

SHOP MANUAL

KOMATSU

D41E,P-6

MACHINE MODEL	SERIAL NUMBER
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D41E-6	B40001 and up
D41P-6	B40001 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.
- D41E,P-6 mounts the SA6D102E-2 engine.
For details of the engine, see the 102 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

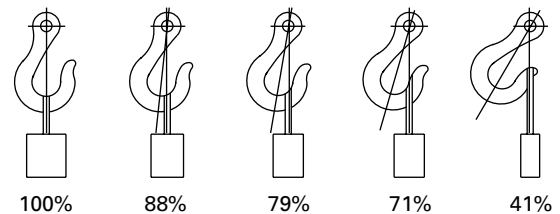
- 1) Use adequate ropes depending on the weight of parts to be hoisted, referring to the table below:

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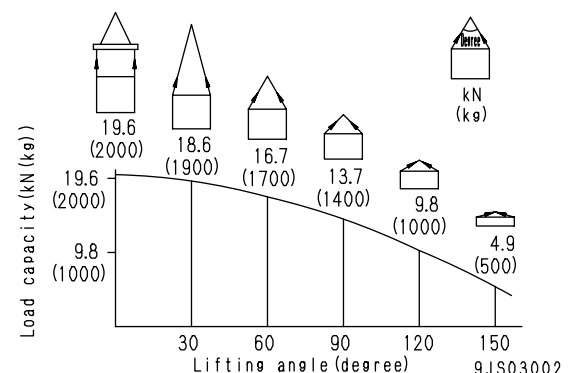
- 3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.

⚠ 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°.



9JS03002

Millimeters to Inches

1 mm = 0.03937 in

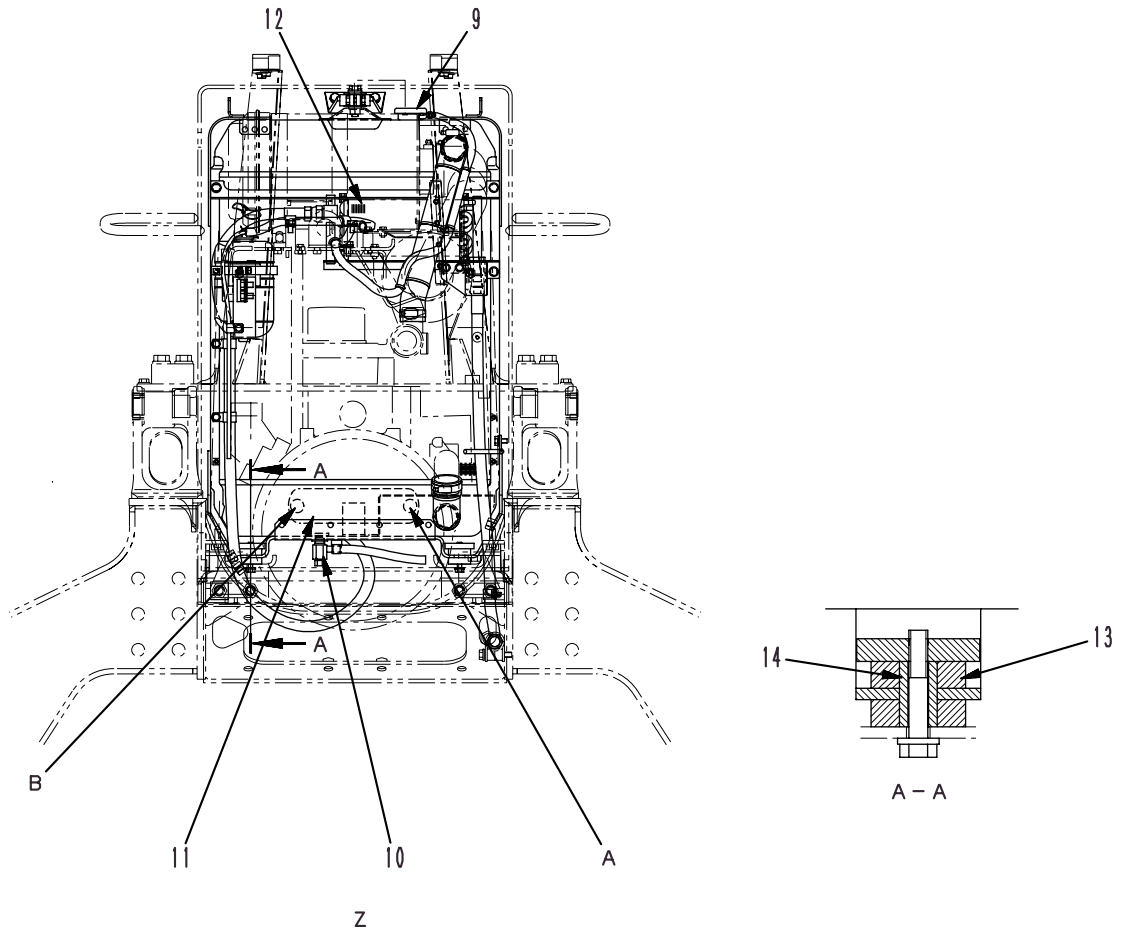
	0	1	2	3	4	5	6	7	8	9
0	0	0.039	0.079	0.118	0.157	0.197	0.236	0.276	0.315	0.354
10	0.394	0.433	0.472	0.512	0.551	0.591	0.630	0.669	0.709	0.748
20	0.787	0.827	0.866	0.906	0.945	0.984	1.024	1.063	1.102	1.142
30	1.181	1.220	1.260	1.299	1.339	1.378	1.417	1.457	1.496	1.536
40	1.575	1.614	1.654	1.693	1.732	1.772	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			D41E-6	D41P-6	
Serial No.			B40001 and up	B40001 and up	
Dimensions	Track gauge	mm	1,790	1,790	
	Length of track on ground	mm	2,485	2,745	
	Width of track shoe (standard)	mm	510	700	
	Min. ground clearance (to bottom of undercover)	mm	365	365	
Engine	Name		SA6D102E-2		
	Type		4-cycle, water-cooled, in-line, vertical type, direct injection, with turbocharger with aftercooler		
	No. of cylinders – bore x stroke		mm	6 – 102 x 120	
	Piston displacement		ℓ {cc}	5.9 {5,900}	
	Performance	Rated horsepower	KW/{HP}/rpm	82/{110}/2,300	
		Max. torque	Nm/{kgm}/rpm	478/{48.7}/1,300	
		High idling speed	rpm	2,600	
		Low idling speed	rpm	950	
		Min. fuel consumption ratio	g/KWh{g/HPh}	227 {167}	
	Starting motor			24V, 5.5 KW	
Alternator			24V, 60A		
Battery			12V, 110Ah x 2		
Radiator core type			D-5		
Power train system	Transmission		Planetary gear type, multiple disc clutch, hydraulically actuated, lubrication gear pump, force feed, forward 3 speed, reverse 3 speed, manual mechanical type		
	Bevel gear shaft		Spiral bevel gear, splash type lubrication		
	Clutch and brake	Steering clutch		Wet type, single disc, manually operated, hydraulically actuated	
		Steering brake		Wet type, single disc, manual/pedal operated, hydraulically actuated	
	Final drive			1-stage spur gear, splash type lubrication	



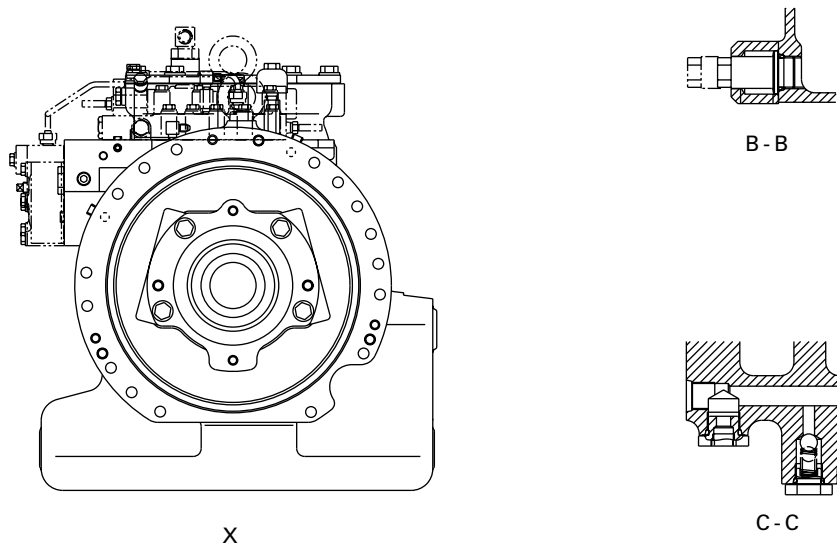
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Outline

- A sub-tank is installed to the radiator to make it possible to check the radiator water level.
- The power train oil cooler is built into the lower tank.

Specifications

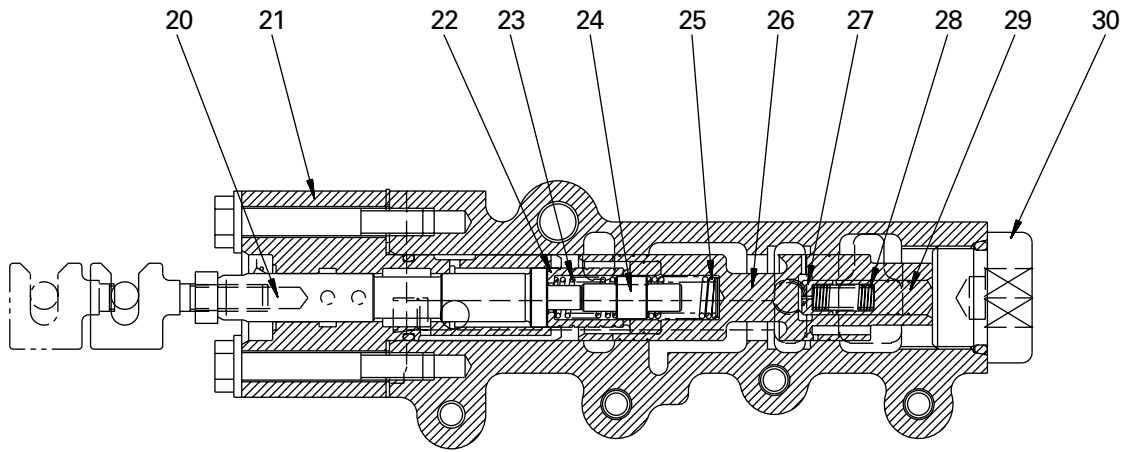
	Radiator	Power train oil cooler
Core type	D-5	PTO-OL
Fin pitch (mm)	3.0	—
Heat dissipation capacity (kcal/h)	83,700	13,450
Heat dissipation area (m ²)	30.08	0.409



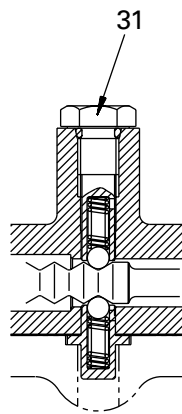
SDD00801

1. Transmission case
2. Coupling
3. Power train pump
4. Hydraulic pump
5. Transmission control valve

- A. From brake valve (drain)
- B. To REVERSE clutch
- C. Oil inspection port
- D. To FORWARD clutch
- E. To 2nd clutch
- F. To 3rd clutch
- G. From priority valve
- H. To 1st clutch
- I. To oil cooler
- J. From oil cooler
- K. To power train pump
- L. From steering PPC valve (drain)



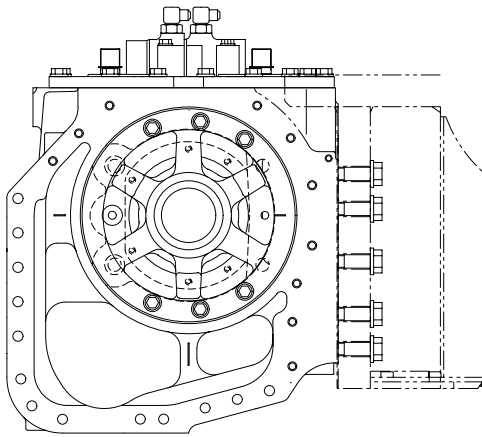
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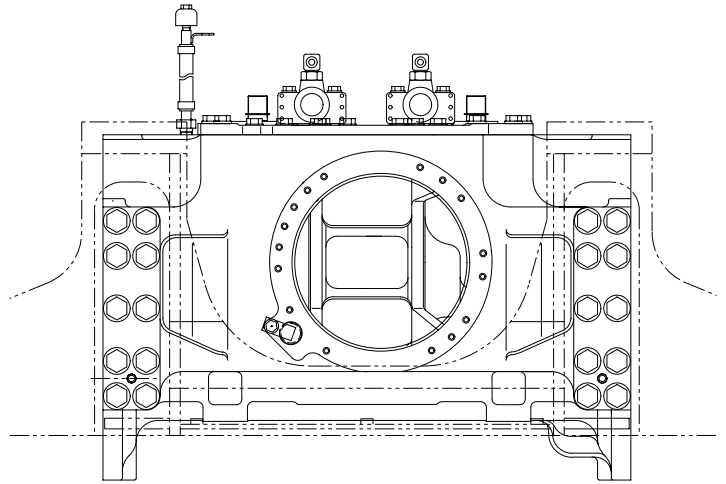
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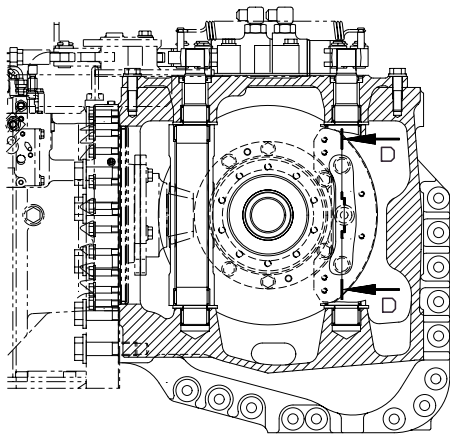
- | | | |
|------------------------|-----------------------------|-------------------|
| 1. Cover | 12. Stopper | 23. Spring |
| 2. Stopper | 13. Cover | 24. Piston |
| 3. Load piston | 14. Valve body | 25. Spring |
| 4. Spring (small) | 15. Valve body | 26. Inching valve |
| 5. Spring (large) | 16. Detent | 27. Piston |
| 6. Modulating valve | 17. Plug | 28. Piston spring |
| 7. Piston | 18. Directional valve spool | 29. Piston |
| 8. Piston spring | 19. Speed valve spool | 30. Plug |
| 9. Piston | 20. Inching valve spool | 31. Detent |
| 10. Stopper | 21. Cover | |
| 11. Quick return valve | 22. Stopper | |



Z

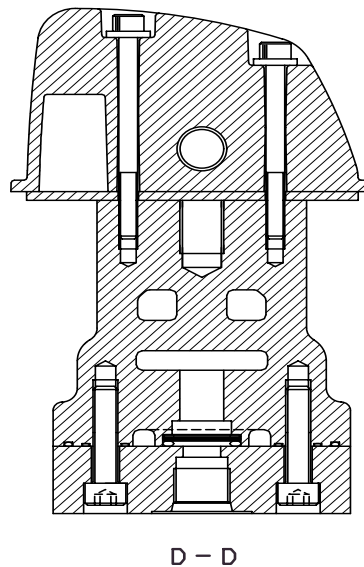
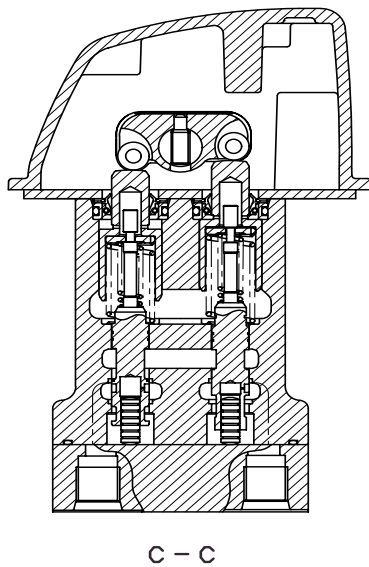
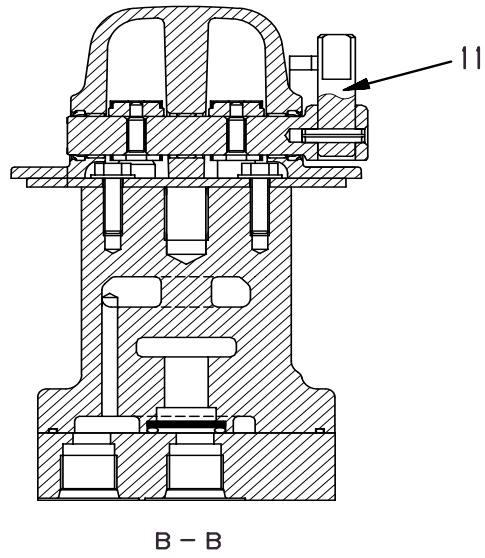
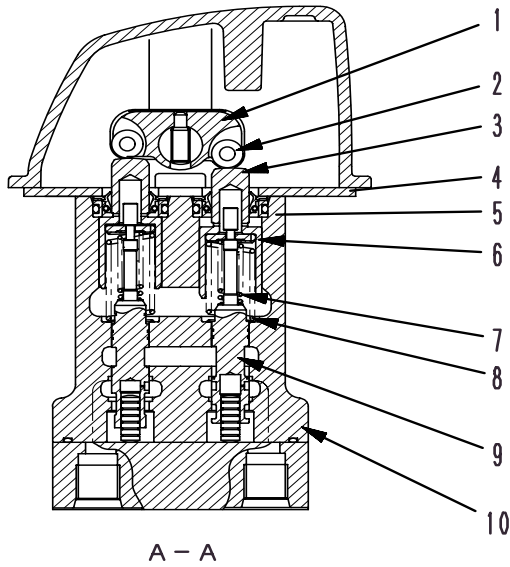


Y



C-C

SWD05230

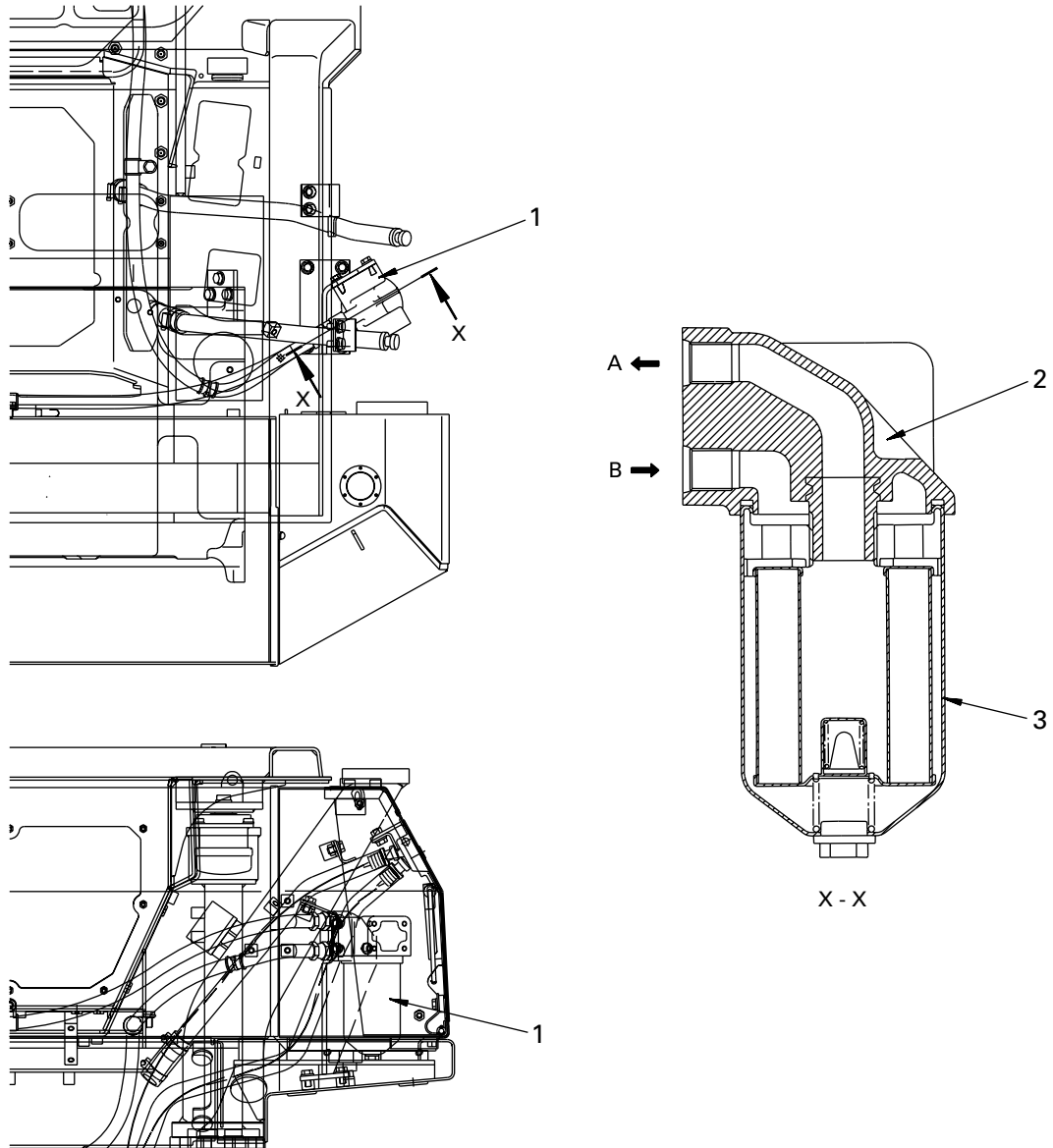


- 1. Link
- 2. Bearing
- 3. Piston
- 4. Plate
- 5. Collar
- 6. Retainer

- 7. Metering spring
- 8. Centering spring
- 9. Valve
- 10. Body
- 11. Lever

S2D05107

POWER TRAIN OIL FILTER



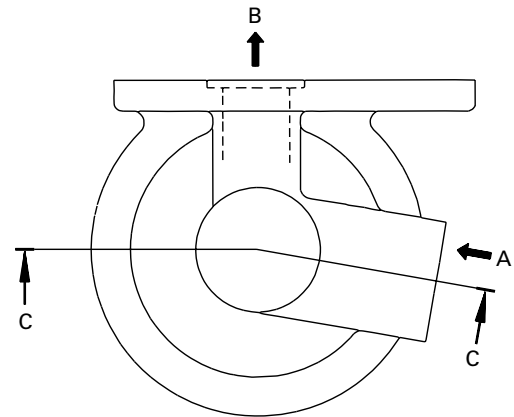
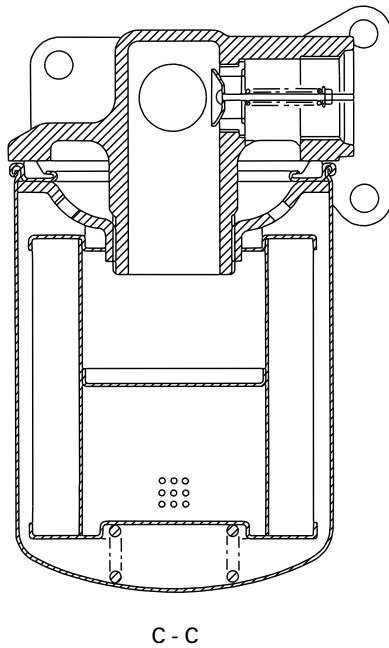
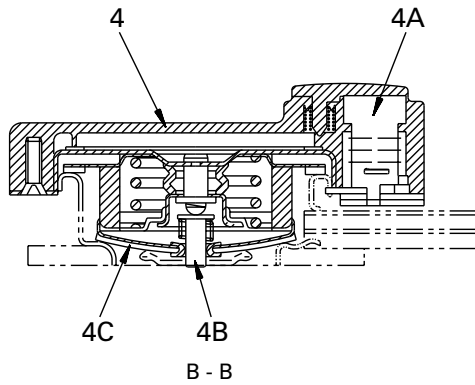
SED00846

- 1. Power train oil filter
- 2. Head
- 3. Filter cartridge

- A. To power train circuit
- B. From power train pump

Specifications

	Performance
Cracking pressure	0.2 ± 0.02 MPa {2.0 ± 0.2 kg/cm ² }
Mesh size	10 μm
Filtering area	3,600 cm ²
Filter flow	80 l/min

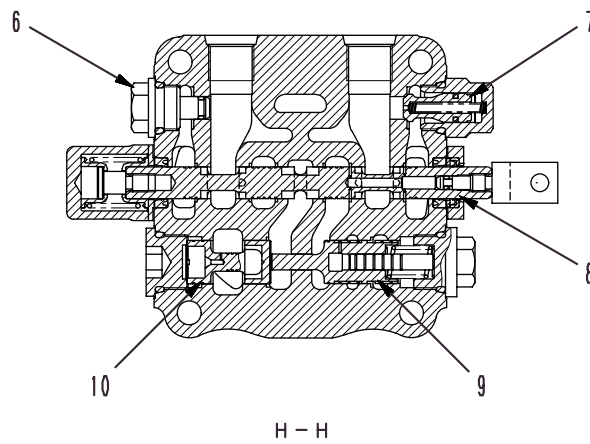
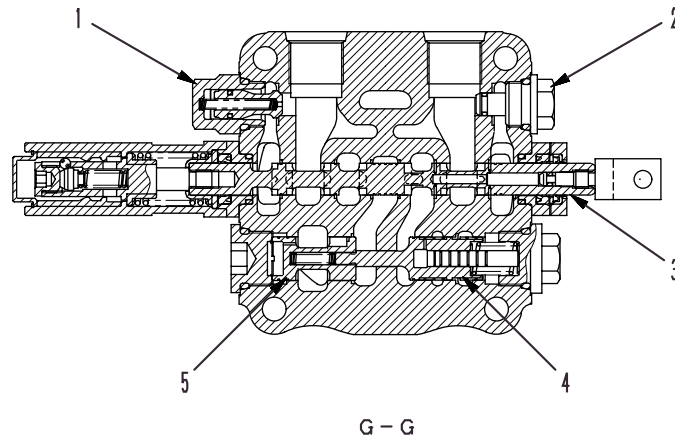


SED00858

Specifications

Item		Specified value
Capacity of hydraulic tank		60 ℓ
Hydraulic tank cap	Pressure valve cracking pressure	38.3 ± 14.7 KPa {0.39 ± 0.15 kg/cm ² }
	Vacuum valve actuating pressure	0 – 3.9 KPa {0 – 0.046 kg/cm ² }
Hydraulic filter	Cracking pressure	102.9 ± 19.6 KPa {1.05 ± 0.2 kg/cm ² }
	Mesh size	10 μm
	Filtering area	3,400 cm ²
Filter flow		100 ℓ/min

(4/5)

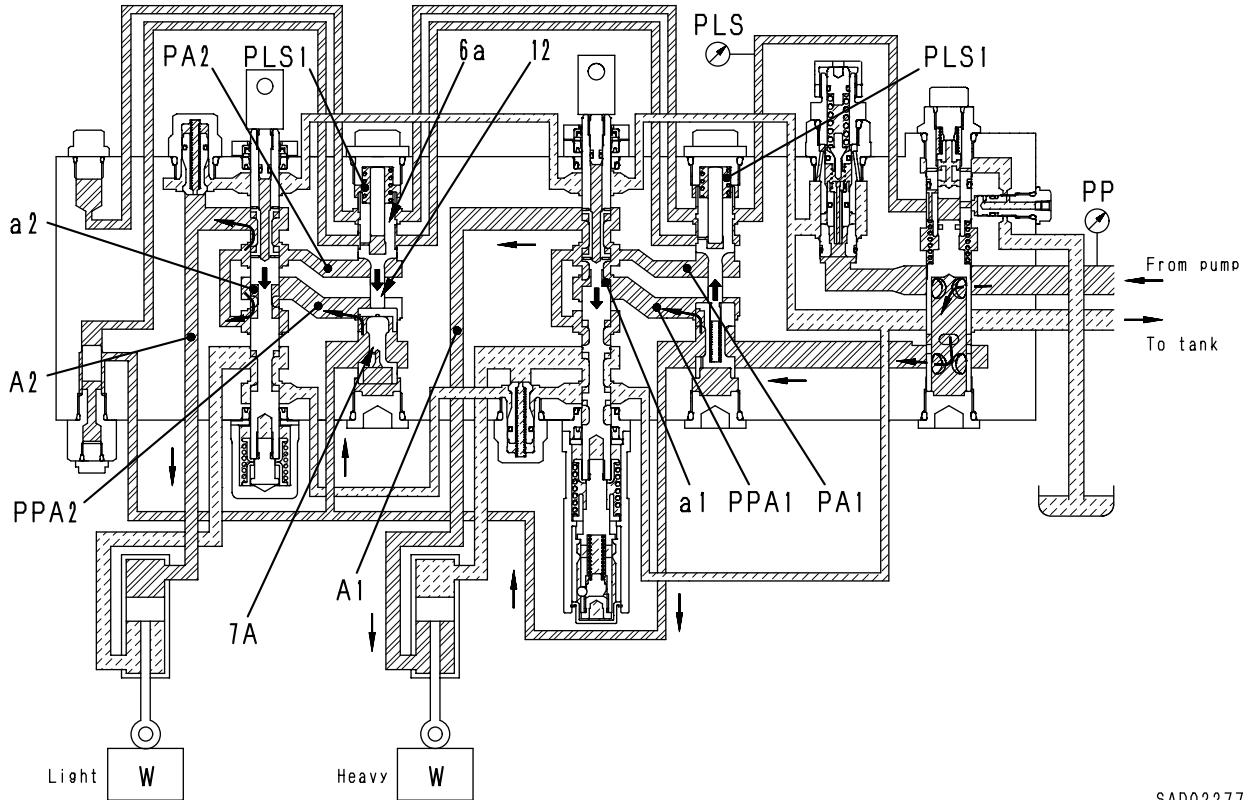


SAD02299

- 1. Suction valve (lift cylinder bottom end)
- 2. Auxiliary valve port plug
- 3. Lift spool
- 4. Pressure compensation valve **F**
- 5. Pressure compensation valve **R**

- 6. Auxiliary valve port plug
- 7. Suction valve (lift cylinder bottom)
- 8. Tilt spool
- 9. Pressure compensation valve **R**
- 10. Pressure compensation valve **F**

★ This diagram shows the condition when port **A1** is under heavy load and port **A2** is under light load.



SAD02277

5) Pressure compensation function during compound operation

- ★ During compound operation, if a difference appears in the load pressure, and the oil flow to the side under light pressure starts to increase, pressure compensation is carried out.
- During compound operation, if the load pressure at port **A1** becomes higher, pressure **PP** also becomes higher, and the oil starts to flow to port **A2**, which is under a lighter load. (Large difference between pressure **PP** and pressure **PA2**)
- If this happens, the LS pressure **PLS** at the side under heavy load acts on spring chamber **PLS1** on the side under light load, and pressure compensation valve **R** (reducing valve) (6A) and pressure compensation valve **F** (flow control valve) (7A) are pushed down.
- Pressure compensation valve **F** (flow control valve) (7A) throttles the area of the opening between pump cir-

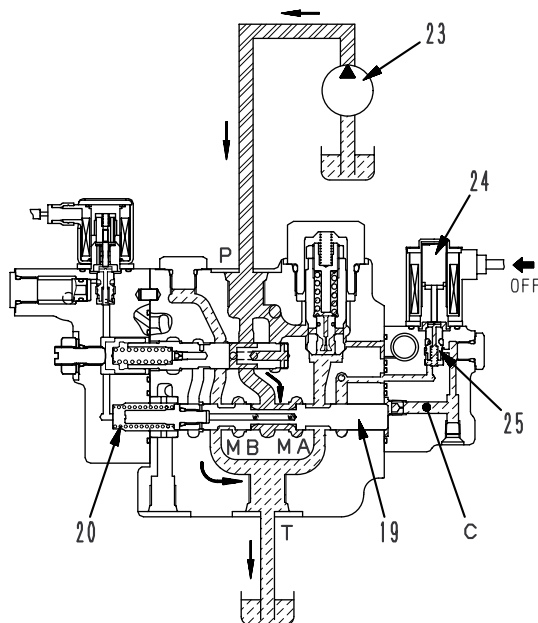
cuit **PP** and pressure compensation valve spool (12) upstream **PPA2**, and pressure loss is generated between **PP** and **PPA2**.

- The condition balances at the position where the difference in pressure between pressure **PLS1** and **PA2** acting on both ends of pressure compensation valve **R** (reducing valve) (6A) and the differential pressure loss between pressure **PPA2** and pressure **PP** on both sides of pressure compensation valve **F** (flow control valve) (7A) are the same.
- In this way, the difference in pressure between the downstream pressure and upstream pressure of both the spools being used for compound operation becomes the same ($PPA1 - PA1 = PPA2 - PA2$), so the oil flow from the pump is divided in proportion to the area of opening of notches **a1** and **a2** of each spool.

3. Operation of reversible valve

1) When reversible valve ON-OFF solenoid is turned off

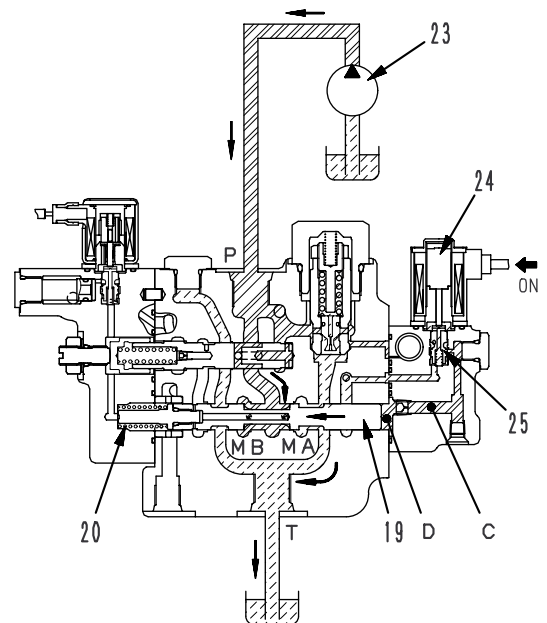
- If reversible valve ON-OFF solenoid (24) is turned OFF, the pressurized oil from pump (23) is shut off by ON-OFF selector valve (25) and port **C** is connected to the tank circuit.
- As a result, reversible valve spool (19) is pushed to the right by reversible valve spring (20) and motor port **MA** opens. Then, the pressurized oil flows in and the motor starts forward (right-handed) rotation.



SJD05216

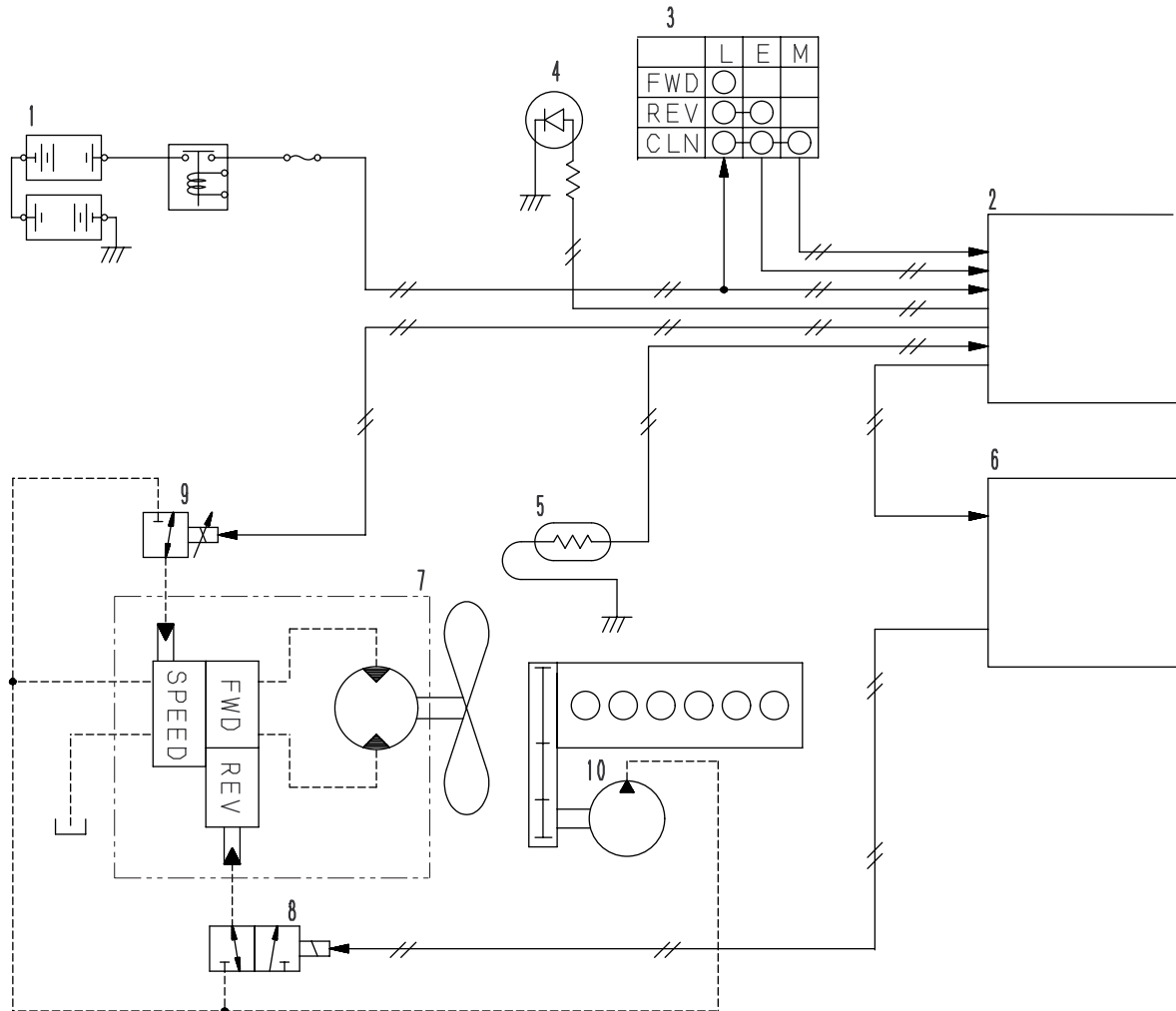
2) When reversible valve ON-OFF solenoid is turned on

- If reversible valve ON-OFF solenoid (24) is turned ON, ON-OFF selector valve (25) changes and the pressurized oil from pump (23) flows through port **C** into spool chamber **D**.
- The pressurized oil in chamber **D** pushes reversible valve spool (19) to the left against reversible valve spring (20). As a result, motor port **MB** opens and the pressurized oil flows in and the motor starts reverse (left-handed) rotation.



SJD05217

COOLING FAN CONTROL SYSTEM

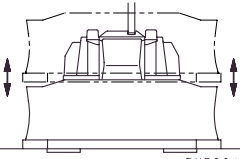
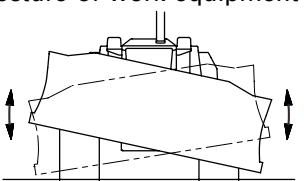


S2D05124

1. Battery
2. Fan reverse rotation controller
3. Fan rotation direction selector switch
4. Fan operation check lamp
5. Water temperature sensor
6. Fan rotation controller
7. Fan drive motor
8. Fan reverse rotation solenoid valve
9. Fan speed solenoid valve
10. Fan drive pump

Outline

- The fan reverse rotation controller (2) and fan rotation controller (6) control the hydraulic cooling fan according to the coolant temperature input from water temperature sensor (5) and the rotation mode selected with fan rotation direction selector switch (3).

Category	Item	Measurement conditions	Unit	Standard value	Permissible value
Hydraulic pressure	Modulating relief pressure	<ul style="list-style-type: none"> • Engine at rated • Power train oil temperature: 70 – 80°C 	Neutral	3.04 ± 0.15 {31.0 ± 1.5}	—
			F1, R1	3.09 ± 0.15 {31.5 ± 1.5}	—
			F2•3, R2•3	3.14 ± 0.15 {32.0 ± 1.5}	—
	Steering actuating pressure	<ul style="list-style-type: none"> • Engine at high idling • Power train oil temperature: 70 – 80°C 	Pedal operated Pedal not operated	3.5 ± 0.34 {36 ± 3.5}	3.0 {30.5}
	Brake actuating pressure (Brake pedal operated)			2.65 ± 0.25 {27 ± 2.5}	2.2 {22}
	Inching circuit actuating pressure			0.08 ± 0.01 {0.8 ± 0.1}	—
Hydraulic pump relief pressure	<ul style="list-style-type: none"> • Engine at high idling • Hydraulic oil temperature: 45 – 55°C 		2.7 ^{+0.6} _{-0.5} {27 ⁺⁶ ₋₅ }	2.55 {26}	
			20.6 ^{+0.8} ₀ {210 ⁺⁸ ₀ }	17.7 {180}	
Power train	Travel speed	<ul style="list-style-type: none"> • Level road surface • Engine at high idling • Engine water temperature: Within operating range • Run-up distance: 10 – 30 m • Measurement distance: 20 m 	FORWARD 1st	2.4 ± 0.2	2.4 ± 0.2
			FORWARD 2nd	4.4 ± 0.3	4.4 ± 0.3
			FORWARD 3rd	7.6 ± 0.5	7.6 ± 0.5
			REVERSE 1st	3.0 ± 0.3	3.0 ± 0.3
			REVERSE 2nd	5.5 ± 0.5	5.5 ± 0.5
			REVERSE 3rd	9.4 ± 0.8	9.4 ± 0.8
Work equipment	Blade lift speed	<ul style="list-style-type: none"> • Posture of work equipment 	RAISE	2.2 ± 0.2	2.7
			LOWER	1.9 ± 0.2	2.3
	Blade tilt speed	<ul style="list-style-type: none"> • Posture of work equipment 	LEFT TILT	2.0 ± 0.2	2.4
			RIGHT TILT	2.0 ± 0.2	2.4
		<ul style="list-style-type: none"> • Hydraulic oil temperature: 45 – 55°C • Blade: No load • Left tilt ↔ Right tilt • Engine at high idling 			

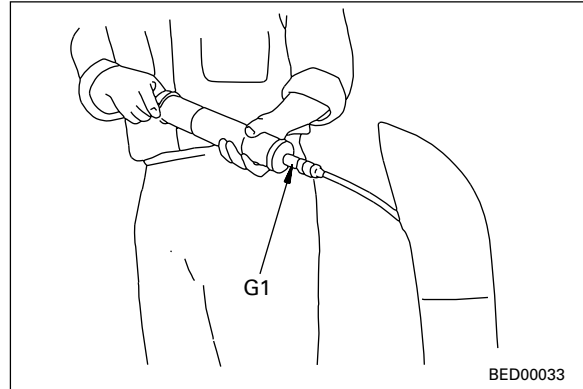
MEASURING EXHAUST COLOR

- When measuring in the field where there is no air or electric power supply, use tool **G1**; when recording formal data, use tool **G2**.
- ★ Raise the coolant temperature to the operating range before measuring.

⚠ Be careful not to touch any hot parts when removing or installing the measuring tools.

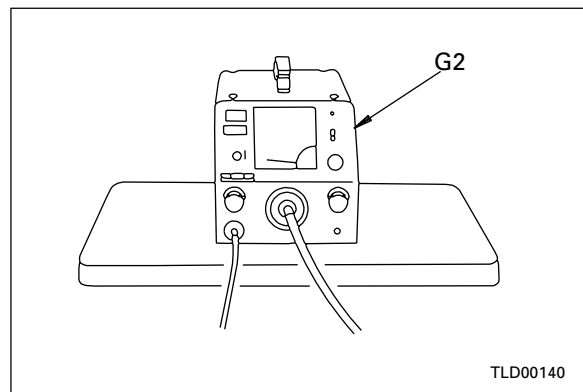
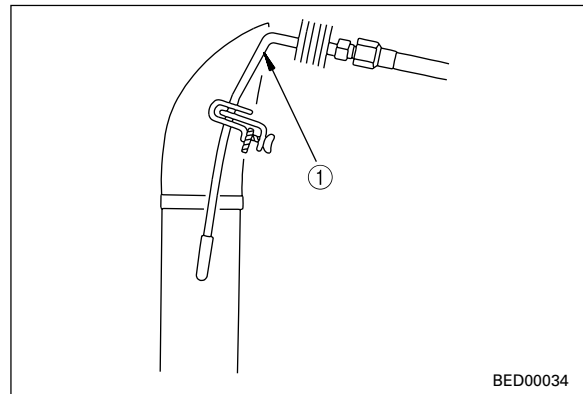
Measuring with G1

- 1) Install filter paper to tool **G1**.
- 2) Insert the exhaust gas suction port into the exhaust pipe, accelerate the engine suddenly, and operate the handle of tool **G1** at the same time to collect the exhaust gas on the filter paper.
- 3) Remove the filter paper and compare it with the scale supplied to judge the condition.



Measuring with G2

- 1) Insert probe ① into the outlet port of exhaust pipe, and tighten the clip to secure it to the exhaust pipe.
- 2) Connect the air hose, the socket of the accelerator switch, and the probe hose to tool **G2**.
 - ★ Keep the pressure of the air supply below 1.5 MPa {15 kg/cm²}.
- 3) Connect the power cord to the AC socket.
 - ★ When connecting the cord, check that the power switch of tool **G2** is OFF.
- 4) Loosen the cap nut of the suction pump, and fit the filter paper.
 - ★ Fit the filter paper securely so that the exhaust gas cannot leak.
- 5) Turn the power switch of tool **G2** ON.
- 6) Accelerate the engine suddenly, and depress the accelerator pedal of tool **G2** at the same time to collect the exhaust gas color on the filter.
- 7) Place the filter paper used to catch the exhaust gas color on top of at least 10 sheets of unused filter paper inside the filter paper holder, and read the value shown.



TESTING WEAR OF BRAKE LINING AND CLUTCH LINING

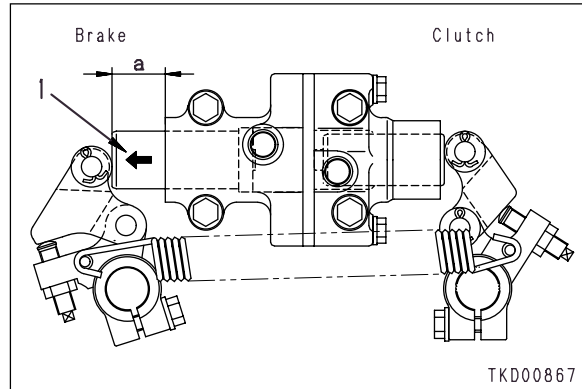
1. Testing wear of brake lining

- 1) Start the engine and set the parking brake lever to the FREE position.

⚠ Check that the directional lever is at neutral. Never operate the lever to the forward or reverse direction or make the machine move during operation.

- 2) Operate the steering lever fully on the left side (or right side), and measure protrusion **a** of brake piston (1) from the end face of the case.

- ★ If dimension **a** > 39 mm:
The brake lining is worn, so replace the lining.
- ★ If dimension **a** < 39 mm:
The lining has not reached the wear limit, so it can be used until dimension **c** = 39 mm, but consider the remaining life and decide if it is necessary to replace the lining.



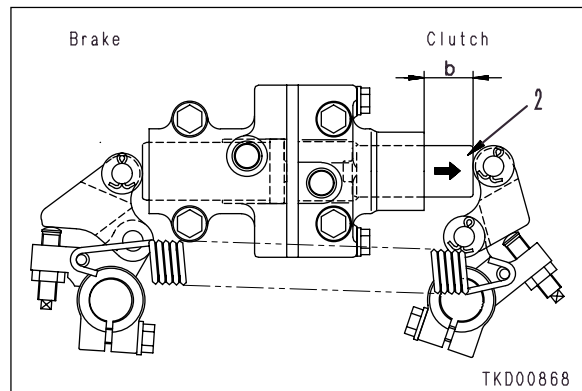
2. Testing wear of clutch lining

- 1) Start the engine and set the parking brake lever to the FREE position.

⚠ Check that the directional lever is at neutral. Never operate the lever to the forward or reverse direction or make the machine move during operation.

- 2) Set the steering lever to the neutral position and measure protrusion **b** of clutch piston (2) from the end face of the case.

- ★ If dimension **b** is greater than 39 mm, the clutch lining is worn, so replace the lining.



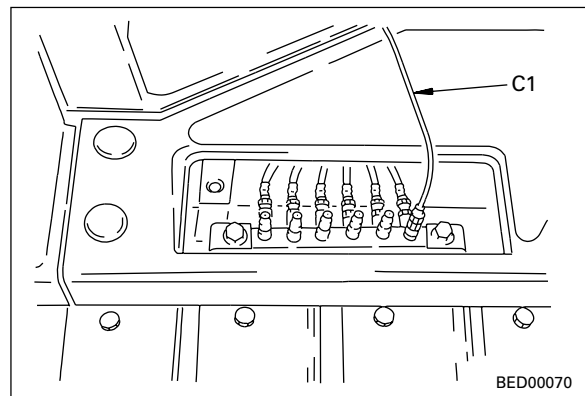
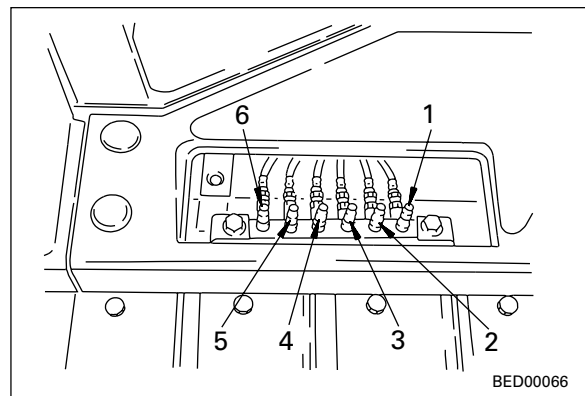
MEASURING POWER TRAIN OIL PRESSURE

- ⚠ Stop the machine on level ground, lower the work equipment completely to the ground and apply the parking brake.
- ★ When measuring the hydraulic pressure, remove all the sand and dirt from around the nipples and plugs.
- ★ Raise the power train oil temperature to 70 – 80°C before measuring.

Refer to the diagram and table below to install oil pressure gauge **C1** to the nipple for the circuit to be measured.

Table of centralized pressure pick-up port positions and gauge to use when measuring hydraulic pressure

No.	Measurement location	Gauge
1	Transmission modulating relief pressure	5.9 MPa {60 kg/cm ² }
2	Inching valve actuating pressure	
3	Right clutch actuating pressure	
4	Left clutch actuating pressure	
5	Right brake actuating pressure	
6	Left brake actuating pressure	

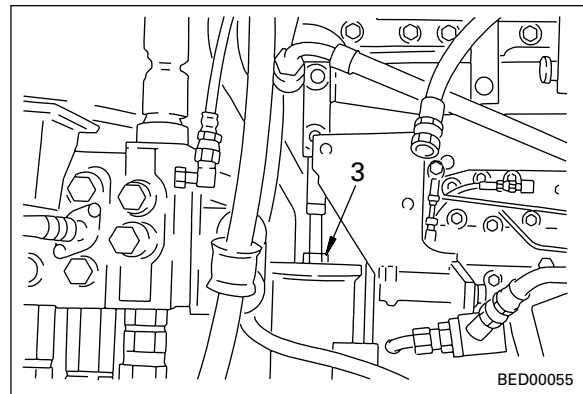
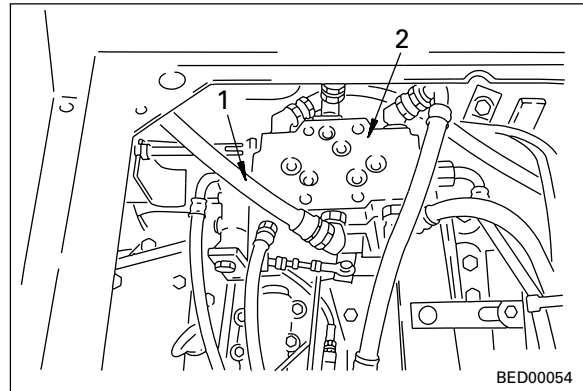


1. **Measuring transmission oil pressure**
 - 1) Measuring modulating relief pressure
 - i) Install oil pressure gauge **C1** to pressure detection plug (2).
 - ii) With the joystick at the neutral position, measure the modulating relief pressure with the engine at low idling and high idling.
 - ★ Note that the 1st speed (No. 5 clutch) is actuated. Therefore, if the oil pressure is defective, place in 2nd or 3rd speed to measure the oil pressure.

PROCEDURE FOR RELEASING PARKING BRAKE

★ When releasing the parking brake manually, do as follows.

- 1) Remove the brake control valve assembly. For details, see REMOVAL OF BRAKE CONTROL VALVE ASSEMBLY.
- 2) Disconnect hose (1) and move brake lock (2) to the side.
- 3) Tighten nut (3) of the parking brake cylinder and extend the rod approx. 40 mm.
 - ★ This operation relieves the parking brake.
 - ★ Width across flats: 32 mm



POINTS TO REMEMBER WHEN CARRYING OUT MAINTENANCE

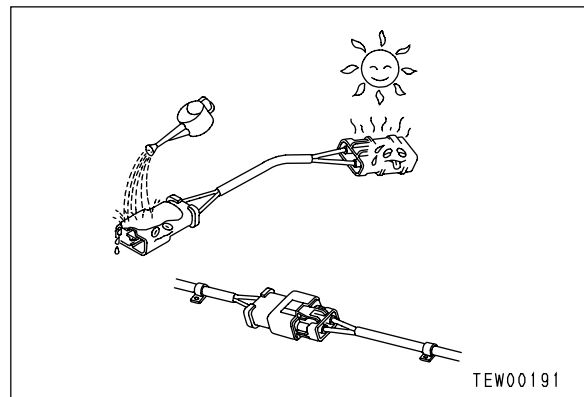
To maintain the performance of the machine over a long period, and to prevent failures or other troubles before they occur, correct operation, maintenance and inspection, troubleshooting, and repairs must be carried out. This section deals particularly with correct repair procedures for mechatronics 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.

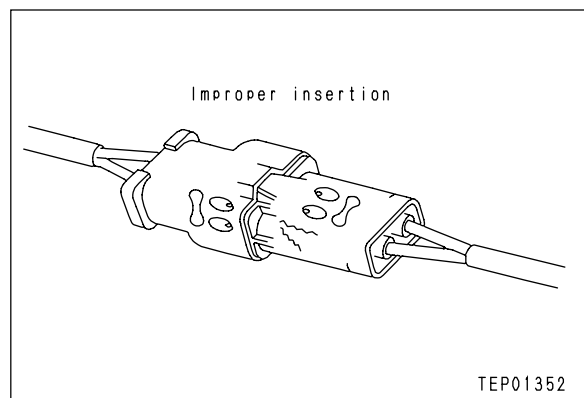
Compared with other electrical components fitted in boxes or cases, wiring harnesses are more likely to be affected by the direct effects of rain, water, heat, or vibration. Furthermore, during inspection and repair operations, they are frequently removed and installed again, so they are likely to suffer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



Main failures occurring in wiring harness

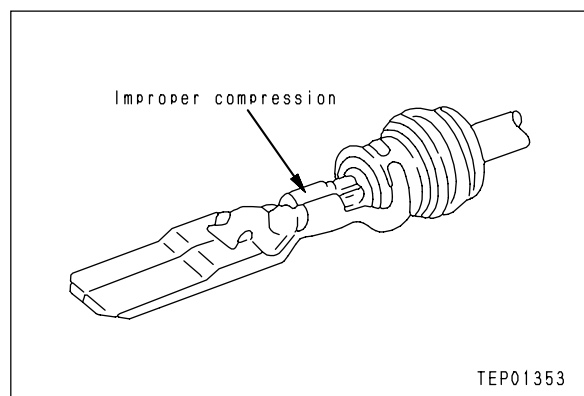
(1) Defective contact of connectors (defective contact between male and female)

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 oxidization 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.



<Example>

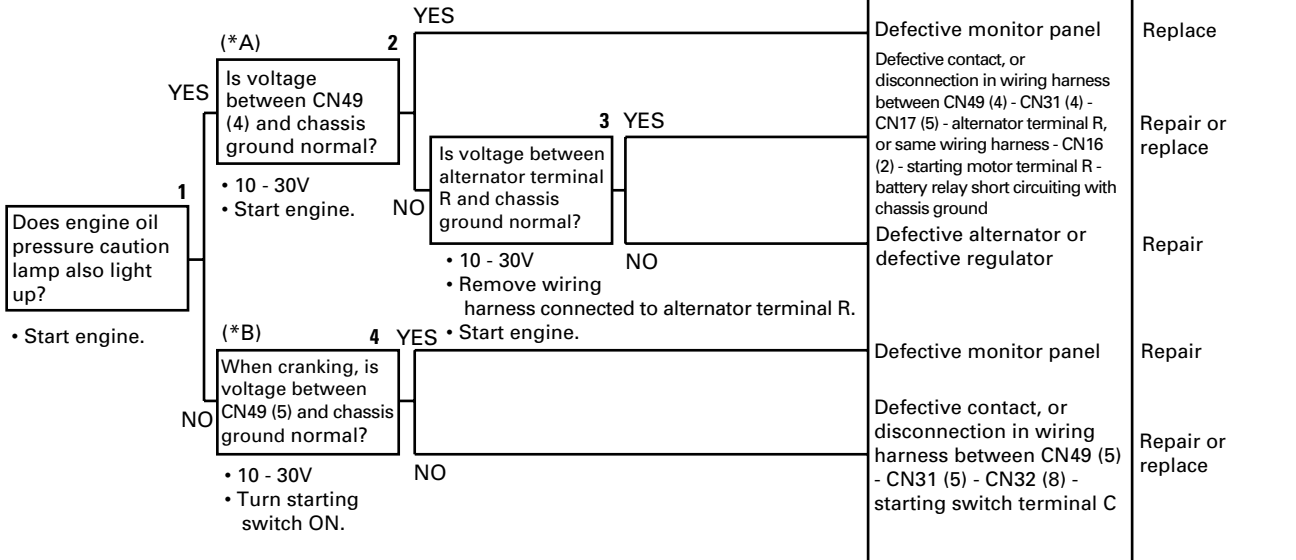
(1) M-4. CAUTION items light up or flash

(2) a)  (charge) lights up or flashes

SAP00522

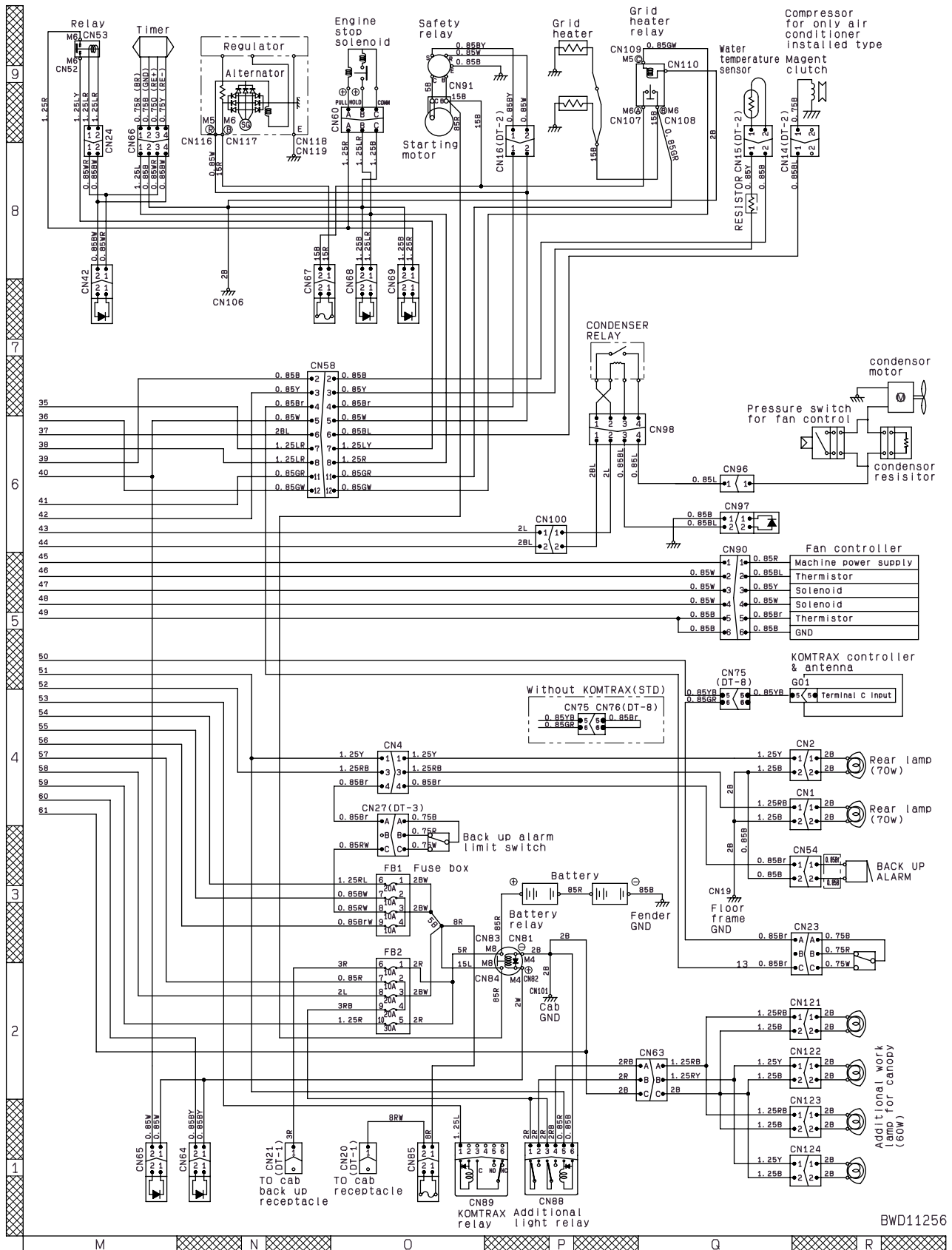
(1) When it lights up

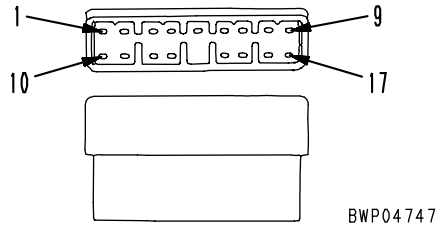
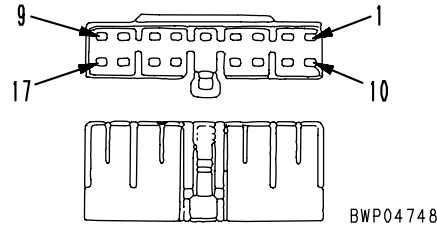
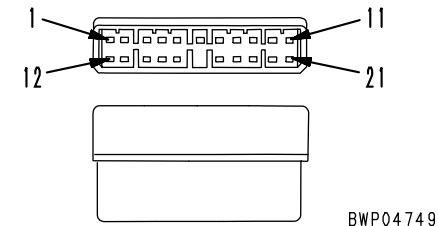
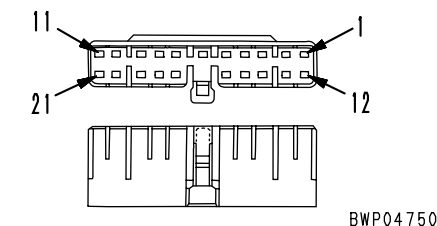
(3)



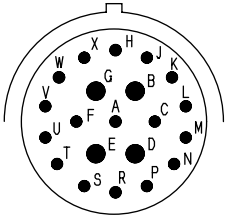
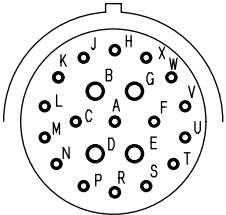
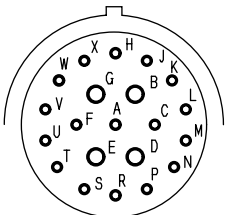
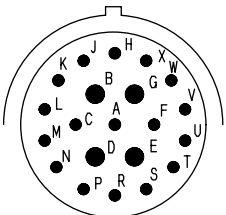
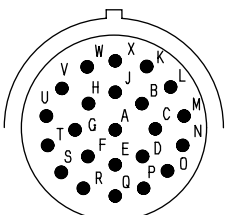
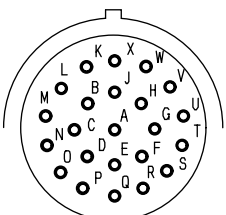
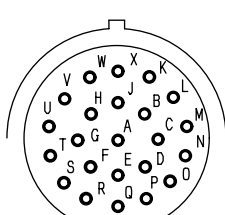
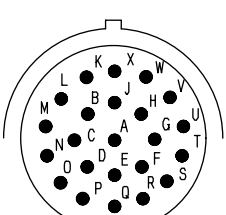
- (4) ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
 ★ Always connect any disconnected connectors before going on the next step.

(2/2)



No. of pins	MIC type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
17	 <p>BWP04747</p>	 <p>BWP04748</p>	799-601-2730
	Body part number: 79A-222-2730 (Q'ty: 2)	Body part number: 79A-222-2720 (Q'ty: 2)	
21	 <p>BWP04749</p>	 <p>BWP04750</p>	799-601-2740
	Body part number: 79A-222-2750 (Q'ty: 2)	Body part number: 79A-222-2740 (Q'ty: 2)	
	Terminal part number: 79A-222-2770 (Q'ty: 50)	Terminal part number: 79A-222-2760 (Q'ty: 50)	—

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

Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
24-21 (7)	Pin (male terminal)	Pin (female terminal)	799-601-9270
	 BWP05025	 BWP05026	
	Part number: 08191-71201, 08191-71202, 08191-71205, 08191-71206		Part number: 08191-74101, 08191-74102, 08191-74105, 08191-74106
	Pin (female terminal)	Pin (male terminal)	799-601-9270
 BWP05027	 BWP05028		
Part number: 08191-72201, 08191-72202, 08191-72205, 08191-72206		Part number: 08191-73102, 08191-73102, 08191-73105, 08191-73106	
24-22 (8)	Pin (male terminal)	Pin (female terminal)	799-601-9280
	 BWP05029	 BWP05030	
	Part number: 08191-81201, 08191-81202, 08191-81203, 08191-81204, 08191-81205, 08191-80206		Part number: 08191-84101, 08191-84102, 08191-84103, 08191-84104, 08191-84105, 08191-84106
	Pin (female terminal)	Pin (male terminal)	799-601-9280
 BWP05031	 BWP05032		
Part number: 08191-82201, 08191-82202, 08191-82203, 08191-82204, 08191-82205, 08191-82206		Part number: 08191-83101, 08191-83102, 08191-83103, 08191-83104, 08191-83105, 08191-83106	

METHOD OF USING TROUBLESHOOTING CHARTS

This troubleshooting chart is divided into three sections: **questions, check items, and troubleshooting**. The questions and check items are used to pinpoint high probability causes that can be located from the failure symptoms or simple inspection without using troubleshooting tools.

Next, troubleshooting tools or direct inspection are used to check the high probability causes to make final confirmation.

[Questions]

Sections (A) + (B) in the chart on the right correspond to the items where answers can be obtained from the user. The items in (B) are items that can be obtained from the user, depending on the user's level.

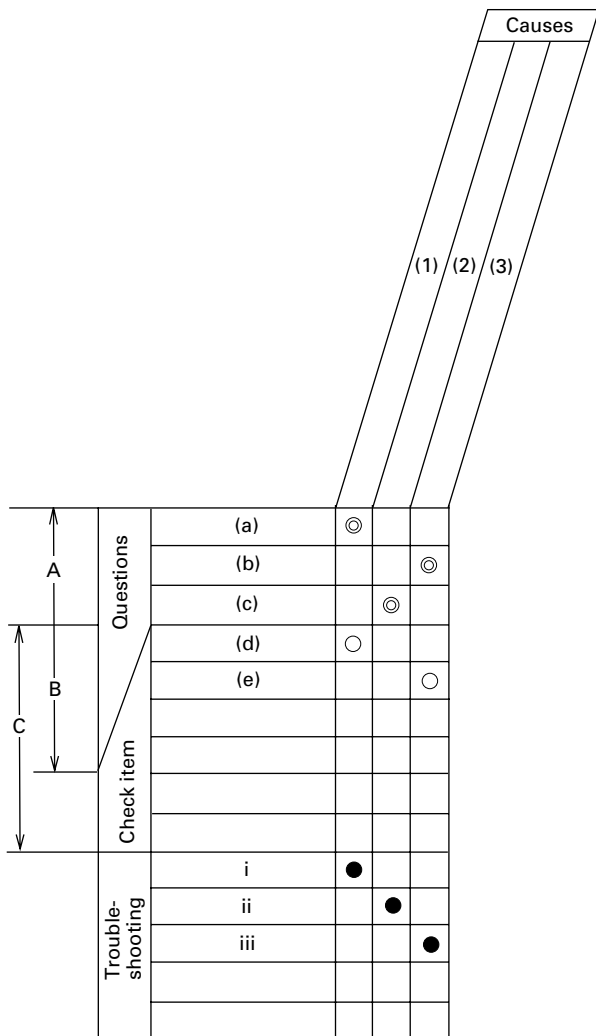
[Check items]

The serviceman carries out simple inspection to narrow down the causes. The items under (C) in the chart on the right correspond to this.

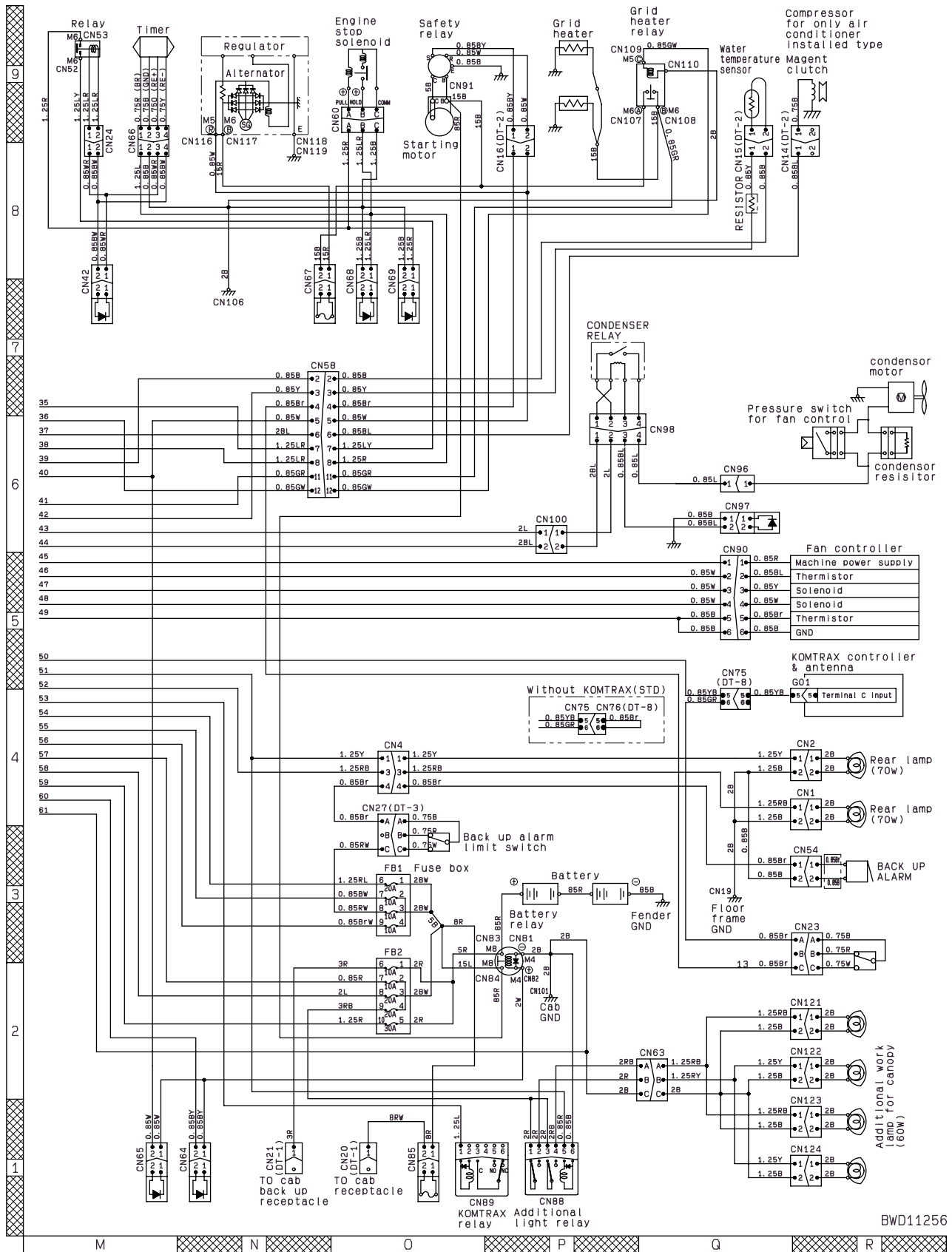
The serviceman narrows down the causes from information (A) that he has obtained from the user and the results of (C) that he has obtained from his own inspection.

[Troubleshooting]

Troubleshooting is carried out in the order of probability, starting with the causes that have been marked as having the highest probability from information gained from **[Questions]** and **[Check items]**.



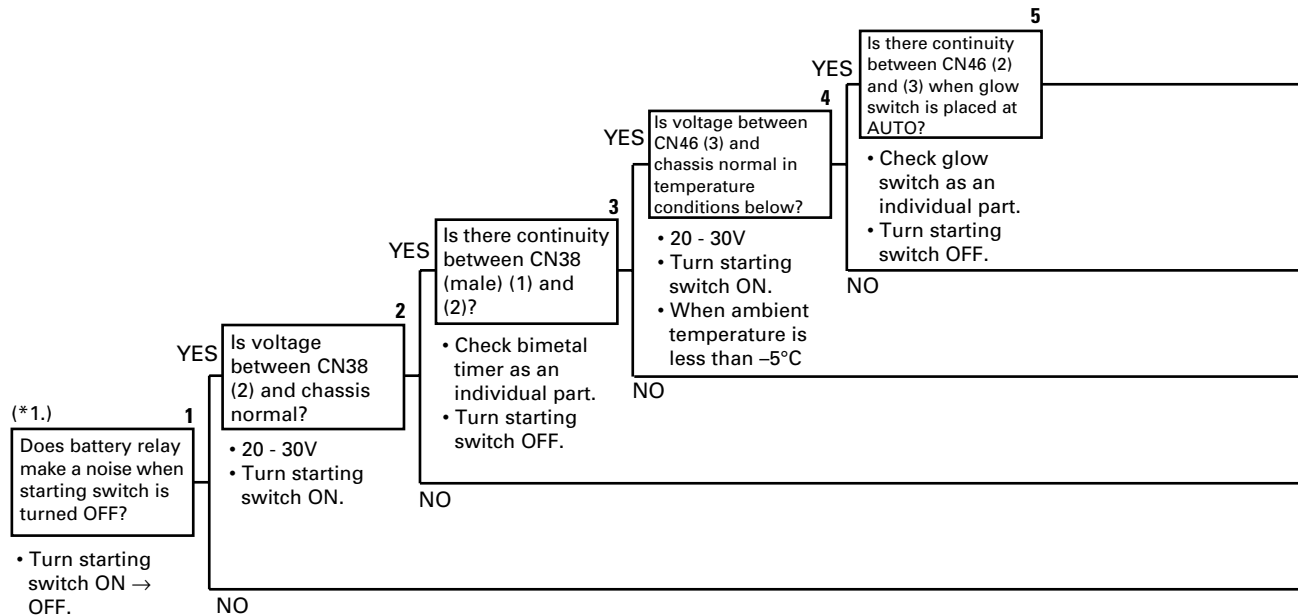
(2/2)



BWD11256

E-4. Automatic preheating is not carried out when glow switch is turned to AUTO

- ★ When the battery is normal.
- ★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
- ★ Always connect any disconnected connectors before going on the next step.



*1. If the lamps (front lamps, rear lamps) or horn circuit are normal, it is possible to check instead if the lamps light up normally or if the horn sounds normally.

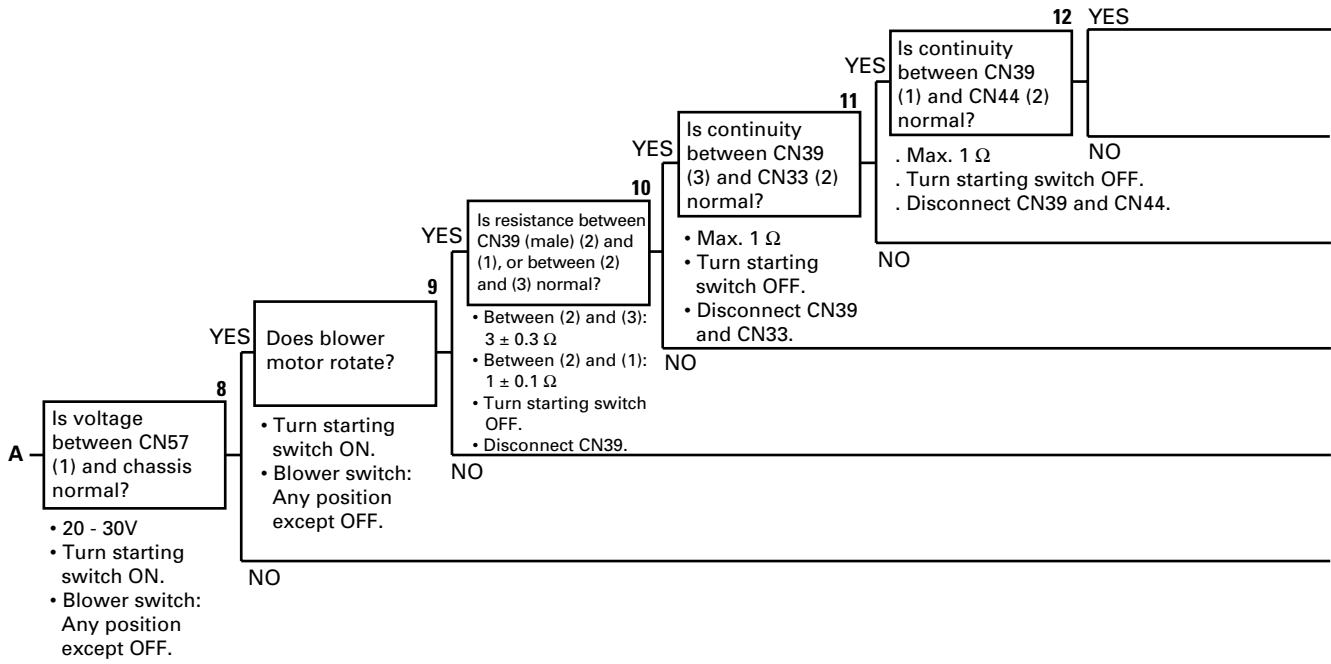
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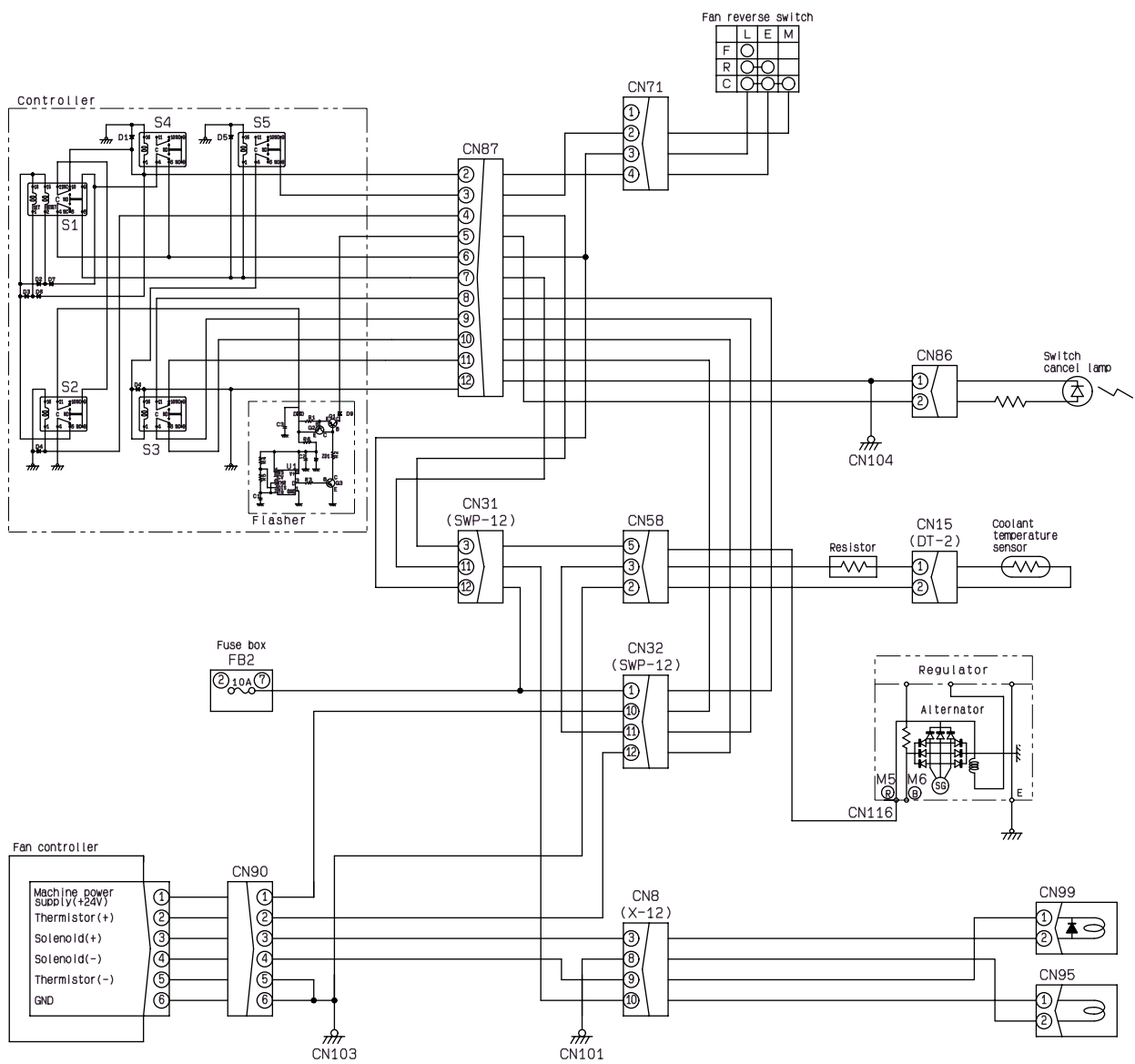


- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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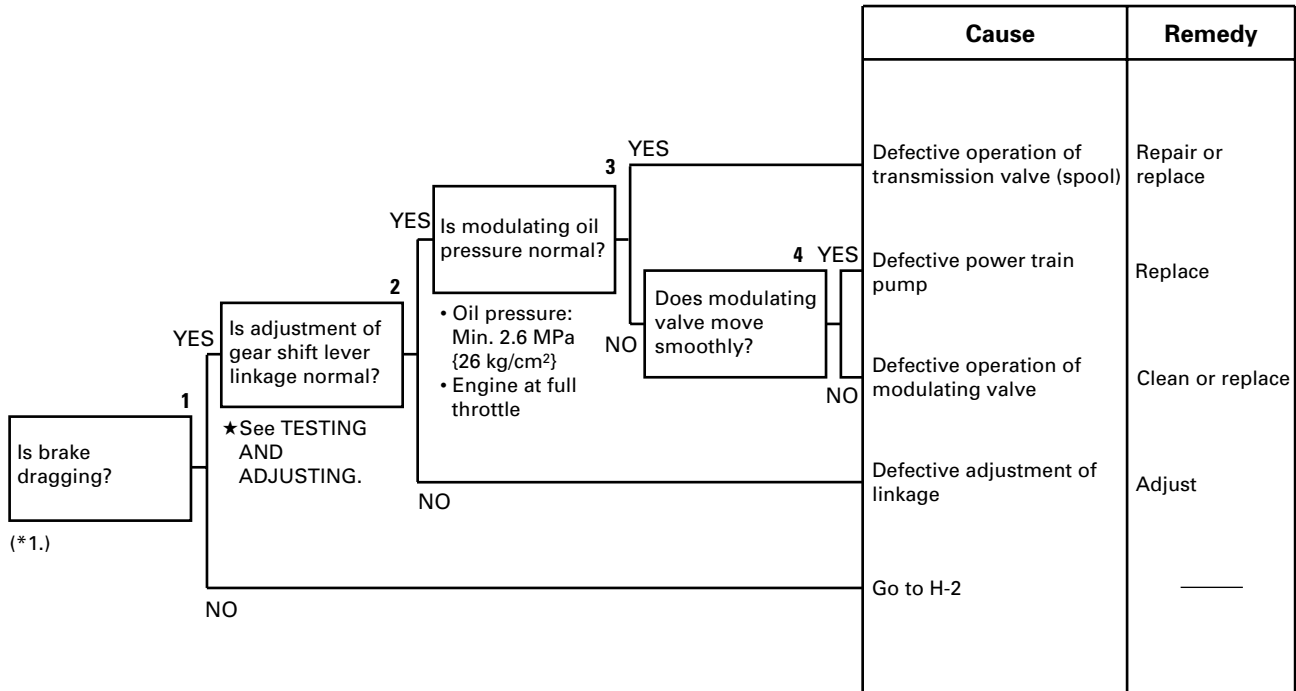


E-8. Related electrical circuit diagram



BWD11264

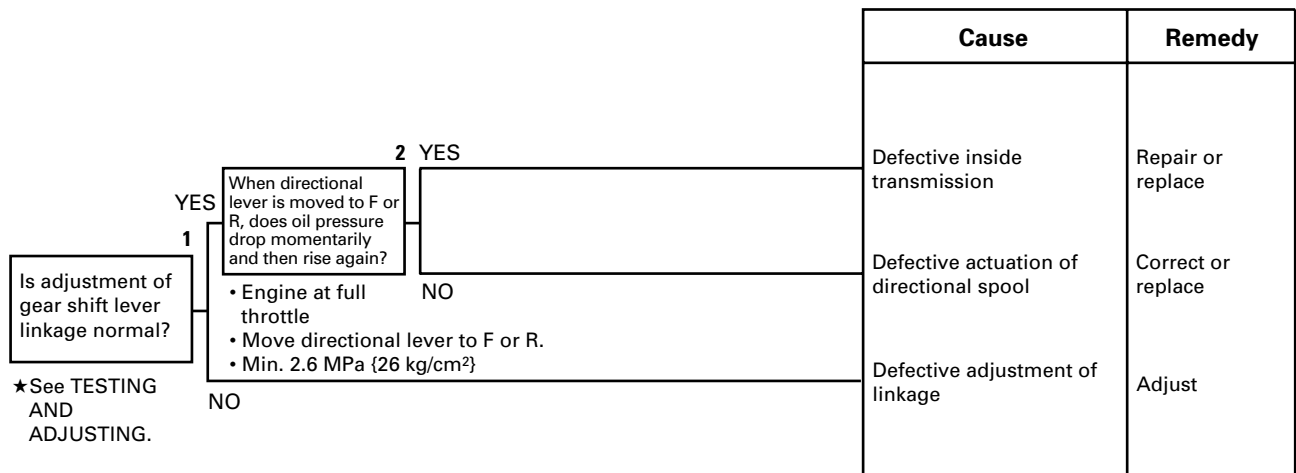
H-6. Excessive time lag



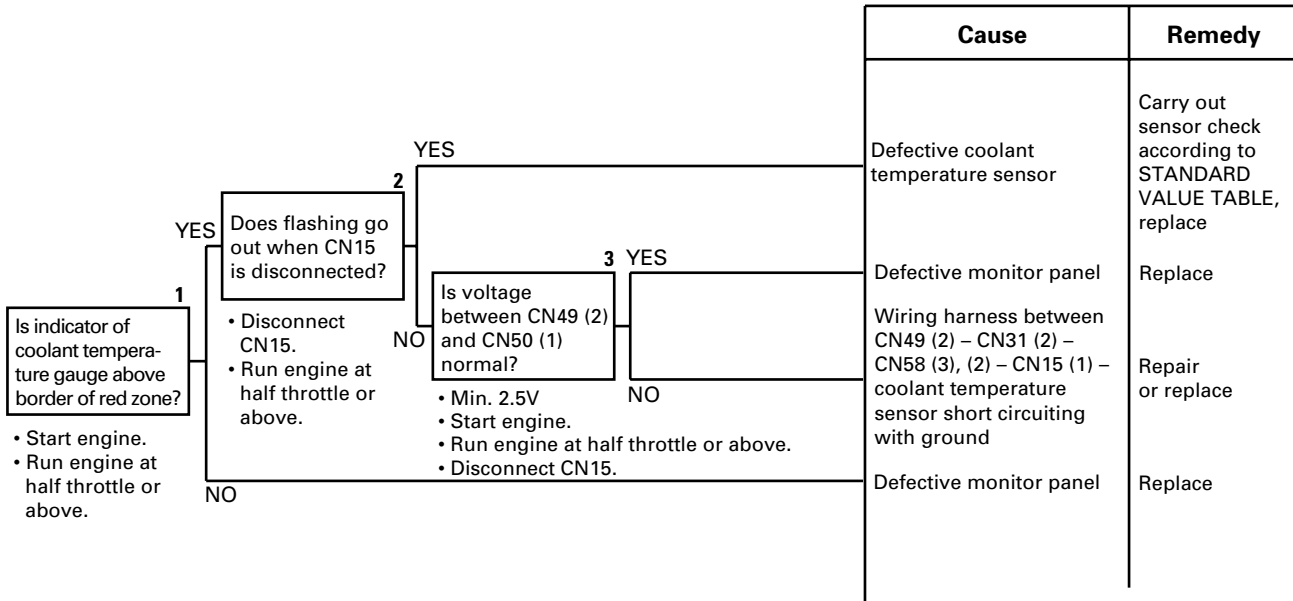
*1. Stop the machine on level ground, run the engine at low idling, then shift to F1 and check if the machine moves (travels).

H-7. Machine can travel in only one direction (forward or reverse)

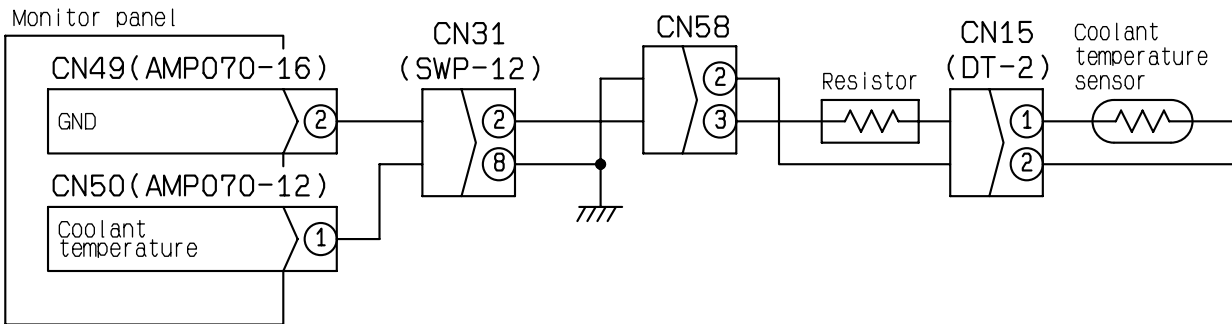
★ Conditions: Modulating oil pressure is normal (Min. 2.6 MPa {26 kg/cm²})



c)  (coolant temperature) flashes
SAP00527



M-4. c) Related electrical circuit diagram

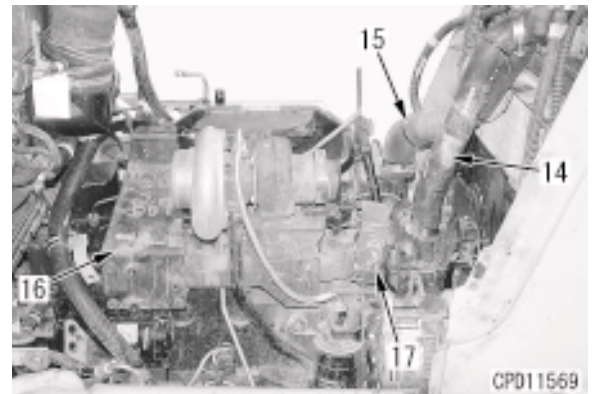


BWD11274

30 DISASSEMBLY AND ASSEMBLY

Method of using manual	30- 3	TRANSMISSION	
Precautions when carrying out operation	30- 4	Disassembly	30-47
Special tool list	30- 6	Assembly	30-58
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RADIATOR, RADIATOR GUARD		Installation	30-110
Removal	30-34	Overall disassembly	30-111
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DAMPER		Press-fitting jig dimension table for link press	30-130
Removal	30-37	ONE LINK	
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TRANSMISSION		Field assembly	30-133
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Installation	30-43	Assembly	30-140
PTO		HYDRAULIC CYLINDER	
Disassembly	30-44	Disassembly	30-146
Assembly	30-45	Assembly	30-148

11. Remove radiator outlet hose (14), oil filler hose (15), and stays (16) and (17).



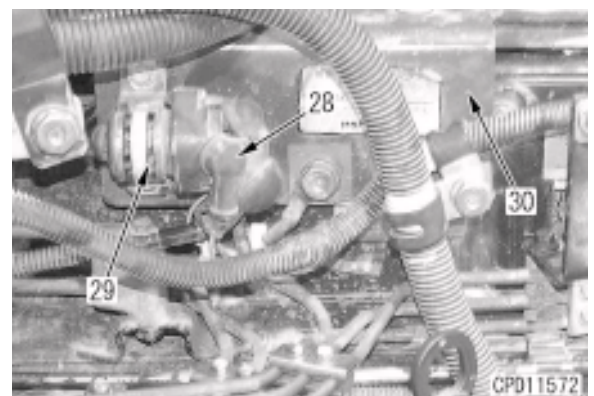
12. Remove frame (18).



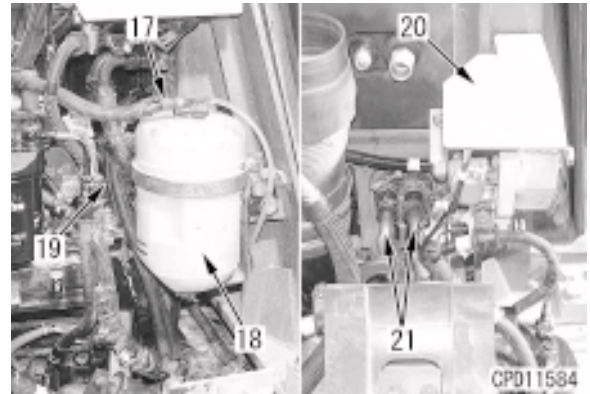
13. Air conditioner compressor
- 1) Disconnect connectors (19) and (20) and remove cover (21).
 - 2) Loosen 2 each of compressor mounting bolts (22) and (23).
 - 3) Loosen locknut (24) and turn adjustment bolt (25) to loosen and remove V-belt (26).
 - 4) Remove compressor mounting bolts (22) and (23), air conditioner compressor (27), and hose clamp.



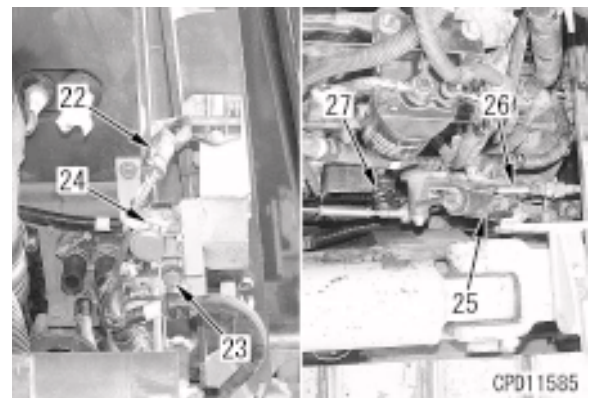
14. Disconnect wiring harness terminal (28) and remove heater relay (29) and bracket (30).



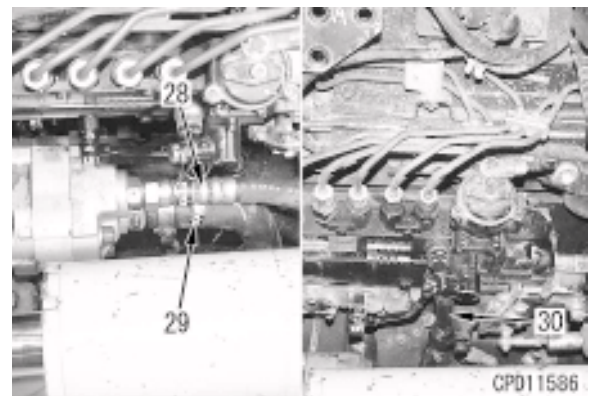
13. Remove overflow hose (17) and reservoir tank (18).
14. Disconnect spill hose (19).
15. Remove cover (20).
16. Disconnect heater hose (21).



17. Disconnect (22) (CN66) and remove clamp (23).
18. Remove relay (24).
19. Disconnect fuel control rod (25) and decelerator cable (26). ※ 2
20. Disconnect fuel supply hose (27).
 - ★ Close the valve under the fuel tank.



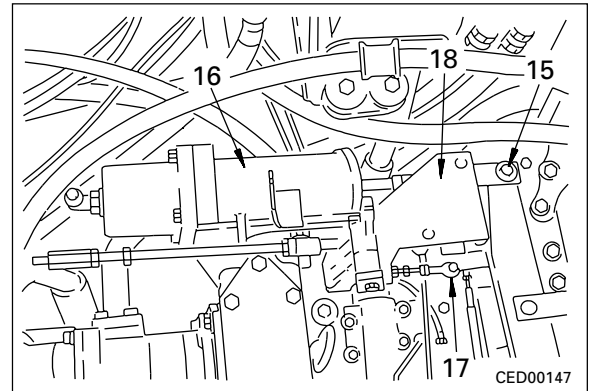
21. Disconnect outlet hose (28) and inlet hose (29) of the fan drive pump.
22. Disconnect fuel return hose (30).



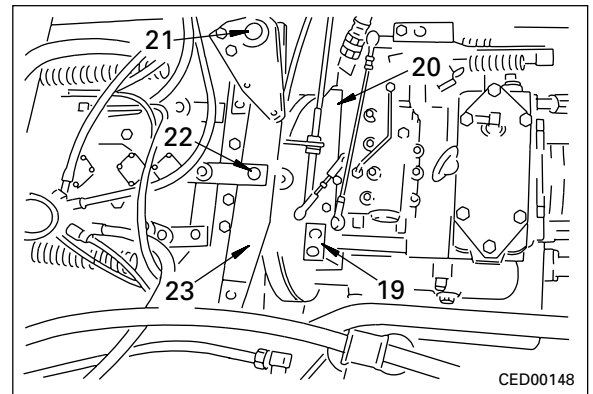
23. Remove the cover under the transmission and disconnect drive shaft (31). ※ 3



8. Pull out pin (15) and remove mounting bolts, then remove parking brake cylinder assembly (16).
9. Disconnect rod (17), and remove bracket (18).

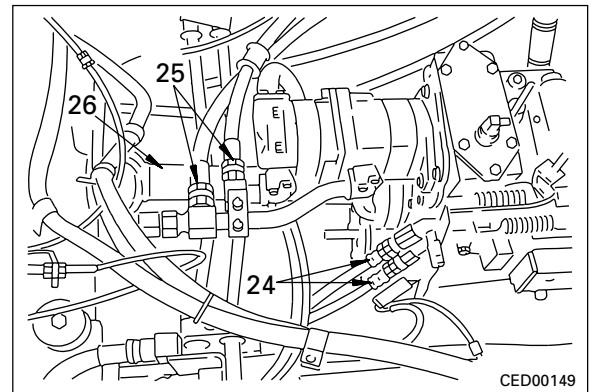


10. Pull out pin (19), then remove bracket (20) together with cable, and move towards left side of chassis.
11. Remove pins (21) and (22), then remove lever (23).

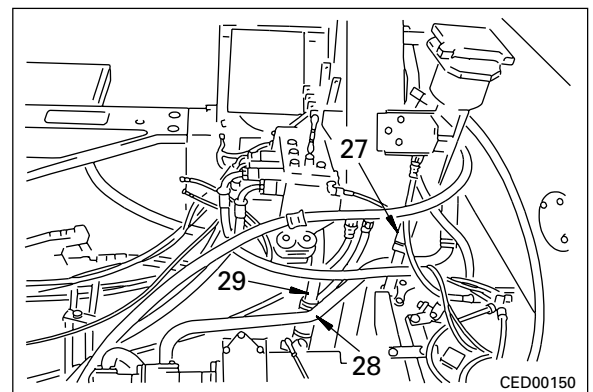


12. Disconnect transmission oil cooler hoses (24).
13. Disconnect pump outlet hoses (25).
14. Remove drive shaft (26).

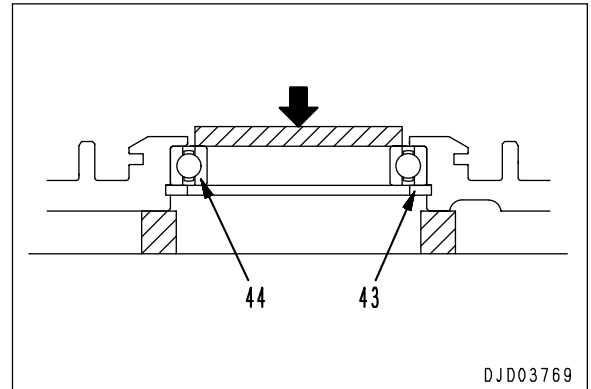
※ 2



15. Remove steering case dipstick tube (27), then remove suction tube (28).
16. Remove transmission dipstick tube (29).

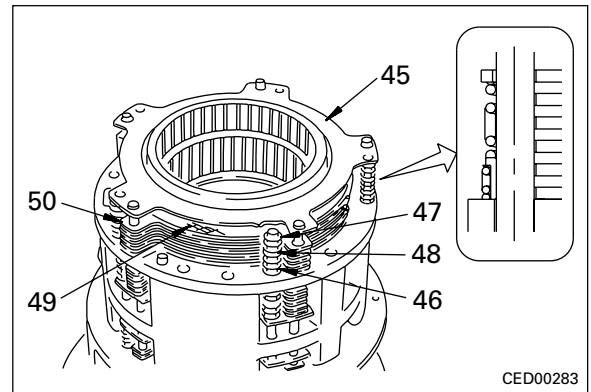


- 6) Remove snap ring (43), then remove bearing (44).



13. No. 1 (R) clutch springs, disc, plates

- 1) Remove plate (45).
- 2) Remove springs (46) and (47), and guide (48).
- 3) Remove disc (49) and plate (50).

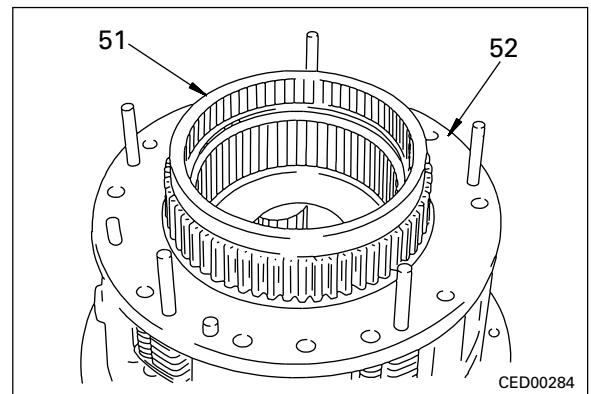


14. No. 1 ring gear

Remove ring gear (51) of No. 1 clutch.

15. No. 2 housing

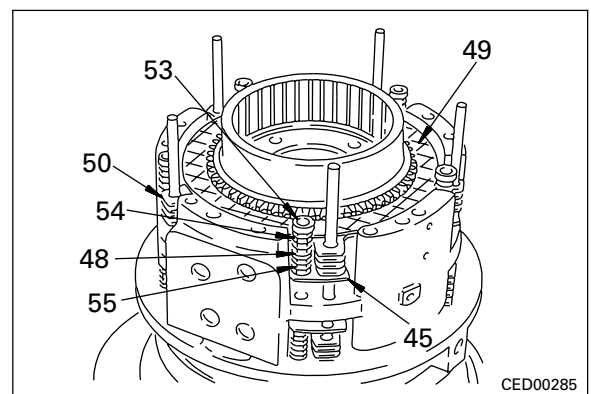
Remove No. 2 housing (52).





16. No. 2 (F) clutch springs, disc, plates

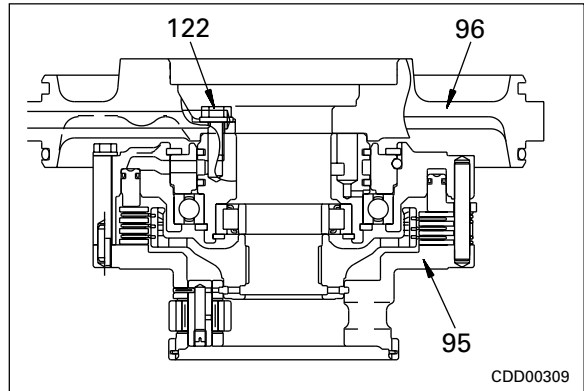
- D41E-6 Serial No. B40351 – B40357
- D41E-6 Serial No. B40366 – B40375
- D41E-6 Serial No. B40421 – B40425
- D41P-6 Serial No. B40340 – B40341
- D41P-6 Serial No. B40345 – B40350
- D41P-6 Serial No. B40358 – B40365
- D41P-6 Serial No. B40379
- D41P-6 Serial No. B40381 – B40382
- D41P-6 Serial No. B40387 – B40388
- D41P-6 Serial No. B40398 – B40399
- D41P-6 Serial No. B40406 – B40407
- D41P-6 Serial No. B40412
- D41P-6 Serial No. B40430 – B40433
- D41P-6 Serial No. B40435 – B40436
- D41P-6 Serial No. B40445
- D41P-6 Serial No. B40447

- 1) Remove washer (53), springs (54) and (55), and guide (48).
- 2) Remove disc (49) and plates (45) and (50).



11) Install No. 5 clutch assembly (95) to rear housing (96) with bolt (122).

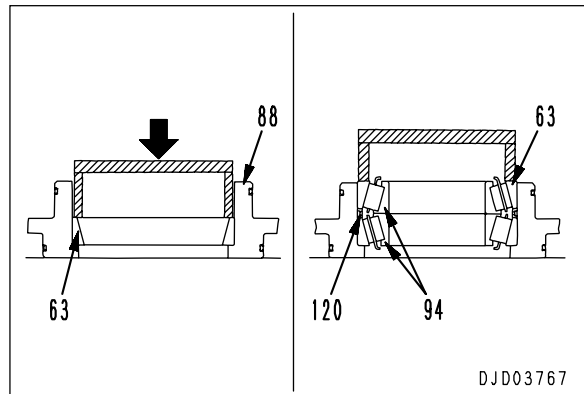
-  Mounting bolt:
Thread tightener (LT-2)
-  Mounting bolt:
66.2 ± 7.4 Nm {6.75 ± 0.75 kgm}





2. Output shaft assembly

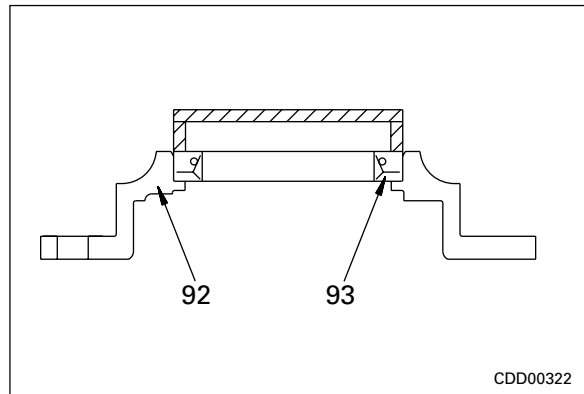
1) Assembly of output shaft assembly

- i) Using push tool, press fit outer race (63) to cage (88).
- ii) Set spacer (120) and bearing (94) in position, and press fit outer race (63).



iii) Using push tool, press fit oil seal (93) to cover (92).

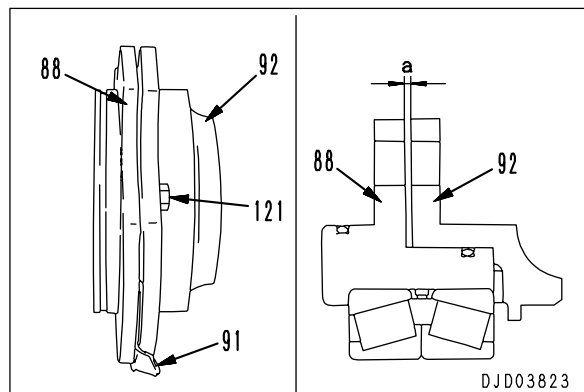
-  Oil seal mounting surface:
Gasket sealant (LG-5)
- ★ Coat the mounting surface thinly, and wipe off any gasket sealant that is pushed out.
-  Lip of oil seal: **Grease (G2-LI)**



iv) Assemble shim (91), spacer (86) and tighten cover (92) temporarily to cage (88) with mounting bolts (121).


v) Adjust shim thickness as follows. Set cover to cage without installing any shim, measure clearance at portion a, then adjust shim thickness so that clearance is 0.05 – 0.15 mm.

- ★ There are two types of shim thickness: 0.2, 0.3 mm

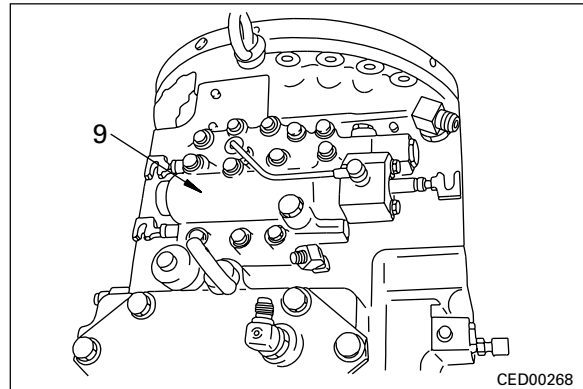


28. Shift valve assembly

Install shift valve assembly (9).

 Mounting bolt:


30.9±3.4Nm {3.15±0.35kgm}



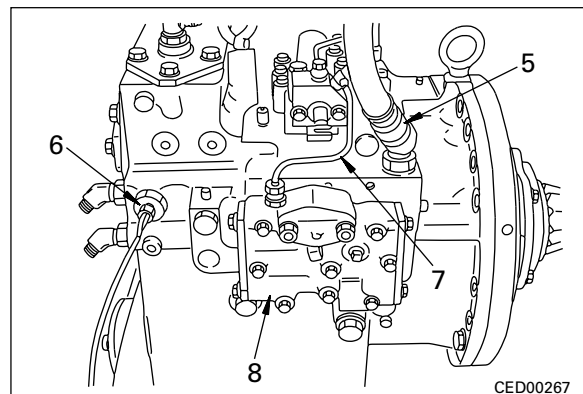
CED00268

29. Pressure control valve

Install pressure control valve assembly (8).

 Mounting bolt:

30.9±3.4Nm {3.15±0.35kgm}



CED00267

30. Oil temperature sensor

Install oil temperature sensor (6).

31. Transmission inlet hose

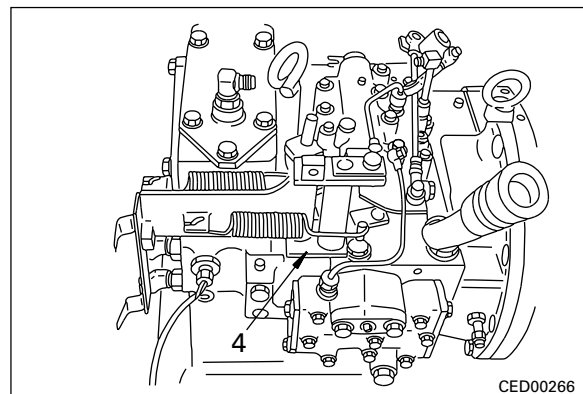
Install hose (5).

32. Inching valve bracket assembly

Install bracket assembly (4).

★ Install the bracket assembly horizontally, mesh the pin and yoke securely, and check that the pin does not come out even when the yoke is rotated.

★ Check that the clearance between the yoke and lever is approx. 1 mm.

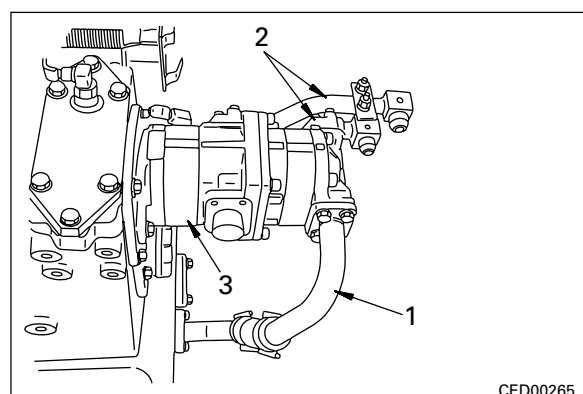


CED00266

33. Tandem pump assembly

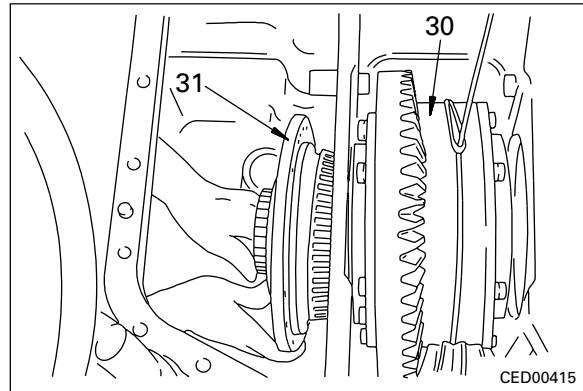
1) Install tubes (2) and (1).

2) Install tandem pump assembly (3).




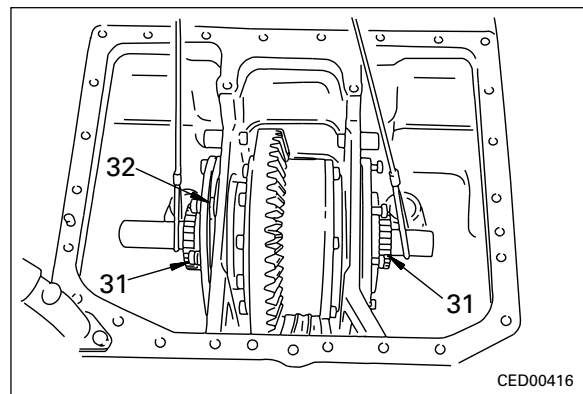
CED00265

- 4) Installation of carrier, bevel gear assembly
- i) Raise carrier and bevel gear assembly (30), and assemble to steering case.
 - ii) Assemble cage and sun gear assembly (31) to both sides.



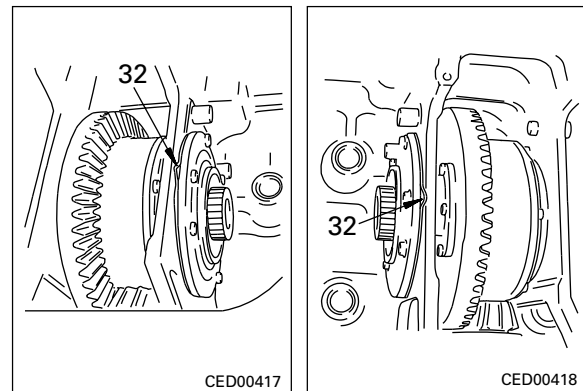
- iii) Pass pipe through center, sling again, then assemble removed shim (32), and install cage and sun gear assembly (31).

 Mounting bolt:
 $66.2 \pm 7.4 \text{ Nm} \{6.75 \pm 0.75 \text{ kgm}\}$



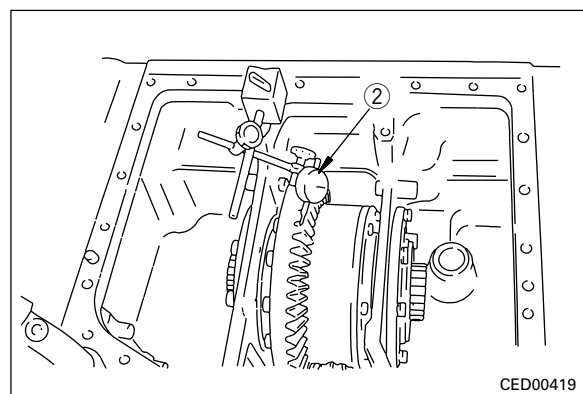
3. Adjusting preload

- 1) Adjust shim (32) so that starting torque at tip of bevel gear is $13.7 - 22.6 \text{ N} \{1.4 - 2.3 \text{ kg}\}$.
 - ★ Do not mesh the bevel pinion when adjusting.
- 2) Adjust so that thickness of shim is more or less equal on left and right.
 - ★ There are three types of shim thickness: 0.2, 0.3, 1.0 mm



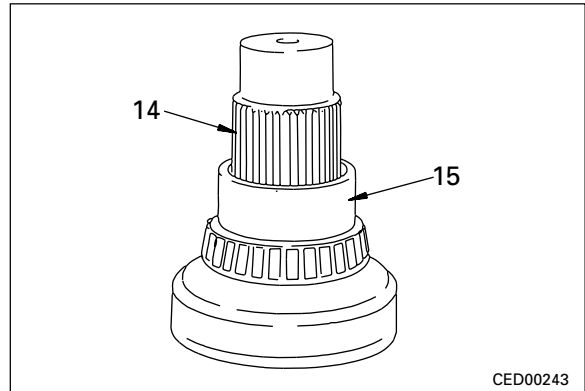
4. Adjusting tooth contact, backlash

- 1) Adjusting backlash
 - Put the probe of dial gauge ② at right angles in contact with the tip of the bevel gear teeth. Hold the bevel pinion in position, and read the measurement when the bevel gear is moved forward and backward.
 - ★ Standard value for backlash: $0.18 - 0.25 \text{ mm}$
 - ★ Measure at a minimum of three points on opposite sides.
 - If the result of the inspection shows that the correct backlash is not being obtained, adjust as follows.

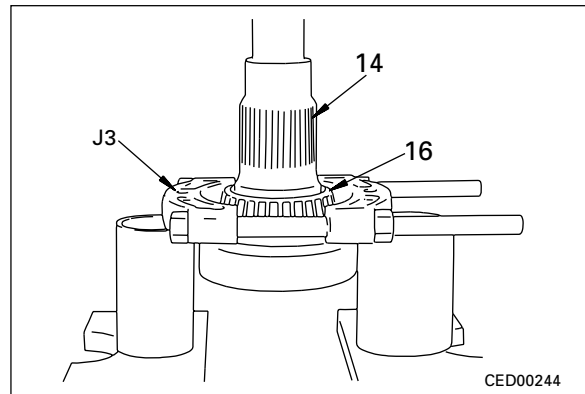


12. Disassembly of drive shaft assembly

1) Remove collar (15) from drive shaft (14).

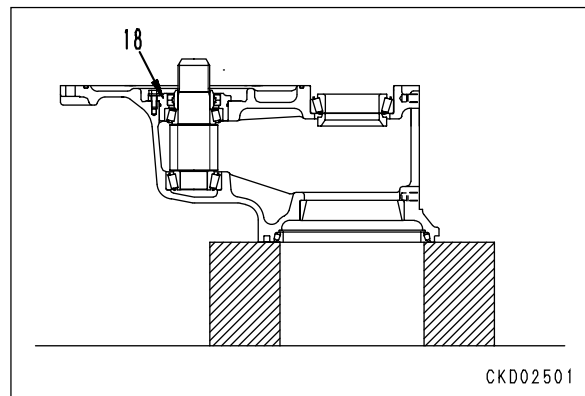


2) Set to press, and using tool J3, pull out bearing inner race (16) from drive shaft (14).



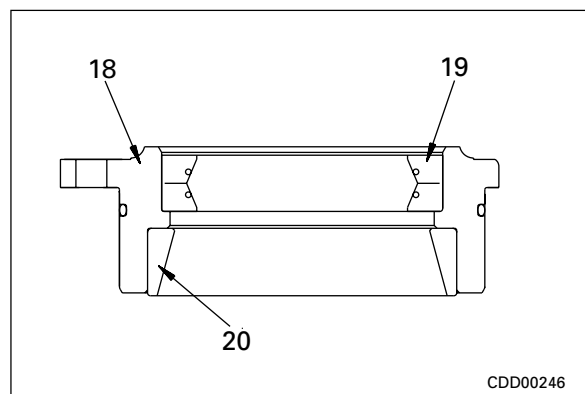
• **Pinion assembly**

13. Remove oil seal and bearing housing (18).



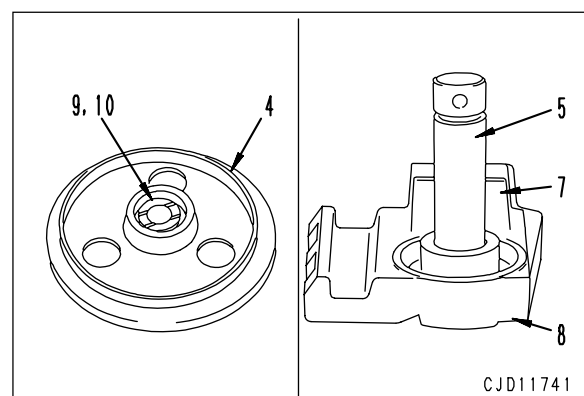
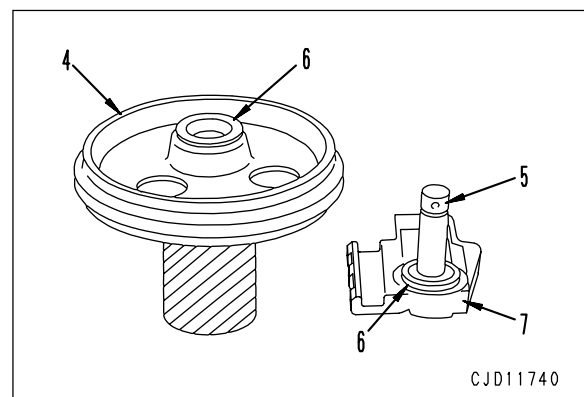
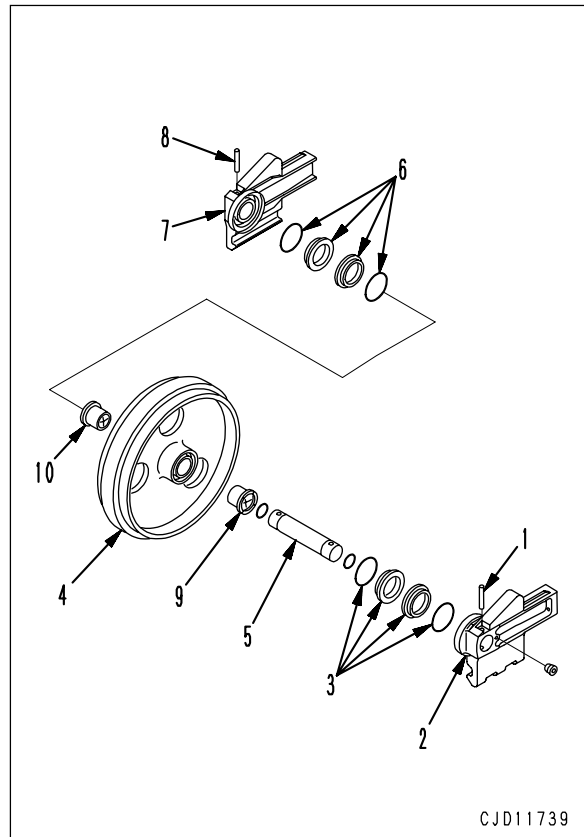
14. Disassembly of oil seal, bearing housing

- 1) Remove oil seal (19) from oil seal and bearing cage (18).
- 2) Remove bearing outer race (20).




DISASSEMBLY OF IDLER ASSEMBLY


1. Remove dowel pin (1), then remove support (2).
2. Remove floating seal (3) from support (2) and idler (4).
3. Pull out idler (4) from shaft (5) and support assembly (7).
 - ★ It is filled with 150 cc. of oil, so drain the oil at this point or lay a cloth to prevent the area from becoming dirty.
4. Remove floating seal (6) on opposite side from idler (4) and shaft (5) and support assembly (7).
5. Remove dowel pin (8), then remove support (7) from shaft (5).
6. Remove bushings (9) and (10) from idler (4).



5. Install spacer (5) with bolt (4).

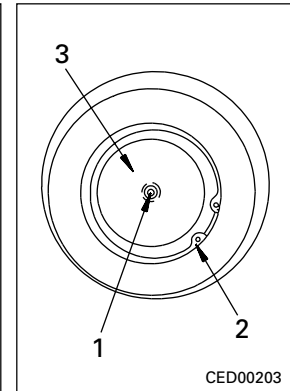
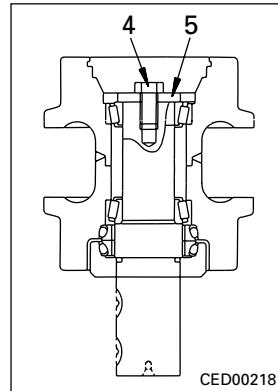
 Bolt: $277.5 \pm 32.4 \text{ Nm}$ { $28.3 \pm 3.3 \text{ kgm}$ }

6. Using tool L4, add oil to carrier roller.

 Carrier roller: **240 cc (GO140B)**

7. Fit O-ring to cover (3) and install to roller, then install snap ring (2).

8. Check oil level and tighten plug (1).



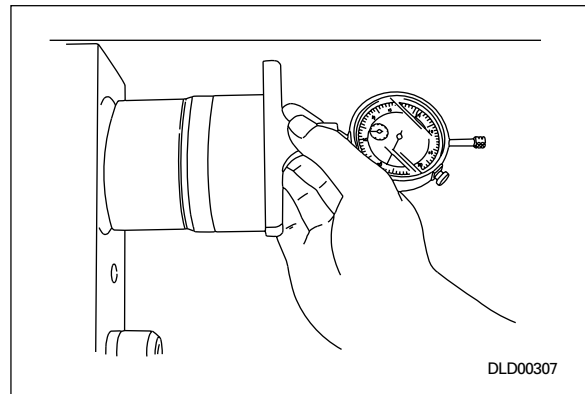
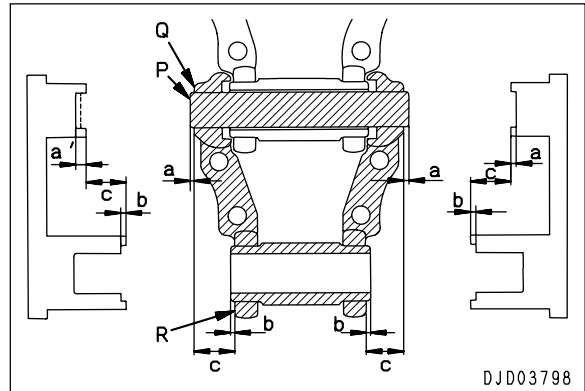
7) In order to keep the protrusion of the pin and bushing constant and the installation dimensions of the seal within the specified value during assembly, adjust the press-fitting jig dimensions of the link press.

★ For details of the standard dimensions, see PRESS-FITTING JIG DIMENSION TABLE FOR LINK PRESS.

★ To leave a small space for the pin when assembling, ensure that the dimension (dimension "a'") is greater than dimension "a" at the pin pushing portion of the left press-fitting jig.

When assembling in order ① press fitting left link, ② press fitting right link, provide the extra space for the pin on the right press-fitting jig.

★ If the end face of the pin (portion P) or the side face of the link (portions Q, R) are worn, add the amount of wear to the standard dimension when adjusting the dimension of the press-fitting jig so that the amount of protrusion of the left and right pin and bushing is uniform.



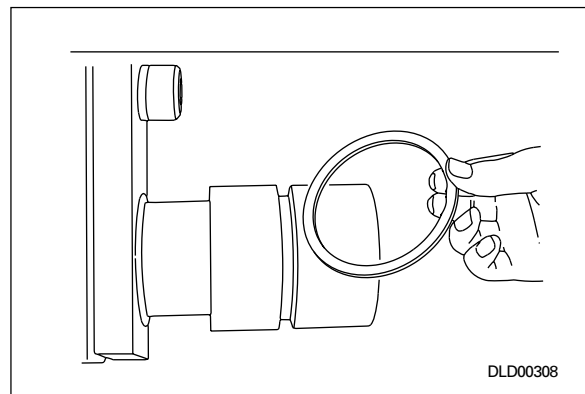
8) Adjust the relief pressure of the link press to make sure that the pushing force of the press does not exceed the specified value.

★ If the pushing force is too strong, excessive force will be brought to bear on the spacer, and it will be pushed against the bushing. This will cause the spacer to break or will cause abnormal wear between the spacer and bushing end face.

★ If the interference at the press-fitting portion is different from when the part is new, as when reusing a pin or bushing, measure several of the press-fitting portions, and use the table below to determine the set pushing force according to the average interference.

★ Pushing force for pin, bushing:
588 kN {60 ton}

Pushing force ≒
1.8 x average press-fitting force
(Adjust the relief pressure of the link press and set the pushing force.)



6) Feed the master link portion, then set the pin and bushing in position.

- ★ When reusing the pin, assemble so that the side hole is on the link tread side in the same way as when the part is new. If the parts are not assembled facing the specified direction, the strength may drop, so mark the direction of the side hole clearly on the end face to prevent any mistake during assembly.

- ★ If the outside diameter of the pin is worn, assemble so that the face that is not worn is on the pulling side. However, in this case also assemble so that the side hole faces the tread surface of the link.

7) Set the left and right links in position, then operate the left and right pushing jigs to press fit the pin and bushing at the same time.

- ★ The seal may come off the link due to the play when press fitting, so press fit smoothly. If the seal comes off the link, stop the press-fitting operation and fit the seal correctly on the link, then start the press-fitting operation again.

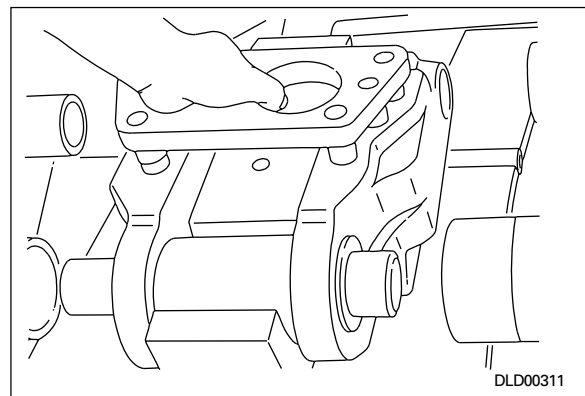
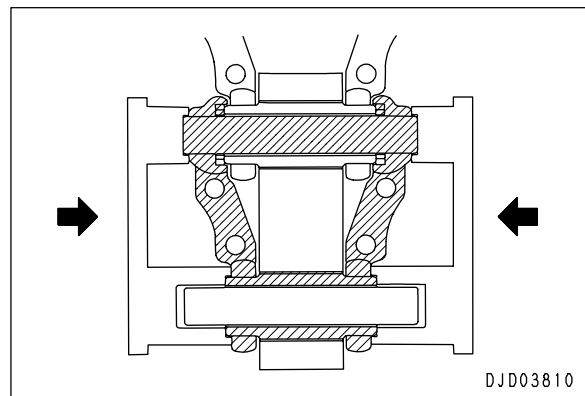
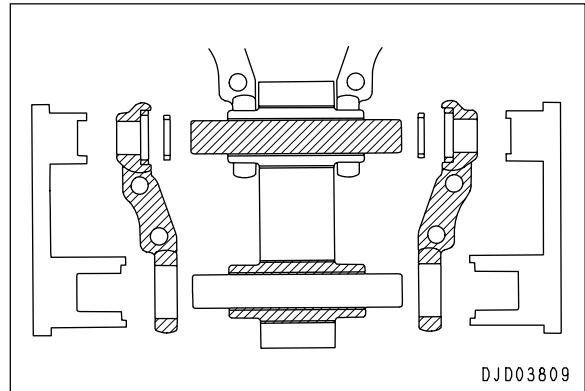
- ★ Pushing force for pin, bushing:
588 kN {60 ton}

Pushing force ≒
1.8 x average press-fitting force
(Adjust the relief pressure of the link press and set the pushing force.)

8) Using a shoe bolt hole pitch gauge, measure the distance between the shoe bolt holes and stop press fitting when it is within the standard value.


9) Assemble the pin end master link as the final link.

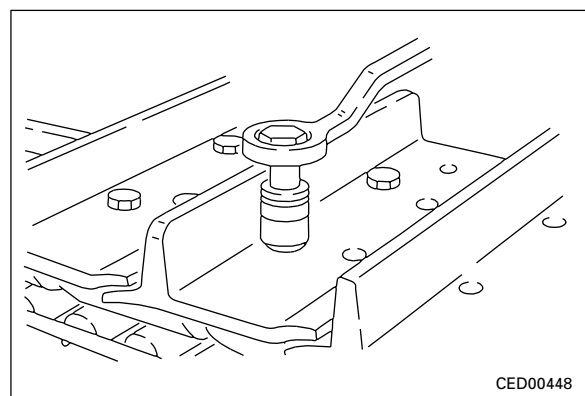
- ★ Check that the left and right master links are press fitted in parallel.



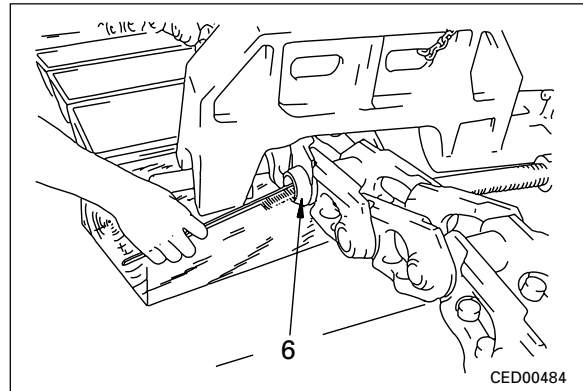
3. Shoe (regular link portion)

Set the link assembly on the bed, then use a shoe bolt impact wrench and torque wrench to install the shoe.

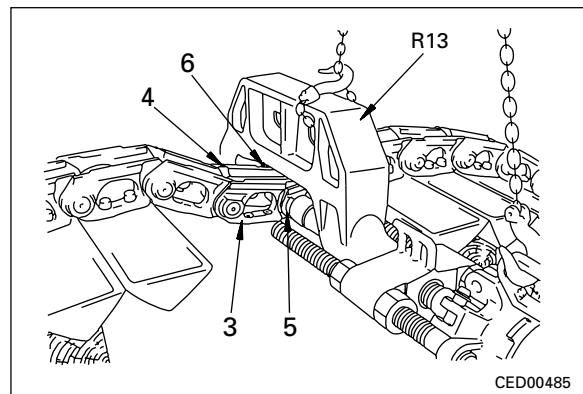
 Shoe bolt (regular link):
Initial torque:
196 ± 19.6 Nm {20 ± 2 kgm}
Tightening angle: **120° ± 10°**



- 7) Coat press-fitting hole for pin in link (6) with gasket sealant (198-32-19890), then continue to press fit pin (2).



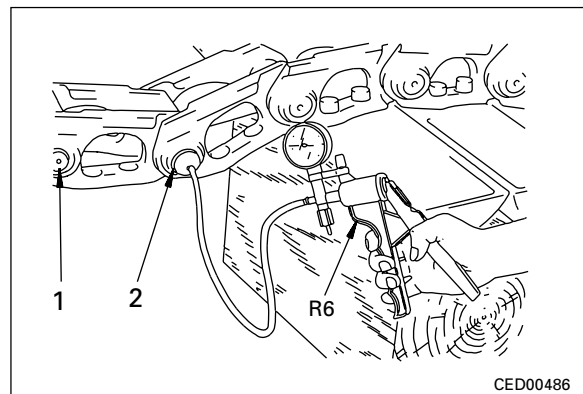
- 8) Using tool **R13**, apply specified pushing pressure to links (3) and (4) and links (5) and (6).
 ★ Pushing pressure of pin, bushing: 588 kN (60 ton)
 (Adjust the link press relief pressure and set the pushing pressure.)



8. Vacuum test

Using tool **R6**, remove air from small plug hole at end face of pins (1) and (2) and check sealing performance.

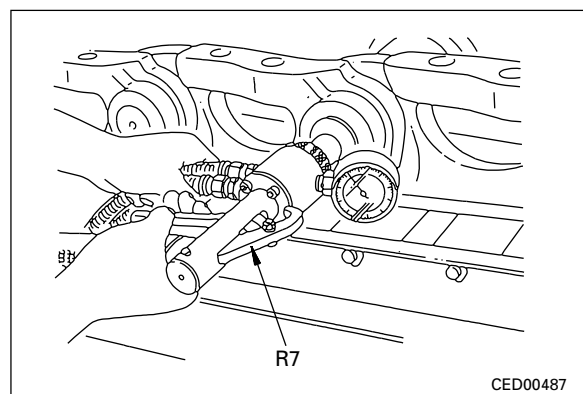
- ★ Check that the airtightness is maintained for 5 seconds at a negative pressure of 92.7 ± 2 kPa {695 \pm 15 mmHg}.



9. Charging with oil

1) Using tool **R7**, charge with oil (GO90) through small plug hole in pin.

- ★ Be careful not to raise the pressure too high when charging with oil. This will have an adverse effect on the seal.
 ★ The oil will expand under heat, so be careful not to charge with too much oil.



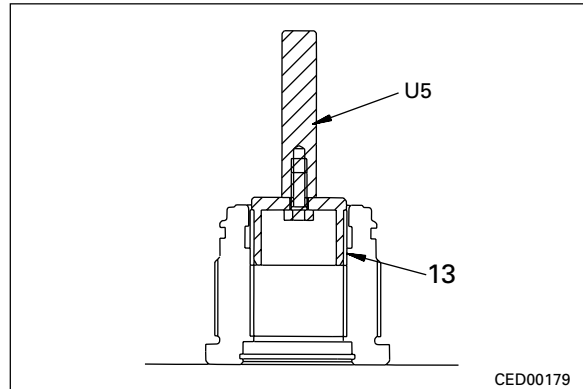
ASSEMBLY OF HYDRAULIC CYLINDER ASSEMBLY

- ★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing. Be careful not to damage the rod packings, dust seals, or O-rings when assembling.

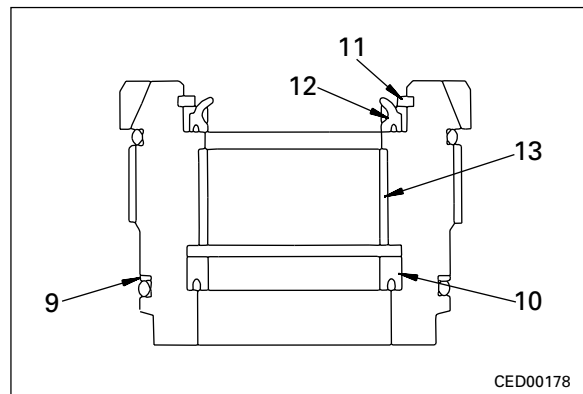
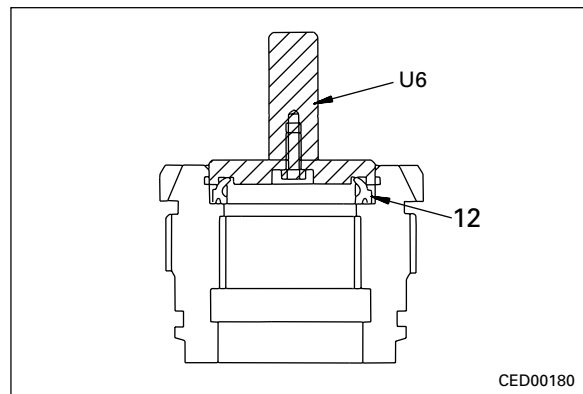
1. Piston rod assembly

1) Assembly of head assembly

- i) Using tool **U5**, press fit bushing (13).

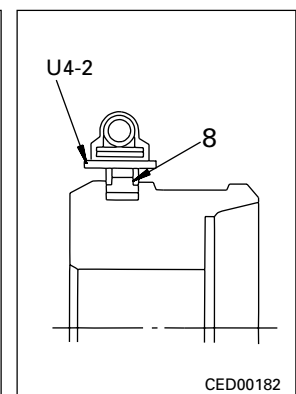
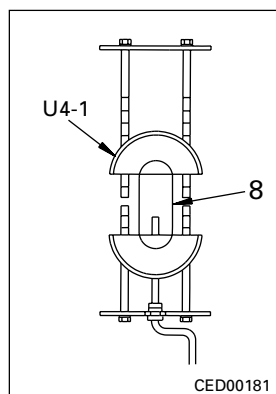


- ii) Using tool **U6**, assemble dust seal (12), and install snap ring (11).
- iii) Install packing (10).
- iv) Install backup ring (9) and O-ring.
 - ★ Do not try to force the backup ring into position. Warm it in warm water (50 – 60°C) before fitting it.



2) Assembly of piston assembly

- i) Set piston ring (8) on tool **U4-1** and turn handle 8 – 10 times to expand ring.
- ii) Remove piston ring (8) from tool **U4-1**, and install to piston (5).
- iii) Using tool **U4-2**, compress piston ring (8).



REMOVAL OF HYDRAULIC TANK ASSEMBLY

⚠ Lower the work equipment to the ground and stop the engine. Release the remaining pressure in the circuit. For details, see TESTING AND ADJUSTING, RELEASING REMAINING PRESSURE IN HYDRAULIC CIRCUIT. Then loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.

1. Drain oil from hydraulic tank.

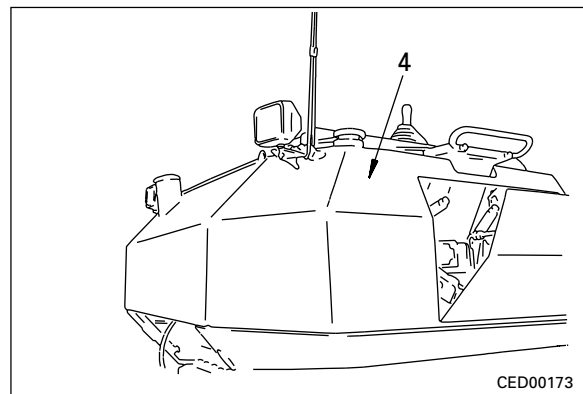
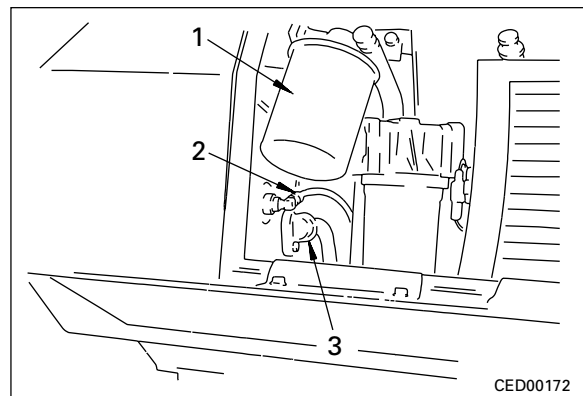


Hydraulic tank: **44 ℓ**

2. Open air conditioner condenser cover.
3. Disconnect filter assembly (1) from tank.
 - ★ Remove with the drain hose still installed, and put it down.
4. Disconnect return hose (2).
5. Disconnect suction tube (3).
6. Lift off hydraulic tank assembly (4).



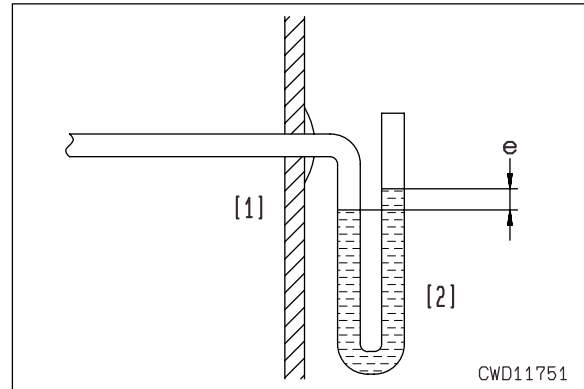
Hydraulic tank assembly: **42 kg**



INSTALLATION OF HYDRAULIC TANK ASSEMBLY

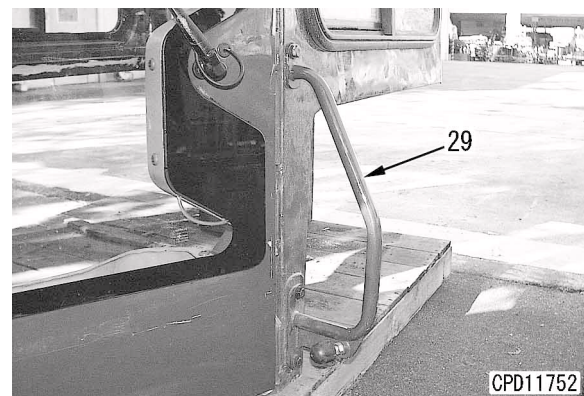
- Carry out installation in the reverse order to removal.
- **Refilling with oil (hydraulic tank)**
Add oil through the oil filler to the specified level.
 - ★ Run the engine to circulate the oil through the system. Then check the oil level again.
- **Bleeding air**
Bleed the air from the piping.
For details, see TESTING AND ADJUSTING, Bleeding air from hydraulic cylinder.

- 2) The internal pressure of the cab may be measured by the following simple method.
- i) Prepare a transparent vinyl hose.
 - ★ Outside diameter: 10 mm, Length: 3,000 mm
 - ii) Fill about a half of the hose with water.
 - iii) Remove the lock lever of the sliding glass on the side of the cab. Insert either end of the vinyl hose from outside and secure it to the top of the back seat with a tape.
 - iv) Seal the lock lever hole with tapes.
 - v) Set the water levels in the vinyl hose on the outside of the cab flash with each other.
 - vi) Run the engine at high idling and read water level difference (e).
 - ★ The air on [1] side is the internal air of the cab, which is "pressurized".
 - The air on [2] side is the atmosphere, which is at the "atmospheric pressure".

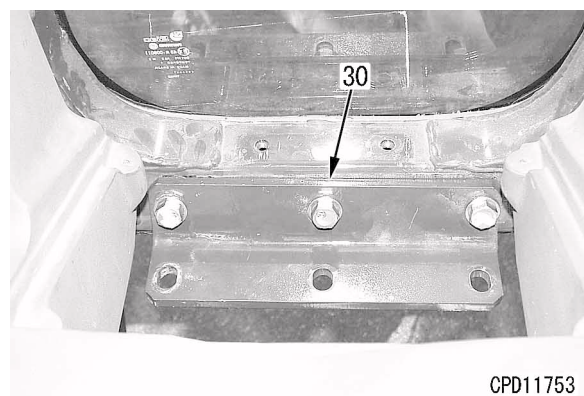


• **Parts to be installed to cab unit**

- 1) Install open lock hook stopper mounting grip (29).



- 2) Install cab mounting L-plate (30) to the cab temporarily.



5. Position the new window glass.

- 1) Using tool X1, set the window glass to the sticking position. Check the clearance between the window glass and the operator's cab on the right, left, upper, and lower sides, and then adjust it evenly.

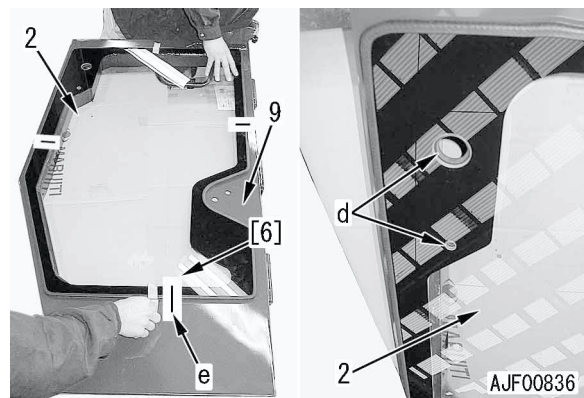
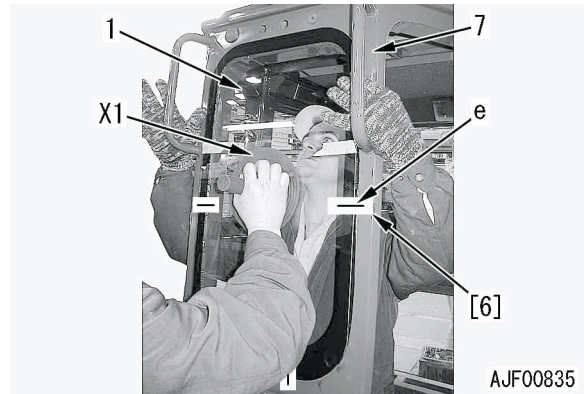
- ★ Position front window glass (1) from inside of operator's cab (7). Adjust it so that the difference between black coated part and the metal sheet of operator's cab (7) will be even on the right, left, upper, and lower sides.

- ★ When positioning each door window glass (2), align handle holes (d) of door (9) (on the glass side and door metal sheet side) first. Then, adjust the door window glass so that the positional relationship between it and door metal sheet will be even all around the window.


- 2) After positioning the glasses, stick tapes [6] between front window glass (1) and operator's cab (7) and the right, left, and lower parts of each door window glass (2) and each door (9), and then draw positioning line (e).

- 3) Cut the tapes between window glasses (1) and (2) and operator's cab (7) with a knife, and then remove the window glasses.

- ★ Do not remove the tapes left on the window glasses and operator's cab before installing the window glasses.



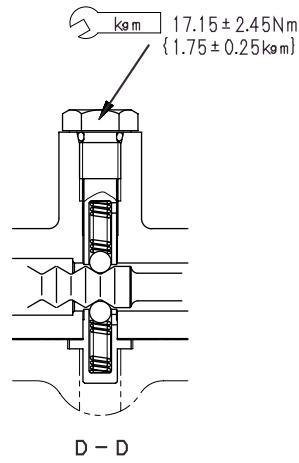
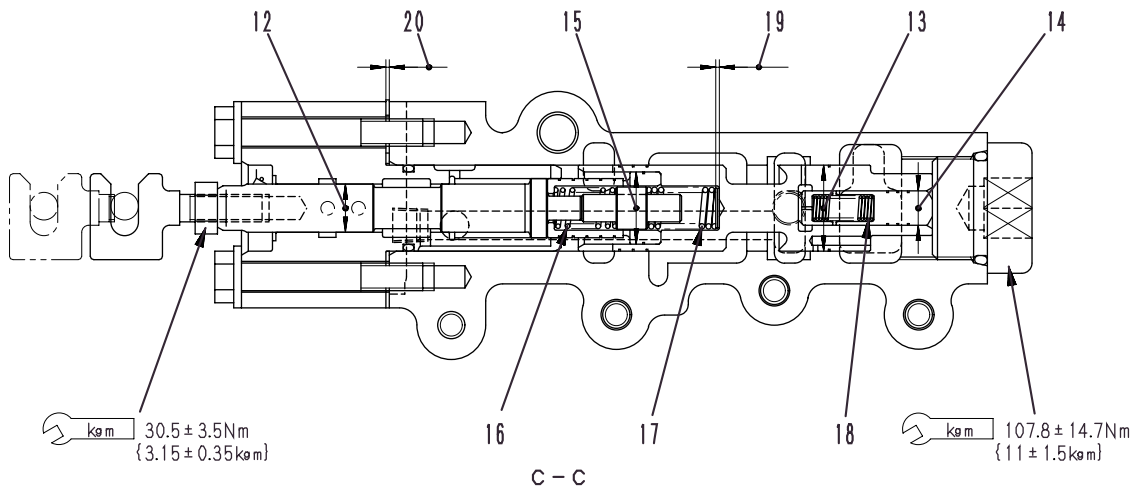
6. Apply adhesive.

 Adhesive:

Sikaflex 256HV manufactured by Sika Japan

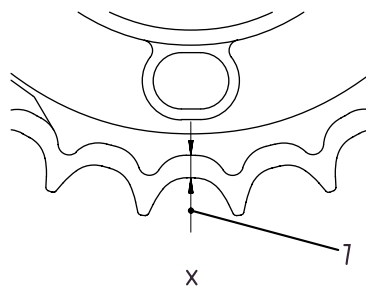
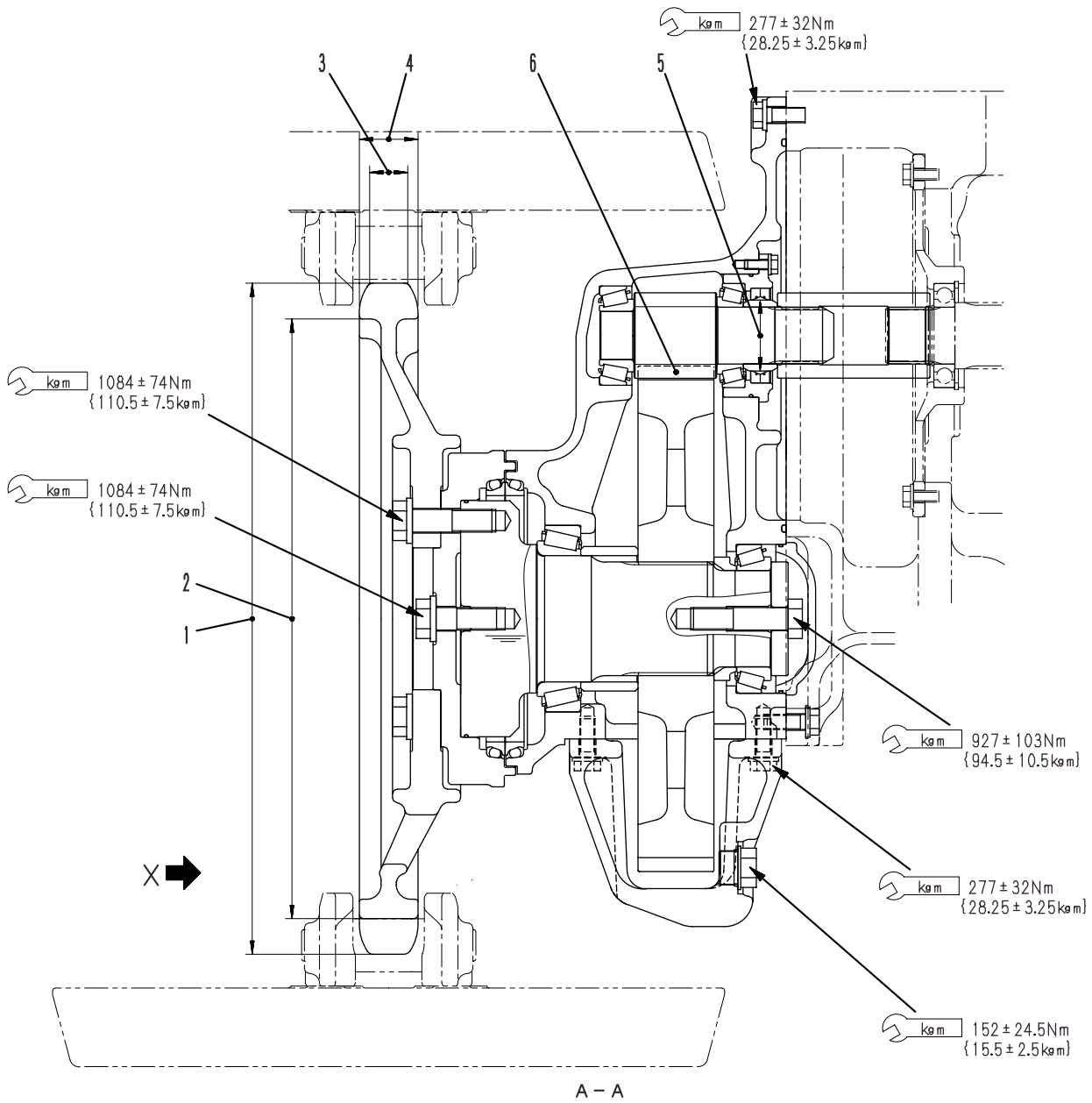
- ★ Do not use primer.
- ★ The using limit of the adhesive is 6 months after the date of manufacture. Do not use the adhesive after this limit.
- ★ Keep the adhesive in a dark place where the temperature is below 25°C.
- ★ Never heat the adhesive higher than 30°C.
- ★ When reusing the adhesive, remove the all hardened part from the nozzle tip.

(3/3)



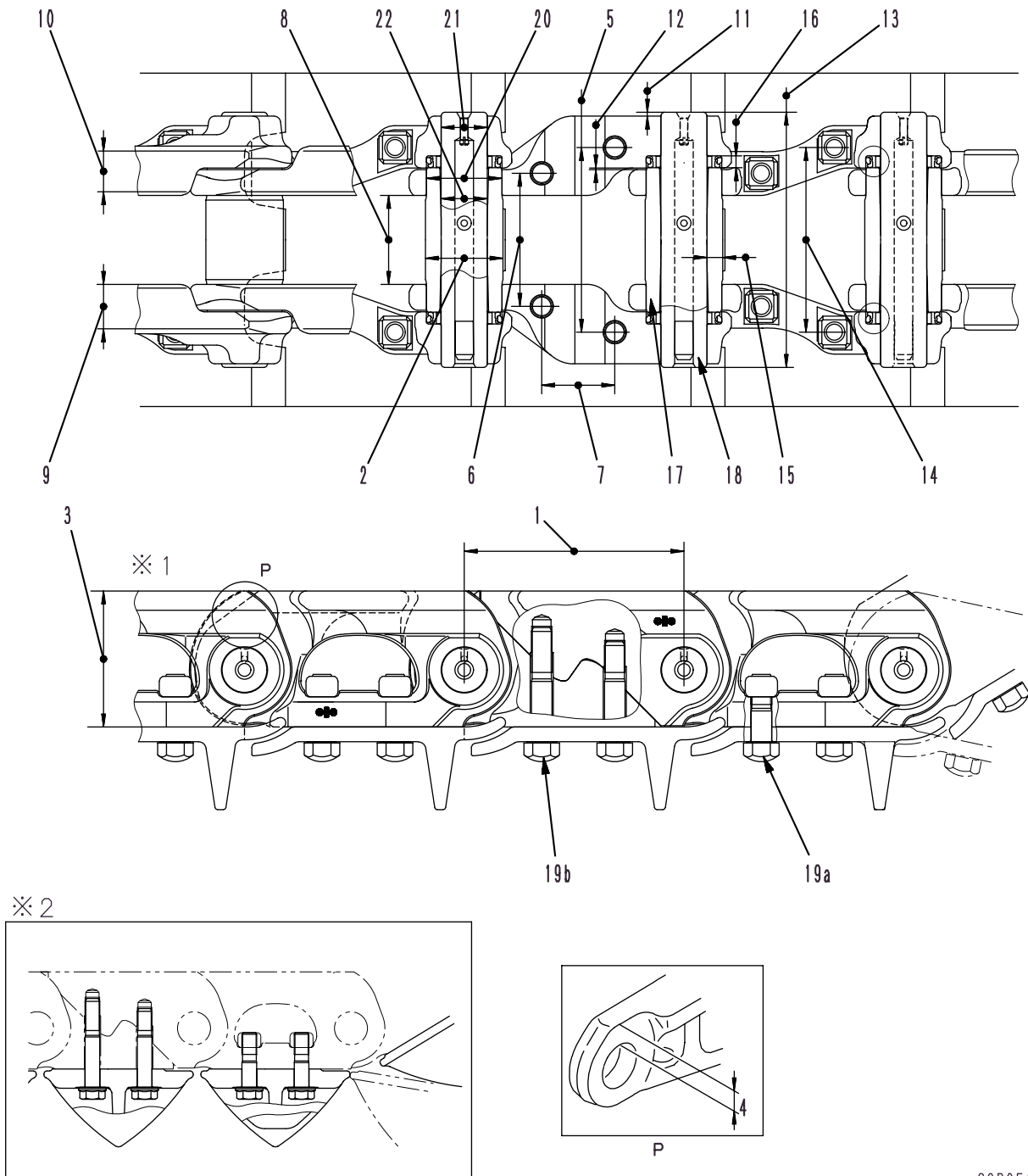
SAD02306

FINAL DRIVE



SAD02311

(2/2)



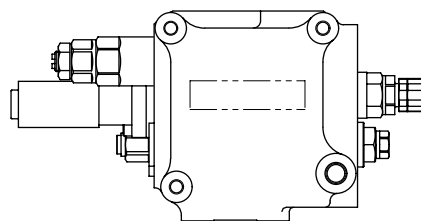
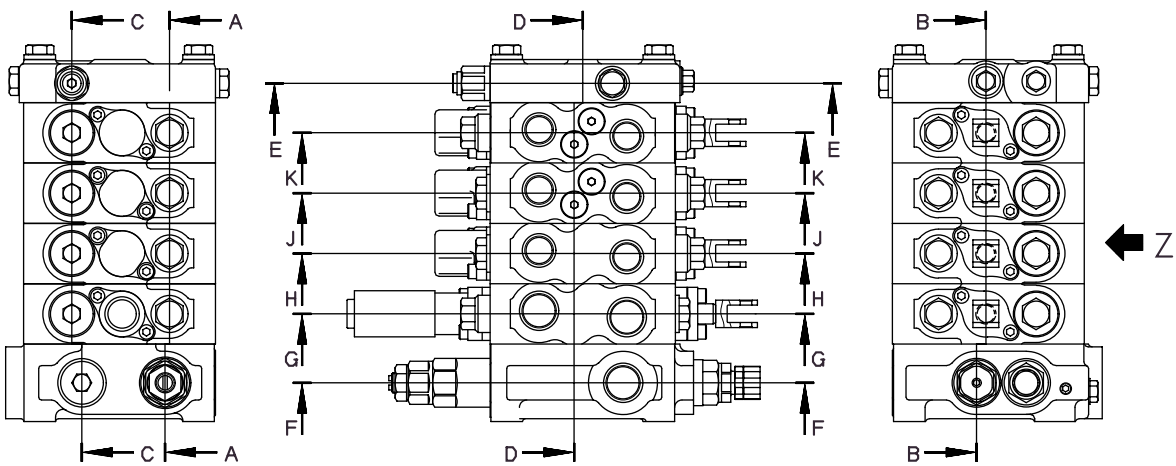
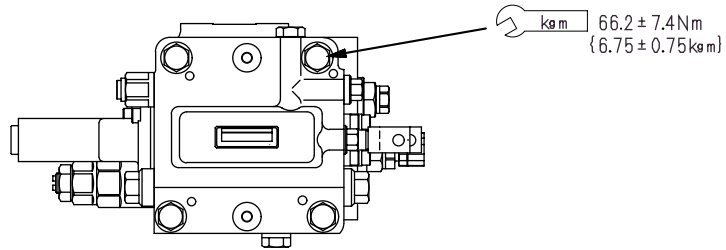
S2D05118

★ P portion shows the link of bushing press fitting end.

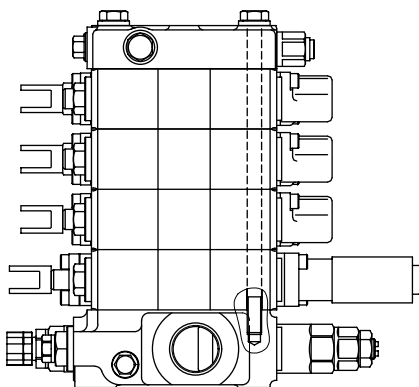
- ※1. Single shoe
- ※2. Swamp shoe (for D41P if equipped)

**4 SPOOL VALVE (BLADE LIFT, TILT, ANGLE, RIPPER)
D41E-6**

(1/5)



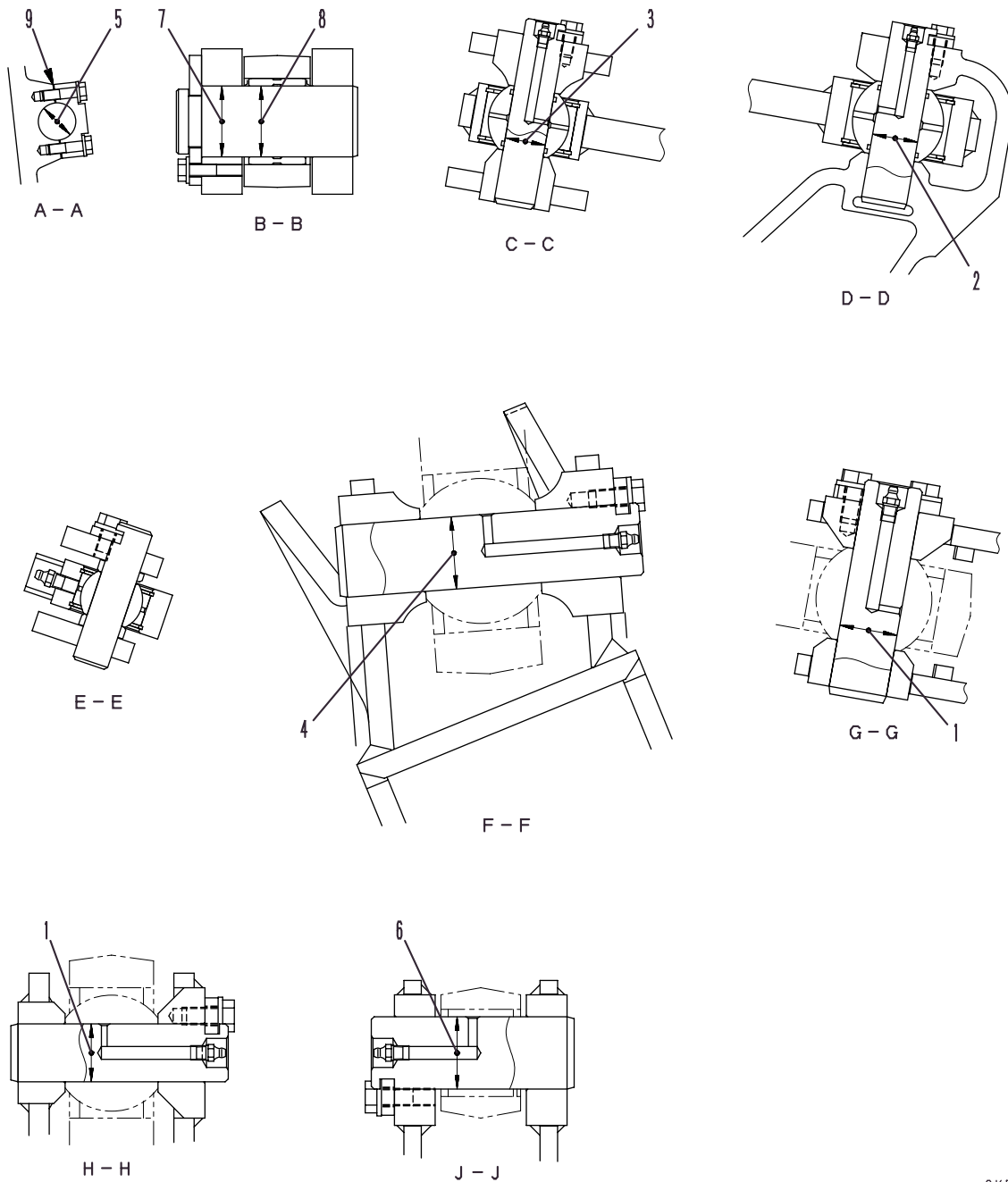
SAD02313



Z

WORK EQUIPMENT

POWER ANGLE TILTDOZER



SKD00917

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