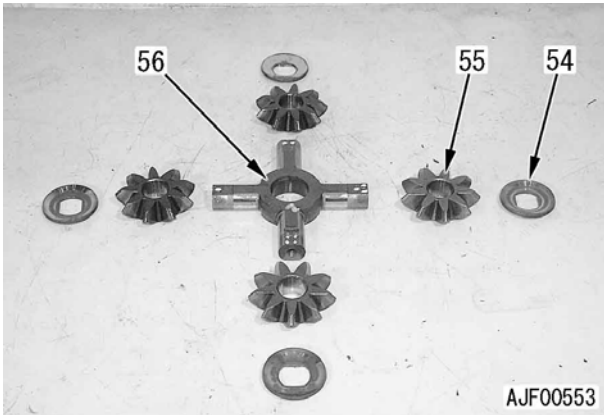
- 1) Remove oil seal (25).



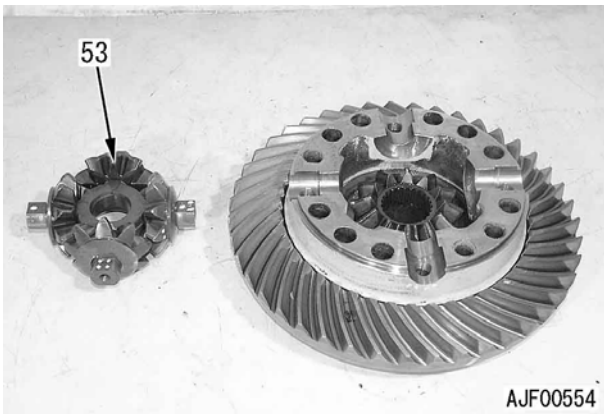
- 2) Using tool **H23**, push shaft (26) with a press to remove it from long cage (27).



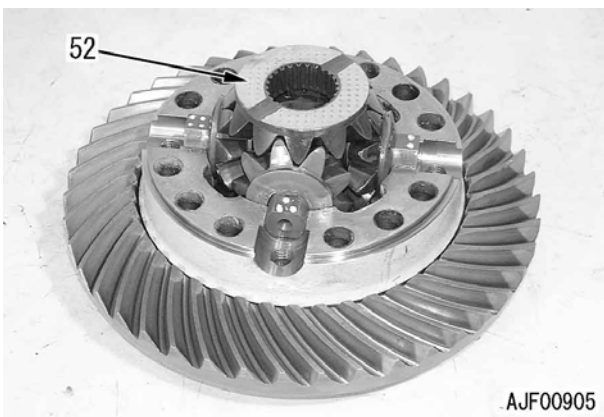
- 5) Install 4 pinion gears (55) and 4 spherical bushings (54) to spider shaft (56).



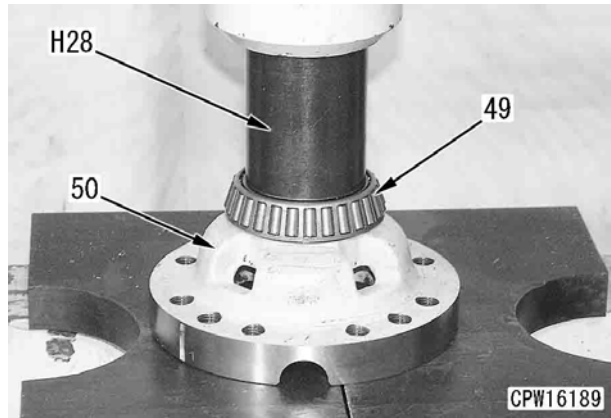
- 6) Install pinion gear assembly (53).



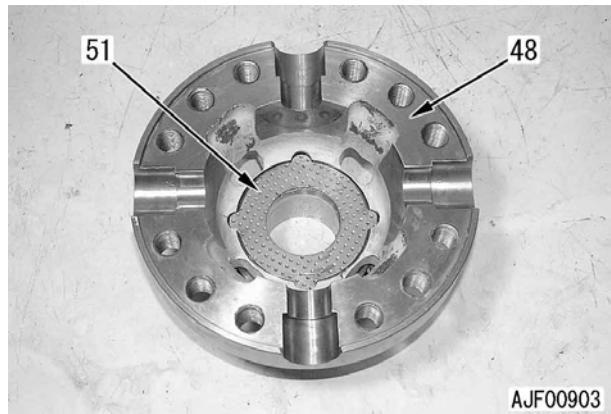
- 7) Install side gear (52).



- 8) Install bearing (49) to case (50).
 ★ Install the bearing by shrink fit at temperature below 100°C or by using tool H28 and a press.



- 9) Install washer (51) to case and bearing assembly (48).
 ★ Install the washer with the dimpled side up (toward the side gear).
 ★ Apply axle oil (AXO80) or grease thinly to the washer and stick the washer to the case.



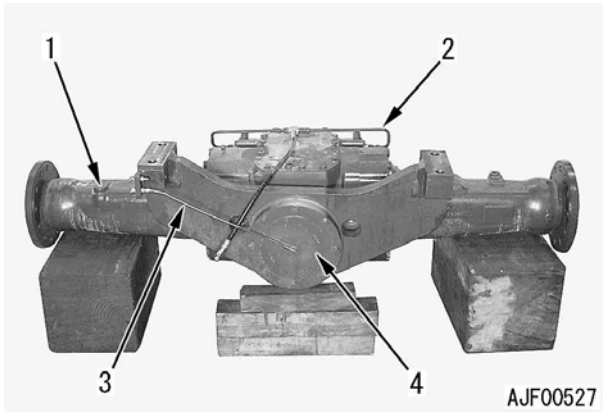
- 10) Install case and bearing assembly (48).
 ★ Match the match marks made when the assembly was removed.
 ★ Turn over the assembly and tighten the mounting bolts.
 ⚙ Mounting bolt: **Adhesive (LT-2)**
 ⚙ Mounting bolt:
245 – 309 Nm {25.0 – 31.5 kgm}

21. Grease tube and brake piping




- 1) Install grease tube (3).
- 2) Install brake tube and hose assembly (2).

22. Axle housing

- 1) Install both axle housings (1). For details, see "Disassembly and assembly of axle housing assembly".

**● Refilling with oil (Axle housing)**

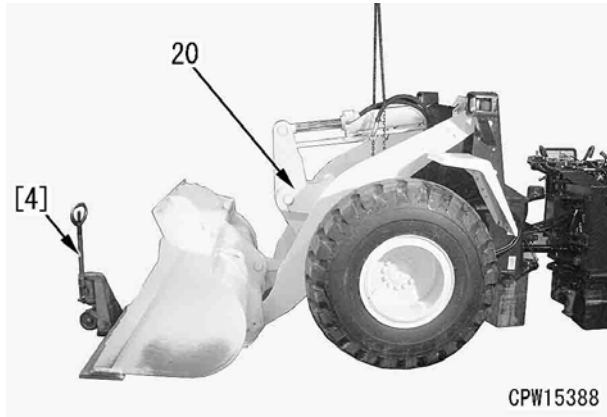
Tighten the drain plug and add oil through the oil filler to the specified level.

-  Drain plug:
127.4 – 176.4 Nm {13 – 18 kgm}
-  Oil filler plug:
93.1 – 122.5 Nm {9.5 – 12.5 kgm}
-  Axle oil: (Each of front and rear):
18 ℓ (AXO80)

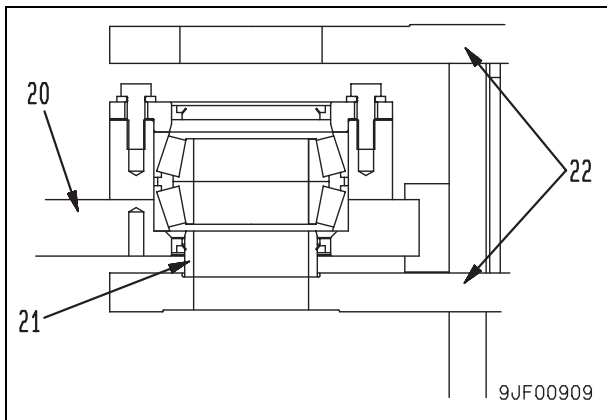
[*6] [*7] [*8] [*9]

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

1. Set hand lift truck [4] under the bucket and turn the tires to move the front frame assembly (20) toward the rear frame.



2. Using a bar, etc., raise front frame assembly (20) by 1 – 2 mm to move spacer (21) to the spacer of rear frame assembly (22).
 - ★ You may raise the front frame assembly by 1 – 2 mm with a large-sized crane, if available.

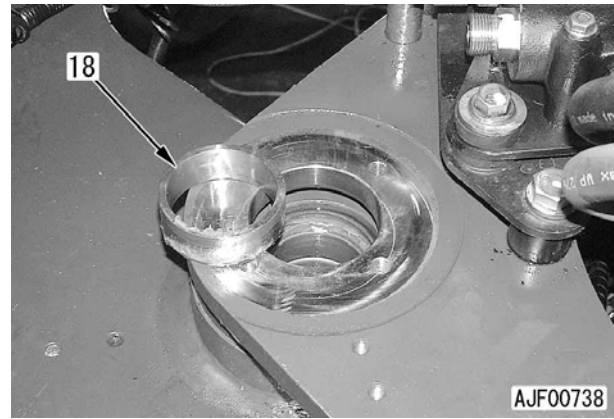


3. Align the upper and lower pin holes.
 - ★ Using a hydraulic jack, adjust the height of the front and rear frames and align the pin holes.
 - ⚠ **When aligning the pin holes, use a bar. Never insert your fingers in the pin holes.**

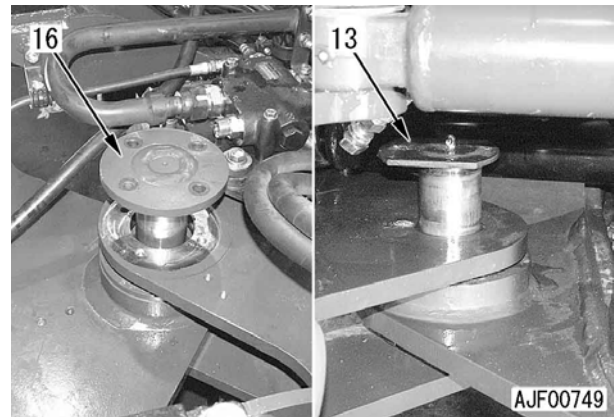
4. Install upper spacer (18).
 - ★ Install the spacer with the chamfered part on the bearing side.



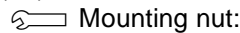
Upper spacer:
Lubricant containing molybdenum disulfide (LM-P)



5. Insert upper hinge pin (16) and lower hinge pin (13) to the end.
 - ★ Do not insert the shim for the upper hinge pin.



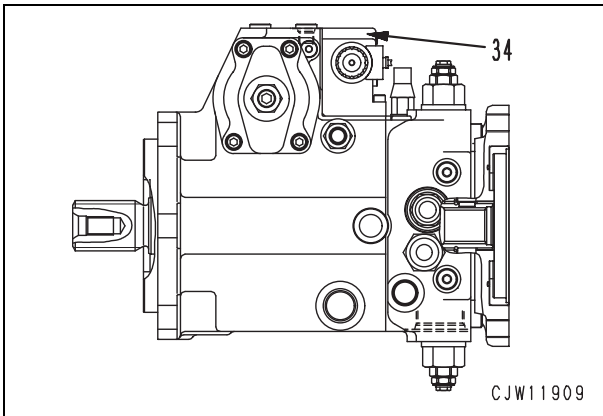
6. Tighten mounting nut (15) of upper hinge pin (16).



Mounting nut:
510 – 628 Nm {52.0 – 64.0 kgm}

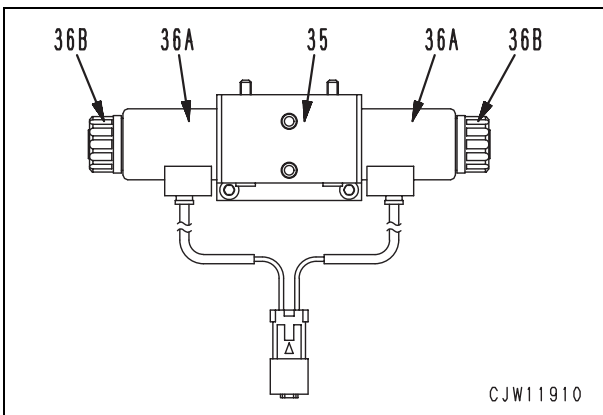
5. Forward-reverse solenoid valve (34)

- 1) Remove forward-reverse solenoid valve assembly (34).



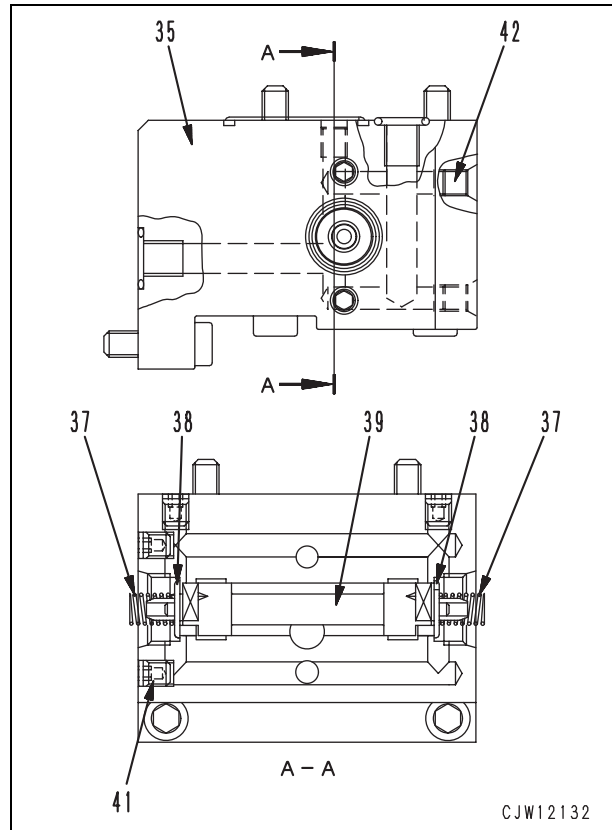
- 2) Remove 2 solenoid valves (36) from forward-reverse solenoid valve assembly (34).

★ Remove cap (36B) by turning it and remove coil (36A) by pulling it from the solenoid valve, and then remove the tube from the valve housing assembly (35).



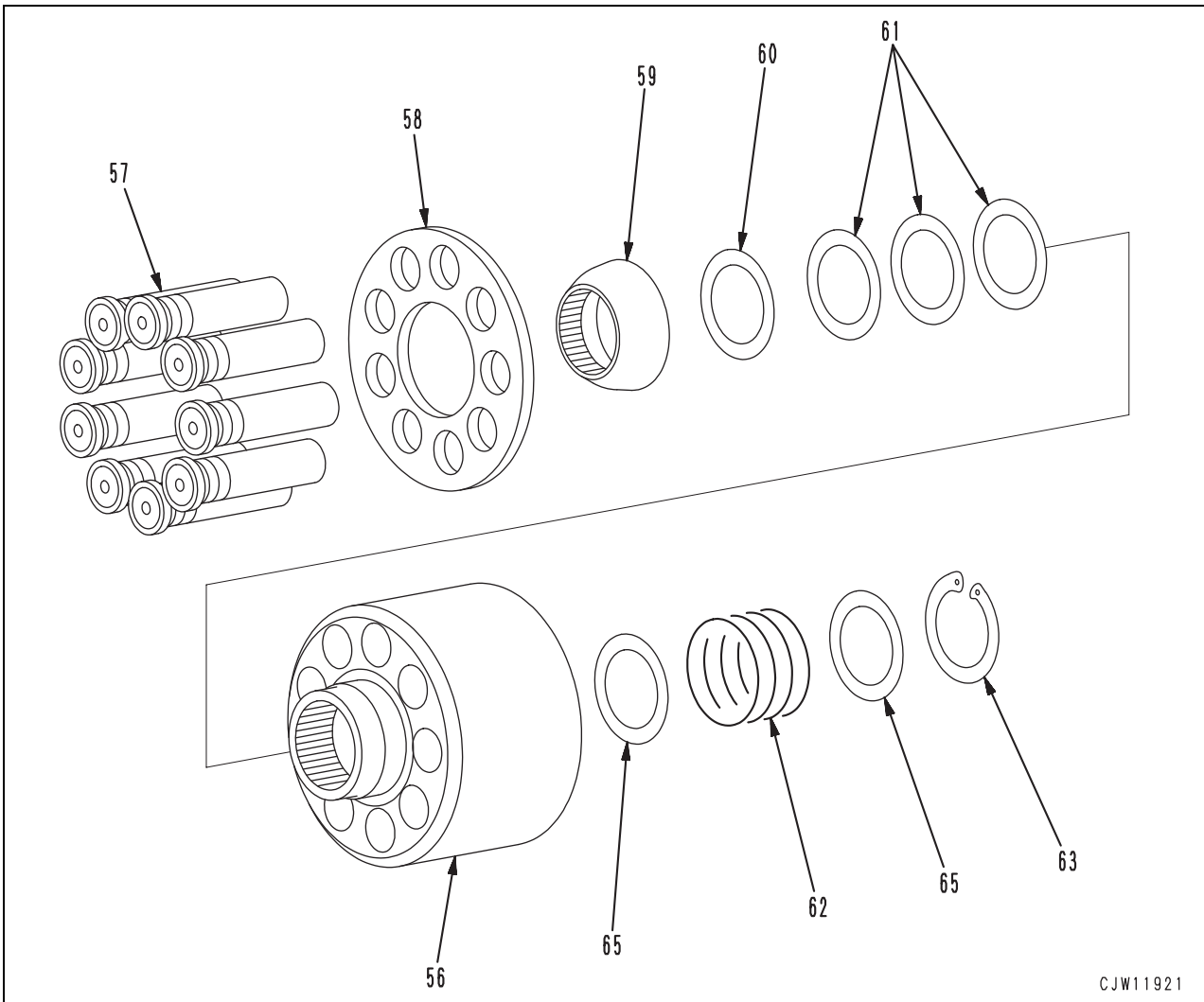
- 3) Disassemble the valve housing assembly (35) according to the following procedure.

- 1] Remove 2 springs (37) and 2 collars (38).
- 2] Remove piston (39).
- ★ Do not remove 4 plugs (41) and plug (42) from housing.



5. Cylinder block and piston assembly

- 1) Assemble the cylinder block and piston assembly according to the following procedure.



CJW11921

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