

Shop Manual

HM400-1L

ARTICULATED DUMP TRUCK

SERIAL NUMBERS **HM400-1L A10001 and up**

ENGINE **6D140E-3**

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Nominal size of hose	Width across flats	Tightening torque (Nm {kgm})		Taper seal type	Face seal type	
		Range	Target	Thread size (mm)	Nominal thread size - Threads per inch, Thread series	Root diameter (mm) (Reference)
06	36	177 - 245 {18.0 - 25.0}	216 {22.0}	30	1 $\frac{3}{16}$ - 12UNF	30.3
(10)	41	177 - 245 {18.0 - 25.0}	216 {22.0}	33	–	–
(12)	46	197 - 294 {20.0 - 30.0}	245 {25.0}	36	–	–
(14)	55	246 - 343 {25.0 - 35.0}	294 {30.0}	42	–	–

WEIGHT TABLE

This weight table is a guide for use when transporting or handling components.

	kg	lb
HM400-1L Serial Numbers A10001 and up	30,350	66,910
Engine	1,470	3,241
Output shaft assembly	88	194
Cooling assembly	349	769
Fuel tank (individual part)	200	441
Torque converter assembly	282	662
Transmission assembly	1,324	2,919
Drive shaft assembly	295	650
Front axle assembly	2,131	4,698
Differential	428	944
Final drive	1,060	2,337
Center axle assembly	2,423	5,342
Differential	397	875
Final drive	1,047	2,308
Rear axle assembly	2,297	5,064
Differential	265	584
Final drive	1047	2,308
Front suspension cylinder	91.2	201
Rear suspension cylinder	78.2	172
Oscillation hitch assembly	851.1	1,876
Front frame	1,585	3,494
Rear frame	2,000	4,409
Cab (including platform, interior components)	652	1,437
Operator's seat	56.1	124
Steering cylinder (one side)	65.6	145
Hoist cylinder (one side) Rear frame	254	560
Flow amp valve	29	64
Hoist valve	63	139
Hydraulic tank	240	529
Hydraulic pump (SBL(1)21)	2.6	6
Hydraulic pump (SAR(3)80+(1)25)	19.4	43
Hydraulic pump (SAR(3)100)	13	29
Hydraulic pump (SAR(3)100+100+(1)8)	35.8	79
Hydraulic pump (SAR(3)100+(1)12+8)	23.9	53
Hydraulic pump (SBR(1)8+8)	4.7	10
Hydraulic motor	1.9	4
Body assembly	4,232	9,330

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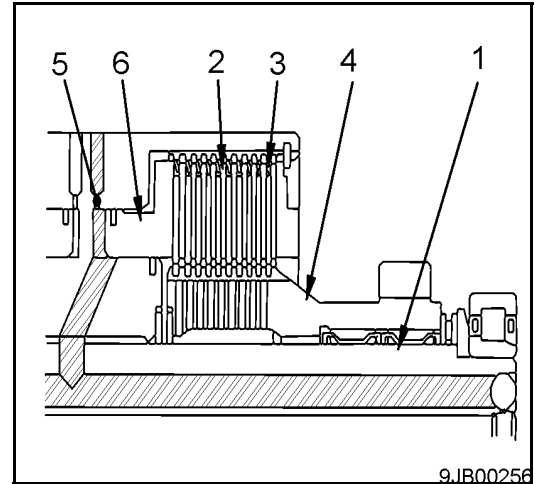
Unit: mm

No.	Check item		Criteria			Remedy
			Standard size	Tolerance	Repair limit	
1	Outside diameter of coupling and oil seal sliding portion		o 95	0 -0.087	o 94.8	Replace
			o 35	+0.025 0	o 35.5	
2	Inside diameter of seal ring sliding portion of input shaft sliding portion		o 420	+0.097 0	o 420.5	
3	Inside diameter of seal ring sliding portion of clutch housing		o 295	+0.081 0	o 295.1	
4	Inside diameter of seal ring sliding portion of pump housing		o 135	+0.040 0	o 135.5	
5	Inside diameter of seal ring sliding portion of input shaft		o 70	+0.030 0	o 70.5	
7	Wear of clutch housing seal ring	Width	5	-0.01 -0.04	4.5	
		Thickness	7	0 0.15	6.85	
8	Wear of stator shaft seal ring	Width	3.95	0 -0.1	3.55	
		Thickness	5.5	0 0.1	4.95	
9	Inside diameter of outer race one-way clutch transmission surface		o 127.844	0 0.013	o 127.874	
10	Outside diameter of inner race one-way clutch transmission surface		o 108.883	0 0.013	o 108.853	
11	Inside diameter of sliding portion of bushing		o 109	+0.015 0	o 109.08	
12	Thickness of sliding portion bushing		5	0 -0.1	4.5	
13	Thickness of clutch disc		5.4	0 0.1	4.8	
14	Backlash between input shaft and PTO gear		0.17 – 0.45			

CLUTCH OPERATIONS

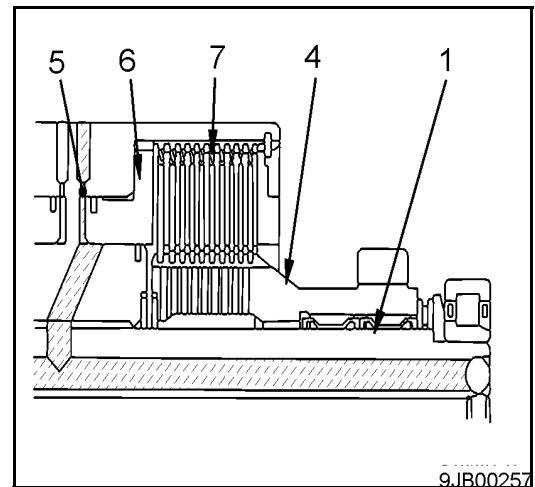
Clutch engaged (fixed)

- The oil sent from the transmission valve passes through the oil passage inside shaft (1), reaches the back face of piston (6) and acts on piston (6).
- When piston (6) is actuated, separator plate (2) and friction plate (3) are pressed together, shaft (1) and clutch gear (4) form one unit, and the power is transmitted.
- When this happens, the oil is drained from oil drain hole (5), but the drain amount is less than the amount of oil supplied, so there is no influence on the actuation of the clutch.
- ★ Oil drain hole (5) forms part of the structure of only the 2nd, 3rd, and differential lock clutches.



Clutch disengaged (free)

- The oil sent from the transmission valve is shut off, so the pressure of the oil acting on the back face of piston (6) goes down.
- Piston (6) is returned to its original position by wave spring (7), and shaft (1) and clutch gear (4) are separated.
- When the clutch is disengaged, centrifugal force is used to drain the oil at the back face of the piston through oil drain hole (5). This acts to prevent the clutch from being partially applied.



ECMV SPEED CLUTCH

ECMV OUTLINE

The ECMV (Electronic Control Modulation Valve) consists of two components: the pressure control valve and the fill switch.

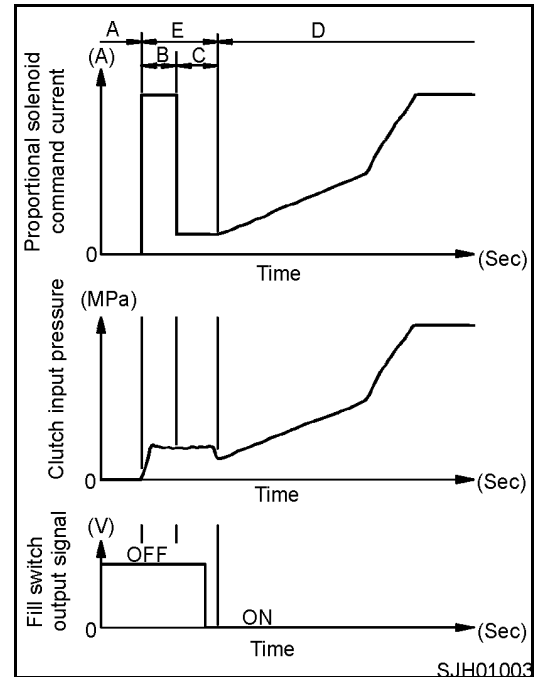
Pressure control valve

The proportional solenoid receives the flow of electricity sent from the transmission controller, and the pressure control valve converts this into hydraulic pressure.

Fill switch

This detects when oil has filled the clutch. It has the following functions.

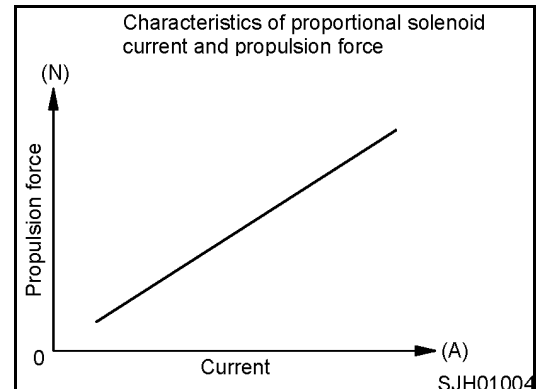
1. When the clutch is filled with oil, it sends a signal (fill signal) to the controller to inform the controller that the filling is completed.
2. While oil pressure is applied to the clutch, it outputs a signal (fill signal) to the controller to inform the controller of the existence of the oil pressure.
 - A range: Before gear shifting (drained)
 - B range: Filling starts (trigger issued)
 - C range: Filling completed
 - D range: Regulation
 - E range: Filling



ECMV AND PROPORTIONAL SOLENOID

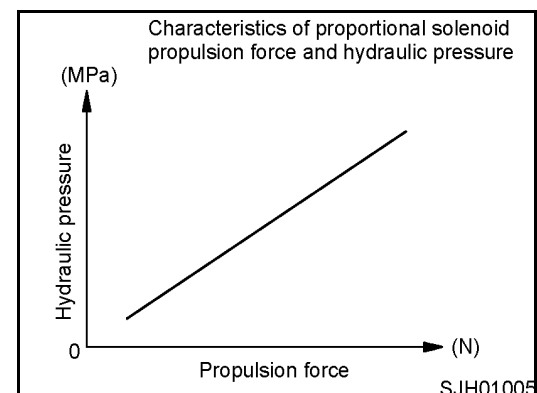
There is one proportional solenoid installed to each ECMV. It generates propulsion as shown in the diagram at the right according to the command current from the controller.

The propulsion generated by the proportional solenoid acts on the pressure control valve spool and generates oil pressure as shown in the diagram below. In this way, the command current is controlled and the propulsion force varies to actuate the pressure control valve and control the oil flow and oil pressure.

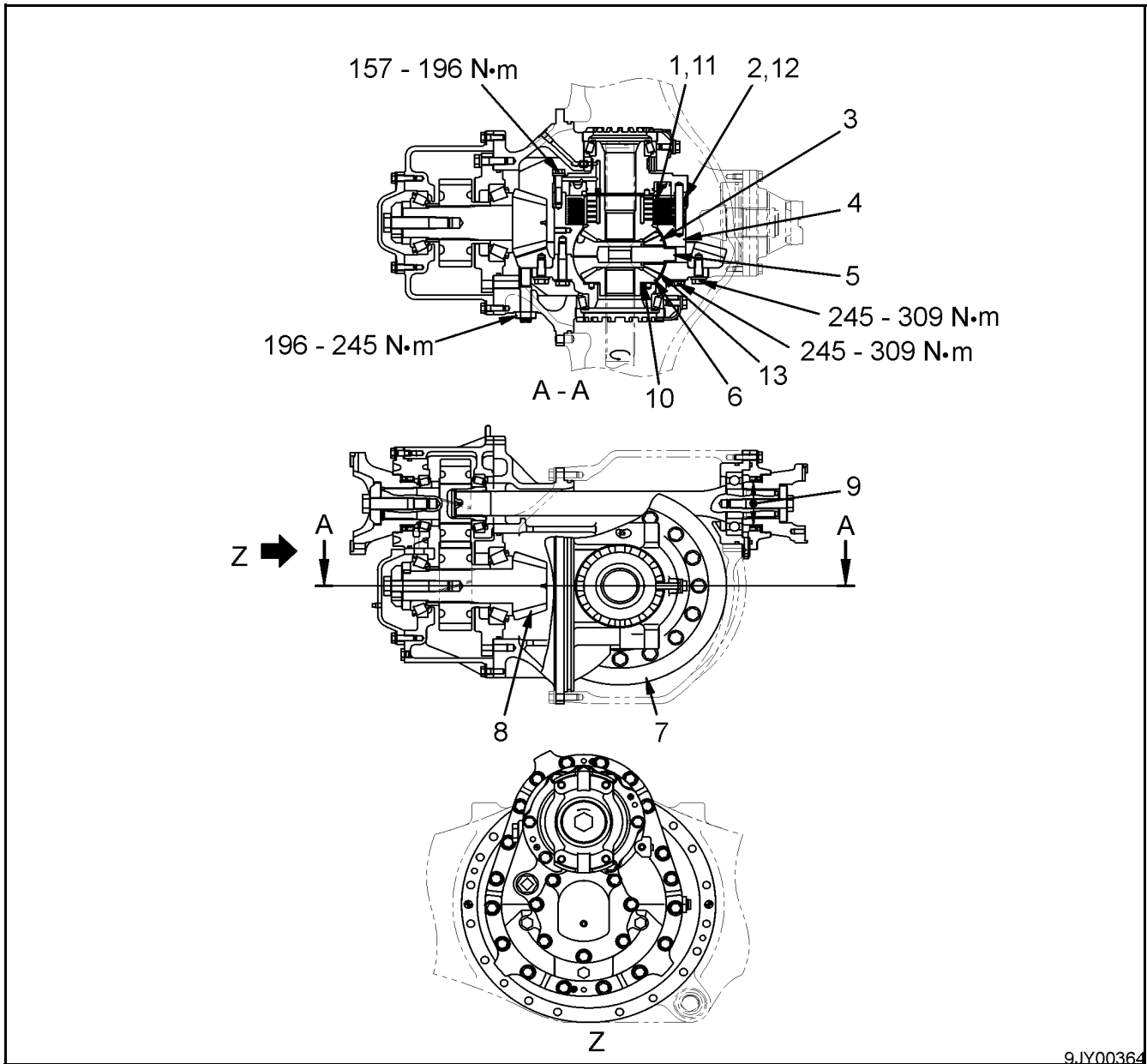


ECMV AND FILL SWITCH

There is one fill switch installed to each ECMV. When the filling of the clutch is completed, the fill switch is turned on by the clutch pressure. With this signal, the oil pressure starts to build up.



CENTER



9.IY00364

- | | |
|-----------------------------------|------------------------------------|
| 1. Disc | 5. Shaft |
| 2. Plate | 6. Side gear (no. of teeth: 24) |
| 3. Pinion gear (no. of teeth: 14) | 7. Bevel gear (no. of teeth: 41) |
| 4. Differential case | 8. Bevel pinion (no. of teeth: 12) |

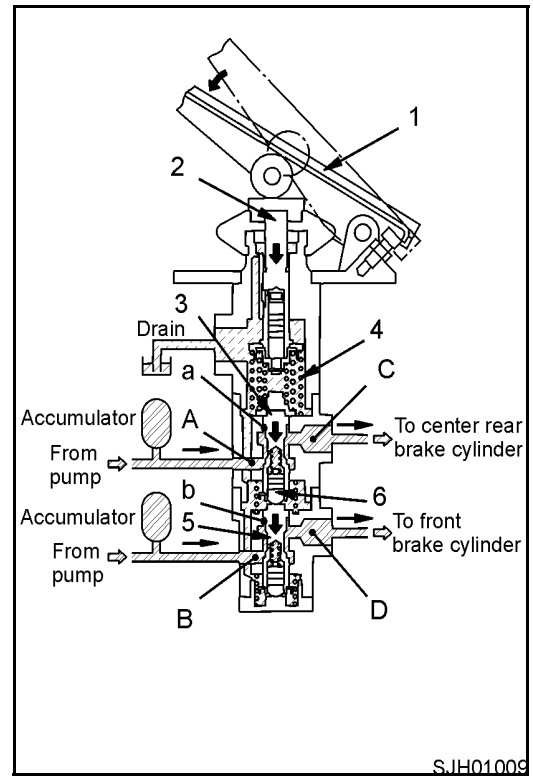
OPERATION

UPPER PORTION

- When brake pedal (1) is depressed, the operating force is transmitted to spool (3) through rod (2) and spring (4). When spool (3) goes down, drain port a is closed, and the oil from the pump and accumulator flows from port A to port C and actuates the center and rear brake cylinders.

LOWER PORTION

- When brake pedal (1) is depressed, the operating force is transmitted to spool (3) through rod (2) and spring (4). When spool (3) goes down, spool (5) is also pushed down by plunger (6). When this happens, drain port b is closed, and the oil from the pump and accumulator flows from port B to port D and actuates the front brake cylinders.



APPLYING BRAKE WHEN UPPER VALVE FAILS

Even if there is oil leakage in the upper piping, spool (5) is moved down mechanically when pedal (1) is depressed, and the lower portion is actuated normally. The upper brake is not actuated.

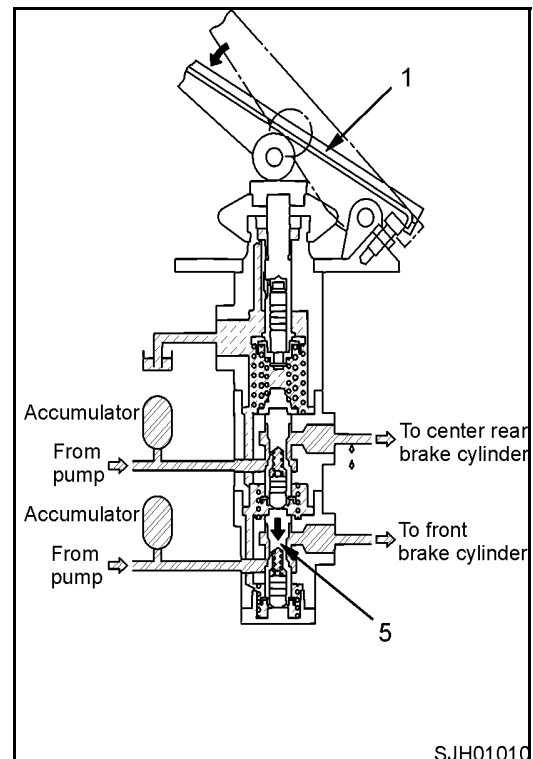
APPLYING BRAKE WHEN LOWER VALVE FAILS

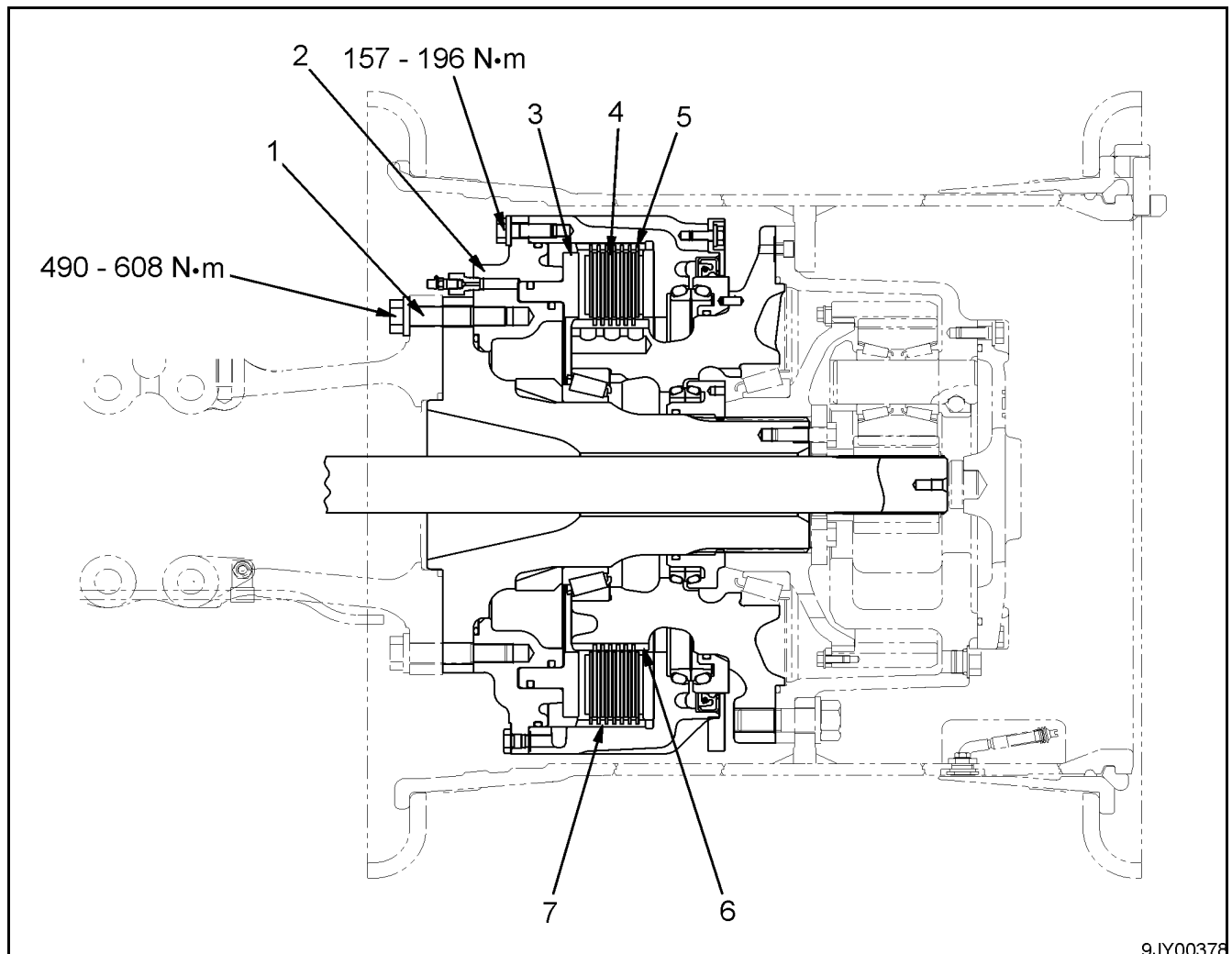
Even if there is oil leakage in the lower piping, the upper portion is actuated normally.

WHEN ACTUATION IS BALANCED

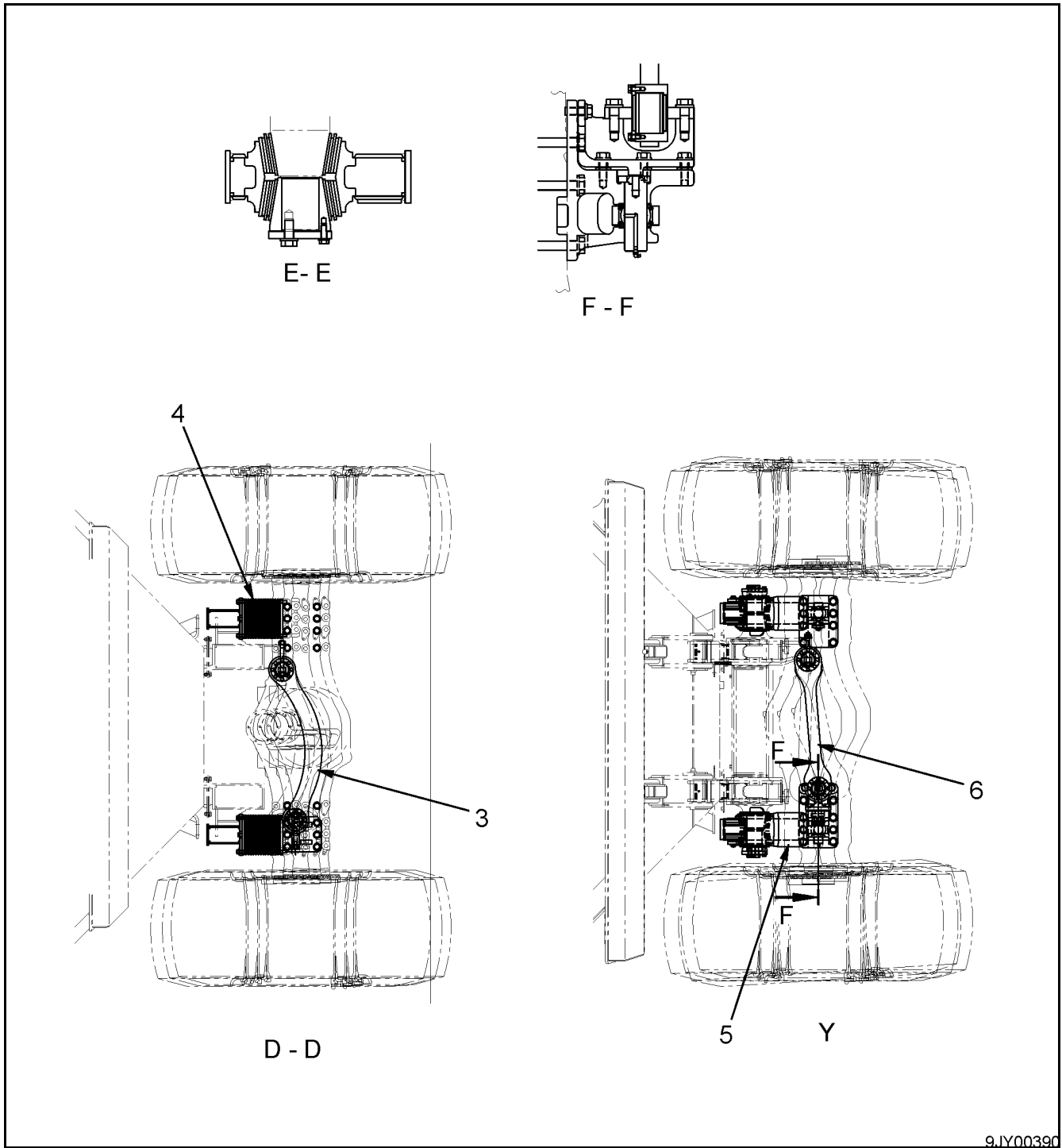
Upper portion

- When oil fills the center and rear brake cylinders and the pressure between port A and port C becomes high, the oil entering port H from orifice e of spool (3) pushes against spring (4). It pushes up spool (3) and shuts off the circuit between port A and port C. When this happens, drain port a stays closed, so the oil entering the brake cylinder is held and the brake remains applied.



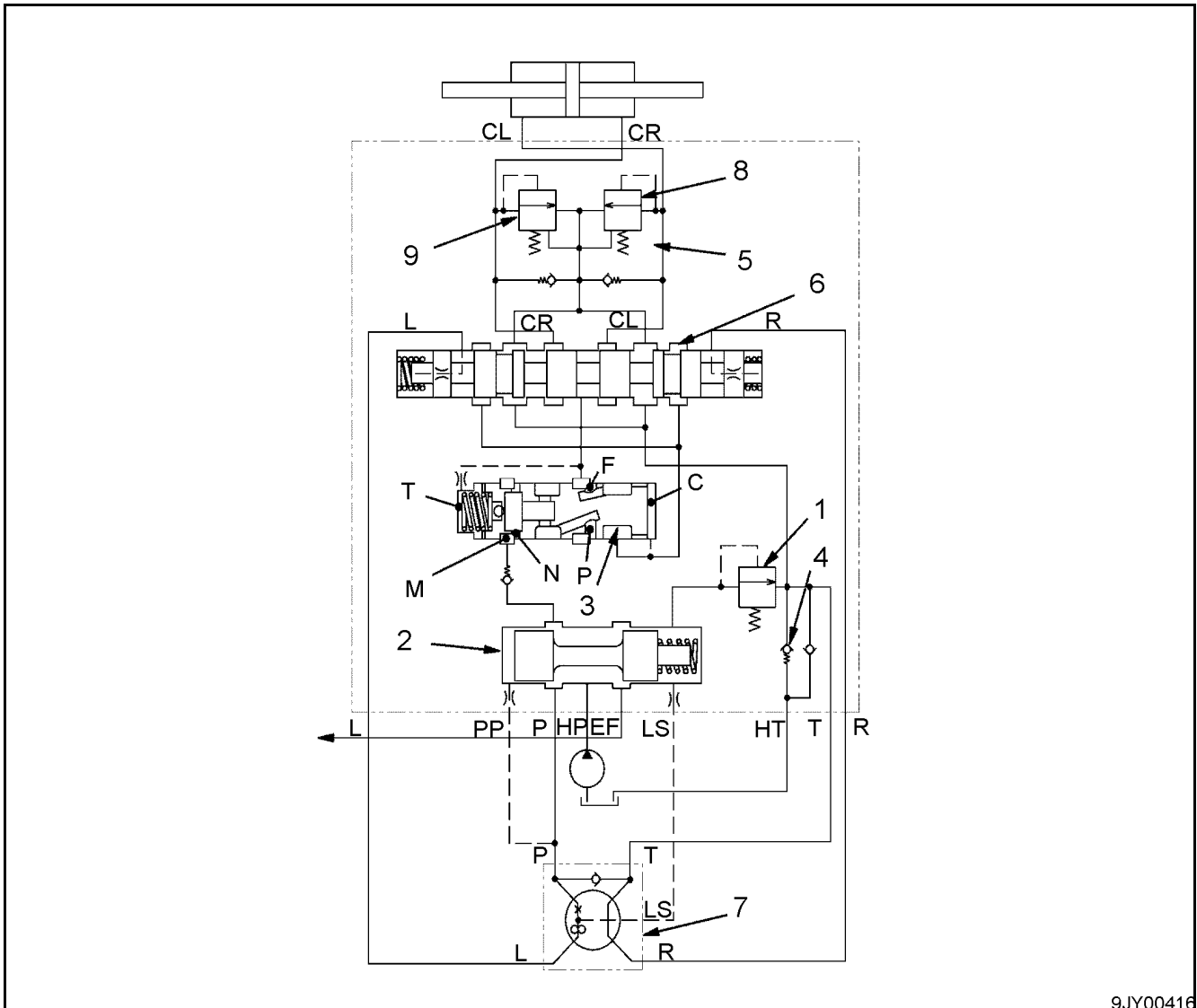


1. Stud pin
2. Cylinder
3. Brake piston
4. Disc
5. Plate
6. Hub gear (No. of teeth: 112)
7. Outer gear (No. of teeth: 164)



9.IY00390

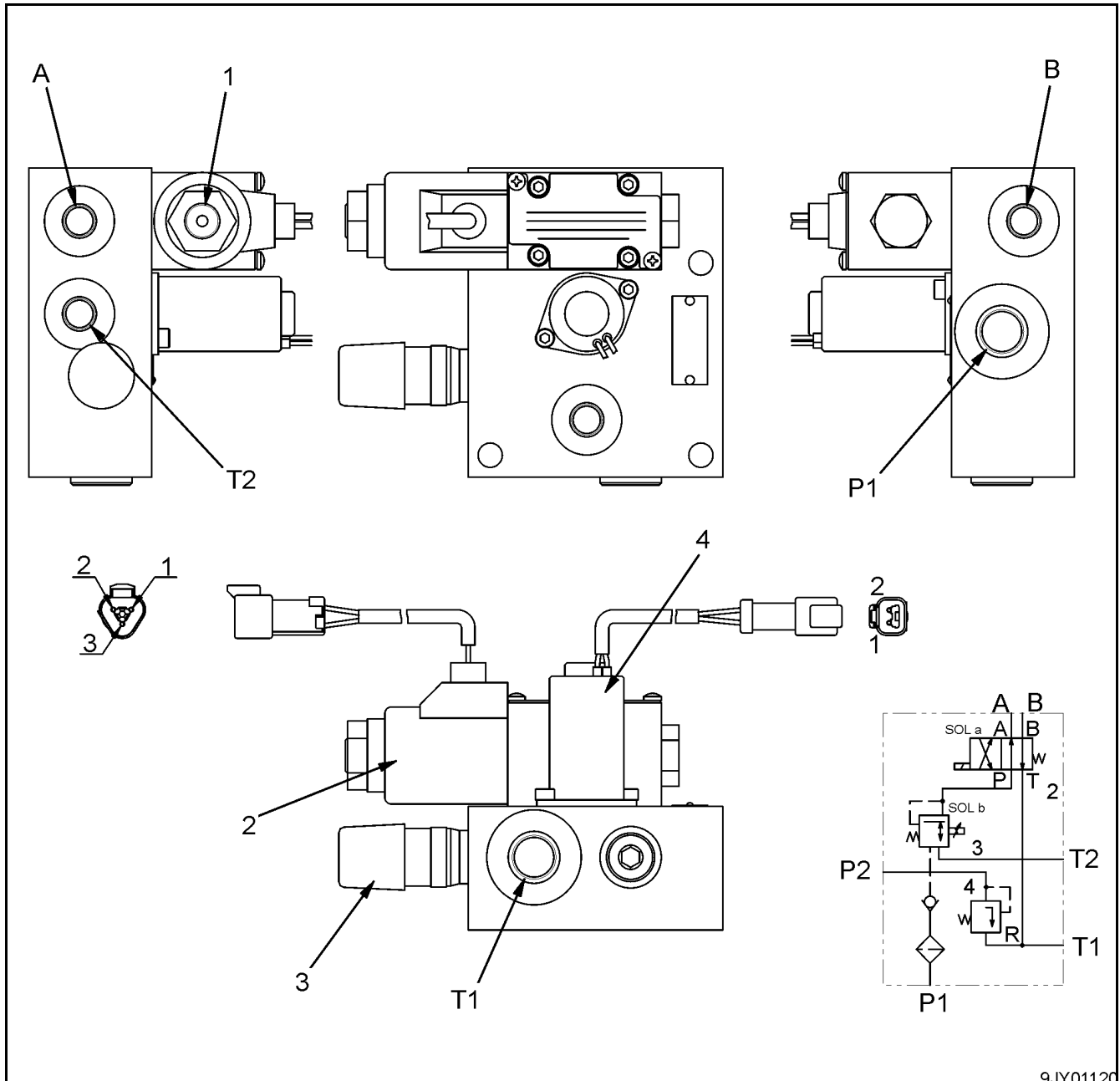
1. Arm
2. Equalizer bar
3. Lateral rod (center)
4. Spring
5. Rear suspension
6. Lateral rod (rear)



2. When turning

- When steering unit (7) is actuated, the oil sent from port P of priority valve (2) passes through ports P and L of steering unit (7) and enters port L of directional valve (6). At the same time, oil from priority valve (2) also enters chamber M of pressure control valve (3).
- When the oil entering directional valve (6) rises to a pressure greater than the force of the spring, it pushes the spool to the right, and enters chamber C of pressure control valve (3). When it rises to a pressure greater than the force of the spring in chamber C, it pushes the spool to the left.
- The oil that is already in chamber M of pressure control valve (3) enters chamber N when the spool is pushed to the left by the action of steering unit (7). It then flows from port P, goes out from port CL of directional valve (6), and flows from suction valve (5) to the bottom end of the steering cylinder.
- The oil at the steering cylinder head end goes out from suction valve (5). It then goes from port CR of directional valve (6) through check valve (4) and is drained to the hydraulic tank from port HT of the flow amp valve.
- If there are rocks on the road or the road surface is uneven, and any abnormal external force is applied to the tires and steering cylinder, relief valves (8) and (9) of suction valve (5) open at a pressure of 23.5 Mpa {240 kg/cm²}, so the oil passes through directional valve (6) and is drained to the hydraulic tank.

EPC VALVE



9.IY01120

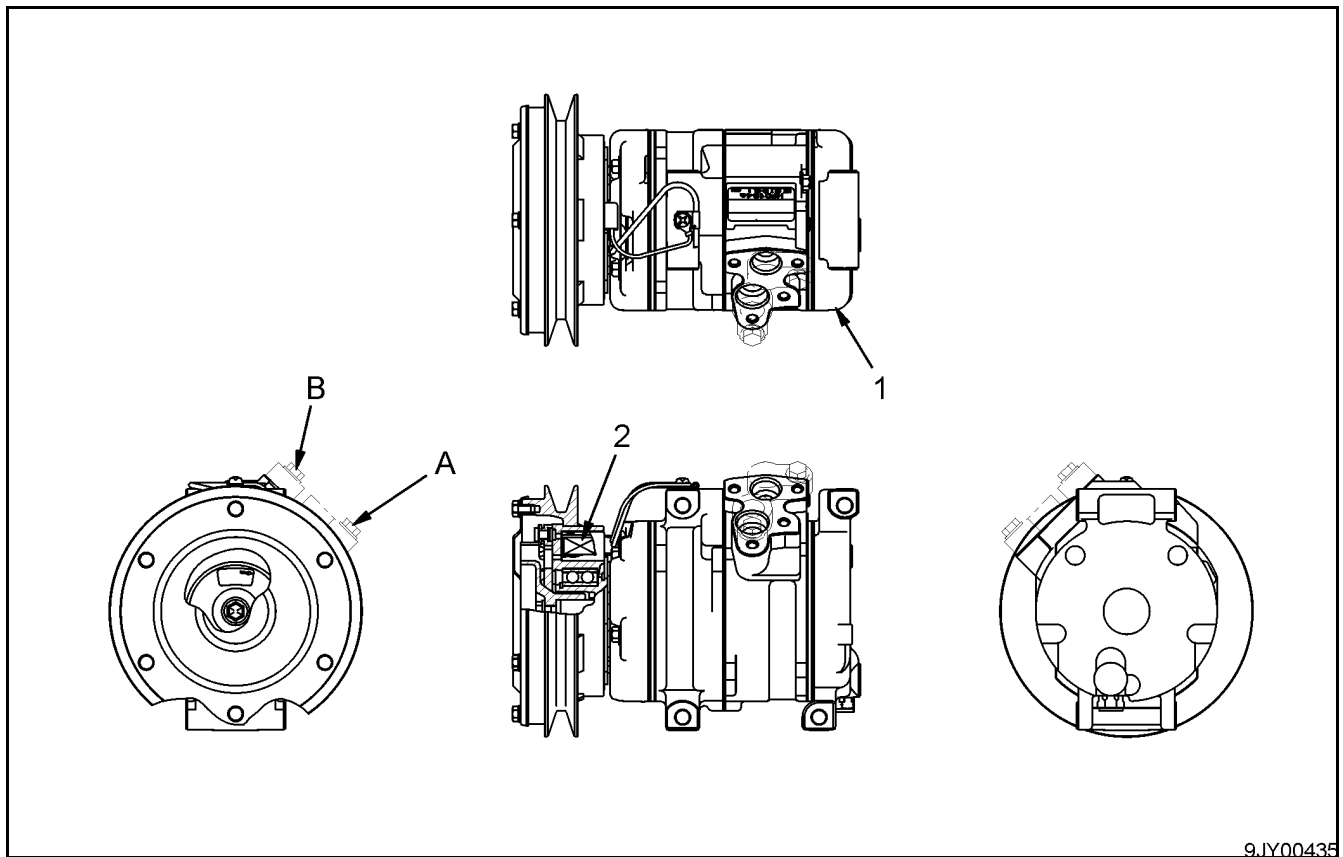
- 1. Manual operation button
- 2. Solenoid assembly
- 3. Relief valve
- 4. Solenoid assembly (EPC)

- A. To hoist valve
- B. To hoist valve
- P1. From hydraulic pump
- T1. To hydraulic tank
- T2. To hydraulic tank

FUNCTION

- With the EPC valve, the oil from the hydraulic pump is controlled by the retarder controller (brake controller: E-SPEC). It is then sent to the spool of the hoist valve, and switches the pilot pressure to control the hoist valve.

COMPRESSOR



9.Y00435

1. Case
 2. Clutch
-
- A. Suction service valve
 - B. Discharge service valve

3. Real-time monitor

This function is used when checking the input and output signals recognized by the controllers on the network. The real-time monitor display on the character display is as shown at the right.

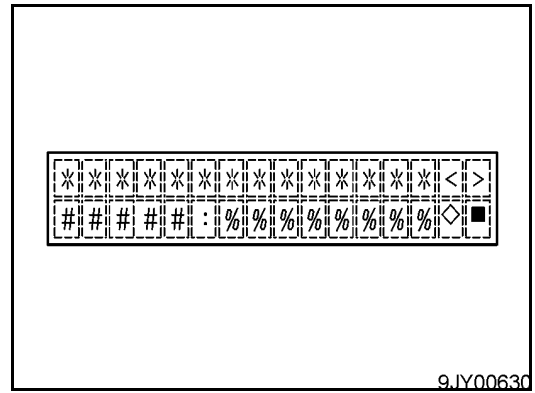
*** : Displays name of item

#####: Displays ID No. given to each item

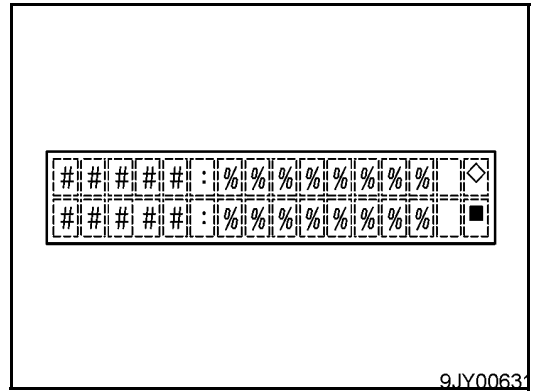
%%: Displays data. If units are used, the unit is displayed on the right side of the data. By specifying the ID No. given to each item, it is possible to display the desired two items at the same time.

*** : Displays specified ID No

%%: Displays data. If units are used, the unit is displayed on the right side of the data

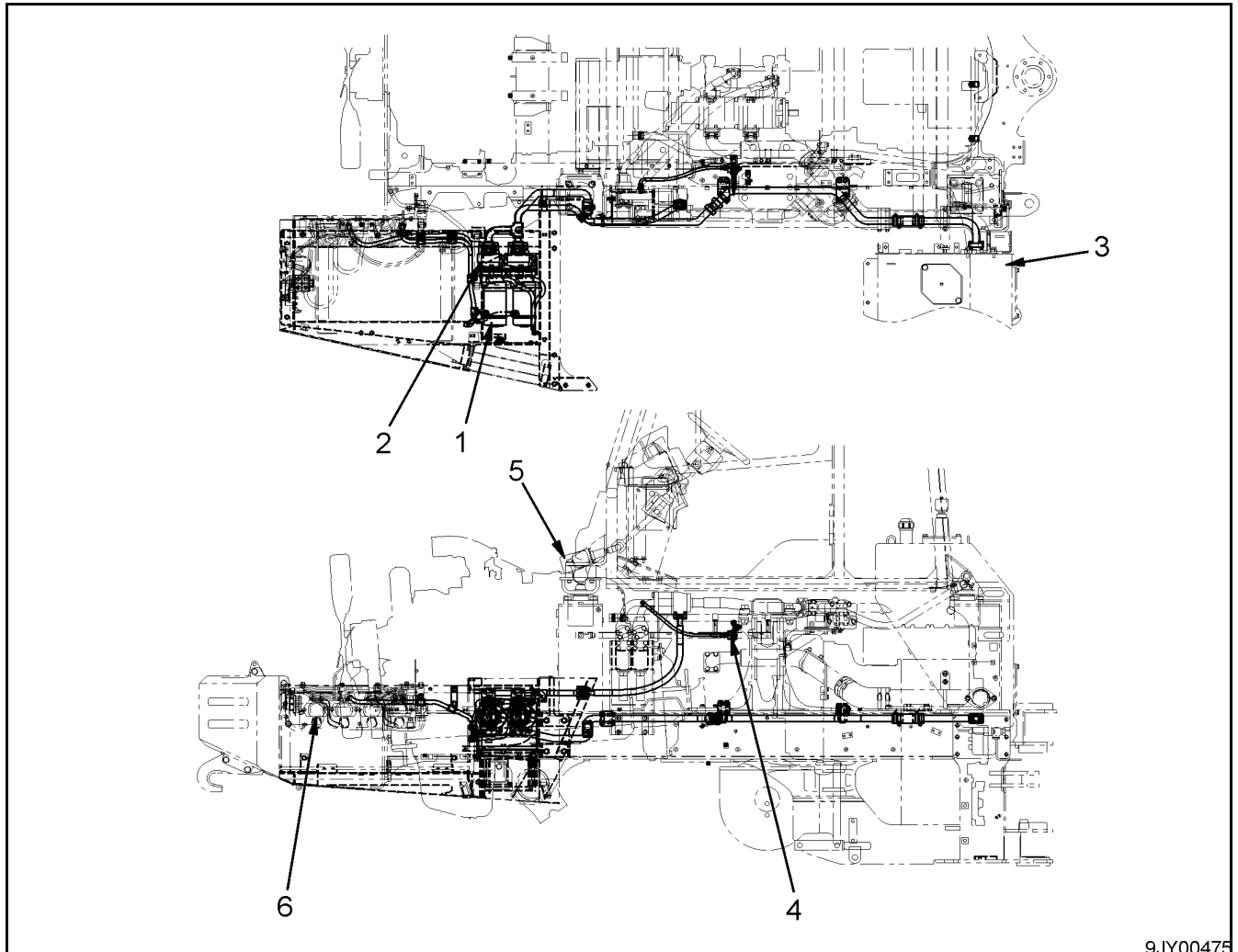


9.IY00630



9.IY00631

AUTO AUXILIARY STEERING SYSTEM



9JY00475

1. Auxiliary steering motor
2. Auxiliary steering pump
3. Hydraulic tank
4. Steering oil pressure sensor
5. Steering valve
6. Battery relay

OUTLINE

If the engine stops or a failure occurs in the hydraulic pump when the machine is traveling, and the oil in the steering circuit goes below the specified oil pressure, the auto auxiliary steering system automatically actuates the auxiliary steering pump to ensure the steering oil pressure and to make it possible to operate the steering. It is also possible to operate it manually.

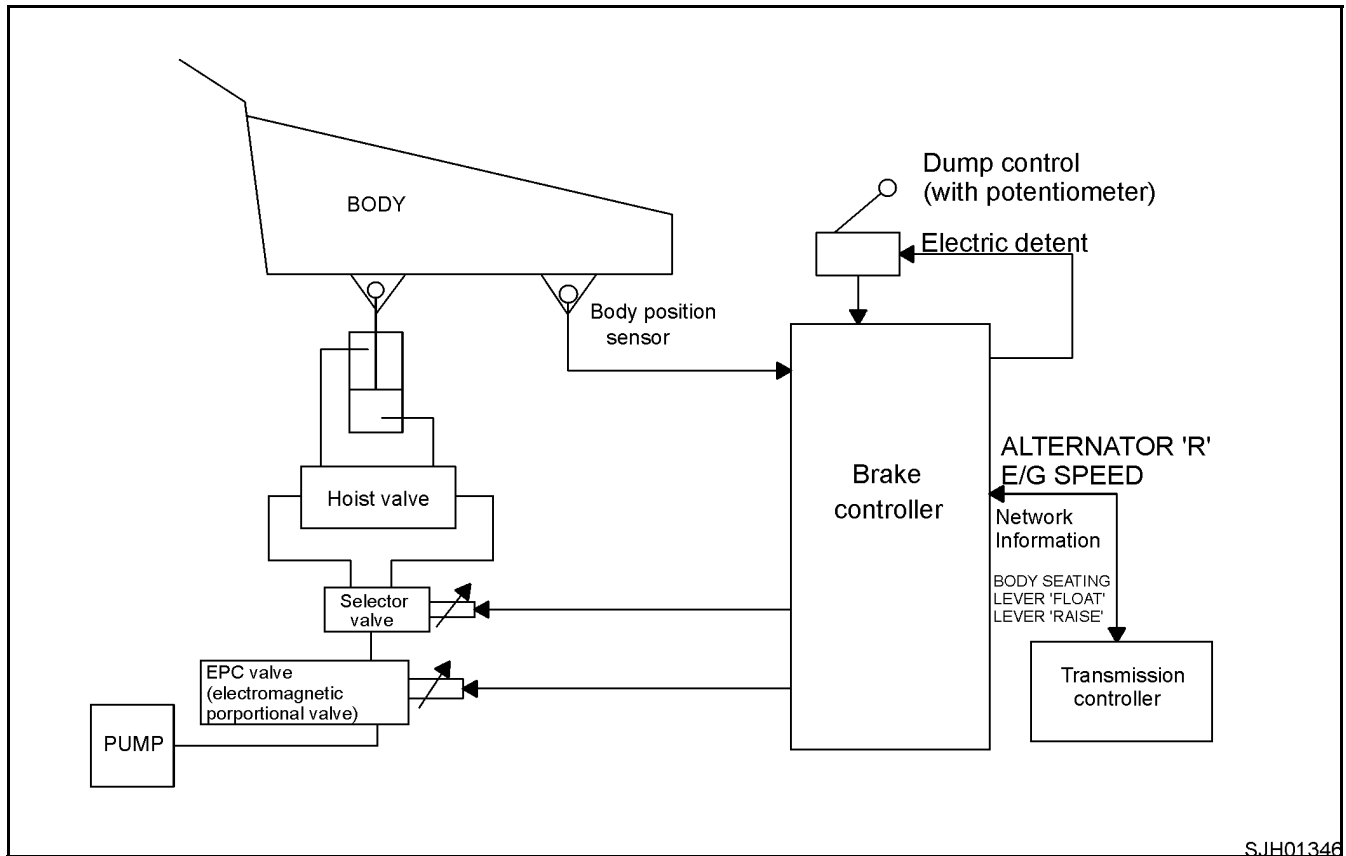
BRC4	
1	RS422 TX(+)
2	RS422 RX(+)
3	RS232 TXD
4	RS232C TXD
5	RS485 (+)
6	S-NET (+)
7	RS422 TX(-)
8	FLASH SW. (ON/OFF)
9	RS422 RX(-)
10	GND. (SERIAL)
11	RS485(-)
12	S-NET (+)

BRC5A	
1	Connector check 2
2	Exhaust brake switch
3	Service brake switch
4	Retarder switch
5	Parking brake auxiliary brake switch
6	Lever validation switch 1
7	Lever validation switch 2
8	Brake system filter switch
9	Brake cooling filter switch
10	æ
11	æ
12	æ
13	æ
14	æ
15	æ
16	æ
17	æ
18	Starting switch terminal C (engine start signal)
19	æ
20	æ

BRC5B	
1	æ
2	Brake wear switch FL
3	Brake wear switch FR
4	Exhaust brake command (FRONT TRANSMISSION)
5	Overrun command (FRONT TRANSMISSION)
6	Brake wear switch RL
7	Brake wear switch RR
8	Brake wear switch ML
9	Brake wear switch MR
10	æ
11	æ
12	æ
13	æ
14	æ
15	æ
16	æ

HOIST CONTROL FUNCTION

HOIST CONTROL SYSTEM DIAGRAM



1. Hoist control function

When the engine is running, the EPC valve (electromagnetic proportional valve) and selector valve are controlled according to the operation of the dump control lever and operate the dump body.

2. Lever positioner function

The dump control lever has four positions: RAISE, HOLD, FLOAT, and LOWER.

If the dump control lever is operated to the RAISE position, the dump body is raised, and when the top of the dump body reaches the set position of the body position sensor, the lever is returned to the HOLD position.

If the lever is kept at the RAISE position, the RAISE output continues to be given.

3. Body seating speed control

When the dump body is lowered and reaches the position just before it is seated, the opening of the EPC valve is throttled to control the lowering speed of the dump body and reduce the shock when the dump body comes into contact with the chassis.

4. Control when starting switch is turned to ON, OFF, or START

Starting switch at ON:

The output is set to HOLD, regardless of the position of the lever.

If the engine is not started, even if the hoist lever is operated, the condition remains at HOLD.

Starting switch at OFF:

The dump body is held in position regardless of the position of the lever.

Engine started:

Immediately after the engine is started, the output is set to HOLD, regardless of the position of the lever.

After the lever is moved to the HOLD position, it becomes possible to carry out normal operations.

3. Normal operation display

Machine Condition		Gearshift lever position	Dump truck position	Load meter display	External display lamps
When empty	Stopped	N	Seated	Time	OFF
	Traveling	Except N	Seated	Time	OFF
During loading	Stopped	N	Seated	payload (ton)	Payload display and estimated display
	Traveling*	Except N	Seated	Traveling distance (m)	OFF
When loaded	Stopped	N	Seated	payload (ton)	Payload display
	Traveling	Except N	Seated	Time	OFF
When dumping		N	Unseated → Seated	Total payload** (100 ton)	OFF
When an error occurs	---	---	---	See ERROR CODE DISPLAY	

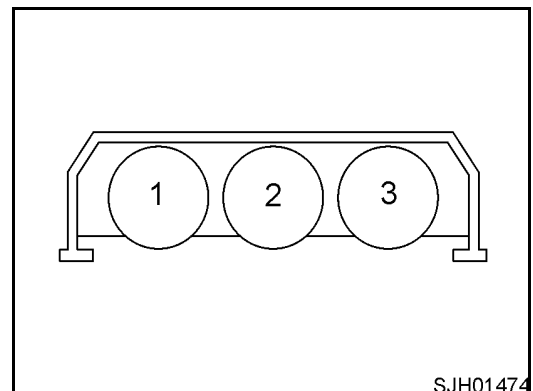
- * When a load is less than 50% of correct weight, display shows 0 t.
- ** The aggregate weight display is shown in units of 100 t (rounded to the nearest 100).

4. External display lamp drive (estimated display)

The chart below shows the payload display level for the external display lamps during the normal operation display. This threshold can be modified by the key operation in the service check mode.

	Lamp color	HM400-1
1	Green	18.5 tons and up
2	Yellow	33.3 tons and up
3	Red	38.3 tons and up

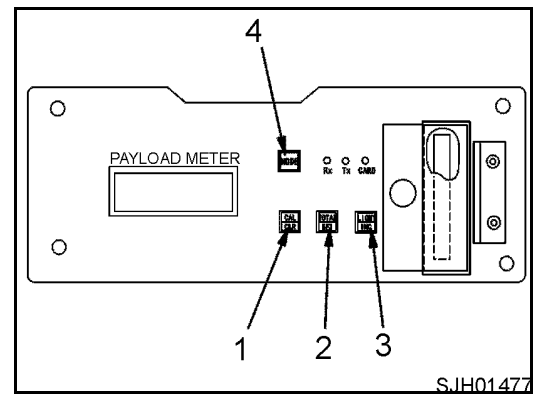
The estimated display shows the estimation of the total payload when one more load is added. The applicable lamp flashes to prevent overload; for example, if current payload is 30 tons and the last bucket was seven tons, the green lamp is turned on from the table above. The estimated payload for the next bucket is 37 tons. Then the yellow lamp is flashed. If the red lamp is flashed, one more bucket reaches over the red threshold and it will be overloaded.



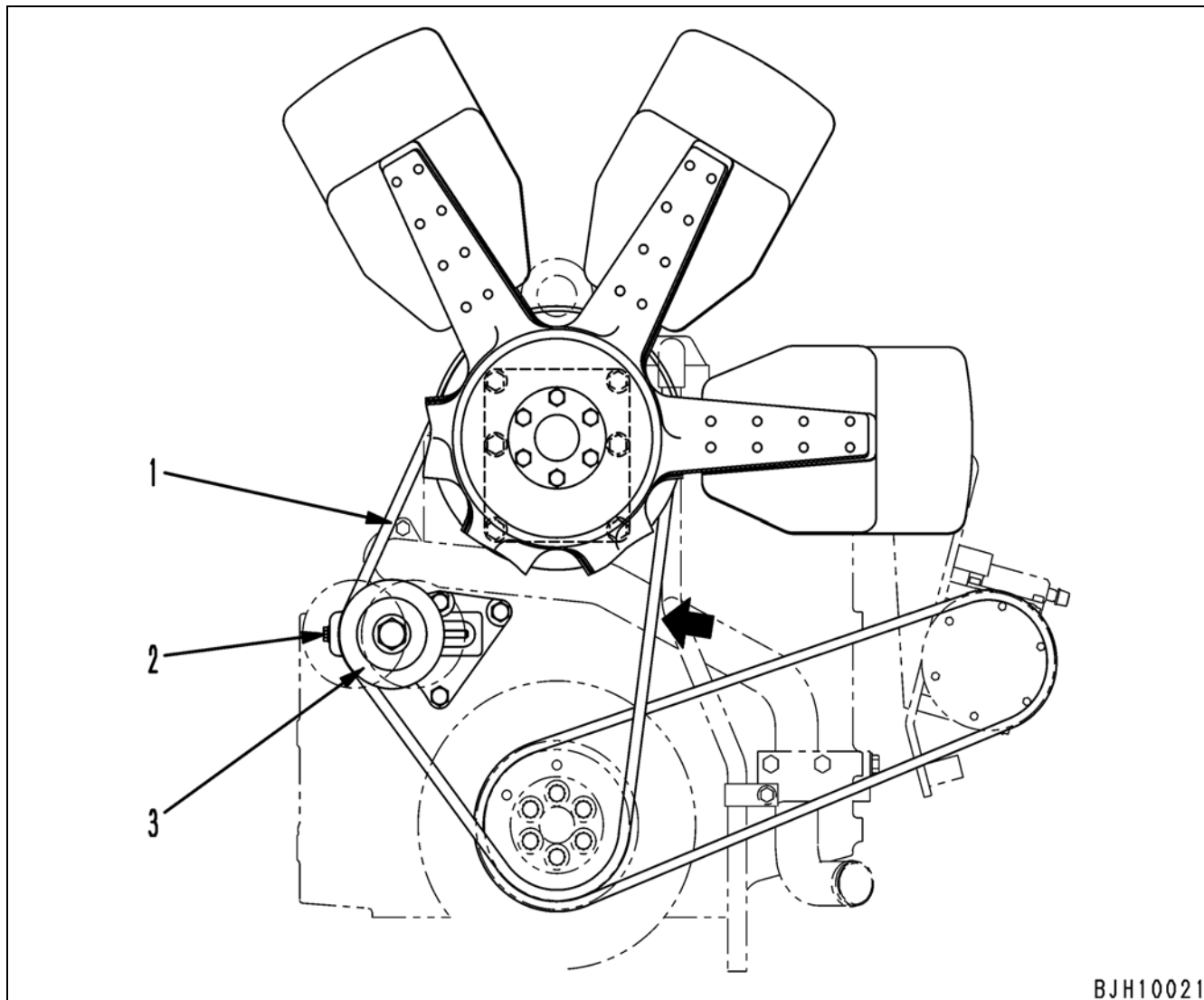
S.IH01474

4. Forcibly initialization mode

- Press [CAL/CLR] switch (1), [TOTAL/SFT] switch (2) and [LIGHT/INC] switch (3) simultaneously for more than two seconds, then "ACLE" is flashed.
- This means the forcibly initialize mode is ready. Press [CAL/CLR] switch (1) for more than two seconds, "ACLE" is lighted up and the forcibly initialize mode is started.
- If you want to cancel the process when "ACLE" is flashed, press [MODE] switch (4) then "CHEC" is flashed.
- Several seconds after the forcibly initialize mode is started, power on process is started. It means that the forcibly initialization is completed.
 - ★ Do not carry out this forcibly initialize mode if not necessary. All the data including the calibration data is cleared.
 - ★ After the execution of this mode, all procedures for local installation is necessary.



System	Name of component	Connector No.	Inspection method	Judgement table	Measurement conditions								
Transmission controller system	Transmission valve oil temperature sensor	LUB-T (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Transmission oil temperature</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>25 °C (77°F)</td> <td>37kΩ – 50kΩ</td> </tr> <tr> <td>100 °C (212°F)</td> <td>3.5kΩ – 4.0kΩ</td> </tr> </tbody> </table>	Pin	Transmission oil temperature	Resistance value	Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ	100 °C (212°F)	3.5kΩ – 4.0kΩ	1) Turn ignition switch OFF. 2) Disconnect LUB-T.
	Pin	Transmission oil temperature	Resistance value										
	Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ										
		100 °C (212°F)	3.5kΩ – 4.0kΩ										
	Hydraulic tank oil level switch	T06 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Hydraulic oil level</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>When normal</td> <td>Max. 1 Ω</td> </tr> <tr> <td>When low</td> <td>Min. 1 MΩ</td> </tr> </tbody> </table>	Pin	Hydraulic oil level	Resistance value	Between (1) and (2)	When normal	Max. 1 Ω	When low	Min. 1 MΩ	1) Turn ignition switch OFF. 2) Disconnect T06.
	Pin	Hydraulic oil level	Resistance value										
	Between (1) and (2)	When normal	Max. 1 Ω										
		When low	Min. 1 MΩ										
Hydraulic oil filter clogging switch	T05 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Hydraulic oil filter</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>When normal</td> <td>Max. 1 Ω</td> </tr> <tr> <td>When clogged</td> <td>Min. 1 MΩ</td> </tr> </tbody> </table>	Pin	Hydraulic oil filter	Resistance value	Between (1) and (2)	When normal	Max. 1 Ω	When clogged	Min. 1 MΩ	1) Turn ignition switch OFF. 2) Disconnect T05.	
Pin	Hydraulic oil filter	Resistance value											
Between (1) and (2)	When normal	Max. 1 Ω											
	When clogged	Min. 1 MΩ											
Steering oil temperature switch	T04 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Steering oil temperature</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and ground</td> <td>25 °C (77°F)</td> <td>Max. 1 Ω</td> </tr> <tr> <td>100 °C (212°F)</td> <td>Min. 1 MΩ</td> </tr> </tbody> </table>	Pin	Steering oil temperature	Resistance value	Between (1) and ground	25 °C (77°F)	Max. 1 Ω	100 °C (212°F)	Min. 1 MΩ	1) Turn ignition switch OFF. 2) Disconnect T04.	
Pin	Steering oil temperature	Resistance value											
Between (1) and ground	25 °C (77°F)	Max. 1 Ω											
	100 °C (212°F)	Min. 1 MΩ											
Front brake oil temperature sensor	T15 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Brake oil temperature</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>25 °C (77°F)</td> <td>37kΩ – 50kΩ</td> </tr> <tr> <td>100 °C (212°F)</td> <td>3.5kΩ – 4.0kΩ</td> </tr> </tbody> </table>	Pin	Brake oil temperature	Resistance value	Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ	100 °C (212°F)	3.5kΩ – 4.0kΩ	1) Turn ignition switch OFF. 2) Disconnect T15.	
Pin	Brake oil temperature	Resistance value											
Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ											
	100 °C (212°F)	3.5kΩ – 4.0kΩ											
Center brake oil temperature sensor	T14 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Brake oil temperature</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>25 °C (77°F)</td> <td>37kΩ – 50kΩ</td> </tr> <tr> <td>100 °C (212°F)</td> <td>3.5kΩ – 4.0kΩ</td> </tr> </tbody> </table>	Pin	Brake oil temperature	Resistance value	Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ	100 °C (212°F)	3.5kΩ – 4.0kΩ	1) Turn ignition switch OFF. 2) Disconnect T14.	
Pin	Brake oil temperature	Resistance value											
Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ											
	100 °C (212°F)	3.5kΩ – 4.0kΩ											
Rear brake oil temperature sensor	T13 (male)	Measure resistance	If the condition is as shown in the table below, it is normal <table border="1"> <thead> <tr> <th>Pin</th> <th>Brake oil temperature</th> <th>Resistance value</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Between (1) and (2)</td> <td>25 °C (77°F)</td> <td>37kΩ – 50kΩ</td> </tr> <tr> <td>100 °C (212°F)</td> <td>3.5kΩ – 4.0kΩ</td> </tr> </tbody> </table>	Pin	Brake oil temperature	Resistance value	Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ	100 °C (212°F)	3.5kΩ – 4.0kΩ	1) Turn ignition switch OFF. 2) Disconnect T13.	
Pin	Brake oil temperature	Resistance value											
Between (1) and (2)	25 °C (77°F)	37kΩ – 50kΩ											
	100 °C (212°F)	3.5kΩ – 4.0kΩ											
Inclination sensor	T10 (male)	Measure voltage	If the condition is as shown in the table below, it is normal <table border="1"> <tbody> <tr> <td>Between (1) and (3)</td> <td>11 – 13 V</td> </tr> <tr> <td>Between (2) and (3)</td> <td>1.4 – 4.6 V (when horizontal: 2.9 – 3.1 V)</td> </tr> </tbody> </table>	Between (1) and (3)	11 – 13 V	Between (2) and (3)	1.4 – 4.6 V (when horizontal: 2.9 – 3.1 V)	1) Insert T-adaptor to T10. 2) Turn ignition switch ON.					
Between (1) and (3)	11 – 13 V												
Between (2) and (3)	1.4 – 4.6 V (when horizontal: 2.9 – 3.1 V)												

ADJUSTING “V” BELT TENSION

BZH10021

Checking Tension

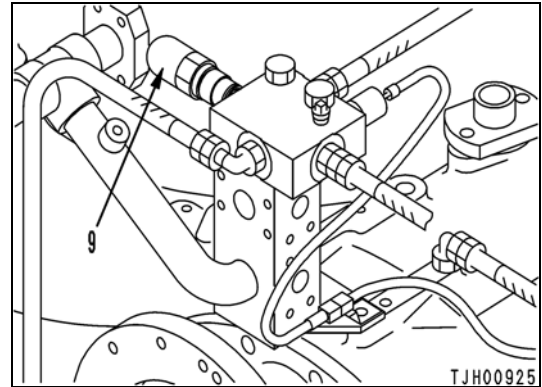
- Measure the deflection when the belt is pressed with a finger at a point (marked by the arrow) at the center of the belt between the fan pulley and crankshaft pulley.
 - Check each belt individually.
 - Pushing force: 98 N (22 lbs)
 - Deflection: 13 - 15 mm (1 - 1.2) new part
 - 17 - 19 mm (2 - 2.1) when adjusting tension

Adjusting Belt

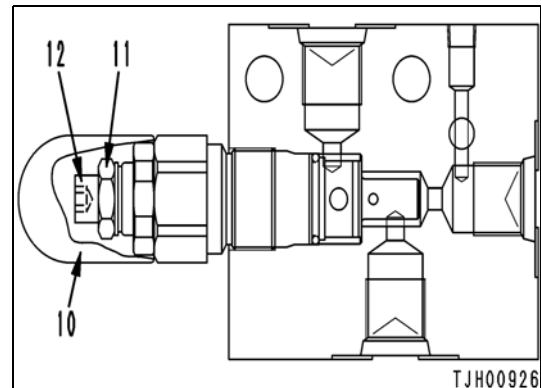
- If the deflection is not within the specified range, adjust as follows.
 1. Install 2 belts (1).
 2. Move tension pulley (3) with adjustment bolt (2) and adjust the tension of the belts.
 3. After adjusting, check the belt tension again.

ADJUSTING CENTER AXLE DIFFERENTIAL LOCK OIL PRESSURE

- If the center axle differential lock oil pressure is not correct, adjust relief valve (9) of the center axle differential lock valve as follows.



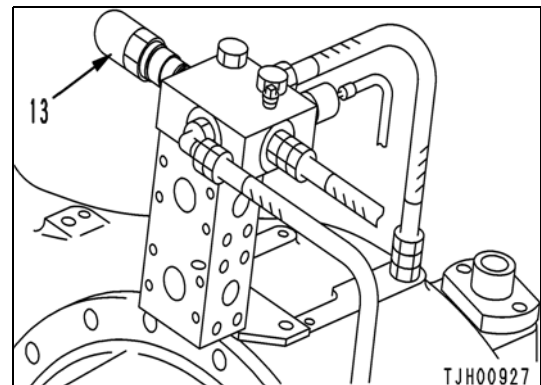
1. Remove cap (10).
2. Loosen locknut (11).
3. Turn adjustment screw (12) and adjust the oil pressure.
4. Adjust with the adjustment screw as follows.
 - To **INCREASE** pressure, turn clockwise
 - To **DECREASE** pressure, turn counterclockwise
5. Hold adjustment screw (12) in position and tighten locknut (11).
6. Install cap (10).



7. After completing the adjustment, repeat the procedure for measurement to check the oil pressure again.

ADJUSTING REAR AXLE DIFFERENTIAL LOCK OIL PRESSURE

If the rear axle differential lock oil pressure is not correct, adjust relief valve (13) of the rear axle differential lock valve. The procedure for adjusting is the same as for the center differential lock valve.



ADJUSTING PAD CLEARANCE

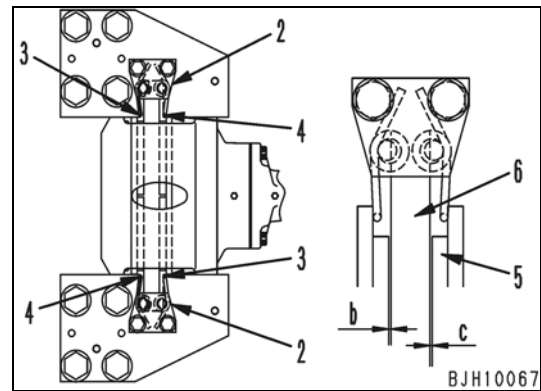
- If the pad wear has been inspected or the pad has been replaced with a new part, adjust the clearance as follows.

1. Install 2 pads (5).
2. Install 2 each of springs (4) and (3) to left and right brackets (2), then install left and right brackets (2).
3. There are two types of springs, so check the color, and be careful not to mistake the mounting position.
 - Spring (4): Yellow
 - Spring (3): Black
4. Screw 2 or 3 mounting bolts into the bracket and tighten temporarily.
5. Turn adjustment nut (1) clockwise until pad (5) is brought into tight contact with disc (6).

6. Measure clearances **b** and **c** between pad (5) and disc (6) and turn adjustment nut (1) counterclockwise to loosen it until the clearance is the specified amount.

- Standard clearance (total of **b** and **c**): 1.5 mm (0.06 in)

7. Start the engine.



8. Repeatedly actuate and cancel with the parking brake switch to adjust the pad clearance.

- When the parking brake is actuated in the direction of release, adjustment nut (1) will turn clockwise, so repeat this operation until it does not turn anymore.

9. Release the parking brake and check the clearance of the pad again.

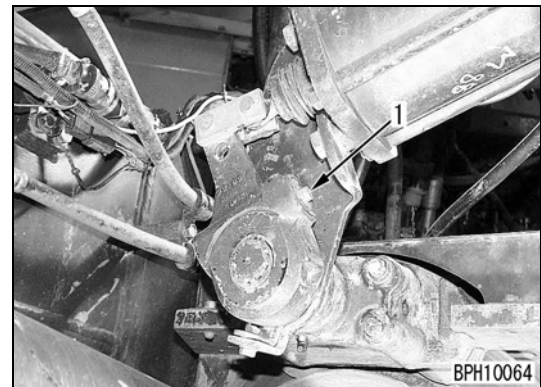
- Clearance (total of **b** and **c**): 1.5 mm (0.06 in)
- If the clearance is not correct, carry out the adjustment again from Step 3).

10. Tighten the mounting bolts of left and right brackets (2).

- Be careful not to let the mounting position move out of alignment.

11. Check the clearance between pad (5) and disc (6) again.

- Target clearance (**b** + **c** on one side): Min. 0.5 mm (0.02 in)
- If the clearance on one side is narrow, move the mounting position of the left and right brackets to adjust.



CALIBRATING SYSTEM

1. Start the engine and raise the hydraulic oil temperature to 80 - 90 °C.
2. Lower the dump body fully and continue the LOWER relief at this position for at least 5 seconds.
3. Check that the dump body pilot lamp is not lighted up.
4. Run the engine at low idling and operate the dump body to the RAISE and FLOAT positions 10 times.
5. Operate to the end of the stroke for both the RAISE and FLOAT operations.
6. Run the engine at high idling and operate the dump body to RAISE and LOWER 10 times.
7. Operate to the end of the stroke for both the RAISE and LOWER operations.

Operator Mode

- ★ No. 2 - No. 5 give an endless display according to the operation of the switch.
- ★ When a failure occurs, the screen changes automatically to No. 6, regardless of the display screen.
- ★ Regardless of the display screen, if no switch is operated for more than 30 seconds, the screen automatically changes as follows.
 - Goes to No. 1: If there is no failure
 - Goes to No. 6: If there is a failure
- ★ From No. 7 the screen changes to No. 1 with the switch operation, and if no switch is operated for more than 10 seconds, the screen automatically changes to No. 6.

Service Mode 1

- ★ No. 8 - No. 14 give an endless display according to the operation of the switch.
- ★ Once the ID is input and confirmed, it remains effective until the ignition switch is turned OFF.

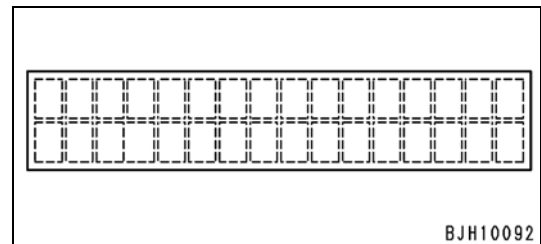
Service Mode 2

- ★ No. 15 - No. 17 give an endless display according to the operation of the switch.

Character Display

The character display consists of a top line and bottom line with 16 characters each. A combination of the following characters (alphabet and numerals) and symbols is displayed according to the content.

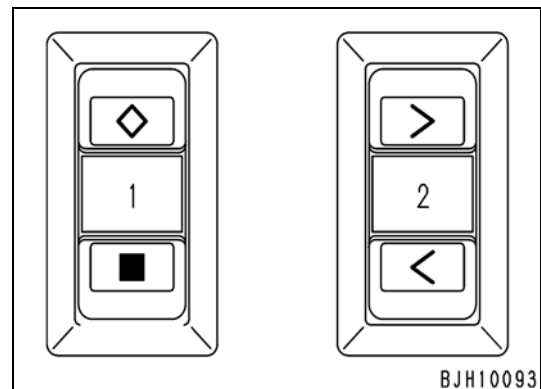
- Numerals: 1, 2, 3...
- Small letters: a, b, c...
- Capital letters: A, B, C...
- Symbols: @, \$...
- Special characters



Control Switches

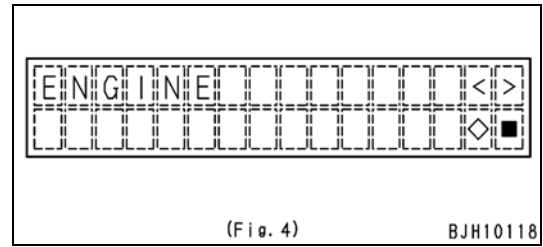
Control of the machine monitor display is all carried out with machine monitor mode selector switches (1) and (2).

- The following functions are provided for the buttons of each switch.
 - ◇: Select, Run
 - : Cancel, Release, Select (YES/NO only)
 - >: Right, Next, Continue
 - <: Left, Previous, Return



D. Setting 1st Item Individual Monitoring

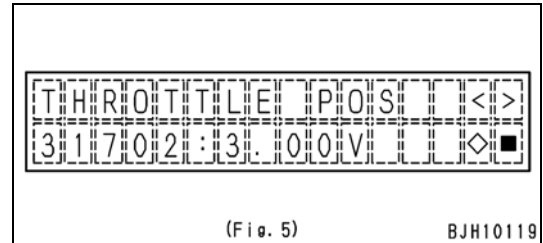
- i. Select the controller system for monitoring on the sub menu screen (Fig. 4: example).
- ii. With the menu selected, press the [◇] button and display the monitoring data initial screen.
 - [◇] button: Runs sub menu
- iii. Press the [>] button or [<] button to select the item for monitoring (Fig. 5: example).
 - [>] button: Goes on to next item
 - [<] button: Goes back to last item
- Scroll the monitoring items to display in the internally set order.



(Fig. 4)

BJH10118

- If the button is kept pressed, the items will scroll at high speed.
- ★ To hold or cancel monitoring data:
If the [◇] button is pressed during monitoring, the monitor data is held and the [◇] mark flashes. If the [◇] button is pressed again, it becomes active again.

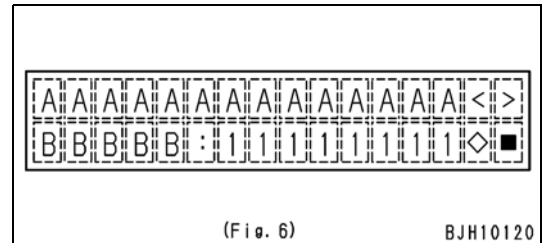


(Fig. 5)

BJH10119

E. Display Data For 1st Item Individual Monitoring

- On the 1st item individual monitoring screen, the following data are displayed (Fig. 6).
 - A: Item display
 - B: Monitoring code (5-digit)
 - 1: Monitoring data (including unit)
 For details, see MONITORING CODE TABLE.

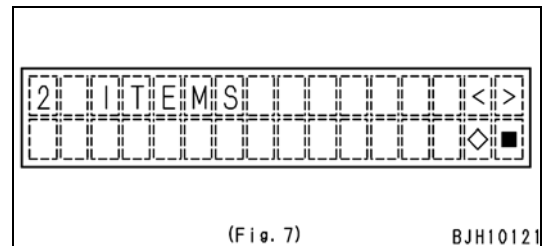


(Fig. 6)

BJH10120

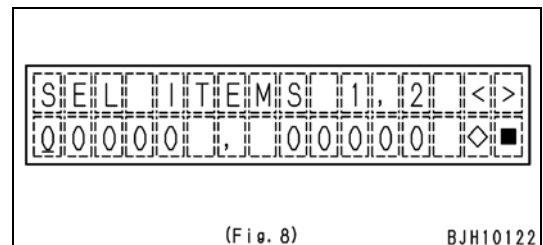
F. Setting 2nd Item Simultaneous Monitoring

- i. Select the 2nd item display on the sub menu screen (Fig. 6).
- ii. With the menu selected, press the [◇] button and display the monitoring code input screen (Fig. 7).
 - [◇] button: Runs sub menu
- iii. Operate each button and input the monitoring code for the 2nd monitoring item directly.
 - [>] button: Number at cursor goes up
 - [<] button: Number at cursor goes down
 - [◇] button: Number at cursor is confirmed
 - [■] button: Returns to code input screen
- iv. When both of the monitoring codes have been confirmed, the screen switches to the 2nd item display screen (Fig. 9: example).



(Fig. 7)

BJH10121



(Fig. 8)

BJH10122

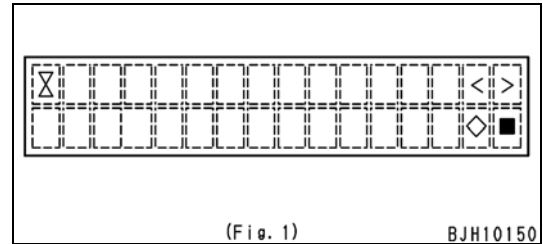
- ★ Note that if the [■] button is pressed on the YES/NO screen, the function will be executed.
- ★ If you return to the normal screen (operator mode) or service mode by mistake, repeat the procedure from Step 1) above (there is no need to input the ID again).

- ii. When completing all operations:
Turn the ignition switch OFF.

3. Service Meter Setting Function (Hourglass Mark)

A. Menu Selection

Select the setting function for the service meter on the menu screen of Service mode 2 (Fig. 1).



B. Setting service meter

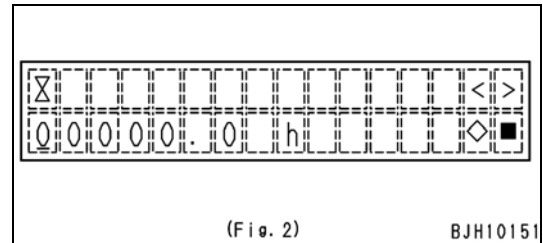
- i. With the menu selected, press the [◇] button and display the service meter input screen (Fig. 2).

- [◇] button: Runs menu

- ii. Operate each button and input the service meter times.

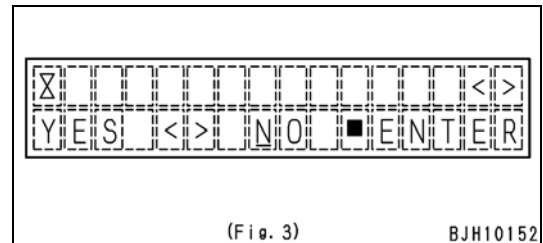
- [>] button: Number at cursor goes up
- [<] button: Number at cursor goes down
- [◇] button: Number at cursor is confirmed
- [■] button: Returns to initial screen (see Note)

- ★ The time must always be input with five digits. For numbers of less than five digits, input 0s at the beginning.



- iii. When all the times are confirmed, the change confirmation screen is displayed, so operate the buttons according to the screen display (Fig. 3).

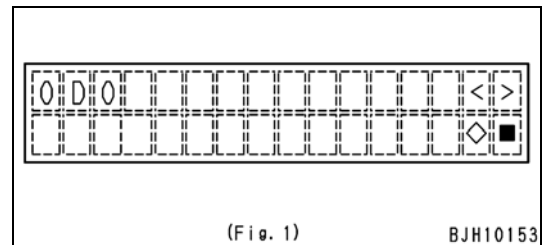
- [<] button: Select YES
- [>] button: Select NO
- [■] button: Run



4. Odometer Setting Function (ODO)

A. Menu Selection

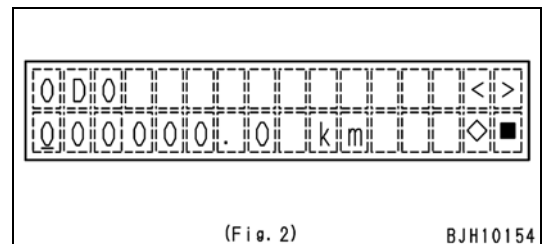
Select the setting function for the distance traveled on the menu screen of Service mode 2 (Fig. 1).



B. Setting Odometer Value

- i. With the menu selected, press the [◇] button and display the odometer input screen (Fig. 2).

- [◇] button: Runs menu

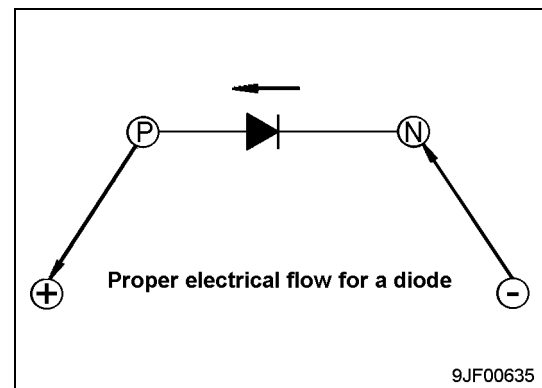


POINTS TO REMEMBER WHEN TROUBLESHOOTING ELECTRICAL CIRCUITS

1. Always turn power OFF before disconnecting or connecting connectors.
2. Before carrying out troubleshooting, check that all the related connectors are properly inserted.
 - ★ Disconnect and connect the related connectors several times to check.
 - ★ Check each individual wire on the connector suspected of the problem by performing a pull test on the wire insert.
3. Always connect any disconnected connectors before going on to the next step.
 - ★ If power is turned ON with the connectors still disconnected, unnecessary abnormality displays will be generated.
4. When carrying out troubleshooting of circuits (measuring the voltage, resistance, continuity or current), move the related wiring and connectors several times and check that there is no charge in the reading of the tester.
 - ★ If there is any charge, there is probably defective contact in that circuit.

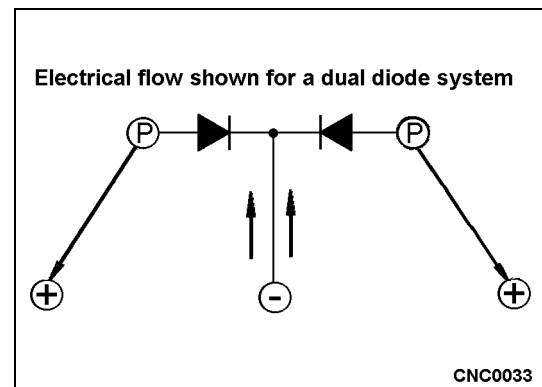
5. When checking a single diode circuit:

- ★ Isolate the diode from the circuit.
- ★ Using a digital volt ohm meter, in the Ohms mode, check the polarity of the diode as shown in the illustration. Reversing the meter leads, you should have a reading in one direction only.
- ★ Electrical flow should be negative (-) to positive (+) only, red lead positive and black lead negative.



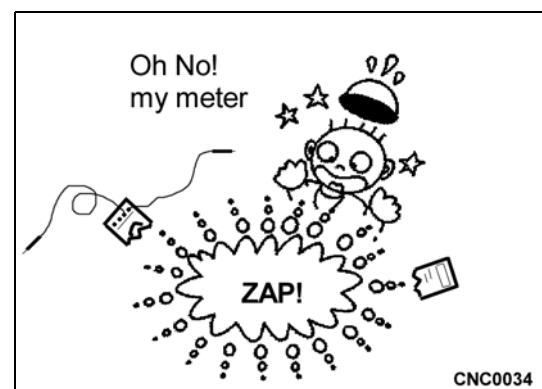
6. When checking a dual diode circuit:

- ★ Isolate the diode from the circuit.
- ★ Using a digital volt ohm meter, in the Ohms mode, check the polarity of the diode as shown in the illustration. Reversing the meter leads, you should have a reading in one direction only.
- ★ Electrical flow should be negative (-) to positive (+) only, red lead positive and black lead negative.

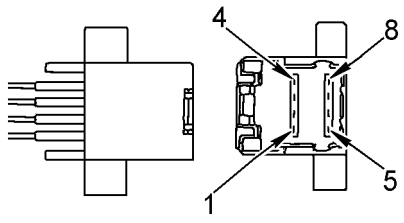
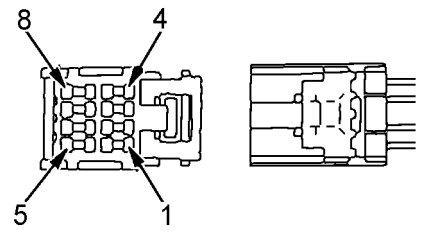
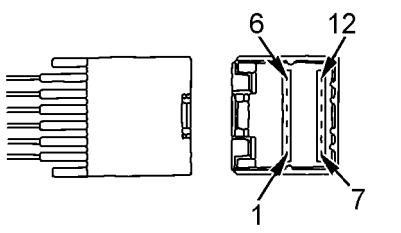
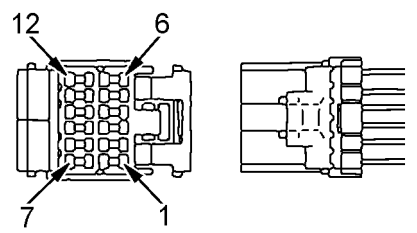
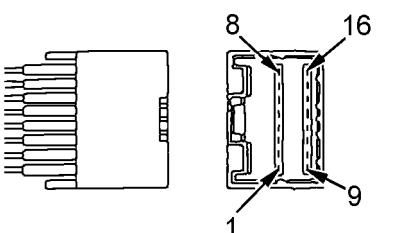
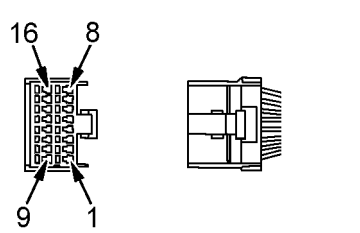
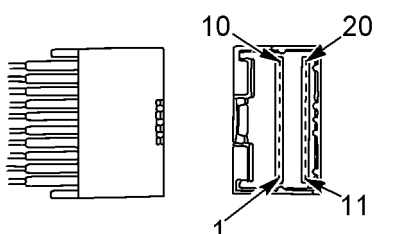
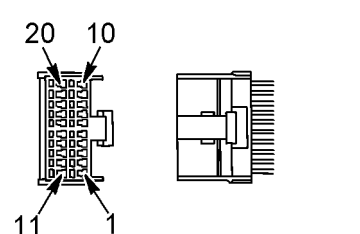


7. Always be aware of what you are measuring. Voltage, Ohms or Amps. Always use caution when measuring a circuit.

- ★ When measuring voltage, be sure the meter is set in the voltage range, AC or DC and above the voltage value you are measuring.
- ★ When measuring ohms, be sure the circuit is dead and has (no voltage) in it before you take any readings. Be sure the meter is set in the proper ohms range.
- ★ When measuring Amps, be sure your meter is rated for the amount of amps you will be measuring. Failure to follow these procedures may damage your equipment or possibly cause injury. Always study the operators manual for the meter you will be using.

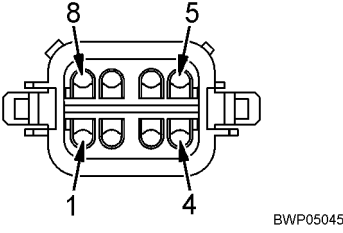
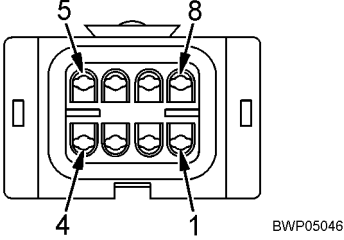
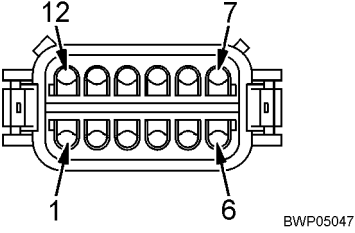
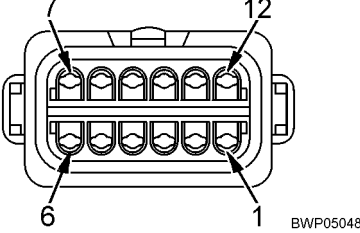


Connector No.	Type	No. of pins	Name of component	3-dimensional drawing display
EXH	M	6	Exhaust brake switch	2/4 (Overall drawing: Left)
FE1	DT2	2	Transmission output shaft (F) speed sensor	1/4 (Overall drawing: Left)
FLB	1-pin connector	-	Turn signal lamp flasher	2/4 (Overall drawing: Left)
FLL	1-pin connector	-	Turn signal lamp flasher	2/4 (Overall drawing: Left)
FOG	M	6	Fog lamp switch	2/4 (Detail drawing: X)
FS3	1-pin connector	1	Spare power source connector	-
FS4	1-pin connector	1	Spare power source connector	-
FS5	1-pin connector	1	Spare power source connector	-
FS6	1-pin connector	1	Spare power source connector	-
FS7	1-pin connector	1	Spare power source connector	-
FS8	1-pin connector	1	Spare power source connector	-
FWL	M	2	Left front working lamp	1/4 (Overall drawing: Left)
FWM		2	Front window washer motor	1/4 (Overall drawing: Left)
FWR	M	2	Right front working lamp	1/4 (Overall drawing: Left)
G	DT1	2	Engine G speed sensor	3/4
G2	Terminal	-	Ground	1/4 (Overall drawing: Left)
G21	Terminal	-	Air conditioner ground	2/4 (Overall drawing: Right)
GND	Terminal	-	Battery ground	1/4 (Overall drawing: Left)
H1	1-pin connector	1	Horn	1/4 (Overall drawing: Left)
H2	1-pin connector	1	Horn	1/4 (Overall drawing: Left)
H10	1-pin connector	1	Heater unit	2/4 (Overall drawing: Left)
H20	1-pin connector	1	Heater unit	2/4 (Overall drawing: Left)
HAZ	M	6	Hazard switch	2/4 (Overall drawing: Left)
HN	1-pin connector	-	Horn switch	2/4 (Overall drawing: Left)
H-PS	DT2	2	Transmission Hi clutch solenoid	4/4
HSL	DT2	4	Dump lever (potentiometer)	2/4 (Overall drawing: Right)
H-SW	DT2	2	Transmission Hi clutch fill switch	4/4
JCA	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JCB	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JCC	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JCD	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JCE	DT2	8	Joint connector	
JCF	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JCG	DT2	8	Joint connector	2/4 (Overall drawing: Right)
JO1	HD30	9	Intermediate connector	1/4 (Detail drawing: Y)
JO10	HD30	23	Intermediate connector	1/4 (Detail drawing: Y)
JO11	HD30	31	Intermediate connector	1/4 (Detail drawing: Y)
JO12	DT2	12	Joint connector	1/4 (Overall drawing: Right)
JO13	DT2	12	Joint connector	1/4 (Overall drawing: Right)
JO14	HD30	31	Joint connector	1/4 (Overall drawing: Right)
JO15	HD30	31	Joint connector	1/4 (Overall drawing: Right)
JO18	HD30	14	Intermediate connector	1/4 (Overall drawing: Left)
JO19	HD30	9	Intermediate connector	1/4 (Overall drawing: Left)
JO2	HD30	23	Intermediate connector	1/4 (Detail drawing: Y)
JO4	HD30	21	Intermediate connector	1/4 (Detail drawing: Y)
JO5	HD30	31	Intermediate connector	1/4 (Detail drawing: Y)
JO6	HD30	31	Intermediate connector	1/4 (Detail drawing: Y)

Number of Pins	AMP040 Type Connector		
	Male (Female housing)	Female (Male housing)	T-adapter Part Number
8	 <p>BWP04751</p>	 <p>BWP04752</p>	799-601-7180
	—	Housing part number: 79A-222-3430 (Quantity: 5 pieces)	
12	 <p>BWP04753</p>	 <p>BWP04754</p>	799-601-7190
	—	Housing part number: 79A-222-3440 (Quantity: 5 pieces)	
16	 <p>BWP04755</p>	 <p>BWP04756</p>	799-601-7210
	—	Housing part number: 79A-222-3450 (Quantity: 5 pieces)	
20	 <p>BWP04757</p>	 <p>BWP04758</p>	799-601-7220
	—	Housing part number: 79A-222-3460 (Quantity: 5 pieces)	

★ Terminal part number: 79A-222-3470 (for all numbers of pins).

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

Number of Pins	DT Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part Number
8			8GR: 799-601-9060 8B: 799-601-9070 8G: 799-601-9080 8BR: 799-601-9080
	Part number: 08192-1820 T (normal type) 08192-2820 T (fine wire type)	Part number: 08192-1810 T (normal type) 08192-2810 T (fine wire type)	
10			12GR: 799-601-9110 12B: 799-601-9120 12G: 799-601-9130 12BR: 799-601-9140
	Part number: 08192-1920 T (normal type) 08192-2920 T (fine wire type)	Part number: 08192-1910 T (normal type) 08192-2910 T (fine wire type)	

Failure Code	Location Of Failure	Nature Of Failure	Probable Cause
ADDZKB (ENG-17)	No. 4, 5, 6 injector solenoid valve: Short circuit (KB)	Excessive current has flowed in No. 4 injector solenoid circuit, No. 5 injector solenoid circuit, or No. 6 injector solenoid circuit	<ul style="list-style-type: none"> • Defective No. 4 injector solenoid • Defective No. 5 injector solenoid • Defective No. 6 injector solenoid • Short circuit with chassis ground or short circuit with power source in No. 4 solenoid (+) circuit and (-) circuit wiring harness • Short circuit with chassis ground or short circuit with power source in No. 5 solenoid (+) circuit and (-) circuit wiring harness • Short circuit with chassis ground or short circuit with power source in No. 6 solenoid (+) circuit and (-) circuit wiring harness • Defective engine controller
ADE1KA (ENG-18)	No. 5 injector solenoid valve: Open (KA)	Open has occurred in No. 5 injector solenoid circuit	<ul style="list-style-type: none"> • Defective No. 5 injector solenoid • Open in solenoid (+) circuit wiring harness • Open in solenoid (-) circuit wiring harness • Defective engine controller
ADF1KA (ENG-19)	No. 6 injector solenoid valve: Open (KA)	Open has occurred in No. 6 injector solenoid circuit	<ul style="list-style-type: none"> • Defective No. 6 injector solenoid • Open in solenoid (+) circuit wiring harness • Open in solenoid (-) circuit wiring harness • Defective engine controller
B@BAZG (ENG-20)	Engine oil: Drop in oil pressure (ZG)	When running at low idling, signal circuit of engine oil pressure low-pressure switch became closed (connected to GND), or when engine speed was more than 1300 rpm, signal circuit of oil pressure high-pressure switch became closed (connected to GND)	<ul style="list-style-type: none"> • Drop in oil pressure (when system is working normally) • Defective engine oil low-pressure switch • Defective engine oil high-pressure switch • Short circuit with chassis ground in low or high -pressure switch signal circuit wiring harness • Defective engine controller
B@BAZK (ENG-21)	Engine oil: Drop in level (ZK)	Signal circuit of engine oil pressure switch became open (shut off from GND)	<ul style="list-style-type: none"> • Drop in engine oil level (when system is working normally) • Defective engine oil level switch • Open in switch circuit wiring harness • Defective engine controller
B@BCNS (ENG-22)	Radiator coolant: Overheat (NS)	Engine coolant temperature went above operating range	<ul style="list-style-type: none"> • Engine coolant temperature overheats (when system is working normally) • Defective engine controller
D181KZ (ENG-23)	Preheating relay contact: Open or short circuit (KZ)	Open, short circuit with ground, or short circuit with power source has occurred in signal circuit of heater relay	<ul style="list-style-type: none"> • Defective heater relay • Defective preheater relay • Open, short circuit with chassis ground, or short circuit with power source in relay signal circuit wiring harness • Defective engine controller

(ENG-4 OR 5) FAILURE CODE [AD00MA] OR [AD10L3]**COMMON RAIL PRESSURE HIGH OR LOW**

Action Code	Error Code	Controller Code	Trouble	Common rail out of set value
E03	AD00L2	ENG-3, 4		
Description of Trouble	<ul style="list-style-type: none"> Common rail fuel pressure rose (Level 1). 			
Controller Reaction	<ul style="list-style-type: none"> Operates with limited output. 			
Effect on Machine	<ul style="list-style-type: none"> Engine output lowers. 			
Related Information	<ul style="list-style-type: none"> The common rail pressure can be checked with monitoring function (Code: 36400). The converted torque can be checked with monitoring function (Code: 36700). Engine speed can be checked with monitoring function (Code: 01004). 			
Diagnostic procedures for error code	Causes		Standard Value in Normal State and Remarks on Troubleshooting	
	1	Defect concerned to another error code	1) Turn ignition switch ON. 2) Operate machine monitor.	
			Another code is displayed, too.	Perform troubleshooting for displayed code.
	2	Use of improper fuel	Proper fuel for atmospheric temperature is used.	Fuel use is proper.
			Proper fuel for atmospheric temperature is not used.	Fuel used is improper (replace).
	3	Defective mechanical system of common rail fuel pressure sensor, clogging of overflow piping, defective overflow valve, defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Loosen overflow valve joint of fuel supply pump. 2) Operate priming pump.	
			Fuel leaks out.	Go to 5.
			Fuel does not leak out.	Go to 4.
	4	Defective overflow valve	1) Disassemble overflow valve of fuel supply pump. 2) Check inside of overflow valve.	
			Spring or seat is broken or ball is stuck.	Defective overflow valve.
			Spring and seat are normal and ball is not stuck.	Overflow valve is normal.
	5	Defective mechanical system of common rail fuel pressure sensor, clogging of overflow piping, defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Perform this after performing 3. 2) Loosen joint of common rail pressure limiter. 3) Start engine.	
			Fuel leaks out.	Go to 6.
			Fuel does not leak out.	Go to 7.
6	Defective pressure limiter, defective electrical system of common rail fuel pressure sensor	1) Perform this after performing 5. 2) Perform troubleshooting for error code [DH40KX].		
		There is trouble in electrical system.	Trouble in electrical system of common rail fuel pressure sensor.	
		There is not trouble in electrical system.	Trouble in pressure limiter.	
7	Clogging of overflow piping	Overflow piping is clogged.	Clogging in overflow piping.	
		Overflow piping is not clogged.	Trouble in mechanical system of common rail fuel pressure sensor.	

(ENG-15) FAILURE CODE [ADC1KA]**OPEN IN NO. 3 INJECTOR SOLENOID VALVE**

Contents Of Trouble	<ul style="list-style-type: none"> • Open in No.3 injector solenoid valve. • ENG code 15 displayed. • Engine output lowered
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Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adapter kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Error Code [ADC1KA]	Specifications	No.	Readings
1. No. 1 Injector Solenoid	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (CN3) connector from injector solenoid. • Zero meter leads for proper Ω readings. 			
A. Solenoid test	Resistance Ω	At No.3 injector solenoid CN3, between (1) and (2)	0.4 to 1.1 Ω	1
		At No.3 injector solenoid CN3, between (1) or (2) and chassis ground.	(OL) open	2
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (CN3) connector from injector solenoid. • Disconnect (CN6) connector from engine controller and install T-adapter on (CN6) wiring harness connector only. 			
A. Open or high resistance	Resistance Ω	Between connectors CN6, (3) and CN3, (1)	0.0 to 1.0 Ω	3
		Between connectors CN6, (9) and CN3, (2)	0.0 to 1.0 Ω	4
3. Engine Controller Unit	<ul style="list-style-type: none"> • No testing procedure for the controller. <p>Remark</p> <p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Engine Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>			

(ENG-21) FAILURE CODE [B@BAZK]

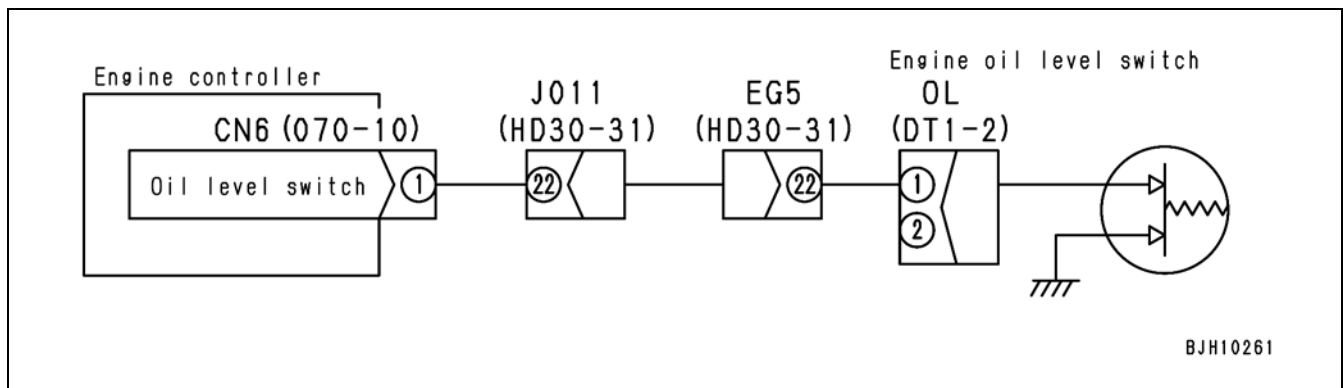
ENGINE OIL LEVEL DROP (ZK)

Contents Of Trouble	<ul style="list-style-type: none"> • Engine oil level indicating poorly • ENG code 21 displayed. • Level sensor indication irregular
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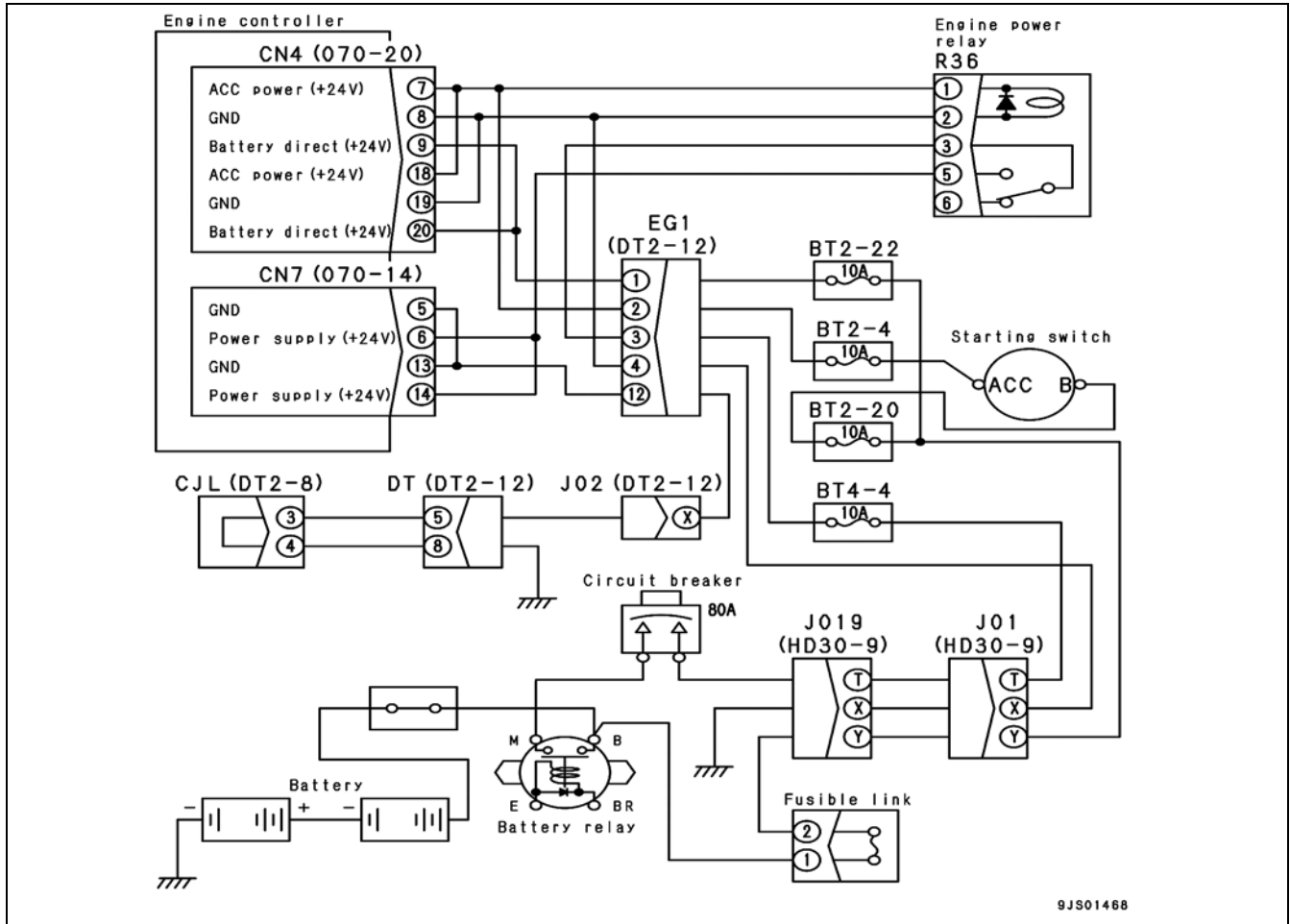
Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adaptor kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Error Code [B@BAZK]		Specifications	No.	Readings	
	Engine Oil Level	—	Check engine oil level	Within Spec.	1	Yes or No
1. Defective Level Switch <ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (OL) level switch connector and isolate switches. • Zero meter leads for proper Ω readings. 						
A.	Pressure switch	Resistance Ω	At switch OL, between (22) and chassis ground.	(OL) open	2	
2. Wiring Harness Assembly Test <ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (OL) level switches. • Disconnect (CN6) connector from engine controller and install T-adaptor on (CN6) wiring harness connector only. 						
A.	Open or high resistance	Resistance Ω	Between level switch OL, (1) and CN6, (1)	0.0 to 1.0 Ω	3	
B.	Short to chassis ground or within harness	Resistance Ω	At connector OL, (1) and chassis ground.	(OL) open	4	
3. Engine Controller Unit <ul style="list-style-type: none"> • No testing procedure for the controller. <p>Remark If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Engine Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</p>						

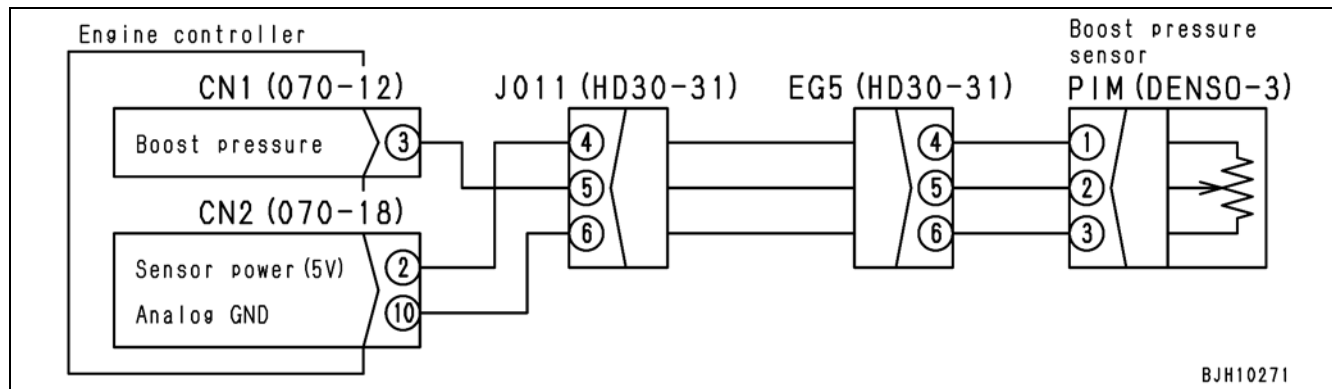
Related circuit diagram



Related circuit diagram



Related circuit diagram



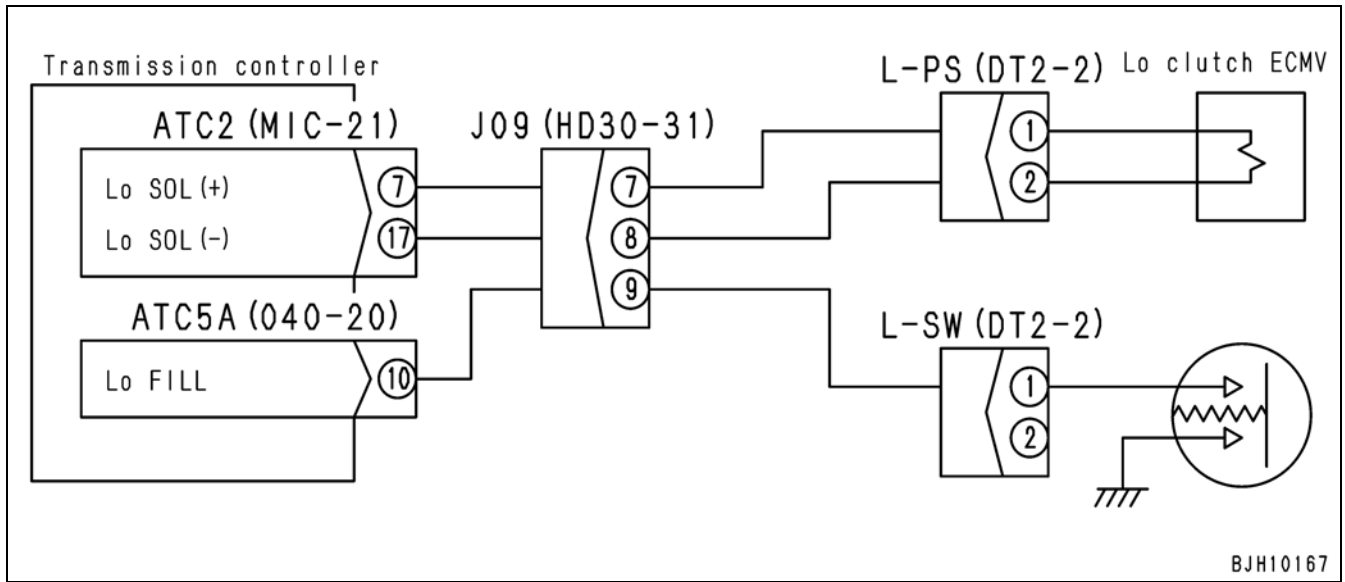
INNER AXLE DIFFERENTIAL LOCK SYSTEM OPEN OR SHORTED (KB)	20-584
(TM-80) FAILURE CODE [DXH1KA]	20-586
LOCK-UP CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-586
(TM-81) FAILURE CODE [DXH1KB]	20-588
LOCK-UP CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-588
(TM-82) FAILURE CODE [DXH2KA]	20-590
HIGH CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-590
(TM-83) FAILURE CODE [DXH2KB]	20-592
HIGH CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-592
(TM-84) FAILURE CODE [DXH3KA]	20-594
LOW CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-594
(TM-85) FAILURE CODE [DXH3KB]	20-596
LOW CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-596
(TM-86) FAILURE CODE [DXH4KA]	20-598
1st CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-598
(TM-87) FAILURE CODE [DXH4KB]	20-600
1st CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-600
(TM-88) FAILURE CODE [DXH5KA]	20-602
2ND. CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-602
(TM-89) FAILURE CODE [DXH5KB]	20-604
2ND. CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-604
(TM-90) FAILURE CODE [DXH6KA]	20-606
3RD. CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-606
(TM-91) FAILURE CODE [DXH6KB]	20-608
3RD. CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-608
(TM-92) FAILURE CODE [DXH7KA]	20-610
REVERSE CLUTCH SYSTEM OPEN OR SHORTED (KA)	20-610
(TM-93) FAILURE CODE [DXH7KB]	20-612
REVERSE CLUTCH SYSTEM OPEN OR SHORTED (KB)	20-612
(TM-94) NO FAILURE CODE DISPLAYED	20-614
BACK-UP LIGHTS AND ALARM DO NOT OPERATE	20-614

MEMORANDUM

Failure Code	Location Of Failure	Nature Of Failure	Probable Cause
DAQ1KK (TM-43)	Transmission controller main power supply line: Drop in power source voltage, input (KK)	The voltage difference between the main power supply voltage circuit and the direct power supply voltage circuit became more than 5 V	<ul style="list-style-type: none"> • Open or short circuit with chassis ground in main power source circuit wiring harness • Defective transmission controller
DAQ2KK (TM-44)	Transmission controller load power supply line: Drop in power source voltage, input (KK)	When the controller power supply voltage circuit was normal, the solenoid power supply voltage circuit became less than 18 V	<ul style="list-style-type: none"> • Defective transmission cut relay • Open or short circuit with chassis ground in relay power source circuit wiring harness • Open or short circuit with chassis ground in relay output circuit wiring harness • Defective transmission controller
DAQ3KK (TM-45)	Transmission controller battery direct power supply line: Drop in power source voltage, input (KK)	The voltage in the direct power supply voltage circuit became less than 5 V	<ul style="list-style-type: none"> • Open or short circuit with chassis ground in direct power source circuit wiring harness • Defective transmission controller
DAQ5KP (TM-46)	Transmission controller power supply output 1: Drop in output voltage (KP)	The voltage in the 12V power supply circuit for the sensor became less than 6 V	<ul style="list-style-type: none"> • Defective inclination sensor • Short circuit with chassis ground in sensor power source circuit wiring harness • Defective transmission controller
DAQ9KM (TM-47)	Transmission controller wiring harness: Mistaken operation or mistaken setting (KP)	When the ignition switch is ON, the input connector check signal does not match the setting inside the controller	<ul style="list-style-type: none"> • Mistaken connection of connector ATC3 (A, B) and connector ATC5 (A, B) (when system is working normally) • Open in signal 1 circuit wiring harness • Defective transmission controller
DAQ9KQ (TM-48)	Transmission controller wiring harness: Non match in model selection signal (KP)	When the ignition switch is ON, the input model selection signal is different from the setting of the controller	<ul style="list-style-type: none"> • Open in model selection signal circuit wiring harness • Defective transmission controller
DAQAKQ (TM-49)	Transmission controller rotary switch: Non match in model selection signal (KP)	The model setting of the rotary switch does not match the setting inside the controller	<ul style="list-style-type: none"> • Defective setting of rotary switch • Defective transmission controller
DAQSMA (TM-50)	Transmission controller: Function impossible (MA)	The communication (S-NET) with the machine monitor is defective and the option setting cannot be made	<ul style="list-style-type: none"> • Another problem is occurring at the same time (failure code DAQSKR is displayed) • Defective machine monitor • Defective transmission controller
DDTFKA (TM-51)	Fill switch for inter-axle differential lock clutch: Open (KA)	When the output is made to the differential lock clutch solenoid, the clutch engages, but the signal from the fill switch does not come ON	<ul style="list-style-type: none"> • Defective differential clutch fill switch • Open or short circuit with power source in switch circuit wiring harness • Defective transmission controller

Condition When Normal	Action By Controller	Problem That Appears On Machine	Action Code
Solenoid resistance value 3-PS (male) (1) - (2): 5 - 15 Ω	<ul style="list-style-type: none"> • Sets transmission to Neutral. 	<ul style="list-style-type: none"> • Shifts to Neutral during travel • If travel is not stopped, machine cannot move off again 	E03
Solenoid resistance value 3-PS (male) (1) - (2): 5 - 15 Ω	<ul style="list-style-type: none"> • Sets transmission to Neutral. 	<ul style="list-style-type: none"> • Shifts to Neutral during travel • If travel is not stopped, machine cannot move off again (depending on condition of failure, machine may not be able to move off again) 	E03
Solenoid resistance value R-PS (male) (1) - (2): 5 - 15 Ω	<ul style="list-style-type: none"> • Sets transmission to Neutral. 	<ul style="list-style-type: none"> • Shifts to Neutral during travel • If travel is not stopped, machine cannot move off again 	E03
Solenoid resistance value R-PS (male) (1) - (2): 5 - 15 Ω	<ul style="list-style-type: none"> • Sets transmission to Neutral. 	<ul style="list-style-type: none"> • Shifts to Neutral during travel • If travel is not stopped, machine cannot move off again (depending on condition of failure, machine may not be able to move off again) 	E03

Related circuit diagram



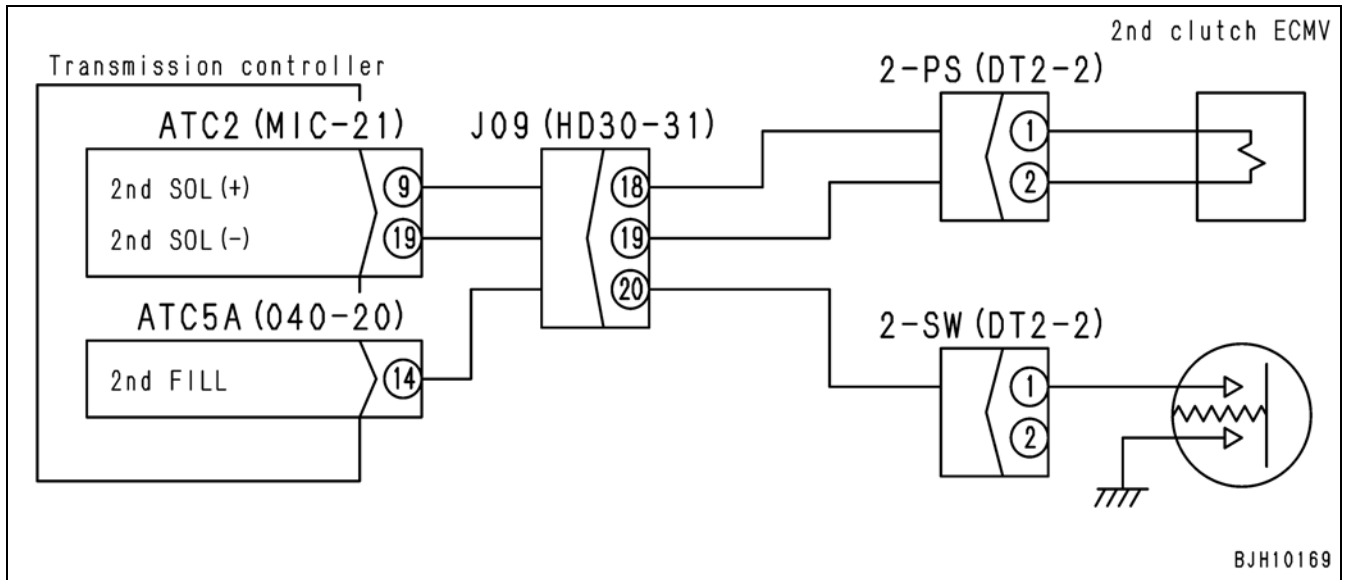
(TM-13) FAILURE CODE [15SCMA]**ECMV "HI" CLUTCH NOT DISENGAGING (MA)**

Contents Of Trouble	<ul style="list-style-type: none"> • Hi clutch not disengaging. • TM code 13 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adaptor kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [15SCMA]		Specifications	No.	Readings
1. HI Clutch ECMV Solenoid And Switch	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (H-PS) connector from solenoid and isolate solenoid. • Disconnect (H-SW) connector from switch and isolate switch. • Zero meter leads for proper Ω readings. 				
A. Solenoid and switch test	Resistance Ω	At solenoid H-PS, between (1) and (2)	5 to 15 Ω	1	
		At switch H-SW, between (1) and (2)	(OL) open	2	
		At switch H-SW, between (1) and (2) engine running and system operating.	0.0 to 1.0 Ω	3	
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (H-PS and H-SW) connectors from solenoid and switch, isolate connectors. • Disconnect (ATC2 and ATC5A) connector from the transmission controller and install T-adaptor on (ATC2 and ATC5A) wiring harness connector only. 				
A. Open or high resistance	Resistance Ω	Between connectors H-PS, (1) and ATC2, (4)	0.0 to 1.0 Ω	4	
		Between connectors H-PS, (2) and ATC2, (15)	0.0 to 1.0 Ω	5	
		Between connectors H-SW, (1) and ATC5A, (12)	0.0 to 1.0 Ω	6	
B. Short to chassis ground or within harness	Resistance Ω	At connector H-PS, between (1) and chassis ground.	(OL) open	7	
		At connector H-PS, between (2) and chassis ground.	(OL) open	8	
		At connector H-PS, between (1) and (2)	(OL) open	9	
		At connector H-SW, between (1) and chassis ground.	(OL) open	10	
3. Transmission Controller Unit	<ul style="list-style-type: none"> • No testing procedure for the controller. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

Related circuit diagram



(TM-26) FAILURE CODE [2B61MW]**ECMV "INTER-AXLE" CLUTCH SLIPPING (MW)**

Contents Of Trouble	<ul style="list-style-type: none"> • Inter-axle possibly slipping. • TM code 26 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adapter kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [2B61MW]		Specifications	No.	Readings
1. Inter-axle Clutch ECMV Solenoid And Switch	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (D/L-PS) connector from solenoid and isolate solenoid. • Disconnect (D/L-SW) connector from switch and isolate switch. • Zero meter leads for proper Ω readings. 				
A. Solenoid and switch test	Resistance Ω	At solenoid D/L-PS, between (1) and (2)	5 to 15 Ω	1	
		At switch D/L-SW, between (1) and (2)	(OL) open	2	
		At switch D/L-SW, between (1) and (2) engine running and system operating.	0.0 to 1.0 Ω	3	
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (D/L-PS and D/L-SW) connectors from solenoid and switch, isolate connectors. • Disconnect (ATC2 and ATC5A) connector from the transmission controller and install T-adapter on (ATC2 and ATC5A) wiring harness connector only. 				
A. Open or high resistance	Resistance Ω	Between connectors D/L-PS, (1) and ATC2, (8)	0.0 to 1.0 Ω	4	
		Between connectors D/L-PS, (2) and ATC2, (18)	0.0 to 1.0 Ω	5	
		Between connectors D/L-SW, (1) and ATC5A, (17)	0.0 to 1.0 Ω	6	
B. Short to chassis ground or within harness	Resistance Ω	At connector D/L-PS, between (1) and chassis ground.	(OL) open	7	
		At connector D/L-PS, between (2) and chassis ground.	(OL) open	8	
		At connector D/L-PS, between (1) and (2)	(OL) open	9	
		At connector D/L-SW, between (1) and chassis ground.	(OL) open	10	
3. Transmission Controller Unit	<ul style="list-style-type: none"> • No testing procedure for the controller. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

(TM-33) FAILURE CODE [AB00MA]

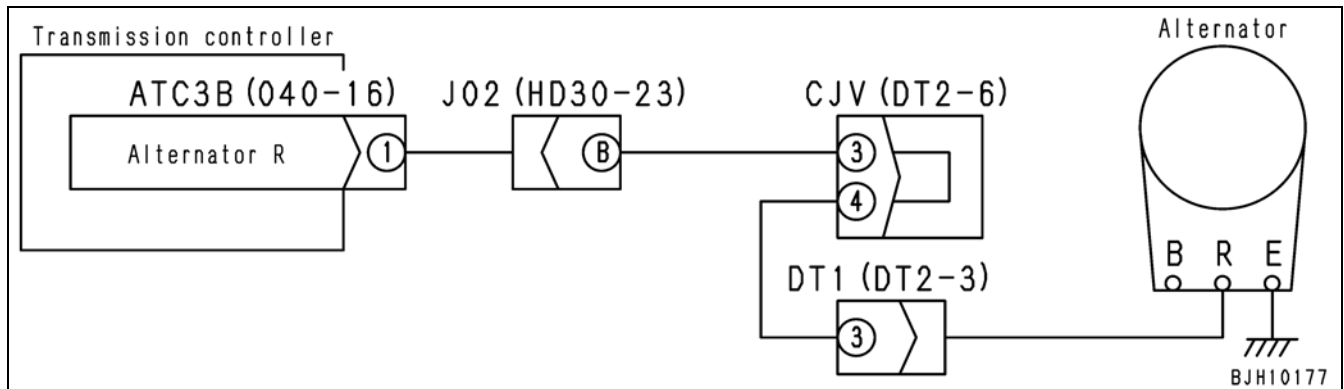
ALTERNATOR NOT CHARGING PROPERLY (MA)

Contents Of Trouble	<ul style="list-style-type: none"> Charging system may be defective. TM code 33 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adaptor kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [AB00MA]	Specifications	No.	Readings
1. Alternator Check <ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (DT1) connector from alternator and insert T-adaptor between (DT1) and alternator connector. Start the engine and run at mid speed. 				
A. Alternator test	Voltage	At connector DT1, between (3) and chassis ground.	20 to 30V	1
		Between alternator terminals (B) and (E)	20 to 30V	2
		With engine OFF, and ignition switch in the "ON" position between alternator terminal (B) and chassis ground.	20 to 30V	3
2. Wiring Harness Assembly Test <ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (DT1) connector from alternator. Disconnect (ATC3B) connector from transmission controller and install T-adaptor on (ATC3B) wiring harness connector only 				
A. Short to chassis ground or within harness	Resistance Ω	At connector DT1, between (3) and chassis ground.	(OL) open	4
B. Open or high resistance	Resistance Ω	Between connectors DT1, (3) and ATC3B, (1)	0.0 to 1.0 Ω	5
3. Transmission Controller Unit <ul style="list-style-type: none"> No testing procedure for the controller. <p>Remark If all test results fall within the specifications listed above in the testing procedures, the error may be in your <i>Transmission Controller Unit</i>. Be sure all steps are completed correctly before faulting the controller unit.</p>				

Related circuit diagram



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(TM-41) FAILURE CODE [D5ZEKX]

ENGINE LOAD SIGNAL OUT OF RANGE (KX)

Contents Of Trouble	<ul style="list-style-type: none"> • Possibly engine load command signal out of range. • TM code 41 displayed.
---------------------	--

Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adapter kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [D5ZEKX]		Specifications	No.	Readings
1. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (CN2, CN4) connector from engine controller and install T-adapter on (CN2, CN4) wiring harness connector only. • Disconnect (ATC1, ATC2, ATC3A) connector from transmission controller and install T-adapter on (ATC1, ATC2, ATC3A) wiring harness connector only • * Turn ignition switch to the "ON" position for this test 				
A. Open or high resistance	Voltage	Between connector CN4, (9), (18), (20) and chassis ground, ignition key in the ON position.	20 to 30V	1	
		Between connector ATC1, (7) and chassis ground.	20 to 30V	2	
		Between connector ATC1, (9), (17) and chassis ground, ignition key in the ON position.	20 to 30V	3	
		Between connector ATC2, (1), (12) and chassis ground, ignition key in the ON position.	20 to 30V	4	
	Resistance Ω	Between connectors CN2, (14) and ATC3A, (4)	0.0 to 1.0 Ω	5	
		Between connectors CN4, (8), (19) and chassis ground.	0.0 to 1.0 Ω	6	
		Between connectors ATC1, (8), (16) and chassis ground.	0.0 to 1.0 Ω	7	
		Between connectors ATC2, (21) and chassis ground.	0.0 to 1.0 Ω	8	
B. Short to chassis ground or within harness	Resistance Ω	Between connector CN2, (14) and chassis ground.	(OL) open	9	
2. Transmission Or Retarder Controller Units	<ul style="list-style-type: none"> • No testing procedure for the controllers. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission or Retarder Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

(TM-48) FAILURE CODE [DAQ9KM]

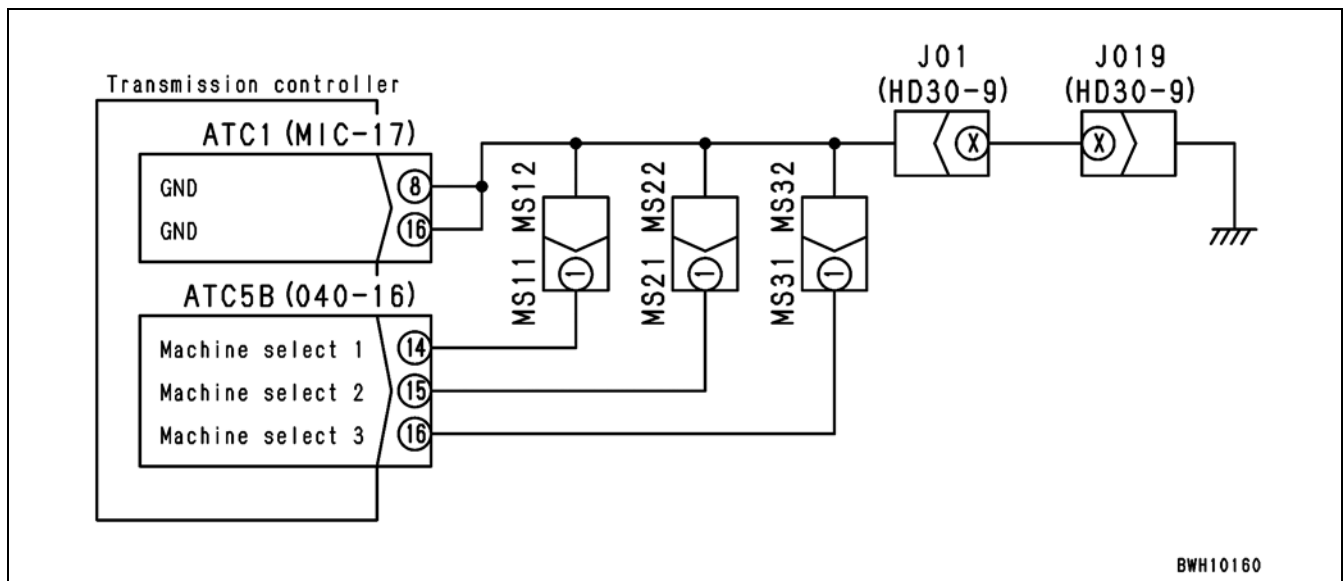
NO MATCH IN MODEL SELECTION SIGNAL (KP)

Contents Of Trouble	<ul style="list-style-type: none"> Model selection signal not matching system. TM code 48 displayed.
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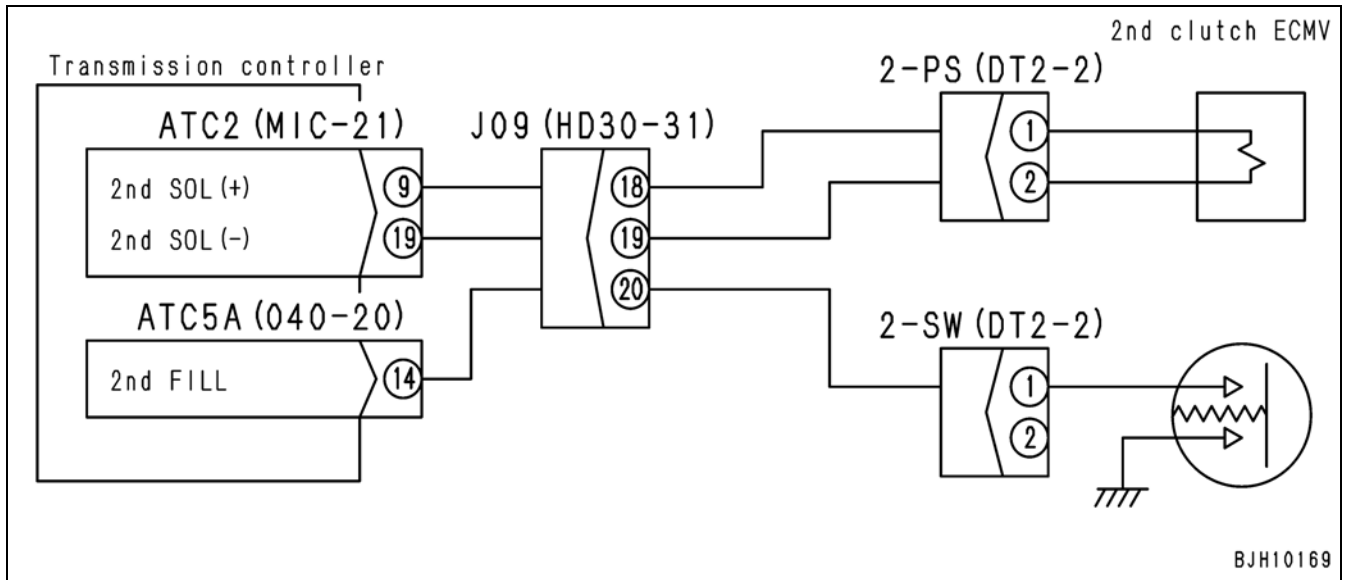
Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adapter kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [DAQ9KM]	Specifications	No.	Readings
1. Wiring Harness Assembly Test	<ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (ATC1 and ATC5B) connector from transmission controller and install T-adapter on (ATC1 and ATC5B) wiring harness connector only 			
A. Open or high resistance	Resistance Ω	Between connector ATC1, (8) and chassis ground.	0.0 to 1.0Ω	1
		Between connector ATC1, (16) and chassis ground.	0.0 to 1.0Ω	2
		Between connector ATC5B, (14) and chassis ground.	0.0 to 1.0Ω	3
		Between connector ATC5B, (15) and chassis ground.	0.0 to 1.0Ω	4
		Between connector ATC5B, (16) and chassis ground.	0.0 to 1.0Ω	5
2. Transmission Controller Unit	<ul style="list-style-type: none"> No testing procedure for the controller. <p><i>Remark</i> If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</p>			

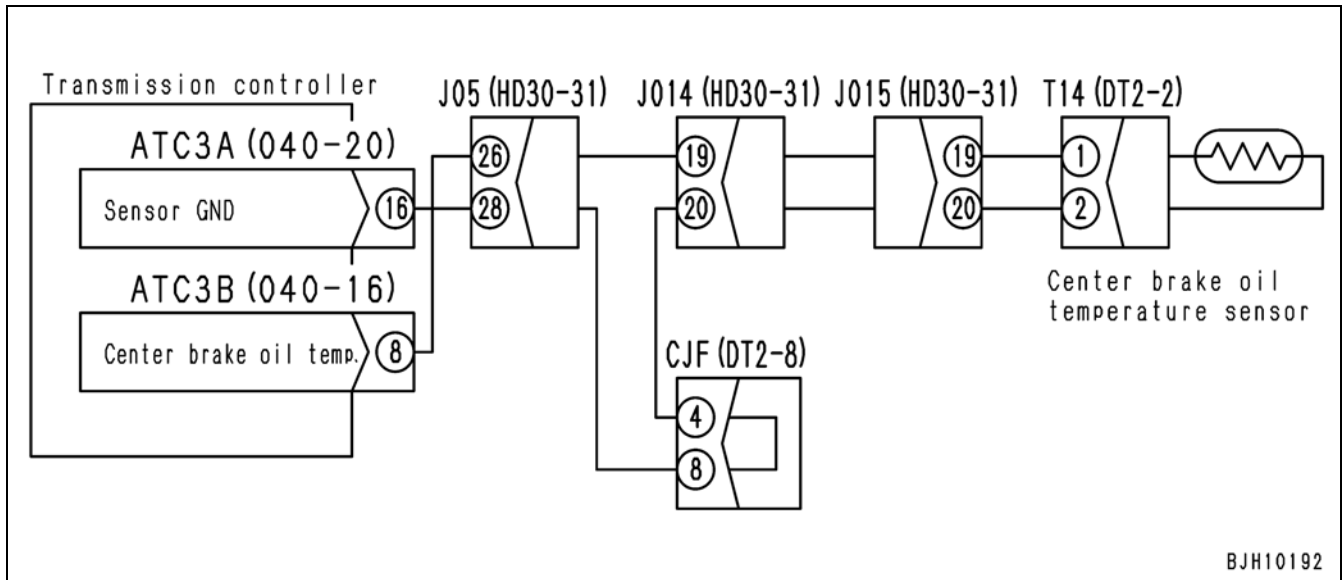
Related circuit diagram



Related circuit diagram



Related circuit diagram



(TM-71) FAILURE CODE [DLE2LC]

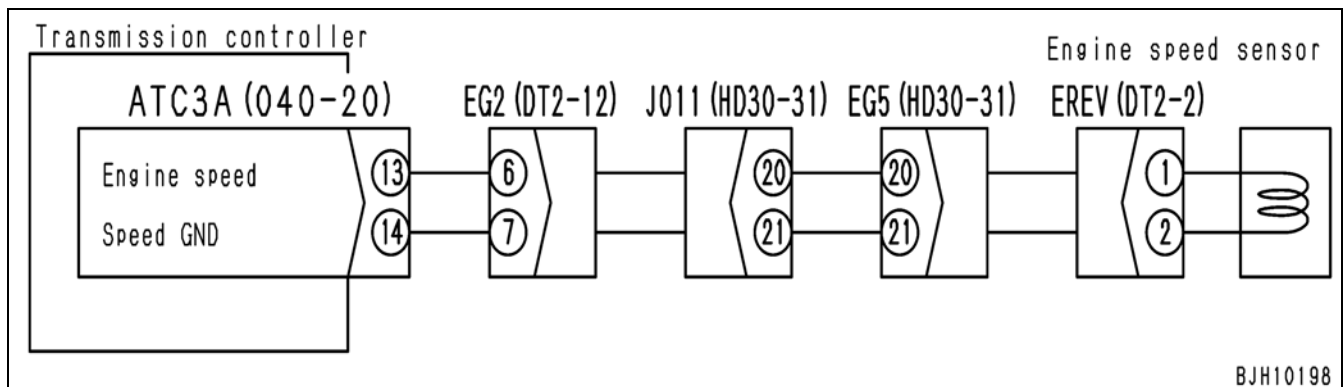
ENGINE SPEED SENSOR OPEN OR SHORTED (LC)

Contents Of Trouble	<ul style="list-style-type: none"> • Short in engine speed sensor. • TM code 71 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> • Digital Volt Ohm Meter. T-adpater kit. • Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. • If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. • Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [DLE2LC]	Specifications	No.	Readings
1. Engine Speed Sensor	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (EREV) connector from sensor and isolate sensor. • Zero meter leads for proper Ω readings. 			
A. Solenoid test	Resistance Ω	At sensor EREV, between (1) and (2)	500 to 1000 Ω	1
		At sensor EREV, between (1) or (2) and chassis ground.	(OL) open	2
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (EREV) connector from sensor. • Disconnect (ATC3A) connector from transmission controller and install T-adpater on (ATC3A) wiring harness connector only 			
A. Open or high resistance	Resistance Ω	Between connectors EREV, (1) and ATC3A, (13)	0.0 to 1.0 Ω	3
		Between connectors EREV, (2) and ATC3A, (14)	0.0 to 1.0 Ω	4
B. Short to chassis ground or within harness	Resistance Ω	Between connector EREV, (1) and chassis ground.	(OL) open	5
		Between connector EREV, (2) and chassis ground.	(OL) open	6
		At connector EREV, between (1) and (2)	(OL) open	7
3. Transmission Controller Unit	<ul style="list-style-type: none"> • No testing procedure for the controller. <p>Remark If all test results fall within the specifications listed above in the testing procedures, the error may be in your <i>Transmission Controller Unit</i>. Be sure all steps are completed correctly before faulting the controller unit.</p>			

Related circuit diagram



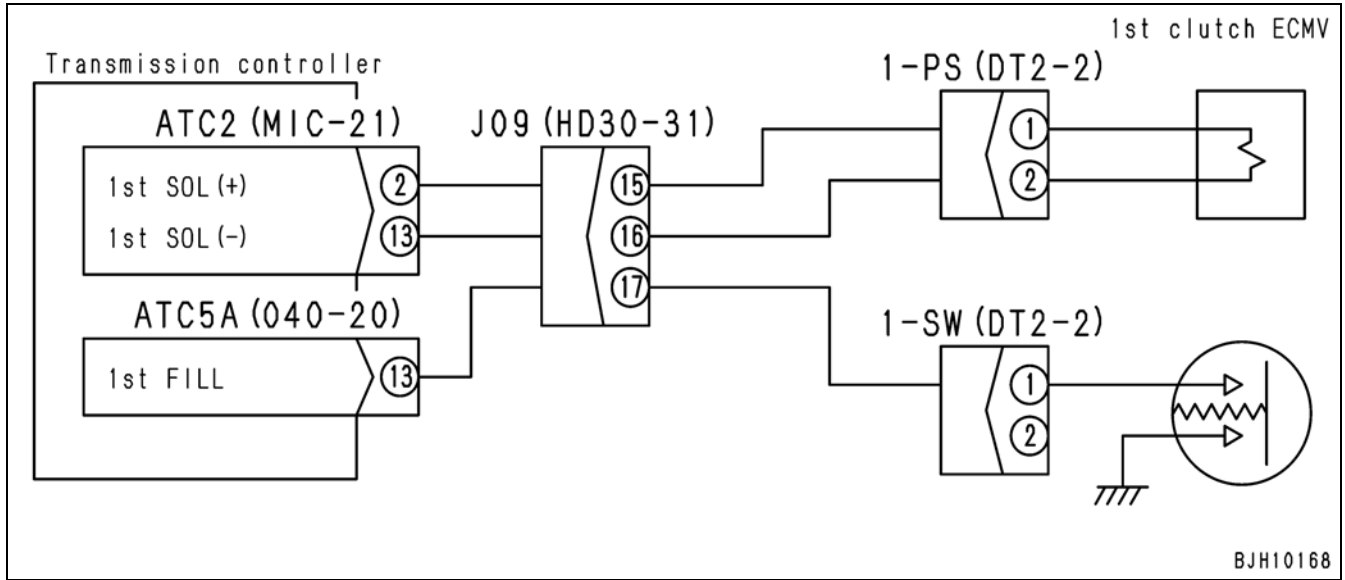
(TM-80) FAILURE CODE [DXH1KA]**LOCK-UP CLUTCH SYSTEM OPEN OR SHORTED (KA)**

Contents Of Trouble	<ul style="list-style-type: none"> Lock-up clutch system open or short. TM code 80 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adaptor kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [DXH1KA]	Specifications	No.	Readings	
1. Lock-up Solenoid And Switch	<ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (L/U-PS) connector from solenoid and isolate solenoid. Disconnect (L/U-SW) connector from switch and isolate switch. Zero meter leads for proper Ω readings. 				
A. Solenoid and switch test	Resistance Ω	At solenoid L/U-PS, between (1) and (2)	5 to 15 Ω	1	
		At switch L/U-SW, between (1) and (2)	(OL) open	2	
		At switch L/U-SW, between (1) and (2) engine running and system operating.	0.0 to 1.0 Ω	3	
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (L/U-PS and L/U-SW) connectors from solenoid and switch, isolate connectors. Disconnect (ATC2 and ATC5A) connector from the transmission controller and install T-adaptor on (ATC2 and ATC5A) wiring harness connector only. 				
A. Open or high resistance	Resistance Ω	Between connectors L/U-PS, (1) and ATC2, (10)	0.0 to 1.0 Ω	4	
		Between connectors L/U-PS, (2) and ATC2, (20)	0.0 to 1.0 Ω	5	
		Between connectors L/U-SW, (1) and ATC5A, (11)	0.0 to 1.0 Ω	6	
B. Short to chassis ground or within harness	Resistance Ω	At connector L/U-PS, between (1) and chassis ground.	(OL) open	7	
		At connector L/U-PS, between (2) and chassis ground.	(OL) open	8	
		At connector L/U-PS, between (1) and (2)	(OL) open	9	
		At connector L/U-SW, between (1) and chassis ground.	(OL) open	10	
3. Transmission Controller Unit	<ul style="list-style-type: none"> No testing procedure for the controller. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

Related circuit diagram



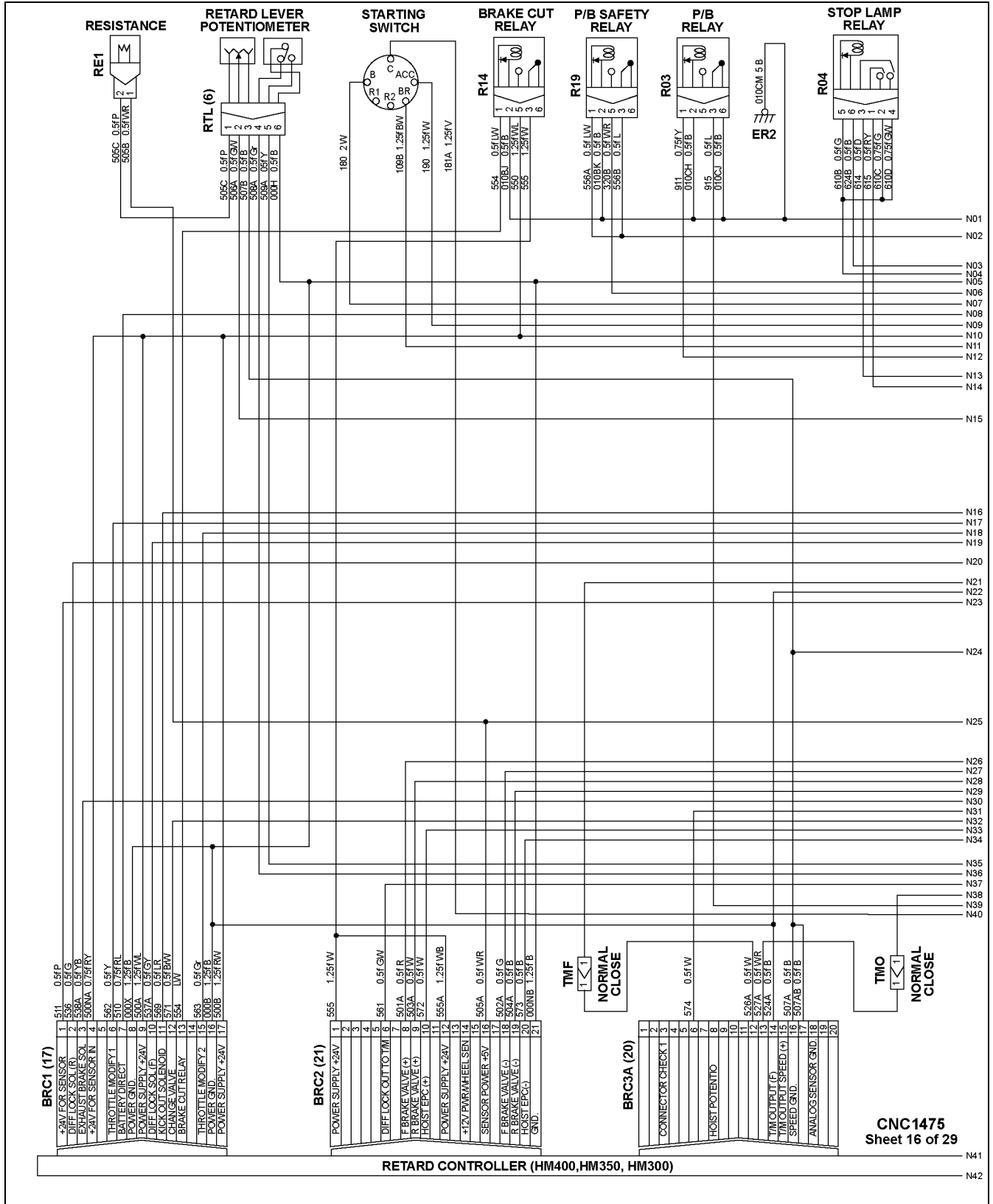
(TM-93) FAILURE CODE [DXH7KB]**REVERSE CLUTCH SYSTEM OPEN OR SHORTED (KB)**

Contents Of Trouble	<ul style="list-style-type: none"> Reverse clutch system open or short. TM code 93 displayed.
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Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adapter kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [DXH7KB]		Specifications	No.	Readings
1. Reverse Solenoid And Switch	<ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (R-PS) connector from solenoid and isolate solenoid. Disconnect (R-SW) connector from switch and isolate switch. Zero meter leads for proper Ω readings. 				
A. Solenoid and switch test	Resistance Ω	At solenoid R-PS, between (1) and (2)	5 to 15 Ω	1	
		At switch R-SW, between (1) and (2)	(OL) open	2	
		At switch R-SW, between (1) and (2) engine running and system operating.	0.0 to 1.0 Ω	3	
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (R-PS and R-SW) connectors from solenoid and switch, isolate connectors. Disconnect (ATC2 and ATC5A) connector from the transmission controller and install T-adapter on (ATC2 and ATC5A) wiring harness connector only. 				
A. Open or high resistance	Resistance Ω	Between connectors R-PS, (1) and ATC2, (5)	0.0 to 1.0 Ω	4	
		Between connectors R-PS, (2) and ATC2, (15)	0.0 to 1.0 Ω	5	
		Between connectors R-SW, (1) and ATC5A, (16)	0.0 to 1.0 Ω	6	
B. Short to chassis ground or within harness	Resistance Ω	At connector R-PS, between (1) and chassis ground.	(OL) open	7	
		At connector R-PS, between (2) and chassis ground.	(OL) open	8	
		At connector R-PS, between (1) and (2)	(OL) open	9	
		At connector R-SW, between (1) and chassis ground.	(OL) open	10	
3. Transmission Controller Unit	<ul style="list-style-type: none"> No testing procedure for the controller. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Transmission Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

BK CONTROL SYSTEM CIRCUIT DIAGRAM

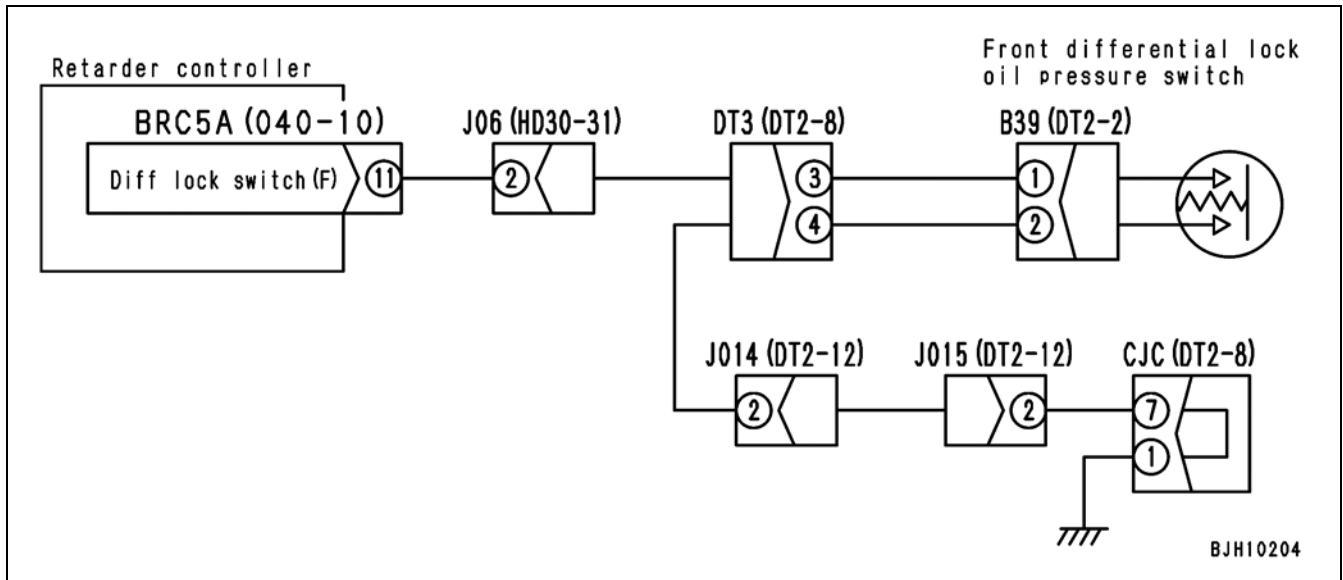


CNC1475
Sheet 16 of 29

Failure Code	Location Of Failure	Nature Of Failure	Probable Cause
DB1SKQ (BK-22)	Retarder controller (q1) S-NET line: Model selection signal mismatch (KQ)	Communication (S-NET) with transmission controller is defective and it is impossible to obtain model selection data	<ul style="list-style-type: none"> • Other problem occurs at same time (failure codes [DAFSKQ] [DAQAKR] [DAQSKQ] is displayed) • Open in S-NET circuit wiring harness • Defective transmission controller • Defective retarder controller (*)
DHU2KZ (BK-23)	Accumulator oil pressure sensor (front): Input signal outside range (KX)	Voltage of signal circuit of front accumulator oil pressure sensor went below 0.5 V or above 4.5 V	<ul style="list-style-type: none"> • Defective front accumulator oil pressure sensor • Open or short circuit with chassis ground in sensor power source circuit wiring harness • Defective retarder controller (*)
DHU3KX (BK-24)	Accumulator oil pressure sensor (rear): Input signal outside range (KX)	Voltage of signal circuit of rear accumulator oil pressure sensor went below 0.5 V or above 4.5 V	<ul style="list-style-type: none"> • Defective rear accumulator oil pressure sensor • Open or short circuit with chassis ground in sensor power source circuit wiring harness • Defective retarder controller (*)
DK51L5 (BK-25)	Retarder lever potentiometer: * See separate table (BK)	Signal voltage of potentiometer of retarder lever circuit went below 0.3 V or above 4.7 V, or potentiometer signal and switch signal do not match	<ul style="list-style-type: none"> • Defective retarder lever (*) (potentiometer, switch) • Open or short circuit with chassis ground, or short circuit with power source in potentiometer power source circuit signal circuit wiring harness • Open or short circuit with chassis ground, or short circuit with power source in potentiometer signal signal circuit wiring harness • Open or short circuit with chassis ground, or short circuit with power source in switch 1 circuit wiring harness • Open or Openshort circuit with chassis ground, or short circuit with power source in switch 2 circuit wiring harness • Open in switch GND circuit wiring harness • Defective retarder controller (*)
DK52KX (BK-26)	Dump lever potentiometer 1: Input signal outside range (KX)	Voltage of potentiometer 1 signal circuit or potentiometer 2 signal circuit went below 0.3 V or above 4.7 V	<ul style="list-style-type: none"> • Defective dump lever (potentiometer) • Open or short circuit with chassis ground, or short circuit with power source in power source circuit wiring harness • Open in GND circuit wiring harness • Open or short circuit with chassis ground, or short circuit with power source in signal 1 circuit wiring harness • Open or short circuit with chassis ground, or short circuit with power source in signal 2 circuit wiring harness • Defective retarder controller (*)

* Used as the brake controller in E-SPEC.

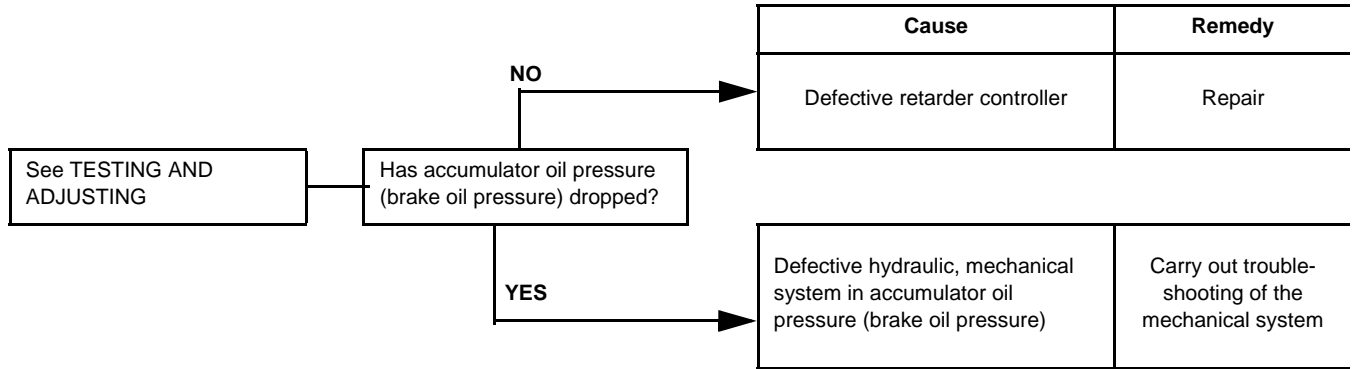
Related circuit diagram



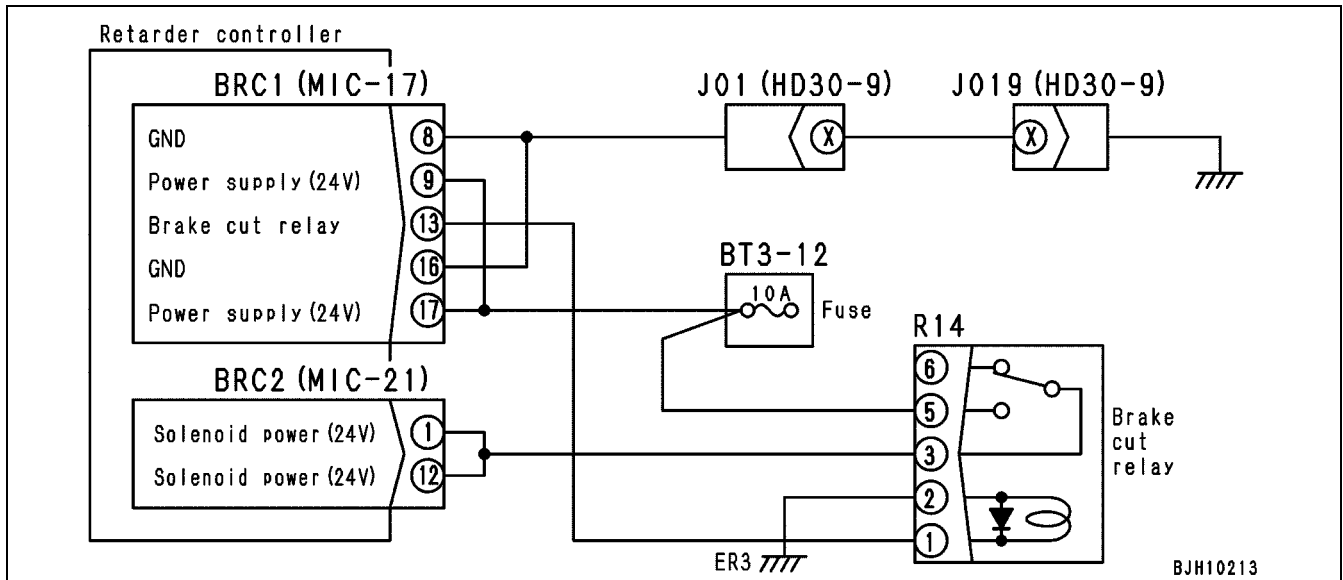
(BK-12) FAILURE CODE [2G42ZG]

ACCUMULATOR (FRONT): DROP IN OIL PRESSURE (ZG)

- ★ Nature of failure: With the engine running (continuously for at least 30 seconds), oil pressure of less than 6.86 MPa {70 kg/cm²} was input for the front accumulator oil pressure sensor signal



Related circuit diagram



(BK-27) FAILURE CODE [DK53L8]

DUMP LEVER INPUT SIGNAL OUT OF RANGE (L8)

Contents Of Trouble	• The voltage of potentiometer 1 signal circuit or potentiometer 2 signal circuit went below 0.3 V or above 4.7 V.
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Tools and Procedures	• Digital Volt Ohm Meter. T-adaptor kit.
	• Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests.
	• If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure.
	• Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.

Steps	Circuit Diagnostic Procedures For Failure Code [DK52KX]		Specifications	No.	Readings
1. Dump Lever Switch	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (HSL) connector from dump lever and isolate dump lever. • Disconnect (LKO) connector from resistor and isolate resistor. • Zero meter leads for proper Ω readings. 				
A. Dump lever switch test	Resistance Ω	At switch HSL, between (1) and (4)		1	
		At switch HSL, between (1) and (2)		2	
		At switch HSL, between (2) and (4)		3	
		At switch HSL, between (3) and (4)		3	
		At resistor LKO, between (1) and (2)	39 to 45 Ω	4	
		At resistor LKO, between (1) or (2) and chassis ground.	(OL) open	5	
2. Wiring Harness Assembly Test	<ul style="list-style-type: none"> • With ignition switch in the "OFF" position. • Disconnect (HSL and LKO) connectors from dump lever and isolate connectors. • Disconnect (BRC1, BRC3A and BRC3B) connector from the retarder controller and install T-adaptor on (BRC1, BRC3A and BRC3B) wiring harness connector only. 				
A. Open or high resistance	Resistance Ω	Between connectors HSL, (1) and BRC3A, (16)	0.0 to 1.0 Ω	6	
		Between connectors HSL, (2) and BRC3B, (14)	0.0 to 1.0 Ω	7	
		Between connectors HSL, (3) and BRC3B, (12)	0.0 to 1.0 Ω	8	
		Between connectors HSL, (4) and BRC3A, (6)	0.0 to 1.0 Ω	9	
		Between connectors LKO, (1) and BRC1, (11)	0.0 to 1.0 Ω	10	
		Between connectors LKO, (2) and chassis ground.	0.0 to 1.0 Ω	11	
B. Short to chassis ground or within harness	Resistance Ω	At connector HSL, between (1) and chassis ground.	(OL) open	12	
		At connector HSL, between (2) and chassis ground.	(OL) open	13	
		At connector HSL, between (3) and chassis ground.	(OL) open	14	
		At connector HSL, between (4) and chassis ground.	(OL) open	15	
		At connector LKO, between (1) and (2)	(OL) open	16	
		At connector HSL, between (1) and (2), (3), (4)	(OL) open	17	
		At connector HSL, between (2) and (3), (4)	(OL) open	18	
		At connector HSL, between (3) and (4)	(OL) open	19	
3. Retarder Controller Unit	<ul style="list-style-type: none"> • No testing procedure for the controller. 				
Remark	<p><i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your Retarder Controller Unit. Be sure all steps are completed correctly before faulting the controller unit.</i></p>				

(BK-35) FAILURE CODE [DX11KB]

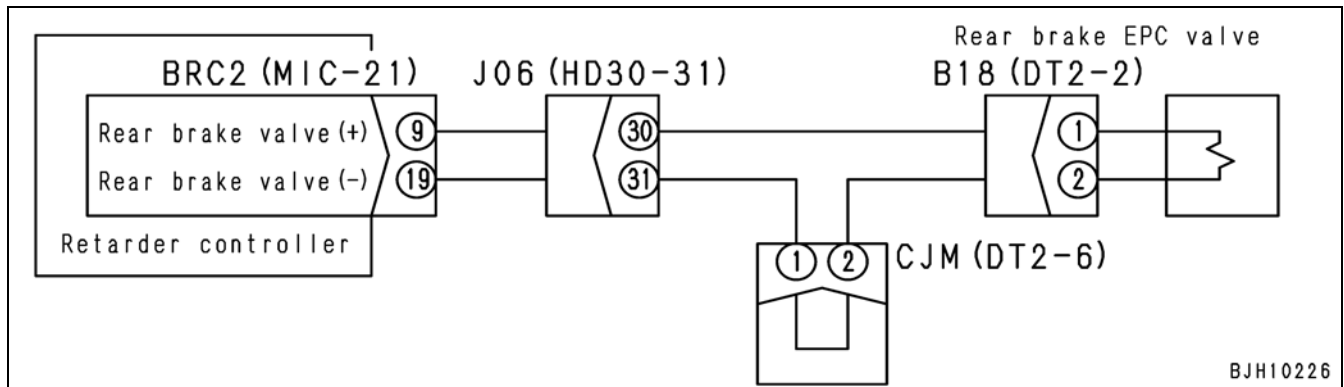
REAR BRAKE PRESSURE REDUCING SOLENOID OPEN OR SHORTED (KB)

Contents Of Trouble	<ul style="list-style-type: none"> When output is sent to the rear brake pressure reducing valve solenoid circuit, excessive electric current flows
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Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adaptor kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [DX11KB]		Specifications	No.	Readings
1. Rear Brake Solenoid <ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (B18) connector from solenoid and isolate solenoid. Zero meter leads for proper Ω readings. 					
A. Solenoid test	Resistance Ω	At solenoid B18, between (1) and (2)	10 to 30 Ω	1	
		At solenoid B18, between (1) or (2) and chassis ground.	(OL) open	2	
2. Wiring Harness Assembly Test <ul style="list-style-type: none"> With ignition switch in the "OFF" position. Disconnect (B18) connector from solenoid and isolate connector. Disconnect (BRC2) connector from retarder controller and install T-adaptor on (BRC2) wiring harness connector only. 					
A. Short to chassis ground or within harness	Resistance Ω	Between connector B18, (1) and chassis ground.	(OL) open	3	
		At connector B18, between (1) and (2)	(OL) open	4	
B. Open or high resistance	Resistance Ω	Between connectors B18, (1) and BRC2, (9)	0.0 to 1.0 Ω	5	
		Between connectors B18, (2) and BRC2, (19)	0.0 to 1.0 Ω	6	
3. Retarder Controller Unit <ul style="list-style-type: none"> No testing procedure for the controller. <p>Remark If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Retarder Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</p>					

Related circuit diagram



(BK-44) NO FAILURE CODE DISPLAYED**PARKING BRAKE SYSTEM FAILURE**

Contents Of Trouble	<ul style="list-style-type: none"> Nature of failure: The parking brake does not work properly (no failure code is displayed) Before starting troubleshooting, check that fuse BT2-6 is normal (if the fuse is blown, there has probably been a surge of current caused by a short circuit, so check the related circuits).
---------------------	---

Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adaptor kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Failure Code [NONE]	Specifications	No.	Readings		
	Fuse Check	—	Check to see if fuse (BT2-6) is blown	—	1	Yes or No
1.	Parking Brake Safety Relay					
	<ul style="list-style-type: none"> With ignition switch in the “OFF” position. Replace relay (R19) with known good relay. Turn ignition switch to the “ON” position. 					
A.	Relay check	—	Does system work properly now?	—	2	Yes or No
2.	Parking Brake Solenoid					
	<ul style="list-style-type: none"> With ignition switch in the “OFF” position. Disconnect (B14) connector from solenoid and isolate solenoid. Zero meter leads for proper Ω readings. 					
A.	Solenoid test	Resistance Ω	At solenoid B14, between (1) and (2)	30 to 50 Ω	3	
			At solenoid B14, between (1) or (2) and chassis ground.	(OL) open	4	
3.	ACC Oil Pressure Switches					
	<ul style="list-style-type: none"> With ignition switch in the “OFF” position. Disconnect (B20 and B21) connector from oil pressure switch and isolate switch. Zero meter leads for proper Ω readings. 					
A.	Switch test	Resistance Ω	At switch B20, between (1) and (2)	(OL) open	5	
			At switch B20, between (1) or (2) and chassis ground.	(OL) open	6	
			At switch B21, between (1) and (2)	(OL) open	7	
			At switch B21, between (1) or (2) and chassis ground.	(OL) open	8	
4.	Wiring Harness Assembly Test					
	<ul style="list-style-type: none"> With ignition switch in the “OFF” position. Disconnect (R19) connector from relay. Disconnect (R33) connector from manual switch and isolate connector. Disconnect (B20 and B21) connectors ACC oil pressure switches and isolate connectors. Disconnect (B14) connector from parking brake solenoid and isolate connector. * Turn ignition switch to the “ON” position for this test. 					
A.	Short to chassis ground or within harness	Resistance Ω	Between connection B21, (1) and chassis ground.	(OL) open	9	
			Between connection B21, (2) and chassis ground.	(OL) open	10	
			Between connection B20, (1) and chassis ground.	(OL) open	11	
			Between connection B20, (2) and chassis ground.	(OL) open	12	
			Between connection R33, (1) and chassis ground.	(OL) open	13	
			Between connection R33, (3) and chassis ground, fuse removed.	(OL) open	14	

(MON-6) FAILURE CODE [DAF9KM]

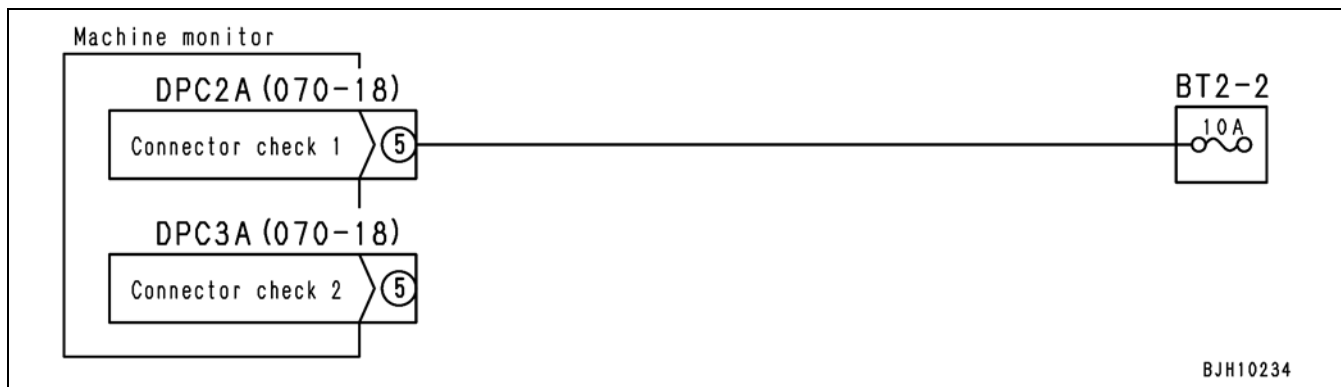
MISTAKEN OPERATION OR SETTING IN MONITOR PANEL (KM)

Contents Of Trouble	<ul style="list-style-type: none"> The check signal of the connector does not match the internal setting of the machine monitor. Before starting troubleshooting, check that fuse BT2-2 is normal (if the fuse is blown, there has probably been a surge of current caused by a short circuit, so check the related circuits).
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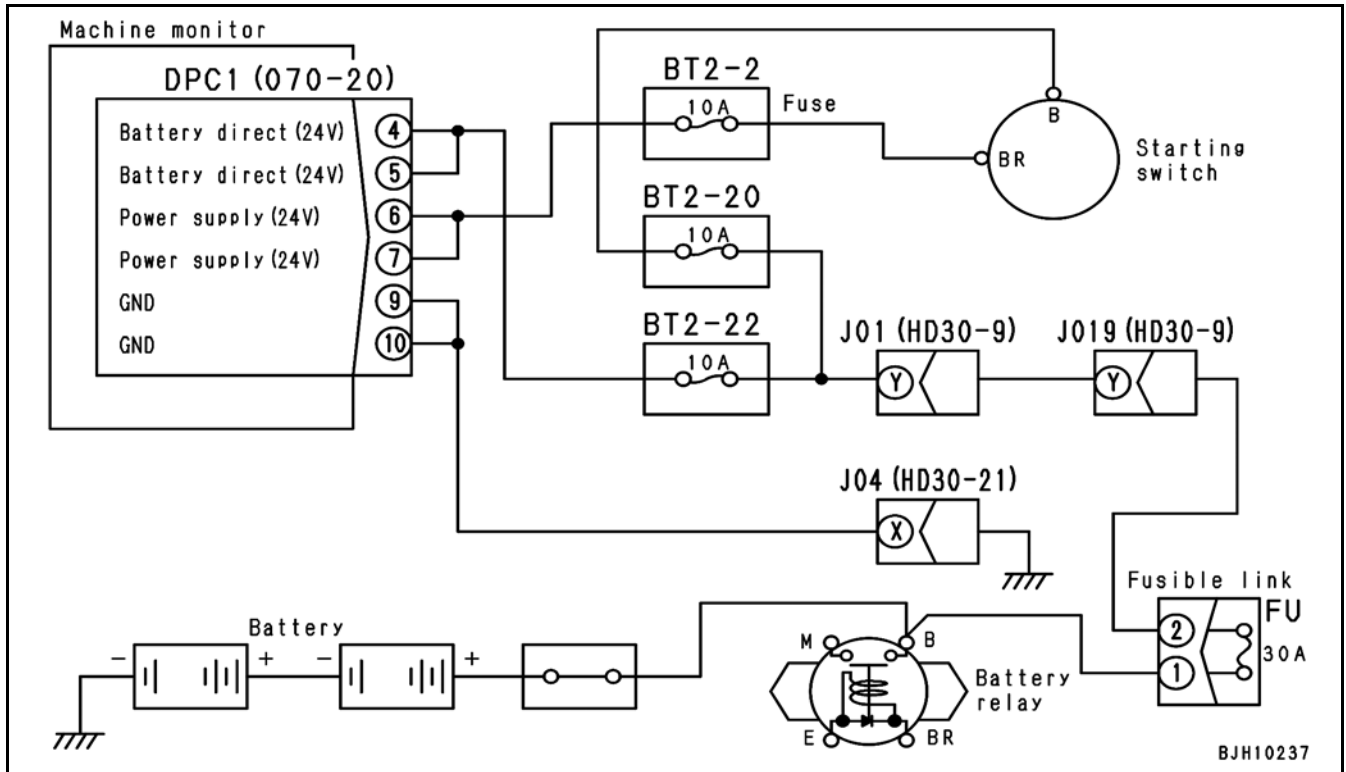
Tools and Procedures	<ul style="list-style-type: none"> Digital Volt Ohm Meter. T-adaptor kit. Do not mark on original page of service manual. Remove this page from the service manual and make a copy for recording information while performing these tests. If you are unable to copy this page, record readings on a separate paper referring to the (No.) numbers listed on the right of the procedure. Follow each step throughout this procedure, do not skip steps, jump ahead or stop when a fault is found unless otherwise instructed to in the procedure. It is important to complete all steps and record information for final analyzing.
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Steps	Circuit Diagnostic Procedures For Action Code [E03]		Specifications	No.	Readings
Fuse Check	—	Check fuse (BT2-2)	Fuse good?	1	Yes or No
1. Wiring Harness Assembly Test <ul style="list-style-type: none"> With ignition switch in the “OFF” position. Disconnect monitor controller (DPC2A) and install T-adaptor between wiring harness connector and monitor controller (DPC2A). Turn ignition switch to the “ON” position. 					
A. Open or high resistance	Voltage	At connector DPC2A, (5) and chassis ground.	20 to 30V	2	
2. Monitor Controller Unit <ul style="list-style-type: none"> No testing procedure for the controller. 					
Remark <i>If all test results fall within the specifications listed above in the testing procedures, the error may be in your <u>Monitor Controller Unit</u>. Be sure all steps are completed correctly before faulting the controller unit.</i>					

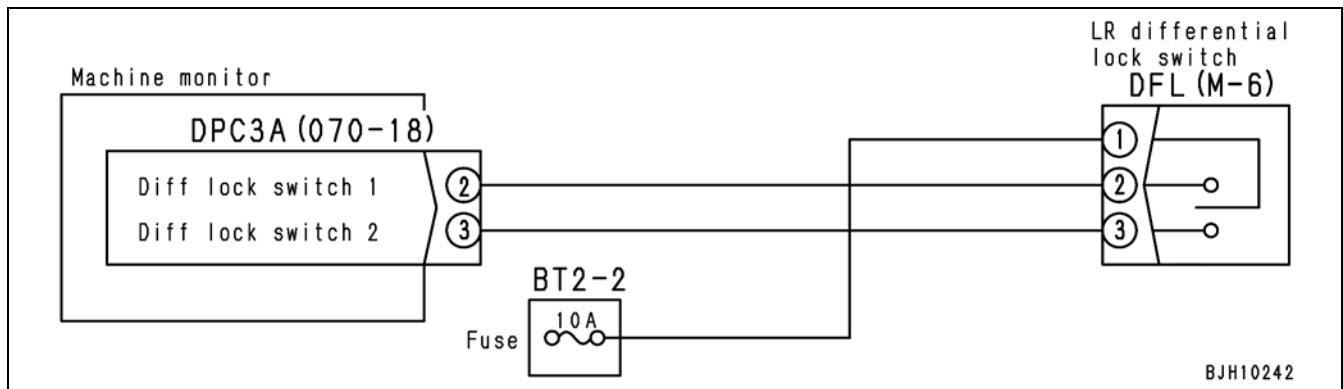
Related circuit diagram



Related circuit diagram



Related circuit diagram



A. Open or high resistance	Resistance Ω	Between connectors R29, (2), (4) and P01, (3), P32, (3)	0.0 to 1.0 Ω	13	
		Between connectors R29, (2), (4) and DPC2A, (1)	0.0 to 1.0 Ω	14	
		Between connectors R29, (2), (4) and R31, (8), (6)	0.0 to 1.0 Ω	15	
		Between connectors R29, (1), (3) and CM, (1), (4)	0.0 to 1.0 Ω	16	
		Between connectors R29, (6) and chassis ground.	0.0 to 1.0 Ω	17	
		Between connectors R29, (5) and CM, (5)	0.0 to 1.0 Ω	18	
		Between connectors R29, (5) and R30, (1)	0.0 to 1.0 Ω	19	
		Between connectors R29, (5) and R31, (10)	0.0 to 1.0 Ω	20	
		Between connectors R30, (6) and P01, (1), P32, (1)	0.0 to 1.0 Ω	21	
		Between connectors R30, (3) and R31, (5), (7)	0.0 to 1.0 Ω	22	
		Between connectors R30, (2) and chassis ground.	0.0 to 1.0 Ω	23	
		Between connectors R31, (1, 2, 3, 4) and CM, (3)	0.0 to 1.0 Ω	24	
		Between connectors R31, (9) and chassis ground.	0.0 to 1.0 Ω	25	
		Between connectors LS, (3) and chassis ground.	0.0 to 1.0 Ω	26	
		Between connectors LS, (2) and DPC2B, (12)	0.0 to 1.0 Ω	27	
		Between connectors LS, (1) and DPC2B, (5)	0.0 to 1.0 Ω	28	
		Between connectors LS, (1) and CM, (2)	0.0 to 1.0 Ω	29	
		Between connectors LS, (1) and P02	0.0 to 1.0 Ω	30	
		Between connectors LS, (1) and P31	0.0 to 1.0 Ω	31	
		Between connectors LS, (1) and JO13, (3), (6)	0.0 to 1.0 Ω	31	
B. Short to chassis ground or within harness	Resistance Ω	Between connector CM, (2) and chassis ground.	(OL) open	33	
		Between connector CM, (3) and chassis ground.	(OL) open	34	
		Between connector CM, (4) and chassis ground.	(OL) open	35	
		Between connector CM, (5) and chassis ground.	(OL) open	36	

(H-11)

CENTER BRAKING SYSTEM IS INEFFECTIVE OR EFFECTIVE ON ONE SIDE

Checks Before Troubleshooting

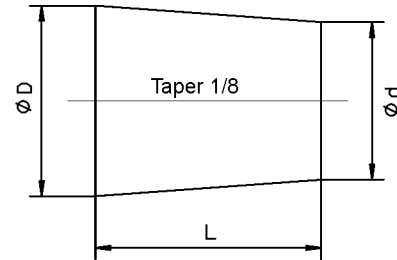
- Is the oil level in the transmission correct?
- Is the brake pedal play correct?
- Is there any oil leakage from the brake piping?
- Is the tire inflation and tread wear good?
- Are any failure codes relating to the system being displayed?

		Causes														
		a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
		Defective PPC pump drive system (PTO)														
		Air is being sucked into the suction side of the PPC pump														
		Defective PPC pump														
		Defective accumulator charge valve														
		Drop in accumulator gas pressure (gas leakage, defective seal)														
		Defective brake valve (center rear)														
		Defective slack adjuster														
		Defective wheel brake piston seal														
		Defective operation of wheel brake piston														
		Breakage inside wheel brake														
		Worn wheel brake disc														
		Defective retarder lever														
		Defective rear brake pressure reducing valve														
		Air in brake circuit														
		Inner axle oil level														
No.	Diagnosis	Remedy	X	Δ	Δ X	Δ X	X	Δ X	Δ X	Δ X	Δ X	Δ X	Δ X	Δ X	Δ X	Δ X
1	Brake has no effect only when brake pedal is depressed							○								
2	When brake pedal is depressed it feels light		○	○	○			○		○						○
3	When brake pedal is depressed it feels heavy							○								
4	When retarder lever is pulled retarder has no effect (not used in E-SPEC)												○	○		
5	Extreme amount of effort needed to obtain specific braking effect					○	○	○		○						
6	When brakes are applied, abnormal noise is heard from brakes										○	○				○
7	Hydraulic and steering do not work		○													
8	Abnormal noise is heard from around PTO		○													
9	Abnormal noise is heard around transmission oil pan or PPC pump			○	○											
10	When oil is drained from axle case, large amounts of metal particles are found											○				
11	Accumulator charge pressure is low			○	○											
12	Brake immediately losses power after engine is stopped					○										
13	There is a time lag before brake starts to take effect							○								○
14	Brake oil pressure is low								○							
15	Brake disc wear is excessive										○	○				
16	Air is found when bleeding the braking system														○	

DISASSEMBLY AND ASSEMBLY PRECAUTIONS WHEN CARRYING OUT OPERATION

D. If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Part Number	Dimensions (mm)		
		D	d	L
06	07049-00608	6	5	8
08	07049-00811	8	6.5	11
10	07049-01012	10	8.5	12
12	07049-01215	12	10	15
14	07049-01418	14	11.5	18
16	07049-01620	16	13.5	20
18	07049-01822	18	15	22
20	07049-02025	20	17	25
22	07049-02228	22	18.5	28
24	07049-02430	24	20	30
27	07049-02734	27	22.5	34



DEW00401

2. Precautions when carrying out installation work


- Tighten all bolts and nuts (sleeve nuts) to the specified (KES) torque.
- Install the hoses without twisting or interference.
- Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
- Bend the cotter pins and lock plates securely.
- When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with two - three drops of adhesive.
- When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
- Clean all parts, and correct any damage, dents, burrs, or rust.
- Coat rotating parts and sliding parts with engine oil.
- When press fitting parts, coat the surface with anti-friction compound (LM-P).
- After fitting snap rings, check that the snap ring is fitted securely in the ring groove.
- When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
- When using eyebolts, check that there is no deformation or deterioration, screw them in fully, and align the direction of the hook.
- When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
- ★ When operating the hydraulic cylinders for the first time after reassembling cylinders, pumps and other hydraulic equipment removed for repair, always bleed the air as follows:
 - A. Start the engine and run at low idling.
 - B. Operate the work equipment control lever to operate the hydraulic cylinder 4 - 5 times, stopping the cylinder 100 mm from the end of its stroke.
 - C. Next, operate the hydraulic cylinder 3 - 4 times to the end of its stroke.
 - D. After doing this, run the engine at normal speed.
- ★ When using the machine for the first time after repair or long storage, follow the same procedure.

3. Precautions when completing the operation

- If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the water level again.
- If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
- If the piping or hydraulic equipment has been removed, always bleed the air from the system after reassembling the parts. For details, see TESTING AND ADJUSTING, Bleeding air.
- Add the specified amount of grease (molybdenum disulphide grease) to the work equipment parts.

ENGINE ASSEMBLY INSTALLATION

- Carry out installation in the reverse order of removal.

 **1** Charge the air conditioner with refrigerant (R134a).

 **2**

- When installing the drive shaft, check that the key way of the spider cap is matched to that of the mating yoke and tighten the bolts.



Drive shaft mounting bolts between engine and transmission:

Adhesive (LT-2)



Mounting bolts of drive shaft between engine and transmission: 98 - 123 N•m

Target: 113 N•m

 **3**



Engine mounting bolt: 662 - 829 N•m

Target: 113 N•m

 **4**

- ★ When dismantling the engine assembly, transmission and torque converter assembly or drive shafts, center the engine and transmission in the left and right direction in the following manner, using tool **A4**.

A. Install tool **A4** to the coupling on the engine side and the coupling on the torque converter side.

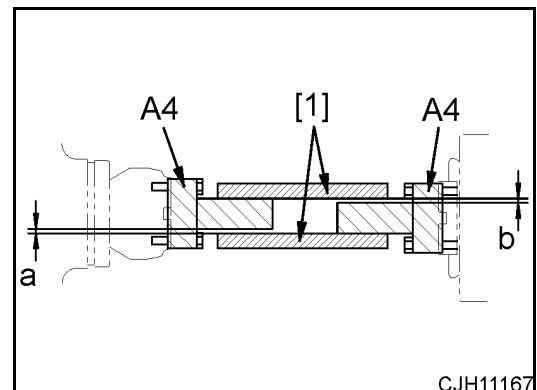
B. Put scale [1] to the left and right sides of tool **A4**.

C. Measure the clearance between scale [1] and tool **A4** on the left side "a" and on the right side "b".

- ★ Check that the maximum clearance remains below 3 mm both on the left and right sides. (If both clearances are not in parallel, check that the clearance remains less than 3 mm even at the widest point)

- ★ If the clearance exceeds 3 mm, make adjustment by shifting the position of torque converter and transmission assembly mount.

- ★ When installing the drive shaft, check that the keyway of spider cap fully engage with that of the corresponding yoke, and then tighten the mounting bolt.



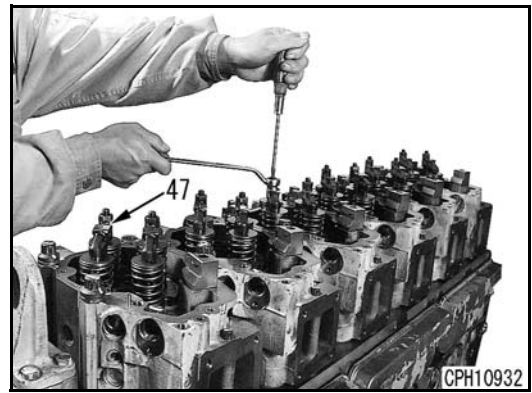
CJH11167



Mounting bolt: Liquid adhesive compound (LT-2)

✖11

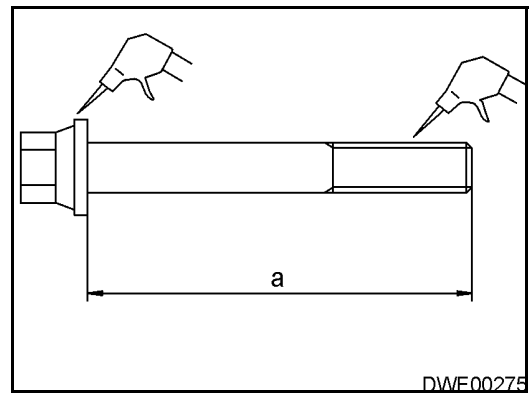
- ★ Adjust the cross head according to the following procedure.
- M. Loosen the locknut and return the adjustment screw.
- N. Holding the top of the cross head (47) lightly, tighten the adjustment screw.
- O. After the adjustment screw touches the valve stem, tighten it further by 20°.
- P. Tighten the locknut

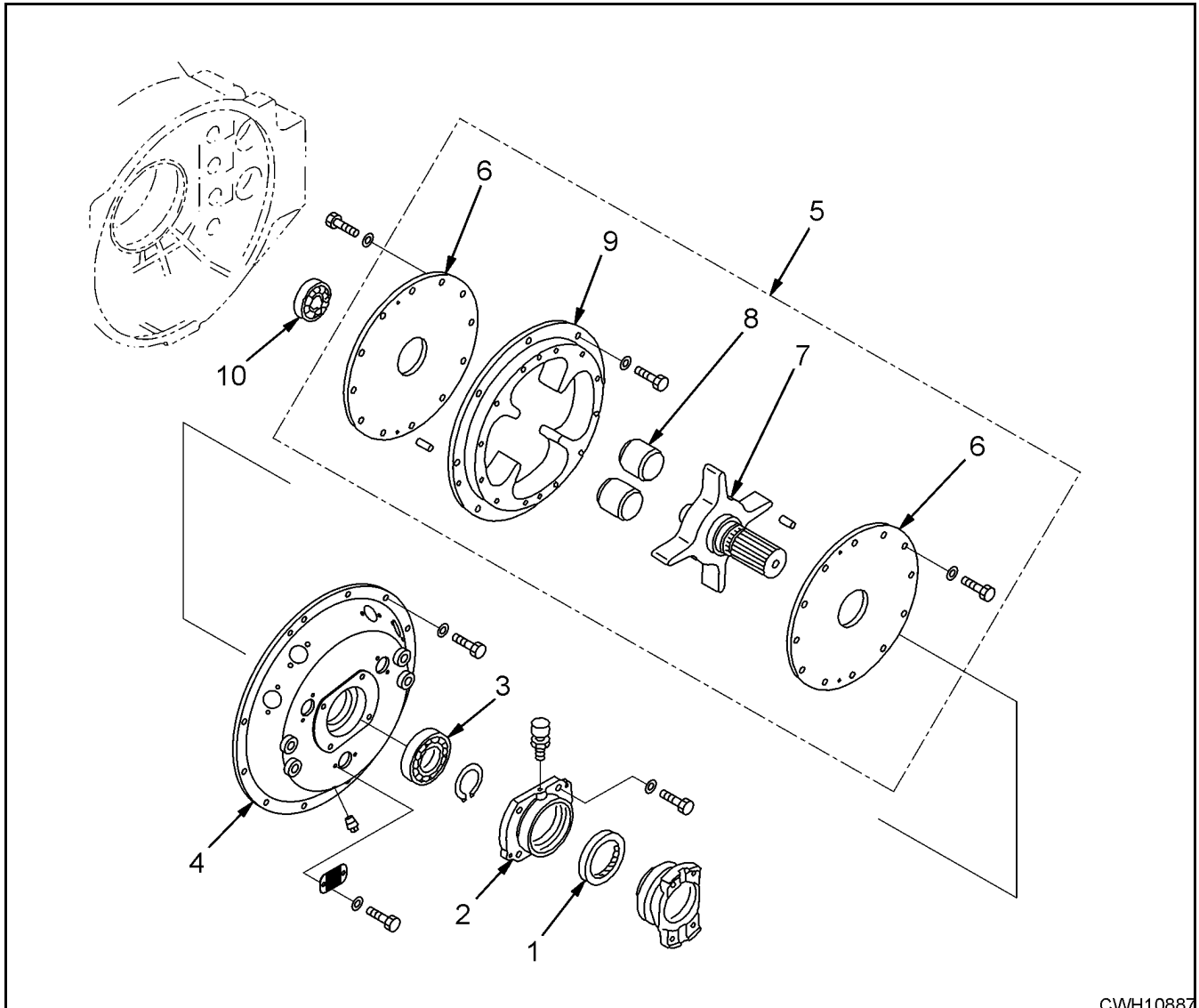


Locknut: 53 - 64.7 N•m

✖12

4. Check that the cylinder head mounting face and inside of the cylinder are free of foreign matter, then set cylinder head gasket.
 - ★ When fitting the gasket, check that the grommets are fitted correctly.
5. Before tightening the cylinder head mounting bolts, check the following item.
 - ★ If a bolt is longer than the following using limit or has been tightened five times (having five punch marks denoting the number of tightening times) or more, replace it.
 - A. Measure stem length "a" of every bolt and make sure that it is less than the using limit.
 - B. Using limit length of bolt
 - Short bolt: 170.8 mm
 - Long bolt: 205.8 mm



OUTPUT SHAFT DISASSEMBLY DIAGRAM

CWH10887

1. Oil cage assembly
Remove oil seal (1) from cage (2).
2. Cover assembly
Remove bearing (3) from cover (4).
3. Damper assembly (5)
 - A. To keep the balance when reassembling, mark the set positions of flange (6), body assembly (7), and outer body (9) before disassembling.
 - B. Remove body assembly (7) and rubber (8) from outer body (9).
 - C. Remove bearing (10) from flywheel.

TRANSMISSION AND FRONT DIFFERENTIAL INSTALLATION

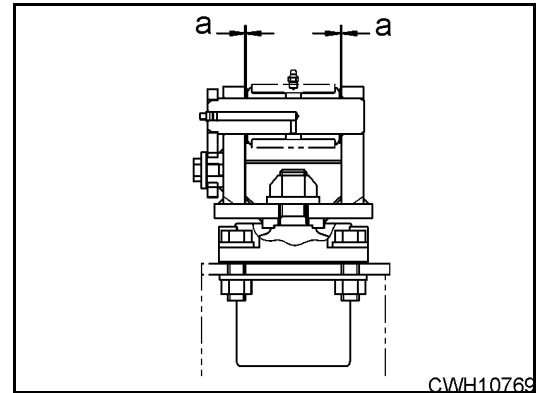
- Carry out installation in the reverse order of removal.



- Add refrigerant (R134a).



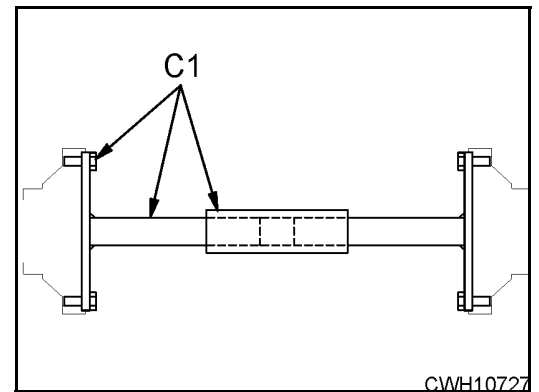
- Standard clearance "a" for operator's cab mounting pin: 0.2 mm (on each side)



- When installing the drive shaft, check that the key way of the spider cap is matched to that of the mating yoke and tighten the bolts.
- ★ Using tool C2, align the engine and torque converter with each other.



Drive shaft mounting bolts between engine and transmission:
Adhesive (LT-2)



Drive shaft mounting bolts between engine and transmission: 98 - 123 N•m
Target: 113 N•m



- When installing the drive shaft, check that the key way of the spider cap is matched to that of the mating yoke and tighten the bolts.





Drive shaft mounting bolts between transmission and hitch frame: Adhesive (LT-2)

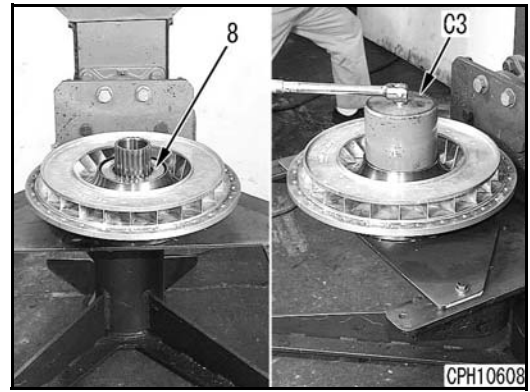


Drive shaft mounting bolts between transmission and hitch frame: 157 - 198 N•m
Target: 177 N•m

E. Using tool C3, tighten nut (8).

 Nut: Adhesive (LT-2)

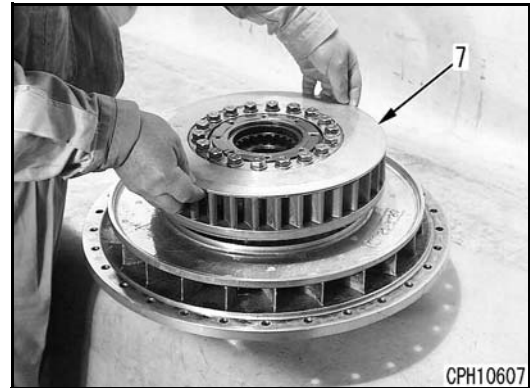
 **N•m** Nut: 441.3 - 490.3 N•m



5. Stator assembly


Install stator assembly (7).


- For further assembly, see "Assembly of stator."

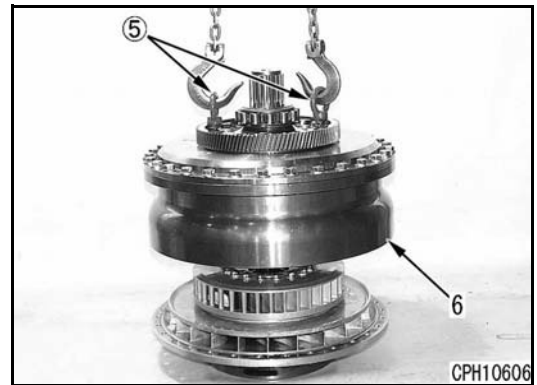


6. Turbine and clutch assembly

Using eyebolt ⑤, set turbine and clutch assembly (6) to the pump and tighten the mounting bolts.


 Mounting bolt: Adhesive (LT-2)


 **N•m** Mounting bolt: 49.0 - 58.8 N•m

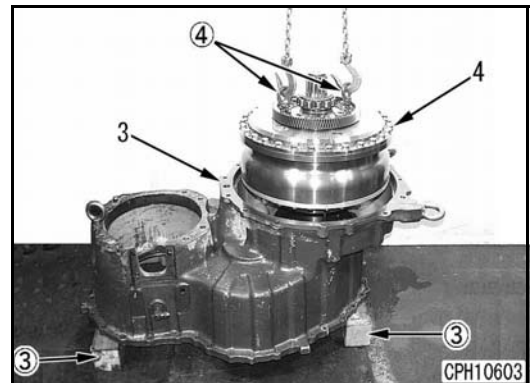


7. Torque converter assembly

Using eyebolt ④, set torque converter assembly (4) to torque converter housing (3) and tighten the mounting bolts.

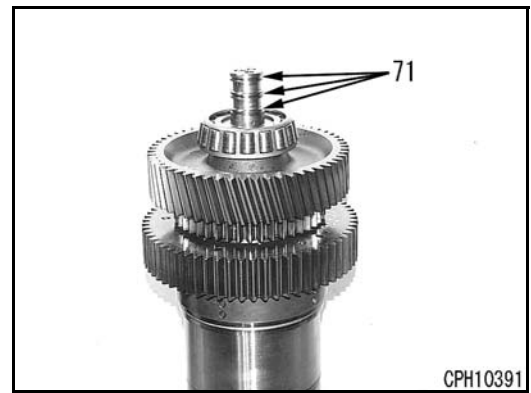
 Mounting bolt: Adhesive (LT-2)

 **N•m** Mounting bolt: 98.1 - 122.6 N•m

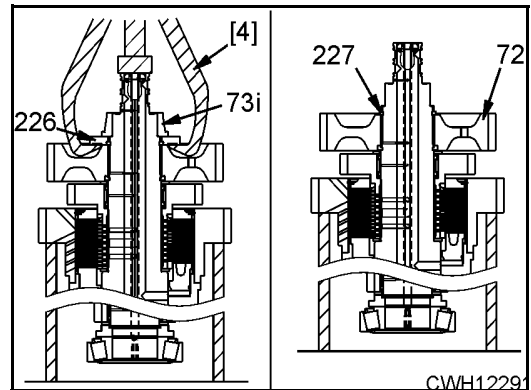


24. Disassembly of 2nd and 3rd clutch assembly
(2nd clutch side)

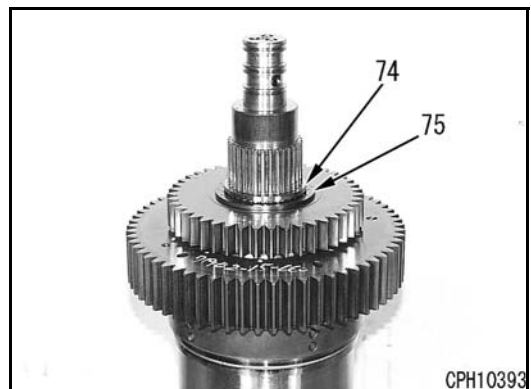
A. Remove seal rings (71) (three pieces).



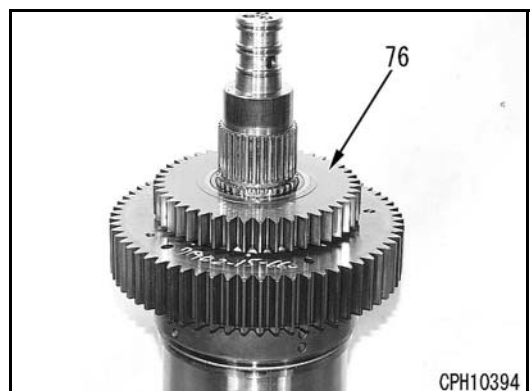
B. Using puller [4], remove spacer (226) and bearing inner race (73i) together. After removing spacer (227) (two-piece type), remove gear (72).



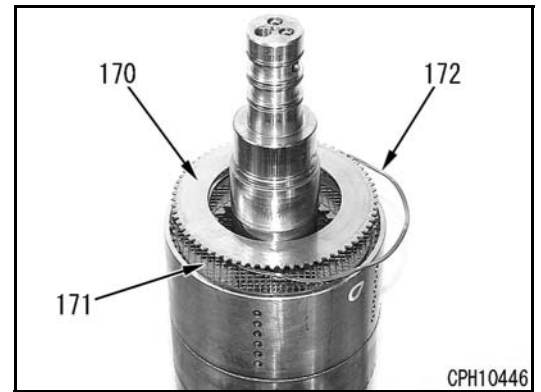
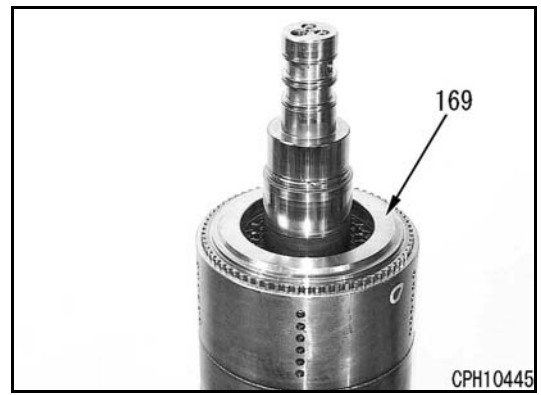
C. Remove spacer (74) (two-piece type) and thrust washer (75).



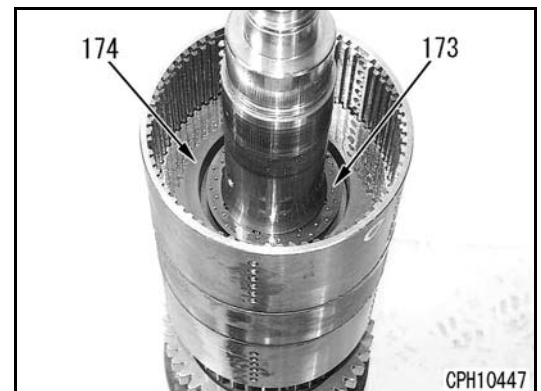
D. Remove gear and needle roller bearing assembly (76).



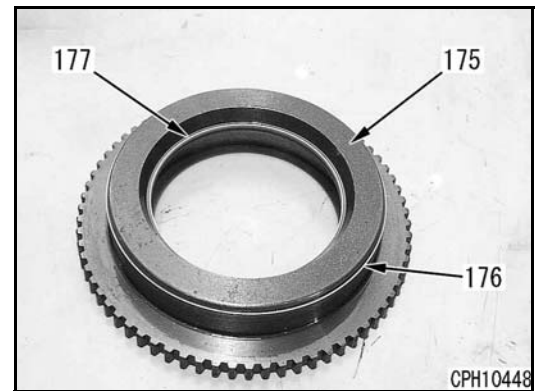
- E. Remove end plate (169), plates (170) (12 pieces), discs (171) (11 pieces), and wave springs (172) (11 pieces) from the R clutch.



- F. Remove thrust washer (173) and piston assembly (174).

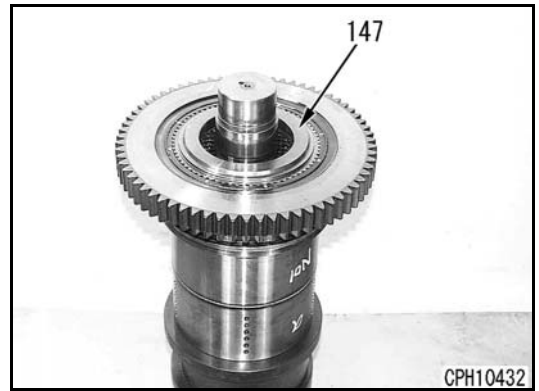
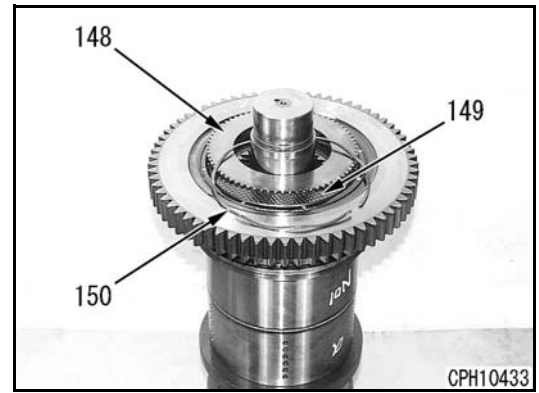


- G. Remove seal rings (176) and (177) from piston (175).

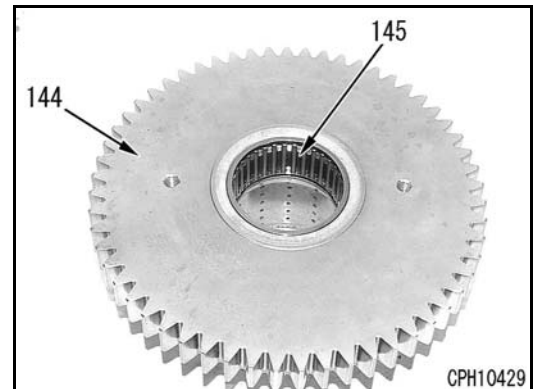


DISASSEMBLY AND ASSEMBLY

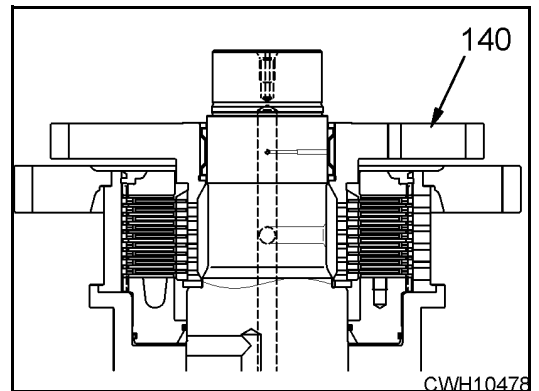
- C. Install plates (148) (ten pieces), discs (149) (nine pieces), wave springs (150) (nine pieces), and end plate (147) to the FH clutch.
- ★ Dip the discs in clean engine oil (EO-30CD) for at least two minutes before installing.



- D. Install needle roller bearing (145) to gear (144).



- E. Install gear and needle roller bearing assembly (140) temporarily and match the grooves of the discs.
- ★ Pressing down the assembly, turn it to the right and left and push it in gradually so that it will not collide with the crests of the discs.

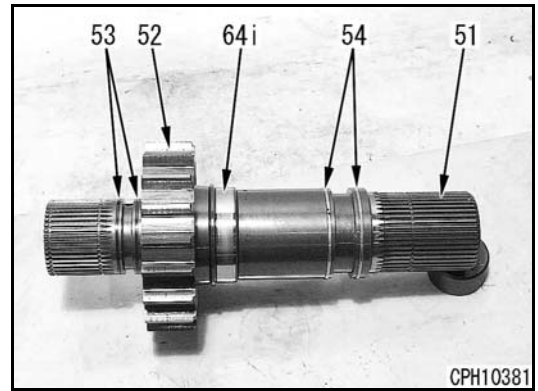
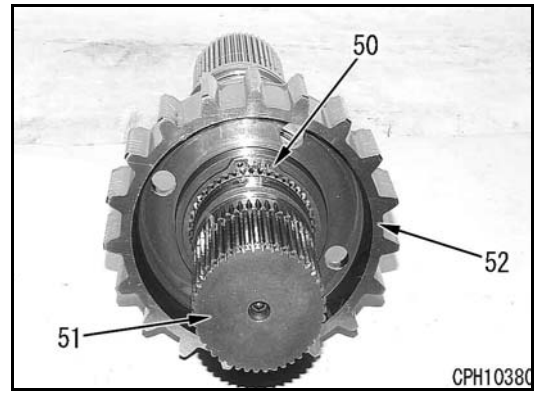


DISASSEMBLY AND ASSEMBLY

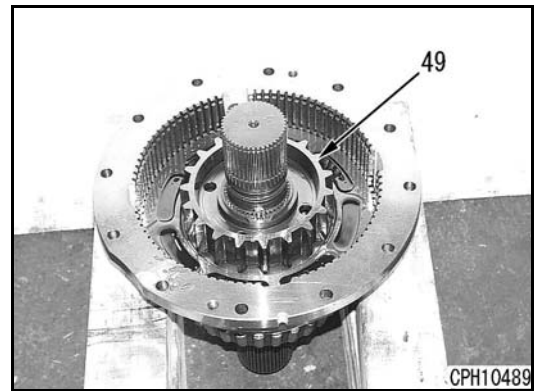
- ii. Install hub (52) to shaft (51), then install snap ring (50).
- iii. Install seal rings (53) and (54).



Apply grease (G2-L1) to the seal rings.



- E. Install front shaft and hub assembly (49).



25. Torque converter oil temperature sensors
Install torque converter oil temperature sensors (6) and (7).



Threaded parts: Gasket sealant (LG-5)



Threaded parts: 15.7 - 19.2 N•m

26. Transmission speed sensors
Install transmission input shaft speed sensor (4), intermediate shaft speed sensor (5), and rear output shaft speed sensor (6).
- ★ For adjustment method and tightening torque, see TESTING AND ADJUSTING.
 - ★ For the front output shaft speed sensor, see Separation of front differential and transmission.
27. Torque converter and transmission charge pump
Install the torque converter and transmission charge pump (3).
28. Wiring harness assembly
Install wiring harness assembly (2).

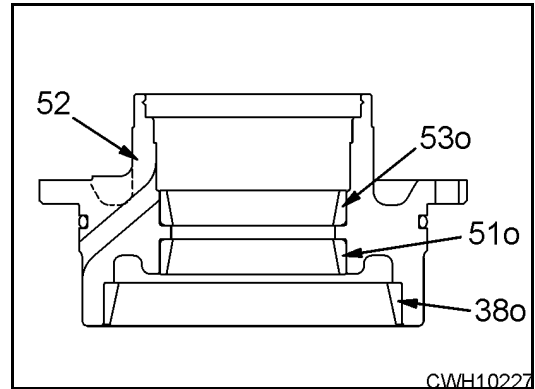
ASSEMBLY OF FRONT DIFFERENTIAL

- ★ When installing a seal to another part (particularly when installing it to the input shaft), use a push tool matched to the diameter of that seal, even if use of the push tool is not described in this manual.

1. Assembly of side carrier and shaft assembly

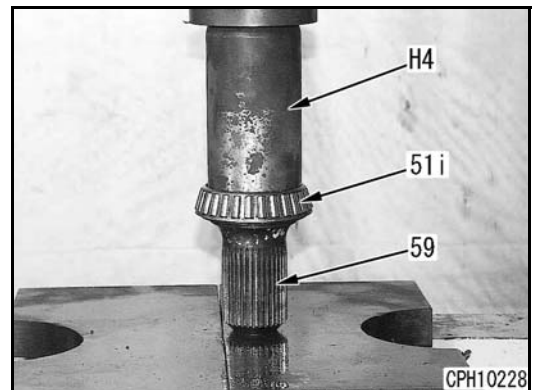
A. Assemble the side carrier and shaft assembly on the bevel gear side according to the following procedure.

- i. Install bearing outer races (38o), (51o), and (53o) to case (52).

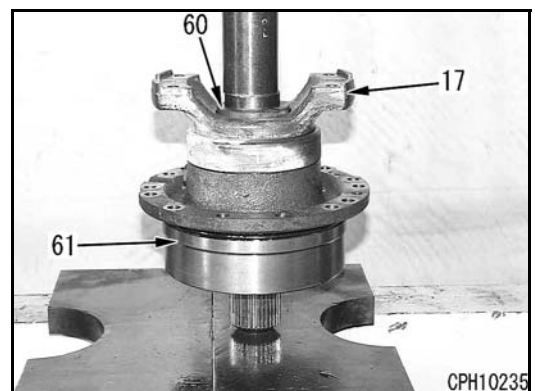


- ii. Shaft and bearing inner race assembly

- Using tool H4, press fit bearing inner race (51i) to shaft (59).



- Set the standard shims (having the thickness and quantity checked when disassembled) and install coupling (17). Using push tool ⑦, press holder (60) to press fit case assembly (61) to shaft and bearing inner race assembly (50).

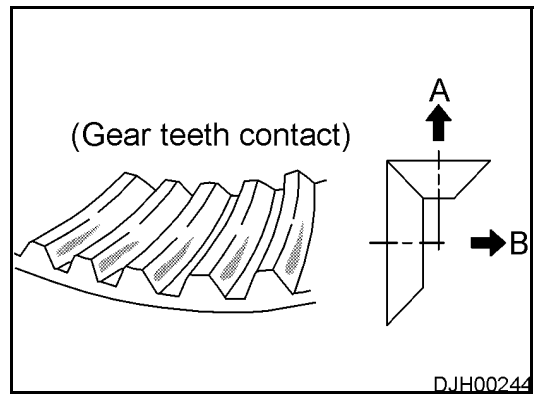
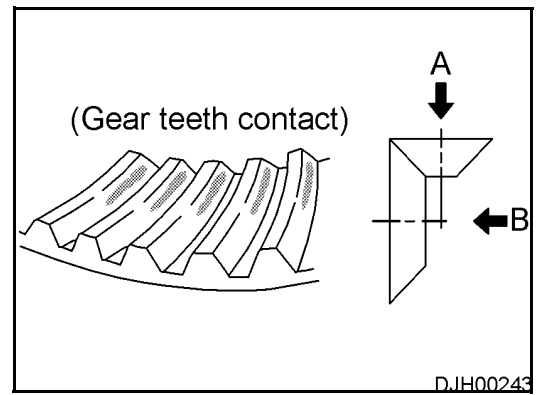


Adjusting


If the tooth contact pattern is not proper, adjust it according to the following procedure.


1. If the bevel pinion is too far from the center line of the bevel gear, the contact is at the small end of the bevel gear tooth surfaces curved outward and at the large end of the bevel gear tooth surfaces curved inward.
 - In this case, adjust the tooth contact according to the following procedure. Adjust the thickness of the shims on the bevel pinion side to move the bevel pinion in direction **A**. Adjust the thickness of the shims of both carrier assemblies to move the bevel gear in direction **B**, then check the tooth contact pattern and backlash again.

2. If the bevel pinion is too close to the center line of the bevel gear, contact is at the large end of the bevel gear tooth faces curved outward and the small end of the bevel gear tooth faces curved inward.
 - In this case, adjust the tooth contact similarly to step 1 above. Reverse directions **A** and **B**, however.
 - If the shim on either side is reduced to adjust the projection of the bevel gear, increase the shim on the opposite side by the same quantity so that the preload on the bearing will not change.
 - After adjusting the tooth contact, refer to the sections of the mounting bolts of both bevel gear side carriers, both output shaft couplings, pinion and case assembly, and input shaft and observe the application of adhesive and tightening torque.




3. Bevel gear supporting bolt
Install bevel gear supporting bolt (4).
 - ★ Bring the bolt end in contact with the back of the gear, then return it by a half turn and secure it with the locknut.

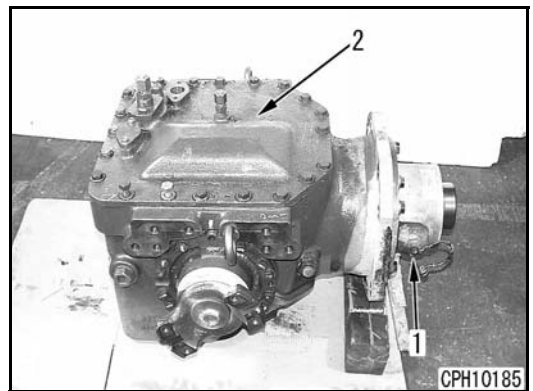
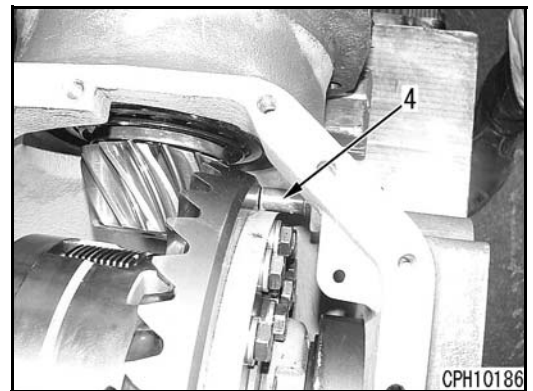
 Bolt: Gasket sealant (LG-5)

 Locknut: 196 - 245 N•m

4. Speed sensor and top cover
Install speed sensor (1) and top cover (2).

 Top cover: Gasket sealant (LT-515)

 Top cover: 157 - 196 N•m



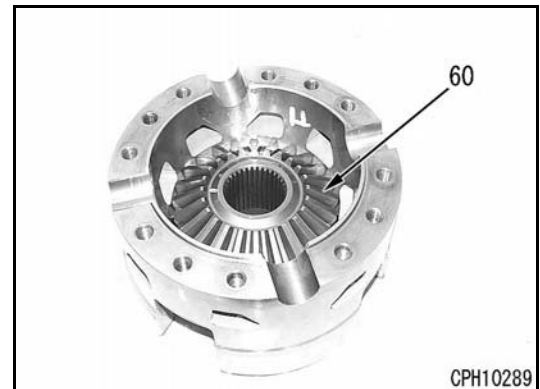
ASSEMBLY OF CENTER DIFFERENTIAL

★ When installing a seal to another part (particularly when installing it to the input shaft), use a push tool matched to the diameter of that seal, even if use of the push tool is not described in this manual.

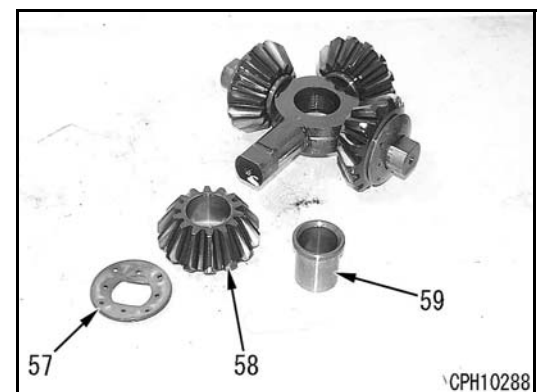
1. Differential gear and differential lock assembly

A. Assemble the differential gear and differential lock assembly according to the following procedure.

i. Install side gear (60).



ii. Install bushing (sleeve) (59), pinion gear (58), and washer (57).



REAR DIFFERENTIAL REMOVAL



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

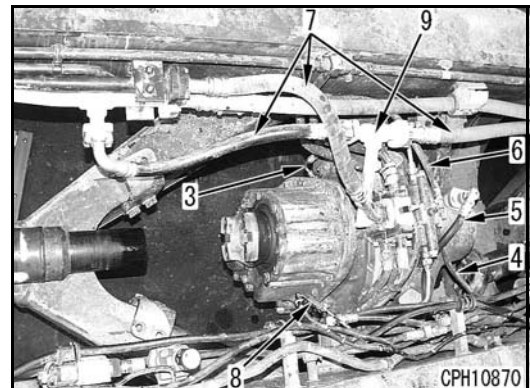
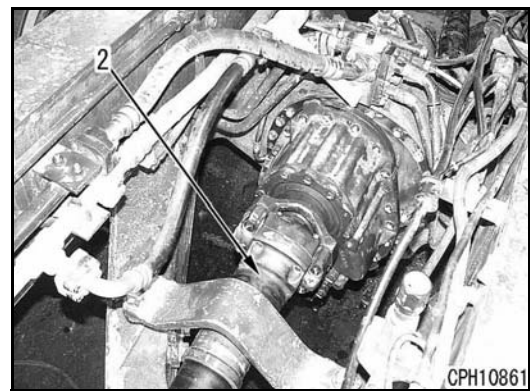
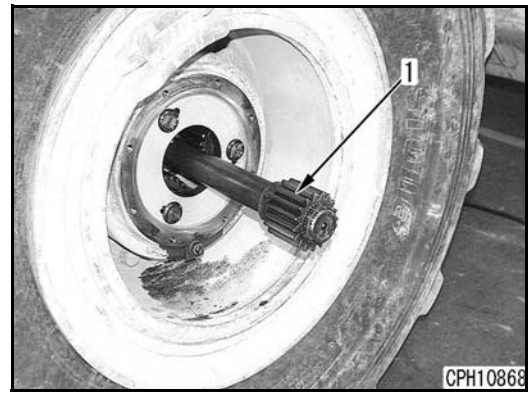


WARNING! Raise the dump body and insert the safety pin.

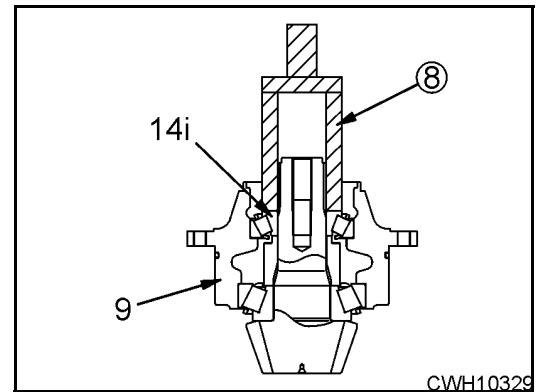
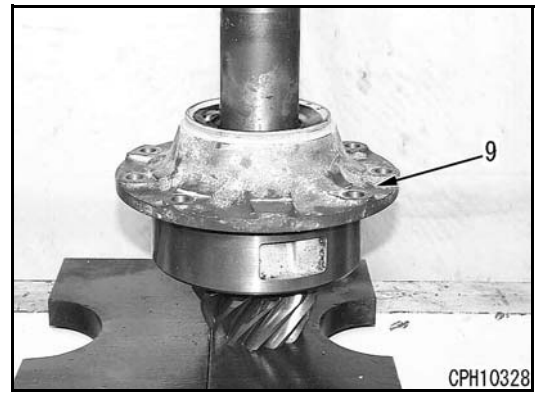
1. Draining oil
Drain oil from the rear differential case and rear final drive case.
2. Sun gear and drive shaft
Remove the rear final drive cover and pull out sun gear and drive shaft (1) (from both sides).
3. Drive shaft between center differential and rear differential
Remove the guard and disconnect only the center differential end of drive shaft (2) between center differential and rear differential.



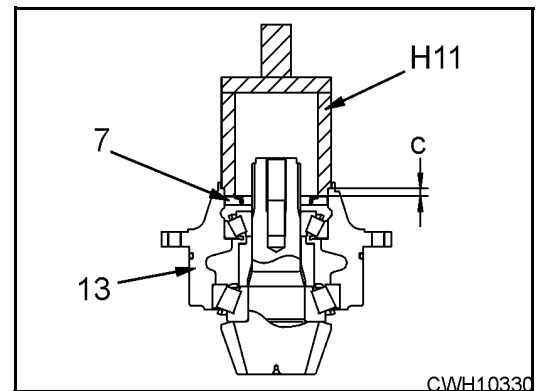
4. Piping and wiring harness
Disconnect differential lock hoses (3) - (5), brake hose (6), brake cooling hoses (7) (three pieces), and rear brake oil temperature sensor connector (CN-T13) (8), then remove brake cooling tube (9).



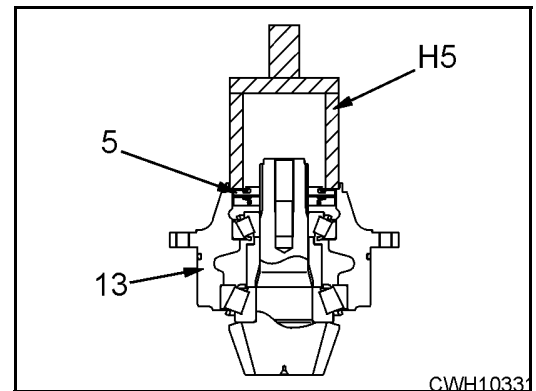
- D. Using push tool ⑧ and turning cage assembly (9), install bearing inner race (14i).
- ★ Never push bearing inner race (14i) with a press.
 - ★ Apply oil to bearing inner race (14i).



- E. Using tool H11, press fit oil seal (7).
- ★ Press fit oil seal (7) so that clearance "c" between the periphery of oil seal (7) and cage (13) will be 10 ± 0.5 mm.



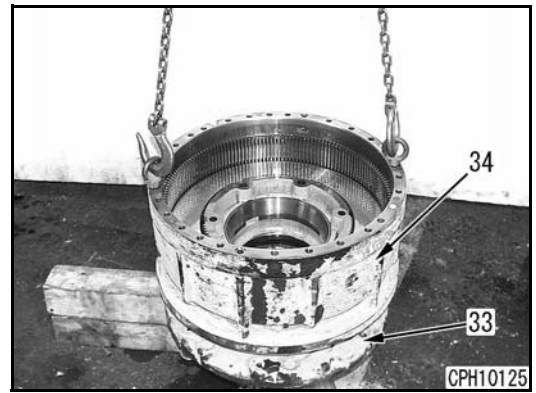
- F. Using tool H5, press fit side seal (5).
- ★ Press fit side seal (5) so that its periphery will be flush with cage (13).



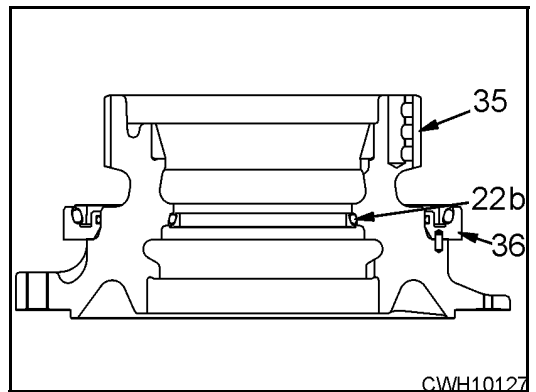
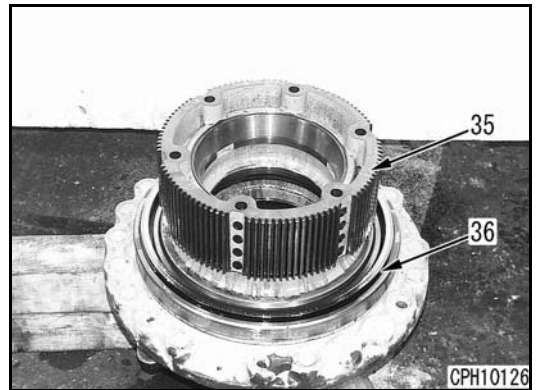
DISASSEMBLY AND ASSEMBLY DISASSEMBLY OF FRONT FINAL DRIVE AND BRAKE

13. Hub (inner gear) and outer gear

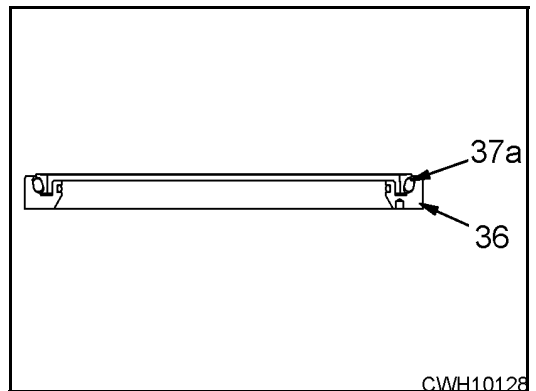
A. Remove outer gear (34) from hub (inner gear) (33).



B. Remove floating seal and cage assembly (36) and floating seal (22b) from hub (inner gear) (35). Check the cut of the plate.



C. Remove floating seal (37a) from floating seal and cage assembly (36).



DISASSEMBLY AND ASSEMBLY REMOVAL OF CENTER FINAL DRIVE AND BRAKE

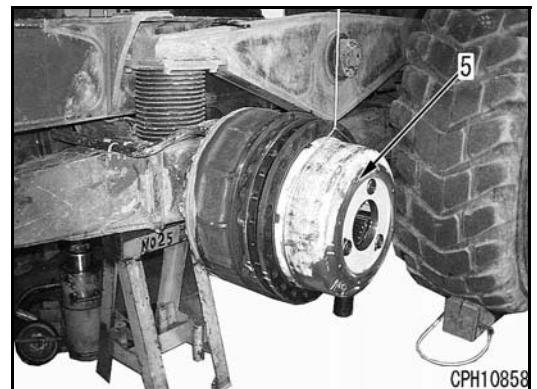
5. Sun gear and drive shaft
Remove the center final drive cover and sun gear and drive shaft (4).



6. Center final drive assembly
Lift off center final drive assembly (5).



Center final drive assembly: 500 kg (1,102 lbs)

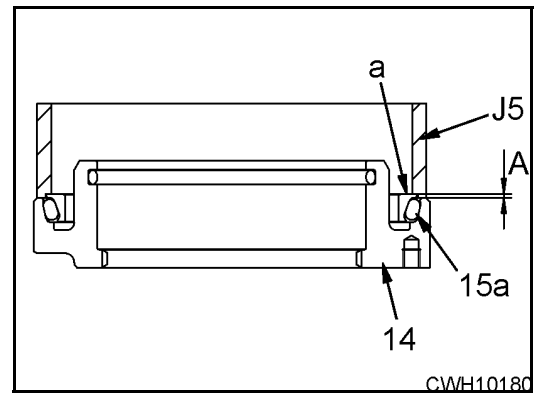


DISASSEMBLY AND ASSEMBLY ASSEMBLY OF CENTER FINAL DRIVE AND BRAKE

4. Place the assembly with the brake side down.

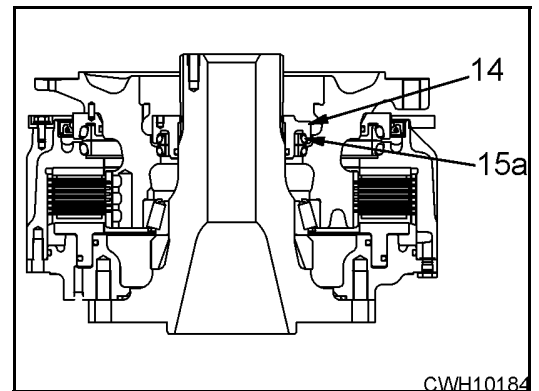
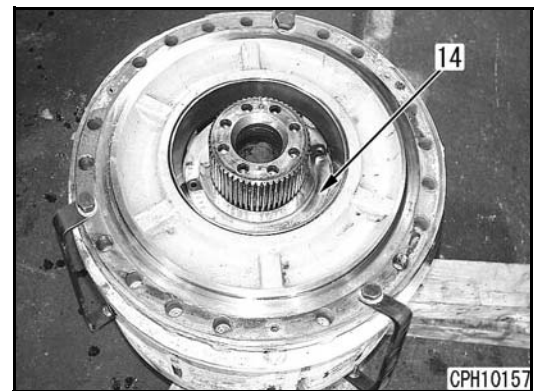
5. Floating seal cage and floating seal

A. Using tool J5, install floating seal (15a) to cage (14).



B. Install floating seal cage (14) [including a half part of floating seal (15a)].

- ★ Measure height A of the seal above the gear, hub, and retainer (at four places on the periphery) and check that its dispersion is less than 1 mm.

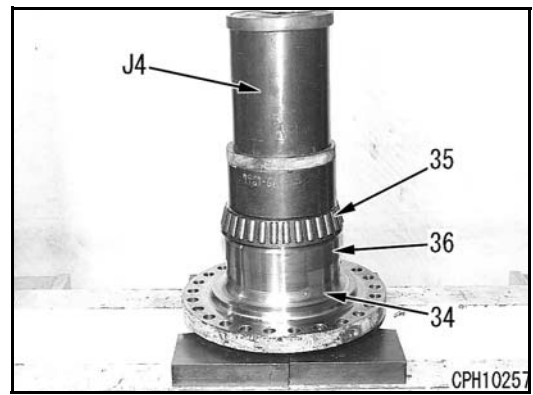


ASSEMBLY OF REAR FINAL DRIVE AND BRAKE

★ When installing a seal to another part (particularly when installing it to the input shaft), use a push tool matched to the diameter of that seal, even if use of the push tool is not described in this manual.

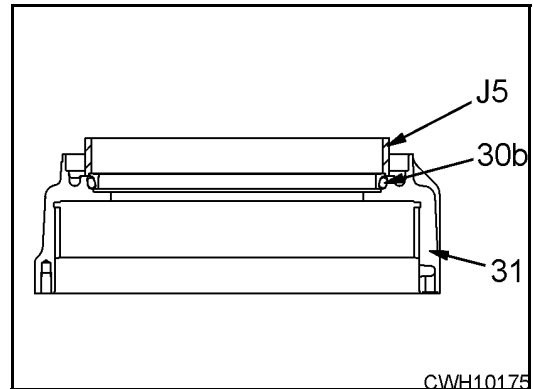
1. Shaft (Tube) assembly

Install retainer (36) to shaft (tube) (34), then install bearing inner race (35).

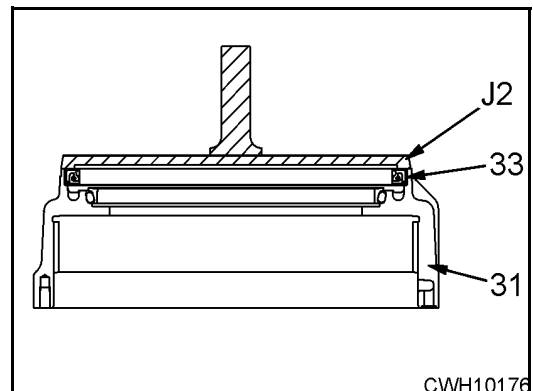


2. Hub (inner gear) and outer gear

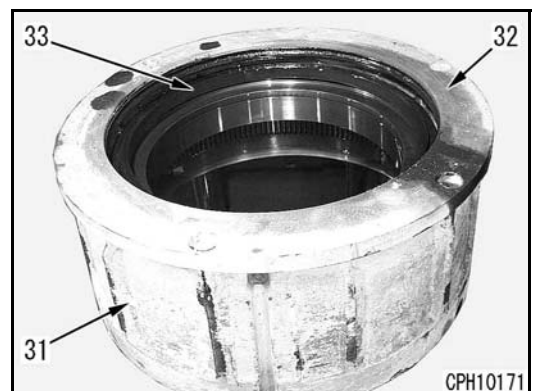
A. Using tool J5, install floating seal (30b) to outer gear (31).



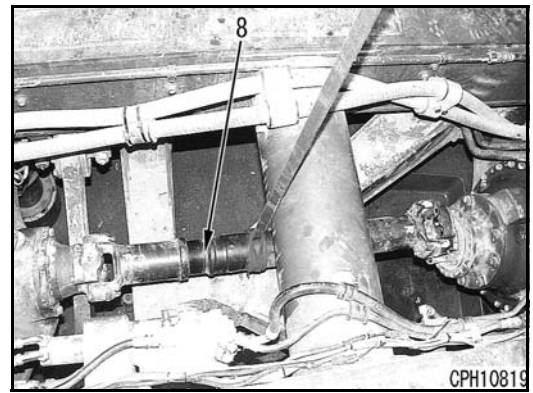
B. Using tool J2, install seal (33) to outer gear (31).



C. Install cover (32) to outer gear (31).



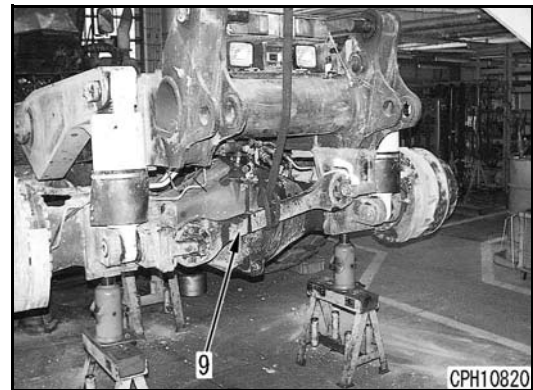
- 5. Drive shaft between center differential and rear differential
Remove the guard and sling off drive shaft (8) between the center differential and rear differential. **※2**



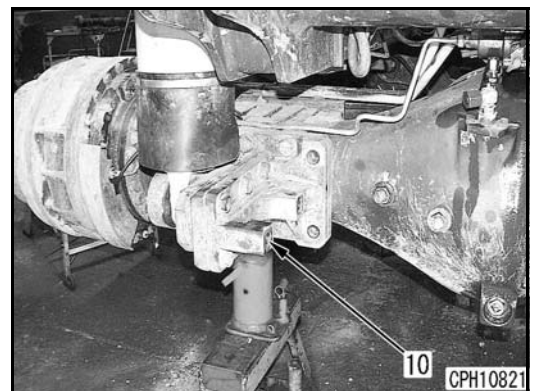
- 6. Lateral rod
Remove lateral rod (9). **※3**



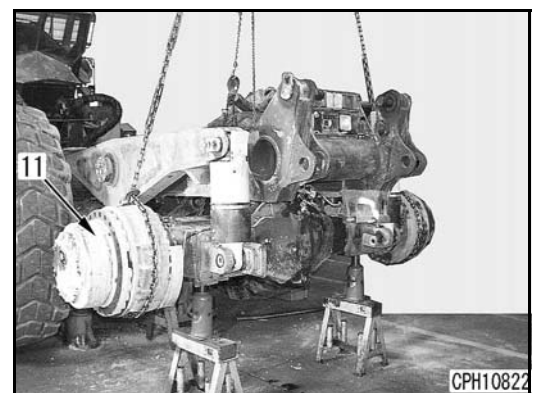
Lateral rod: 60 kg (132 lbs)



- 7. Bracket (left)
Remove bracket (left) (10).



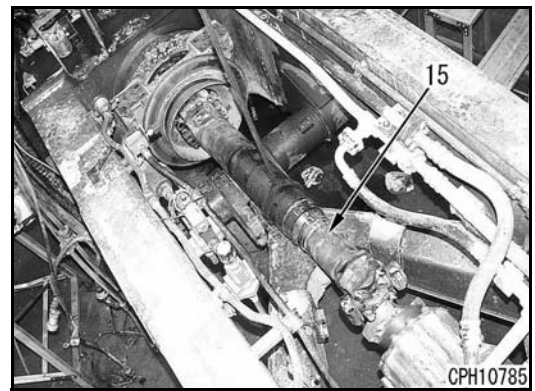
- 8. Rear axle and arm assembly
 - A. Sling rear axle and arm assembly (11) temporarily.



- 3. Drive shaft between hitch frame and center differential
Remove the guard and drive shaft (15) between the hitch frame and center differential. **※3**



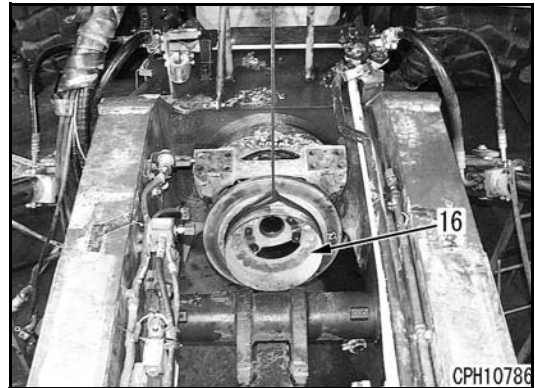
Drive shaft between hitch frame and center differential:
85 kg (187 lbs)



- 4. Parking brake disc and coupling assembly
Remove the coupling holder, then remove parking brake disc and coupling assembly (16). **※4**



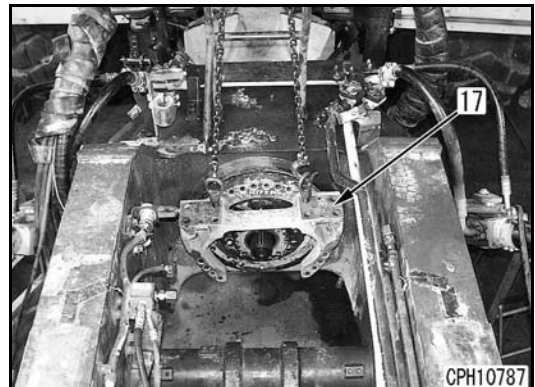
Parking brake and coupling assembly: 55 kg (121 lbs)



- 5. Parking brake bracket.
Remove parking brake bracket (17).



Parking brake bracket: 55 kg (121 lbs)



- 6. Drive shaft between transmission and hitch frame
Remove the guard and disconnect the transmission end of drive shaft (18) between the transmission and hitch frame. **※5**



Drive shaft between transmission and hitch frame:
55 kg (121 lbs)



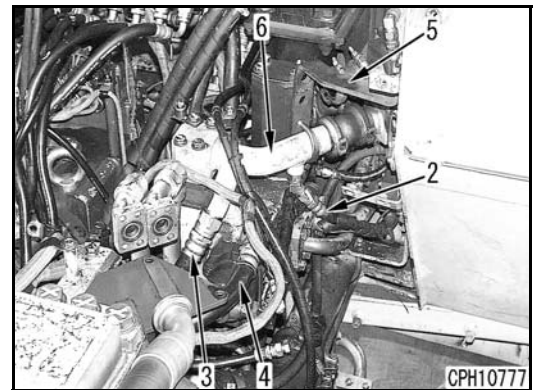
Part No.	Part name	Qty	Remarks
1	Screw	6	
2	Retainer screw assembly	1	
3	End cap	1	
4	Gerotor	1	
5	Spacer	1	
6	Spacer	(1)	
7	Spacer plate	1	
8	Drive	1	
9	Housing	1	
10	Sleeve	1	
11	Spool	1	
12	Pin	1	
13	Centering spring	6	For standard input torque specification
	Centering spring	4	For low input torque specification
14	Flat spring	(2)	Only for low input torque specification
15	Race bearing	1	
16	Thrust needle	1	
17	O-ring	1	
18	Oil seal	1	X-ring or Teflon seal
19	Dust seal	1	
20	Retaining ring	1	
21	Seal gland bushing	1	
22	O-ring	2	Part No.: 5776
23	O-ring	1	Part No.: BA0098A
24	Inlet check valve sub assembly	1	(Cannot be disassembled)
25	Valve seat	1	(Cannot be disassembled)
26	Poppet	1	
27	Spring	1	
28	Plug	1	
29	O-ring	1	
30	Retainer plug	2	
31	Spring	2	
32	Ball	2	
33	Valve seat	2	(Cannot be disassembled)
34	Ball	2	
35	Ball holder	2	
36	Spring	2	
37	Plug	2	
38	O-ring	2	
39	Adapter screw	1	
40	Ball	1	
41	Name plate	1	
42	Rivet	2	
	Seal kit (X-ring)		Part No.: BA0271A
	Seal kit (Teflon seal)		Part No.: BA0273A


REMOVAL OF HOIST VALVE

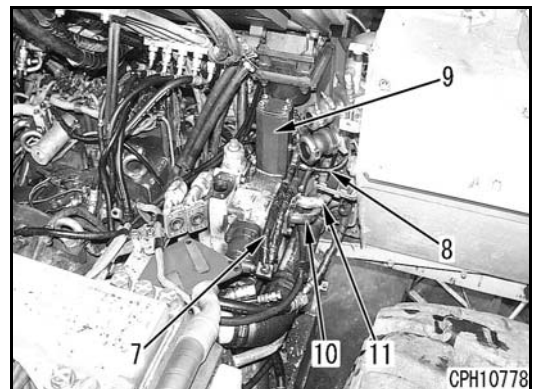
1. Drain the hydraulic oil.
2. Left fender
Lift off left fender (1).



3. Steering valve
Remove the steering valve assembly. For details, see Removal of steering valve assembly.
4. Hose and piping
 - A. Remove the tube of port P of the loosened hoist valve and disconnect tank circuit hoses (2), (3), (4).
 - B. Remove bracket (5) and tank circuit tube (6).

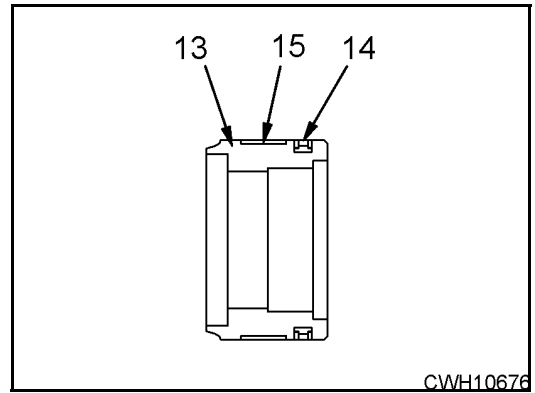
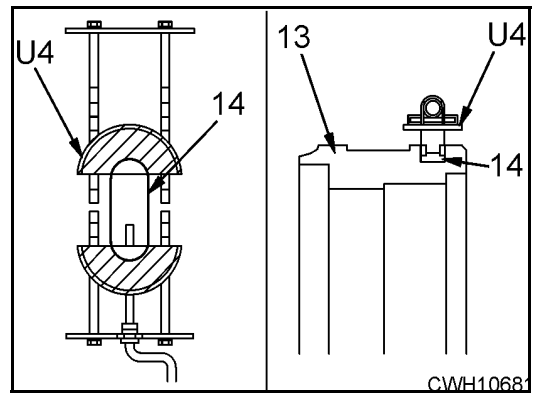


- C. Remove the throttle between tube (6) and hoist valve, too.
- D. Disconnect hoses (7) and (8) of pilot ports (PA) and (PB).
- E. Remove check valve (9). 
- F. Disconnect tube (10) and (11) of hoist cylinder ports (A) and (B).
 - ★ Loosen the rear tube clamp and move the tubes toward the hydraulic tank.

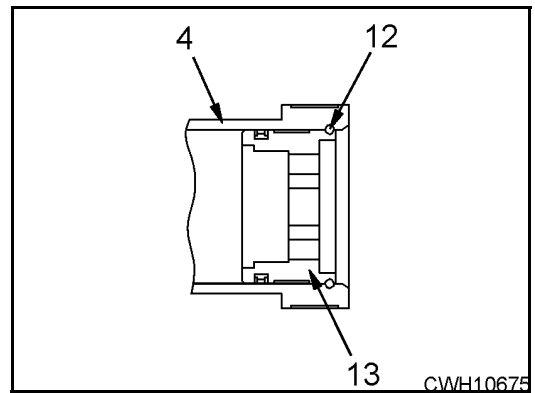


4. Assembly of piston assembly

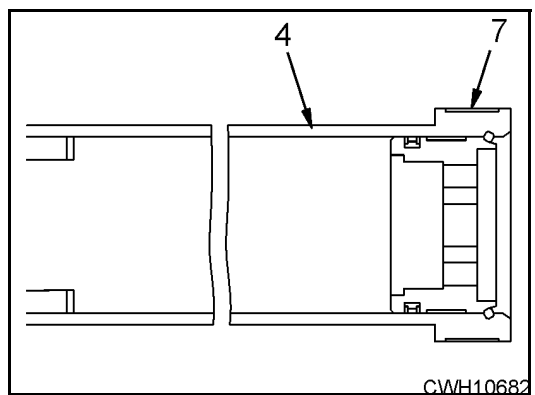
- A. Using tool U4, expand piston ring (14), and assemble to piston (13).
 - ★ Set the piston ring on tool, and turn the handle eight to ten times to expand the ring.
- B. Set tools U4 in position, and compress piston ring (14).
- C. Install wear ring (14)



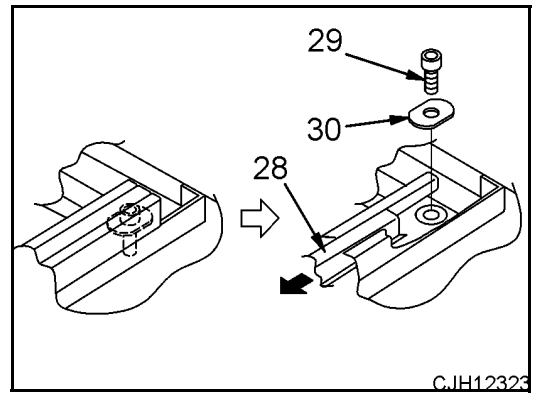
5. Assembly piston assembly (13) to cylinder II (4), and install snap (12).



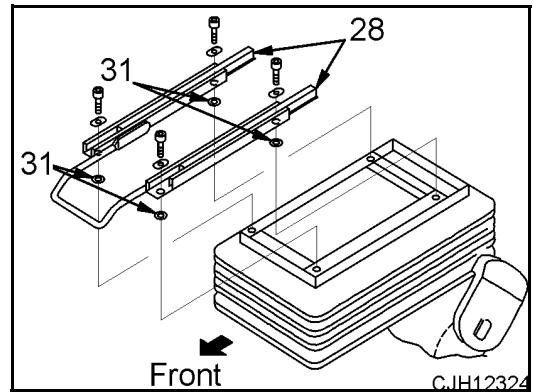
6. Install wear ring (7) to cylinder II (4).



- D. Slide rails (28) to the front end.
- E. Remove one hexagon socket head bolt (29) and one lock washer (30) from the rear part of each rail, and then remove rails (28). **※7**



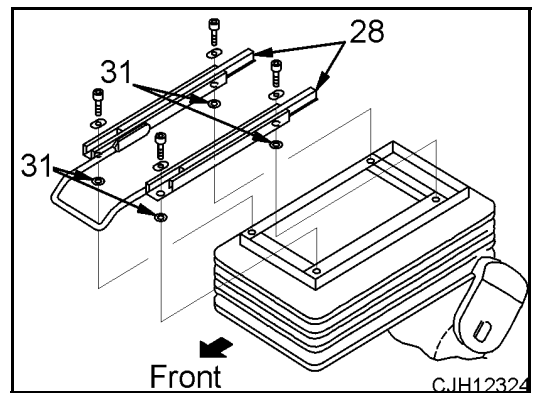
★ Take care not to lose height adjustment washers (31) between the rails and suspension.



ASSEMBLY

1. Rails

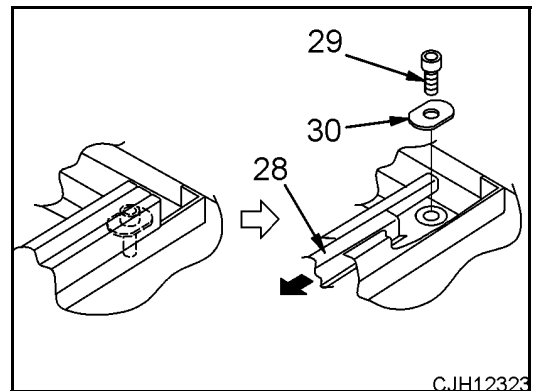
- A. Put height adjustment washers (31) between rails (28) and suspension, and then set rails (28) in position.



- B. Set rails (28) to the front end and install one lock washer (30) and one hexagon socket head bolt (29) to each rail.



Hexagon socket head bolt: 21.4 - 27.6 N•m



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