

SHOP MANUAL KOMATSU D85EX-15 D85PX-15

MACHINE MODEL

SERIAL NUMBER

D85EX-15

10001 and up

D85PX-15

1001 and up

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- D85EX, PX-15 mount the SA6D125E-3 engine.
For details of the engine, see the 125-3 Series Engine Shop Manual.

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


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HOISTING INSTRUCTIONS

HOISTING

! Heavy parts (25 kg or more) must be lifted with a hoist, etc. In the **DISASSEMBLY AND ASSEMBLY** section, every part weighing 25 kg or more is indicated clearly with the symbol 

- If a part cannot be smoothly removed from the machine by hoisting, the following checks should be made:
 - 1) Check for removal of all bolts fastening the part to the relative parts.
 - 2) Check for existence of another part causing interference with the part to be removed.

WIRE ROPES

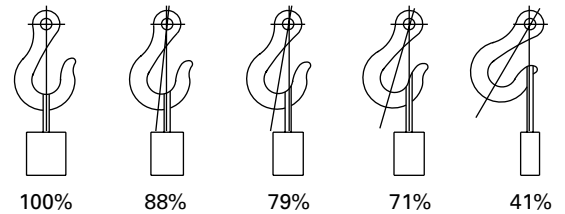
- 1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

Wire ropes
(Standard "Z" or "S" twist ropes
without galvanizing)

Rope diameter	Allowable load	
	kN	tons
mm		
10	9.8	1.0
11.5	13.7	1.4
12.5	15.7	1.6
14	21.6	2.2
16	27.5	2.8
18	35.3	3.6
20	43.1	4.4
22.4	54.9	5.6
30	98.1	10.0
40	176.5	18.0
50	274.6	28.0
60	392.2	40.0

- ★ The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.
- 2) Sling wire ropes from the middle portion of the hook.

Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



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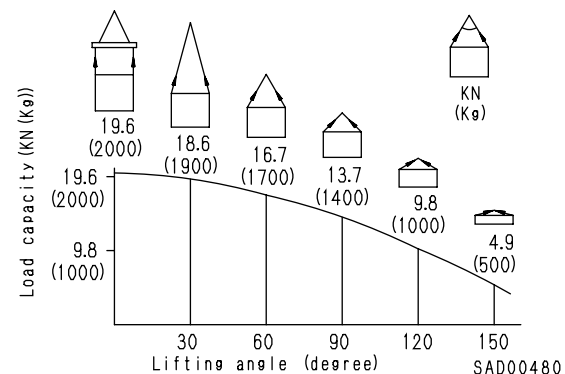
- 3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.

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

- 4) Do not sling a heavy load with ropes forming a wide hanging angle from the hook.

When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load kN {kg} when hoisting is made with two ropes, each of which is allowed to sling up to 9.8 kN {1000 kg} vertically, at various hanging angles.

When two ropes sling a load vertically, up to 19.6 kN {2000 kg} of total weight can be suspended. This weight becomes 9.8 kN {1000 kg} when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 39.2 kN {4000 kg} if they sling a 19.6 kN {2000 kg} load at a lifting angle of 150°.



SAD00480

Millimeters to Inches

1 mm = 0.03937 in

	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	1.811	1.850	1.890	1.929
50	1.969	2.008	2.047	2.087	2.126	2.165	2.205	2.244	2.283	2.323
60	2.362	2.402	2.441	2.480	2.520	2.559	2.598	2.638	2.677	2.717
70	2.756	2.795	2.835	2.874	2.913	2.953	2.992	3.032	3.071	3.110
80	3.150	3.189	3.228	3.268	3.307	3.346	3.386	3.425	3.465	3.504
90	3.543	3.583	3.622	3.661	3.701	3.740	3.780	3.819	3.858	3.898

Kilogram to Pound

1 kg = 2.2046 lb

	0	1	2	3	4	5	6	7	8	9
0	0	2.20	4.41	6.61	8.82	11.02	13.23	15.43	17.64	19.84
10	22.05	24.25	26.46	28.66	30.86	33.07	35.27	37.48	39.68	41.89
20	44.09	46.30	48.50	50.71	51.91	55.12	57.32	59.53	61.73	63.93
30	66.14	68.34	70.55	72.75	74.96	77.16	79.37	81.57	83.78	85.98
40	88.18	90.39	92.59	94.80	97.00	99.21	101.41	103.62	105.82	108.03
50	110.23	112.44	114.64	116.85	119.05	121.25	123.46	125.66	127.87	130.07
60	132.28	134.48	136.69	138.89	141.10	143.30	145.51	147.71	149.91	152.12
70	154.32	156.53	158.73	160.94	163.14	165.35	167.55	169.76	171.96	174.17
80	176.37	178.57	180.78	182.98	185.19	187.39	189.60	191.80	194.01	196.21
90	198.42	200.62	202.83	205.03	207.24	209.44	211.64	213.85	216.05	218.26

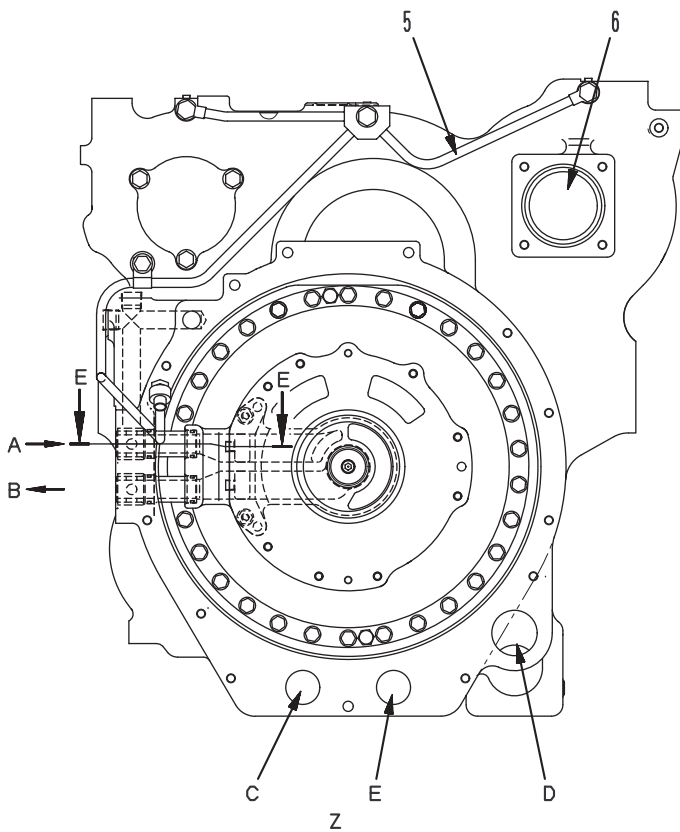
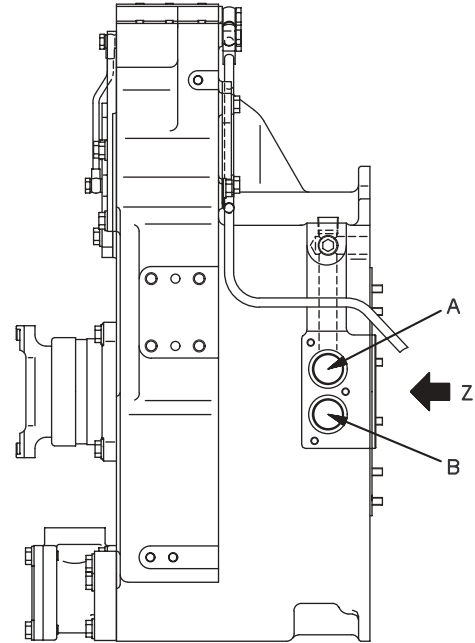
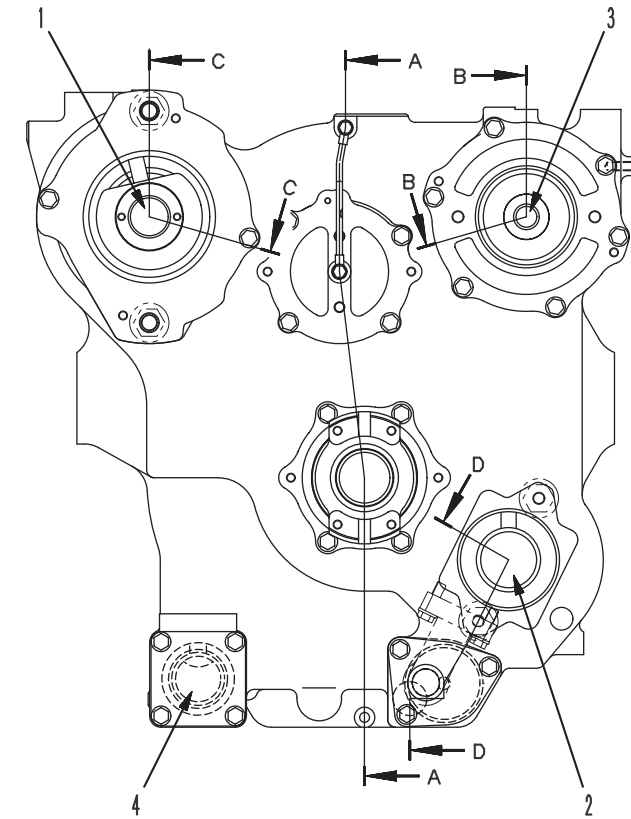
Machine model		D85EX-15		
Serial number		10001 and up		
Power train system	HSS pump	MPa {kg/cm ² } ℓ/min/rpm	Variable swash plate type (HPV160) Max. discharge pressure: 40.2 {410} Logical discharge pressure: 341/2,133	
	HSS motor	MPa {kg/cm ² }	Fixed swash plate type (HMF112) Max. allowable working pressure: 40.2 {410}	
	Bevel gear shaft		Spiral bevel gear type, force-feed lubrication gear pump type	
	HSS	HSS steering system		Differential planetary gear type, hydraulic motor actuated type, electric motorized type, hydraulically actuated type
		Master brake		Wet type, multiple disc clutch type, spring-boosted type, hydraulically actuated type, pedal operated type
	Final drive		Spur gear 1-stage, planetary gear 1-stage type, splash type lubrication	
Undercarriage	Suspension		Rigid, balancing beam type	
	Carrier roller		2 on each side	
	Track roller		7 on each side	
	Track shoe (560 mm)		Assembly type, single grouser, 41 each side Pitch: 260.6 mm	
Power train + lubrication pump (tandem)			Gear type (SAL(3)63+(2)50)	
Scavenging pump			Gear type (SAR(3)80)	
Work equipment hydraulic system	Work equipment pump	MPa {kg/cm ² } ℓ/min/rpm	Variable swash plate type (HPV160) with HSS common use Max. discharge pressure: 27.4 {280} Work equipment relief pressure: 22.5 {230} Logical discharge pressure: 341/2,133	
	Variable in-line pump type	Fan pump	MPa {kg/cm ² } ℓ/min/rpm	Variable swash plate type: (LPV30) Max. discharge pressure: 19.1 {195} Logical discharge pressure: 64/2,133
Fan motor		MPa {kg/cm ² } ℓ/min/rpm	Fixed swash plate type (LMF28) Max. allowable working pressure: 19.1 {195}	

TABLE OF FUEL, COOLANT AND LUBRICANT

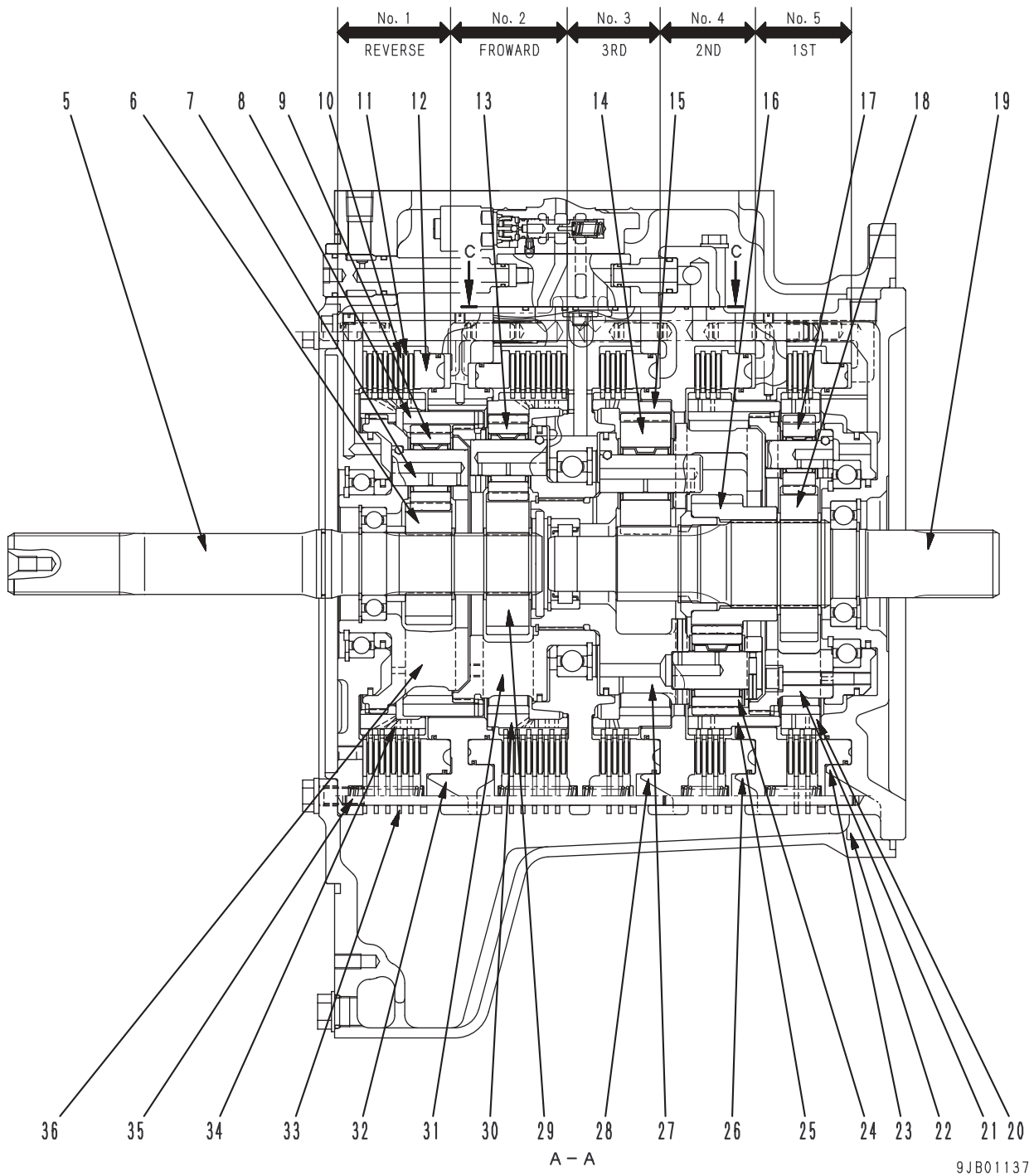
Refilling position	Kind of oil	Ambient temperature							Specified oil amount (ℓ)	Refilled oil amount (ℓ)
		-20	-10	0	10	20	30	40 C°		
Engine oil pan	Engine oil	SAE 30					44	38		
		SAE 10		SAE 10W-30						
		SAE 15W-40								
Power train oil pan (including torque converter, transmission and bevel gear case)	Engine oil	SAE 30					90	60		
Final drive case (each side)		SAE 10		D85EX-15: 26 D85PX-15: 36	D85EX-15: 26 D85PX-15: 36					
Damper case	Engine oil	SAE 30					1.5	1.5		
Pivot shaft case (each side)							7	7		
Hydraulic oil	Engine oil	SAE 10					D85EX-15:120 D85PX-15:106	67		
		SAE 10W-30								
		SAE 15W-40								
Idler (each)	Gear oil								0.35	0.35
Track roller (each)		GO 140					0.28	0.28		
Carrier roller (each)									0.5	0.5
Fuel tank	Diesel fuel	ASTM D975 No.2					490	—		
		* 1								
Cooling system (Incl. reservoir tank)	Coolant	Add antifreeze						82	—	

*1 ASTM D975 No.1

TORQUE CONVERTER, PTO



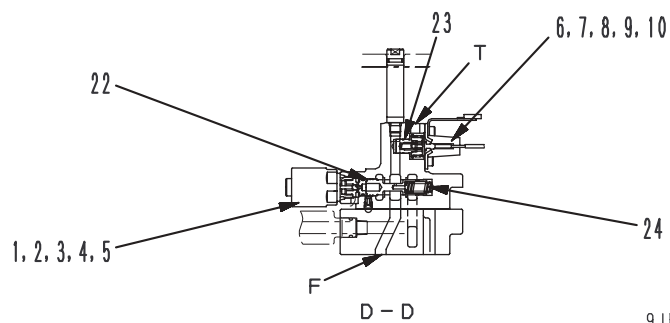
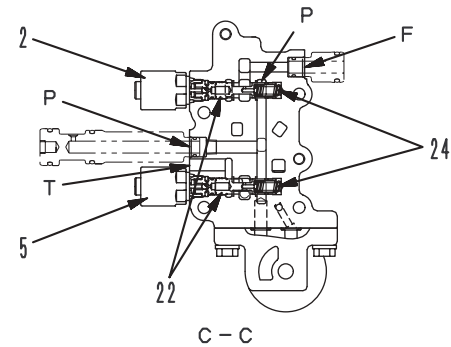
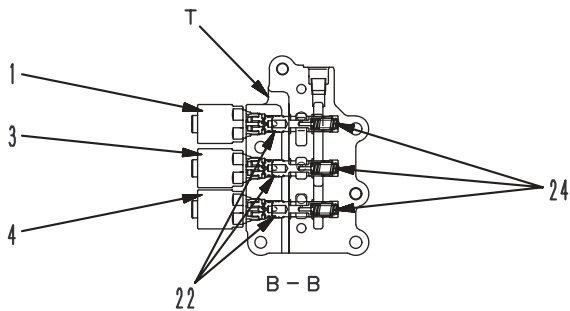
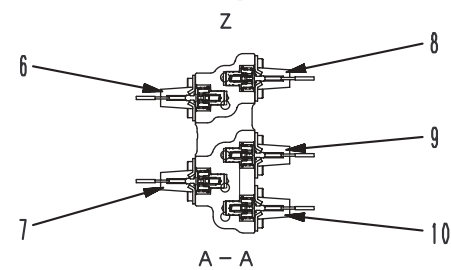
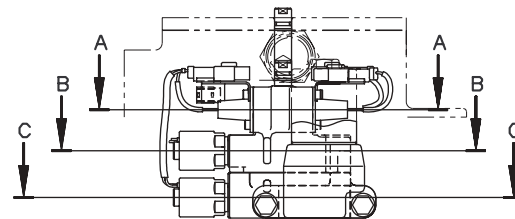
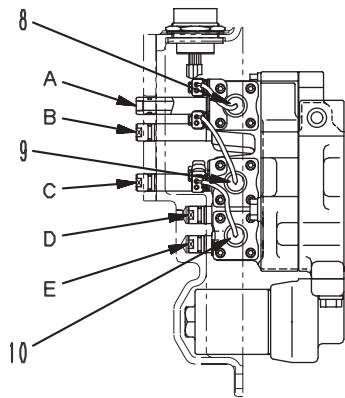
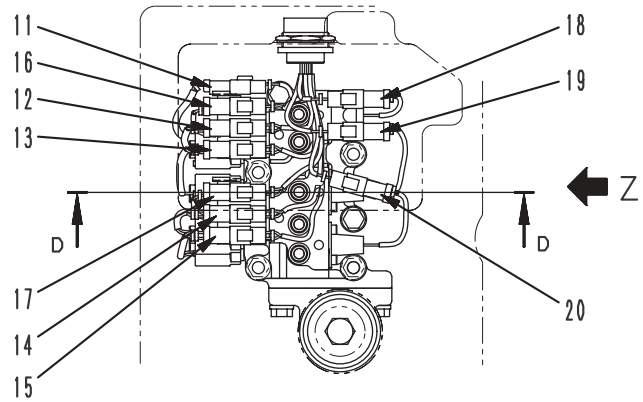
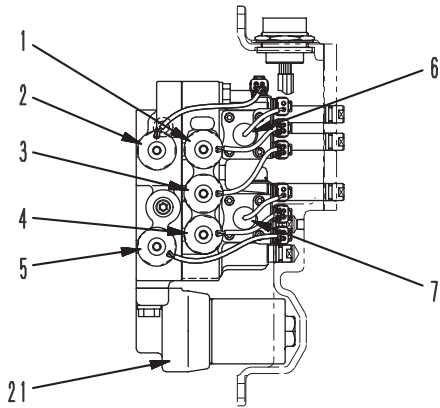
9JB01130



9JB01137

TRANSMISSION ECMV

(Electronic control modulation valve)



9JB01162

1. PCCS lever
2. Transmission, steering controller
3. Hydraulic, HSS valve
4. Hydraulic, HSS pump
5. Engine
6. EPC valve
7. Hydraulic tank
8. Sprocket
9. Final drive
10. HSS motor
11. HSS opening circuit
12. Servo valve
13. Engine controller

- A. Forward, reverse signal
- B. Steering signal
- C. Engine control information
- D. Hydraulic oil pressure signal
- E. CAN communication network

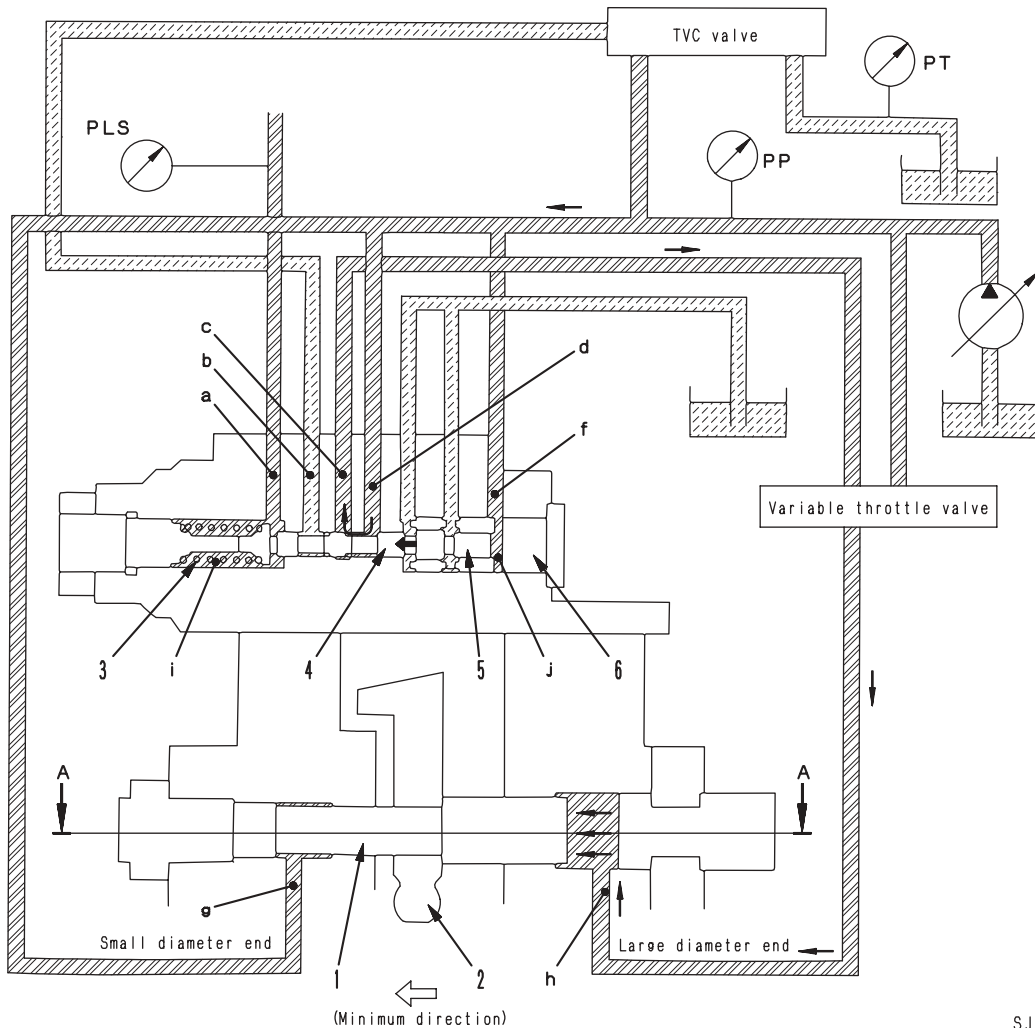
Outline

- HSS system is an abbreviation for the Hydrostatic Steering System.
- The HSS system consists of a set of hydraulic-HSS valve, piston pump, and piston motor. It turns the machine continuously without lowering the travel speed by making a difference in speed between both tracks.
- The transmission, steering controller controls the EPC valve of the hydraulic-HSS valve to control the revolving direction and revolving speed of the HSS motor according to the tilting direction and angle of the PCCS lever. The HSS motor acts on the planetary gear mechanism of the bevel gear shaft to make a difference in speed between both sprockets. As a result, the machine turns.
- The steering-transmission controller senses the engine speed and oil pressure at each part and controls the hydraulic, HSS pump and hydraulic, HSS valve to drive the HSS pump so that the engine will not stall.
- The engine speed signal and other engine control information items are send and received through the CAN communication network which connects the engine controller and transmission, steering controller.

Operation

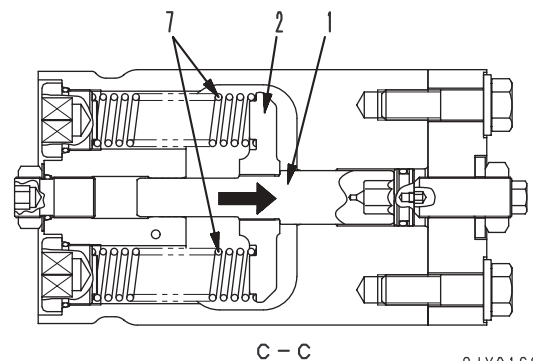
1. LS valve

(1) When control valve is at "neutral" position

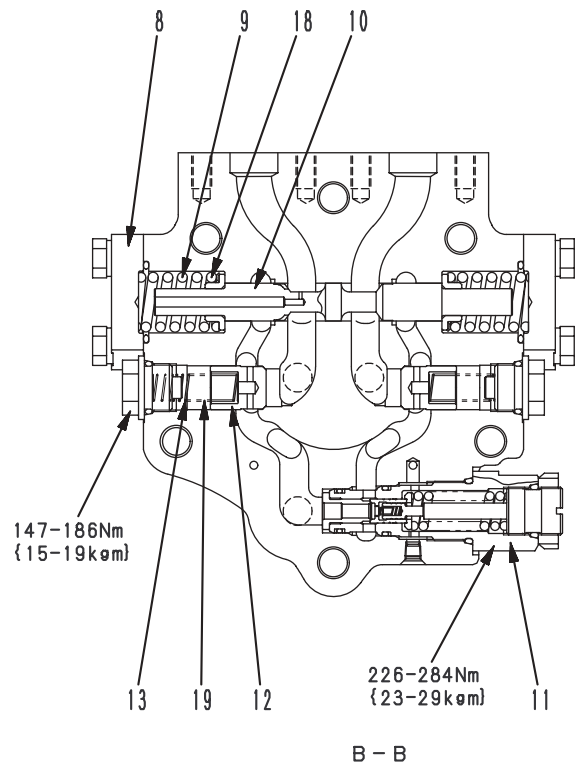
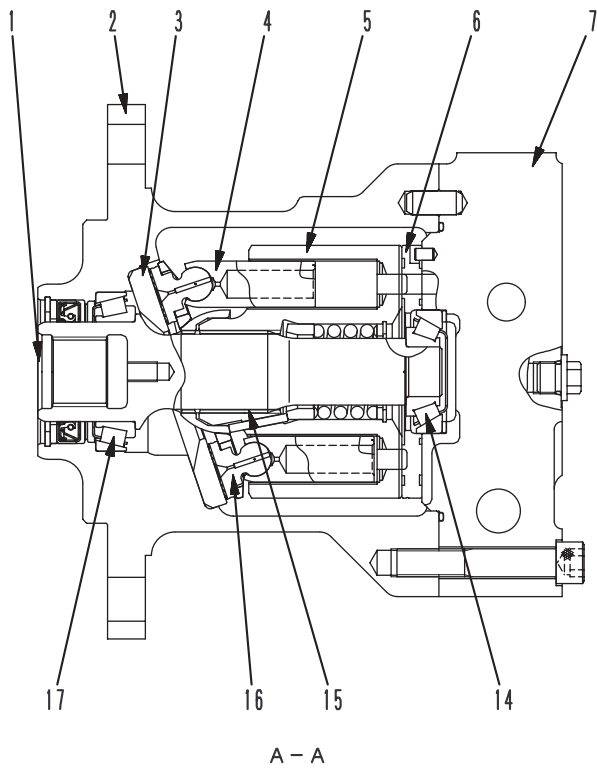


SJD05260

- The LS valve is a three-way selector valve, with pressure **PLS** (LS pressure) from the outlet port of the control valve brought to spring chamber **i**, and main pump discharge pressure **PP** brought to chamber **j** of plug (6). The size of the LS pressure **PLS** + force **F** of spring (3) and the main pump pressure (self pressure) **PP** determines the position of spool (4).
- Before the engine is started, servo piston (1) is pushed to the right by spring (7) installed to rod (2). (See the diagram on the right)
- When the engine is started and the control lever is at the "NEUTRAL" position, LS pressure **PLS** is 0 MPa {0 kg/cm²}. (It is interconnected with the drain circuit through the control valve spool.) At this point, spool (4) is pushed to the left, and port **d** and port **c** are connected. Pump pressure **PP** enters the large diameter end of the piston from port **h**.
- The same pump pressure **PP** also enters the small diameter end of the piston, so the swash plate is moved to the minimum angle by the difference in area of piston (1).



9JY01624

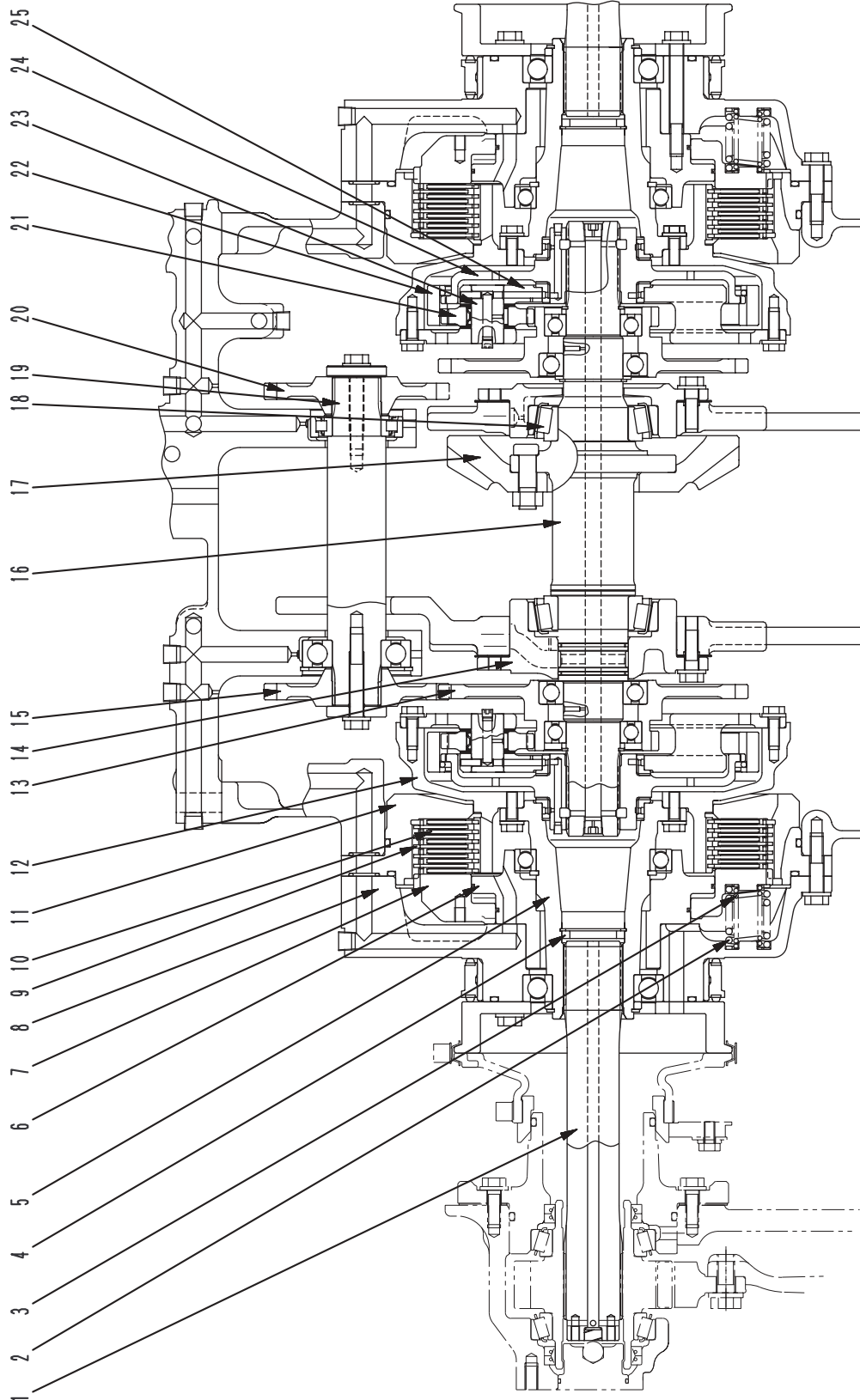


9JY01629

- | | |
|---|--|
| <ul style="list-style-type: none"> 1. Output shaft 2. Motor case 3. Swash plate 4. Piston 5. Cylinder 6. Valve plate 7. End cover 8. Brake valve assembly 9. Spool return spring | <ul style="list-style-type: none"> 10. Counterbalance valve 11. Safety valve 12. Check valve 13. Check valve spring 14. Sub bearing 15. Spline 16. Shoe 17. Main bearing |
|---|--|

Unit: mm

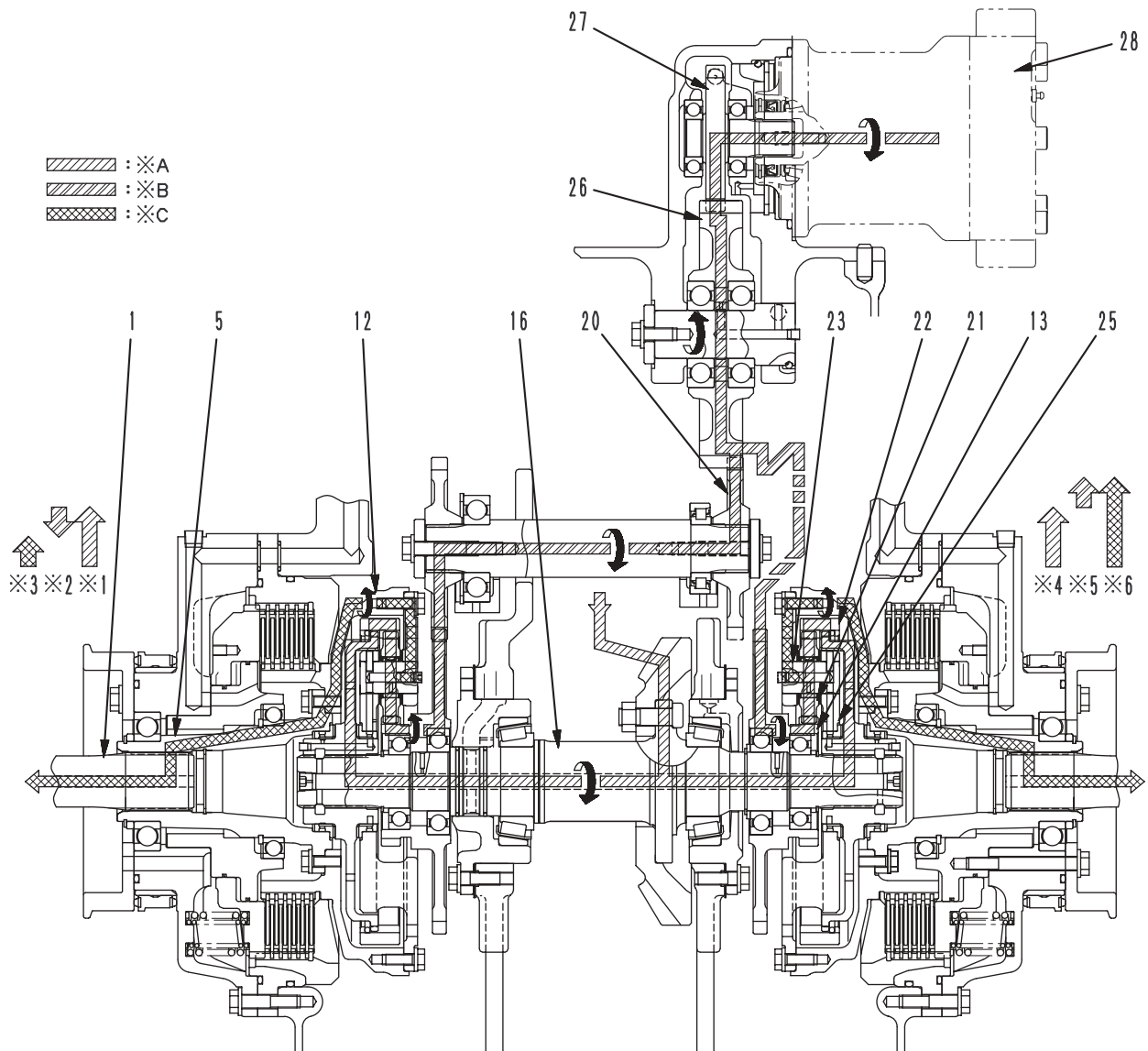
No.	Check item	Criteria				Remedy	
		Standard size		Repair limit			
		Free length x OD	Installed length	Installed load	Free length	Installed load	
18	Spool return spring	42.7 x 30.0	40.5	192 N {19.6 kg}	-	154 N {15.7 kg}	Replace spring if damaged or deformed
19	Check valve spring	43 x 13.8	32.9	1.27 N {0.13 kg}	-	0.98N {0.10 kg}	



A - A

9JB01166

3. When steering lever is operated to left



9JB01181

- ※ A: Transmission power
- ※ B: HSS motor power
- ※ C: Combined power

- ※ 1. Transmission output speed
- ※ 2. Decrease in speed from HSS motor
- ※ 3. Left bevel gear shaft output speed
(※ 1. - ※ 2.)
- ※ 4. Transmission output speed
- ※ 5. Increase in speed from HSS motor
- ※ 6. Right bevel gear shaft output speed
(※ 4. + ※ 5.)

Forward

If the steering lever is operated to the left when the machine is traveling forward, HSS motor (28) rotates clockwise as seen from the left side of the machine.

At the same time, gear A (13) on the left side of the machine rotates counterclockwise as seen from the left side of the machine, while gear A (13) on the right side of the machine rotates clockwise as seen from the left side of the machine.

When the machine is traveling forward, bevel gear shaft (16) and ring gear (22), which is interconnected with the bevel gear shaft, rotate clockwise as seen from the left side of the machine.

Therefore, considering the relationship of the rotating speed of the elements in the pairs of planetary gears, the rotating speed of carrier (25) on the right side is faster than when traveling in a straight line by the amount of the power of HSS motor; on the other hand, the rotating speed of carrier (25) on the left side is slower than when traveling in a straight line, so the machine turns in forward to the left, where the output speed is slower.

- | | |
|-------------------|----------------------|
| 1. Floating seal | 10. No.1 pinion |
| 2. Sun gear | 11. Final drive case |
| 3. Carrier | 12. Bearing cage |
| 4. Sprocket boss | 13. No.1 gear |
| 5. Sprocket teeth | 14. No.1 gear hub |
| 6. Cover | 15. Shaft |
| 7. Planetary gear | 16. Wear guard |
| 8. Ring gear | 18. Pivot shaft |
| 9. Cover | |

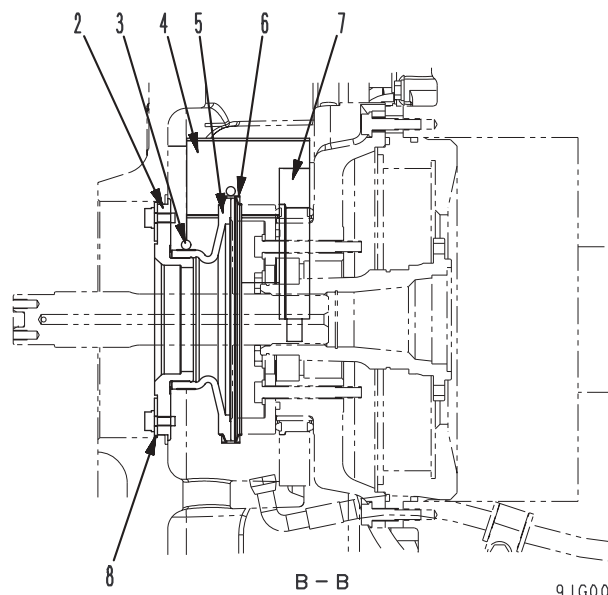
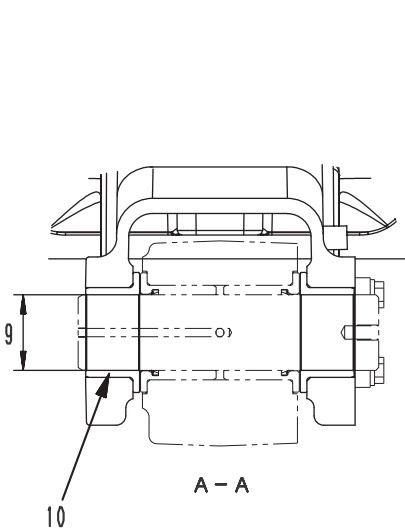
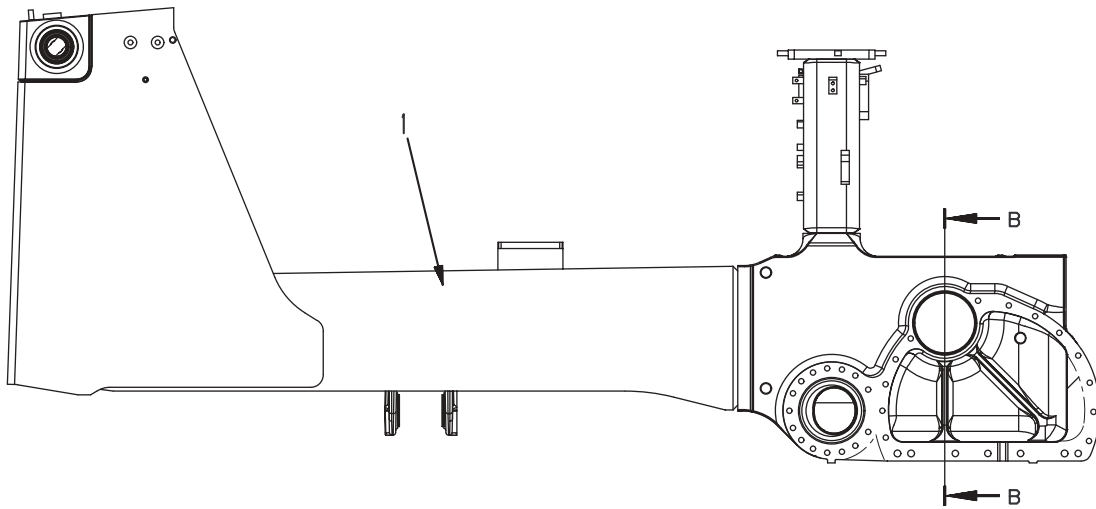
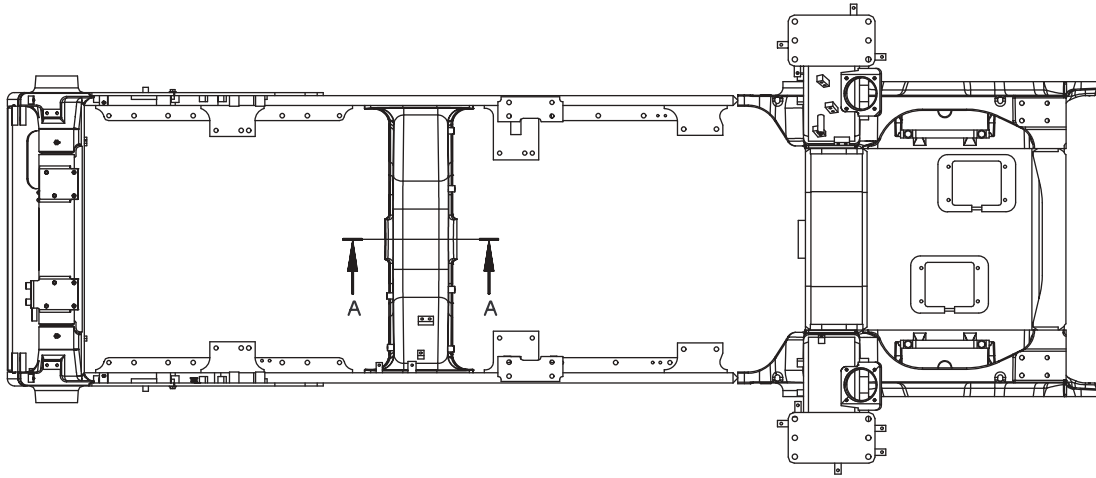
Unit: mm

No.	Check item	Criteria				Remedy	
18	Backlash between No.1 pinion and No.1 gear	Standard clearance		Clearance limit		Replace	
		0.23 – 0.79		0.79			
19	Backlash between sun gear and planetary gear	0.20 – 0.74		0.74			
20	Backlash between planetary gear and ring gear	0.24 – 0.83		0.83			
21	Outside diameter of No.1 pinion oil seal contact surface	Standard size	Tolerance		Repair limit	Repair or replace	
		70	0 – 0.074		69.926		
22	Thickness of thrust collar of inner body roller bearing	23		22.95			
23	Clearance between outer diameter of planet gear shaft and inner diameter of carrier hole. (Small diameter)	Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
		70	+ 0.021 + 0.002	0 – 0.03	– 0.051- – 0.002	0.002	Replace
24	Clearance between outer diameter of planet gear shaft and inner diameter of carrier hole. (Large diameter)	84	+ 0.059 + 0.037	+ 0.035 0	– 0.059- – 0.002	– 0.002	
25	Standard shim thickness for No.1 pinion bearing cage	2				Adjust	
26	Wear of wear guard	Standard size		Repair limit		Repair or replace	
		52		21			

Unit: mm

No.	Check item	Criteria				Remedy	
1	Press-fitting force for idler yolk	392 kN {40 ton}				Adjust	
3	Clearance between rod and bushing	Standard size	Tolerance		Standard clearance	Clearance limit	
			Shaft	Hole			
		90	- 0.120 - 0.207	+ 0.270 + 0.061	0.181- 0.477	1.0	
4	Recoil spring	Standard size			Repair limit		Replace
		Free length	Installed length	Installed load	Free length	Installed load	
		787.4	651	227.5 kN {23,200 kg}	855	208.9 kN {21,300 kg}	

MAIN FRAME



9JG00222

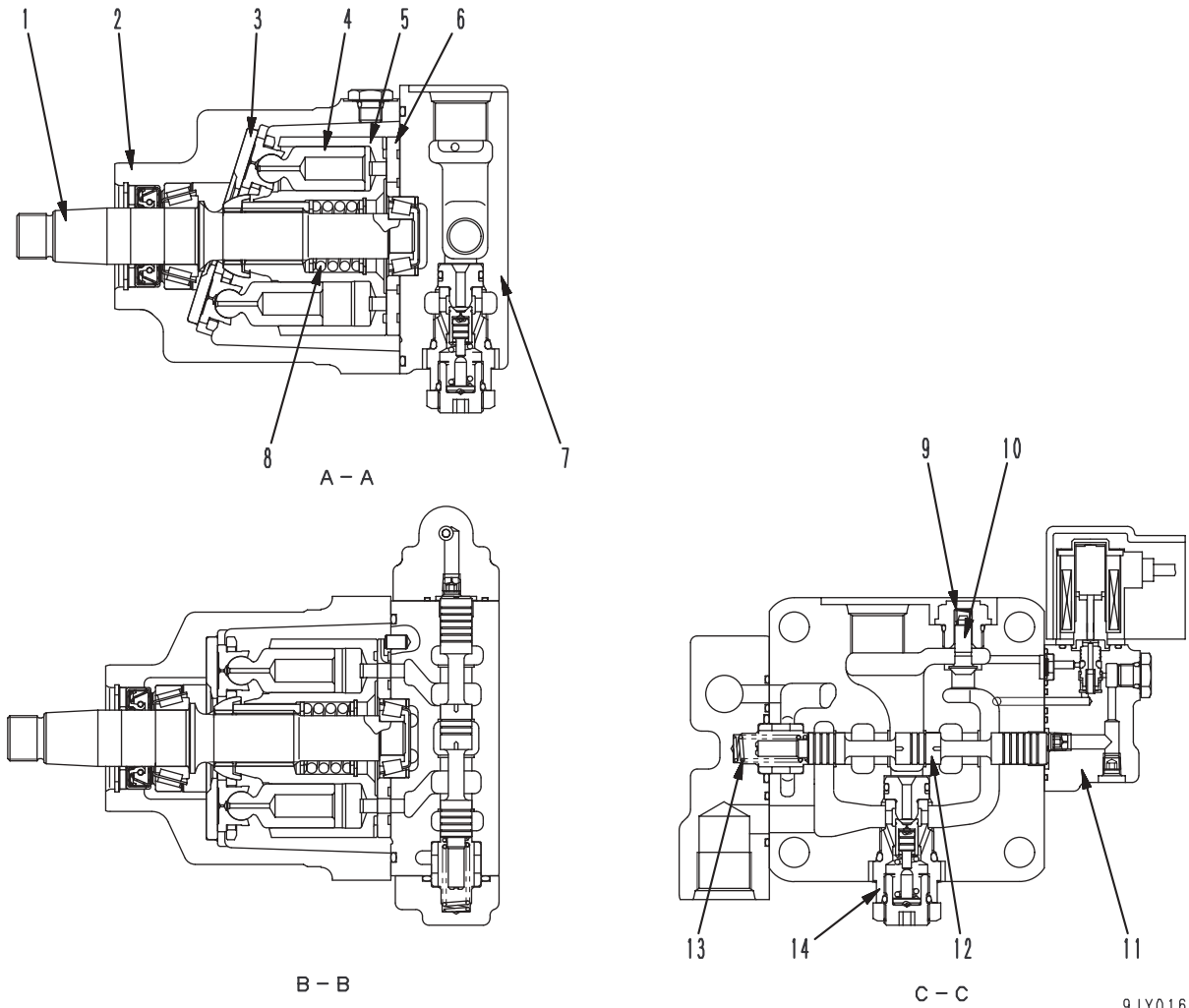
1. Work equipment safety lever
2. Blade control valve
3. Ripper control lever
4. PPC lock valve

Lever positions

- A : Blade HOLD
- B : Blade LOWER
- C : Blade FLOAT
- D : Blade RAISE
- E : Blade LEFT TILT
- F : Blade RIGHT TILT
- G : Ripper HOLD
- H : Ripper RAISE
- J : Ripper LOWER
- K : Ripper TILT IN
(For variable multiple shank ripper)
- L : Ripper TILT BACK
(For variable multiple shank ripper)
- M : FREE
- N : LOCK

Outline

- The work equipment control employs a PPC method which uses a PPC valve to move each control valve spool.
- Work equipment safety lever (1) is interconnected with PPC lock valve (4), and at the LOCK position, the oil in the PPC circuit is stopped.



- 1. Output shaft
- 2. Case
- 3. Thrust plate
- 4. Piston assembly
- 5. Cylinder block
- 6. Valve plate
- 7. End cover

- 8. Center spring
- 9. Check valve spring
- 10. Check valve
- 11. Pilot valve
- 12. Reversible valve spool
- 13. Reversible valve spring
- 14. Safety valve

Unit: mm

No.	Check item	Criteria				Remedy	
		Standard size		Repair limit			
9	Check valve spring	Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	If damaged or deformed, replace spring
		13.0 x 6.5	7.0	3.43 N {0.35 kg}	—	2.55 N {0.26 kg}	

Unit: mm

No.	Check item	Criteria					Remedy	
		Standard size	Tolerance		Standard clearance	Clearance limit		
	Shaft		Hole					
1	Clearance between piston rod and bushing	Blade lift	65	- 0.030 - 0.104	+ 0.262 + 0.067	0.097- 0.366	0.666	Replace
		Blade tilt	75	- 0.030 - 0.104	+ 0.291 + 0.077	0.107- 0.395	0.695	
		Ripper lift/ tilt	70	- 0.030 - 0.104	+ 0.271 + 0.075	0.105- 0.375	0.675	
2	Clearance between piston rod spherical surface and blade ball portion	Blade lift	85 (Ball)	-	+ 0.3 0	-	1.0	
3	Clearance between cylinder support shaft bushing and yoke	Blade lift	75	- 0.100 - 0.174	-	-	0.5	
4	Clearance between piston rod spherical shaft and cap	Blade tilt	100	- 0.200 - 0.300	-	-	-	
5	Clearance between cylinder bottom support shaft and bushing	Blade tilt	60	-	+ 0.174 + 0.100	-	1.0	
		Ripper lift/ tilt	75	-	+ 0.286 + 0.184	-	1.0	
6	Clearance between piston rod support shaft and bushing	Ripper lift/ tilt	75	-	+ 0.286 + 0.184	-	1.0	

Unit: mm

No.	Check item	Criteria					Remedy
9	Centering spring	Standard size			Repair limit		If damaged or deformed, replace spring.
		Free length x Outside diameter	Installed length	Installed load	Free length	Installed load	
		33.9 x 15.3	28.4	125 N {12.7 kg}	-	100 N {10.2 kg}	
10	Metering spring	22.7 x 8.10	22.0	16.7 N {1.70 kg}	-	13.3 N {1.36 kg}	

CONTROL VALVE

Outline

- This manual explains the 3-spool valve (Blade lift + Tilt + Steering) and 4-spool valve (Ripper + Blade lift + Tilt + Steering).

1. 3-spool valve

P: From pump

T: To hydraulic tank

A1: To HSS motor

A2: To tilt cylinder bottom

A3: To lift cylinder head

B1: To HSS motor

B2: To tilt cylinder head

B3: To lift cylinder bottom

LS: To pump LS valve

PC: Pump pressure plug

PI: From self-pressure reducing valve

TS: To hydraulic tank

PA1: Connector (From controller)

PA2: From PPC valve

PA3: From PPC valve

PB1: Connector (From controller)

PB2: From PPC valve

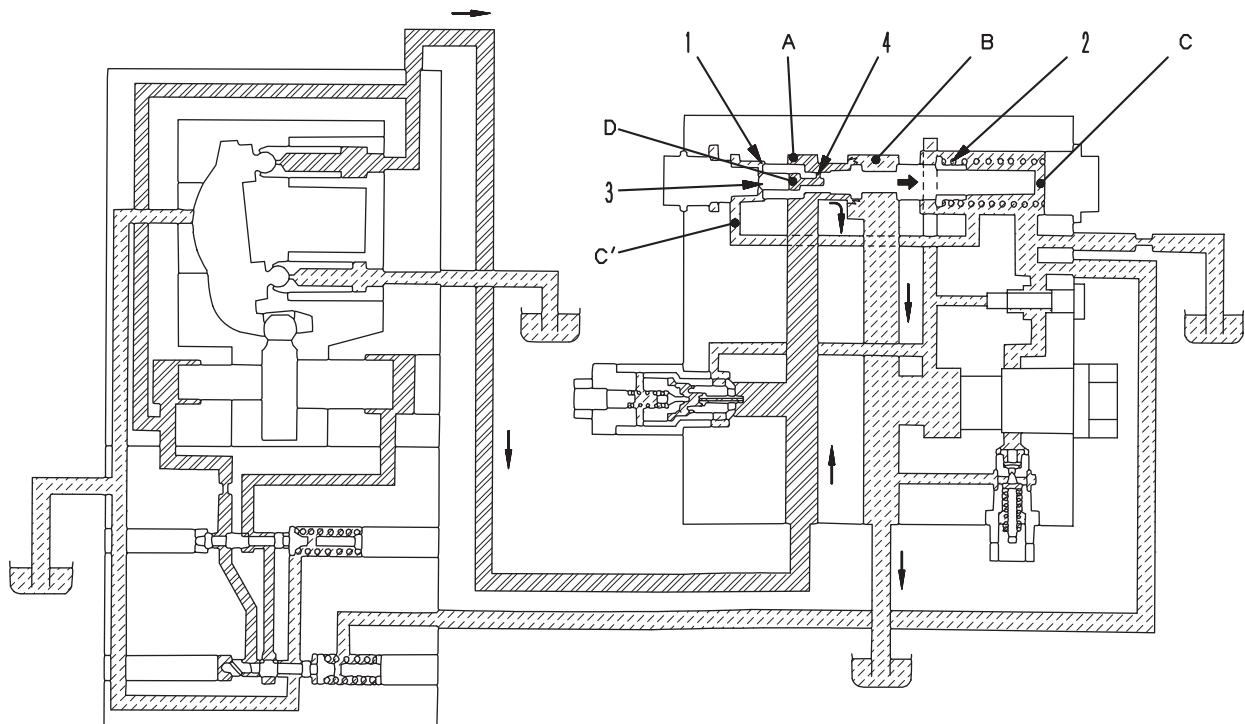
PB3: From PPC valve

PLSC: LS pressure plug

1. EPC valve

OPERATION OF MAIN CONTROL VALVE

1. AT HOLD (OPERATION OF UNLOAD VALVE)



9JY01592

Function

- When the main spool is at the HOLD position, it drains the excess oil discharged by the pump, and prevents the pressure from being formed in the circuit from rising.

Operation

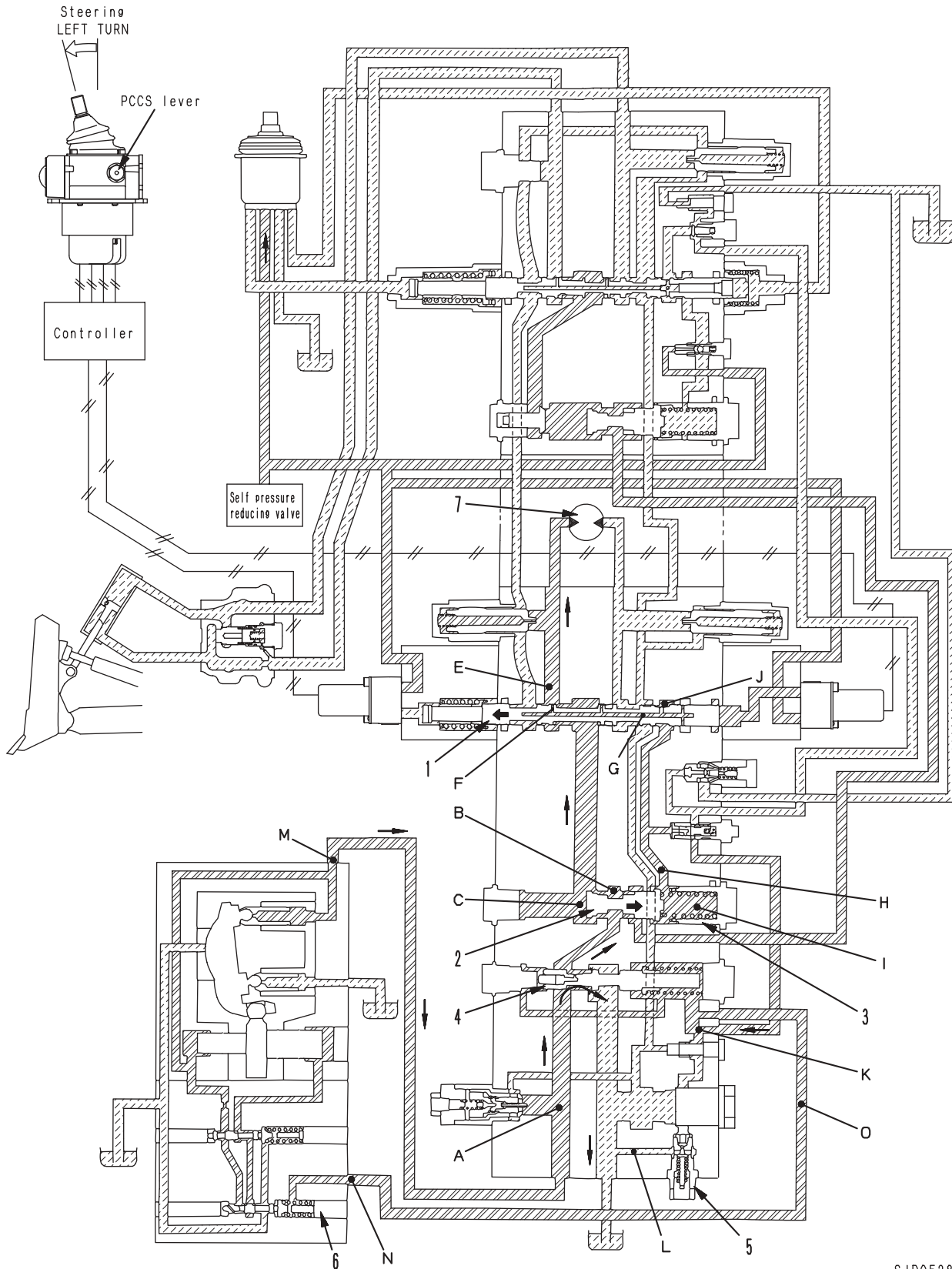
- When the main spool is at the HOLD position, the pump pressure passes from chamber **A** through throttle (4) to chamber **D**. Chambers **C** and **C'** are connected to the drain circuit.
- When oil is supplied from the pump, the pressure in chamber **D** rises, and spool (1) is pushed to the right by pressure which is determined by the cross-sectional area of piston (3) receiving the pressure.

- When **FO** becomes larger than set load **FS** of spring (2), the spool moves to the right and connects the passage between chamber **A** and chamber **B**, so the oil from the pump is drained.
- Therefore, spool (1) is balanced at a position that matches the supply of oil from the pump. Actually, the amount of oil supplied from the pump is small, so the pressure in the circuit is almost the same as the set load of spring (2).

3. AT RELIEF

(1) Steering valve

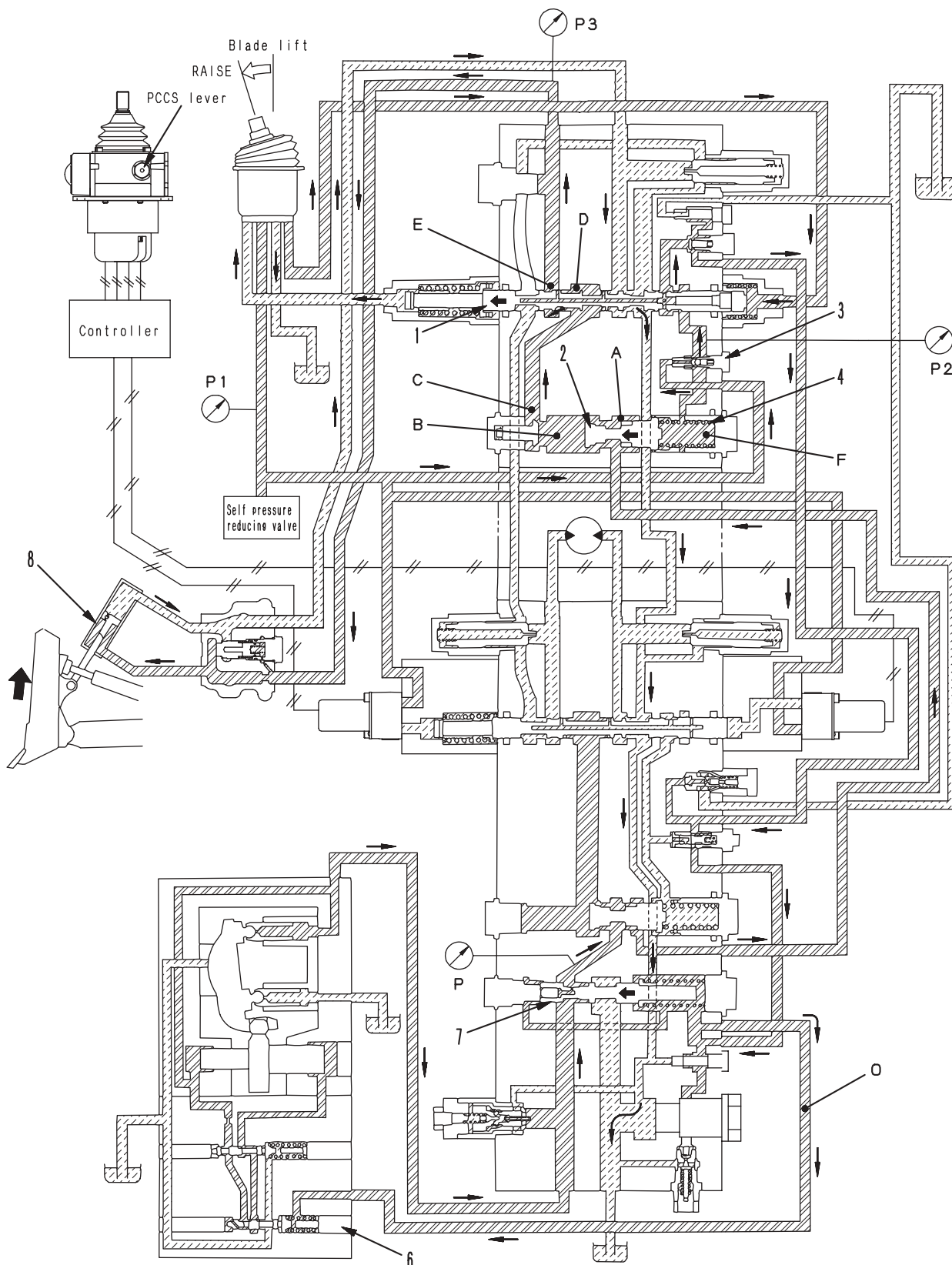
- ★ The diagram shows the condition at relief for steering LS relief valve (5).



SJD05285

5. UNLOAD VALVE PRESET SYSTEM

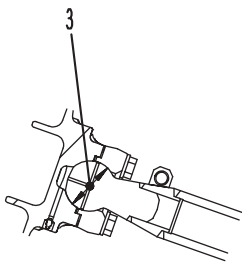
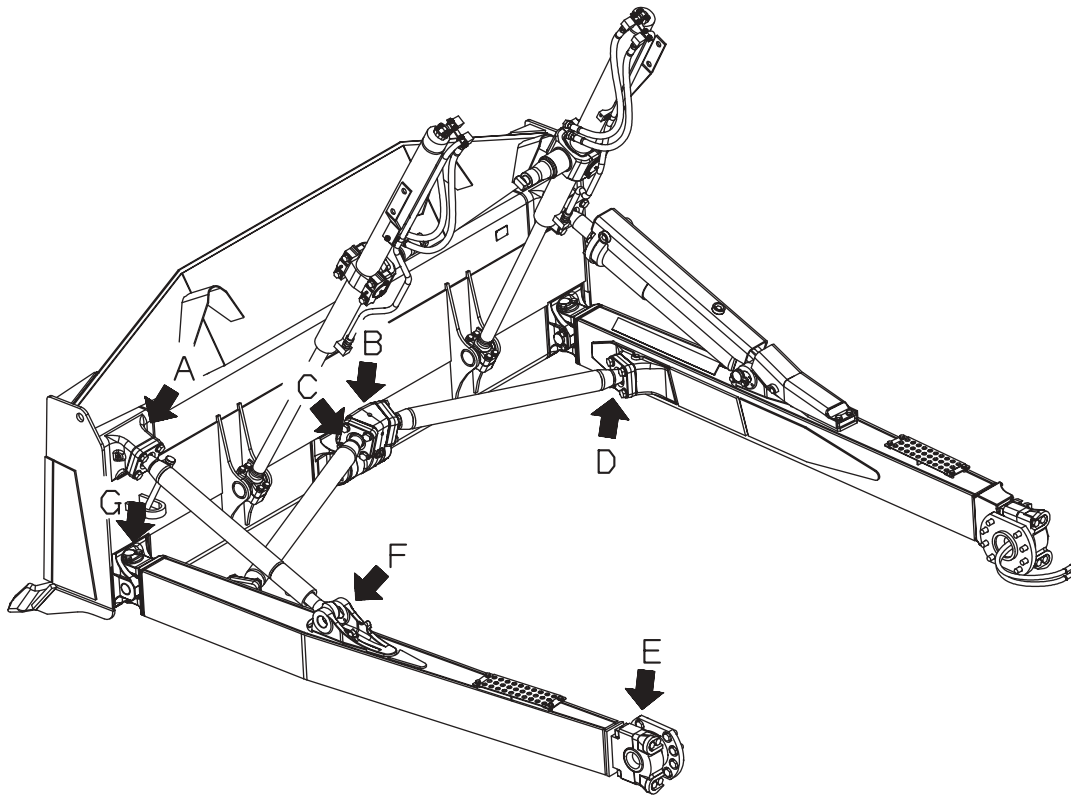
- ★ The diagram shows the condition with preset check valve (3) open immediately after blade lift valve is operated.



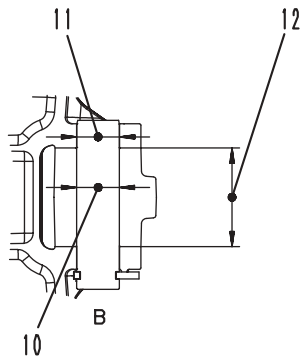
SJD05291

BLADE

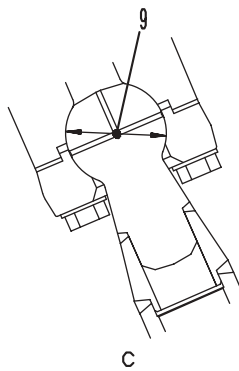
SEMI U-DOZER



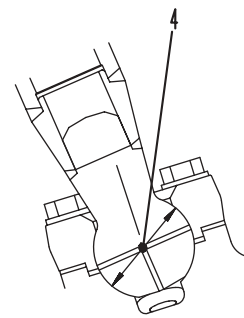
A



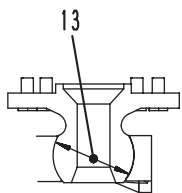
B



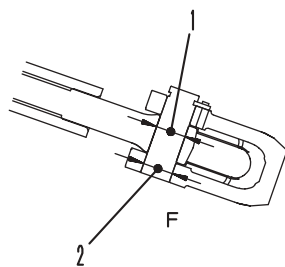
C



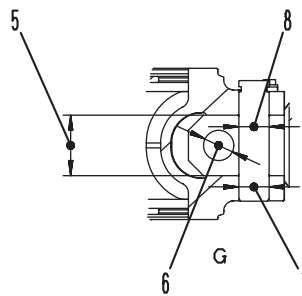
D



E



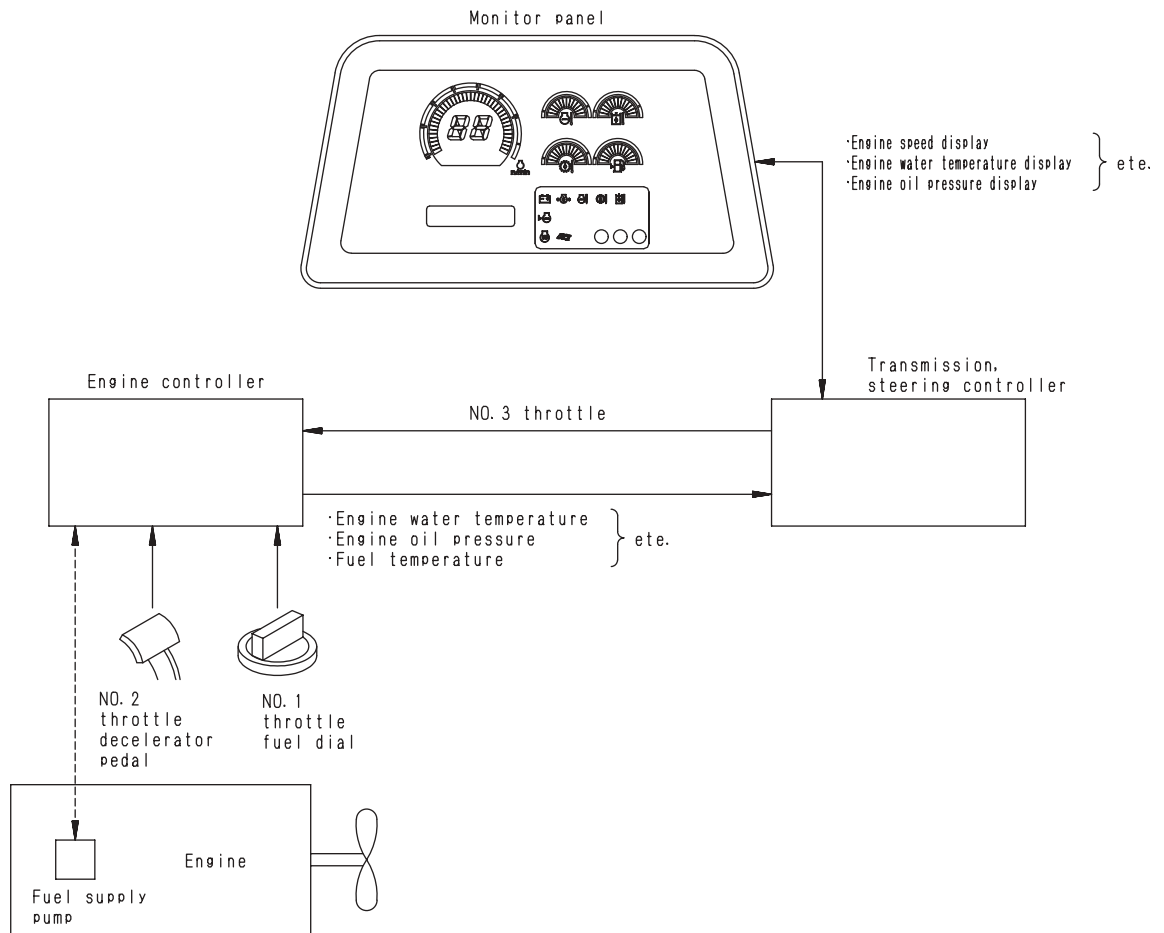
F



G

9JG00233

ENGINE CONTROL SYSTEM



9JG00241

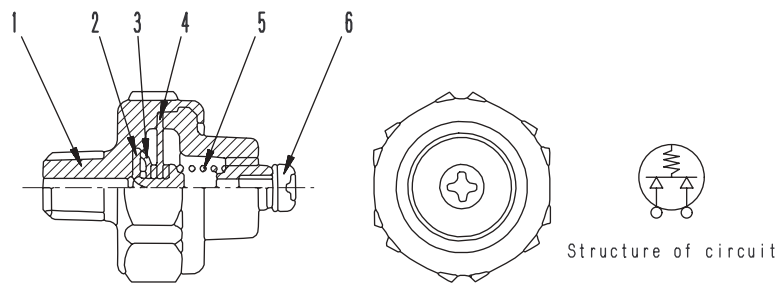
Outline

- The engine controller receives the fuel control dial signal of the 1st throttle, decelerator pedal signal of the 2nd throttle, and 3rd throttle signal which is the control signal from the steering controller, and then controls the fuel supply pump according to the command signal having the lowest engine speed.
The control signals of the 3rd throttle are as follows.
 - (1) Auto deceleration (F3, R3, F2, R2)
 - (2) Neutral deceleration
- The steering controller calculates a proper engine speed from information items (1), (2), etc. and sends it as the 3rd throttle signal to the engine controller.
- The information of the engine controller is possessed jointly by the other controllers through the network and used for the optimum control of the engine and machine body.
- The auto deceleration is a function of setting the engine speed low temporarily when the travel direction is changed from F3, R3, F2, and R2 (to protect the transmission clutch).
- The neutral deceleration is a function of limiting the high idling speed when the transmission is set in neutral.

SENSORS

Type of sensor	Sensor method	When normal	When abnormal
Engine oil pressure	Contact	OFF	ON
Engine water temperature	Resistance	-	-
Torque converter oil temperature	Resistance	-	-
Hydraulic oil temperature	Resistance	-	-
Radiator water level	Contact	ON	OFF
Fuel level	Resistance	-	-

ENGINE OIL PRESSURE SENSOR



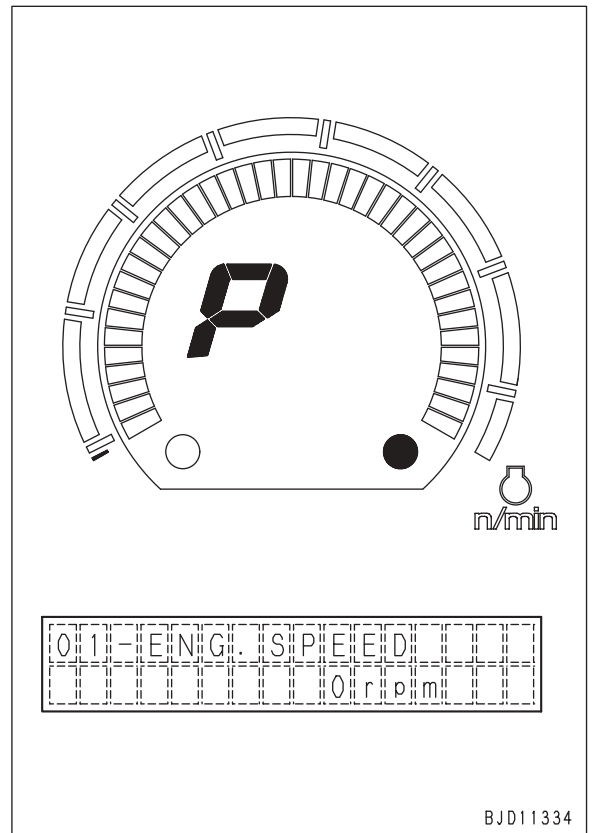
SBD01537

1. Plug
2. Contact ring
3. Contact
4. Diaphragm
5. Spring
6. Terminal

Machine model				D85EX, PX-15					
Category	Item	Measurement conditions	Unit	Standard value for new machine	Service limit value				
HSS pressure	Relief pressure	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range Engine: High idling 	MPa {kg/cm ² }	38.2 – 41.7 {390 – 425}	38.2 – 41.7 {390 – 425}				
	LS pressure (Load sensing pressure)			36.2 – 38.1 {369 – 389}	36.2 – 38.1 {369 – 389}				
Performance of power train	Travel speed	<ul style="list-style-type: none"> Flat road Engine water temperature: Within operating range Torque converter oil temperature: Within operating range Engine: High idling Run up distance: 10 – 30m Measuring distance: 20m 	EX	km/h	F1	3.6 ± 0.2	3.6 ± 0.2		
					F2	6.1 ± 0.3	6.1 ± 0.3		
					F3	10.1 ± 0.5	10.1 ± 0.5		
					R1	4.7 ± 0.2	4.7 ± 0.2		
					R2	8.0 ± 0.4	8.0 ± 0.4		
					R3	13.0 ± 0.7	13.0 ± 0.7		
			PX	km/h	F1	3.8 ± 0.2	3.8 ± 0.2		
					F2	6.7 ± 0.3	6.7 ± 0.3		
					F3	11.2 ± 0.6	11.2 ± 0.6		
					R1	4.9 ± 0.2	4.9 ± 0.2		
					R2	8.7 ± 0.4	8.7 ± 0.4		
					R3	14.9 ± 0.7	14.9 ± 0.7		
			Work equipment oil pressure	Unload pressure	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range Unload pressure: Set all equipment in neutral. Relief pressure: Set cylinder to stroke end. LS pressure: Set cylinder to stroke end. 	MPa {kg/cm ² }	Engine: Low idling	—	—
							Engine: High idling	2.45 ^{+1.37} ₀ {25 ⁺¹⁴ ₀ }	2.45 ^{+1.37} ₀ {25 ⁺¹⁴ ₀ }
Blade lift relief pressure	Engine: Low idling	21.6 ± 1.18 {220 ± 12}		22.54 ± 1.18 {230 ± 12}					
	Engine: High idling	22.54 ± 1.18 {230 ± 12}		22.54 ± 1.18 {230 ± 12}					
Blade tilt relief pressure	Engine: Low idling	21.6 ± 1.18 {220 ± 12}		22.54 ± 1.18 {230 ± 12}					
	Engine: High idling	22.54 ± 1.18 {230 ± 12}		22.54 ± 1.18 {230 ± 12}					
Ripper lift relief pressure (for EX)	Engine: Low idling	22.54 ± 1.18 {230 ± 12}		22.54 ± 1.18 {230 ± 12}					
	Engine: High idling	22.54 ± 1.18 {230 ± 12}		22.54 ± 1.18 {230 ± 12}					
LS pressure (Load sensing pressure)	Engine: Low idling	20.2 ± 0.98 {206 ± 10}		20.2 ± 0.98 {206 ± 10}					
	Engine: High idling	20.2 ± 0.98 {206 ± 10}		20.2 ± 0.98 {206 ± 10}					
Control circuit main pressure (HSS, PPC, fan)	<ul style="list-style-type: none"> Hydraulic oil temperature: Within operating range Engine: High idling 	MPa {kg/cm ² }		3.97 ^{+0.49} ₀ {40.5 ⁺⁵ ₀ }			3.97 ^{+0.49} _{-0.20} {40.5 ⁺⁵ ₋₂ }		
PPC valve output pressure			3.82 – 4.12 {39 – 42}	3.82 – 4.12 {39 – 42}					

- 7) Perform steps 2) – 4) again and relieve the ripper in the raising direction and measure the engine speed about 5 seconds after the power train oil temperature gauge reads the top line of the green range.
 - ★ After finishing measurement, return the direction of the PCCS lever into neutral and lower the power train oil temperature with the engine at high idling.

- ★ The engine speed can be measured in the “Pm Clinic auxiliary mode” of the monitor panel (Measure the high idling speed of the engine in the “Adjustment mode”, however).



MEASURING BLOW-BY PRESSURE

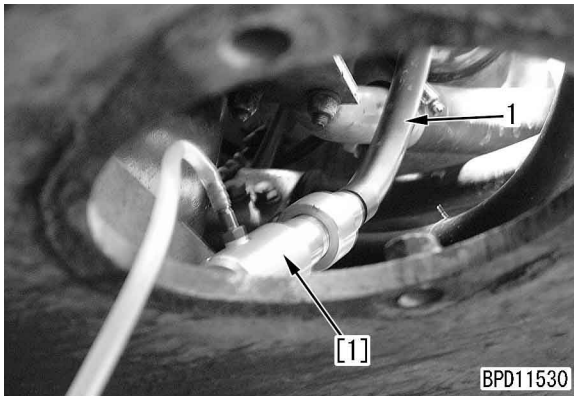
- ★ Measuring instrument for blow-by pressure

Symbol	Part No.	Name
E	799-201-1504	Blow-by kit

- ★ Measure the blow-by pressure under the following condition.

- Engine water temperature: Within operating range
- Power train oil temperature: Within operating range
- Hydraulic oil temperature: Within operating range

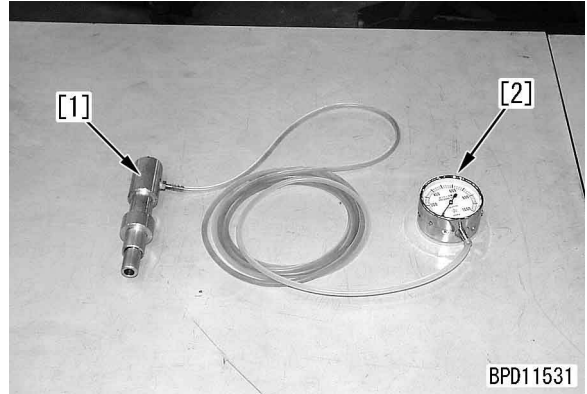
1. Remove the radiator drain cock cover.
2. Install nozzle [1] of blow-by checker E to blow-by hose (1) and connect them to gauge [2].



3. Run the engine at high idling, stall the torque converter, and measure the blow-by pressure.

- ★ For the procedure for stalling the torque converter, see MEASURING ENGINE SPEED.
- ★ Normally, the blow-by pressure should be measured while the engine is operated at the rated output. In the field, however, an approximate value can be obtained by stalling the torque converter.
- ★ If it is impossible to run the engine at the rated output or stall the torque converter, measure while the engine is running at high idling.
The value obtained in this case is about 80% of the blow-by pressure at the rated output.

- ★ The blow-by pressure may vary largely with the engine condition. If the measured value is judged abnormal, check for increase of oil consumption, bad exhaust gas color, deterioration of oil, high deterioration speed of oil, etc. which are related to the abnormal blow-by pressure.



4. After finishing measurement, remove the measuring instrument and return the removed parts.

3. Adjusting decelerator pedal engine speed

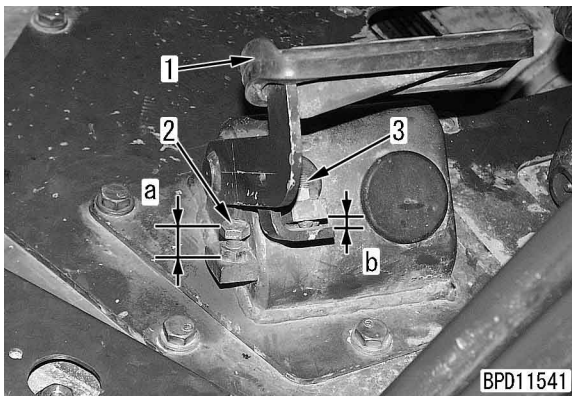
With the fuel control dial in the high idling position, press decelerator pedal (1) to stopper bolt (2) and check that the decelerator pedal engine speed is normal.

- Decelerator pedal engine speed:
1,000 – 1,050 rpm
- ★ If the decelerator pedal engine speed is abnormal, adjust installed dimension **a** of stopper bolt (2).
- Standard installed dimension **a** of stopper bolt: 19 mm

4. High idling engine speed

Set the fuel control dial in the high idling position and check that the high idling engine speed is normal.

- High idling engine speed: 2,050 – 2,100 rpm
- Standard installed dimension **b** of stopper bolt: 6 mm
- ★ If the engine speed is abnormal, perform the following.
- When the engine speed is above 1,950 rpm:
Lower the engine speed below 1,900 rpm temporarily with stopper bolt (3) to eliminate the play of the decelerator pedal, and then adjust the engine speed to the high idling speed.
- When the engine speed is below 1,950 rpm:
Adjust the engine speed to the high idling speed with stopper bolt (3).



5. When brake pedal (1) released, adjust its play with dimension **e** between the pins of rod assembly (8).
 - Play of pedal: 1 – 5 mm (Center of pedal)
 - Dimension **e** between pins of rod assembly:
1,125 mm

★ Adjust by turning joints (5) and (7) in the same direction.
6. With brake pedal (1) released, check that brake pedal (1) is in contact with damper (2).
7. Checking brake oil pressure

	Oil pressure MPa {kg/cm ² }	Remarks
Brake OFF	2.84±0.10 {29±1}	Engine at full throttle
Brake ON	0	

8. After adjusting the pedal, adjust the zero point of the brake potentiometer (Adjustment mode: 0005).
 - ★ For the method of operation, see "Special functions of monitor panel (EMMS)".

TESTING CONTROL CIRCUIT MAIN PRESSURE

- ★ Testing and adjusting instruments for control circuit main pressure

Symbol	Part No.	Name
J	1	799-101-5002 Hydraulic tester
		790-261-1203 Digital hydraulic tester
2		799-401-3200 Oil pressure pickup adapter (Size 03)
		12896-11009 O-ring

- ★ The control circuit main pressure is the pressure lowered by the self-pressure reducing valve. It is used commonly for ripper PPC, blade PPC, fan pump control and steering EPC.

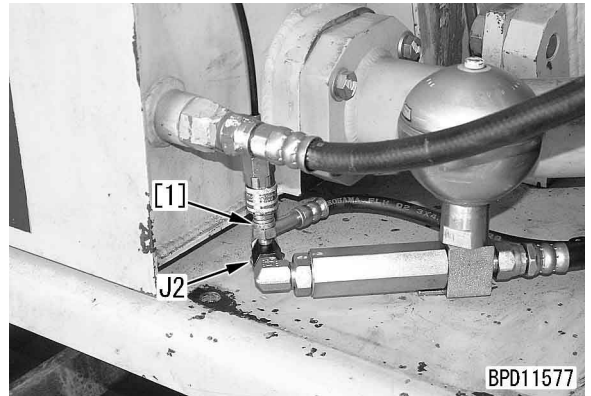
Measuring

- ⚠ Stop the machine on a level place, lower the work equipment to the ground, and set the parking brake lever and safety lock lever in the LOCK position.
- ★ Measure the control circuit main pressure under the following condition.
 - Hydraulic oil temperature: Within operating range

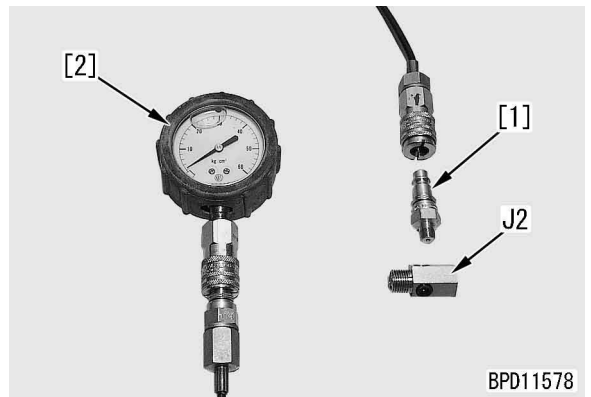
1. Remove the main control valve cover.
2. Disconnect hose (1).



3. Install oil pressure pickup adapter **J2** and connect the disconnected hose again.
4. Install nipple [1] of hydraulic tester **J1** and connect oil pressure gauge [2].
 - ★ Use an oil pressure gauge of 5.9 MPa {60 kg/cm²}.



5. Run the engine at high idling and set the blade lever and ripper lever in neutral and measure the oil pressure.



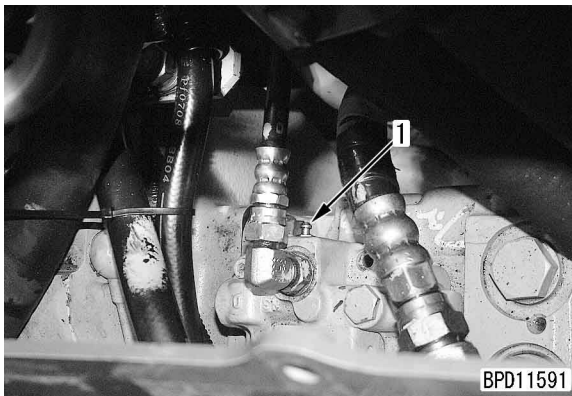
6. After finishing measurement, remove the measuring instrument and return the removed parts.

Adjusting

- ★ The self-pressure reducing valve cannot be adjusted.

BLEEDING AIR FROM FAN PUMP

- ★ If the fan pump is removed and installed or its piping is disconnected and connected, bleed air from the pump case according to the following procedure.
 - ★ Before bleeding air, check that the hydraulic oil level is proper.
1. Remove the floor inspection cover (R.H).
 2. Loosen air bleeder (1) and leave it for 15 minutes.



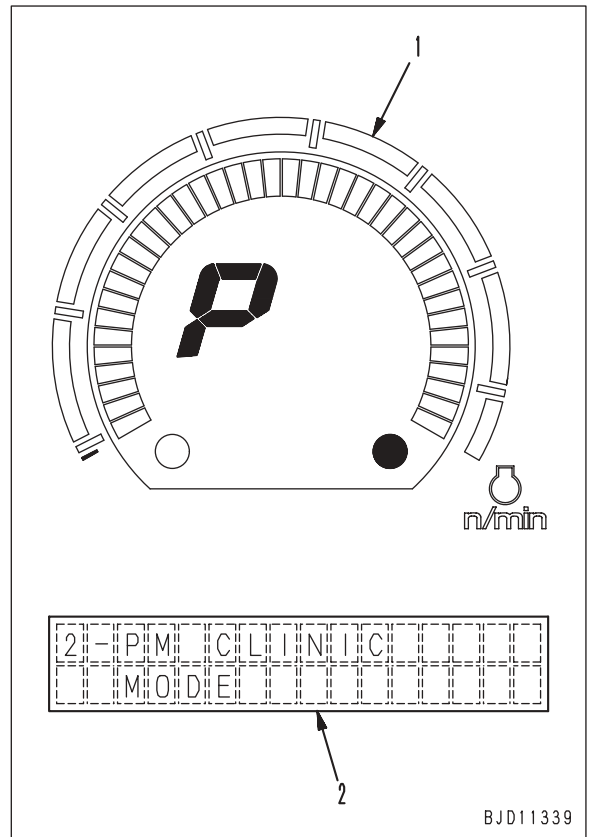
3. After 15 minutes, run the engine at low idling.
4. After oil flows out of air bleeder (1), tighten air bleeder (1).

**2. Pm clinic auxiliary mode
(2-PM CLINIC MODE)**

In this mode, the condition of the machine is displayed on multi-information section (2) as an auxiliary function of the periodic diagnoses such as the Pm clinic, even if any measuring instrument is not connected.

- ★ Gear speed display section (1) keeps displaying normally.

No.	Pm clinic auxiliary item
01	Engine speed
02	Boost pressure
03	Work equipment pressure
04	Battery voltage

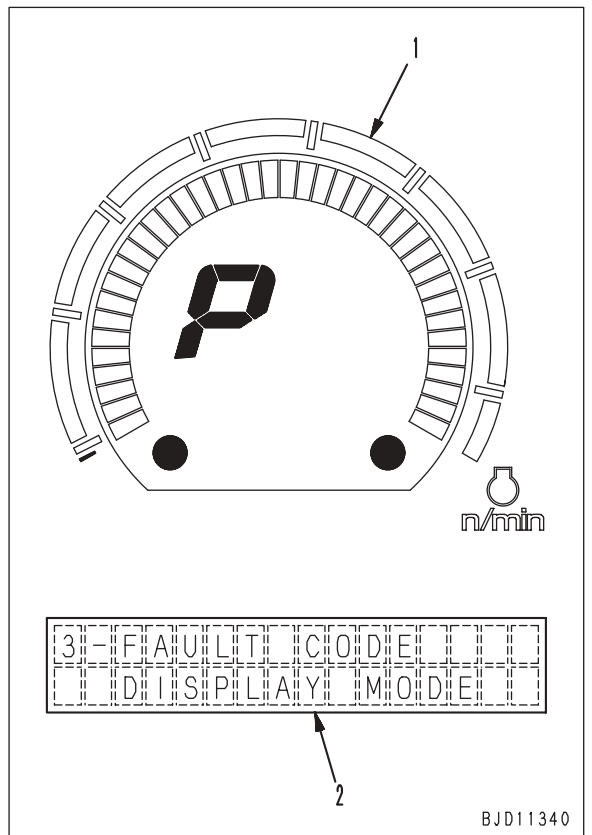


**3. Error code display mode
(3-ERROR CODE DISPLAY MODE)**

In this mode, the contents of each fault in the machine are displayed by a 6-character error code on the multi-information section (2).

When the user or the operator needs to be notified of the error code of each fault, this mode is applied.

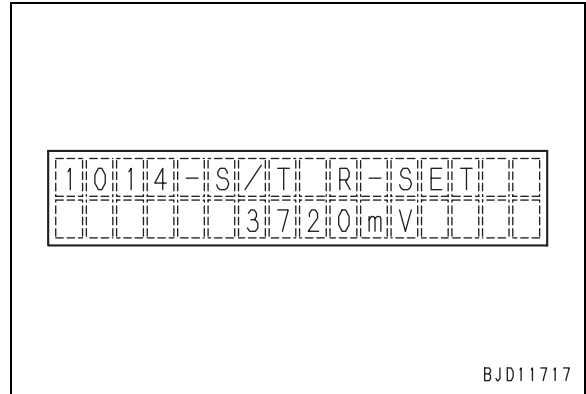
- ★ Gear speed display section (1) keeps displaying normally.
- ★ When a serviceman needs to check the error codes for troubleshooting, the Electric system error code display mode and the Mechanical system error code display mode should be used for more detailed information.
- ★ Method of checking error code:
Turn buzzer cancel switch (4) to the [◇] position on the screen shown at right, and the all error codes detected currently are displayed at the interval of about 2 seconds. (To finish displaying, turn the buzzer cancel switch to the [□] position.)
- ★ For the error codes list, see TROUBLE-SHOOTING.



- ★ Flashing and lighting of error code
Flashing: Code is being output currently.
Lighting: Code is not being output currently.
 - ★ Condition for detecting and keeping error code
If a error code of any item other than communication is output, it keeps flashing until the starting switch is turned off.
After the starting switch is turn on or the engine is started again, the error code keeps lighting until the same fault is detected.
A error code of communication starts lighting when the fault is solved, even if the starting switch is turned off.
- 4) Operation to take when multiple codes are recorded.
When multiple codes are recorded, they can be displayed one by one by operating information switch (5).
- [>]: Next code
 - [<]: Previous code
 - ★ The error codes are displayed from the oldest one in order of length of time after they were output.
- 5) Method of deleting error code
The mechanical system error codes cannot be deleted.

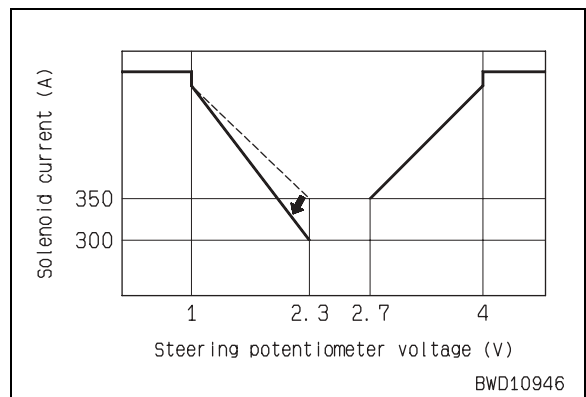
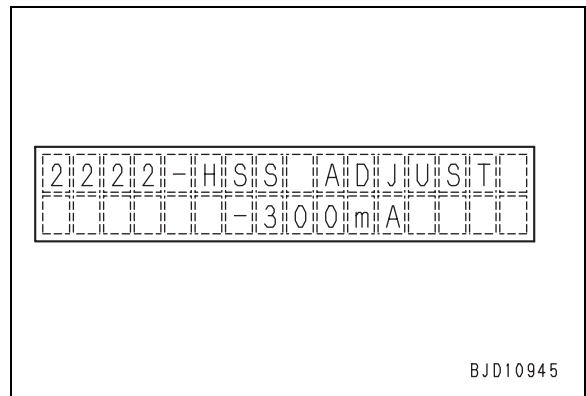
[13] 1014: Steering lever right set

- This code is used to adjust the maximum right steering potentiometer position of the PCCS lever.
- The output signal of steering potentiometer from displayed by voltage on the lower line (Display range: 0 – 5000).
- Adjustment method:
 - 1) Set the PCCS lever to the right steering stroke end.
 - 2) Set buzzer cancel switch (4) in the [◇] position and check that the caution buzzer sounds.
- ★ Even if this code is turned off, the setting is effective.
- ★ This code is not for adjustment of the steering performance, etc.
- ★ Even after adjustment, the display of the lower line does not change.



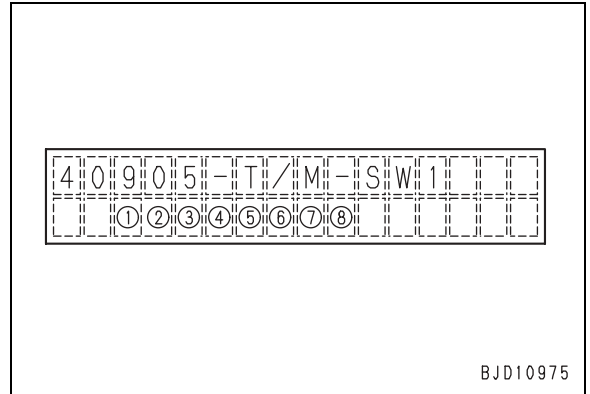
[14] 2222:HSS lever initial current set

- When the steering start feeling is different by the steering direction, this code is used to adjust the turning radius at the start of steering.
- The current to drive the HSS EPC solenoid is displayed on the lower line [Display range: –350 (Left end) – 0 – 350 (Right end)].
- Adjustment method:
 - 1) Gradually turning the PPC lever to the left or right, display and keep the current to be set.
 - If the lever is turned to the left, the current becomes negative.
 - If the lever is turned to the right, the current becomes positive.
 - 2) Set buzzer cancel switch (4) in the [◇] position and check that the caution buzzer sounds.
- ★ As the set current is increased in the positive or negative direction, the turning radius at the start of steering is decreased (the machine turns more quickly).
- ★ The figure at right is an example that the set current for steering to the left is reduced to increase the turning radius.
- ★ Even if this code is turned off, the setting is effective.



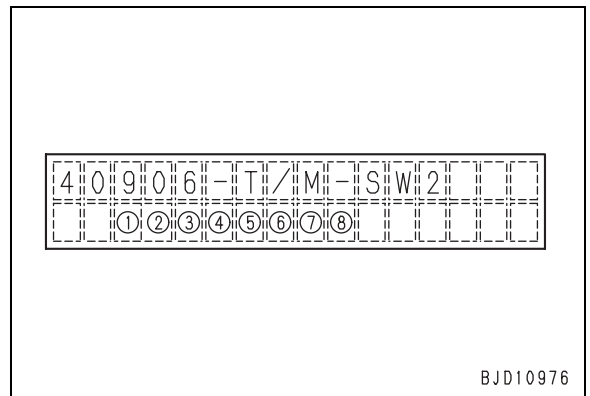
40905: Transmission related controller input signal 1

- ①: Gear shift-up switch: OFF
- ②: Gear shift-up switch: ON
- ③: Gear shift-down switch: OFF
- ④: Gear shift-down switch: ON
- ⑤: (Unused)
- ⑥: (Unused)
- ⑦: (Unused)
- ⑧: (Unused)



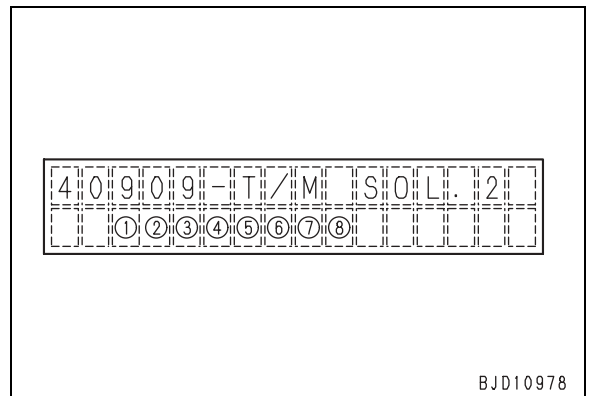
40906: Transmission-related controller input signal 2

- ①: Automatic gear shift-down switch: ON
- ②: Fan reverse mode: ON
- ③: Fan reverse 100% mode: ON
- ④: (Unused)
- ⑤: (Unused)
- ⑥: (Unused)
- ⑦: (Unused)
- ⑧: (Unused)



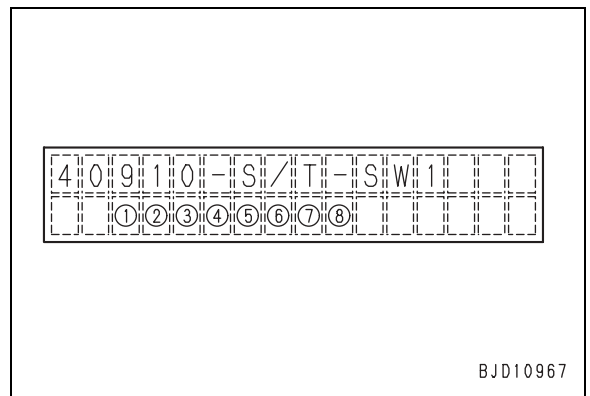
40909: Transmission related controller output signal

- ①: Transmission N-signal: ON
- ②: N-signal 2: ON
- ③: (Unused)
- ④: Back-up alarm relay: ON
- ⑤: Neutral safety relay: ON
- ⑥: (Unused)
- ⑦: (Unused)
- ⑧: (Unused)

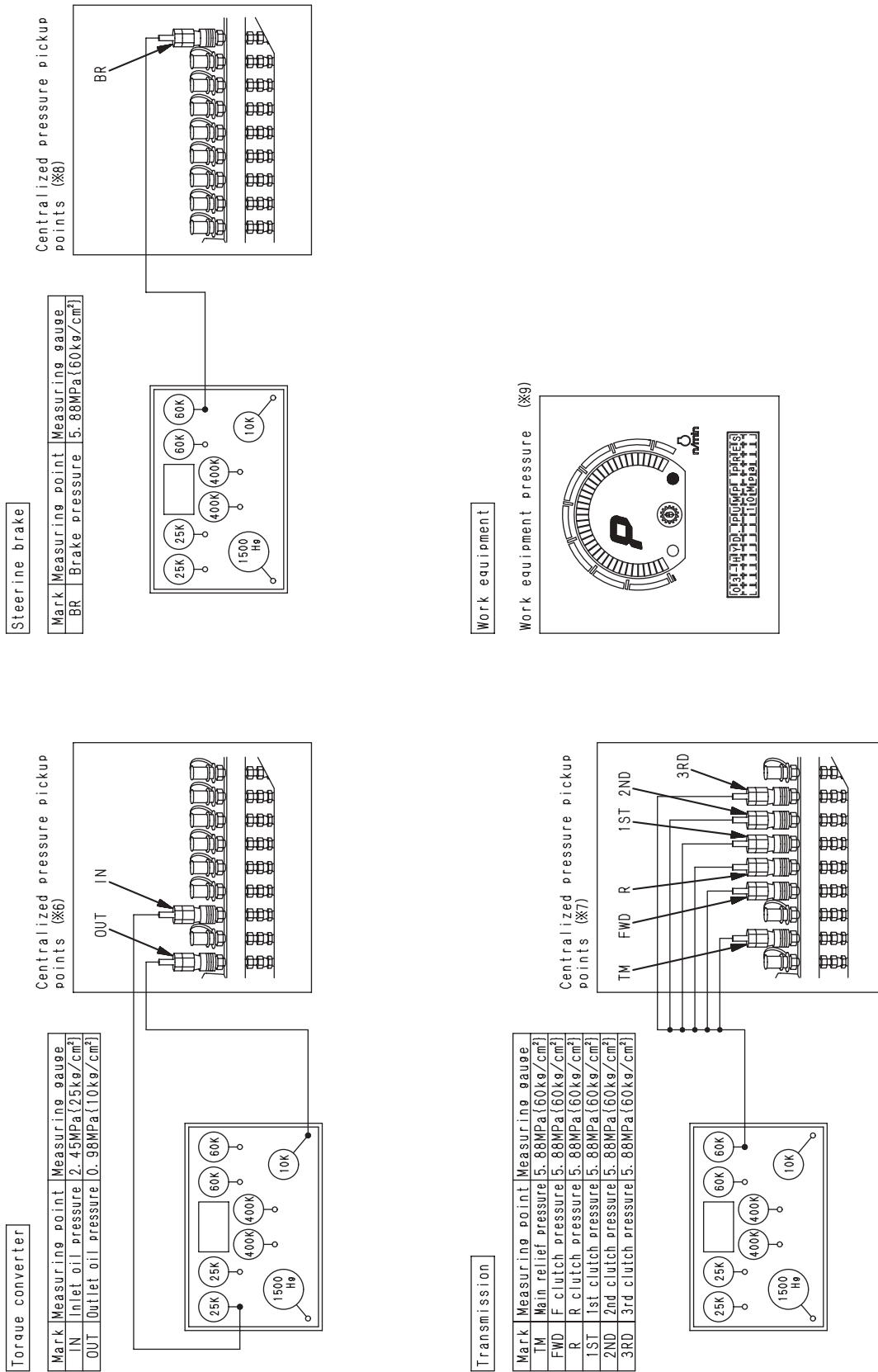


40910: Steering related controller input signal 1

- ①: (Unused)
- ②: (Unused)
- ③: (Unused)
- ④: (Unused)
- ⑤: Parking brake lever switch: FREE
- ⑥: Parking brake lever switch: LOCK
- ⑦: (Unused)
- ⑧: (Unused)



Pm-clinic measuring points for D85EX, PX-15 (2/2)



“Reference Page for Measurement Procedure” designated.

- ※ 6. Phenomenon related to torque converter: 20-128 – 133 page
- ※ 7. Phenomenon related to transmission: 20-128 – 133 page
- ※ 8. Phenomenon related to steering brake: 20-128 – 133 page
- ※ 9. Phenomenon related to work equipment: 20-144 – 146 page

TJD01935

POINTS TO REMEMBER WHEN CARRYING OUT MAINTENANCE

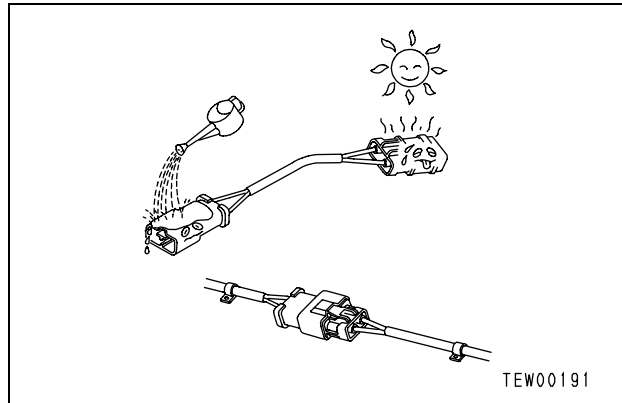
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct operation, maintenance and inspection, troubleshooting, and repairs must be carried out. This section deals particularly with correct repair procedures for mechatronics and is aimed at improving the quality of repairs. For this purpose, it gives sections on "Handling electric equipment" and "Handling hydraulic equipment" (particularly gear oil and hydraulic oil).

1. Points to remember when handling electric equipment

1) Handling wiring harnesses and connectors

Wiring harnesses consist of wiring connecting one component to another component, connectors used for connecting and disconnecting one wire from another wire, and protectors or tubes used for protecting the wiring.

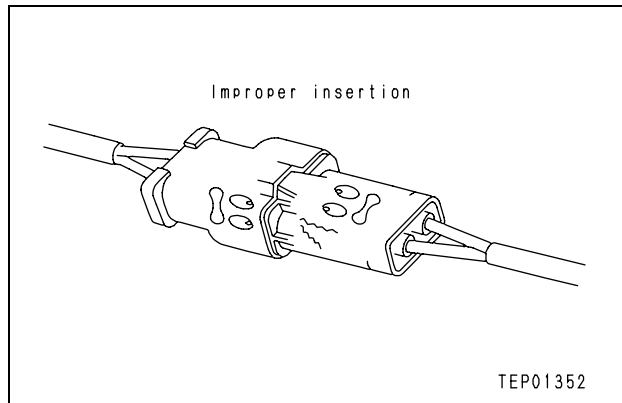
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations, they are frequently removed and installed again, so they are likely to suffer deformation or damage. For this reason, it is necessary to be extremely careful when handling wiring harnesses.



Main failures occurring in wiring harness

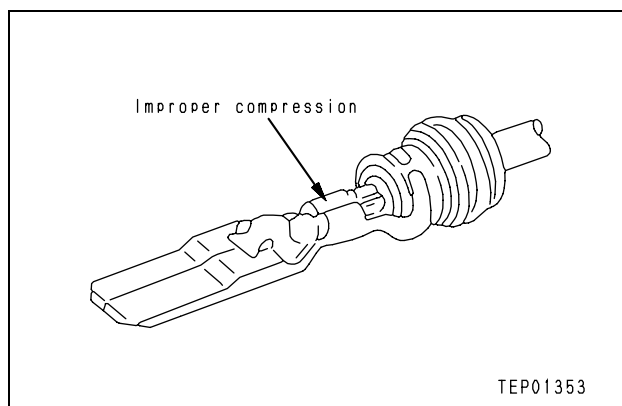
(1) Defective contact of connectors (defective contact between male and female)

Problems with defective contact are likely to occur because the male connector is not properly inserted into the female connector, or because one or both of the connectors is deformed or the position is not correctly aligned, or because there is corrosion or oxidation of the contact surfaces.



(2) Defective crimping or soldering of connectors

The pins of the male and female connectors are in contact at the crimped terminal or soldered portion, but if there is excessive force brought to bear on the wiring, the plating at the joint will peel and cause improper connection or breakage.

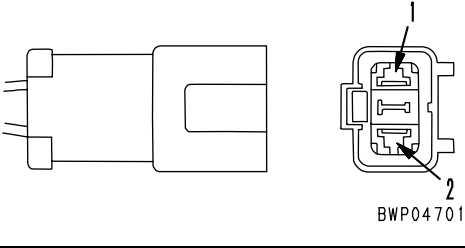
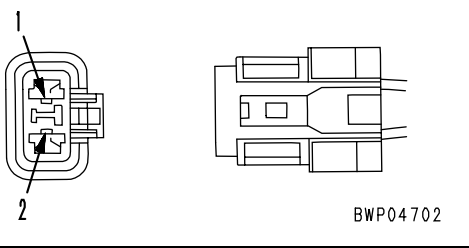
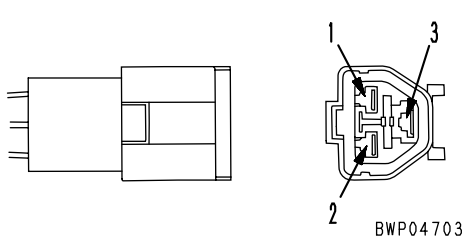
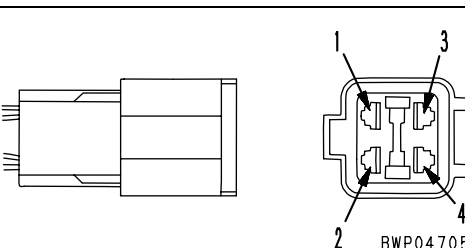
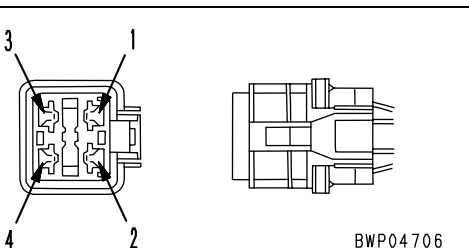


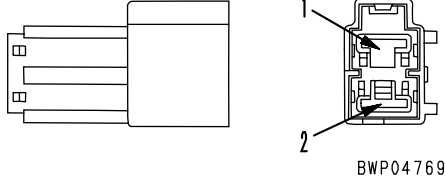
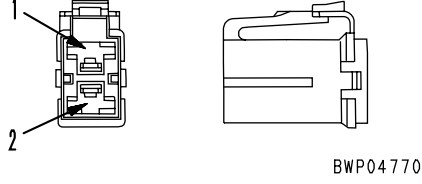
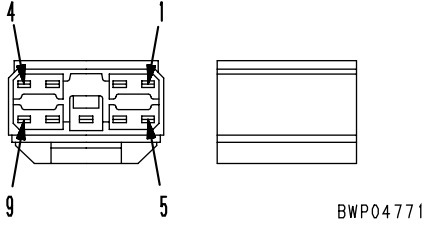
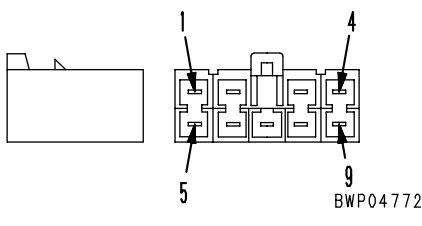
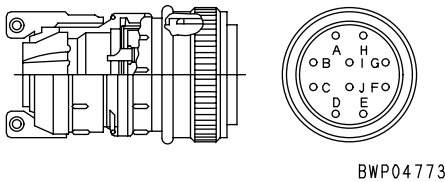
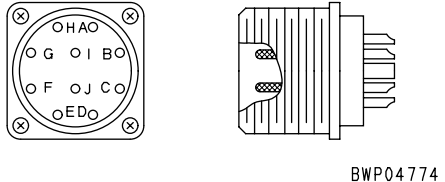
Phenomena supposed to be Failures and Troubleshooting No.

No.	Phenomenon suppose to be Failure	Troubleshooting			
		Error Code	E Mode	H Mode	S Mode
Phenomenon related to action code/error code					
1	An action code is displayed on the monitor panel.	Check the error code.			
2	A error code is displayed in the error code display mode.	●			
Phenomenon related to engine					
3	The engine does not start smoothly. (Engine starting takes a time all the time.)				S-1
4		The engine does not rotate.	E-1		S-2a)
5	The engine does not start.	The engine rotates but does not exhaust gas.			S-2b)
6		The engine exhausts gas but does not rotate.			S-2c)
7	The engine does not pick-up smoothly. (Poor follow-up performance)				S-3
8	The engine stops during operation.				S-4
9	The engine rotates abnormally. (Hunting)				S-5
10	Insufficient output or no power				S-6
11	Black exhaust (Imperfect combustion)				S-7
12	Large oil consumption or blue exhaust				S-8
13	Oil is contaminated fast.				S-9
14	Large fuel consumption				S-10
15	Oil mixes in coolant, spurts or water reduces.				S-11
16	Engine oil pressure drops.				S-12
17	Oil increases.				S-13
18	Water temperature rises too high. (Overheat)				S-14
19	An abnormal noise occurs.				S-15
20	Large vibration				S-16
21	The preheater does not work.		E-2		
Phenomenon related to power train					
22	The power train has no power (no drawbar pull).			H-1	S-6
23	The power train does not travel (in case of 2-spool or 3-spool).			H-2	
24	The power train does not start at all gear speeds.			H-3	
25	The power train travel forward or in reverse only			H-4	
26	Large time lag at any gear speed or at forward-reverse shifting			H-5	
27	Steering is not possible. (Left turn or right turn is impossible.)			H-6	
28	The steering speed is slow or the steering system has no power.			H-7	
29	The brake does not work.			H-8	
30	The power train oil is overheated.			H-9	
31	Abnormal noise around the HSS and work equipment pump or the HSS motor			H-10	
Phenomenon related to work equipment					
32	All the work equipment operates slowly.			H-11	
33	All the work equipment does not operate.			H-12	
34	The blade lift moves slowly or has no power.			H-13	
35	The blade tilt moves slowly or has no power.			H-14	
36	The ripper lift moves slowly or has no power.			H-15	
37	Large hydraulic drift of the blade lift			H-16	
38	Large hydraulic drift of the blade tilt			H-17	
39	Large hydraulic drift of the ripper lift			H-18	

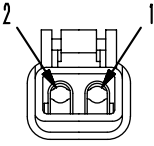
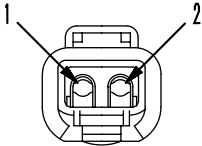
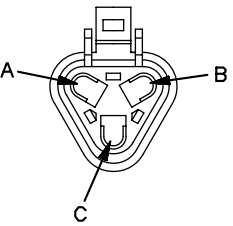
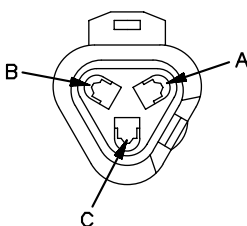
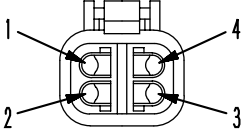
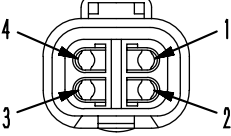
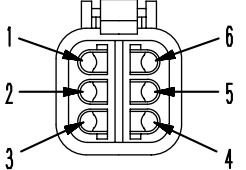
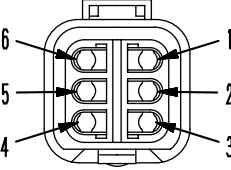
CONNECTION TABLE FOR CONNECTOR PIN NUMBERS

★ The terms male and female refer to the pins, while the terms male housing and female housing refer to the mating portion of the housing.

No. of pins	X type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
1	Part No.: 08055-00181	Part No.: 08055-00191	799-601-7010
2	 <p>Part No.: 08055-00282</p>	 <p>Part No.: 08055-00292</p>	799-601-7020
	3	 <p>Part No.: 08055-00381</p>	
4	 <p>Part No.: 08055-00481</p>	 <p>Part No.: 08055-00491</p>	799-601-7040
	—	Terminal part No.: 79A-222-3370 <ul style="list-style-type: none"> • Electric wire size: 0.85 • Grommet: Black • Q'ty: 20 	
—	Terminal part No.: 79A-222-3380 <ul style="list-style-type: none"> • Electric wire size: 2.0 • Grommet: Red • Q'ty: 20 	Terminal part No.: 79A-222-3410 <ul style="list-style-type: none"> • Electric wire size: 2.0 • Grommet: Red • Q'ty: 20 	—

No. of pins	L type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
2	 <p>BWP04769</p>	 <p>BWP04770</p>	—
	—	—	
No. of pins	Connector for PA		
	Male (female housing)	Female (male housing)	T-adapter Part No.
9	 <p>BWP04771</p>	 <p>BWP04772</p>	—
	—	—	
No. of pins	Bendix MS connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
10	 <p>BWP04773</p>	 <p>BWP04774</p>	799-601-3460
	—	—	

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

No. of pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
2	 <p style="text-align: center;">BWP05037</p>	 <p style="text-align: center;">BWP05038</p>	799-601-9020
	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
	Part No.: 08192-13200 (normal type) 08192-23200 (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
	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
	Part No.: 08192-16200 (normal type) 08192-26200 (fine wire type)	Part No.: 08192-16100 (normal type) 08192-26100 (fine wire type)	

ERROR CODE 1500LO (TRANSMISSION CLUTCH: SEE THE LIST. (L1))

Action code	Error code	Controller code	Trouble	Transmission clutch: See the list. (LO) (Steering and transmission controller system)
CALL E03	1500LO	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> Of the error codes related to the transmission clutch, the following codes were displayed at the same time. (Connection error) (1)Either [DXH4KA] or [DXH4KB] and either [DXH5KA] or [DXH5KB] Of the error codes related to the transmission clutch, the following codes were displayed at the same time. (Disconnection error) (2)Either [DXH8KA] or [DXH8KB] and either [DXH7KA] or [DXH7KB] (3)[DXH6KA] and [DXH6KB] (4)[15SFL1] and [15SGL1] (5)[15SFLH] and [15SGLH] (6)[15SAL1], [15SBL1], and [15SEL1] (7)[15SALH] and [15SBLH] (8)[15SALH] and [15SELH] (9)[15SBLH] and [15SELH] 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Limits operation of engine and transmission. 			
Problem that appears on machine	<ul style="list-style-type: none"> The auto shift down function does not start. Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, running is limited to specific gear speeds. 			
Related information	<ul style="list-style-type: none"> Method of reproducing error code: Engine start + Run 			
Possible causes and standard value in normal state	Cause	Standard value in normal state/Remarks on troubleshooting		
	Confirm the error codes displayed at the same time, then carry out troubleshooting for the codes. [15SAL1], [15SALH], [15SBL1], [15SBLH], [15SEL1], [15SELH], [15SFL1], [15SFLH], [15SGL1], [15SGLH] [DXH4KA], [DXH4KB], [DXH5KA], [DXH5KB], [DXH6KA], [DXH6KB], [DXH7KA], [DXH7KB], [DXH8KA], [DXH8KB]			

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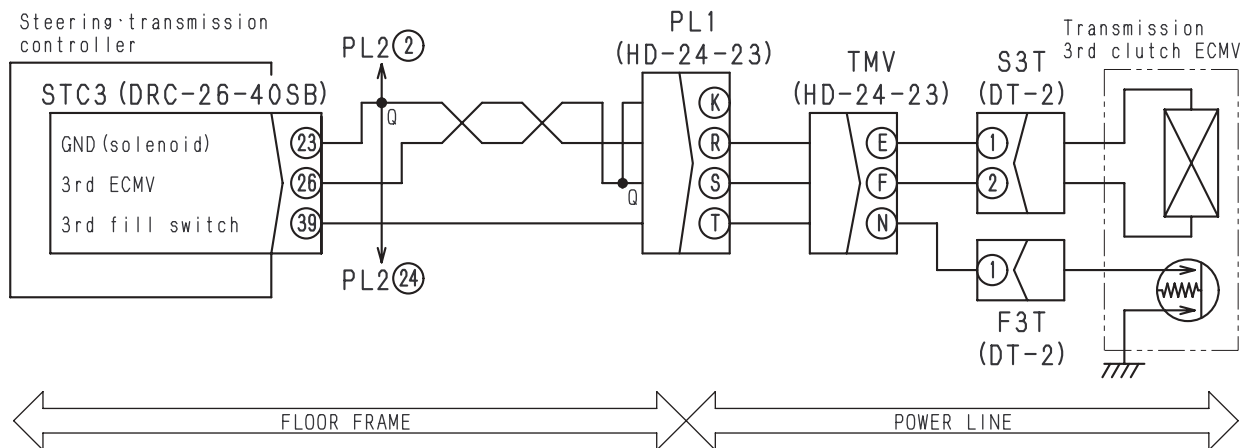
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ERROR CODE 15SGLH (3RD CLUTCH: SEE THE LIST. (LH))

Action code	Error code	Controller code	Trouble	3rd clutch: See the list. (LH) (Steering and transmission controller system)
CALL E03	15SGLH	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> The fill switch signal is not set off at output to the transmission 3rd clutch solenoid circuit. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Limits operation of engine and transmission. 			
Problem that appears on machine	<ul style="list-style-type: none"> Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, running is limited to F1 and R1. 			
Related information	<ul style="list-style-type: none"> The input state (ON/OFF) from the 3rd clutch fill switch can be checked in monitoring mode. (Code 31520: Transmission fill switch input state) Method of reproducing error code: Engine start + F3 or R3 running 			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective 3rd clutch fill switch (Internal short)	★ Prepare with starting switch OFF, then start the engine for troubleshooting.	
F3T (male)				PCCS lever	Resistance
Between (1) – chassis ground				Other than F3/R3	Min. 1MΩ
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 STC3 (female) (39) – F3T (female) (1)	Resistance	Max. 1Ω
3		Defective steering and transmission controller	★ Prepare with starting switch OFF, then start the engine for troubleshooting.		
			STC3	PCCS lever	Voltage
			Between (39) – chassis ground	Other than F3/R3	20 – 30V
4		Defective hydraulic pressure system	When no fault is detected in the electric system, the hydraulic pressure system is assumed to be abnormal. Carry out the related troubleshooting (H mode).		
			F3•R3		Max. 1V

Circuit diagram related to transmission 3rd clutch ECMV



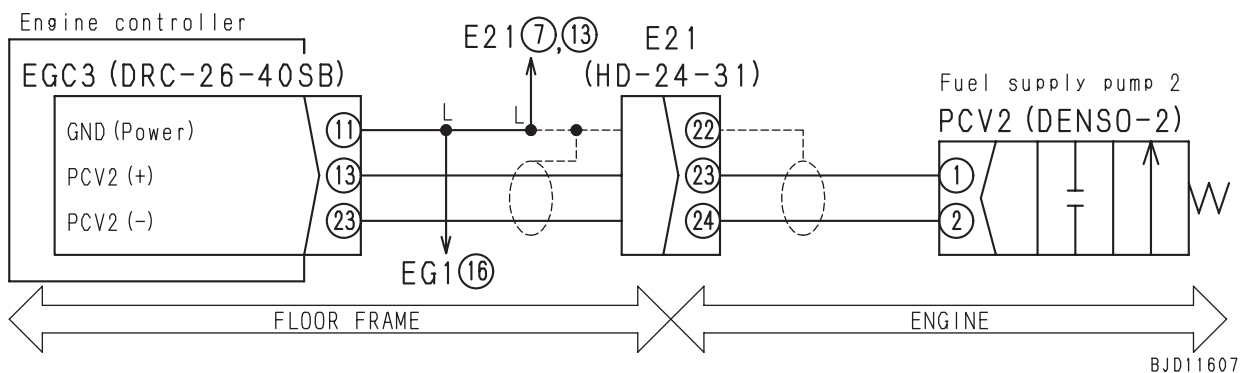
BJD11605

ERROR CODE AD51KB (FUEL SUPPLY PUMP SOLENOID 2: DISCONNECTION IN SHORT (KB))

Action code	Error code	Controller code	Trouble	Fuel supply pump solenoid 2: Short (KB) (Engine controller system)
CALL E03	AD51KB	ENG		
Contents of trouble	<ul style="list-style-type: none"> Overcurrent occurred in fuel supply pump solenoid 2 (PCV2). 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Limits engine and transmission operation. Stops output to fuel supply pump solenoid 2 circuit. 			
Problem that appears on machine	<ul style="list-style-type: none"> Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, running is limited to F1 and R1. If codes [AD11KA] and [AD11KB] are displayed at the same time, engine stops. 			
Related information	<ul style="list-style-type: none"> The special adapter (799-601-9430) is necessary for troubleshooting of fuel supply pump solenoid 2. Method of reproducing error code: Engine start 			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective fuel supply pump solenoid 2 (Internal disconnection in wiring)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
PCV2 (male)				Resistance	
Between (1) – (2)				2.3 – 5.3Ω	
Between (1) – chassis ground				Min. 1MΩ	
2		Defective harness grounding (Contact with ground circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between EGC3 (female) (13) – PCV2 (female) (1)	Resistance	Max. 1MΩ
			3	Defective harness hot short (Contact with 24V circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.
Wiring harness between EGC3 (female) (13) – PCV2 (female) (1) with chassis ground		Voltage			Max. 1V
4		Defective engine controller	Wiring harness between EGC3 (female) (23) – PCV2 (female) (2) with chassis ground	Voltage	Max. 1V
			★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
4		Defective engine controller	EGC3 (male)	Resistance	
			Between (13) – (23)	2.3 – 5.3Ω	
	Between (13) (23) – chassis ground		Min. 1MΩ		

Circuit diagram related to fuel supply pump solenoid 2

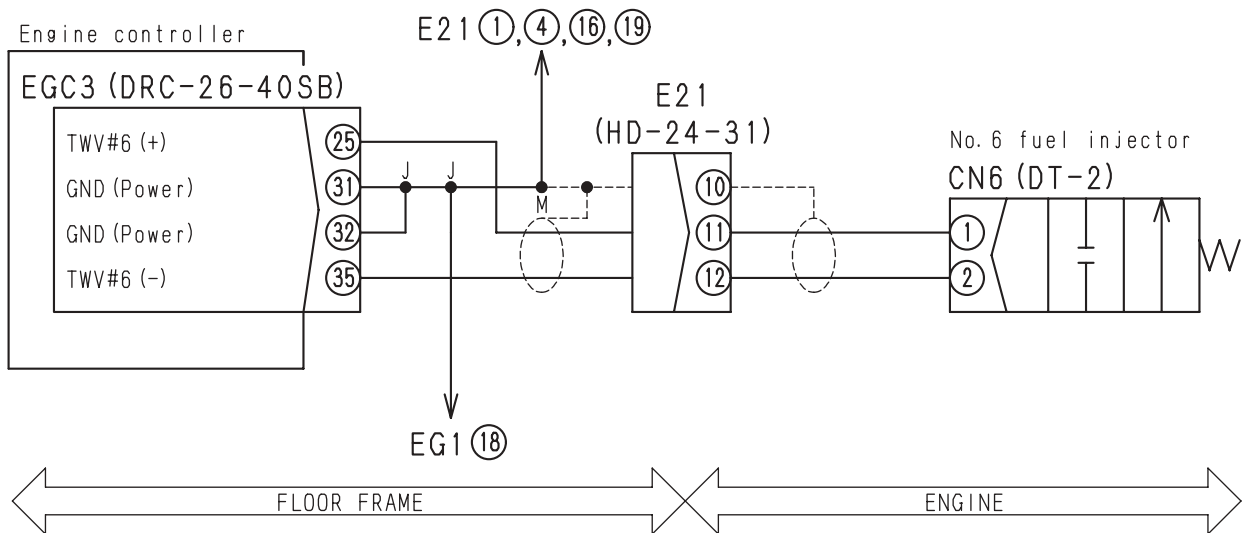


ERROR CODE ADF1KA (NO. 6 FUEL INJECTOR SOLENOID: DISCONNECTION (KA))

Action code	Error code	Controller code	Trouble	No. 6 fuel injector solenoid: Disconnection (KA) (Engine controller system)
E02	ADF1KA	ENG		
Contents of trouble	<ul style="list-style-type: none"> Disconnection occurred in No. 6 fuel injector solenoid (TWV#6) circuit. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Stops output to No. 6 fuel injector solenoid circuit. 			
Problem that appears on machine	<ul style="list-style-type: none"> Engine output lowers. 			
Related information	<ul style="list-style-type: none"> Method of reproducing error code: Start engine. 			

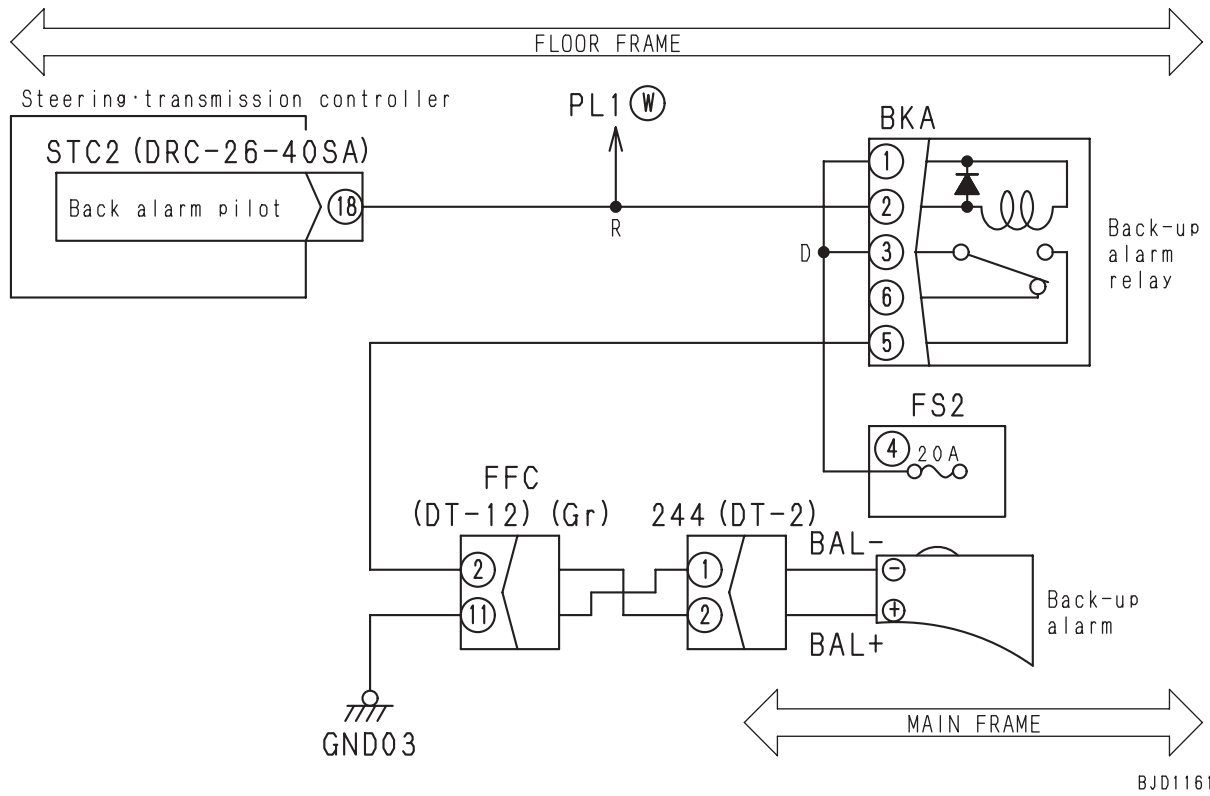
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective No. 6 fuel injector solenoid (Internal disconnection)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
CN6 (male)				Resistance	
Between (1) – (2)				0.4 – 1.1Ω	
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 EGC3 (female) (25) – CN6 (female) (1)	Resistance Max. 1Ω	
			Wiring harness between EGC3 (female) (35) – CN6 (female) (2)	Resistance Max. 1Ω	
3	Defective engine controller	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
		EGC3 (male)		Resistance	
		Between (25) – (35)		0.4 – 1.1Ω	

Circuit diagram related to No. 6 fuel injector solenoid

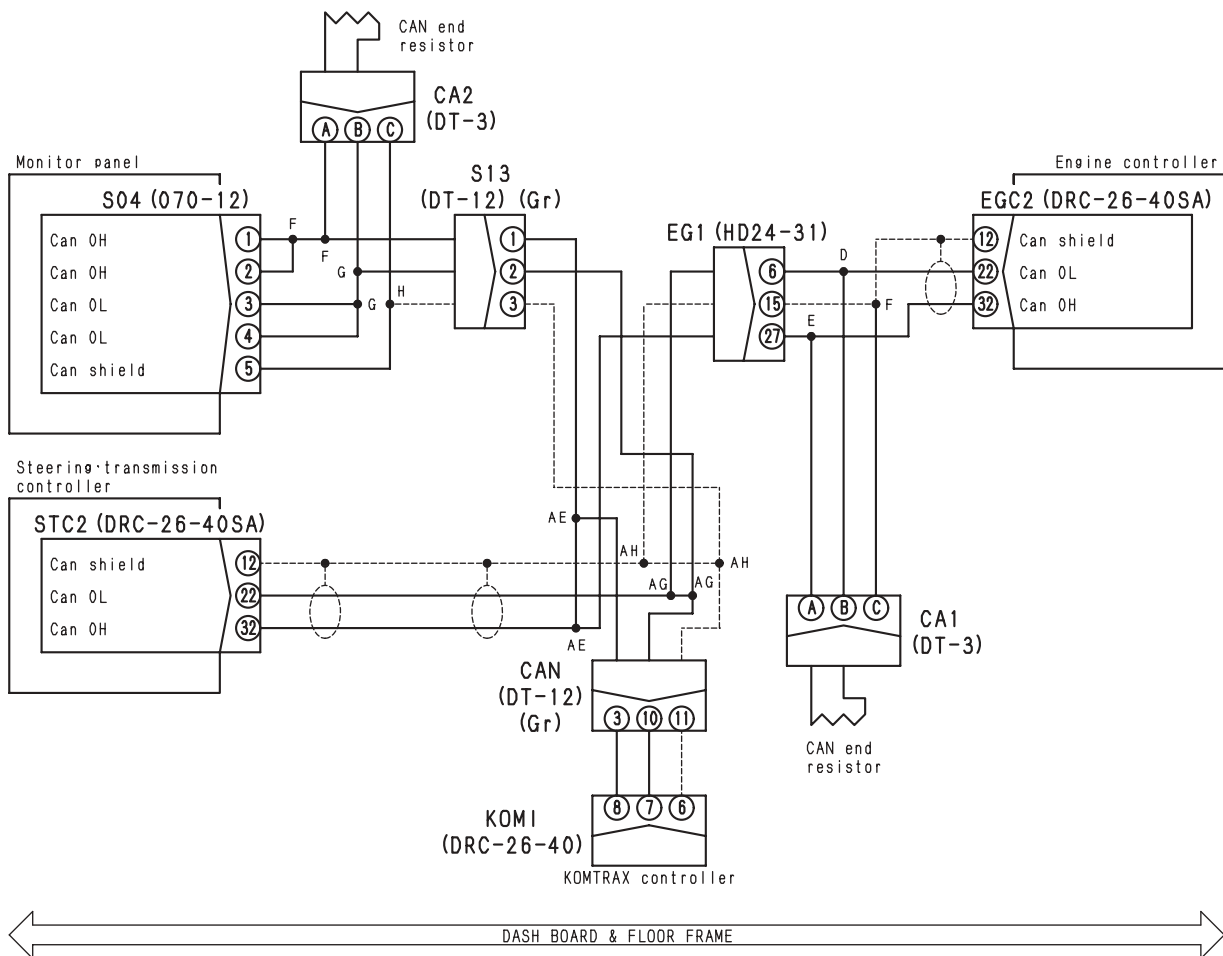


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Circuit diagram related to back-up alarm relay

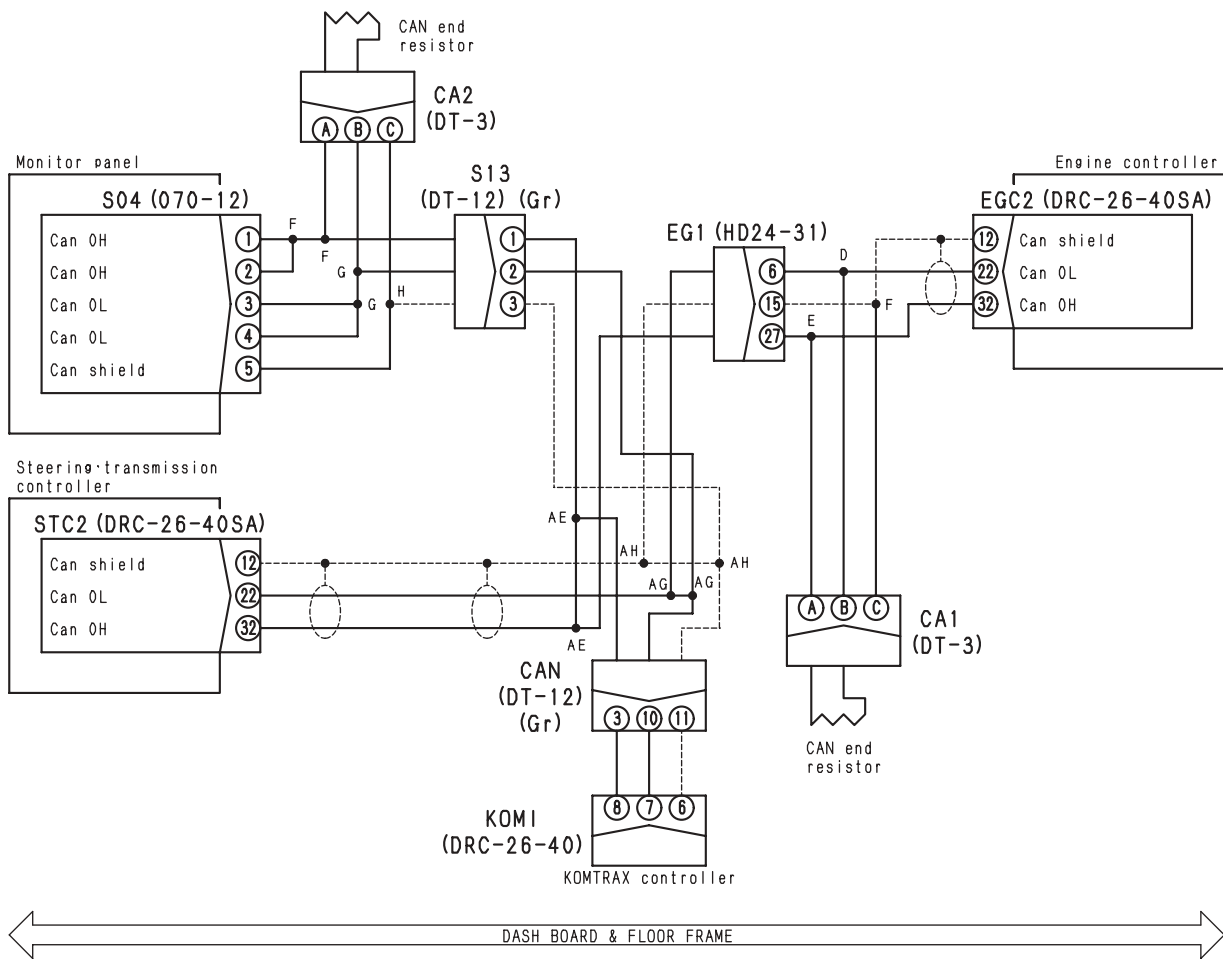


Circuit diagram related to CAN communication



BJD11680

Circuit diagram related to engine controller type select



BJD11680

ERROR CODE DB30KK DAQ0KK (STEERING AND TRANSMISSION CONTROLLER: SOURCE VOLTAGE REDUCTION/INPUT (KK))

★ See DAQ0KK.

ERROR CODE DB30KT DAQ0KT (STEERING AND TRANSMISSION CONTROLLER: ABNORMALITY IN CONTROLLER (KT))

★ See DAQ0KT.

ERROR CODE DB35KK DAQ5KK (STEERING AND TRANSMISSION CONTROLLER SENSOR 5V POWER SUPPLY: SOURCE VOLTAGE REDUCTION/INPUT (KK))

★ See DAQ5KK.

ERROR CODE DB36KK DAQ6KK (STEERING AND TRANSMISSION CONTROLLER SENSOR 24V POWER SUPPLY: SOURCE VOLTAGE REDUCTION/INPUT (KK))

★ See DAQ6KK.

ERROR CODE DB39KQ DAQ9KQ (STEERING AND TRANSMISSION CONTROLLER TYPE COLLATION: TYPE SELECT SIGNAL INCONSISTENCY (KQ))

★ See DAQ9KQ.

ERROR CODE DB3RKR DAQRKR (STEERING AND TRANSMISSION CONTROLLER CAN COMMUNICATION: DEFECTIVE COMMUNICATION (KR))

★ See DAQRKR.

ERROR CODE DD14KA DDQ2KA (PARKING LEVER SWITCH: DISCONNECTION (KA))

Action code	Error code	Controller code	Trouble	Parking lever switch: Disconnection (KA) (Steering and transmission controller system)
CALL E03	DD14KA DDQ2KA	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> Signals of two systems of parking lever switch circuit were turned OFF (OPEN) at the same time. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Recognizes parking lever is in Free position. Limits operation of engine, transmission, and brake. 			
Problem that appears on machine	<ul style="list-style-type: none"> Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, travel is limited to F1 and R1. 			
Related information	<ul style="list-style-type: none"> Of signals of two systems of switch, NO is for operation detection and NC is for error detection. Input state (ON/OFF) from parking brake switch can be checked in monitoring mode. (Code 40905: Steering and transmission controller input signal 1) Method of reproducing error code: Turn starting switch ON and operate parking lever. 			

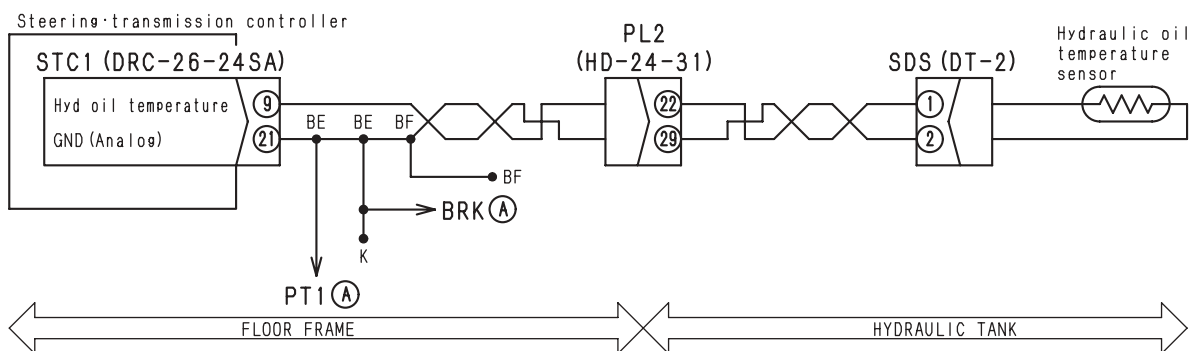
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting			
		1	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
Wiring harness between STC2 (female) (15) – NSW (female) (C)				Resistance	Max. 1Ω	
Wiring harness between STC2 (female) (5) – NSW (female) (B)				Resistance	Max. 1Ω	
2		Defective steering and transmission controller	★Prepare with starting switch OFF, turn starting switch ON and carry out troubleshooting.			
			STC2	Parking lever		
				Free position	Lock position	
	Between (18) – chassis ground		Max. 1V	5 – 11V		
	Between (12) – chassis ground	5 – 11V	Max. 1V			

ERROR CODE DGS1KX (HYDRAULIC OIL TEMPERATURE SENSOR: INPUT SIGNAL IS OUT OF NORMAL RANGE (KX))

Action code	Error code	Controller code	Trouble	Hydraulic oil temperature sensor: Input signal is out of normal range (KX) (Steering and transmission controller system)
—	DGS1KX	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> Hydraulic oil temperature sensor signal is out of normal range. 			
Action of controller	<ul style="list-style-type: none"> Does not take any particular action. 			
Problem that appears on machine	<ul style="list-style-type: none"> Hydraulic oil temperature gauge of monitor panel may not display normally. 			
Related information	<ul style="list-style-type: none"> Hydraulic oil temperature (temperature) can be checked in monitoring mode. (Code 04401: Hydraulic oil temperature) Method of reproducing error code: Turn starting switch ON or start engine. 			

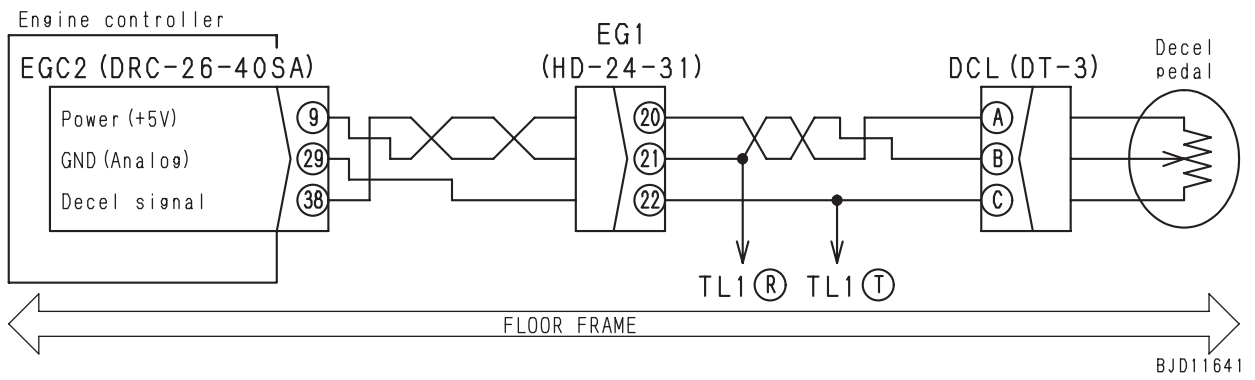
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting			
		1	Defective hydraulic oil temperature sensor (Internal disconnection or short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
SDS (male)				Resistance		
Between (1) – (2)				1k – 50kΩ		
Between (1) – chassis ground				Min. 1MΩ		
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 STC1 (female) (14) – SDS (female) (1)	Resistance	Max. 1Ω	
			Wiring harness between STC1 (female) (21) – SDS (female) (2)	Resistance	Max. 1Ω	
3		Short circuit with chassis ground in wiring harness (Contact with ground circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			Short circuit of wiring harness between STC1 (female) (14) – SDS (female) (1) with chassis ground	Resistance	Min. 1MΩ	
4		Short circuit with power source in wiring harness (Contact with 24V circuit)	★Prepare with starting switch OFF, turn starting switch ON and carry out troubleshooting.			
			Short circuit of wiring harness between STC1 (female) (14) – SDS (female) (1) with chassis ground	Voltage	Max. 1V	
5		Defective steering and transmission controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
			STC1 (female)		Resistance	
			Between (14) – (21)		1k – 50kΩ	
	Between (14) – chassis ground		Min. 1MΩ			

Circuit diagram related to hydraulic oil temperature sensor

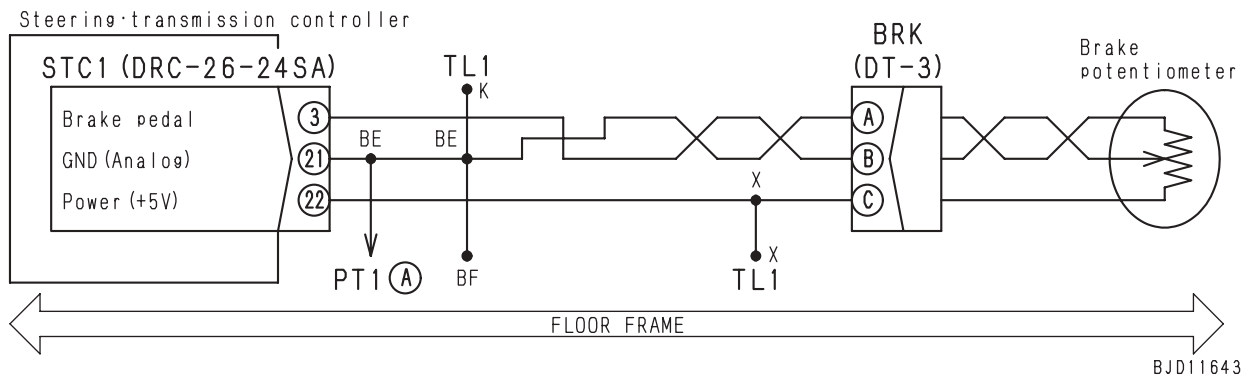


BJD11636

Circuit diagram related to decel potentiometer



Circuit diagram related to brake potentiometer

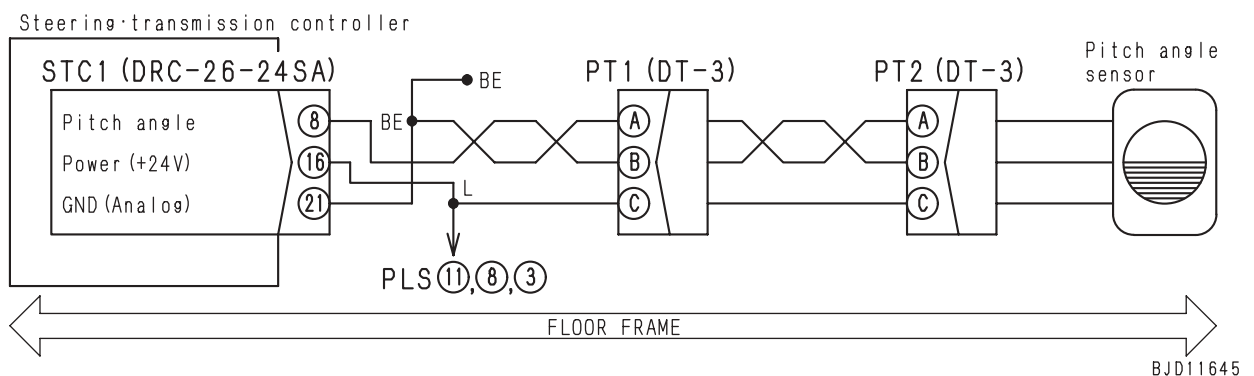


ERROR CODE DKH1KA (PITCH ANGLE SENSOR: DISCONNECTION (KA))

Action code	Error code	Controller code	Trouble	Pitch angle sensor: Disconnection (KA) (Steering and transmission controller system)
CALL E03	DKH1KA	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> Signal voltage of pitch angle sensor is below 0.15V. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Cannot recognize pitch angle. Limits operation of engine and transmission. 			
Problem that appears on machine	<ul style="list-style-type: none"> Shocks are made when gear is shifted on slope and when machine is steered on level place. Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, travel is limited to F1 and R1. 			
Related information	<ul style="list-style-type: none"> Input (Voltage) from pitch angle sensor can be checked in monitoring mode. (Code 60100: Voltage of pitch angle sensor) Method of reproducing error code: Turn starting switch ON. 			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective 24V power source system	See if error code [DAQ6KK] [DB36KK] is displayed. If it is displayed, carry out troubleshooting for it first.	
2		Defective pitch angle sensor (Internal trouble)	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.		
			PT2	Voltage	
			Between (B) – (A)	0.15 – 4.85V	
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 STC1 (female) (16) – PT2 (female) (C)		Resistance	Max. 1Ω	
		Wiring harness between STC1 (female) (13) – PT2 (female) (B)	Resistance	Max. 1Ω	
4	Short circuit with chassis ground in wiring harness (Contact with ground circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
		Short circuit of wiring harness between STC1 (female) (8) – PT2 (female) (B) with chassis ground	Resistance	Min. 1MΩ	
5	Defective steering and transmission controller	★Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.			
		STC1	Voltage		
		Between (8) – (21)	0.15 – 4.85V		

Circuit diagram related to pitch angle sensor

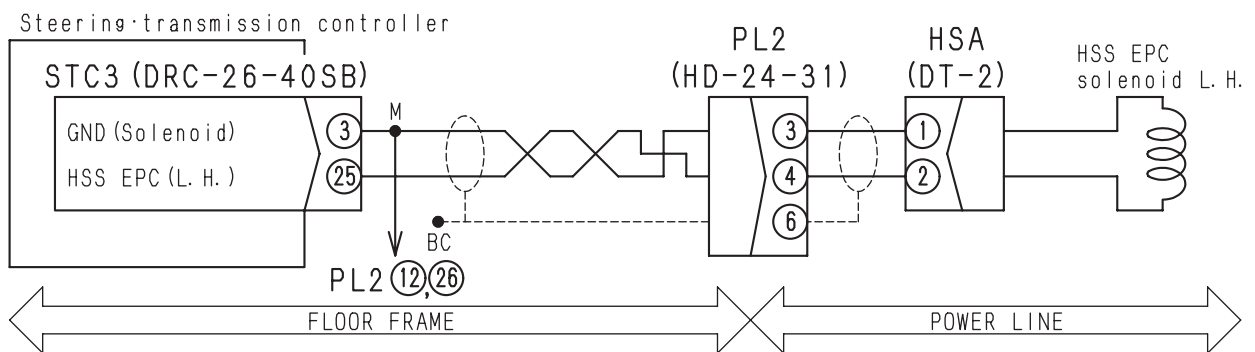


ERROR CODE DWN1KB (HSS EPC SOLENOID LEFT: SHORT CIRCUIT (KB))

Action code	Error code	Controller code	Trouble	HSS EPC solenoid left: Short circuit (KB) (Steering and transmission controller system)
CALL E03	DWN1KB	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> When signal was output to HSS EPC solenoid left circuit, abnormal current flowed. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Stops outputting to HSS EPC solenoid left circuit. Limits operation of engine and transmission. 			
Problem that appears on machine	<ul style="list-style-type: none"> Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, travel is limited to F1 and R1. 			
Related information	<ul style="list-style-type: none"> Output (Current) to HSS EPC solenoid left can be checked in monitoring mode. (Code 50600: Left HSS solenoid output current) Method of reproducing service code: Turn starting switch ON and operate PCCS lever (for steering to left). 			

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective HSS EPC solenoid left (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
HSA (male)				Resistance	
Between (1) – (2)				5 – 15Ω	
Between (1) – chassis ground				Min. 1MΩ	
2		Short circuit with chassis ground in wiring harness (Contact with ground circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Short circuit of wiring harness between STC3 (female) (25) – HSA (female) (1) with chassis ground		Resistance Min. 1MΩ
3		Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Short circuit in wiring harness between STC3 (female) (25) – HSA (female) (1) with wiring harness between STC3 (female) (3) – HSA (female) (2)		Resistance Min. 1MΩ
4	Defective steering and transmission controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
		STC3		Resistance	
		Between (25) – (3)		5 – 15Ω	
		Between (25) – chassis ground		Min. 1MΩ	

Circuit diagram related to HSS EPC solenoid left



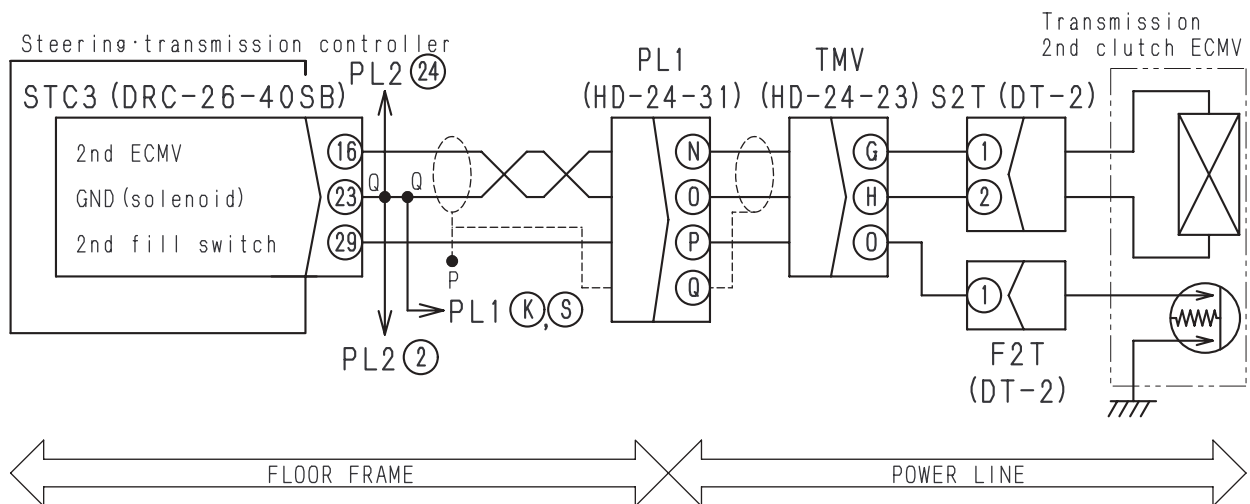
BJD11651

ERROR CODE DXH5KB (2ND CLUTCH ECMV: SHORT CIRCUIT (KB))

Action code	Error code	Controller code	Trouble	2nd clutch ECMV: Short circuit (KB) (Steering and transmission controller system)
CALL E03	DXH5KB	Steering and transmission		
Contents of trouble	<ul style="list-style-type: none"> When signal was output to transmission 2nd clutch solenoid circuit, abnormal current flowed. 			
Action of controller	<ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Stops outputting to transmission 2nd clutch solenoid circuit. Limits operation of engine and transmission. 			
Problem that appears on machine	<ul style="list-style-type: none"> Once machine is stopped, engine speed is limited to medium (half). Once machine is stopped, travel is limited to F1 and R1. 			
Related information	<ul style="list-style-type: none"> Output (Current) to 2nd clutch solenoid can be checked in monitoring mode. (Code 31603, 31613: Output current of 2nd clutch ECMV) Method of reproducing service code: Start engine and drive machine in F2 or R2. 			

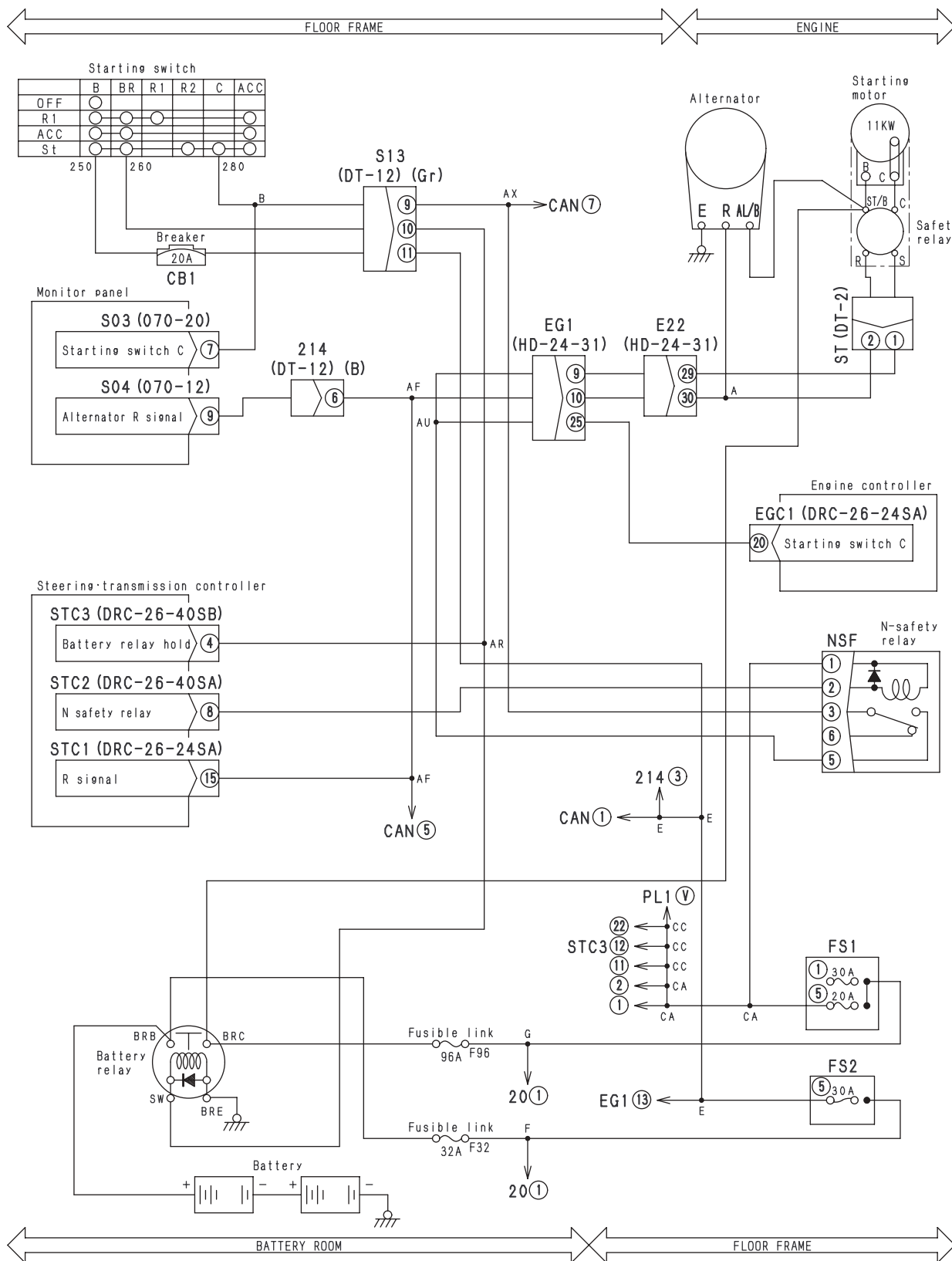
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective 2nd clutch ECMV (Internal short circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
S2T (male)				Resistance	
Between (1) – (2)				5 – 25Ω	
Between (1) – chassis ground				Min. 1MΩ	
2		Short circuit with chassis ground in wiring harness (Contact with ground circuit)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Short circuit of wiring harness between STC3 (female) (16) – S2T (female) (1) with chassis ground	Resistance	Min. 1MΩ
3		Short circuit in wiring harness (with another wiring harness)	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Short circuit in wiring harness between STC3 (female) (16) – S2T (female) (1) with wiring harness between STC3 (female) (23) – S2T (female) (2)	Resistance	Min. 1MΩ
4	Defective steering and transmission controller	★Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.			
		STC3	Resistance		
		Between (16) – (23)	5 – 25Ω		
		Between (16) – chassis ground	Min. 1MΩ		

Circuit diagram related to transmission 2nd clutch ECMV



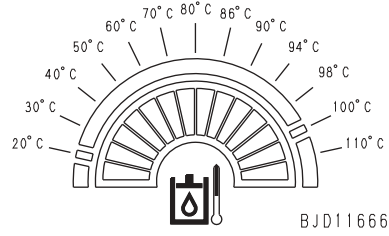
BJD11656

Engine start/charge-related circuit diagram

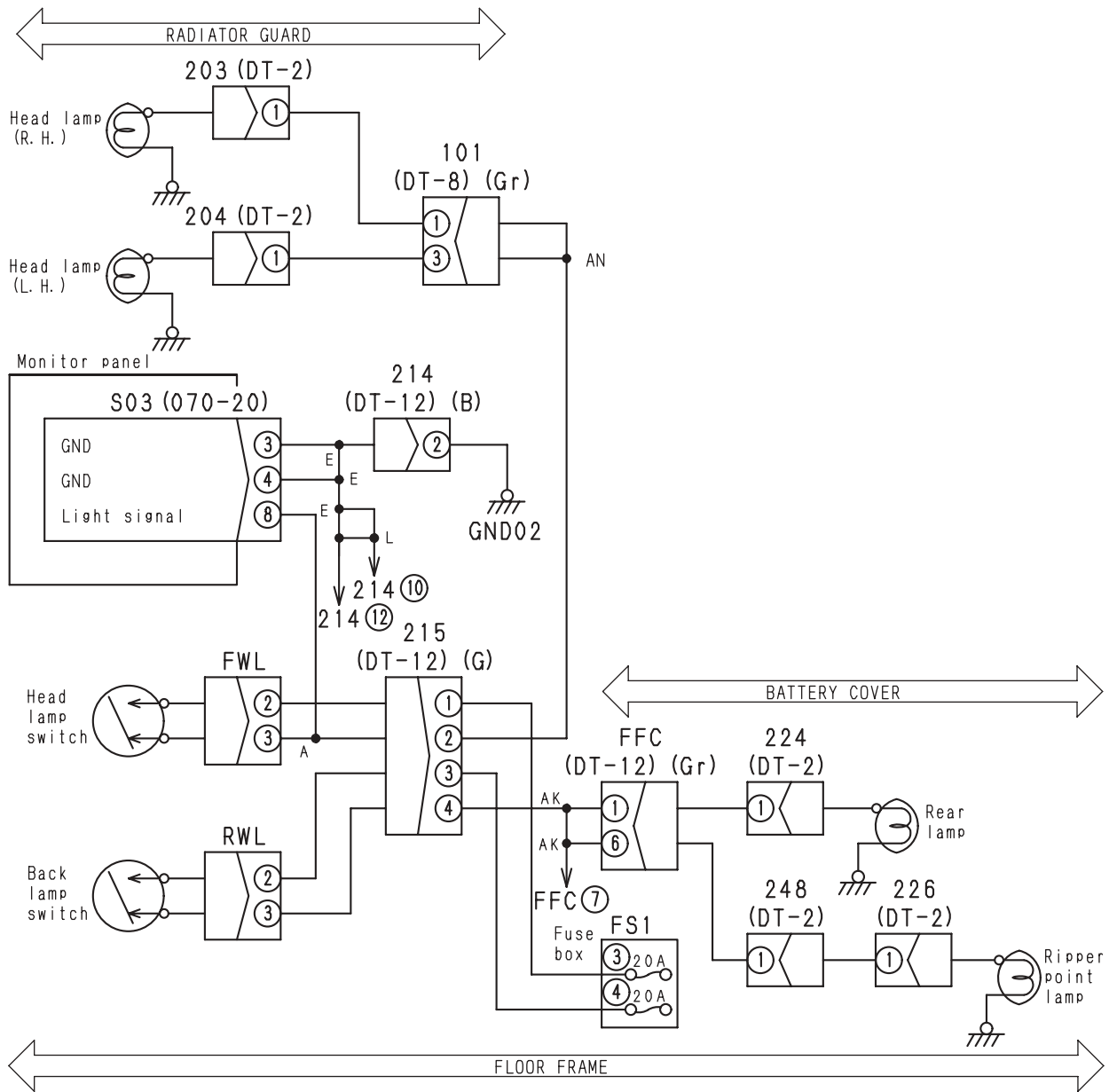


BJD11660

Trouble (4)	<ul style="list-style-type: none"> The hydraulic oil temperature caution lamp flashes.
Related information	<ul style="list-style-type: none"> When any abnormality is detected during engine operation, the hydraulic oil temperature caution lamp will flash and sound the alarm buzzer. The hydraulic oil temperature caution lamp flashes or goes out as it links with indication on the hydraulic oil temperature gauge.

		Cause	Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Overheated hydraulic oil temperature (when the system is normal)	As an overheated hydraulic oil temperature was detected, check the hydraulic oil temperature. (When the oil temperature is over 130°C, the lamp flashes.)			
	2	The hydraulic oil temperature sensor system is defective. (Monitor panel system)	Check the indication on the engine water temperature gauge. If the indication is abnormal, carry out the troubleshooting of "Indication on the hydraulic oil temperature gauge is abnormal."			
			Oil temperature gauge	★Oil temperatures are guides for selecting indications. 		
			Oil temperature lamp	<table border="1"> <tr> <td>White range/ Green range</td> <td>Red range</td> </tr> <tr> <td>Goes out.</td> <td>Flashes.</td> </tr> </table>	White range/ Green range	Red range
	White range/ Green range	Red range				
Goes out.	Flashes.					
3	Defective monitor panel	When Causes 1 and 2 are not applicable, the monitor panel is supposed to be defective. (This is an internal defect, which cannot be troubleshot.)				

Circuit diagram related to panel lamp, head lamp, rear lamp, and ripper point lamp



BJD11677

	Cause		Standard value in normal state/Remarks on troubleshooting		
	Possible causes and standard value in normal state	7	Disconnection or short circuit with chassis ground in wiring harness (Disconnection in wiring or defective contact in connector or contact with ground circuit)	Wiring harness between fuse (6) - CN13 (female) (2), (3) - CN17 (4) - connector (female) (4) just before motor - CN13 (female) (2), (3)	Resistance
Contact of wiring harness between fuse (6) - CN13 (female) (2), (3) - CN17 (4) - connector (female) (4) just before motor - CN13 (female) (2), (3) with ground				Resistance	Min. 1 MΩ
Wiring harness between fuse (6) - CN30 (female) (3)				Resistance	Max. 1Ω
Contact of wiring harness between fuse (6) - CN30 (female) (3) with ground				Resistance	Min. 1 MΩ
Wiring harness between connector (female) (3) just before motor - CN17 (3) - CN30 (female) (5)				Resistance	Max. 1Ω
Contact of wiring harness between connector (female) (3) just before motor - CN17 (3) - CN30 (female) (5) with ground				Resistance	Min. 1 MΩ
Wiring harness between CN30 (female) (6) - ground				Resistance	Max. 1Ω
Wiring harness between connector (female) (1) just before motor - CN17 (1) - ground				Resistance	Max. 1Ω

Trouble (3)	<ul style="list-style-type: none"> Washing water of the left door washer does not come out.
Related information	<ul style="list-style-type: none"> Carry out the following troubleshooting when the left door wiper operates normally. (If the wiper does not operate either, carry out troubleshooting in E-24 THE WIPER DOES NOT OPERATE first. Since the left door wiper switch and right door wiper switch use fuse (6) jointly, if fuse (6) is broken, both wipers do not operate.

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
		1	Defective left door washer motor	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.	
Wiring harness between 361 (male) (2) – ground				Resistance	Max. 1Ω
★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting.					
Between 361 (2) – ground				Voltage	20 – 30V
2		Defective left door wiper switch	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			CN15 (female)	Position of switch	Resistance
			Between (2) – (1)	W/I or W/II	Max. 1Ω
				OFF	Min. 1 MΩ
3		Disconnection or short circuit with chassis ground in wiring harness (Disconnection in wiring or defective contact in connector or contact with ground circuit)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.		
			Wiring harness between fuse (6) – CN15 (female) (2)	Resistance	Max. 1Ω
			Contact of wiring harness between fuse (6) – CN15 (female) (2) with ground	Resistance	Min. 1 MΩ
			Wiring harness between CN15 (female) (1) – 19 (1) – 361 (female) (1)	Resistance	Max. 1Ω
			Contact of wiring harness between CN15 (female) (6) – 19 (1) – 361 (female) (1) with ground	Resistance	Min. 1 MΩ
			Wiring harness between 361 (female) (2) – ground	Resistance	Max. 1Ω

* For the electric circuit diagram of each system, see Trouble (1).

H-2 MACHINE DOES NOT MOVE (AT 2ND OR 3RD SPEED)

Trouble	• Machine does not move. (At 2nd or 3rd speed)				
Related information	<ul style="list-style-type: none"> • Confirm that the oil quantity on the power train is normal before troubleshooting. • Confirm that the transmission main relief pressure is normal before troubleshooting. (See H-1.) 				
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Internally defective torque converter	★Prepare with starting switch OFF, then drive the engine in high idling mode for troubleshooting.		
			PCCS lever	Original pressure of torque converter	Torque converter delivery pressure
			Full neutral	Max. 1.02MPa {Max. 10kg/cm ² }	0.61 – 0.81MPa {6 – 8kg/cm ² }
	2	Defective transmission valve (ECMV) function	★Prepare with starting switch OFF, then drive the engine in low idling mode for troubleshooting.		
			Transmission clutch	Clutch pressure	
			2ND	Min. 2.35MPa {Min. 24kg/cm ² }	
	3RD	Min. 2.55MPa {Min. 26kg/cm ² }			
	3	Internally defective transmission clutch	The transmission clutch (2nd or 3rd speed) is assumed to be defective internally; directly check it.		
	4	Defective parking brake function (Drag)	The parking brake function is assumed to be defective (dragged); check the linkage valves.		
	5	Defective brake function (Drag)	★Move to a flat place, and start the engine for troubleshooting.		
			If the machine does not run by low idling + F2 operation, brake drag occurs. (Carry out troubleshooting "Brake does not work.")		
6	Internally defective transmission	The transmission is assumed to be defective internally; directly check it.			

H-18 EXCESSIVE HYDRAULIC DRIFT OF RIPPER LIFT

Trouble	• Excessive hydraulic drift of ripper lift.		
Related information	<ul style="list-style-type: none"> • Confirm whether the ripper is remodeled. • Confirm that no oil leaks the circuits in the work equipment before troubleshooting. 		
Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective seal of ripper lift operation valve (Spool)	★Prepare with starting the engine, then stop the engine for troubleshooting.
			Follow the procedure below for troubleshooting. If the hydraulic drift speed becomes high, the spool seal of the ripper lift operation valve (Hi) is assumed to be defective. <ol style="list-style-type: none"> 1. Prop up the machine using the blade tilt, and lift the rear of the machine. 2. Stop the engine, and release the safety lock lever. 3. Set the blade lever to the lift lowering side, and confirm how the phenomenon changes.
	2	Defective seal of ripper lift cylinder	★Prepare with starting switch OFF, then drive the engine in high idling mode for troubleshooting.
			Ripper lift cylinder
Lowering stroke end			16cc/min

S-3 Engine does not pick up smoothly (follow-up is poor)

General causes why engine does not pick up smoothly

- Insufficient intake of air
- Insufficient supply of fuel
- Abnormal fuel injection condition
- Improper selection of fuel
- Controller controlled by delayed mode
(The injection amount (output) is limited because an error has occurred in the electrical system.)

		Causes											
		Clogged air cleaner element	Defective contact of valve and valve seat	Improper valve clearance	Seized turbocharger, interference	Worn piston ring, cylinder liner	Clogged air breather hole in fuel tank cap	Leakage, clogging, air in fuel piping	Clogged fuel filter, strainer	Clogged fuel feed pump strainer	Stuck, seized fuel supply pump plunger	Defective actuation of fuel flow damper (excessive leak from injector)	Clogged fuel injector, defective spray (dirt caught)
Questions	Confirm recent repair history												
	Degree of use of machine	Operated for long period	△	△			△		△	△			
	Engine pick-up suddenly became poor				⊙		○	○					○
	Non-specified fuel is being used								⊙	⊙	⊙		⊙
	Replacement of filters has not been carried out according to Operation Manual		⊙						⊙	⊙			
	Engine oil must be added more frequently					⊙							
	Dust indicator lamp is red		⊙										
	Air breather hole in fuel tank cap is clogged						⊙						
	Rust and water are found when fuel is drained							⊙	⊙				
	There is leakage from fuel piping							⊙					
	When fuel priming pump is operated, there is no response, or operation is too heavy							⊙	○	○			
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low										○		⊙
	Color of exhaust gas	Blue under light load					⊙						
		Black	⊙	○		⊙							⊙
	Abnormal noise is heard from around cylinder head when engine is run			⊙									
Noise of interference is heard from around turbocharger				⊙									
High idling speed is normal, but speed suddenly drops when load is applied						○		⊙	⊙				
There is hunting from engine (rotation is irregular)						○		○	⊙			○	
Blow-by gas is excessive					⊙								
Troubleshooting	Check air cleaner element directly	●											
	When compression pressure is measured, it is found to be low		●			●							
	Check valve clearance directly			●									
	When turbocharger is rotated by hand, it is found to be heavy				●								
	When air is bled from fuel line, air comes out							●					
	Check fuel filter, strainer directly								●				
	Check fuel feed pump strainer directly									●			
	Carry out troubleshooting for error code "AD10L3 : Fuel supply pump non-force feed"										●		
Engine speed does not change when operation of certain cylinders is stopped in reduced cylinder mode											●	●	
Remedy	Clean	Replace	Adjust	Replace	Replace	Clean	Correct	Clean	Clean	Replace	Replace	Correct	

S-13 Oil level rises (water, fuel in oil)

General causes why oil level rises

- Water in oil (cloudy white)
- Fuel in oil (diluted, smells of diesel fuel)

★ If there is oil in the cooling water, carry out troubleshooting for "Oil is in cooling water".

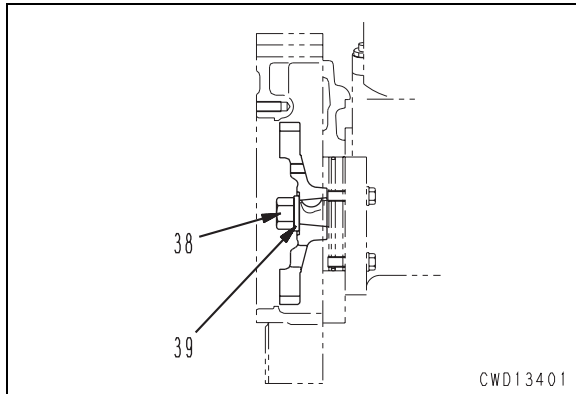
		Causes									
		Broken cylinder head, head gasket	Leakage of fuel inside head cover	Cracks inside cylinder block	Damaged cylinder liner O-ring, holes made by pitting	Worn, damaged rear oil seal	Broken oil cooler core, O-ring	Clogged water pump drain (breather hole), defective seal	Defective thermostat seat	Defective part inside fuel supply pump	Defective auxiliary equipment seal (pump, air compressor)
Questions	Confirm recent repair history										
	Degree of use of machine	Operated for long period				△	△		△		△
	Fuel consumption has increased		⊙							⊙	
	Water must be added more frequently		○						⊙		
	There is oil in engine cooling water		○	○	○		⊙				
	Oil smells of diesel fuel		⊙							⊙	
	Oil is cloudy white		○						⊙		
	When engine is started, drops of water come from muffler		○								
	When radiator cap is left open and engine is run at idling, an abnormal number of bubbles appear, or water spurts back		⊙		○						
	Exhaust smoke is white			○					○		
	Water pump drain hole (breather hole) is clogged							⊙			
	When water pump drain hole (breather hole) is cleaned, water comes out							⊙			
	Oil level goes down in clutch chamber or damper chamber						⊙				
	Oil level goes down in hydraulic tank										⊙
Troubleshooting	When compression pressure is measured, it is found to be low	●									
	Remove head cover and check directly		●								
	Check cylinder block, liner directly			●	●						
	Check rear oil seal directly					●					
	Pressure-tightness test of oil cooler shows there is leakage						●				
	Remove water pump and check directly							●			
	Remove thermostat cover and check directly								●		
	Remove fuel supply pump and check directly									●	
	Check auxiliary equipment seal directly										●
Remedy		Replace	Correct	Replace	Replace	Correct	Replace	Replace	Correct	Replace	Replace

SPECIAL TOOL LIST

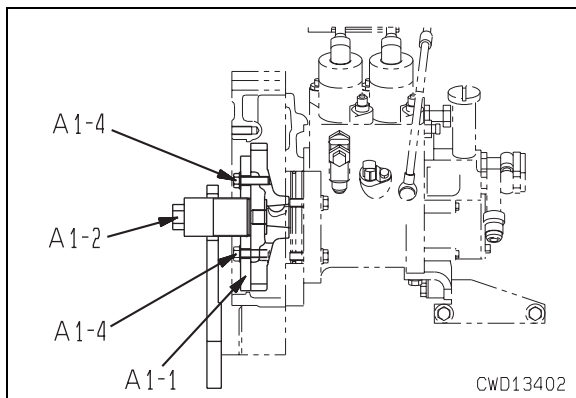
- ★ Tools with part number 79○T-○○○-○○○○ can not be supplied (they must be locally manufactured).
- ★ Necessity: ■ Cannot be substituted, should always be installed (used)
 ● Extremely useful if available, can be substituted with commercially available part.
- ★ New/Remodel: N Tools with new part numbers, newly developed for this model.
 R Tools with upgraded part numbers, remodeled from items already available for other models.
 Blank. ... Tools already available for other models, used without any modification
- ★ Tools marked ○ in the Sketch column are tools introduced in the sketches of the special tools (See SKETCHES OF SPECIAL TOOLS).

Component	Symbol	Part No.	Part Name	Necessity	Q'ty	New/ Remodel	Sketch	Nature of work, remarks	
Engine assembly	A1	795-471-1800	Remover	■	1	N		Removal of fuel supply pump	
		1 • 795-471-1810	• Plate		1	N			
		2 • 795-471-1820	• Bolt		1	N			
		3 • 795-471-1830	• Bracket		1	N			
		4 • 01435-01035	• Bolt		3				
		5 • 01435-01025	• Bolt		1				
	A2	795T-521-1140	Push tool	■	1		○	Installation of engine front seal	
		790-101-5221	Grip	■	1				
		• 01010-81225	• Bolt	■	1				
		• 01050-31640	• Bolt	■	3				
	A3	1	795-931-1210	Push tool	■	1		Installation of engine rear seal	
			• 01050-31625	• Bolt	■	3			
			• 01050-31645	• Bolt	■	3			
		2	795-931-1220	Push tool	■	1			
			• 01050-31645	• Bolt	■	3			
A4	790-331-1110	Wrench	■	1			Tightening of cylinder head bolt		
A5	795T-471-1550	Wrench	■	1		○	Removal, installation of nozzle tip		
Damper assembly	B	791-612-1100	Installer	■	1		Press fitting of bearing		
		790-101-4200	Puller (294kN {30ton})	■	1				
		790-101-1102	Hydraulic pump	■	1				
TORQFLOW transmission assembly	D1	791-415-1300	Puller assembly	■	1		Removal, installation of snap ring of carrier		
	D2	799-301-1600	Oil leak tester	■	1		Operation check of piston		
HSS case assembly	E1	791T-422-1320	Hanger	■	1		○	Removal, installation of brake assembly	
	E2	790-302-1500	Wrench set	●	1			Removal, installation of bearing nut	

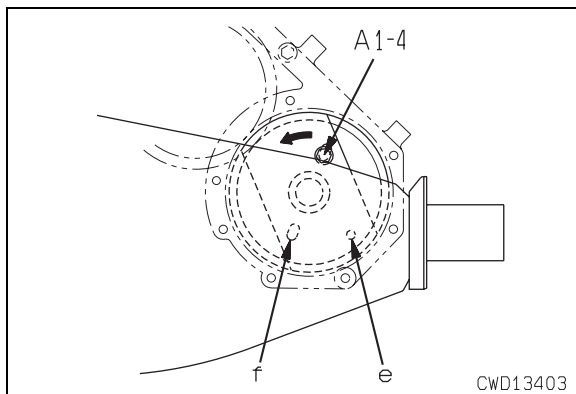
- 4) Remove gear mounting nut (38) and washer (39).
 - ★ Take great care not to drop the nut and washer in the case.



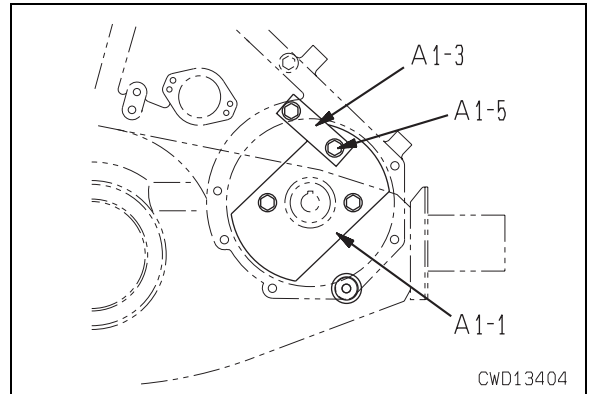
- 5) Insert plate **A1-1** with its shouldered side toward the gear and tighten bolt **A1-2** with your fingers (about 5 turns).



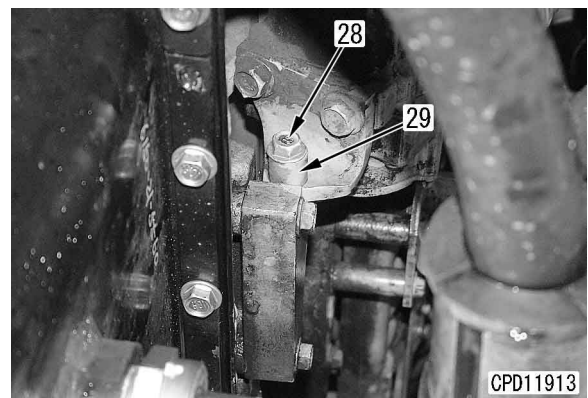
- 6) Tighten gear fixing bolt **A1-4** with your fingers.
 - ★ Set tap hole **e** of plate **A1-1** down.
- 7) Rotate the crankshaft 1 turn again (forward) to set lower gear fixing bolt hole **f** up, and then tighten bolt **A1-4** with your fingers.



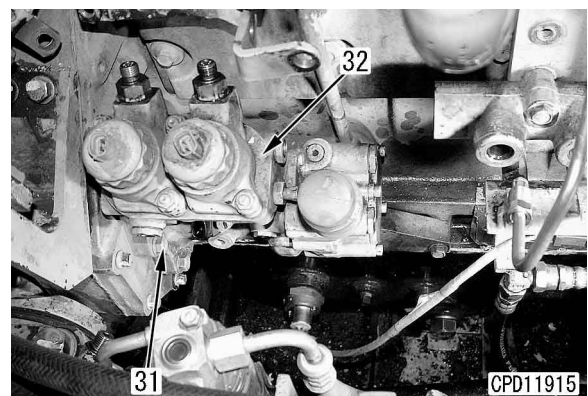
- 8) Install bracket **A1-3** to the case.
- 9) Rotate the crankshaft to match tap hole **e** of plate **A1-1** and secure bracket **A1-3** with bolt **A1-5**.
 - At this time, the key of the supply pump must be at the upper position.



- 10) Remove fuel supply pump lower bracket mounting bolt (28) and spacer (29).



- 11) Remove 4 mounting bolts (31).
 - Tighten 1 mounting bolt on the upper side temporarily as a guide bolt.



REMOVAL AND INSTALLATION OF ENGINE FRONT SEAL

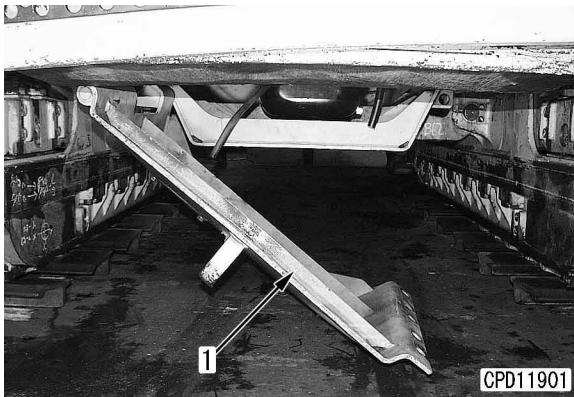
SPECIAL TOOLS

Symbol	Part No.	Part name	Necessity	Qty	New/Remodel	Sketch
A2	795T-521-1140	Push tool	■	1		
	790-101-5221	Grip	■	1		○
	• 01010-81225	• Bolt	■	1		
	• 01050-31640	• Bolt	■	3		

REMOVAL

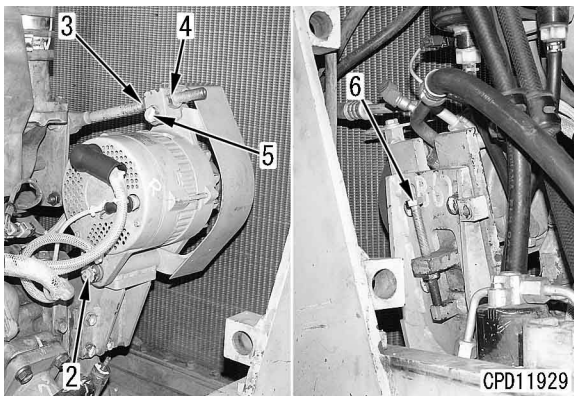
⚠ Disconnect the cable from the negative (-) terminal of the battery.

1. Open undercover (1).

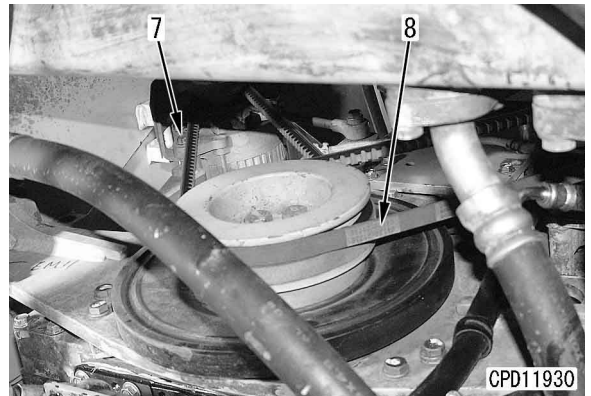


2. Loosen alternator assembly mounting bolts (2), nuts (3) and (4) of the adjustment bolts, and bolt (5) of the adjustment bolt guide. [*1]

3. Loosen the 4 mounting bolts of the air compressor assembly and adjustment bolt (6). [*2]

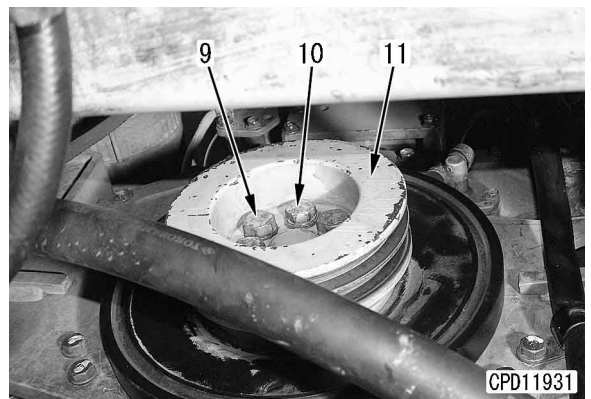


4. Remove alternator belt (7) and air compressor belt (8).

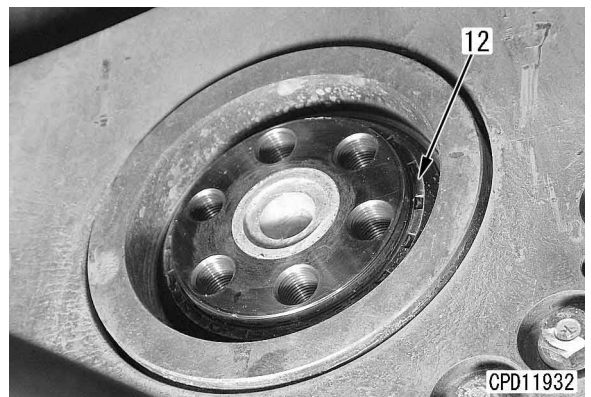


5. Remove 6 pulley mounting bolts (9) and (10) and pulley (11).

★ One of mounting bolts (10) has a different diameter. [*3]

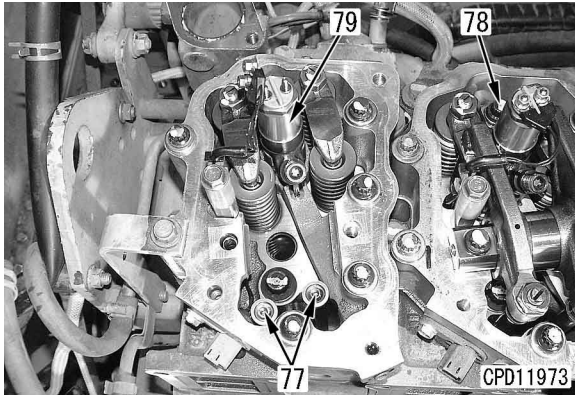


6. Remove front seal (12). [*4]



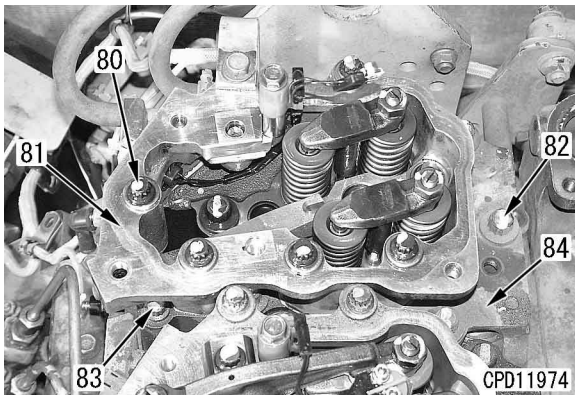
50. Remove 2 push rods (77).

51. Remove injector mounting bolt (78) and injector assembly (79). [*25]




52. Remove 6 mounting bolts (80) and rocker housing (81). [*26]


53. Remove 6 cylinder head mounting bolts (82), 1 auxiliary bolt (83), and cylinder head assembly (84). [*27]





INSTALLATION


• Carry out installation in the reverse order to removal.


[*1]  Hose clamp:
8.8 ± 0.5 Nm {0.9 ± 0.5 kgm}

[*2]  Band clamp:
9.8 – 11.76 Nm {1.0 – 1.2 kgm}

[*3]  Wiring harness mounting nut:
2.5 – 2.9 Nm {0.25 – 0.3 kgm}

[*4]  Hose clamp:
6.8 ± 0.49 Nm {69 ± 5 kgcm}

[*5]  Joint bolt on engine block side:
24.5 – 34.3 Nm {2.5 – 3.5 kgm}

[*6]  Hose clamp:
5.9 ± 0.49 Nm {0.6 ± 0.05 kgm}

[*7] Length of spacer: **L = 84 mm (2 pieces)**

[*8] Length of spacer: **L = 60.5 mm (2 pieces)**
L = 108.5 mm (8 pieces)

[*9] Length of spacer: **L = 18 mm (4 pieces)**

REMOVAL AND INSTALLATION OF ENGINE ASSEMBLY

SPECIAL TOOLS


Symbol	Part No.	Part name	Necessity	Qty	New/Remodel	Sketch
X2	799-703-1200	Service tool KIT	■	1		
	799-703-1100	Vacuum pump (100V)	■	1		
	799-703-1110	Vacuum pump (220V)	■	1		
	799-703-1120	Vacuum pump (240V)	■	1		
	799-703-1401	Gas leak detector	■	1		

REMOVAL

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

★ For the method of changing the fuel injection amount adjustment after the engine assembly or engine controller is replaced, ask your Komatsu distributor.

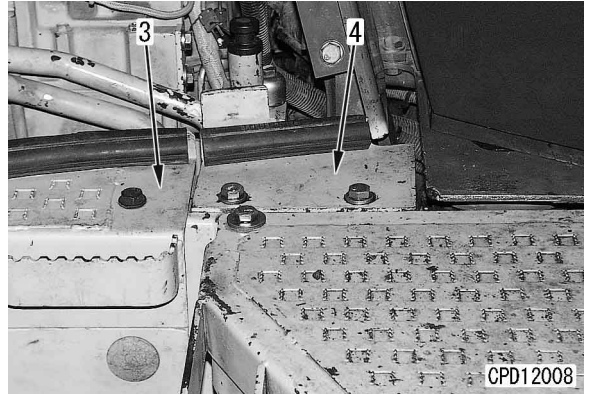
1. Drain the cooling water.

 Cooling water: **Approx. 80 ℓ**

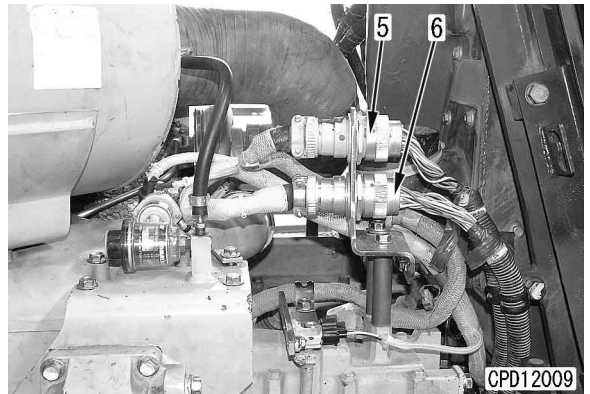
2. Remove the engine hood assembly. For details, see REMOVAL OF ENGINE HOOD ASSEMBLY.
3. Remove the radiator assembly. For details, see REMOVAL OF RADIATOR ASSEMBLY.
4. Close the fuel supply valve of the fuel tank.
5. Open undercovers (1) and (2).



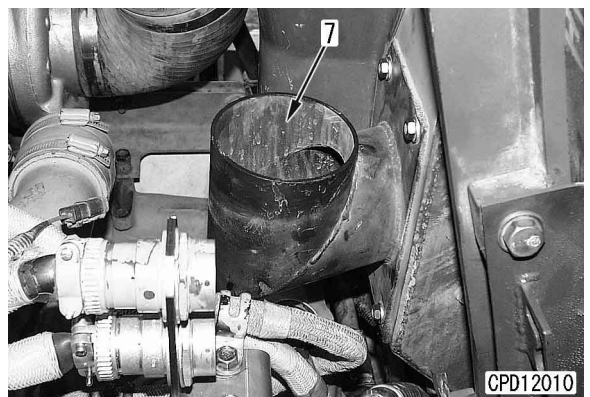
6. Remove engine side covers (3) and plates (4) on both sides.



7. Disconnect centralized connectors E21 (5) and E22 (6).

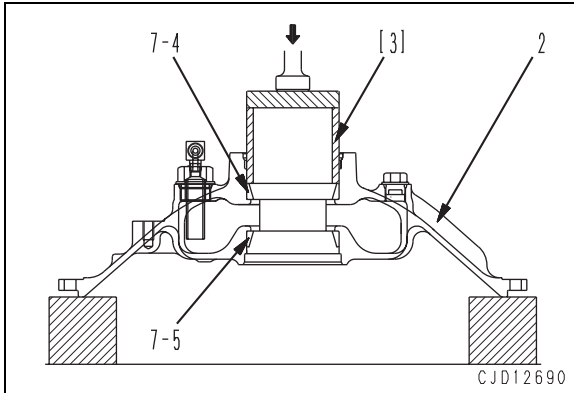


8. Remove fresh air suction tube (7).

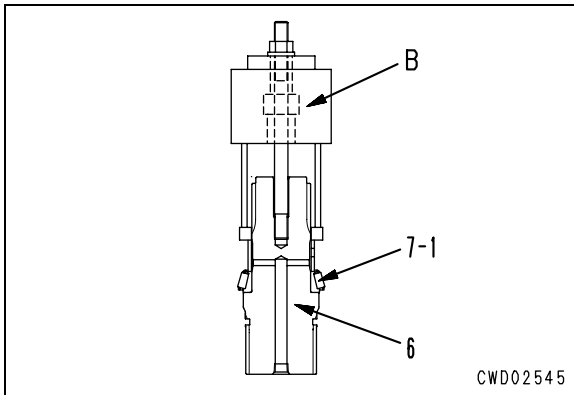


2. Assembly of damper cover assembly (1)

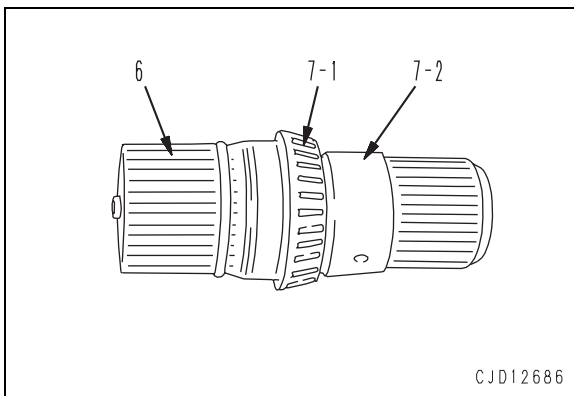
1) Using push tool [3], press fit outer races (7-4) and (7-5) of bearing (7) to cover (2).



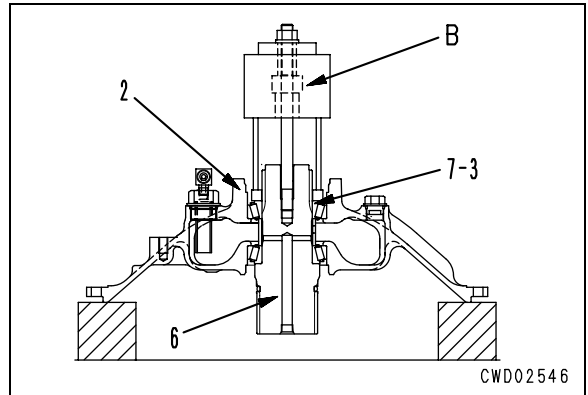
2) Press fit inner race (7-1) of bearing (7) to shaft (6) with tool B.



3) Install collar (7-2) and O-ring to shaft (6).



4) Set cover (2) to shaft (6). Using tool B, press fit bearing inner race (7-3).

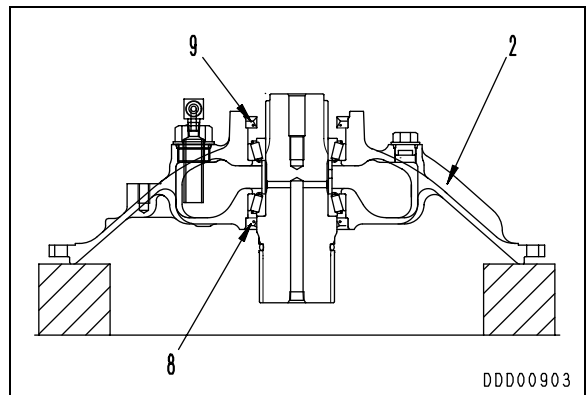


5) Fit oil seals (8) and (9) to cover assembly (2).

Press fitting face of oil seal: **Gasket sealant (LG-6)**

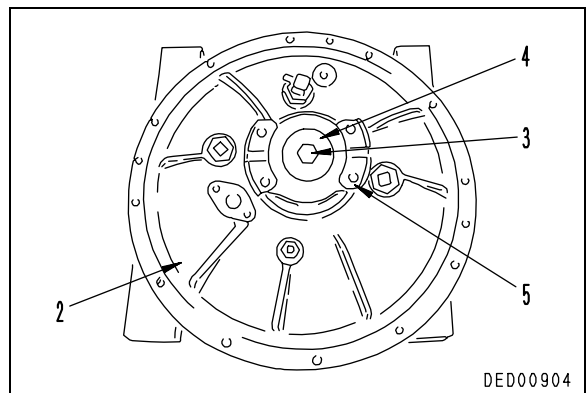
Oil seal lip: **Grease (G2-LI)**

★ Apply the gasket sealant thinly to the oil seal surface and wipe off projected part.

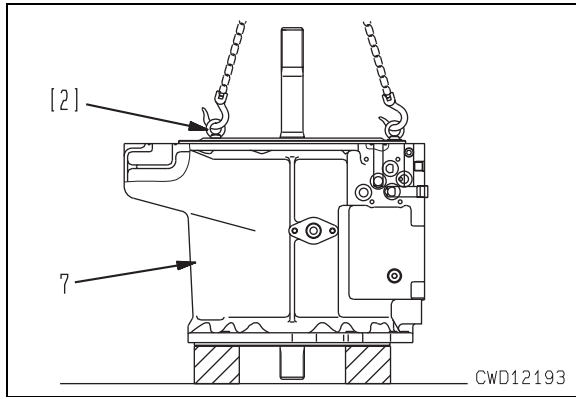


6) Install coupling (5) and holder (4) and secure them with bolts (3).

Coupling mounting bolt: **245 – 309 Nm {25 – 31.5 kgm}**

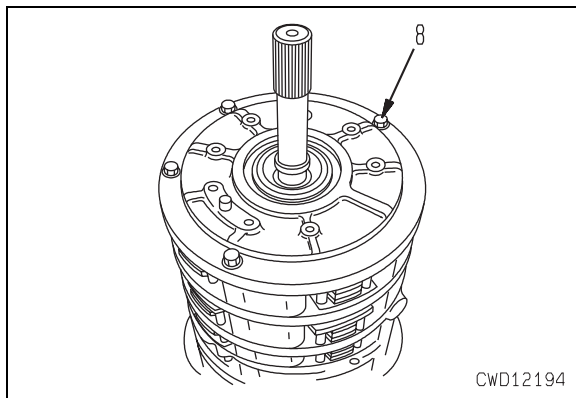


- 2) Using eyebolt [2], lift off transmission case (7).



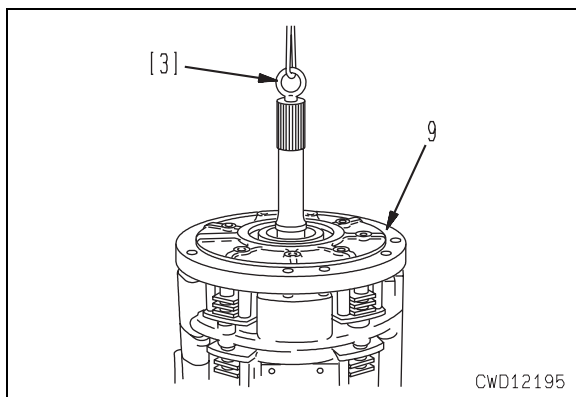
4. Tie bolts

- Remove 4 remaining tie bolts (8)



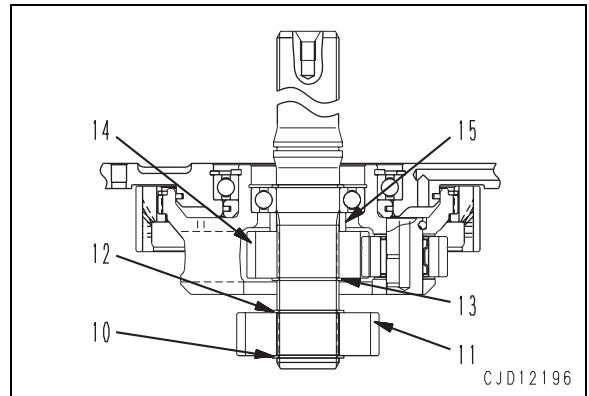
5. Input shaft/Front plate/No. 1 carrier assembly

- 1) Using eyebolt [3], remove input shaft/front plate/No. 1 carrier assembly (9).

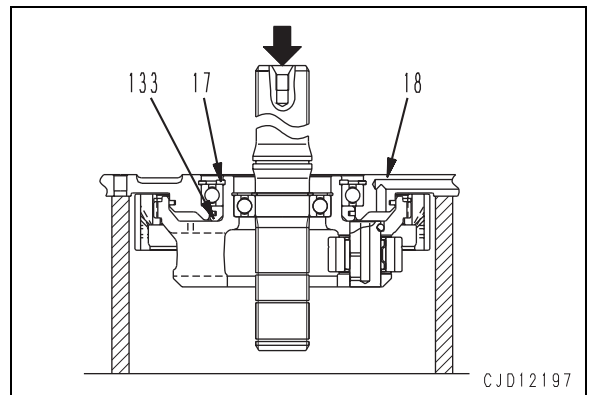


- 2) Disassemble the input shaft/front plate/No. 1 carrier assembly according to the following procedure.

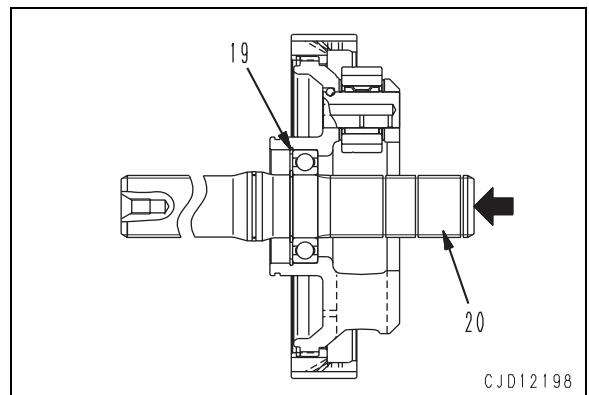
- i) Remove snap ring (10), No. 2 sun gear (11), and snap ring (12).
- ii) Remove snap ring (13), No. 1 sun gear (14), and collar (15).



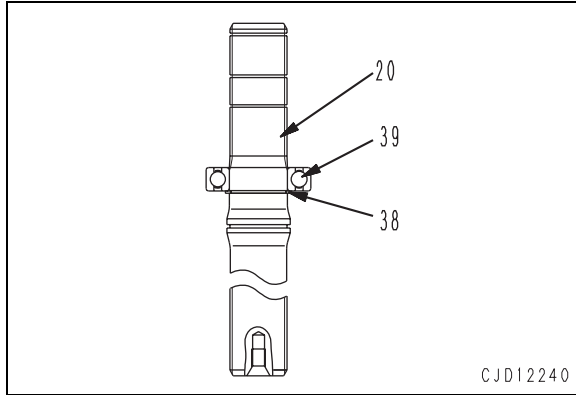
- iii) Remove snap ring (17).
- iv) Drive out the input shaft from the torque converter side and remove front cover (18).
- v) Remove collar (133)



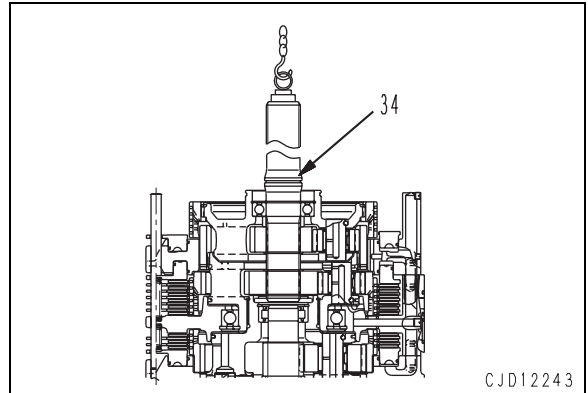
- vi) Remove snap ring (19), then remove input shaft (20) by driving it out to the torque converter side.



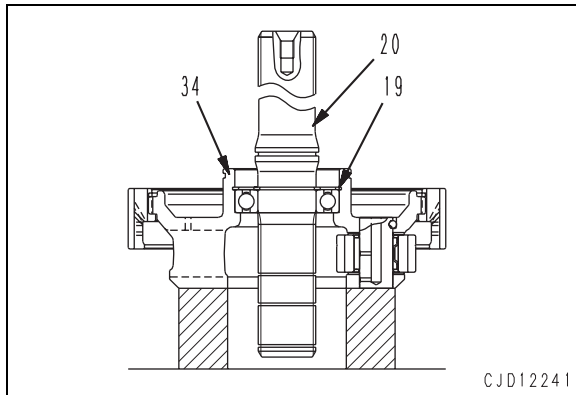
- iv) Install snap ring (38) to input shaft (20), and then press fit bearing (39).



- 2) Sling and install input shaft and No. 1 carrier assembly (34), meshing No. 2 sun gear with No. 1 planetary gear.



- v) Install input shaft (20) to No. 1 carrier assembly (34), and then install snap ring (19).



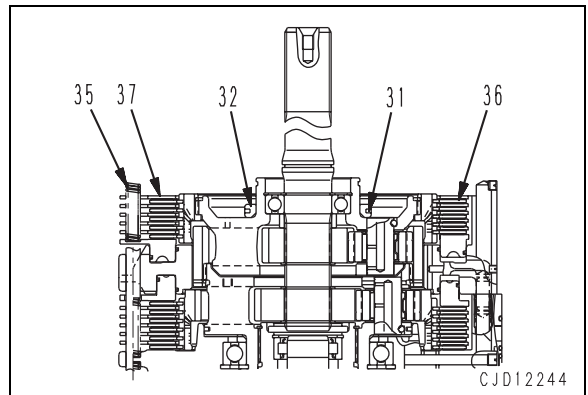
23. No. 1 discs, plates, and springs

Install discs (36), plates (37), and springs (35).

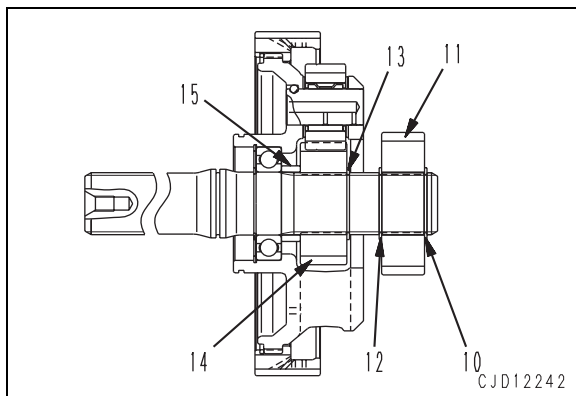
- ★ Disc: 5 pieces, Plates: 5 pieces
- ★ Free length of spring: 77 mm

24. Front plate

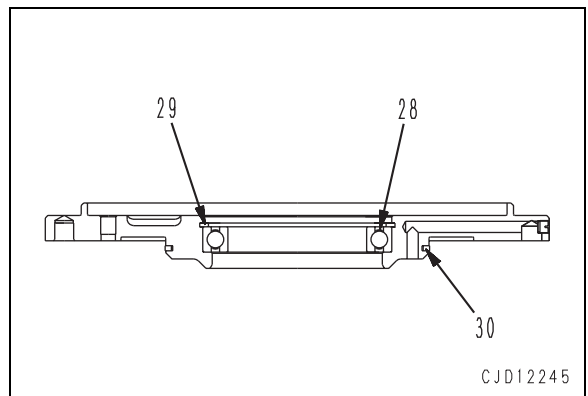
- 1) Fit seal ring (31) and install collar (32) to No. 1 carrier (33).



- vi) Install collar (15).
- vii) Install No. 1 sun gear (14).
- viii) Install snap rings (13) and (12).
- ix) Install No. 2 sun gear (11) and snap ring (10).




- 2) Install the following parts to the front plate.
 - i) Press fit bearing (28) and install snap ring (29).
 - ii) Install seal ring (30).



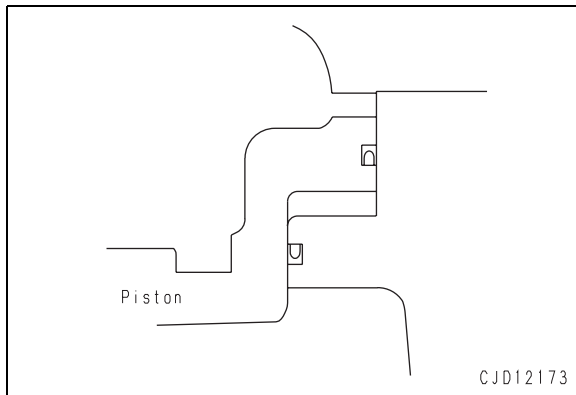
ASSEMBLY

• Precautions for assembly

- ★ Clean the all parts and check them for dirt or damage before installing.
- ★ Drop engine oil onto the rotating parts of each bearing and rotate it several turns.
- ★ Coat the sliding parts with engine oil before installing.
- ★ Apply grease (G2-LI) to each piston seal ring and install it evenly, with the pressure receiving side directed to the housing.

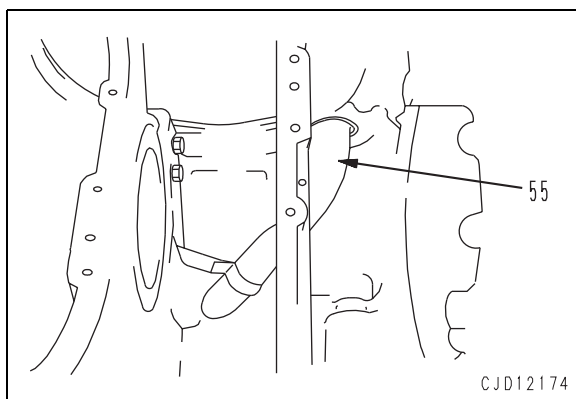
 Rotary seal ring: **Fix each seal ring with grease (G2-LI) and install it very carefully not to catch it in the parts.**

- ★ Check that the snap rings are fitted in the grooves.



1. Suction tube

Install suction tube (55).

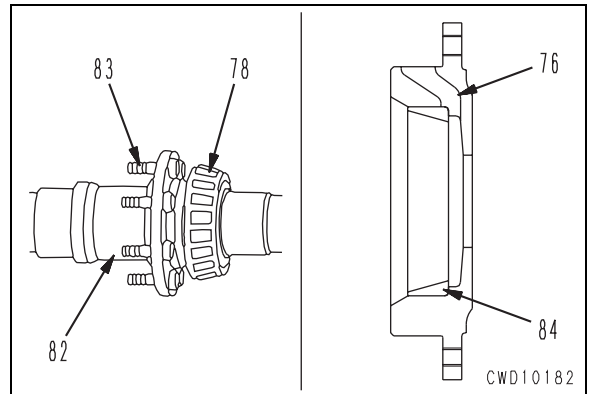


2. Bevel gear shaft and bevel gear assembly

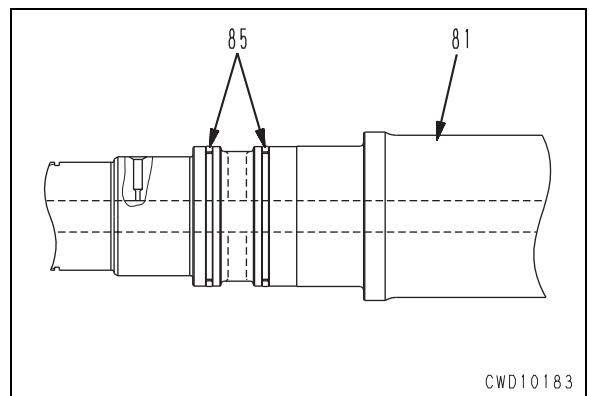
- 1) Install bolt (83) to bevel gear shaft (82)
- 2) Heat bearing (78) with a bearing heater, etc. and install it to the right side of the bevel gear shaft by shrink fit.
 - ★ If the bearing temperature is raised too high, the hardness of the heat-treated part lowers. Accordingly, do not raise the bearing temperature more than 120°C.

- ★ After installing the bearing, drop engine oil onto its rotating parts and rotate it several turns.
- ★ Check that the clearance at the bearing end is 0.03 mm or less.

3) Install outer race (84) to cages (76) and (86).

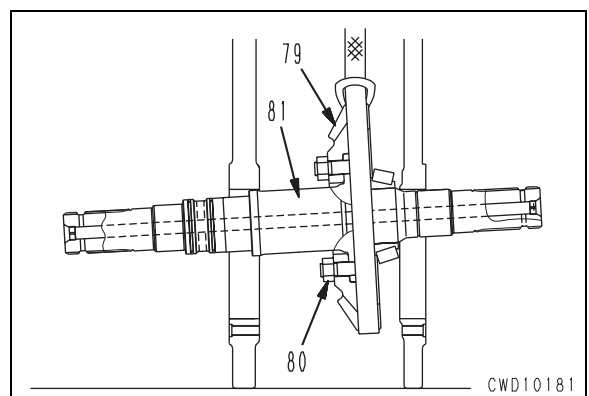


4) Install seal ring (85) to bevel gear shaft (81).




5) Insert bevel gear shaft (81) in bevel gear (79) slung at the center of the case from the right side of the machine.

- ★ Tighten mounting nut (80) temporarily.




9. Adjustment and installation of speed sensor

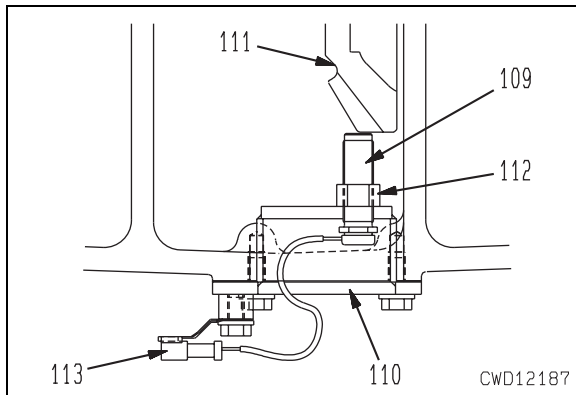
- 1) Remove the locknut from speed sensor (109) and apply LG-5 to its threads generously.
- 2) Screw the speed sensor into mounting cover (110), and then install the cover to the HSS case.
- 3) Screw the speed sensor until its tip touches bevel gear (111), and then return it by 1/2 – 1 turn.
- 4) Remove the speed sensor and cover together and tighten locknut (112).
 - ★ Tighten the locknut so that the speed sensor will not move.

 Locknut: **49 – 68.8 Nm {5 – 7 kgm}**

- 5) Install cover (110) and insert connector (113) in the holder.

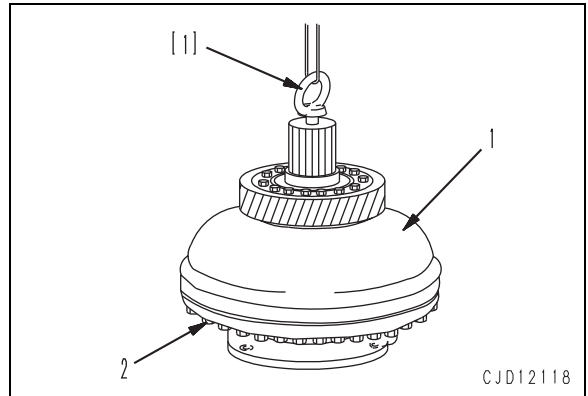
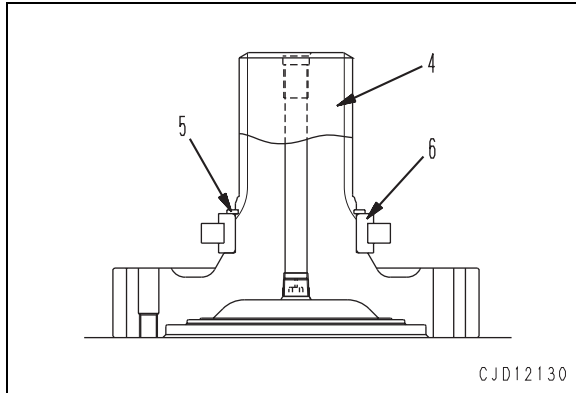
 Mating faces of cover and HSS case:
Gasket sealant (LG-1)

- ★ Install the cover so that the speed sensor will be on the right side.





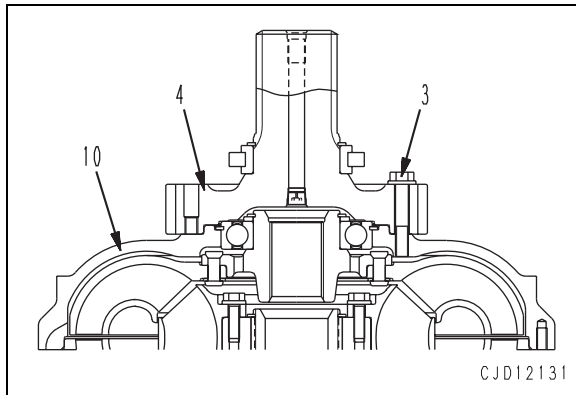
4. Gear and input shaft

- 1) Press fit bearing (6) to input shaft (4).
- 2) Install snap ring (5).





- 3) Install gear and input shaft (4) to case assembly (10) and tighten bolts (3).


-  Mounting bolt: **Adhesive (LT-2)**
-  Mounting bolt: **98 – 122.5 Nm {10 – 12.5 kgm}**



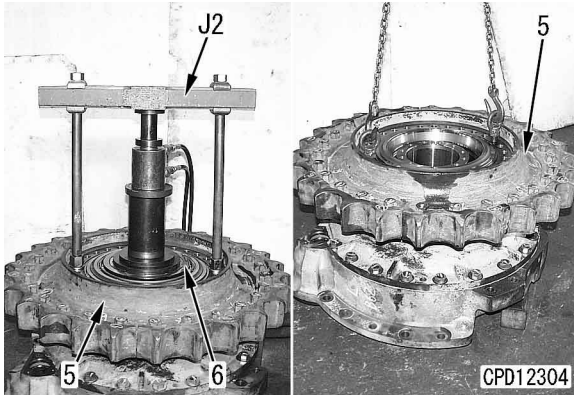
5. Case and turbine assembly

- 1) Using eyebolts [1] and matching the case groove to the drain plug, install case and turbine assembly (1) and tighten 30 mounting bolts (2).

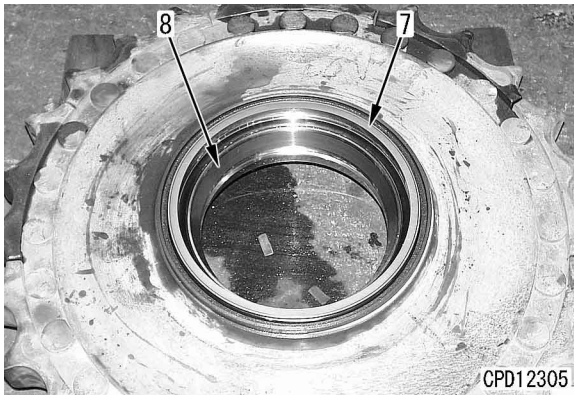
-  Mounting bolt: **Adhesive (LT-2)**
-  Mounting bolt: **49 – 58.8 Nm {5 – 6 kgm}**

- 2) Install the drain plug.
 -  Mounting bolt: **9.8 – 12.74 Nm {1.0 – 1.3 kgm}**

- 2) Using tool **J2**, disconnect sprocket hub assembly (5) and bearing (6).
- 3) Using eyebolts (3), remove sprocket hub assembly (5).



- 4) Remove floating seal (7) and 2 bearing outer races (8).
 - ★ Store the floating seal in a safe place so that it will not be damaged.

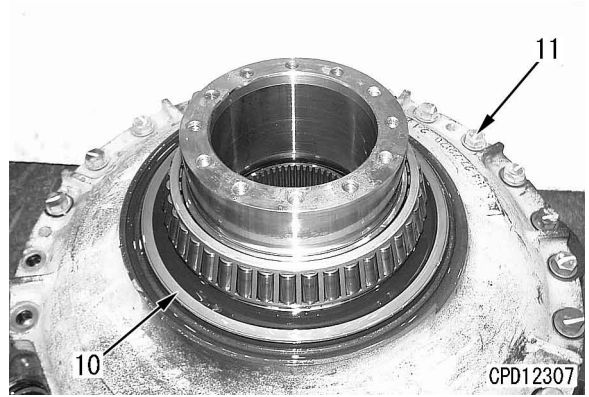


- 5) Turn over the sprocket hub assembly and remove sprocket (9).

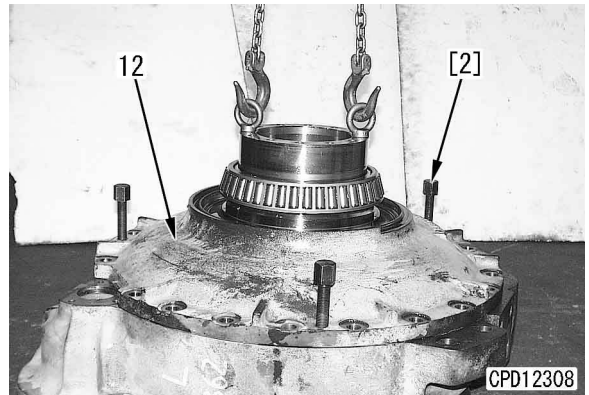


5. Cover assembly

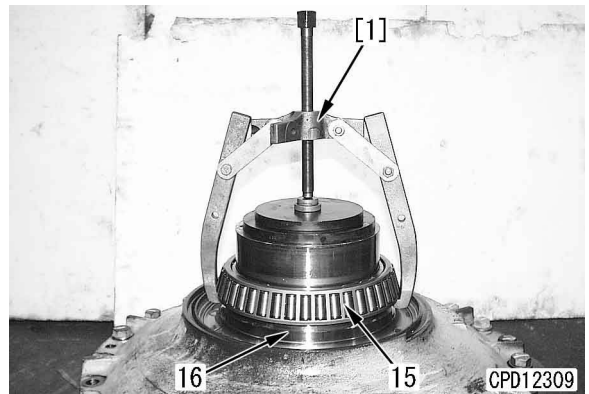
- 1) Remove floating seal (10).
 - ★ Store the floating seal in a safe place so that it will not be damaged.
- 2) Remove mounting bolts (11).



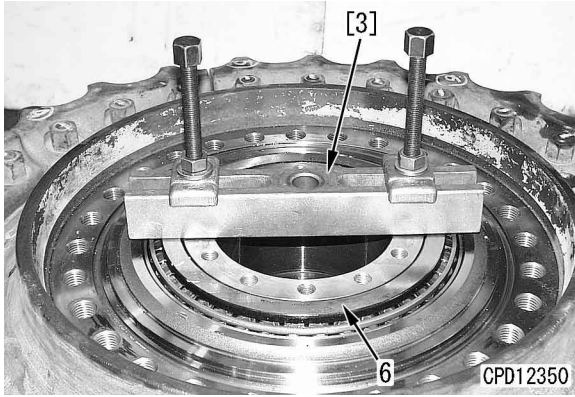
- 3) Using eyebolts, sling cover assembly (12) temporarily. Using 3 forcing screws [2], remove the cover assembly.





- 4) Using puller [1], pull out bearing (15) and remove spacer (16).

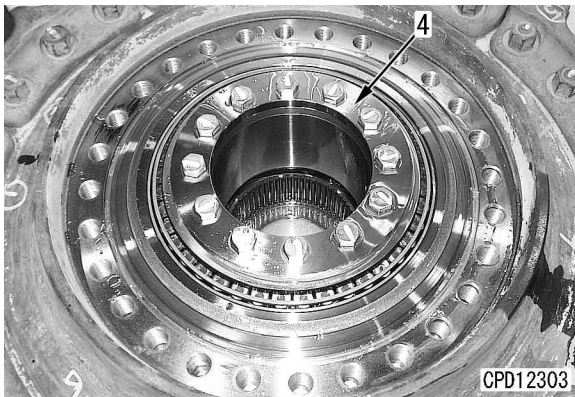


- 6) Using tool [3], press fit bearing (6).
 - ★ Press fit the bearing, turning the sprocket hub assembly.
 - Press fitting force for bearing:
24 – 52 kN {2.4 – 5.3 tons}




- 7) Install plate (4) and secure it with the mounting bolts.

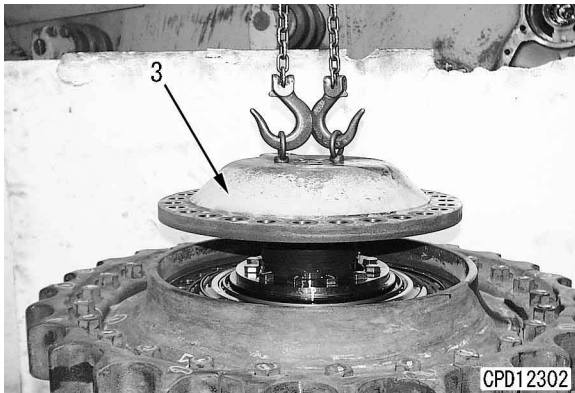
-  Mounting bolt: **Adhesive (LT-2)**
-  Mounting bolt:
230 – 289 Nm {23.5 – 29.5 kgm}





7. Shaft

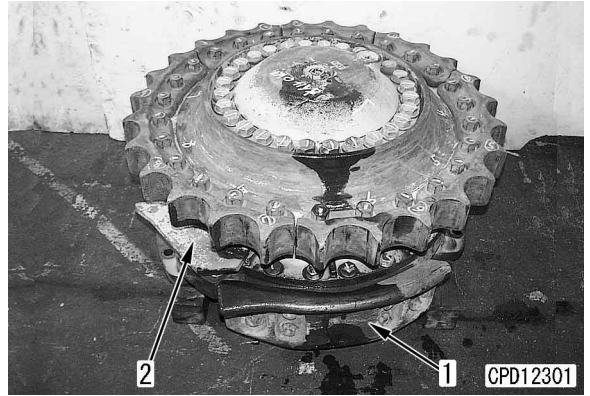
Install the O-ring to the sprocket hub assembly side. Using eyebolts, install shaft (3).

-  Mounting bolt:
824 – 1,030 Nm {84 – 105 kgm}



8. Wear guard and plate




- 1) Install plate (2).
 Mounting bolt:
455 – 565 Nm {46.5 – 58 kgm}
- 2) Install wear guard (1)
 Mounting bolt:
455 – 565 Nm {46.5 – 58 kgm}



- **Refilling with oil**

Tighten the drain plug and add oil through the oil filler.

- ★ After installing the final drive assembly to the chassis, check the oil level finally.

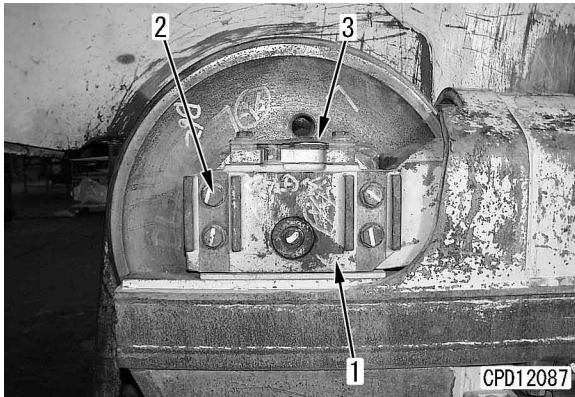
-  Final drive case: **Approx. 26 ℓ**
-  Oil filler plug and drain plug:
127 – 176 Nm {13 – 18 kgm}
-  Oil level gauge plug:
58.8 – 76.4 Nm {6 – 8 kgm}

REMOVAL AND INSTALLATION OF RECOIL SPRING ASSEMBLY

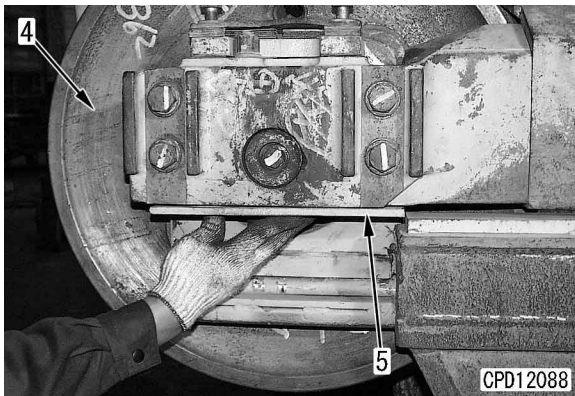
REMOVAL

⚠ Never stand in front of the idler assembly to prevent danger.

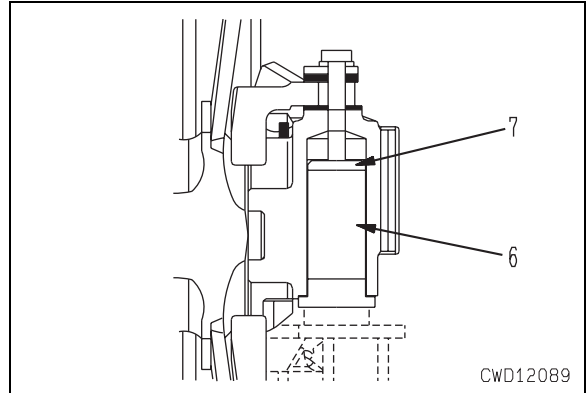
1. Remove the blade assembly. For details, see REMOVAL OF BLADE ASSEMBLY.
2. Expand the track shoe assembly. For details, see EXPANDING TRACK SHOE ASSEMBLY.
3. Loosen mounting bolts (2) of support (1) and spring seat clamping bolts and remove plate (3).



4. Pass wires through the hanging holes of idler assembly (4). Sling idler assembly (4) and slide it out forward along the top of the track frame.
5. Remove guide plate (5).

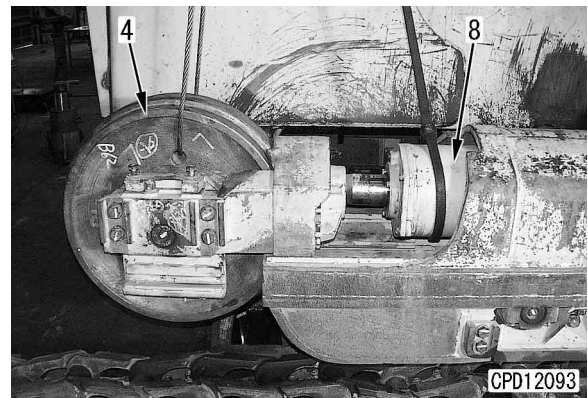


6. Remove spring (6) and seat (7).



7. Slide idler assembly (4) further and install wires on spring case (8) side, and then slide the assembly forward to remove.

Idler and recoil spring assembly: **640 kg**



8. Set idler and recoil spring assembly (9).

⚠ Take measures to prevent the idler assembly from leaning for safety.

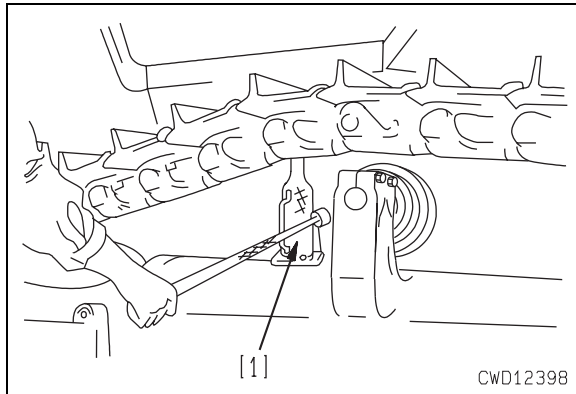
Idler assembly: **290 kg**




REMOVAL AND INSTALLATION OF CARRIER ROLLER ASSEMBLY

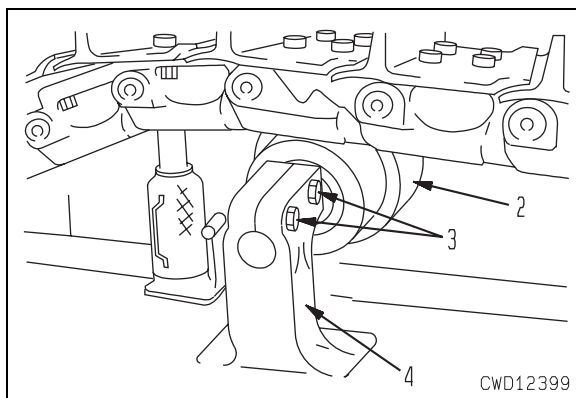
REMOVAL

1. Loosen the track shoe assembly. For details, see EXPANDING TRACK SHOE ASSEMBLY.
2. Using hydraulic jack [1], raise the track shoe.



3. Remove mounting bolts (3) of carrier roller assembly (2).
4. Sling carrier roller assembly (2) and remove it from support (4).

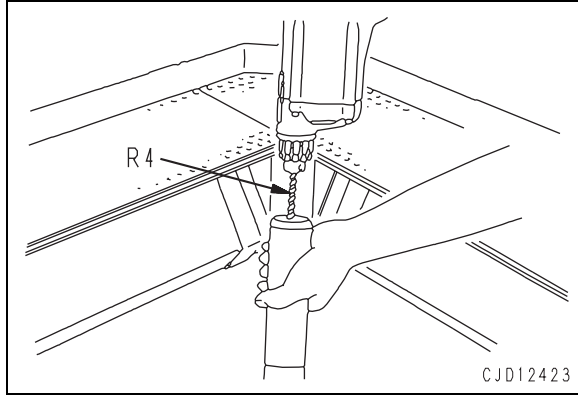
 Carrier roller assembly: **39 kg**



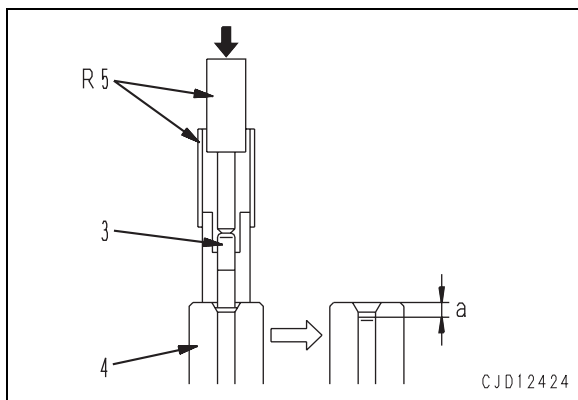
INSTALLATION

- Carry out installation in the reverse order to removal.
- Adjust the track shoe assembly tension. For details, see ADJUSTING TRACK SHOE ASSEMBLY TENSION.

- ★ Since these parts rust easily, clean them just before assembling them.
 - ★ Do not polish the bushing ends. If they are polished, oil may leak.
- 4) If the large plug was pulled out, drive it in by using tool **R5**.
- ★ In this case, clean the pin hole in advance by using tool **R4**.

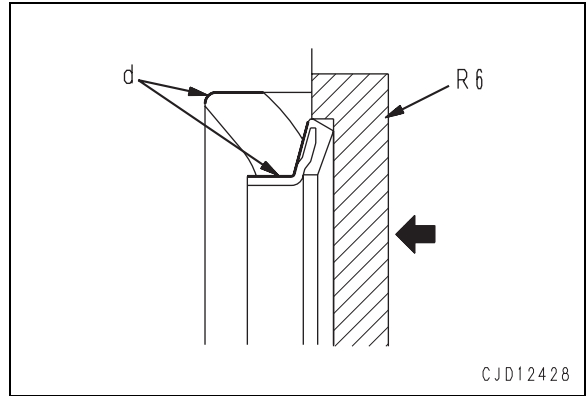


- i) Insert the plug (3) through the plug insertion window into the guide hole.
- ii) Push the bar with the hand until the plug stops.
- iii) Push the plug with the bar to press the guide against the pin (4).
- iv) Drive in the bar with a hammer.
 - ★ Driving distance **a** from pin end: 6 ± 2 mm
 - ★ If the chamfered part of the pin hole has been worn, chamfer it with a small-sized grinder (grindstone tip angle: $45^\circ - 60^\circ$) so that the plug will not be damaged.
 - ★ Coat the plug with GO90 and drive it with the small diameter end ahead.



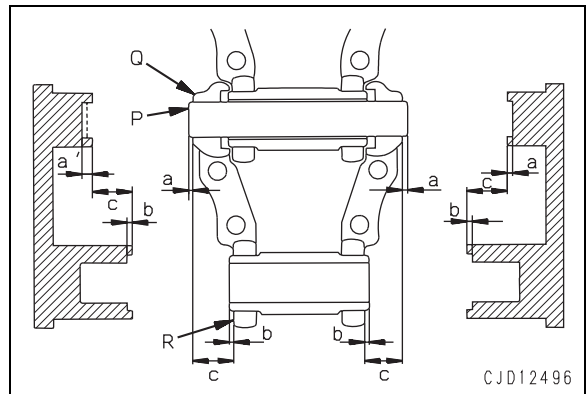
- 5) Installation of seal assembly
Clean the counterbore portion **d** of the link carefully and push in the seal to the bottom by using tool **R6**.

- ★ If oil is sticking to the counterbore portion of the link or seal assembly, the seal will turn and its sealing performance will lower. Accordingly, do not apply any oil. When inserting the seal in the counterbore portion, take care that oil not stick to the seal and counterbore portion.

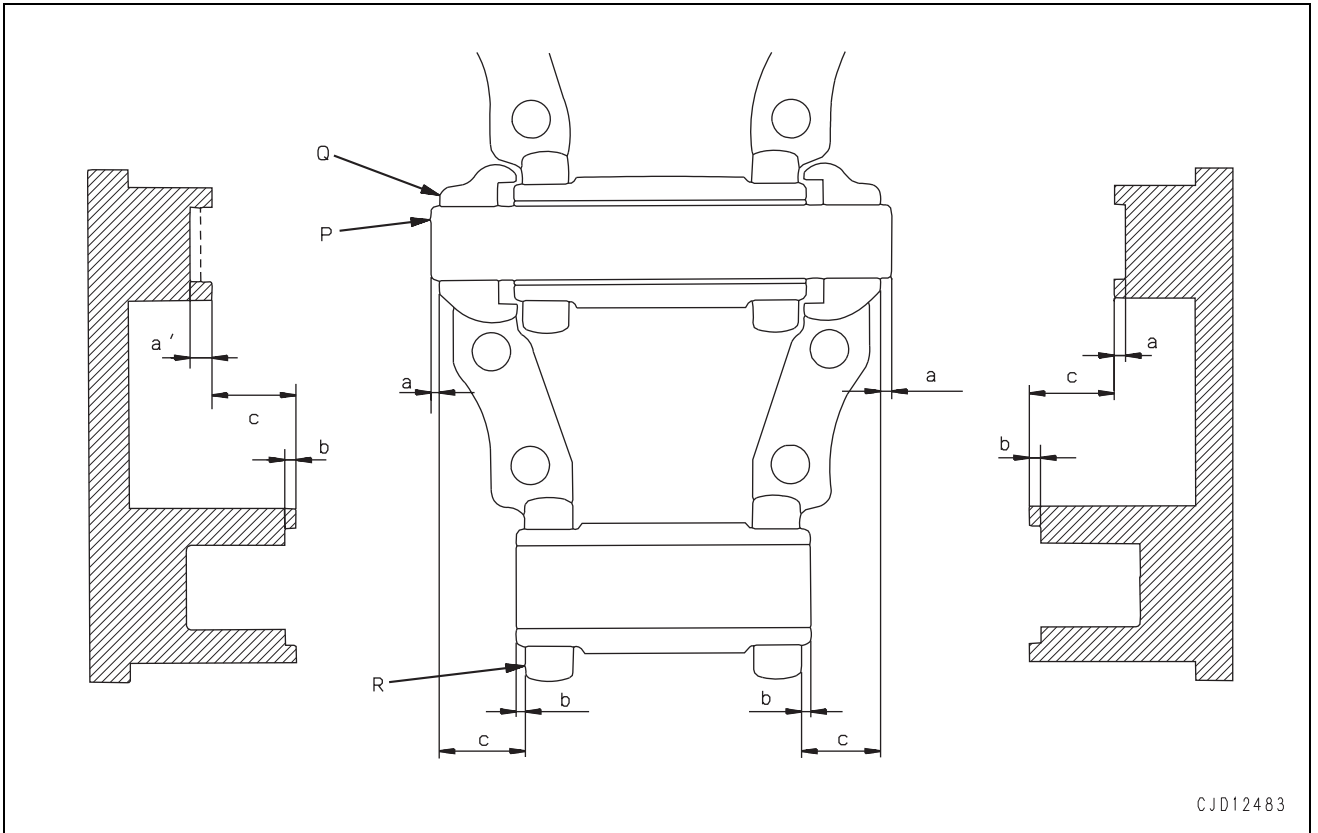


- 6) Adjust the dimensions of the press fitting jig of the link press to keep the projection of the pin and bushing constant and keep the installed dimensions of the seal within the standard range.

- ★ For the standard dimensions, see Dimensions table of press fitting jig of link press.
- ★ If the pin end (part **P**) or the sides of the link (parts **Q** and **R**) are worn, add the dimensions of the worn parts when adjusting the standard dimensions so that the projections of the pins and bushings on both sides will be even.



DIMENSIONS TABLE OF FITTING JIG OF LINK PRESS



Adjusting

Adjust the dimensions of the press fitting jig of the link press to keep the projection of the pin and bushing constant and keep the installed dimensions of the seal within the standard range.

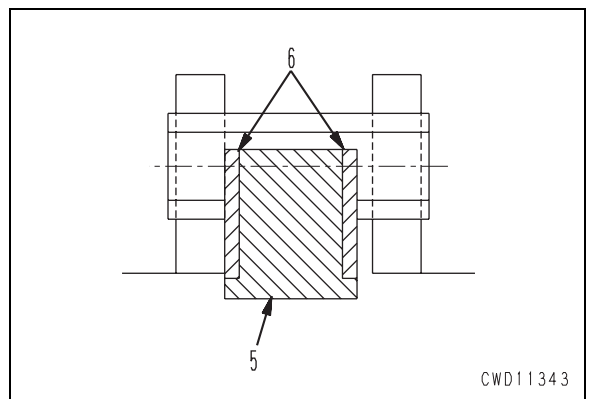
★ If the pin end (part **P**) or the sides of the link (parts **Q** and **R**) are worn, add the dimensions of the worn parts when adjusting the standard dimensions so that the projections of the pins and bushings on both sides will be even.

Unit: mm


Dimensions of jig		
a	b	c
4	2.0	47.9


Precaution

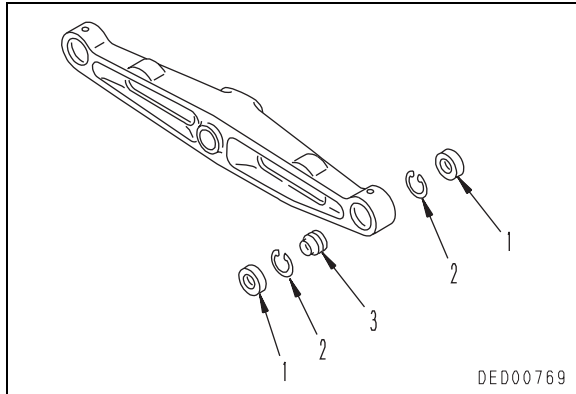
1. The link receiving faces of jaw (5) must be vertical.
2. Replaceable wear plate (6) shown below is desirable.



- 3) Install ring (2) on the opposite side.
- 4) Using the press, press fit seal (1).
 - ★ Press fitting force for seal:
57.8 – 161.7 kN {5.9 – 16.5 tons}

 Periphery of spherical bushing:
Lubricant containing molybdenum disulfide (LM-P)

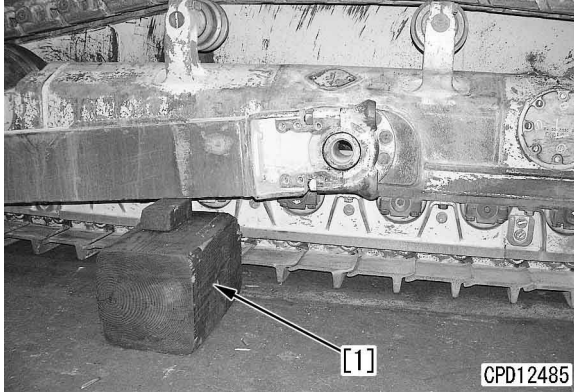
 Between spherical bushing and seal:
Grease (G2-LI)



REMOVAL AND INSTALLATION OF BLADE ASSEMBLY

REMOVAL

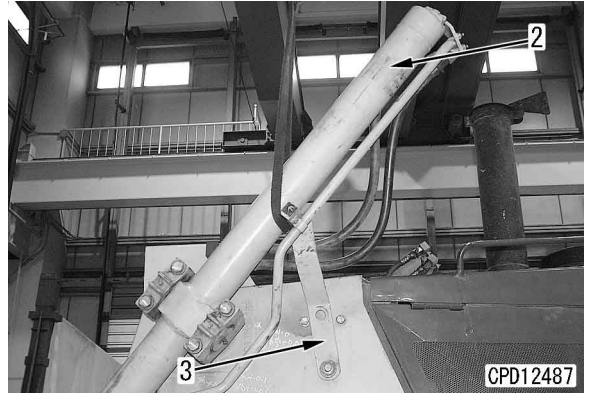
- !** Lower the work equipment horizontally to the ground and set blocks [1] to the right and left straight frames securely.



1. Remove cap (1) of the lift cylinder assembly. [*1]
★ Check the quantity and thickness of the shims.



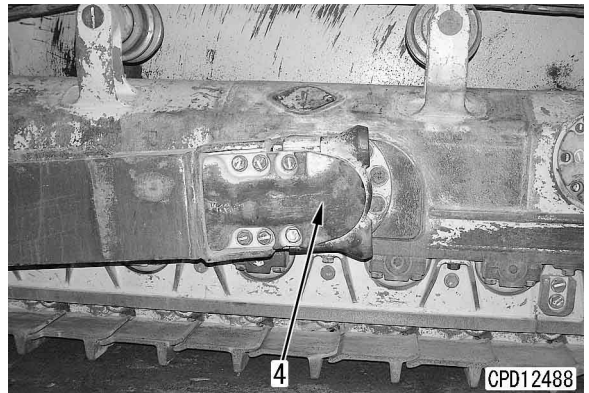
2. Sling lift cylinder assembly (2) temporarily. Run the engine and retract the piston fully.
3. Using blade (3), fix lift cylinder assembly (2) to the radiator guard.
★ Bind the piston rod with wires, etc. so that it will not come out.



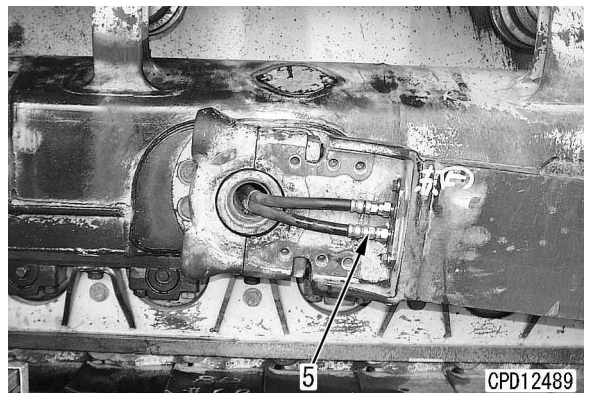
4. Similarly, disconnect the lift cylinder assembly on the opposite side from the blade.

- !** Release the residual pressure in the work equipment cylinders. For details, see TESTING AND ADJUSTING, Releasing residual pressure in work equipment cylinders.

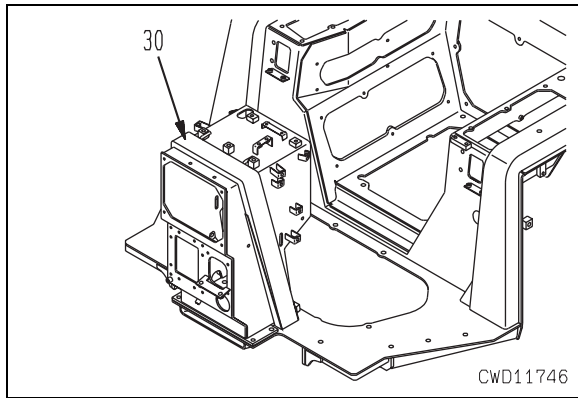
5. Remove left and right covers (4).



6. Disconnect 2 tilt hoses (5) from the right straight frame.
★ Make distinction marks to the hoses and plug them so that dirt will not enter the piping.



- 4) Apply grease (G2-LI) to the outside of seal (30) (sealing face against the cab).
 - ★ Apply grease so that the cab will slip well and the seal will not be moved or deformed when the cab is installed.



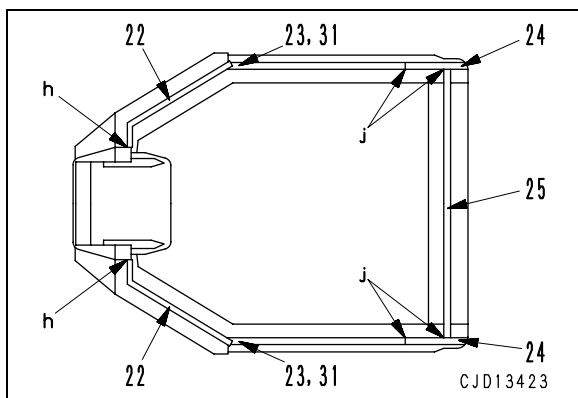
- Installation of seals of operator's cab mating faces

- 1) Sling the operator's cab assembly.
- 2) Remove dirt, oil, and grease from the seal fitting surfaces.

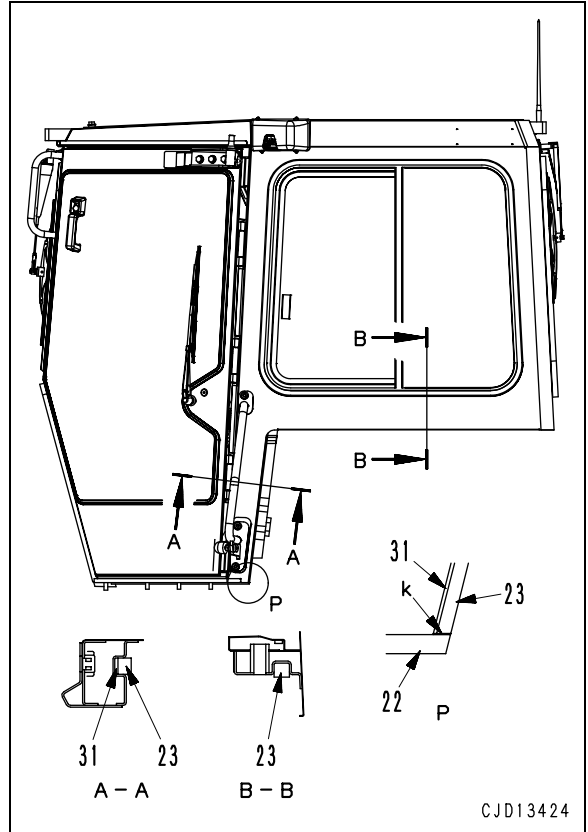
⚠ Do not stand under the operator's cab.

- 3) Referring to the figure, stick seals (22), (23), (24), (25), and (31).
- 4) Stick the seals in the order of (22), (31), (23), (24), and (25).
- 5) Fit end part h of seal (22) to the air conditioner box to eliminate clearance.
- 6) Fit part j (the joint) to eliminate clearance.
- 7) Use the excessive part of seal (22) as seal (24).

★ Cab seen from bottom



- 8) Cut seal (22) flush with seal (23). (See figure P.)
 - Fit part k (the joint) to eliminate clearance.
- 9) Seal (31) to the groove first, and then stick seal (23). (See section A – A.)



- 2) Immediately after sticking both door window glasses, install door handles (5), and lock the doors to fix the glasses.

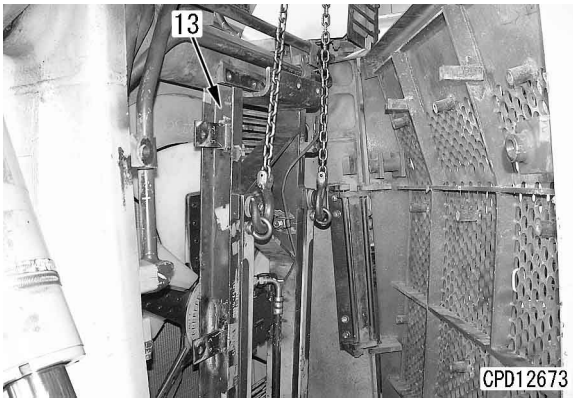


10. After installing the window glasses, remove the primer and adhesive from them and the operator's cab.
 - ★ Using white gasoline, wipe off the adhesive before it is dried up.
 - ★ When cleaning the glasses, do not give an impact to them.
11. Protect the stuck window glasses.
 - 1) Keep the stopper rubbers, styrene foam blocks, and rubber bands installed for 10 hours (at temperature of 20°C and humidity of 60%).
 - 2) After applying the adhesive, wait for at least 24 hours, before operating the machine actually.

10. Lift off fan drive assembly (13).



Fan dry assembly: **73 kg**



INSTALLATION

- Carry out installation in the reverse order to removal.
- **Refilling with oil**
Add oil to the specified level. Run the engine to circulate the oil through the system. Then, check the oil level again.



Hydraulic tank: **D85EX-15; Approx. 150 ℓ**
D85PX-15; Approx. 140 ℓ

- **Bleeding air**
Bleed air from the piping. For details, see TESTING AND ADJUSTING, Bleeding air from work equipment cylinders.

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