SEN00486-19

Shop Manual

DUMP TRUCK

HD325-7
HD405-7

SERIAL NUMBERS

HD325- 7001-7025
HD325- 7101 and up
HD405- 3001-3035
HD405- 7101 and up

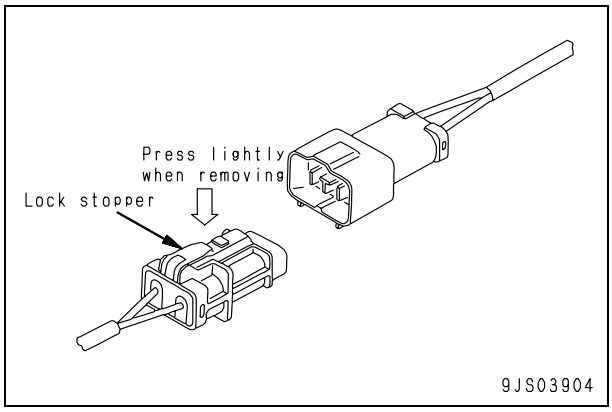
ecot3

KOMATSU

3. Removing, installing, and drying connectors and wiring harnesses

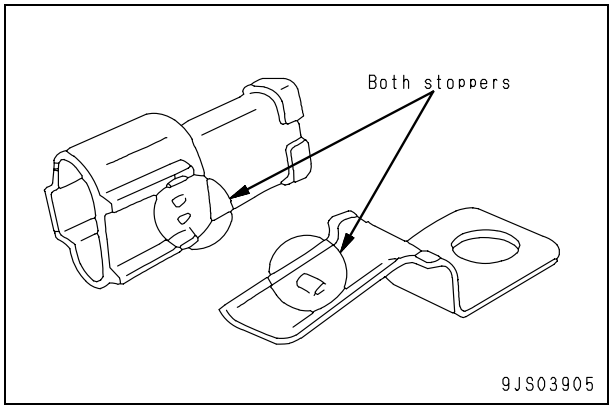
1) Disconnecting connectors

1] Hold the connectors when disconnecting.
When disconnecting the connectors, hold the connectors. For connectors held by a screw, loosen the screw fully, then hold the male and female connectors in each hand and pull apart. For connectors which have a lock stopper, press down the stopper with your thumb and pull the connectors apart.
★ Never pull with one hand.

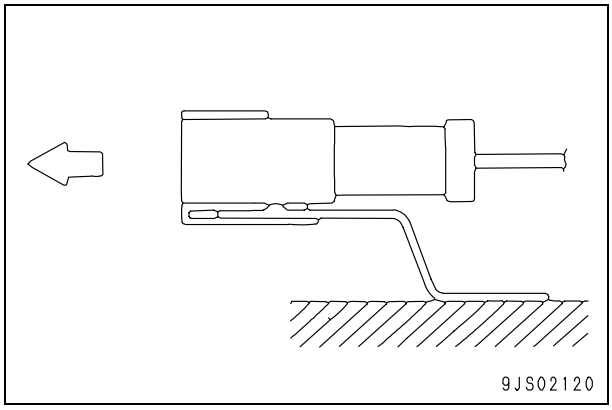


2] When removing from clips

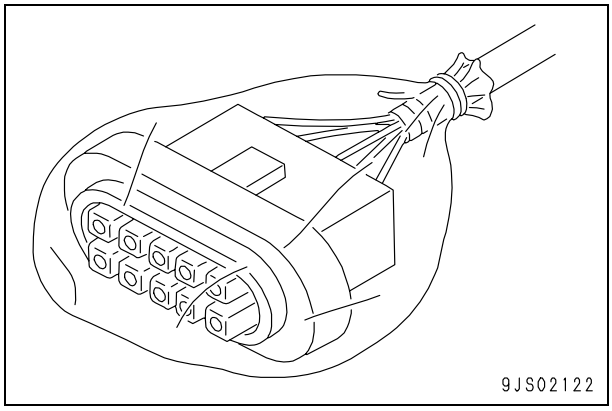
- Both of the connector and clip have stoppers, which are engaged with each other when the connector is installed.



- When removing a connector from a clip, pull the connector in a parallel direction to the clip for removing stoppers.
★ If the connector is twisted up and down or to the left or right, the housing may break.



3] Action to take after removing connectors
After removing any connector, cover it with a vinyl bag to prevent any dust, dirt, oil, or water from getting in the connector portion.
★ If the machine is left disassembled for a long time, it is particularly easy for improper contact to occur, so always cover the connector.



4) Checking muffler and exhaust pipe for damage and looseness
   1] Visually check the muffler, exhaust pipe and their mounting parts for a crack and damage.
      If any part is damaged, replace it.
   2] Check the mounting bolts and nuts of the muffler, exhaust pipe and their mounting parts for looseness.
      If any bolt or nut is loosened, retighten it.
5) Checking muffler function
   Check the muffler for abnormal sound and sound different from that of a new muffler.
   If any abnormal sound is heard, repair the muffler, referring to “Troubleshooting” and “Disassembly and assembly”.

DUMP TRUCK

HD325-7
HD405-7

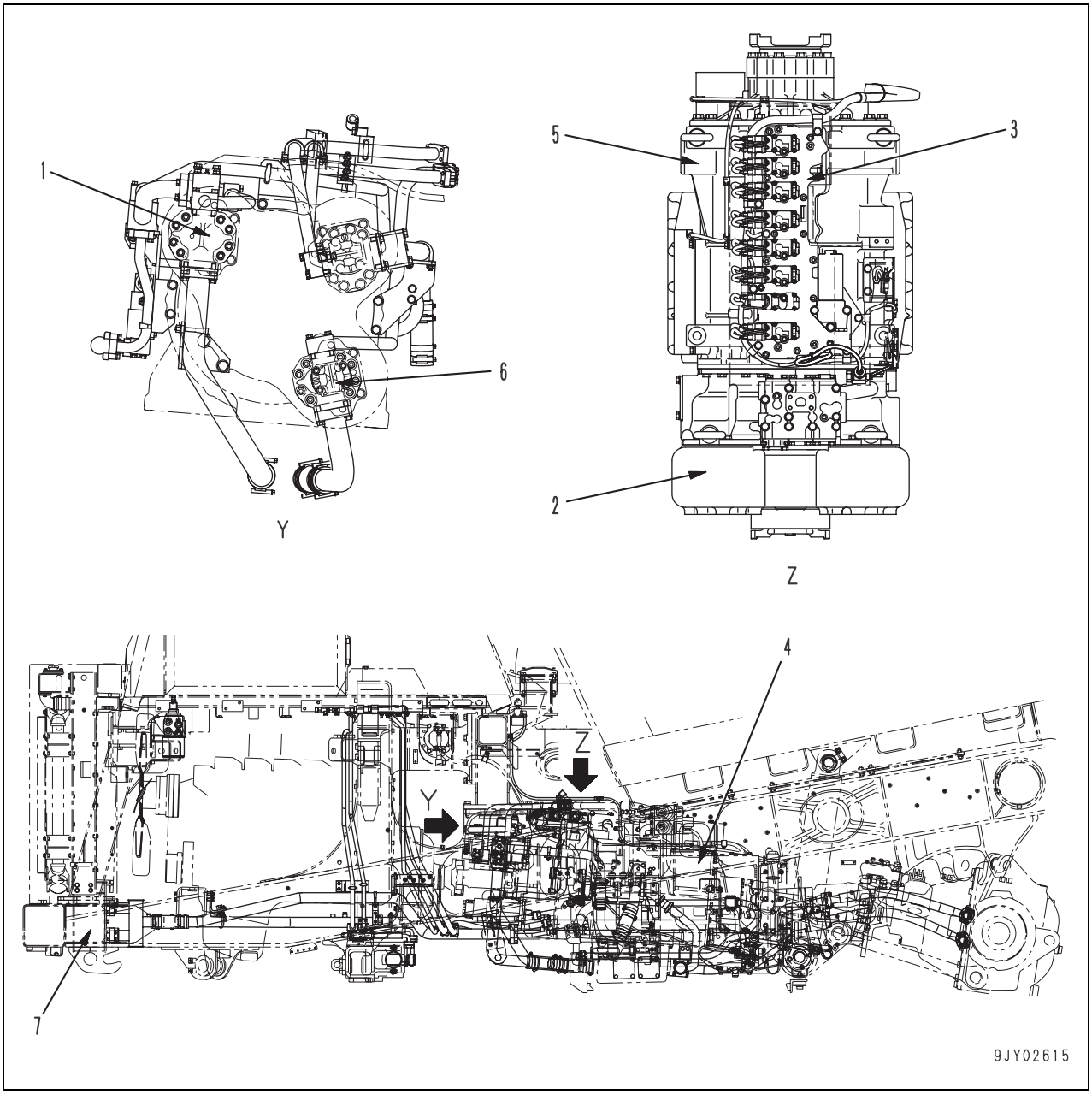
Machine model	Serial number
HD325-7	7001 – 7025
HD325-7	7101 and up
HD405-7	3001 – 3035
HD405-7	7101 and up

01 Specification

Specification and technical data

Machine model				HD405-7
Serial numbers				7101 and up
Hydraulic system	Hydraulic pump	For work equipment and steering		For EU (Stairway specifications)
		Type		Gear pump
		Discharge amount (When engine is at rated speed of 2,000 rpm)	ℓ/min	255.0
		For power train charge		
		Type		Gear pump
		Discharge amount	ℓ/min	180.0
		For retarder cooling		
		Type		Gear pump
		Discharge amount	ℓ/min	255.0
	Cylinder	Hoist cylinder		
		Type		2-stage piston type (only 2nd stage: double-acting)
		No. – bore (1st – 2nd) × stroke		2 – (140 mm – 120 mm) × 1,494 mm
		Steering cylinder		
		Type		Piston type, double acting
		No. – bore × stroke		2 – 75 mm × 377 mm

Torque converter and transmission hydraulic piping

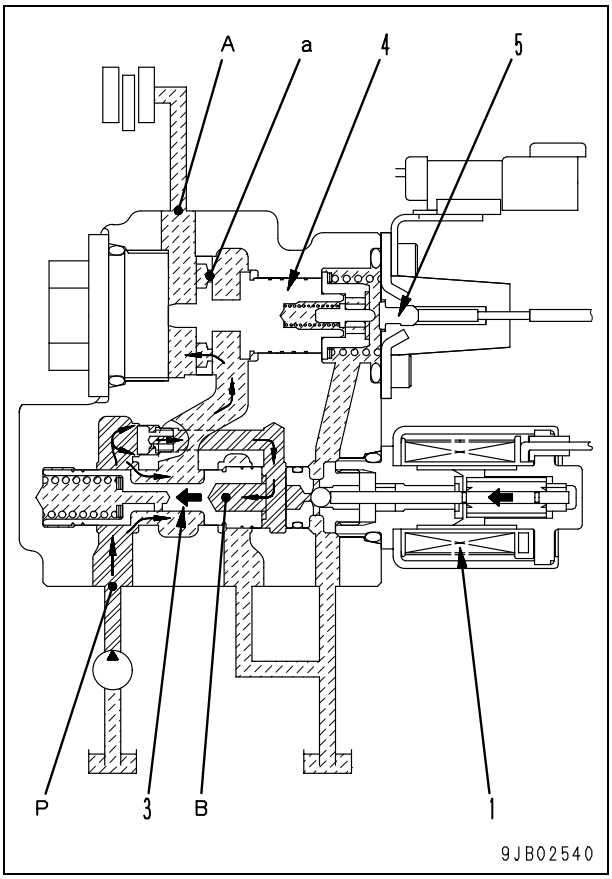


1. Retarder cooling pump (SDR (30) 63 + 63)
2. Torque converter
3. Transmission valve
4. Hydraulic tank
5. Transmission
6. Power train, charge pump (SAR (3) 80 + (1) 18)
7. Oil cooler (radiator in built)

Unit: mm

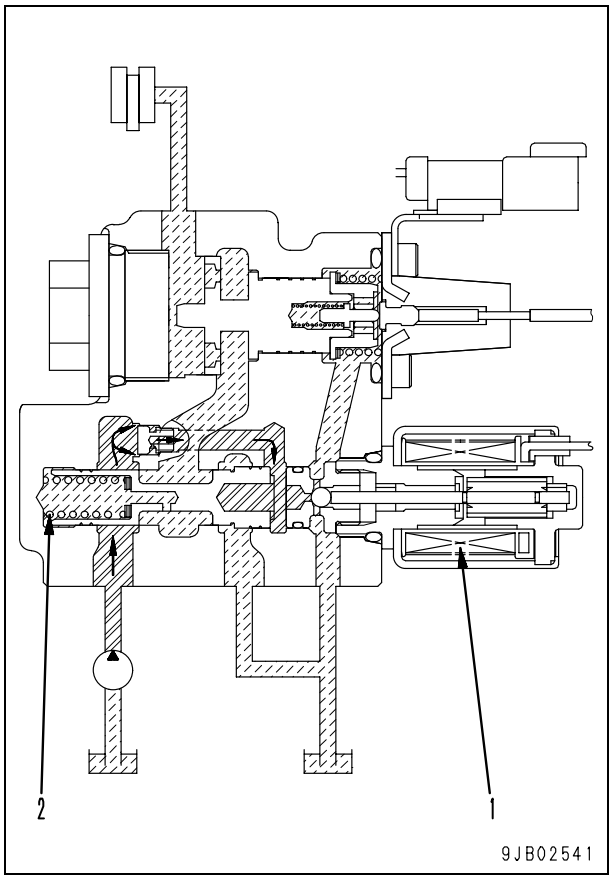
No.	Check item		Criteria			Remedy
			Standard size	Tolerance	Repair limit	
17	Wear of the H carrier and 4th ring gear seal ring	Width	3.95	0 –0.1	3.56	
		Thick-ness	4.95	±0.1	4.46	
18	Wear of the L and 4th clutch collar seal ring	Width	4.0	–0.01 –0.03	3.60	
		Thick-ness	4.9	±0.12	4.80	
19	Wear of the 3rd sun gear seal ring	Width	3.0	–0.01 –0.03	2.70	
		Thick-ness	4.0	±0.12	3.85	
20	Wear of the 3rd and R carrier seal ring	Width	4.0	–0.01 –0.04	3.60	
		Thick-ness	4.0	±0.15	3.85	
21	Wear of the 2nd and 1st carrier seal ring	Width	4.0	–0.01 –0.04	3.60	
		Thick-ness	4.0	±0.15	3.85	
22	Backlash between H sun gear and planetary pinion		0.13 – 0.36			
23	Backlash between H planetary pinion and ring gear		0.15 – 0.39			
24	Backlash between 3rd sun gear and planetary pinion		0.15 – 0.34			Replace
25	Backlash between 3rd planetary pinion and ring gear		0.17 – 0.39			
26	Backlash between R sun gear and planetary pinion		0.15 – 0.34			
27	Backlash between R planetary pinion and planetary pinion		0.14 – 0.31			
28	Backlash between R planetary pinion and ring gear		0.17 – 0.39			
29	Backlash between 2nd sun gear and planetary pinion		0.14 – 0.35			
30	Backlash between 2nd planetary pinion and ring gear		0.15 – 0.38			
31	Backlash between 1st sun gear and planetary pinion		0.13 – 0.32			
32	Backlash between 1st planetary pinion and ring gear		0.15 – 0.38			
33	Deterioration of disc internal teeth		Repair limit: 0.3			
34	Thickness of thrust washer (H planetary pinion)		Standard size	Tolerance	Repair limit	
			2	±0.1	1.6	
35	Thickness of thrust washer (3rd, R planetary pinion)		2	±0.1	1.6	
36	Thickness of thrust washer (2nd, 1st planetary pinion)		2	±0.1	1.6	

During filling (Range B in chart)



- If a current is given to proportional solenoid (1) while there is no oil in the clutch, a hydraulic force balanced with the solenoid force is applied to chamber (B) and it pushes pressure control valve (3) to the left. This conducts oil through pump port (P) and orifice (a) of flow rate pickup valve (4) to start filling the oil to the clutch chamber. At this time, differential pressure is generated between the upper stream and down stream of orifice (a) of flow rate pickup valve (4). This differential pressure pushes flow rate pickup valve (4) leftward.
  As the clutch chamber is filled up with oil and oil flow from pump port (P) to clutch port (A) is stopped, differential pressure before and after orifice (a) of flow rate pickup valve (4) disappears. As the result, flow rate pickup valve (4) is pushed rightward, turning “ON“ fill switch (5).

Pressure regulation (Range C in chart)

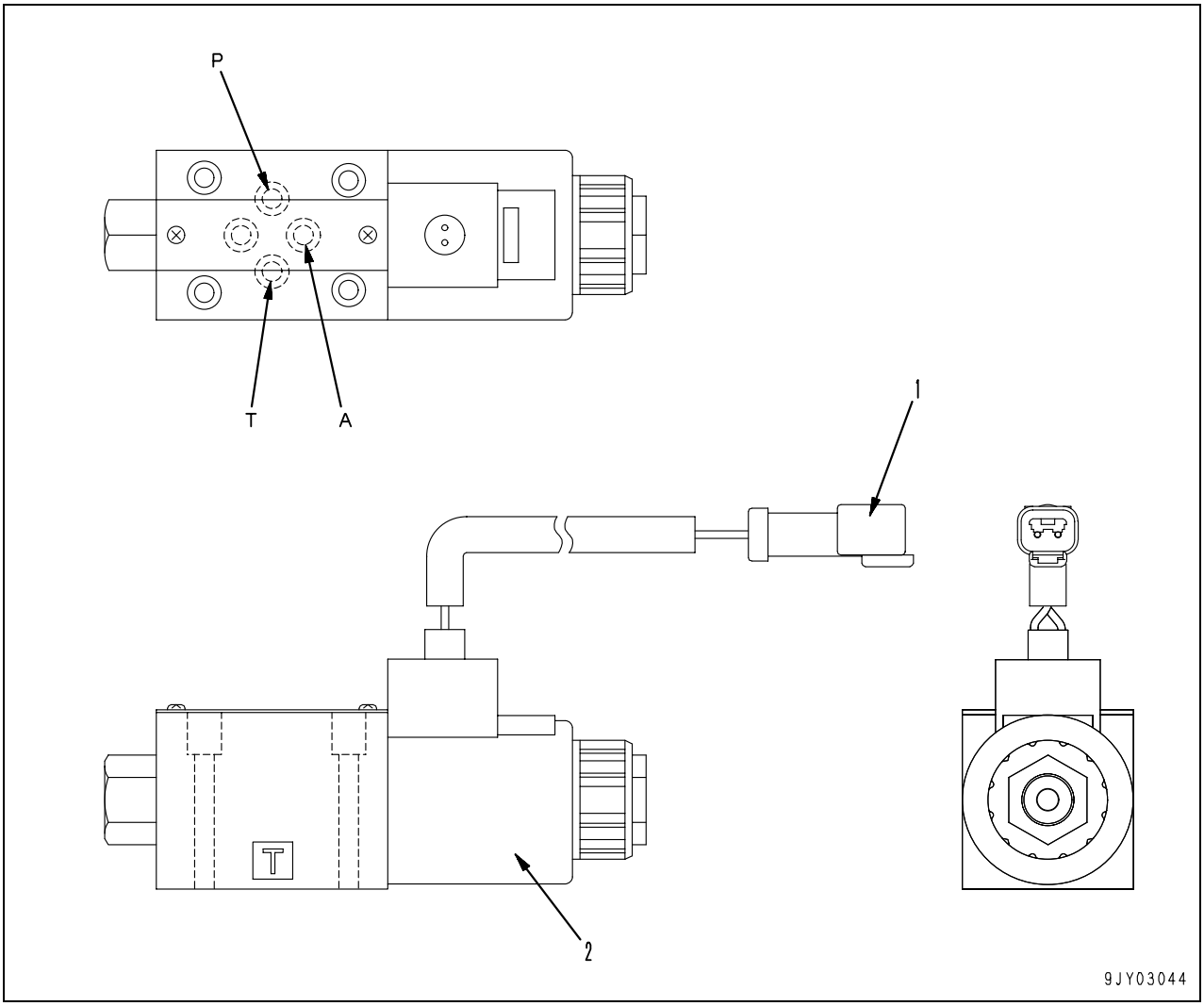


- If current flows in proportional solenoid (1), the solenoid generates thrust in proportion to the current. This thrust of the solenoid is balanced with the sum of the thrust generated by the oil pressure in clutch port and the tension of pressure control valve spring (2), and then the pressure is settled.

HD325-7, HD405-7 Dump truck

Form No. SEN00853-02

Front brake cut valve



1. Connector
2. Solenoid

A: To front brake
P: From brake valve
T: To brake sub tank

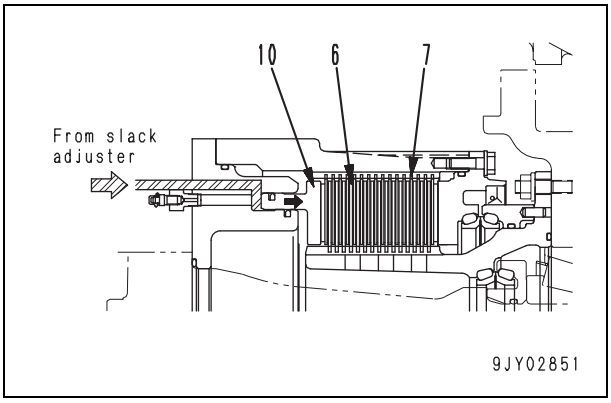
Function

- This valve is installed on the brake oil circuit between the brake valve and the front brake. When the front brake off switch of the operator's seat is pressed, the solenoid is energized, and the valve cuts off the circuit between the brake valve and the front brake.
  Thus, the front brakes are not applied.

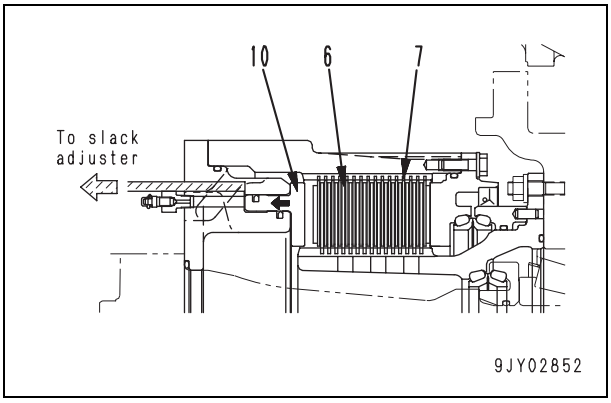
Operation

Operation of brake

- When the brake pedal is depressed, pressure oil from the brake valve moves brake piston (10) to the right in the direction of the arrow. This presses disc (7) and plate (6) together and generates friction between the disc and plate. The wheel is rotating together with the disc, so this friction reduces the travel speed and stops the machine.



- When the brake pedal is released, the pressure at the back face of brake piston (10) is released, so the piston is moved to the left in the direction of the arrow by the internal pressure, and this releases the brake.



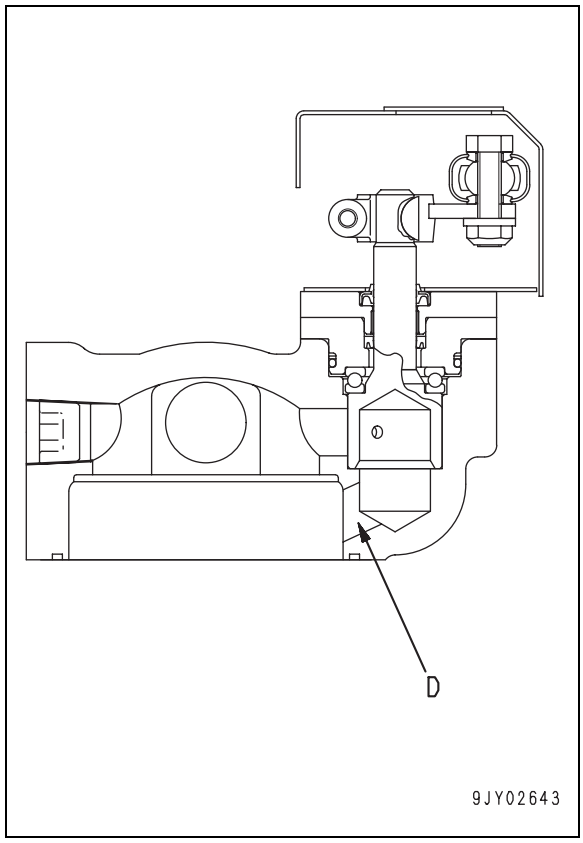
3. Variable shaft mechanism

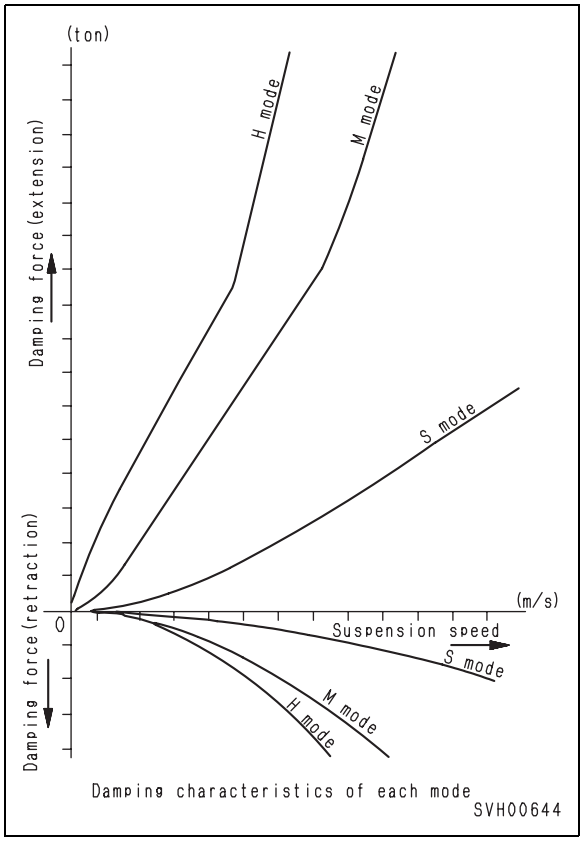
In the valve body, bypass circuit (D) is provided before and after orifice plate (8a), so the oil flow is divided into oil flowing through orifice plate (8a) and oil flowing through the bypass circuit (D).

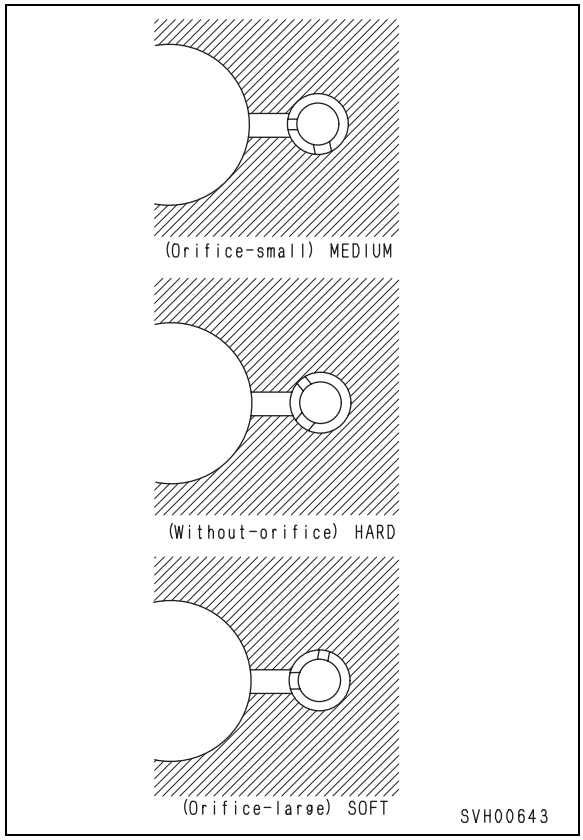
The oil flowing through bypass circuit (D) passes through a shaft with orifices at two places on the inside circumference, and flows to oil chamber (C) or oil chamber (B) according to whether it is retracting or extending.

The shaft is connected to an hydraulic cylinder driven by a signal from the retarder controller, and the size of the orifices automatically changes according to the condition of the machine.

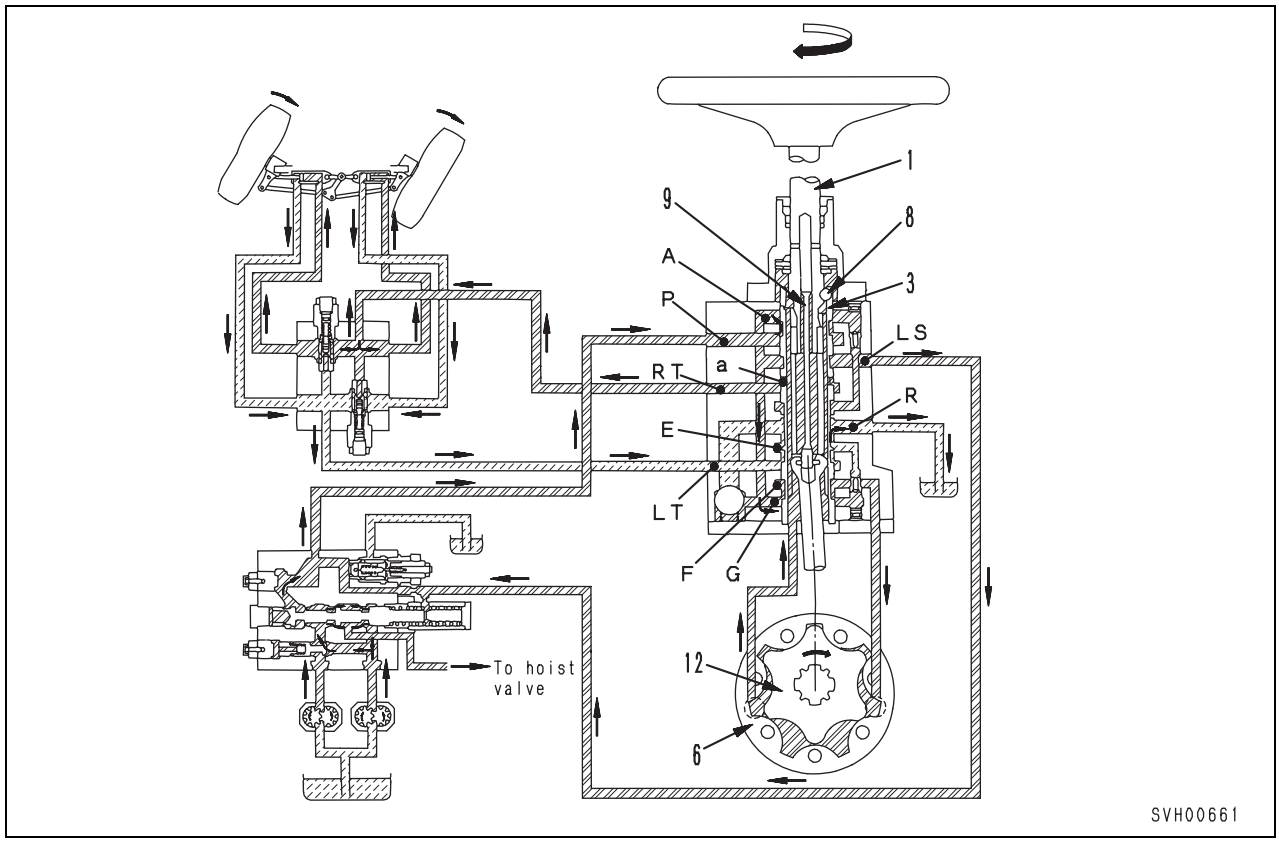
The damping force is set at three levels (MEDIUM, HARD, SOFT) according to the size of the orifices through which the oil is passing.





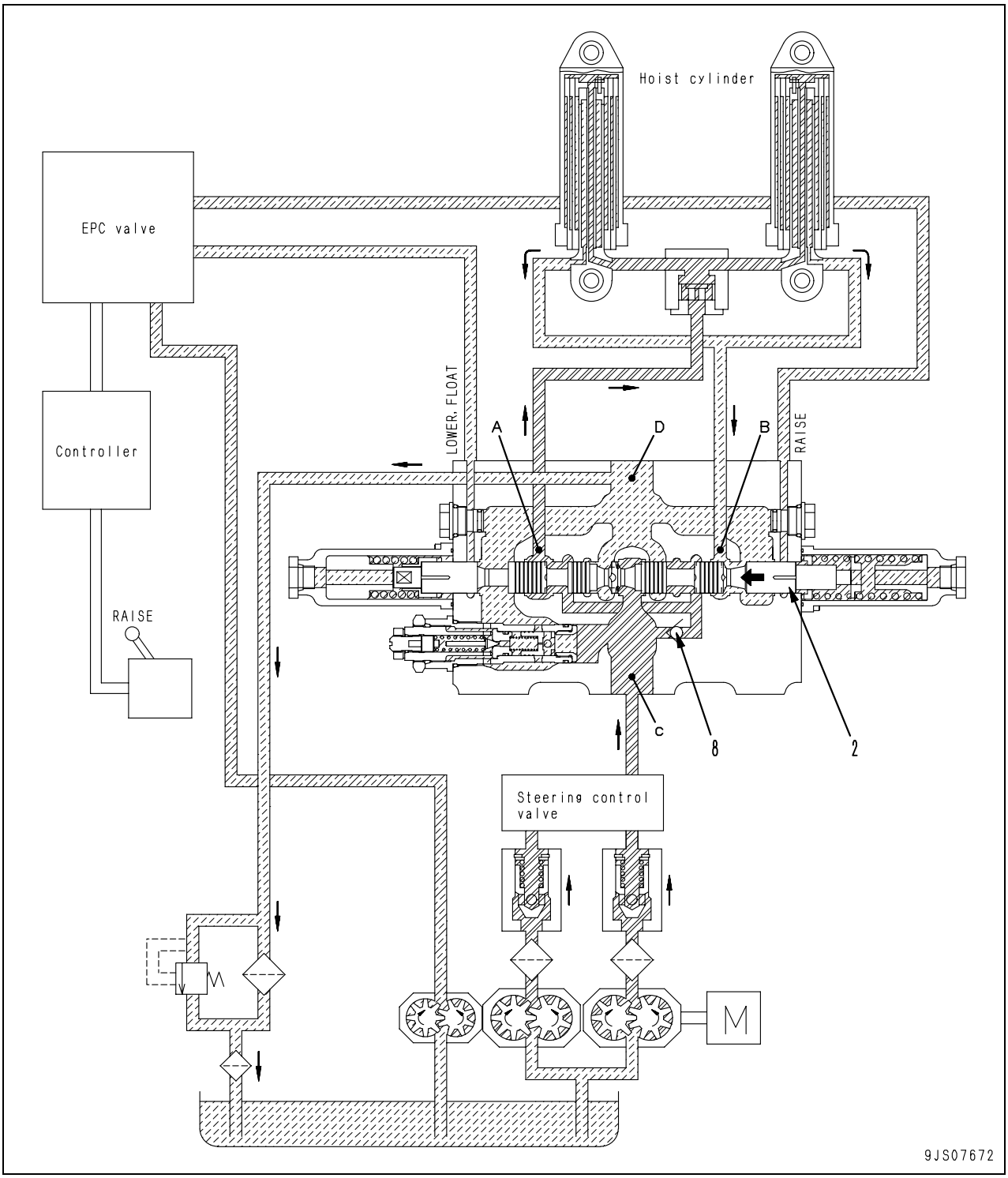


2. When turning right



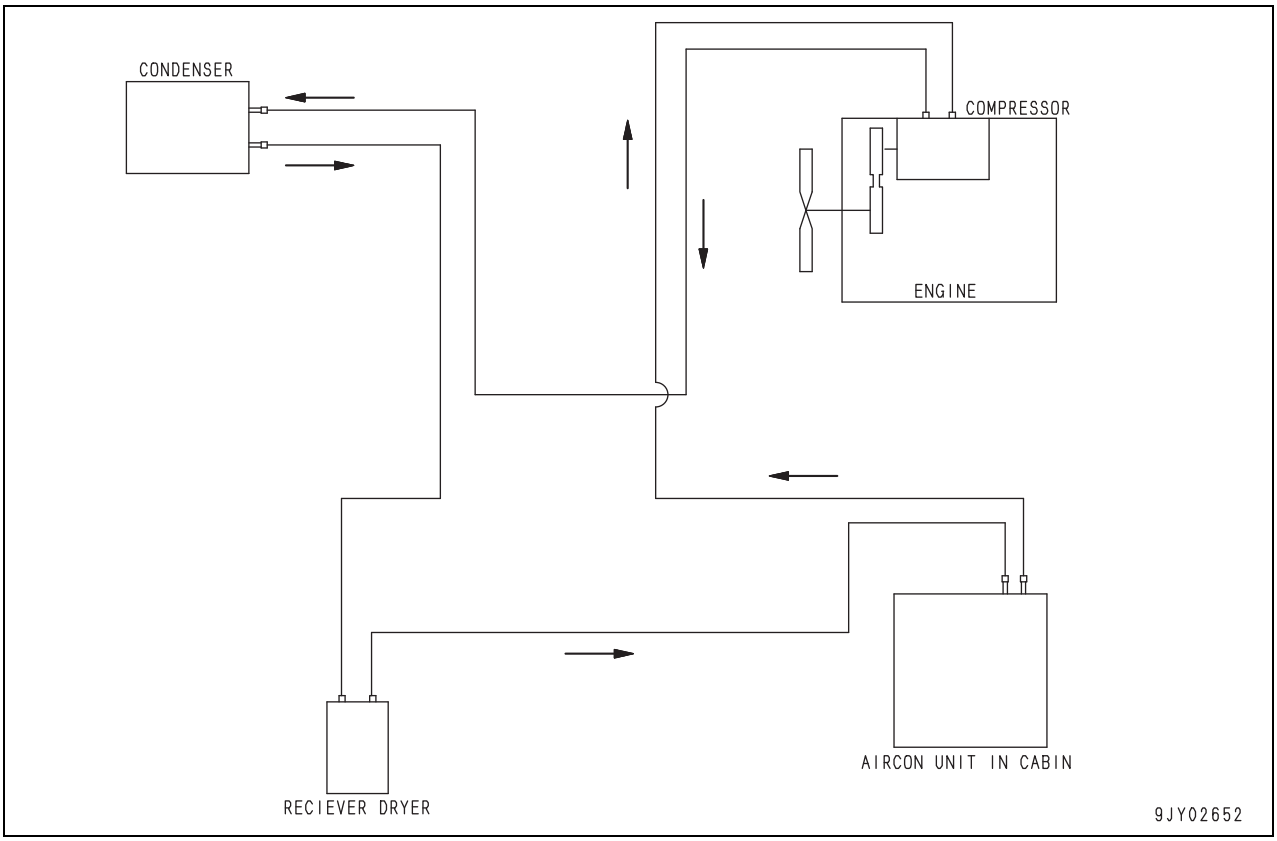
- When the steering wheel is turned (to the right), input shaft (1) rotates. When this happens, valve spool (3) moves down.
  (Input shaft (1) has a spiral groove in which ball (8) moves, so when input shaft (1) rotates, torsion bar (9) is twisted, and ball (8) moves up or down to move valve spool (3).)
- The oil from the steering control valve flows from port (P) through port (A) and port (G) and goes to port (F).
- The oil at port (F) then passes between stator (6) and rotor (12) in the metering portion.
  After the amount of oil flowing to the steering cylinder is measured here, it enters the inside of valve spool (3), passes through hole (a) in the valve spool through port (RT) and flows to the steering cylinder.
- In this way, the two cylinders are actuated and the wheels turn to the right.
- The oil returning from the steering cylinder flows from port (LT) through port (E) and port (R) and goes back to the tank.
- At the same time, the oil pressure at port (P) is restricted by valve spool (3), and passes through port (A), so a lower oil pressure (the drop in pressure (pressure difference) differs to according to the area of the opening of the spool) than the pressure at port (P) is applied to port (LS).
- The steering control spool is actuated by the difference in pressure between the oil pressure at port (P) end and the oil pressure at the port (LS) end. As a result, only the necessary amount of oil flows to the steering circuit, and remaining oil flows from the steering control valve to the hoist valve.

2. When hoist valve is in "RAISE" position



- If the hoist lever in the cab is set in the "RAISE" position, the pressurized oil from the EPC valve moves hoist spool (2) to the left.
- Accordingly, the pressurized oil flows through chamber (C), opens check valve (8), and enters chamber (A).
- The pressurized oil flows through chamber (A) to the bottom side of the hoist cylinder to extend the hoist cylinder and raise the body.
- The pressurized oil returning from the head side flows through chambers (B) and (D) to the tank.

Refrigerant flow system



DUMP TRUCK

HD325-7
HD405-7

Machine model	Serial number
HD325-7	7001 – 7025
HD325-7	7101 and up
HD405-7	3001 – 3035
HD405-7	7101 and up

10 Structure, function and maintenance standard

Electrical system, Part 1

No.	Item	ID No.	Display of item	Displayed data	
12	D-IN-16-----23	40902	D-IN-16-----23	State of input signal is displayed.	
13	D-IN-24-----31	40903	D-IN-24-----31	State of input signal is displayed.	
14	D-IN-32-----39	40904	D-IN-32-----39	State of input signal is displayed.	
15	D-OUT-0--3	40925	D-OUT-0--3	State of output signal is displayed.	

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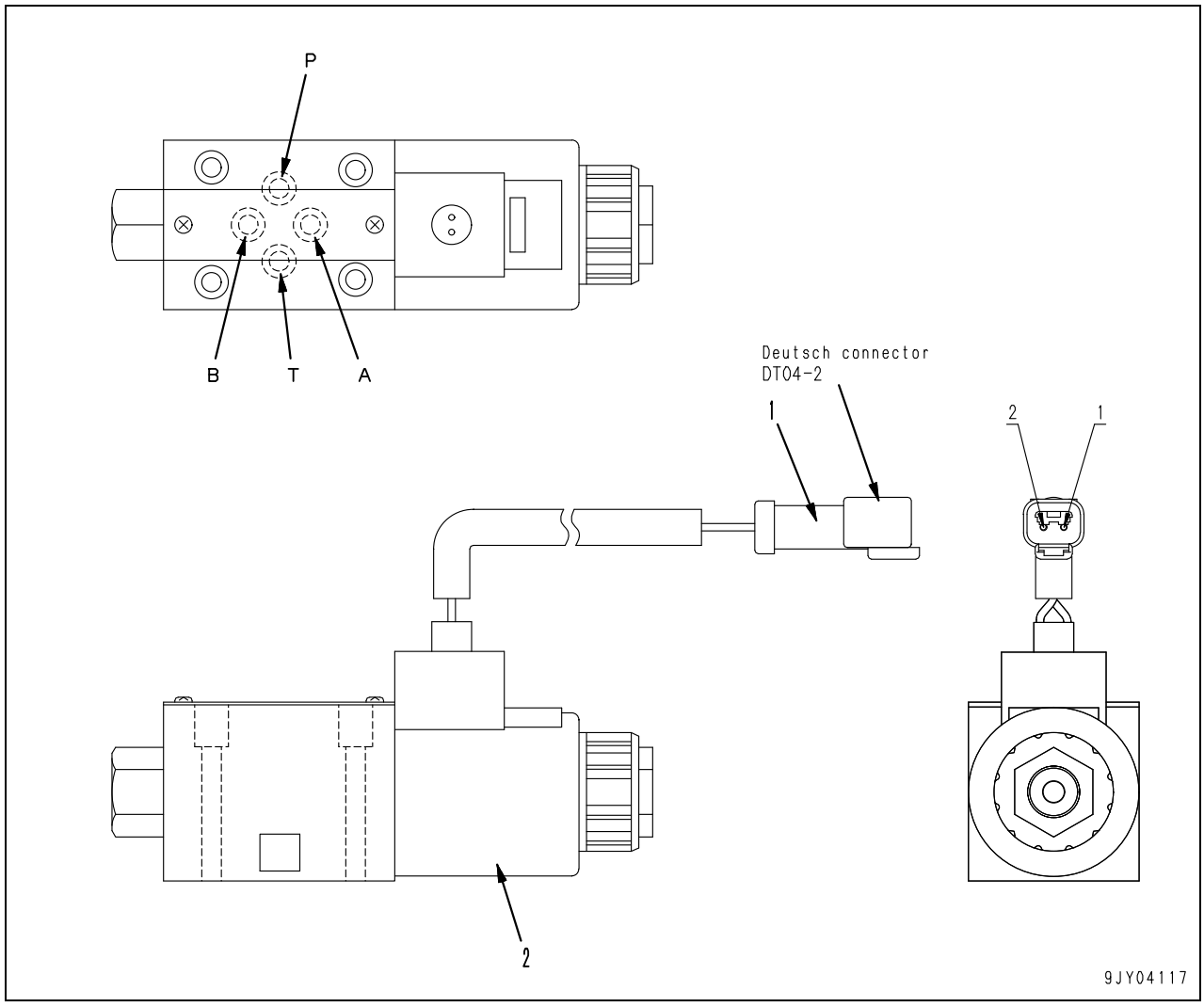
10 Structure, function and maintenance standard

Electrical system, Part 2

No.	Item	ID number	Displayed spec	Data contents
39	2nd clutch trigger modification value	38903	TRIGGER MOD 2	2nd clutch trigger modification value is output (all oil temperature mode)
40	3rd clutch trigger modification value	38904	TRIGGER MOD 3	3rd clutch trigger modification value is output (all oil temperature mode)
41	4th clutch trigger modification value	38905	TRIGGER MOD 4	4th clutch trigger modification value is output (all oil temperature mode)
42	Revolution clutch trigger modification value	38906	TRIGGER MOD R	Revolution clutch trigger modification value is output (all oil temperature mode)
43	Clutch FILL switch	38919	FILL HL1234R	Every each clutch of FILL SW recognition condition is output [H,L,1,2,3,4,R]

Data range	Remarks
Depending upon software part number	
Depending upon software version No.	
Depending upon software version No.	
0.00 – 5.00 [V] ---- [ARSC setting OFF or other than above]	
0 – 32767 [rpm] ---- [ARSC option setting OFF or other than above]	
0 – 32767 [rpm] ---- [Other than above]	
0 – 32767 [rpm] ---- [Other than above]	
0 – 160 [°C] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0 – 1000 [mA] [command value] ---- [Other than above]	
0 – 1000 [mA] [command value] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0 – 1000 [mA] [command value] ---- [Other than above]	
0 – 1000 [mA] [command value] ---- [Other than above]	
0 – 1000 [mA] [command value] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.0 – 10.00 [s] ---- [Other than above]	Down to 2 decimal places are displayed.
0.0 – 10.00 [s] ---- [Other than above]	Down to 2 decimal places are displayed.
ON [1] OFF [0]	Unit is not displayed.
-180.0 – +180.0 [°] ---- [Other than above]	
0.00 – 5.00 [V] ---- [Other than above]	
0.0 – 99.99 [rad/s] ---- [Other than above]	Down to 2 decimal places are displayed.
0.00 – 20.10 [MPa] ---- [Automatic suspension option setting OFF and ARSC option setting OFF, or other than above]	
0.00 – 5.00 [V] ---- [Automatic suspension option setting OFF and ARSC option setting OFF, or other than above]	
0.00 – 20.10 [MPa] ---- [Automatic suspension option setting OFF and ARSC option setting OFF, or other than above]	

Auto suspention solenoid valve



1. Connector
2. Solenoid

A: To hydraulic cylinder head
B: To hydraulic cylinder bottom
P: From pump
T: To transmission oil pan

Function

- The automatic suspension solenoid valve is installed in the circuit between the hydraulic pump and the suspension cylinder. The valve switches oil pressure of the hydraulic cylinder which is installed to the front suspension, according to signal from the retarder controller. Two solenoid valves are combined to select three modes of Soft, Medium and Hard.

4) Data of intergrated load weight and total number of cycles

★ The integrated load weight and total number of cycles after a time are calculated and saved again each time the dumping condition is fulfilled.

★ Integration of the load weight and total number of cycles are started after they are cleared. (See the volume of Operation.)

★ The saving limit of the integrated load weight and total number of cycles is 999900.0 t (metric ton) or US ton (short ton) and 9999 cycles.

Item	Unit	Range	
Intergrated load weight	t (Metric ton) or US ton (Short ton)	0-999900.0	Shows integrated value after time when data were cleared
Total number of cycles	Times	0-9999	
Year (right 2 digits)	Year	0-99	Shows date and time when data were cleared
Month	Month	1-12	
Day	Day	1-31	
Time Hour	Hour	Displayed as 0-23	
Time Minute	Minute	0-59	

5) Other data

Contents	Item	Unit	Range	
Operator check mode set data	Machine ID Open ID Limit speed Option code	Integer Integer km/h Integer	0-200 0-200 0-99 0-11	Operator check mode set by input operation
Calibration performance data	Year (right 2 digits) Month Day Time Hour Time Minute	Year Month Day Hour Minute	0-99 1-12 1-31 Displayed as 0-23 0-59	Date and time when calibration was performed
User write data	Data 1 Data 2 Data 3 Data 4		20 Characters 20 Characters 20 Characters 20 Characters	Comments that can be written freely into payload meter. Note: Input and settings are possible only from PC through cable communications. (For details, see software manual.)

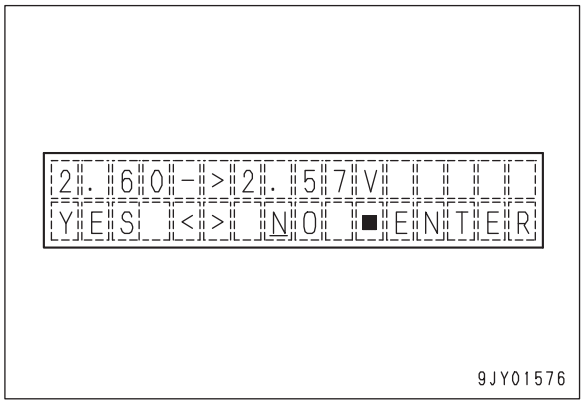
5. Self-diagnostic function

The controller always observes the condition of the sensors and outputs, and if any abnormality occurs, it displays and saves an error message.

Error message display

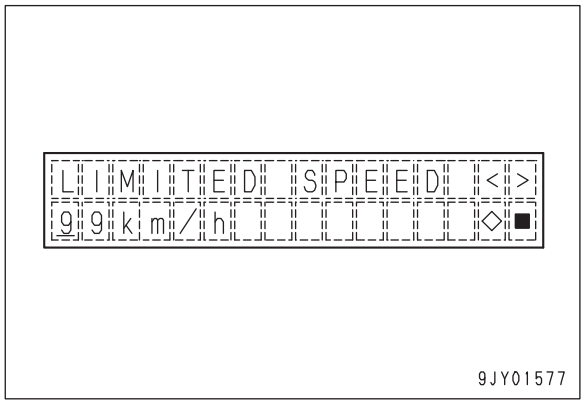
Order of display priority	Contents	Criterion	Error code display			Timing for display
			Controller display	External lamp display	Cancellation of display	
1	Dump lever at position other than FLOAT (except when dumping)	—	b-FL ON	All flash	When removed	[for HD1200-1] When parking brake or brake lock is ON
			b-FL ON	—	When removed	[for HD1200-1] When parking brake or brake lock is OFF
2	Memory card removed	—	Cd flashes	—	When removed	Removal detection only for card dump
3	Drop in backup battery voltage	Defective contact or voltage below 2.7 V	F-09 flashes	—	When removed	Except during loading
4	Cycle data memory FULL	See (*1)	See (*1)	—	See (*1)	Except during loading
	Engine ON/OFF data memory FULL					
	Abnormality, warning data memory FULL					
	Integrated load weight, number of cycles data memory FULL					
5	Disconnection in terminal R	Output below 2 V when engine is running	F-18 flashes	All flash	When removed	When engine is running
6	Abnormality in sensor power source (18 V)	Output is less than 15 V and power source voltage is more than 20 V	F-20 flashes	All flash	When removed	Any time
7	Short circuit with ground, disconnection in front left suspension pressure sensor system	Suspension pressure sensor input signal is 0 kPa or below	F-21 flashes	All flash	When removed	Any time
8	Short circuit with ground, disconnection in front right suspension pressure sensor system		F-22 flashes			
9	Short circuit with ground, disconnection in rear left suspension pressure sensor system		F-23 flashes			
10	Short circuit with ground, disconnection in rear right suspension pressure sensor system		F-24 flashes			

iv) Enter the standard level value.



- [<] switch: Select "YES".
- [>] switch: Select "NO".
- [■] switch: Enter.

4. Setting of criterion of maximum travel speed



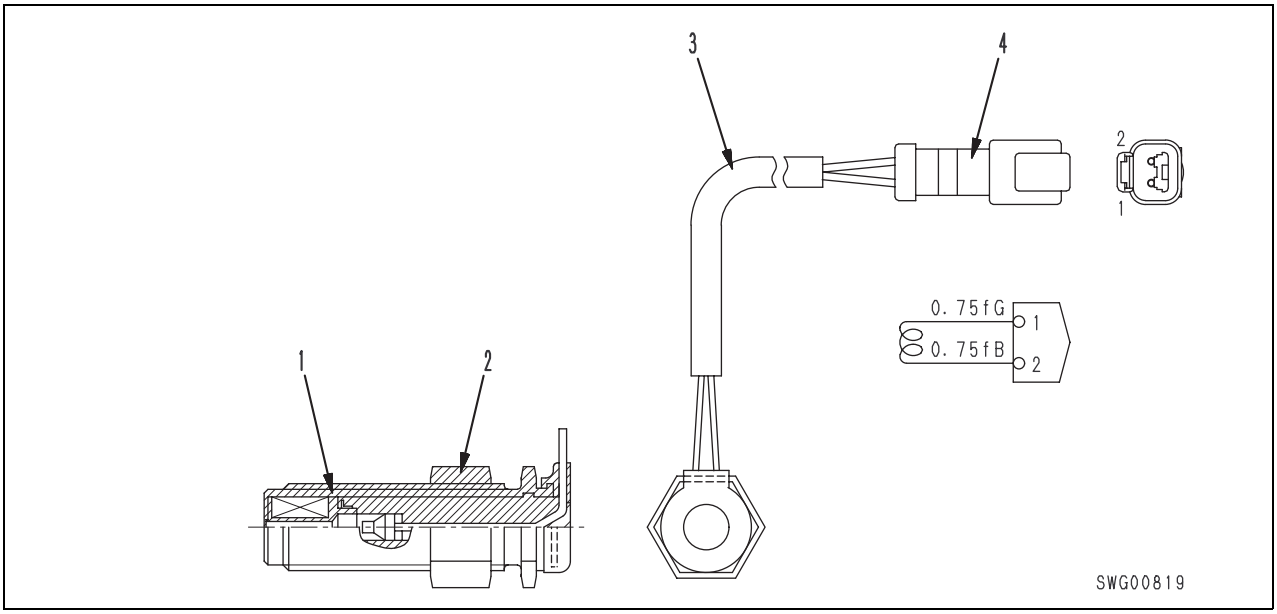
Input a criterion of the maximum travel speed by pressing the following switches

- [>] switch:
  Number at cursor moves forward.
- [<] switch:
  Number at cursor moves backward.
- [◇] switch: Enter number at cursor.
- [■] switch: Stop inputting number.

The setting range is 0 – 99 km/h (0 – 62 MPH).
(Default: 99 km/h)

Sensors, switches

Engine speed sensor



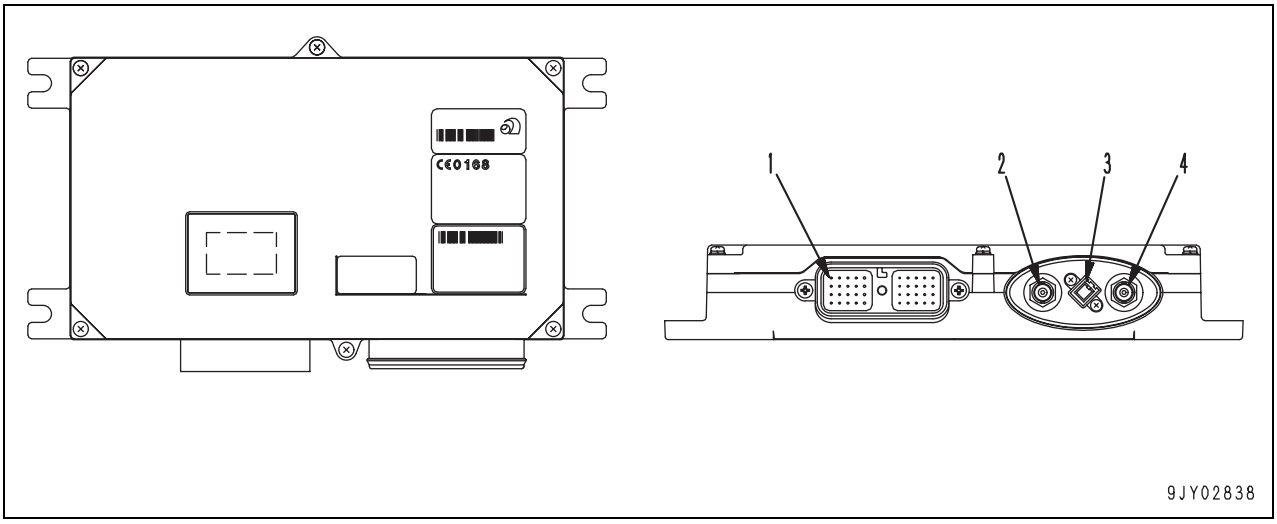
1. Magnet
2. Locknut
3. Wiring harness
4. Connector

Function

- The engine speed sensor is installed to the ring gear of the flywheel housing. It uses the rotation of the gear teeth to generate a pulse voltage and transmits a signal to the transmission controller.

KOMTRAX communication modem

TC200



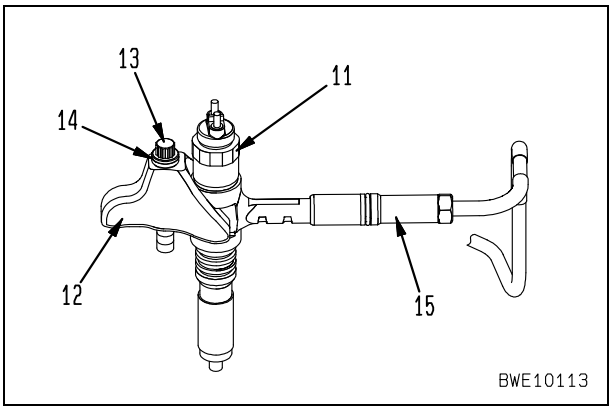
1. DRC connector (40 poles) connecting part
2. (Not connected)
3. GPS antenna connector connecting part
4. Orbcomm antenna connecting part

Outline

- The KOMTRAX terminal can obtain various kinds of machine information from network signals or input signals in the machine, and transmit the information via the communication antenna. The terminal is equipped with a CPU (central processing unit), and has wireless communication and GPS functions as well.
- The terminal is provided with a LED lamp and a 7-segment display lamp as a display unit. The display unit is used for inspection and maintenance.

8. Rotate the engine with the starting motor and measure the compression pressure.
   ★ Read the pressure gauge pointer when it is stabilized.

9. After finishing testing, remove the testing tools and return the removed parts.
   ★ Install the injector and fuel high-pressure tube according to the following procedure.
   1) Push in injector (11) with the hand to assemble holder (12) temporarily.
   2) Tighten bolt (13) and washer (14) temporarily.
   Spherical part of washer: **Engine oil**
   3) Tighten sleeve nut (15) of the fuel high-pressure tube temporarily.
   4) Tighten bolt (13) permanently.
   Bolt: **58.8 – 73.5 Nm {6.0 – 7.5 kgm}**
   5) Tighten sleeve nut (15) permanently.
   Sleeve nut: **39.2 – 49.0 Nm {4 – 5 kgm}**



   ★ Install the injector wiring harness according to the following procedure.
   1) Install the injector wiring harness to the rocker arm housing and fix the connector side with the plate.
   2) Fix the intermediate clamp with the clip.
   3) Tighten the nut on the injector side.
   Nut: **2 ± 0.2 Nm {0.2 ± 0.02 kgm}**
   4) Secure the clamp and spacer with the bolt.

   Rocker arm assembly mounting bolt:
   93 – 103 Nm {9.5 – 10.5 kgm}

   ★ Adjust the valve clearance. For details, see "Adjusting valve clearance".

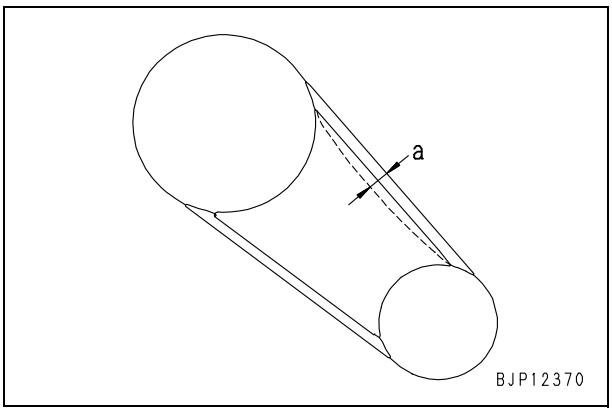
   Cylinder head cover mounting bolt:
   29.4 – 34.3 Nm {3.0 – 3.5 kgm}

Testing and adjusting air conditioner compressor belt tension

Testing

1. Open the engine compartment cover on the control valve side and remove the air conditioner compressor belt cover.

2. Press the middle point of the belt between the air conditioner compressor pulley and drive pulley with the finger and measure deflection (a) of the belt.
   ★ Deflection (a) when pressing force is approx. 58.8 N {approx. 6 kg}: 10 – 15 mm



Adjusting

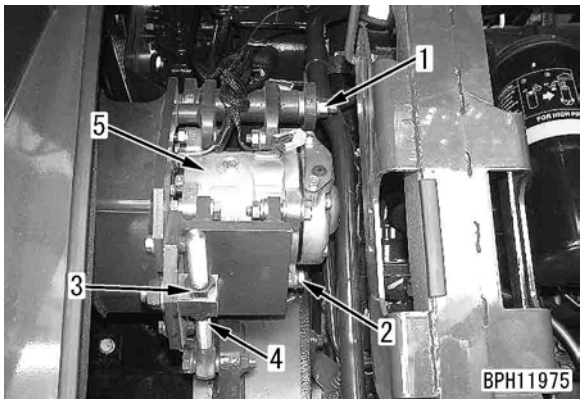
★ If the deflection is abnormal, adjust it according to the following procedure.

1. Loosen bolts and nuts (1), (2), and (3) in numeric order.

2. Rotate nut (4) to move compressor (5) and adjust the belt tension.
   ★ If nut (4) is
   - Rotated to the right, the belt tension is lowered.
   - Rotated to the left, the belt tension is heightened.

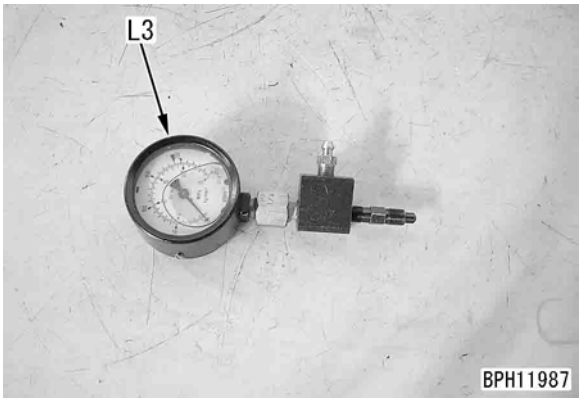
   ★ Check each pulley for breakage, V-groove for wear, and V-belt for contact with the V-groove.
   ★ If the belt is lengthened to the adjustment limit, cut, or cracked, replace it with new one.

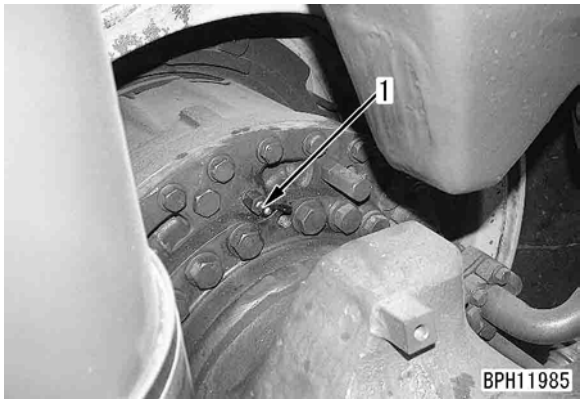
3. Tighten the nuts and bolts (3), (2), and (1) in numeric order.
   ★ If the V-belt is replaced, adjust its tension again after 1 operating hour.



2. Rear brake actuating pressure

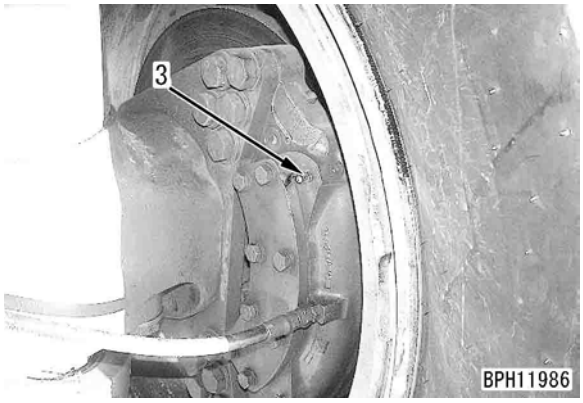
1) Remove air bleeder (1) and install brake test kit **L3**.
2) Operate the brake pedal and retarder control lever and measure the oil pressure.
   ★ After finishing measurement, bleed air, referring to "Bleeding air from brake circuit" on the page 15.





3. Front brake actuating pressure

★ Check that the front brake cut-off switch is turned OFF.
1) Remove air bleeder (3) and install brake test kit **L3**.
2) Operate the brake pedal and measure the oil pressure.
   ★ After finishing measurement, bleed air, referring to "Bleeding air from brake circuit" on the page 15.



Testing wear of front brake pad

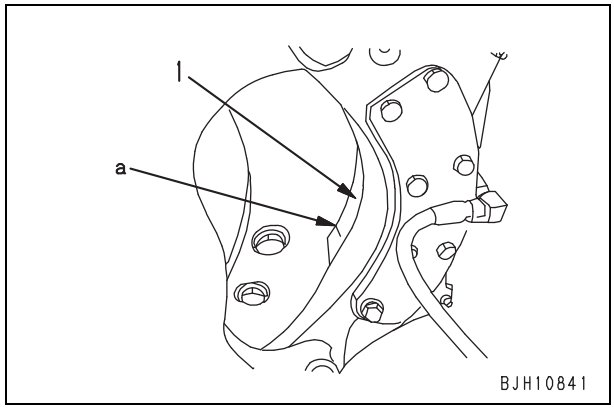
★ **Inspecting instruments of front brake pad wear**

Symbol	Part No.	Part Name
M	566-98-41410	Gauge (Tools carried on machine)

⚠ **Stop the machine on level ground, apply the parking brake, and put chocks under the tires.**

1. Visual check

Check visually, and if the pad has reached the wear limit line, replace the pad.

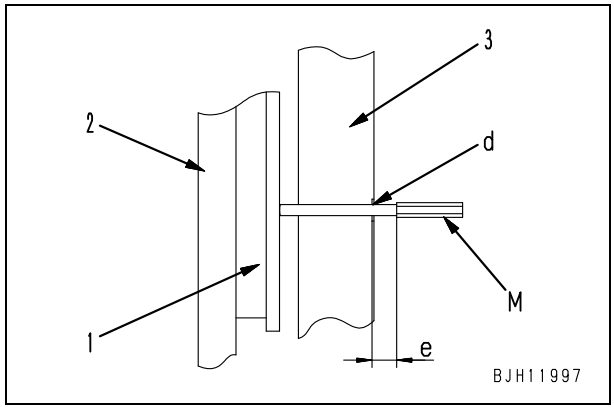


2. Checking with gauge

1) Depress the brake pedal, keep the pad (1) pressed against the disc (2), then insert inspection gauge **M** into indicator hole (d) of the caliper (3).
2) If the stepped part of the gauge contacts the mouth of the hole, the pad has reached the wear limit, so replace it.
   e: Remaining thickness up to wear limit

★ Replace the pads on the left and right sides at the same time.

★ The pad wear is not the same for both left and right sides, so check the wear of all pads.



Testing and adjusting dump EPC circuit oil pressure

★ **Measuring dump EPC circuit oil pressure**

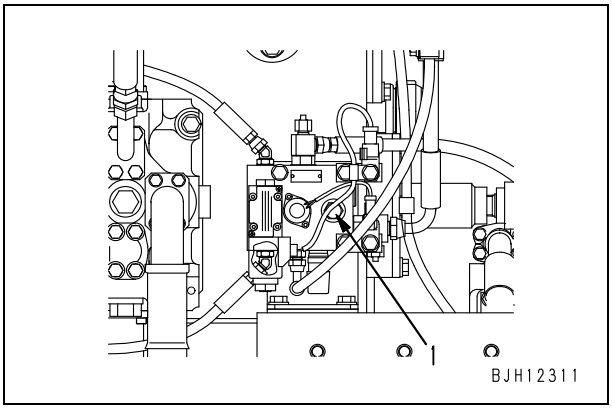
Symbol		Part No.	Part Name
Q	1	799-101-5002	Hydraulic tester
		790-261-1204	Digital hydraulic tester
	2	799-101-5230	Nipple (14 x 1.5)
	3	799-401-3100	Adapter
		02896-11008	O-ring

⚠ **Loosen the oil filler cap of the hydraulic tank slowly to release the residual pressure in the hydraulic tank.**

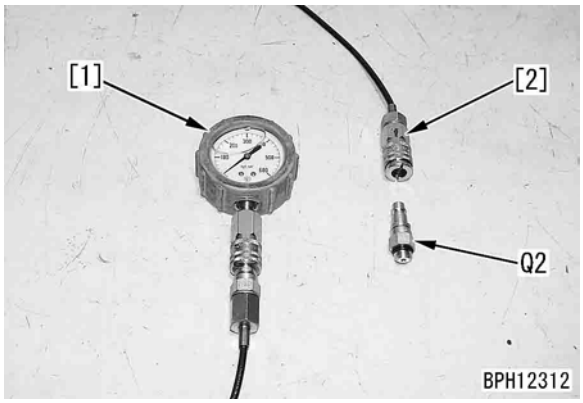
Measuring

1. Testing dump EPC basic pressure

1) Remove oil pressure pickup plug (2) (M14 x 1.5) from dump EPC valve (1) on the inside of the hydraulic tank (inside of the machine).

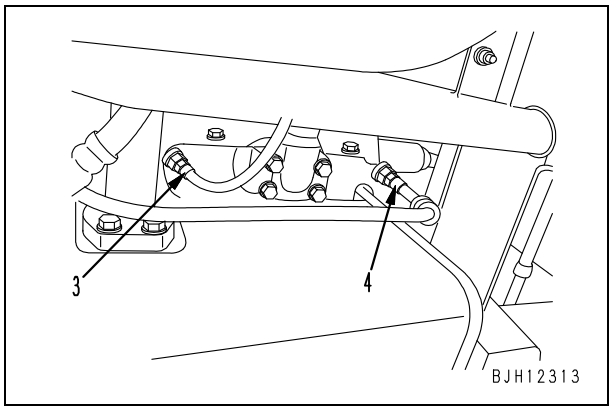


2) Install nipple **Q2**, connect hose [2], and connect oil pressure gauge [1] (6 MPa {60 kg/cm²}) of hydraulic tester **Q1**.
3) Start the engine, set the dump lever in neutral, and measure the oil pressure at high idle.

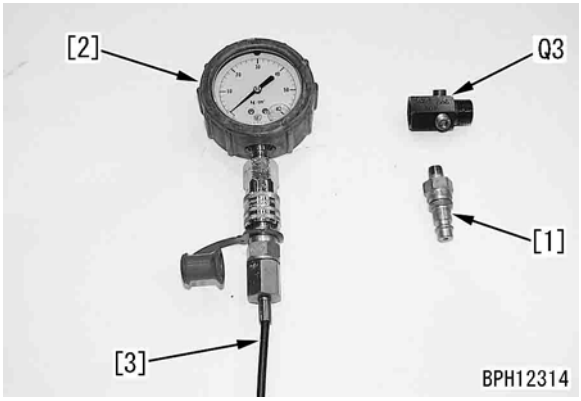


2. Testing dump EPC output pressure

1) Disconnect EPC hose (3) or (4) to be measured.
(3): Dump raise side (Port PB)
(4): Dump lower side (Port PA)



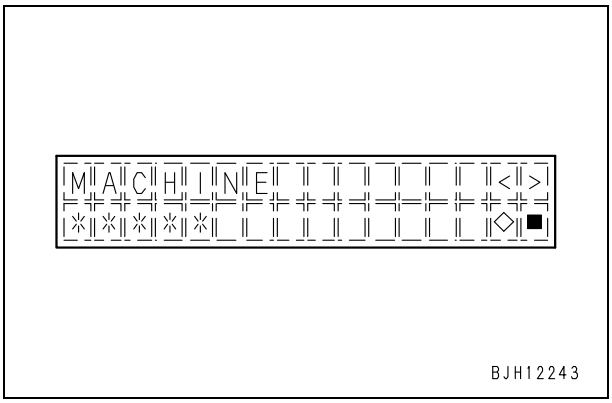
2) Install adapter **Q3** to the hoist valve and connect the hose.
3) Install nipple [1] of hydraulic tester **Q1** to **Q3** and connect oil pressure gauge [2] (6 MPa {60 kg/cm²}) by hose [3].
4) Start the engine, set the dump lever in the raise, float, or lower position, and measure the circuit oil pressure.



★ As for the use of the service menu, besides model selection function, option selection function, and filter and oil replacement time setting function (part of function), refer to the section of "Special function of machine monitor".

★ In the "*" part, the model presently set is displayed.

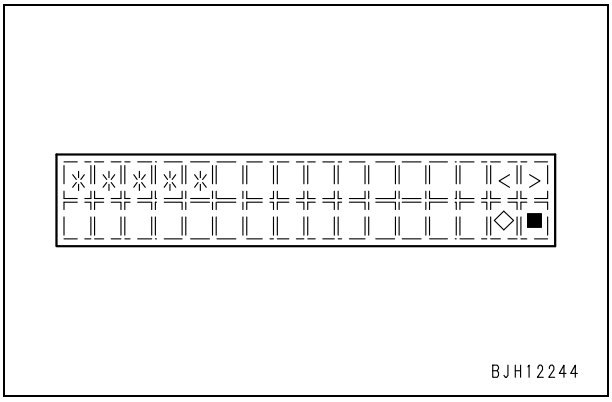
★ Even if the model presently set is correct, be sure to carry out the setting newly.



2) After selecting the model selection function, press [◇] switch for longer than 5 seconds and display the model selection setting screen.
- [◇]: Conduct the service menu.

★ Press [◇] switch for longer than 5 seconds, otherwise it will not change to model selection setting screen.

★ In the model selection setting screen, display only the model to be set at the [*] part.



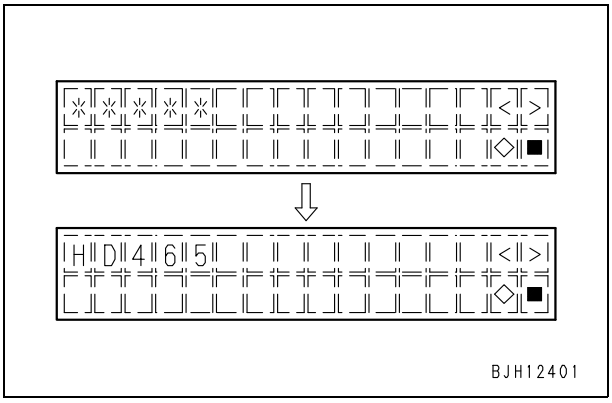
3. Selecting and setting of model
   1) When pressing the [>] switch or [<] switch in the model selection setting screen, the model which can be set is displayed endlessly in the order shown in the below table, so select the applied model.
      - [>] switch: To proceed to next model
      - [<] switch: To return to previous model

      ★ Displayed model:

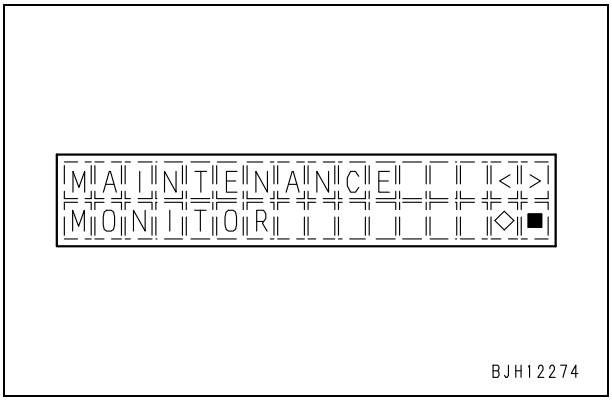
Display	Model
HD785	HD785-7
HD605	HD605-7E0
HD465	HD465-7E0
HD405	HD405-7
HD325	HD325-7

   2) After selecting the model in the model selecting screen, determine the model by pressing the [◇] switch.
      - [◇]: Determine the setting.
      - [■]: To cancel the setting

      ★ The below figure shows the example that HD465-7E0 has been selected.



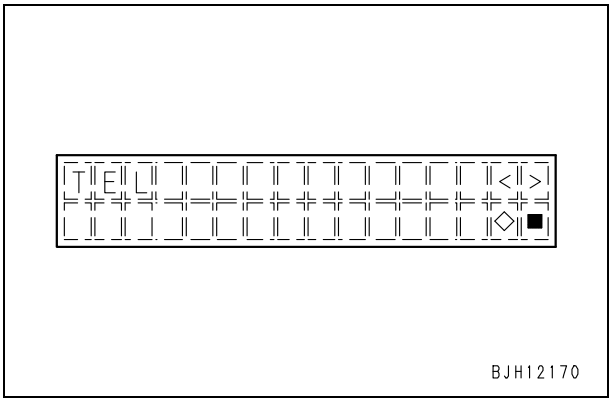
2. Reset of replacement time (selection menu)
   The machine monitor can reset the interval time by operating the switch, if various filters and oils maintenances are finished.
   ★ For details, see operation manual.
   ★ Replacement interval time setting can be operated by the filter and oil replacement time setting function in the service mode.



[5] Phone No. input function

Phone No. set in the machine monitor can be inputted, corrected, and released by the switch operation.

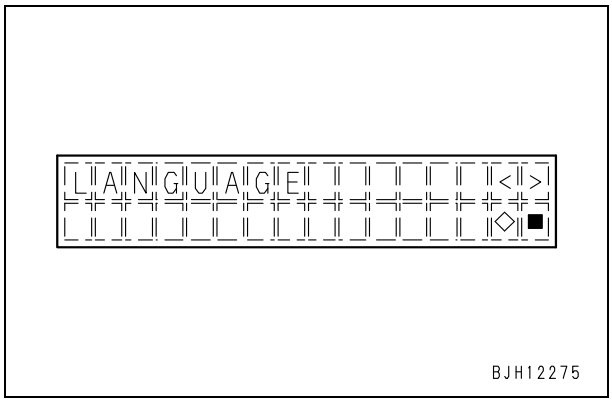
★ Phone No. is displayed together with "CALL" when action code "E03" is displayed.
★ For details, see operation manual.



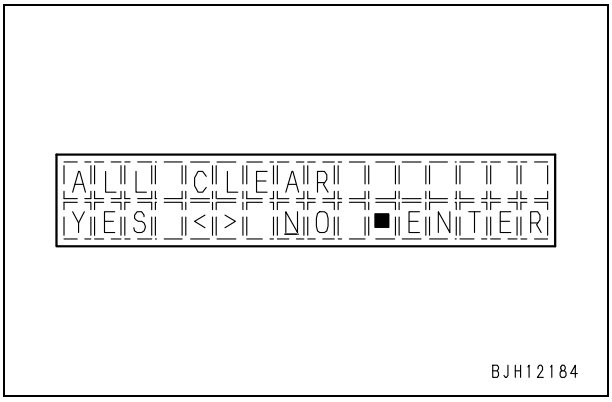
[6] Language selection function

Display language of the machine monitor can be selected with the switch operation.

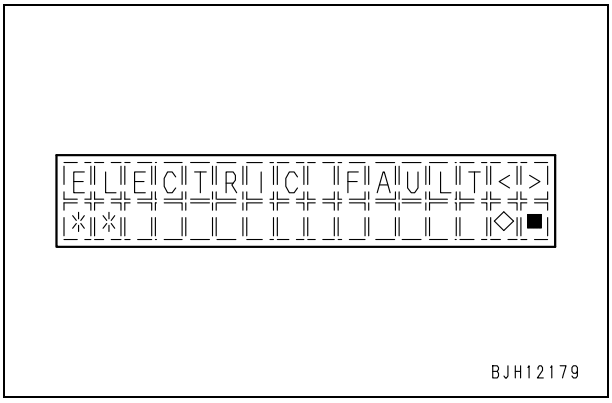
★ The Service mode function is not included in the display selection function, therefore always displayed in English.
★ For details, see operation manual.



3) When the ALL CLEAR execution screen is displayed, operate each switch of [<], [>] and [■].
   - [<]: Select YES (move cursor)
   - [>]: Select NO (move cursor)
   - [■]: Execute YES or NO
   - ★ An information which is active currently (display is flashing) cannot be deleted.



4) The screen changes to the fault history screen. Check that the number of records in ** is "0".



Detailed information of 40932 (D-IN--0------7)

[0] : (Unused)
[1] : Service brake switch
[2] : (Unused)
[3] : Retarder switch (Rear)
[4] : Validation switch 1
[5] : Validation switch 2
[6] : Memory clear switch
[7] : Brake oil filter

Detailed information of 40933 (D-IN--8-----15)

[8] : ASR pressure switch (Rear left)
[9] : ASR pressure switch (Rear right)
[10] : Shut-off valve switch
[11] : ASR check switch
[12] : Parking brake pressure switch
[13] : (Unused)
[14] : (Unused)
[15] : Secondary brake switch

Detailed information of 40934 (D-IN--16----23)

[16] : Starting switch C terminal signal
[17] : (Unused)
[18] : (Unused)
[19] : Brake wear switch (Rear left)
[20] : Brake wear switch (Rear right)
[21] : (Unused)
[22] : (Unused)
[23] : (Unused)

Detailed information of 40935 (D-IN--24----31)

[24] : Steering wheel speed
[25] : (Unused)
[26] : Retarder cooling filter
[27] : Engine oil level switch
[28] : Engine oil filter
[29] : Steering hoist level switch
[30] : Steering hoist filter switch
[31] : Battery electrolyte level switch

Detailed information of 40943 (D-IN--32----39)

[32] : Transmission/Brake oil level switch

Detailed information of 40955 (D-OUT--0------7)

[0] : Auto-suspension solenoid 1
[1] : Hoist selector valve
[2] : Lever kick-out solenoid
[3] : Auto-suspension solenoid 2
[4] : Front brake cut valve
[5] : (Unused)
[6] : (Unused)
[7] : (Unused)

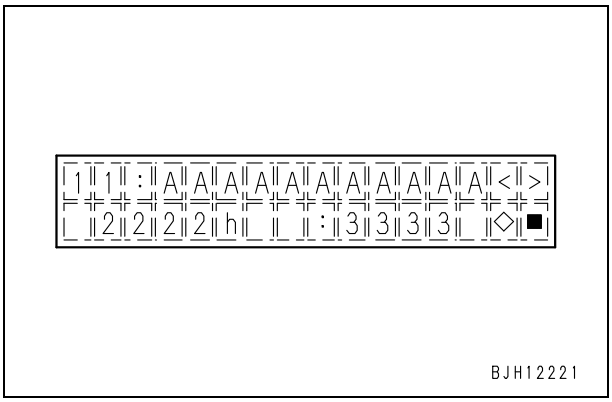
Detailed information of 40956 (D-OUT--8-----15)

[8] : (Unused)
[9] : (Unused)
[10] : (Unused)
[11] : ASR shut-off valve
[12] : (Unused)
[13] : (Unused)
[14] : (Unused)
[15] : Body "Float" signal

Detailed information of 40957 (D-OUT--16-----23)

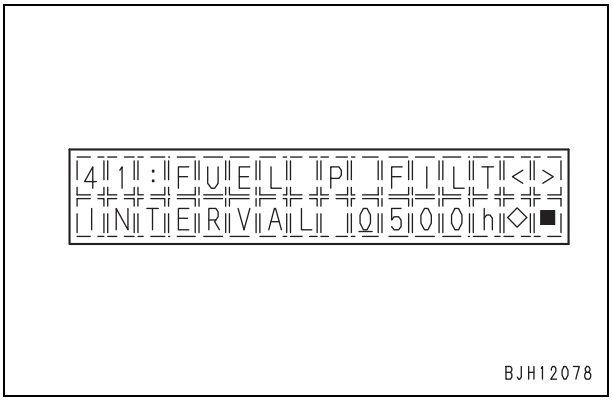
[16] : Stop lamp relay
[17] : (Unused)
[18] : Sensor power supply (24 V)
[19] : BCV relay
[20] : (Unused)
[21] : (Unused)
[22] : (Unused)
[23] : (Unused)

3. Display contents of the maintenance item (Items No.1 – 13)
   If the maintenance item for filter or oil is selected, the following contents are displayed.
   1: Code (2 digits)
   A: Filter and oil replacement time set item
   2: Remaining time to set replacement time
   3: Number of times of replacement up to present



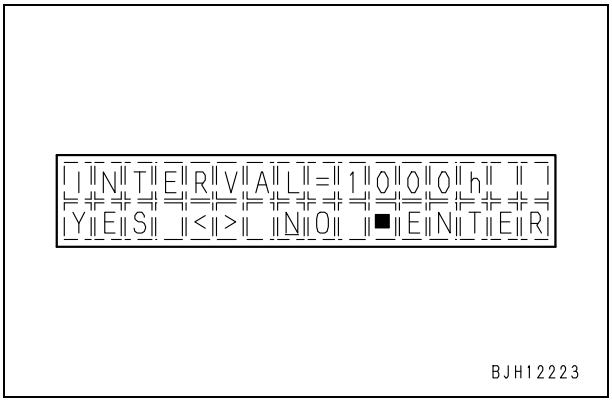
BJH12221

4. Changing the interval time by maintenance item (Items No.1 – 13)
   1) With the item to change the interval time (ex: FUEL P FILT) selected on the maintenance item and the function selection screen, press the [◇] switch to display the interval change screen.
      - [◇]: Execute the function to change maintenance item.
      - ★ The current set interval is displayed on the screen.
      - ★ With this screen displayed, if the [>] switch or the [<] switch is operated, the screen switches to the setting screen for enable and disable the maintenance item.
   2) On the interval change screen, operate each of the switches [>], [<], [◇] and [■] to input the interval time.
      - [>]: Number at the cursor increases.
      - [<]: Number at the cursor decreases.
      - [◇]: Number at the cursor is determined.
      - [■]: To return to the service menu selection screen.
      - ★ The time must always be input with 4 digits. For the time with less than 4 digits, input 0s in place of the vacant number.



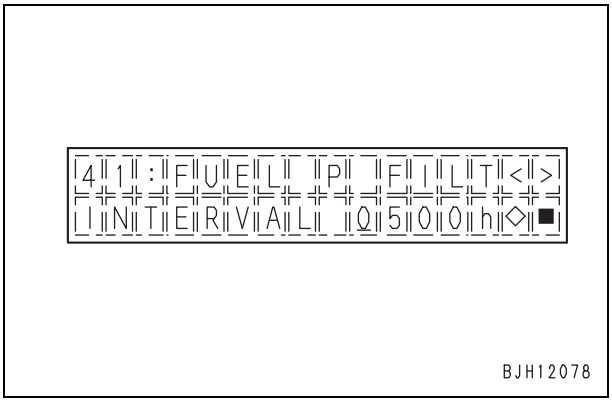
BJH12078

   3) When the interval time is completely determined, the screen to confirm the changes is displayed. Then, operate each of the switches [<], [>] and [■].
      - [<]: To select YES (The cursor moves)
      - [>]: To select NO (The cursor moves)
      - [■]: Execute YES or NO



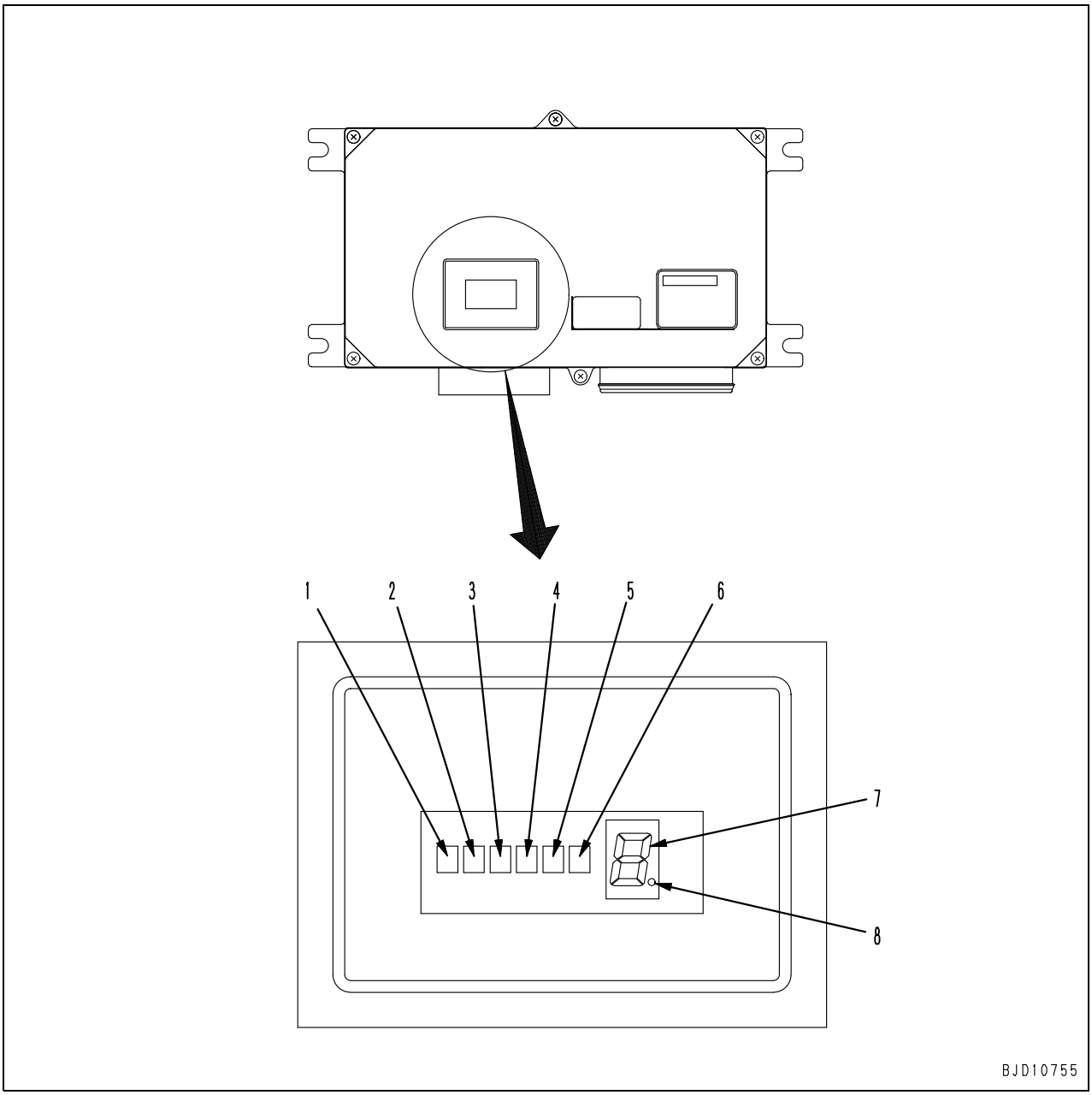
BJH12223

5. Set the function activation or deactivation by maintenance item (items No.1 – 14).
   1) With the item (ex: FUEL P FILT) to change the enable and disable of the function selected on the maintenance item and function selection screen, press the [◇]switch to display the interval input screen.
      - [◇]: Implement the function to change maintenance item.



BJH12078

Lamp display of KOMTRAX terminal



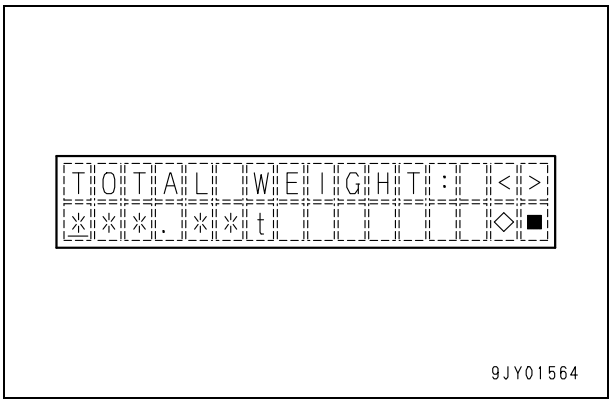
CPU LED

1. LED-C1 (R signal, ACC signal)
2. LED-C2 (Starting output status)
3. LED-C3 (S-NET, C signal status)
4. LED-C4 (Condition of CAN communication)
5. LED-C5 (downloading and writing status)
6. LED-C6 (downloading and writing status)

7 segments and dot for CPU

7. 7 segments (number of mails not yet sent)
8. Dot (GPS positioning status)

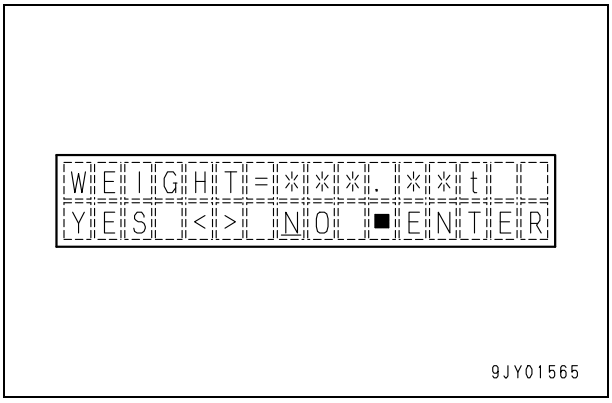
3] Input the measured weight of the fully loaded machine.



- [>] button: Number at cursor moves forward
- [<] button: Number at cursor moves backward
- [◇] button: Enter number at cursor
- [■] button: Return to the largest position of the number to input the value again. If this button is pressed again, inputting of the value is stopped and the previous screen appears.

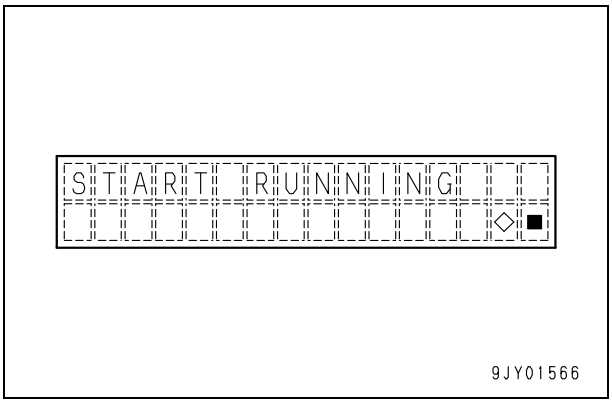
★ Inputtable range
HD325-7:
A1 ± (A1 × 0.25) (metric ton)
However,
A1 = {32.7 [t] (**Operating weight**) + 36.5 [t] (**Load capacity**)}
HD405-7:
A2 ± (A2 × 0.25) (metric ton)
However,
A2 = {35 [t] (**Operating weight**) + 40 [t] (**Load capacity**)}

4] Check the input value.



- [<] button: Select "YES"
- [>] button: Select "NO"
- [■] button: Enter

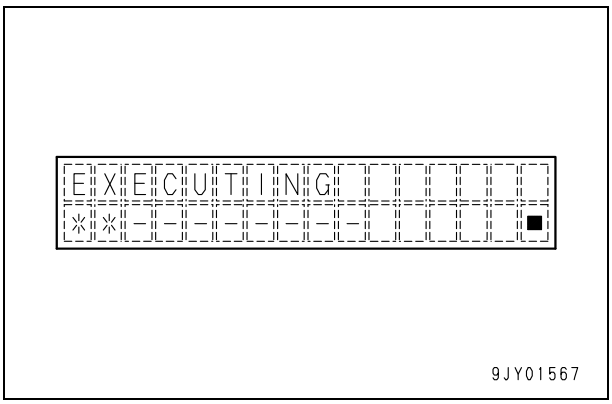
5] Move the machine to a place where you can drive it for about 3 minutes.



- [◇] button: After getting ready for drive, press this button and start driving the machine
- [■] button: Return to the screen for inputting values

Drive the machine for about 3 minutes (at a speed higher than 8 km/h) to settle the relationship between the weight of the machine and the suspension pressure under that weight.

6] Display the progress of measurement.



- [■] button: Stop measurement and return to the previous screen

As measurement is executed, the number of "*" increases. When measurement is finished, the next screen appears automatically.

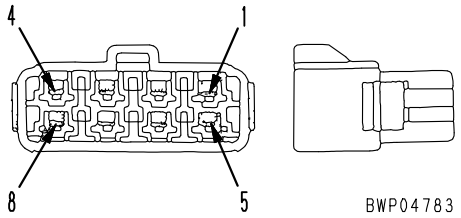
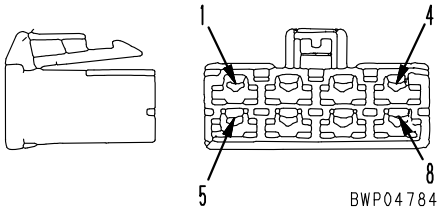
Information in troubleshooting table

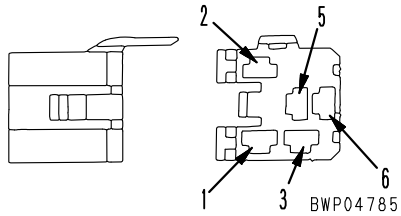
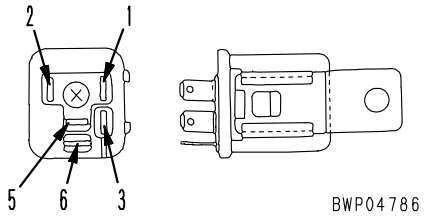
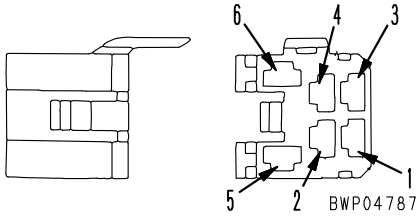
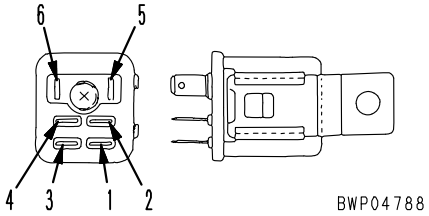
(Rev. 2010/03)

★ The following information is summarized in the troubleshooting table and the related electrical circuit diagram. Before performing troubleshooting, understand that information fully.

User code	Failure code		
Display on machine monitor	Display on machine monitor	Failure	Failure name displayed on the Abnormality Record screen of the machine monitor
Detail of failure	Description of the failure detected by the machine monitor or controller		
Action of machine monitor or controller	Action to be taken to protect the system and equipment when the machine monitor or controller detects a trouble		
Problem on machine	Problem that appears on machine as result of action (above) taken by machine monitor or controller		
Related information	Information related to detected failure or troubleshooting		

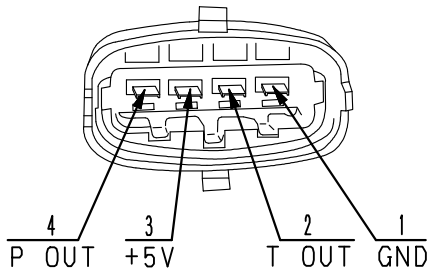
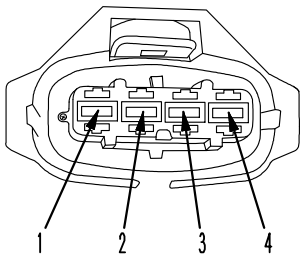
Cause		Procedure, measuring location, criteria and remarks
1	Defective component	<Details of description> ● Procedure ● Measuring location ★ "Between A and B" means the measurement of voltage, resistance or others between terminals A and B. ● Criteria to judge probable causes (normal value) ● Remarks for judgment <How to use troubleshooting sheet> ● Perform troubleshooting procedures in numerical order. ● If the check result does not meet the criteria, the probable cause described on the left column is the actual cause of the failure. ● If the check result shows no abnormality, and unless otherwise specified, proceed to the next step (next cause item). ● Check that the failure is fixed after a failure was found and repaired. <Failures in wiring harness> ● Open circuit in wiring The connector connection is defective or the wire is broken. ● Ground fault A harness not connected to ground circuit contacts the ground wiring or machine. ● Hot short circuit A harness not connected to the power circuit (24 V) contacts with the power circuit. ● Short circuit An independent wire in the harness contacts with other wire. (poor insulation at connector and others) <Precautions for troubleshooting> (1) Connector number indication method and handling of T-adapter For troubleshooting, insert or connect T-adapter as follows unless otherwise specified. ● When "male" or "female" is not indicated with a connector number, disconnect the connector, and insert T-adapter between the male and female connectors. ● When "male" or "female" is indicated with a connector number, disconnect the connector, and connect T-adapter only to either male or femae connector. (2) Description sequence of pin number and handling of tester lead For troubleshooting, connect the positive (+) and negative (-) leads as shown below unless otherwise specified. ● Connect the positive (+) lead to pin or wire indicated first. ● Connect the negative (-) lead to a pin or wire indicated second.
2	Open or short circuit in wiring harness	
3	Open circuit in wiring harness (wire breakage or defective contact of connector)	
4	Ground fault in wiring harness (contact with ground circuit)	
5	Hot short circuit (contact with 24 V circuit)	
6	Short circuit in wiring harness	
7	Defective controller	

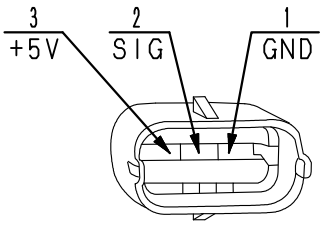
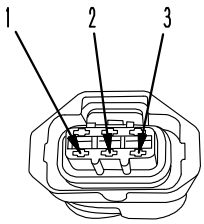
No. of pins	KES1 (Automobile) connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			—
	Part No. :08027-10810 (Natural color) 08027-10820 (Black)	Part No. :08027-10860 (Natural color) 08027-10870 (Black)	

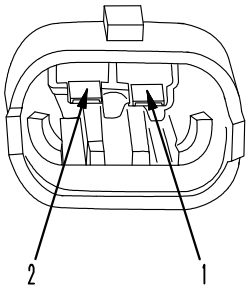
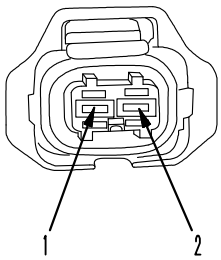
No. of pins	Connector for relay (Socket type)		
	Male (female housing)	Female (male housing)	T-adapter Part No.
5			799-601-7360
	—	—	
6			799-601-7370
	—	—	

9JS04902

BOSCH connector for engine

No. of pins	Boost (air intake) pressure and temperature sensor (95 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
4			799-601-4380
	—	—	

No. of pins	Common rail (fuel) pressure sensor (95, 107, 114 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
3			799-601-4190 (Kit:799-601-4101) (Kit:799-601-4201)
	—	—	

No. of pins	Fuel supply pump (95, 107 engine) and fuel injector (95 engine)		
	Valve side (plug)	Harness side (receptacle)	T-adapter Part No.
2			799-601-4340 (Kit:799-601-4101) (Kit:799-601-4201)
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BJH13175

Failure code	Trouble	Contents of trouble	Device in charge	Action code	Category of record	Reference document No.
CA135	Oil pressure sensor	Too high	ENG	E01	Electrical system	SEN01188-**
CA141	Oil pressure sensor	Too low	ENG	E01	Electrical system	
CA144	Coolant temperature sensor	Too high	ENG	E01	Electrical system	
CA145	Coolant temperature sensor	Too low	ENG	E01	Electrical system	
CA153	Charge temperature sensor	Too high	ENG	E01	Electrical system	
CA154	Charge temperature sensor	Too low	ENG	E01	Electrical system	
CA187	Sensor power source 2	Too low	ENG	E03	Electrical system	
CA221	Atmospheric pressure sensor	Too high	ENG	E01	Electrical system	
CA222	Atmospheric pressure sensor	Too low	ENG	E01	Electrical system	
CA227	Sensor power source 2	Too high	ENG	E03	Electrical system	
CA234	Engine over speed	Over speed	ENG	E02	Mechanical system	
CA238	Engine Ne speed sensor	Abnormal power source	ENG	E03	Electrical system	
CA263	Fuel temperature sensor	Too high	ENG	E01	Electrical system	
CA265	Fuel temperature sensor	Too low	ENG	E01	Electrical system	
CA271	PCV1 short circuit	Short circuit	ENG	E03	Electrical system	
CA272	PCV1 disconnection	Disconnection	ENG	E03	Electrical system	
CA273	PCV2 short circuit	Short circuit	ENG	E03	Electrical system	
CA274	PCV2 disconnection	Disconnection	ENG	E03	Electrical system	
CA322	Injector No. 1 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA323	Injector No. 5 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA324	Injector No. 3 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA325	Injector No. 6 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA331	Injector No. 2 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA332	Injector No. 4 system	Disconnection or short circuit	ENG	E03	Electrical system	
CA342	Engine controller data consistency	Abnormal	ENG	E03	Electrical system	
CA351	Injector drive circuit	Abnormal	ENG	E03	Electrical system	
CA352	Sensor power source 1	Too low	ENG	E03	Electrical system	
CA386	Sensor power source 1	Too high	ENG	E03	Electrical system	

Failure code [15J0MW] Lo clutch: Slipping

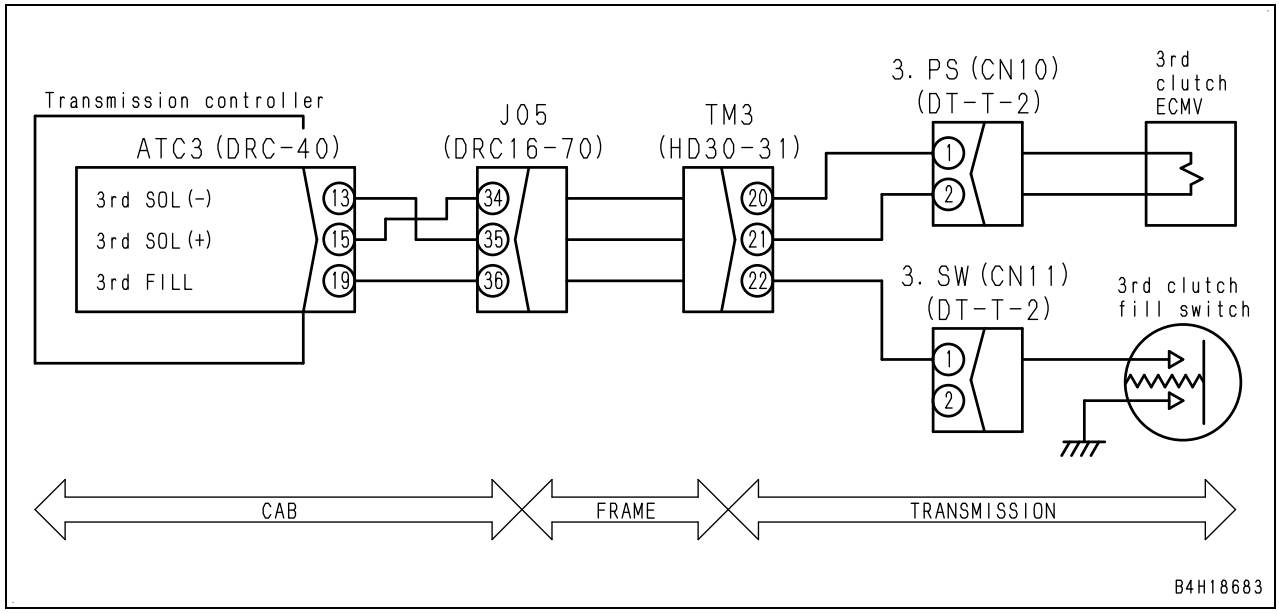
Action code	Failure code		
E03	**15J0MW**	Trouble	Lo clutch: Slipping (Command is holding pressure, fill switch is ON, and slipping detected) (Transmission controller system)
Contents of trouble	• When a signal is output to the Lo clutch ECMV, the value calculated from the signals of the transmission input shaft speed sensor, transmission intermediate shaft speed sensor, and transmission output shaft speed sensor is abnormal.		
Action of controller	• Shifts up and keeps gear according to gear speed before trouble and **Table 1**. • Turns lockup system OFF.		
Problem that appears on machine	• Machine travels at gear speeds which do not use Lo clutch.		
Related information	• Can be checked with monitoring function (Code: **31601**). • When carrying out emergency escape operation, see "Emergency escape method when electrical system has trouble".		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective hydraulic or mechanical system of Lo clutch	1) Check for failures such as clogged transmission oil filter. 2) Check that clutch pressure is normal, referring to Testing and adjusting, "Testing power train oil pressure".		
	2	Lo clutch ECMV defective	1) Turn the starting switch OFF. 2) Disconnect connector L.PS (CN17). 3) Connect T-adapter.		
			Between L.PS (CN17) (male) (1) and (2)	Resistance	5 – 15 Ω
			Between L.PS (CN17) (male) (1) or (2) and ground	Resistance	Min. 1 MΩ
	3	Disconnection or short circuit in wiring harness	1) Turn the starting switch OFF. 2) Disconnect connector ATC3. 3) Connect T-adapter.		
			Between ATC3 (female) (6) and ATC3 (female) (13)	Resistance	5 – 15 Ω
	4	Disconnection in wiring harness (Disconnection or defective contact)	★ If no abnormality is found in above checks, this check is not required. 1) Turn the starting switch OFF. 2) Disconnect connectors ATC3 and L.PS (CN17). 3) Connect T-adapter.		
			Between ATC3 (female) (6) and L.PS (CN17) (female) (1)	Resistance	Max. 1 Ω
			Between ATC3 (female) (13) and L.PS (CN17) (female) (2)	Resistance	Max. 1 Ω
	5	Defective sensing by speed sensor	• Troubleshooting by the failure codes of DL**KA, and DL**LC.		
	6	Transmission controller defective	If causes are not found by above checks, transmission controller is defective. (Since this is an internal failure, troubleshooting can not be performed.)		

Table 2

Speed when trouble was detected		Failed clutch (Fill switch ON)	Remedy against trouble		
			Action of controller (Selected clutch, gear speed)		ON/OFF state of lockup clutch
F7	4th High	3rd	OFF	NEUTRAL	OFF
		2nd	OFF	NEUTRAL	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		Low	OFF	NEUTRAL	OFF
F6	4th Low	3rd	OFF	NEUTRAL	OFF
		2nd	OFF	NEUTRAL	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		High	4H	F7	OFF
F5	3rd High	4th	4L	F6	OFF
		2nd	OFF	NEUTRAL	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		Low	4L	F6	OFF
F4	3rd Low	4th	4L	F6	OFF
		2nd	OFF	NEUTRAL	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		High	3H	F5	OFF
F3	2nd High	4th	4L	F6	OFF
		3rd	3L	F4	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		Low	3L	F4	OFF
F2	2nd Low	4th	4L	F6	OFF
		3rd	3L	F4	OFF
		1st	OFF	NEUTRAL	OFF
		Reverse	OFF	NEUTRAL	OFF
		High	2H	F3	OFF
F1	1st Low	4th	4L	F6	OFF
		3rd	3L	F4	OFF
		2nd	2L	F2	OFF
		Reverse	OFF	NEUTRAL	OFF
		High	2H	F3	OFF
R1	Reverse Low	4th	OFF	NEUTRAL	OFF
		3rd	OFF	NEUTRAL	OFF
		2nd	OFF	NEUTRAL	OFF
		1st	OFF	NEUTRAL	OFF
		High	RH	R2	OFF
N		ANY	NONE	No reaction	—

Circuit diagram related

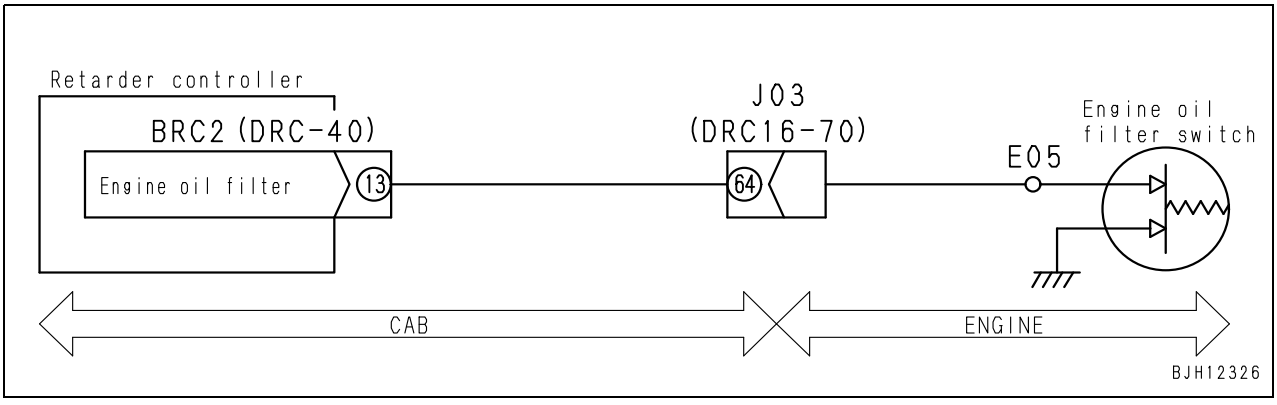


Failure code [A570NX] Engine oil filter: Clogging

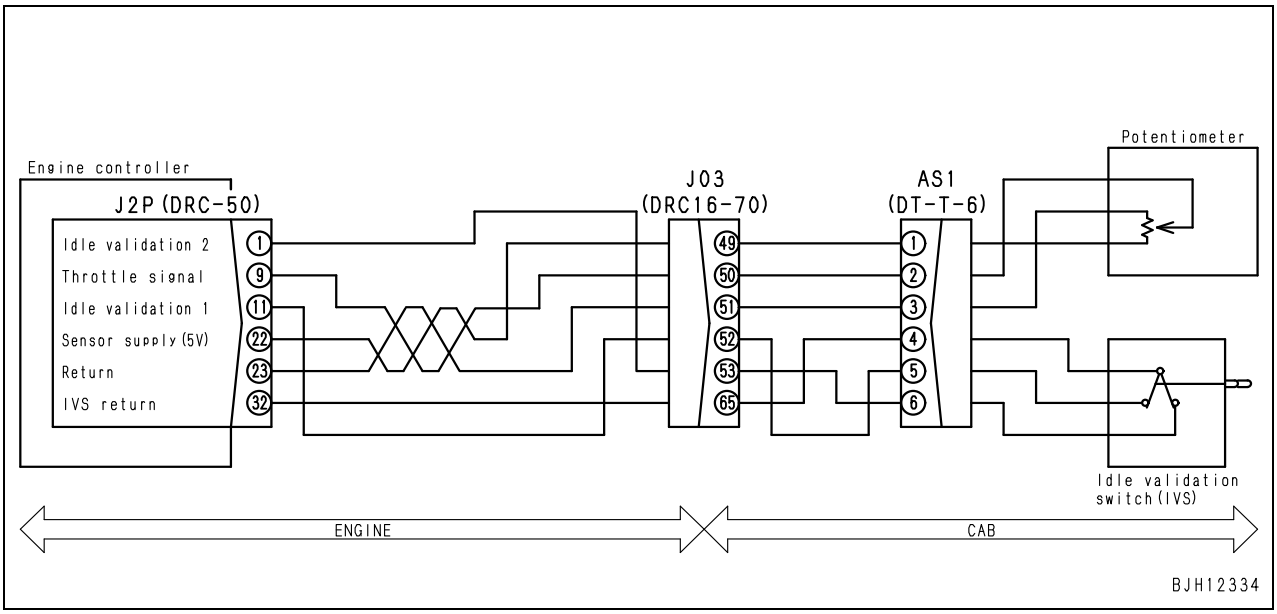
Action code	Failure code	Trouble	Engine oil filter: Clogging (Retarder controller system)
E01	**A570NX**		
Contents of trouble	• When engine speed is above 500 rpm and torque converter oil temperature is above 50°C, and engine coolant temperature is above 67°C, oil filter circuit is opened (disconnected from ground circuit).		
Action of controller	• None in particular.		
Problem that appears on machine	• If engine is used for long hours, it may be seized.		
Related information			

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Clogged oil filter	When maintenance caution lamp is lighting	Oil filter is probably clogged		
	2	Defective oil filter clogging switch	1) Turn starting switch OFF. 2) Disconnect switch terminal E05.			
			Between terminal E05 of switch and ground	When oil filter normal	Resistance	Max. 1 Ω
				When oil filter clogging switch is open	Resistance	Min. 1 MΩ
	3	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect connector BRC2 and switch terminal E05. 3) Connect T-adapter to BRC2 (female).			
			Between BRC2 (female) (13) and terminal E05		Resistance	Max. 1 Ω
	4	Defective retarder controller	1) Turn starting switch OFF. 2) Insert T-adapter in connector BRC2. 3) Turn starting switch ON.			
			Between BRC2 (13) and ground	When oil filter normal	Voltage	Max. 1 V
				When oil filter clogging switch is open	Voltage	Min. 7 V

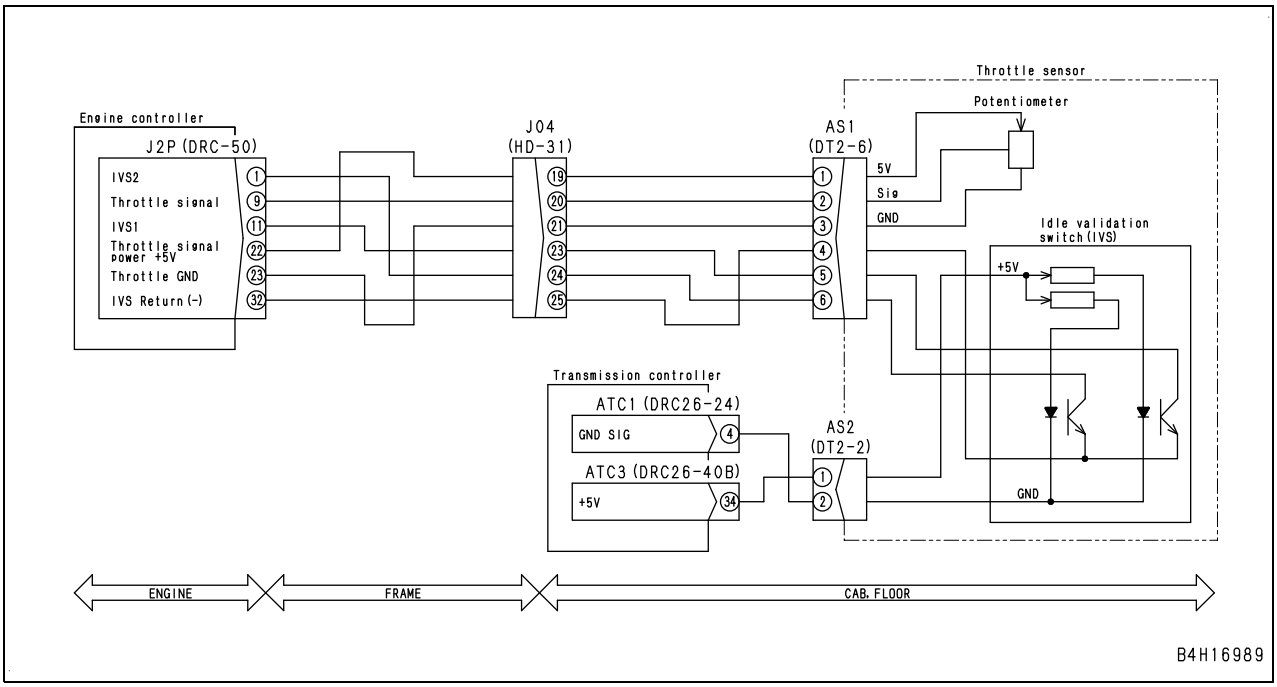
Circuit diagram related



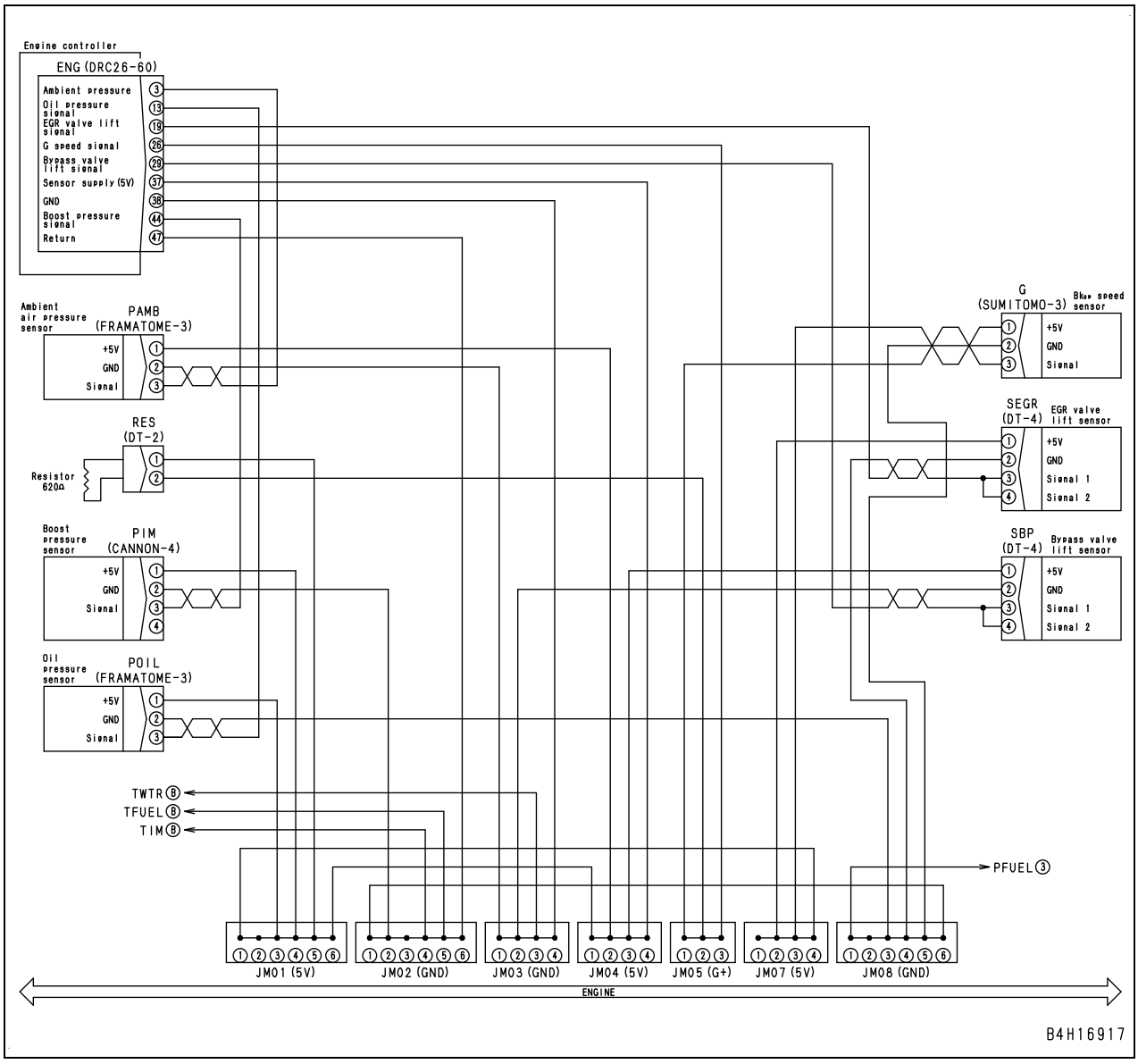
Circuit diagram related to throttle sensor
Applied serial number: HD325-7 # 7001 – 7161
HD405-7 # 3001 – 7157



Applied serial number: HD325-7 # 7162 and up
HD405-7 # 7158 and up



Engine serial No.: 53880 and up

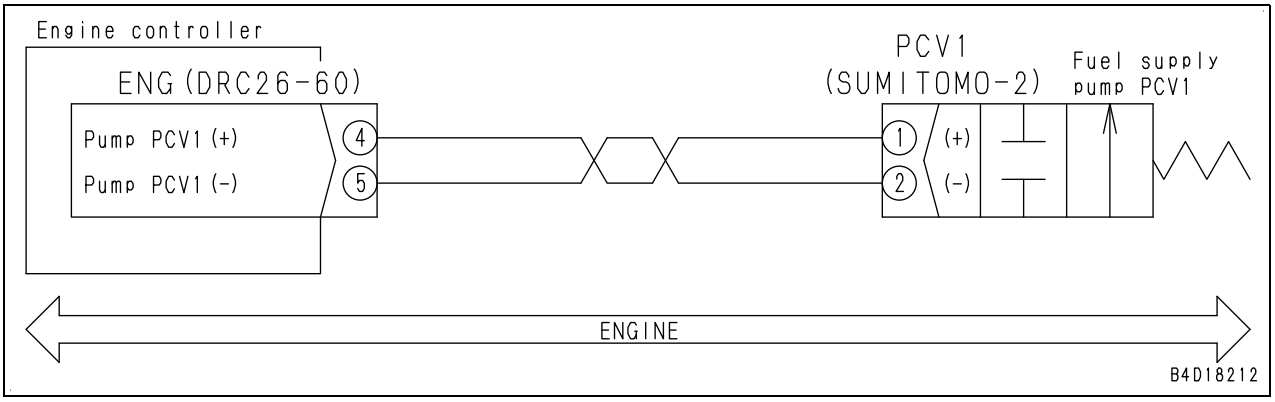


Failure code [CA272] PCV1 Disconnection

Action code	Failure code	Failure	IMV/PCV1 Open Error (Engine controller system)
E03	**CA272**		
Detail of failure	• Disconnection was detected in supply pump PCV1 circuit.		
Action of controller	• Turns the centralized warning lamp and alarm buzzer ON.		
Problem on machine	• Engine output drops.		
Related information	• Method of reproducing failure code: Turn the starting switch to ON position. • Under normal conditions, pulse voltage of approx. 24 V is applied to PCV (1) while engine is running. However it cannot be measured with multimeter since it is pulse voltage. • Because troubleshooting "socket" for PCV1 features female connector alone, it is not connectable to female connector of sensor wiring harness, and thus not usable for checking open circuit (not designed as a T-adapter).		

Cause		Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	See descriptions of wiring harness and connectors in "Electrical equipment" in "Checks before troubleshooting" of "General information on troubleshooting", and check them.		
2	Defective supply pump PCV1 (Internal disconnection)	1. Turn starting switch to OFF position. 2. Disconnect connectors PCV1 and connect socket to male side.		
		Between PCV1 (male) (1) and (2)	Resistance	2.3 – 5.3 Ω
3	Open or short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connector ENG and connect T-adapter to female side.		
		Between ENG (female) (4) and (5) (PCV1 resistance)	Resistance	2.3 – 5.3 Ω
4	Ground fault in wiring harness (Contact with ground circuit)	1. Turn starting switch to OFF position. 2. Disconnect connectors ENG and PCV1. 3. Connect T-adapter to female side of connector ENG.		
		Between ENG (female) (4) and ground	Resistance	Min. 1 MΩ
		Between ENG (female) (5) and ground	Resistance	Min. 1 MΩ
5	Defective engine controller	If no abnormality is found by above checks, engine controller is defective. (Since failure is in it, troubleshooting cannot be performed.)		

Circuit diagram related to PCV1



Failure code [CA342] Calibration code inconsistency

Action code	Failure code	Failure	Engine controller data inconsistency (Engine controller system)
E04	**CA342**		
Detail of failure	• Data inconsistency occurred in engine controller.		
Action of controller	• Turns the centralized warning lamp and alarm buzzer ON.		
Problem on machine	• Engine continues running ordinarily, but it may stop during operation or may not restart once it is stopped.		
Related information	• Method of reproducing failure code: Turn the starting switch to ON position.		

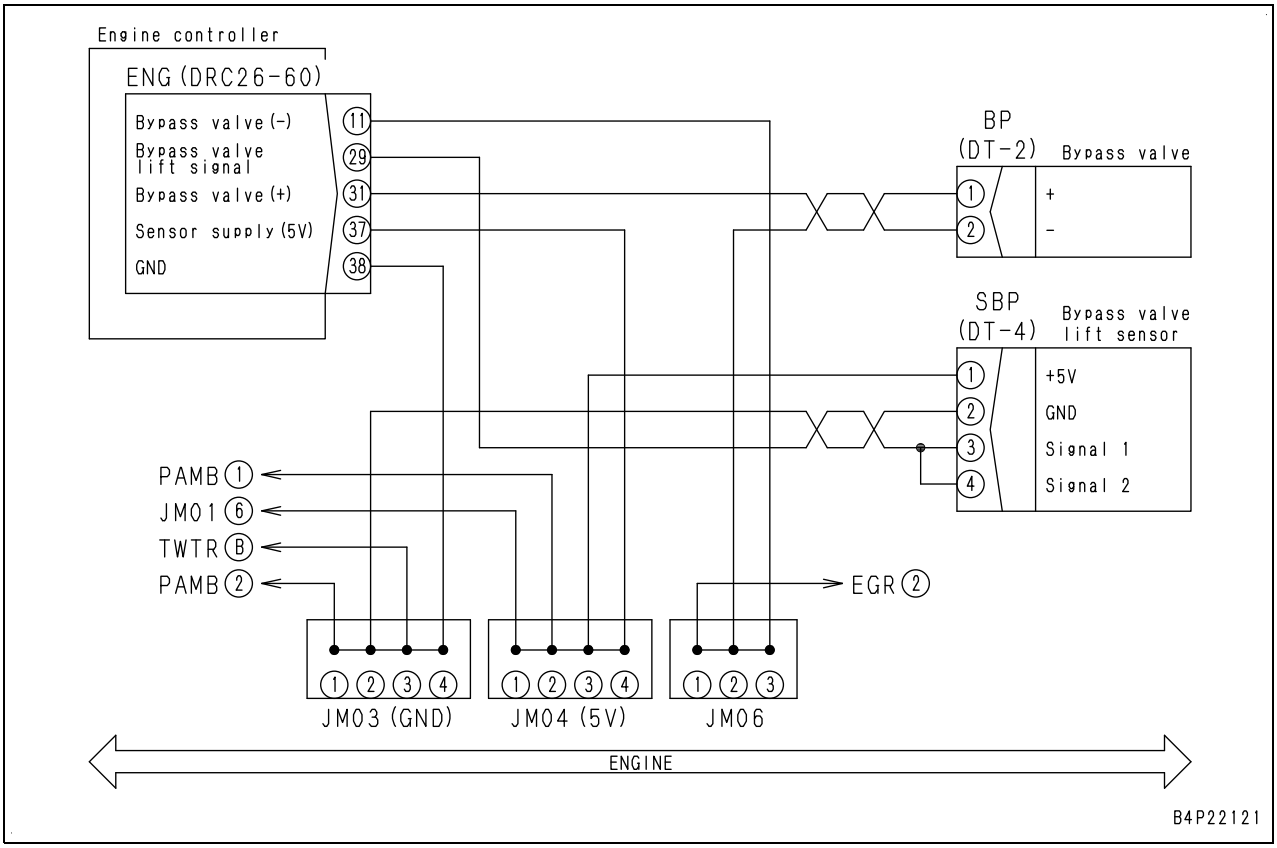
Cause	Procedure, measuring location, criteria and remarks
Preform troubleshooting for failure code [**CA111**].	

Failure code [CA778] Engine Bkup speed sensor error

Action code	Failure code	Failure	Eng Bkup Speed Sensor Error (Engine controller system)
E03	**CA778**		
Detail of failure	● Abnormality has occurred in engine Bkup speed sensor circuit.		
Action of controller	● Controls engine by using Ne speed sensor signal. ● Limits engine output and allows engine to run. ● Turns the centralized warning lamp and alarm buzzer ON.		
Problem on machine	● Engine stops during operation (when Ne speed sensor is also defective at the same time). ● Engine cannot be started once it is stopped (when Ne speed sensor is also defective at the same time).		
Related information	● Method of reproducing failure code: Start engine. ★ If engine Bkup speed sensor is replaced, fuel supply pump must be replaced. (See "Disassembly and assembly", "Removal and installation of fuel supply pump assembly".) ● Since inside of speed sensor is not composed of coil but electronic circuit, speed sensor cannot be determined to be normal by measuring its resistance with circuit tester. ● Since output of normal speed sensor is 5 V pulse voltage, it cannot be measured with circuit tester.		

Cause		Procedure, measuring location, criteria and remarks			
1	Defective wiring harness connector	Check wire harness and connectors by referring to "Electrical equipment" described in "Check before troubleshooting" of "General information on troubleshooting".			
2	Defective sensor power supply line	If failure code [**CA187**] or [**CA227**] is also displayed, troubleshoot it first.			
3	Damage or improper installation (loose) of engine Bkup speed (G) sensor	Engine Bkup speed (G) sensor may be damaged or improperly installed (loose). Check sensor.			
4	Defective resistor (RES)	1. Turn starting switch to OFF position. 2. Disconnect connector RES and connect T-adapter to male side.			
		Between RES (male) (1) and (2)		Resistance	620 Ω
5	Defective engine Bkup speed sensor power supply input	1. Turn starting switch to OFF position. 2. Disconnect connector G and connect T-adapter to female side. 3. Turn starting switch to ON position.			
		Between G (female) (1) and (2)	Power supply input	Voltage	4.75 – 5.25 V
6	Open or short circuit in wiring harness (Resistor RES line)	1. Turn starting switch to OFF position. 2. Disconnect connectors ENG and G, and connect T-adapter to female side of ENG.			
		Between ENG (female) (37) and (26)		Resistance	620 Ω
7	Open circuit in wiring harness (wire breakage or defective contact of connector)	1. Turn starting switch to OFF position. 2. Disconnect connectors ENG, G and RES, and connect T-adapters to each female side.			
		★ If power supply voltage in checks on cause 5 is normal, this check is not required. Between ENG (female) (37) and G (female) (1)		Resistance	Max. 1 Ω
		★ If power supply voltage in checks on cause 5 is normal, this check is not required. Between ENG (female) (47) and G (female) (2)		Resistance	Max. 1 Ω
		Between ENG (female) (26) and G (female) (3)		Resistance	Max. 1 Ω

Circuit diagram related to bypass valve solenoid & lift sensor

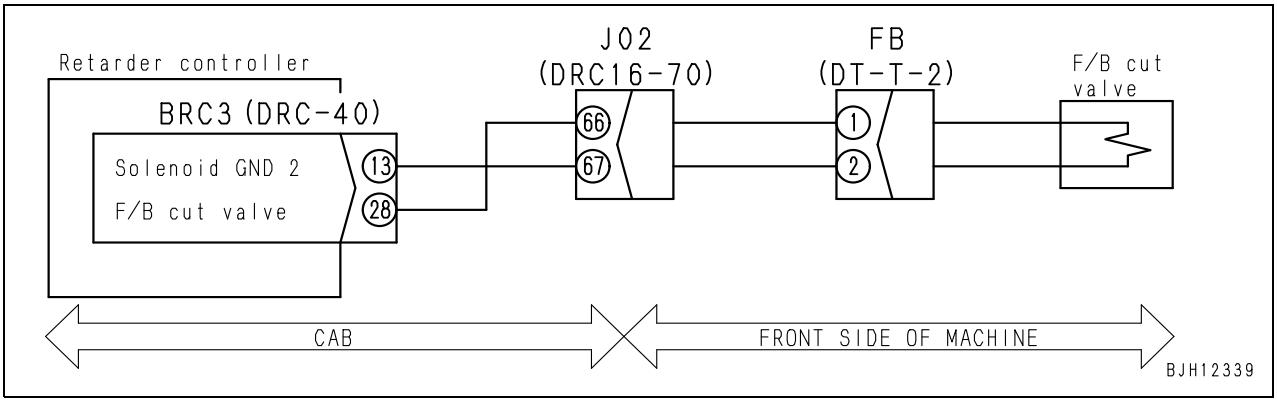


Failure code [CA2271] EGR valve lift sensor high error

Action code	Failure code	Failure	EGR valve lift sensor signal voltage is too high. (Engine controller system)
E03	**CA2271**		
Detail of failure	● High voltage was detected in EGR valve lift sensor signal circuit.		
Action of controller	● Limits engine output and continues operation. ● Stops outputting current to EGR valve and bypass valve (closes EGR valve and bypass valve). ● Turns the centralized warning lamp and alarm buzzer ON.		
Problem on machine	● Engine output drops.		
Related information	● Signal voltage from EGR valve lift sensor can be checked with monitoring function (Code: 18101 (V)). ● Position (mm) sensed by EGR valve lift sensor can be checked with monitoring function (Code: 18100 (mm). ● Method of reproducing failure code: Start engine.		

Cause		Procedure, measuring location, criteria and remarks		
1	Defective wiring harness connector	Check wire harness and connectors by referring to "Electrical equipment" described in "Check before troubleshooting" of "General information on troubleshooting".		
2	Defective sensor power supply system	If failure code [**CA187**] or [**CA227**] is also displayed, troubleshoot it first.		
3	Defective EGR valve lift sensor (internal defect)	1. Turn starting switch to OFF position. 2. Disconnect connector SEGR. 3. Turn starting switch to ON position (with connector SEGR disconnected).		
		If failure code changes from [**CA2271**] to [**CA2272**], sensor is defective.		
4	Short circuit in wiring harness	1. Turn starting switch to OFF position. 2. Disconnect connectors ENG and SEGR, and connect T-adapters to either female side.		
		Between ENG (female) (37) and (19), between SEGR (female) (1) and (3), or between SEGR (female) (1) and (4)	Resistance	Min. 1 MΩ
5	Hot short in wiring harness (contact with 24 V circuit)	1. Turn starting switch to OFF position. 2. Disconnect connector SEGR and connect T-adapter to female side. 3. Turn starting switch to ON position (with connector SEGR disconnected).		
		Between SEGR (female) (3) or (4) and (2)	Voltage	Max. 1 V
6	Defective engine controller	If cause is not found by the above checks, engine controller may be defective. ● Reference; the following is standard value in normal condition. 1. Turn starting switch to OFF position. 2. Insert T-adapter into connector ENG. 3. Turn starting switch to ON position.		
		Between ENG(19) and (47)	Voltage	1.0 – 4.0 V

Circuit diagram related



Failure code [DAQRMA] Transmission controller option setting: Malfunction

Action code	Failure code	Trouble	Transmission controller option setting: Malfunction (Machine monitor-transmission controller) (Machine monitor system)
E03	**DAQRMA**		
Contents of trouble	• Option setting signals inputted from machine monitor with the starting switch ON are different from the option settings that controller memorizes.		
Action of controller	• Holds the gear speed in neutral. • Controls with the option setting that the controller memorizes. • It does not return normal unless the starting switch is turned OFF.		
Problem that appears on machine	• The gear speed becomes neutral and the machine cannot move off again.		
Related information	• Perform initial setting and initial adjustment as when transmission controller is replaced.		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting
	1	Defective machine monitor	Defective option setting of machine monitor or internal defect of monitor

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	4	Defective CAN terminating resistor (Internal open or short circuit)	1) Turn the starting switch to OFF position. 2) Disconnect connector CAN2 (one each on engine side and inside cab), and connect the T-adapter to male side.		
			Between CAN2 (male) (A) and (B) (engine side)	Resistance	120 ± 12 Ω
			Between CAN2 (male) (A) and (B) (inside cab)	Resistance	120 ± 12 Ω
	5	Disconnection or short circuit in wiring harness	• CAN communication line ★ CAN terminating resistors of 120 Ω are connected in parallel. Therefore, an disconnection has not occurred in the communication line when the combined resistance of 60 Ω is measured from any connector. 1) Turn the starting switch to OFF position and disconnect the battery ground cable. 2) Disconnect either one of the following connectors ATC2, J2P, DPC4, BRC2 and HM-CN4A*, and connect the T-adapter to the female side of the disconnected connector. ★ If a short circuit is detected (resistance between terminals is 1 Ω or less), disconnect all CAN communication connectors on each controller. Then, identify whether the failure is short circuit between wiring harnesses or inside the controller.		
			Between ATC2 (female) (32) and (22)	Resistance	Approx. 60 MΩ
			Between J2P (female) (46) and (47)	Resistance	Approx. 60 MΩ
			Between DPC4 (female) (3) and (8)	Resistance	Approx. 60 MΩ
			Between BRC2 (female) (32) and (22)	Resistance	Approx. 60 MΩ
			Between HM-CN4A (female) (4) and (12) *	Resistance	Approx. 60 MΩ
	6	Defective ACC signal from starting switch (Start of CAN communication is not detected)	1) Turn the starting switch to OFF position and disconnect the battery ground cable. 2) Insert the T-adapter into connectors ATC3, J2P, J3P, DPC1, BRC3 and HM-CN1 *. 3) Connect the battery ground cable and turn the starting switch to ON position.		
			Between ATC3(14) and (21)	Voltage	20 - 30 V
			Between ATC3(24) and (31)	Voltage	20 - 30 V
			Between J2P (39) and J3P (1)	Voltage	20 - 30 V
			Between DPC1 (6) and (9)	Voltage	20 - 30 V
			Between DPC1 (7) and (10)	Voltage	20 - 30 V
			Between BRC3 (14) and (21)	Voltage	20 - 30 V
			Between BRC3 (24) and (31)	Voltage	20 - 30 V
			Between HM-CN1 (17) and (19) *	Voltage	20 - 30 V

Failure code [DBC9KQ] Disagreement of model selection (ABS controller)

Action code	Failure code	Trouble	Disagreement of model selection (ABS controller) (Machine monitor system)
E03	**DBC9KQ**		
Contents of trouble	• Information of model selection input from machine monitor when starting switch is turned ON is different from model selection saved in ABS controller.		
Action of machine monitor	• Turns all outputs OFF. • Even if cause of failure disappears, system does not reset itself until starting switch is turned OFF. • Turns on centralized warning lamp and sounds alarm buzzer.		
Problem that appears on machine	• ABS does not operate. • All ABS output is turned OFF.		
Related information	• Perform initial setting and adjustment of ABS controller to be performed after replacement.		

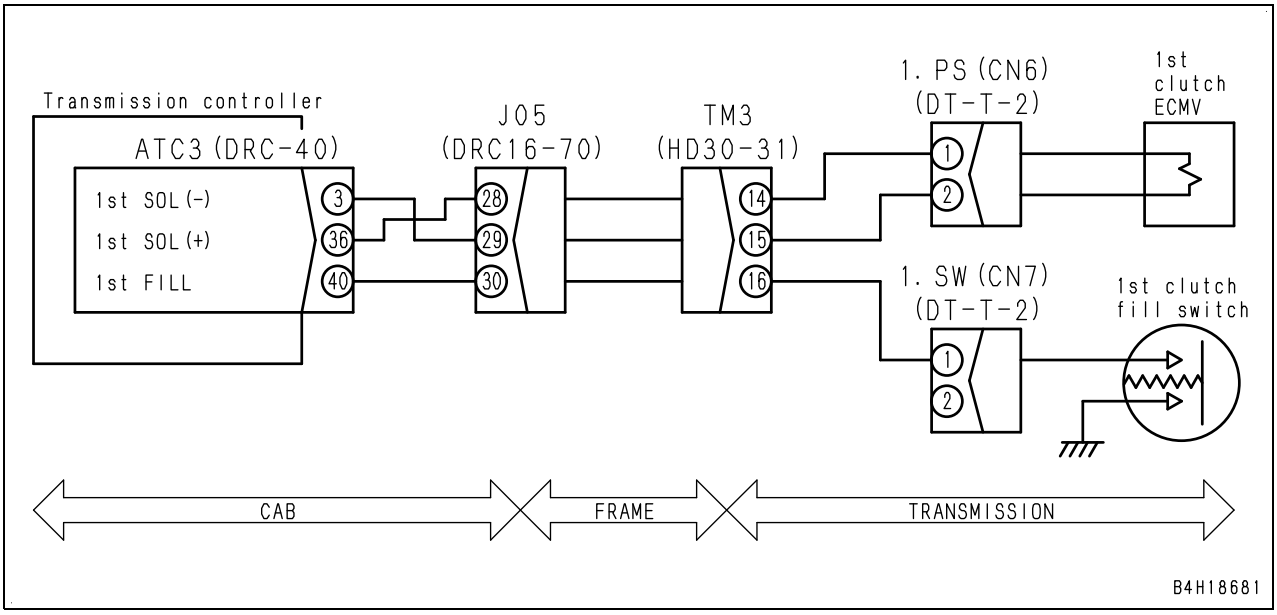
	Cause		Standard value in normal state/Remarks on troubleshooting
Possible causes and standard value in normal state	1	Wrong model selection in machine monitor	Failure code [**DBC9KQ**] is not displayed. ★ Machine model may not be set correctly in machine monitor. After replacing machine monitor or retarder controller, set them correctly according to Testing and adjusting volume.
	2	Installation of wrong ABS controller	Wrong ABS controller may be installed. Check part No. of installed ABS controller and install normal ABS controller.

Failure code [DDTKKA] 1st clutch fill switch: Disconnection

Action code	Failure code	Trouble	1st clutch fill switch: Disconnection (Command is Holding pressure, fill switch is OFF, and slip is not sensed) (Transmission controller system)
E03	**DDTKKA**		
Contents of trouble	• When the output to the 1st clutch ECMV is turned ON, the clutch is engaged but the signal from the fill switch is not turned ON.		
Action of controller	• The controller keeps the current gear speed. • If the shift lever is set in the "N" position, the controller keeps the gear in neutral.		
Problem that appears on machine	• The gear cannot be shifted. • If the shift lever is set in the "N" position, the machine cannot start until it is stopped.		
Related information	• This failure can be checked in the monitoring function (Code: 38919).		

Possible causes and standard value in normal state	Cause		Standard value in normal state/Remarks on troubleshooting		
	1	Disconnection in wiring harness (Disconnection or defective contact)	1) Turn the starting switch OFF. 2) Disconnect connectors ATC3 and 1.SW (CN7). 3) Connect T-adapter.		
			Between ATC3 (female) (40) and 1.SW (CN7) (female) (1)	Resistance	Max. 1 Ω
	2	1st clutch fill switch defective	Exchange 1st clutch fill switch.		
	3	Transmission controller defective	If causes are not found by above checks, transmission controller is defective. (Since this is an internal failure, troubleshooting can not be performed.)		

Circuit diagram related



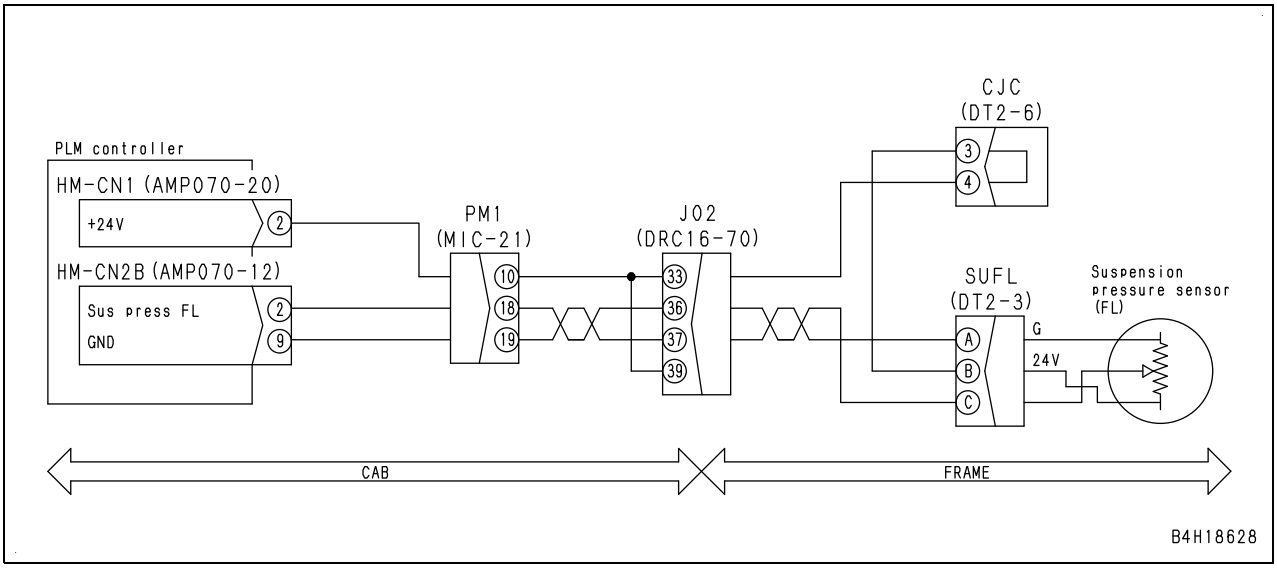
Failure code [DGR6KX] Steering oil temperature sensor: Input signal out of range

Action code	Failure code	Trouble	Steering oil temperature sensor: Input signal out of range (Transmission controller system)
E01	**DGR6KX**		
Contents of trouble	• Signal circuit voltage of steering oil temperature sensor has reached 0.97 V (more than 150°C) or only steering oil temperature is low (signal circuit voltage of steering oil temperature sensor is above 4.56 V (less than 15°C)). • Oil temperature sensor voltages of torque converter and brake are below 3.7 V (more than 55°C) and normal.		
Action of controller	• Takes no particular action.		
Problem that appears on machine	• Steering oil temperature gauge does not indicate properly.		
Related information	• Input signal from oil temperature sensor can be checked with monitoring function. 1) Steering oil temperature sensor (codes: **32701** and **32702**) 2) Torque converter oil temperature sensor (codes: **30100** and **30101**) 3) Retarder oil temperature sensor (codes: **30211** and **30212**)		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective steering oil temperature sensor	1) Turn starting switch OFF. 2) Connect T-adapter to connector STR (male).			
			Between STR (male) (1) and (2)	Oil temperature: 25°C	Resistance	37 – 50 kΩ
				Oil temperature: 100°C	Resistance	3.5 – 4.0 kΩ
	2	Disconnection or short circuit in wiring harness	1) Turn starting switch OFF. 2) Connect T-adapter to connector ATC1 (female).			
			Between ATC1 (female) (20) and (21)	Oil temperature: 25°C	Resistance	37 – 50 kΩ
				Oil temperature: 100°C	Resistance	3.5 – 4.0 kΩ
	3	Disconnection in wiring harness (Disconnection or defective contact)	★ If no abnormality is found in above checks, this check is not required. 1) Turn starting switch OFF. 2) Connect T-adapter to connectors ATC1 (female) and STR (female).			
			Between ATC1 (female) (20) and STR (female) (1)		Resistance	Max. 1 Ω
			Between ATC1 (female) (21) and STR (female) (2)		Resistance	Max. 1 Ω
	4	Defective harness grounding (Contact with ground circuit)	1) Turn starting switch OFF. 2) Disconnect connectors ATC1 and STR. 3) Connect T-adapter to connector ATC1 (female) or STR (female).			
			Between ground and ATC1 (female) (20) or STR (female) (1)		Resistance	Min. 1 MΩ
	5	Hot short in wiring harness (a contact with 24 V circuit)	1) Turn starting switch OFF. 2) Disconnect connector STR. 3) Connect T-adapter to connector STR (female). 4) Turn starting switch ON.			
			Between STR (female) (1) and (2).		Voltage	Approx. 5 V
	6	Defective transmission controller	If causes are not found by above checks, transmission controller is defective. (Since this is an internal failure, troubleshooting can not be performed.)			

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	5	Defective PLM controllers	If no abnormality is found in the above troubleshooting, the PLM controller may be defective. (Since this is an internal defect, troubleshooting cannot be performed.)		
			★ Reference 1) Turn the starting switch to OFF position. 2) Insert the T-adapter into connectors HM-CN1 and HM-CN2B. 3) Turn the starting switch to ON position.		
			Between HM-CN1 (2) and HM-CN2B (9)	Voltage	Approx. 24 V
			Between HM-CN2B (2) and (9)	Voltage	1.0 - 5 V

Circuit diagram related

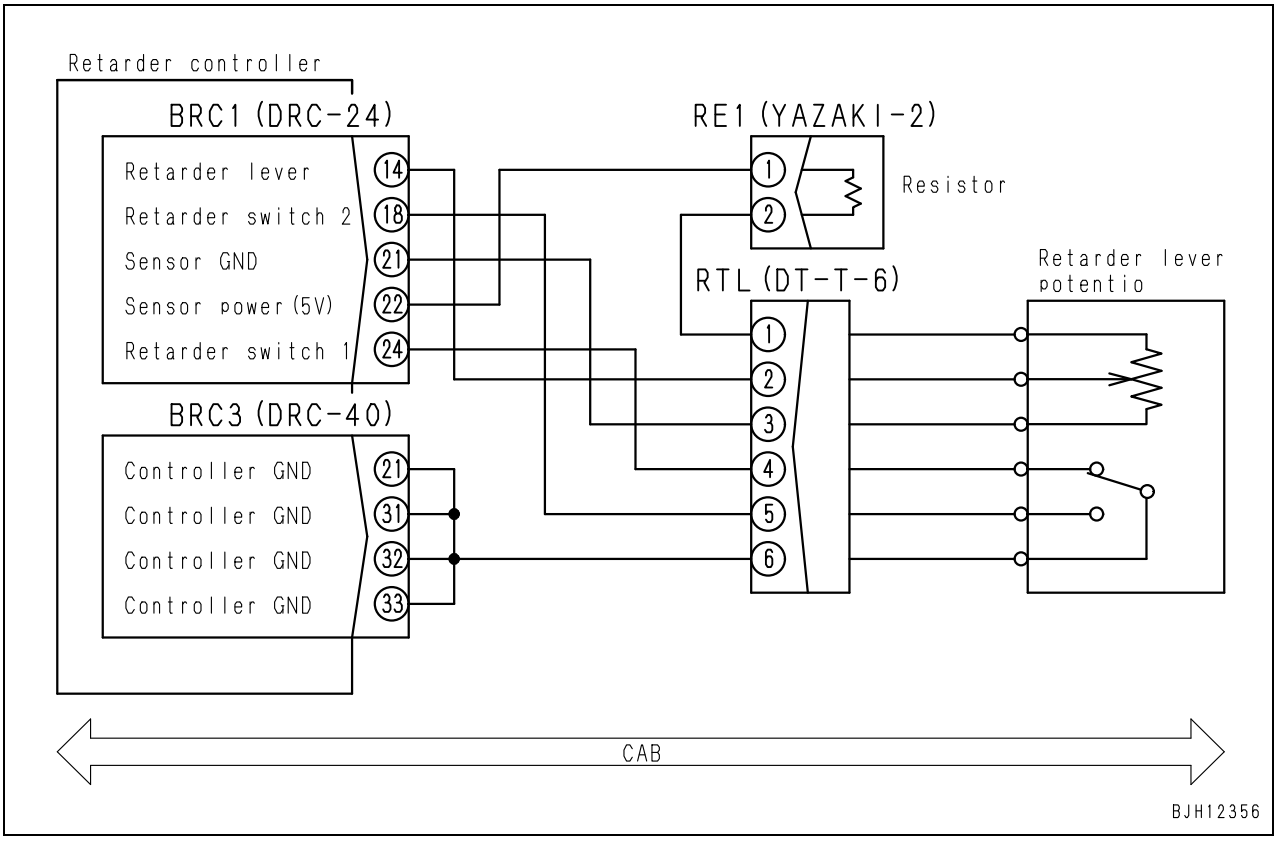


Failure code [DHP7KZ] Suspension pressure sensor system: Disconnection or ground fault (Left rear) or PLM controller_LED display: "n5" → "73"

Action code	Failure code	Trouble	Suspension pressure sensor system: Disconnection or ground fault (Left rear) (PLM controller system)
E01	**DHP7KZ**		
Contents of trouble	• Signal is not sent from suspension pressure sensor or it is grounded (Abnormal).		
Action of controller	• Stops auto-suspension function.		
Problem that appears on machine	• Auto-suspension function does not operate.		
Related information	• The LED of the PLM controller displays "n5" → "73". • Suspension pressure can be checked with monitoring function (Code: **32807 (MPa)**, **32813 (V)**).		

	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Grounding fault in wiring harness (Contact with ground circuit)	1) Turn starting switch OFF. 2) Disconnect connectors BRC1, SURL, HM-CN1 and HM-CN2B. 3) Connect T-adapter to HM-CN1(female), HM-2B (female) or SURL (female).			
			Between HM-CN2B (female) (8) or SURL (female) (C) and ground		Resistance	Min. 1 MΩ
			Between ground and HM-CN1 (female) (2) or SURL (female) (B)		Resistance	Min. 1 MΩ
	2	Defective sensor power supplly	1) Turn starting switch OFF. 2) Disconnect connector SURL. 3) Connect T-adapter to it (female). 4) Turn starting switch ON. ★ If the power supply voltage is abnormal, go to cause 4.			
			Between SURL (female) (B) and (A)	Power supply Voltage		Approx. 24 V
	3	Defective suspension pressure sensor (Right rear)	1) Turn starting switch OFF. 2) Disconnect connector SURL. 3) Insert T-adapter. 4) Turn starting switch ON.			
			Between SURL (C) and (A)	Voltage		1.0 – 4.6 V
	4	Disconnection in wiring harness (Disconnection or defective contact of connector)	1) Turn the starting switch OFF. 2) Disconnect connectors BRC1, SURL, HM-CN1 and HM-CN2B. 3) Connect T-adapters to them (female)			
			Wiring harness between HM-CN2B(female) (8) and SURL (female) (C)		Resistance	Max. 1 Ω
			★ If the power supply voltage is normal, this check is not required. Wiring harness between HM-CN2B (female) (9) and SURL (female) (A)		Resistance	Max. 1 Ω
			★ If the power supply voltage is normal, this check is not required. Wiring harness between HM-CN1 (female) (2) and SURL (female) (B)		Resistance	Max. 1 Ω

Circuit diagram related

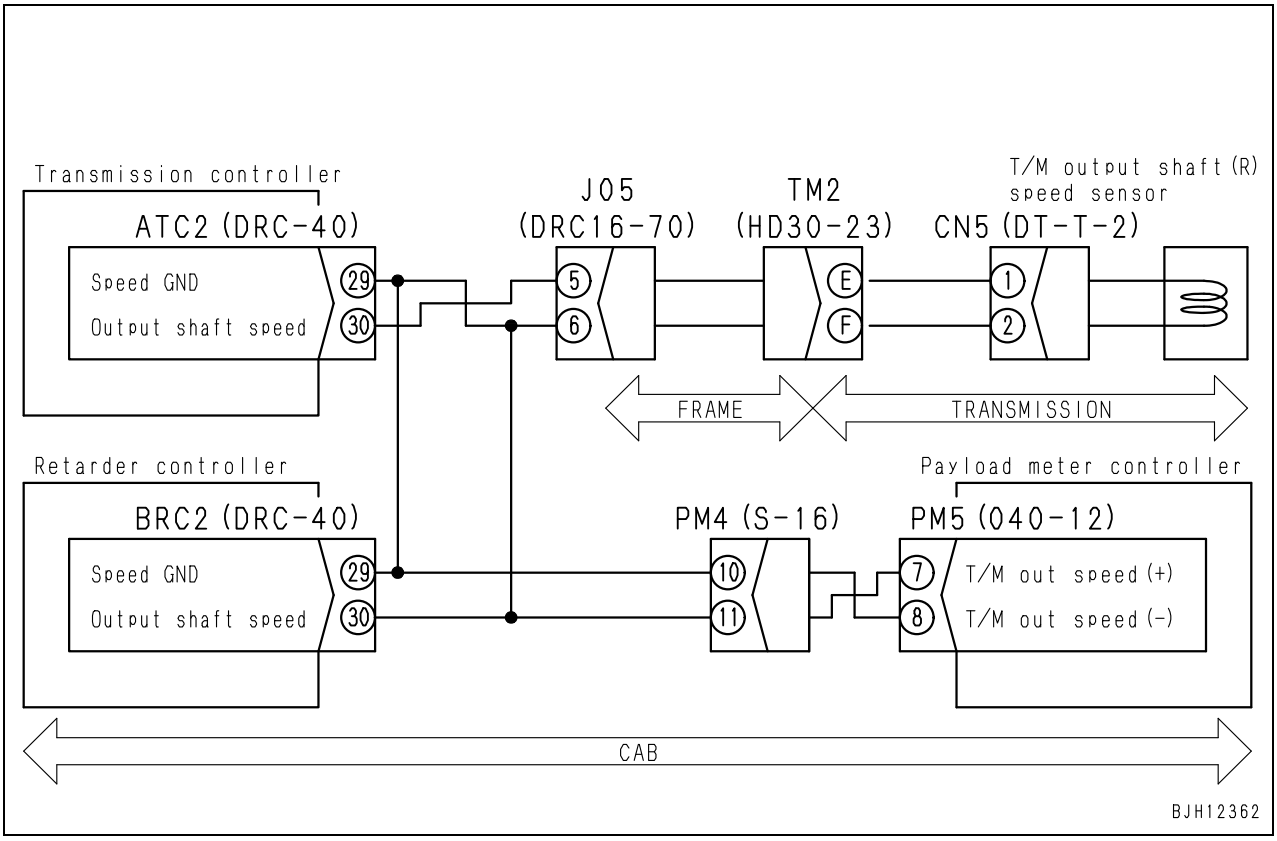


Failure code [DLF1LC] (Transmission input shaft speed sensor: Disagreement of revolution speed signal)

Action code	Failure code	Trouble	Transmission input shaft speed sensor: Disagreement of revolution speed signal (Transmission controller system)
E03	**DLF1LC**		
Contents of trouble	• The speed calculated from the engine speed sensor signal, transmission intermediate shaft speed sensor signal, and transmission output shaft speed sensor signal is different from the signal speed of the transmission input shaft speed sensor.		
Action of controller	• The controller keeps the current gear speed and turns the lockup operation OFF. • If the shift lever is set in the "N" position, the controller keeps the gear in Neutral.		
Problem that appears on machine	• The lockup system is reset and the gear cannot be shifted. • If the shift lever is set in the "N" position, the machine cannot start until it is stopped.		
Related information	• This failure can be checked in the monitoring function (Code: **31200**).		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Transmission input shaft speed sensor defective	1) Turn the starting switch OFF. 2) Disconnect connector CN3. 3) Connect T-adapter.		
			Between CN3 (male) (1) – (2)	Resis-tance	500 – 1,000 Ω
			Between CN3 (male) (1), (2) – ground	Resis-tance	Min. 1 MΩ
	2	Ground fault in wiring harness	1) Turn the starting switch OFF. 2) Disconnect connectors ATC2 and CN3. 3) Connect T-adapter.		
			Between ground and wiring harness between ATC2 (female) (40) – CN3 (female) (1)	Resis-tance	Min. 1 MΩ
	3	Hot short in wiring harness	1) Turn the starting switch OFF. 2) Disconnect connectors ATC2 and CN3. 3) Connect T-adapter. 4) Turn the starting switch ON.		
			Between ground and wiring harness between ATC2 (female) (40) – CN3 (female) (1)	Voltage	Max. 1 V
	4	Transmission controller defective	1) Turn the starting switch OFF. 2) Disconnect connector ATC2. 3) Connect T-adapter.		
			Between ATC2 (female) (40) – (29)	Resis-tance	500 – 1,000 Ω

Circuit diagram related



Failure code [DW78KZ] (Failure in rear brake BCV command output system: Disconnection or short circuit)

Action code	Failure code	Trouble	Failure in rear brake BCV command output system: Disconnection or short circuit (Retarder controller system)
E01	**DW78KZ**		
Contents of trouble	• Current does not flow to rear brake BCV solenoid, or excessive current flows when output is ON.		
Action of controller	• If wiring harness has disconnection, no current flows. • If wiring harness has ground fault or short circuit, controller stops output.		
Problem that appears on machine	• No change is made in machine, or cooling capacity lowers and retarder may overheat.		
Related information			

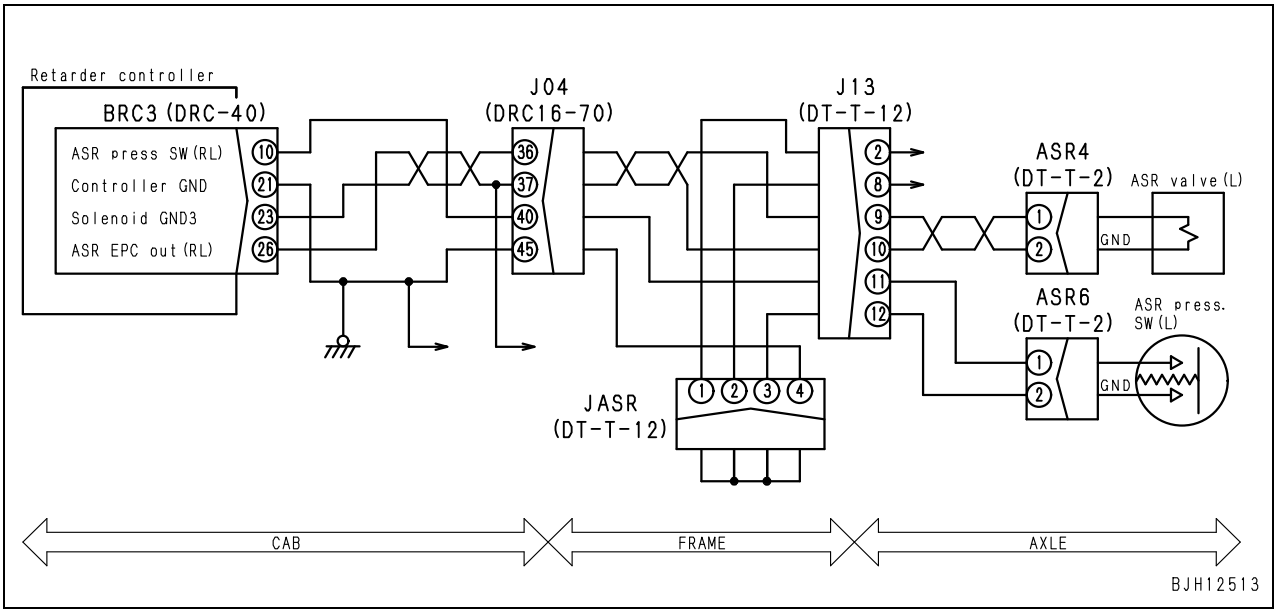
	Cause		Standard value in normal state/Remarks on troubleshooting			
Possible causes and standard value in normal state	1	Defective rear BCV solenoid	1) Turn starting switch OFF. 2) Connect T-adapter to connector BCVR (male).			
			Between BCVR (male) (1) – (2)		Resistance	Max. 1 Ω
			Between BCVR (male) (1), (2) – ground		Resistance	Min. 1 MΩ
	2	Disconnection in wiring harness (Disconnection or defective contact)	1) Turn starting switch OFF. 2) Connect T-adapter to connectors BRC3 (female) and BCVR (female).			
			Wiring harness between BRC3 (female) (18) – BCVR (female) (1)		Resistance	Max. 1 Ω
			Wiring harness between BCVR (female) (2) – ground		Resistance	Max. 1 Ω
	3	Short circuit of harness (Contact with ground circuit or contact between harnesses)	1) Turn starting switch OFF. 2) Disconnect connectors BRC3 and BCVR. 3) Connect T-adapter to BRC3 (female).			
			Between ground and wiring harness between BRC3 (female) (18) – BCVR (female) (1)		Resistance	Min. 1 MΩ
			Wiring harness between BRC3 (female) (18) – BCVR (female) (1) – other wiring harness		Resistance	Min. 1 MΩ
	4	Defective retarder controller	1) Turn starting switch OFF. 2) Insert T-adapter in connector BRC3. 3) Turn starting switch ON.			
			Between BRC3 (female) (18) – ground	When solenoid output is ON	Voltage	20 – 30 V
				When solenoid output is OFF	Voltage	Max. 1 V

Failure code [DX17KA] Disconnection in ASR proportional pressure reducing solenoid valve (right) output circuit

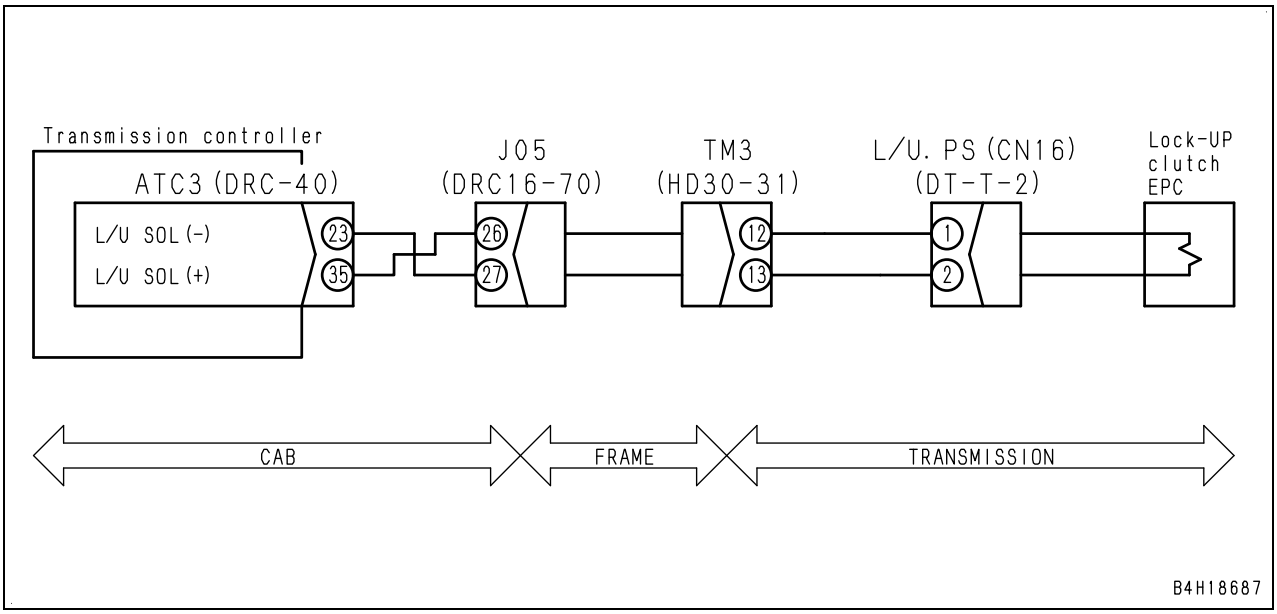
Action code	Failure code	Trouble	Disconnection in ASR proportional pressure reducing solenoid valve (right) output circuit (Retarder controller system)
E01	**DX17K4**		
Contents of trouble	• When signal is output to ASR proportional pressure reducing solenoid valve (right) solenoid circuit, no current flows.		
Action of controller	• Stops controlling ASR.		
Problem that appears on machine	• ASR is not controlled normally.		
Related information	• Signal is not output to ASR proportional pressure reducing solenoid valve (right) solenoid circuit until starting switch is turned OFF once.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective ASR proportional pressure reducing solenoid valve (right) solenoid (Internal disconnection)	★ Turn starting switch OFF and disconnect ASR4, then carry out troubleshooting without turning starting switch ON.		
			Between ASR4 (male) (1) and (2)	Resistance	Approx. 20 Ω
	2	Disconnection in wiring harness (Disconnection in wiring or defective contact in connector)	★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. ★ Approx. 20 Ω means resistance of solenoid valve.		
			Between BRC3 (female) (26) and (23)	Resistance	Approx. 20 Ω
	3	Defective retarder controller	If causes 1 and 2 are not detected, retarder controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Circuit diagram related



Circuit diagram related



Failure code [DXH4KA] 1st clutch solenoid output circuit: Disconnection

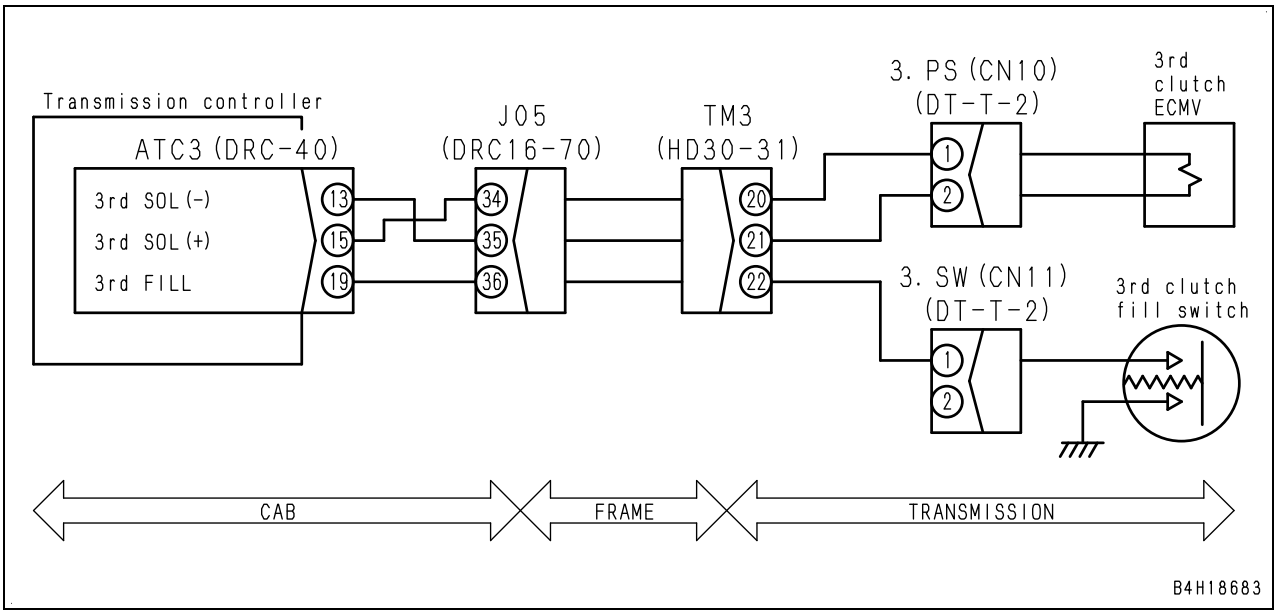
Action code	Failure code	Trouble	1st clutch solenoid output circuit: Disconnection (Transmission controller system)
E03	**DXH4KA**		
Contents of trouble	• Current does not flow when output to 1st clutch ECMV is ON.		
Action of controller	• Shifts up and holds the gear speed as shown in **Table 1** depending on the gear speed before failure. • Turns lock up to OFF.		
Problem that appears on machine	• Once the gear shift lever is set to neutral, the machine can not move off in any gear speeds.		
Related information	• As solenoid detects disconnection while output is ON, be sure to turn output ON to check operation after repair. • Electric current of output to ECMV can be checked with monitoring function (code: **31602**). • Since output is turned ON and self-check is performed for 5 seconds after starting switch is turned ON, wait for 5 seconds without starting the engine. • If trouble has not been repaired, error is detected again.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective 1st clutch ECMV	1) Turn starting switch OFF. 2) Connect T-adapter to connector 1.PS (CN6) (male).		
			Between 1.PS (CN6) (male) (1) and (2)	Resistance	5 – 15 Ω
			Between 1.PS (CN6) (male) (1) or (2) and ground	Resistance	Min. 1 MΩ
	2	Disconnection or short circuit in wiring harness	1) Turn starting switch OFF. 2) Connect T-adapter to ATC3 (female).		
			Between ATC3 (female) (36) and (3)	Resistance	5 – 15 Ω
	3	Disconnection in wiring harness (Disconnection or improper contact)	★ If no abnormality is found in above checks, this check is not required. 1) Turn starting switch OFF. 2) Connect T-adapter to ATC3 (female) and 1.PS (CN6) (female).		
			Between ATC3 (female) (36) and 1.PS (CN6) (female) (1)	Resistance	Max. 1 Ω
			Between ATC3 (female) (3) and 1.PS (CN6) (female) (2)	Resistance	Max. 1 Ω
	4	Defective transmission controller	If causes are not found by above checks, transmission controller is defective. (Since this is an internal failure, troubleshooting can not be performed.)		

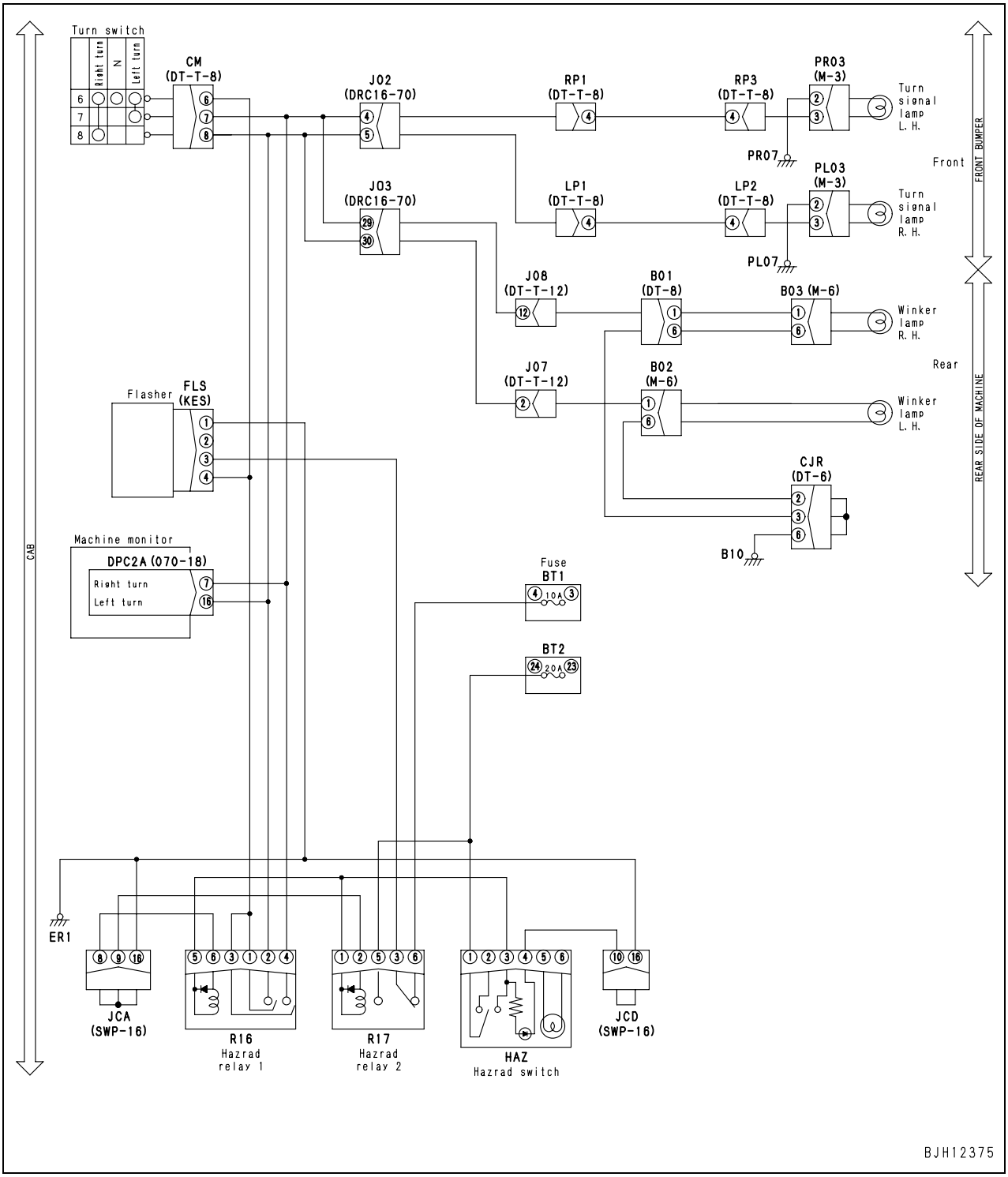
Table 1

Speed when trouble was detected		Failed clutch	Remedy against trouble		
			Action of controller (Selected clutch, gear speed)		ON/OFF state of lockup clutch
F7	4th High	4th	OFF	NEUTRAL	OFF
		High	OFF	NEUTRAL	OFF
F6	4th Low	4th	OFF	NEUTRAL	OFF
		Low	4H	F7	OFF
F5	3rd High	3rd	4L	F6	OFF
		High	4L	F6	OFF
F4	3rd Low	3rd	4L	F6	OFF
		Low	3H	F5	OFF
F3	2nd High	2nd	3L	F4	OFF
		High	3L	F4	OFF
F2	2nd Low	2nd	3L	F4	OFF
		Low	2H	F3	OFF
F1	1st Low	1st	2L	F2	OFF
		Low	2H	F3	OFF
R1	Reverse Low	Reverse	OFF	NEUTRAL	OFF
		Low	RH	R2	OFF

Circuit diagram related



Circuit diagram related



DUMP TRUCK

HD325-7
HD405-7

Machine model	Serial number
HD325-7	7001 – 7025
HD325-7	7101 and up
HD405-7	3001 – 3035
HD405-7	7101 and up

40 Troubleshooting

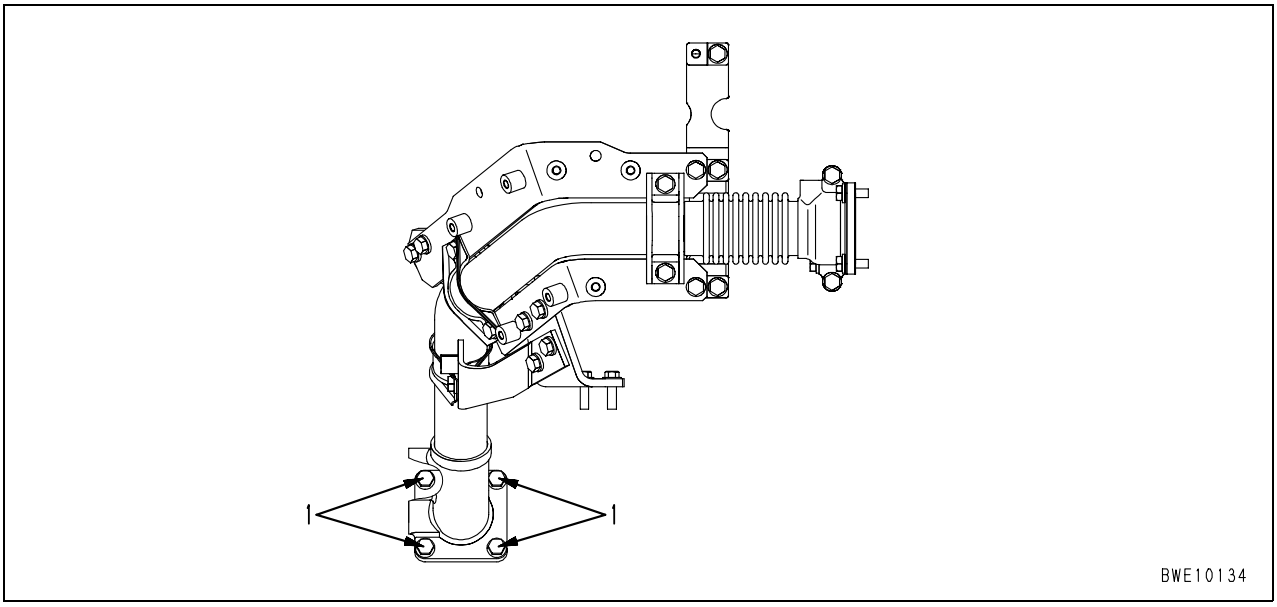
Troubleshooting of hydraulic and mechanical system (H-mode)

H-12 Steering wheel is heavy

Trouble	Steering wheel is heavy.
Related information	• Check that the oil level in the hydraulic tank is correct. • If a failure code related to the machine is displayed, firstly troubleshooting the displayed code. • Check that the steering wheel play is correct (less than 150 mm). • Check tha the hinge pin, etc. are greased sufficiently. • Adjust the tire inflation pressure to the proper value before troubleshooting. [Standard tire] 18.00-33-32PR × 2 (0.56 ± 0.01 MPa {5.57 ± 0.1 kg/cm²})

	Cause		Standard value in normal state/Remarks on troubleshooting	
Possible causes and standard value in normal state	1	Air sucked in at the suction side of the steering and work equipment pump	Since the air can be suspected to be sucked in from the suction side of the steering and work equipment pump, check it directly.	
	2	Defective steering and work equipment pump strainer	Since the steering and work equipment pump strainer is potentially clogged, visually check it.	
	3	Defective relief valve of demand valve	★ Prepare with the engine stopped and troubleshooting with the engine running at high idle.	
			Relief oil pressure (cylinder stroke end)	20.6 (+0.98/0) MPa {210 (+10/0) kg/cm²}
	4	Defective steering valve	★ Prepare with the engine stopped and troubleshooting with the engine running at high idle.	
			Relief oil pressure (cylinder stroke end)	20.6 (+0.98/0) MPa {210 (+10/0) kg/cm²}
	5	Defective operation of demand valve spool	If the oil pressure is within the range, the operation of the demand valve spool can be suspected to be defective: check it directly.	
	6	Defective steering cylinder	★ Prepare with the engine stopped and troubleshooting with the engine running at high idle.	
			Relief oil pressure (cylinder stroke end)	20.6 (+0.98/0) MPa {210 (+10/0) kg/cm²}
			When the oil pressure is low, disconnect the hydraulic hose in the steering cylinder head side and relieve the pressure at the stroke end. If the oil comes out from the cylinder side, the cylinder piston ring is defective.	
	7	Defective steering and work equipment pump	If the oil pressure is low in the item 3 or 4, the steering and work equipment pump can be suspected to be defective. Check for aluminum worn powder etc. residing on the line filter.	

*1: EGR cooler outlet gas piping
Loosen 4 mounting bolts (1) of the EGR cooler outlet gas piping and check that the coolant flows out. A little condensate produced from cooled exhaust gas may flow out. If it is colorless and transparent, however, it is not a problem.



*2: Code [**CA559**] and code [**CA2249**]

S-12 Oil pressure drops

General causes why oil pressure drops

- Leakage, clogging, wear in lubrication system
- Defective oil pressure control
- Selection of oil by the temperature etc. Specified in the Operation and Maintenance Manual is not observed
- Deterioration of oil due to overheating

			Causes													
			Worn journal of bearing	Lack of oil in oil pan	Coolant, fuel in oil	Clogged strainer in oil pan	Clogged, broken pipe in oil pan	Defective oil pump	Defective oil pump relief valve	Clogged oil filter	Leaking, crushed, clogged hydraulic piping	Defective EGR oil pump	Leaking EGR hydraulic piping	Defective oil pressure sensor, wiring harness	Defective oil level sensor, wiring harness
Questions	Confirm recent repair history														
	Degree of use of machine	Operated for long period						△		△		△			
	Oil pressure monitor indicates low oil pressure (if monitor is installed)								○	◎					
	Non-specified oil is being used		○							○					
	Replacement of filters has not been carried out according to Operation and Maintenance Manual									◎					
	Oil pressure monitor (if installed)	Indicates pressure drop at low idle	◎						○			○			
		Indicates pressure drop at low, high idle		○		◎	◎	◎	○			○	○		
		Indicates pressure drop on slopes		◎											
		Sometimes indicates pressure drop							◎					○	○
Check items	Oil level monitor indicates oil level drop (if monitor is installed)			◎											◎
	Oil level in oil pan is low			◎											
	External hydraulic piping is leaking, crushed										◎		◎		
	Oil is milky or smells of diesel oil				◎										
	Metal particles are found when oil pan is drained		◎												
	Metal particles are found when oil filter is drained		◎					○				○			
Troubleshooting	Metal particles are found in oil filter		●		See S-13										
	Inspect oil pan strainer, pipe directly					●	●								
	Oil pump rotation is heavy, there is play in oil pump							●							
	Valve and spring of oil pump relief valve are fatigued, damaged								●						
	Inspect oil filter directly									●					
	Relief valve of EGR oil pump is damaged, oil leaks from it											●			
	Inspect EGR hydraulic piping directly												●		
	Carry out troubleshooting according to "Abnormality in oil pressure sensor (*1)"													●	
	If oil level sensor is replaced, oil pressure monitor indicates normally														●
		Remedy	Replace	Add	—	Clean	Clean	Replace	Adjust	Replace	Correct	Replace	Replace	Replace	Replace

*1: Code [**CA135**] and code [**CA141**]

Special tool list

(Rev. 2009.01)

★ Tools with part number 79*T-***-**** means that they are not available from Komatsu Ltd. (i.e. tools to be made locally)
★ Tools marked with ○ in the sketch column are presented in the sketches of the special tools (See "Sketches of special tools")

Special tools to be used when you removal and installation of engine assembly

Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
Z	2	07376-70315	Plug	1		Nominal 03
		02789-00315	Cap	1		Nominal 03
		02896-11009	O-ring	1		
	4	07376-70522	Plug	1		Nominal 05
		02789-00522	Cap	1		Nominal 05
		02896-11015	O-ring	1		

Special tools to be used when you removal and installation of radiator assembly

Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
Z	20	07379-02071	Flange	4		Nominal 20
		07378-12000	Head	4		Nominal 20
		07000-F2060	O-ring	4		
		07371-32076	Split flange	8		
		07375-21240	Bolt	16		

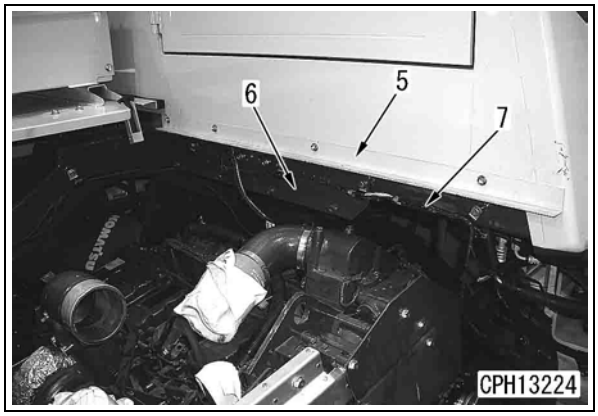
Special tools to be used when you removal and installation of output shaft assembly

Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
B	1	790-201-2840	Spacer	1		
		791-600-1120	Bolt	1		
		01580-01613	Nut	1		
		01643-31645	Washer	1		
		790-101-2102	Puller	1		
		790-101-1102	Pump (30t)	1		

Special tools to be used when you removal and installation of fuel supply pump assembly

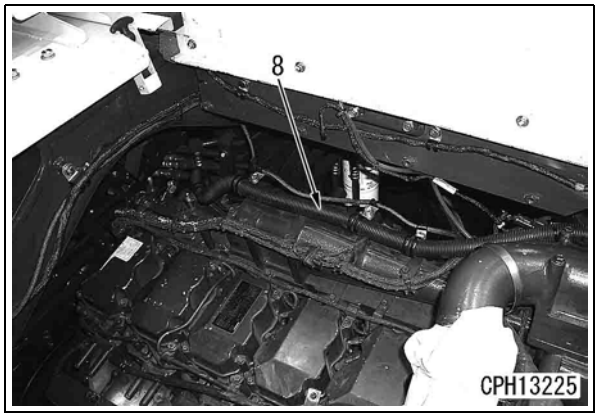
Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
A	1	795-630-5500	Standard puller	1		Removal of fuel supply pump
	2	01010-81090	Bolt	2		
	3	01643-31032	Washer	2		

7. Remove plate (5).
   Tool: Impact wrench, socket wrench
   Mounting bolt for plate (5): Width across flats 14mm, M10
8. Remove bracket (6).
   Tool: Impact wrench, socket wrench
   Mounting bolt for bracket (6): Width across flats 17mm, M10
9. Disconnect wiring harness (7).
   Tool: Impact wrench, socket wrench
   Mounting bolt for wiring harness(7): Width across flats 17mm, M10

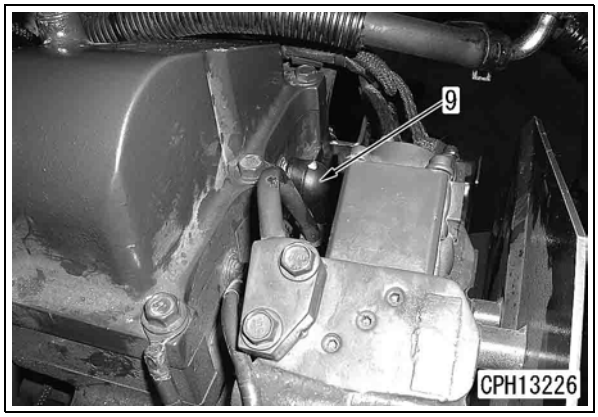


- Upper side of engine

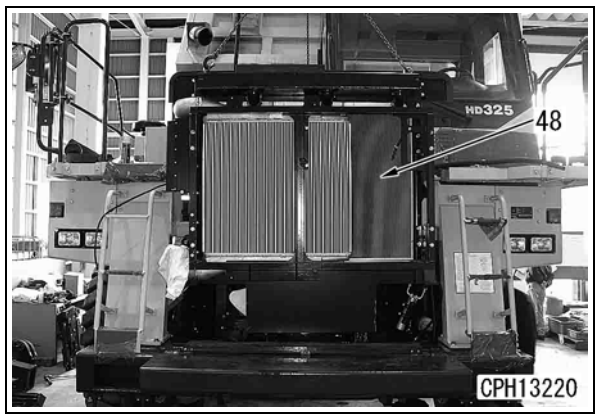
10. Disconnect heater hose (8).
    Tool: Pliers



11. Disconnect heater terminal HTR (9).
    Tool: Open-end wrench
    Mounting bolt for heater terminal HTR (9): Width across flats 10mm, M6



40. Lift off radiator assembly (48).



Installation

- Carry out installation in the reverse order to removal.

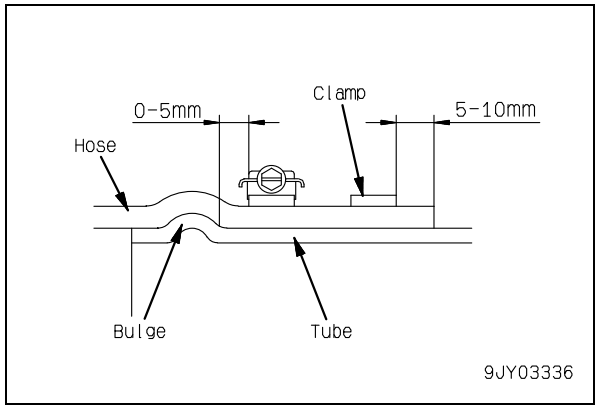
[*1]

★ When installing the shims, check its quantity.

[*2]

★ Install the hose so that it will not twist.

★ When using 2 clamps, set them 180° apart from each other as shown in the figure.



★ Install the hose clamp as shown in the figure.

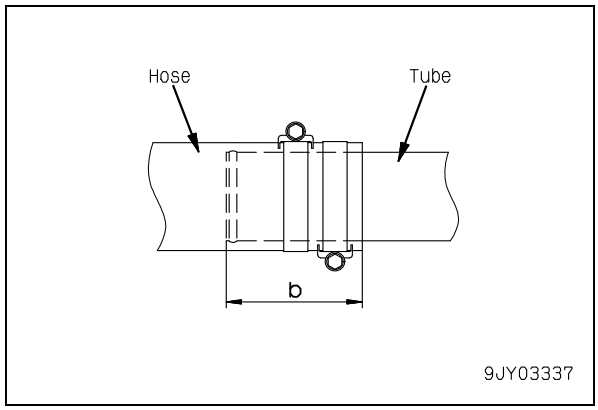
★ Set hose insertion length (b) as shown below.

1) Radiator side: 85 mm
2) Engine side: 90 mm

Tool: Torque wrench (socket)

Clamp for radiator inlet hose (24): Width across flats 9.5mm

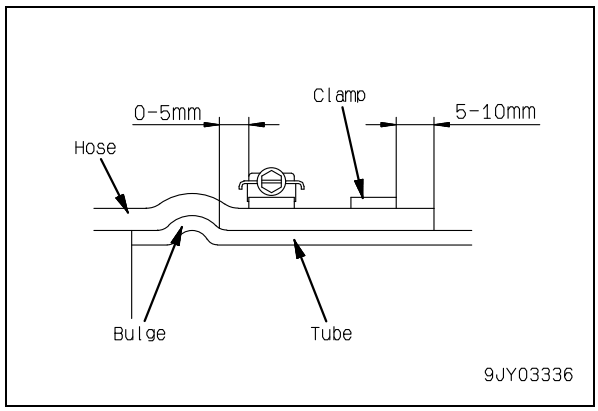
Hose clamp:
10 to 11Nm{1.02 to 1.12kgm}



[*3]

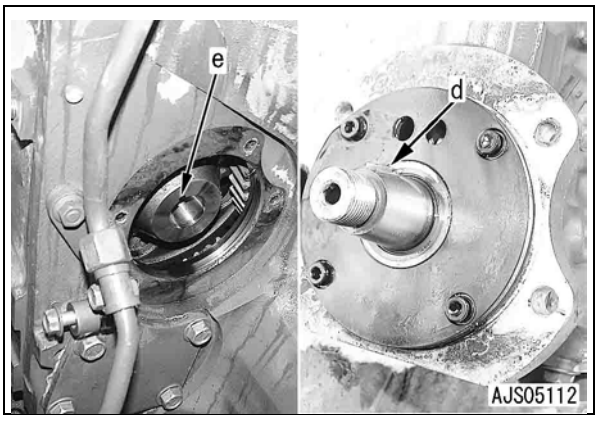
★ Install the hose so that it will not twist.

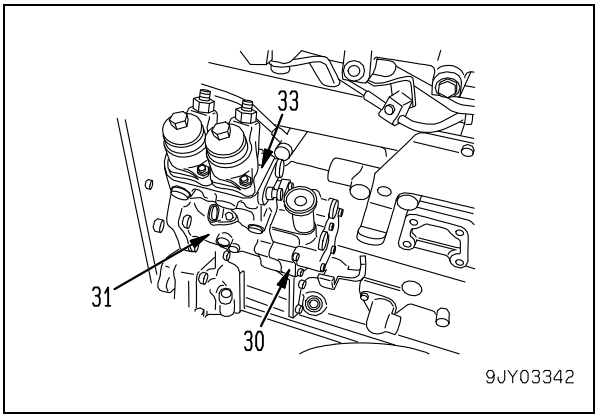
★ When using 2 clamps continuously, set their clamp bolts 180° apart from each other.



Installation

1. Set fuel supply pump assembly (33).
   ★ Before setting, check that key (d) of the shaft is matched to key way (e) of the drive gear.
2. Finger tighten 4 mounting bolts (31) and bracket (30).
   Mounting bolt:
   Adhesive (LT-2)





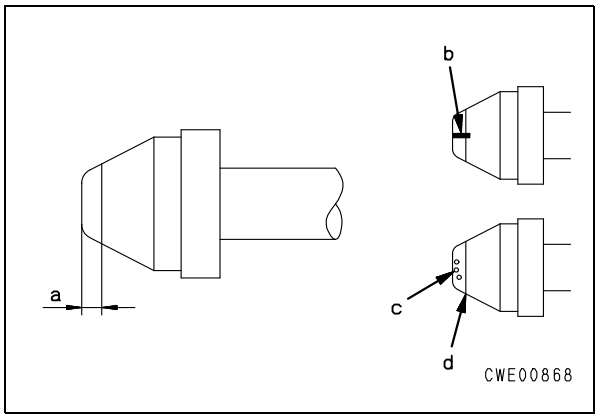
High-pressure pipe

⚠ **When handling the high-pressure pipe and clamp, observe the following.**

- Do not bend the high-pressure pipe to collect before installing or use it for another section.
- Install the specified clamp to the specified position securely.
- Do not apply lubricant to the high-pressure pipe sleeve nut and the threads of the mating part.
  ★ If lubricant is applied, the axial tension is increased too much and the high-pressure pipe may be broken when the sleeve nut is tightened.

⚠ **Before installing the high-pressure pipe, check it. If it has any defect, replace it since fuel may leak.**

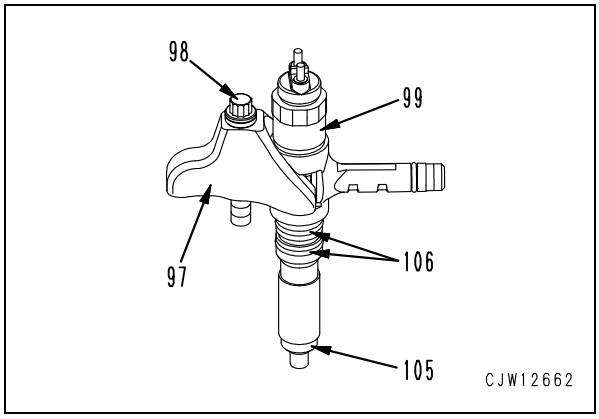
- Check the taper seal of the connecting part (Part (a): Part of 2 mm from the end) for visible lengthwise slit (b) and dent (c).
- Check part (d) (End of the taper seal: Part at 2 mm from the end) for stepped-type wear (fatigue) which your nail can feel.

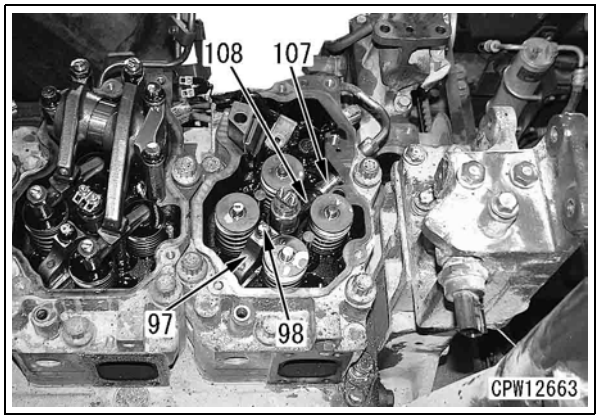


[*23], [*24]

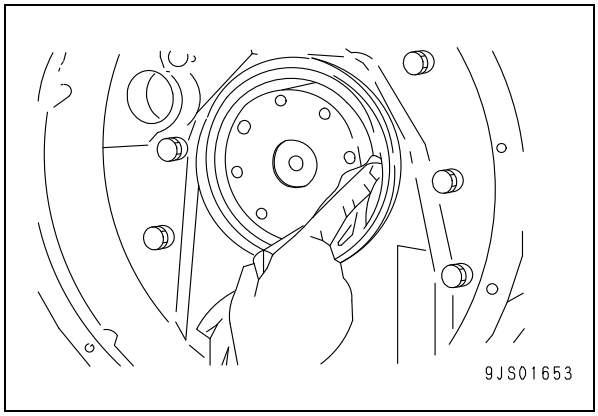
★ Install the injector assembly according to the following procedure.

1) Check that there is not dirt in the injector sleeve.
2) Install gasket (105) and O-ring (106) to fuel injector (99).
   - O-ring: Engine oil (EO30-DH)
3) Insert holder (97) in the fuel injector and insert the injector connector, directing it toward the high-pressure pipe insertion hole.
4) Install the spherical washer to bolt (98) and tighten holder (97) temporarily.
   - Spherical washer: Engine oil (EO30-DH)
5) Insert high-pressure pipe sleeve (107) through the high-pressure pipe insertion part, setting it to injector connector (108), and tighten it temporarily.
   - ★ Tighten the sleeve nut on the common rail side, too, and take care that the high-pressure pipe will not slant.
6) Tighten holder (98) permanently.
   - ★ While pulling the high-pressure pipe in the opposite direction to the injector, tighten the bolt.
   - Holder mounting bolt: 58.8 – 73.5 Nm {6.0 – 7.5 kgm}
   - ★ After tightening the holder, remove the high-pressure pipe.





★ Clean, degrease, and dry the contact surface against the flywheel housing.
★ Clean, degrease, and dry the seal lip surface (periphery of the crankshaft).
★ Check that the end corners and lip sliding surfaces of the crankshaft are free from flaw, burr, and rust of the housing.



Installation

- Carry out installation in the reverse order to removal.

★ Install the hose so that it will not twist.

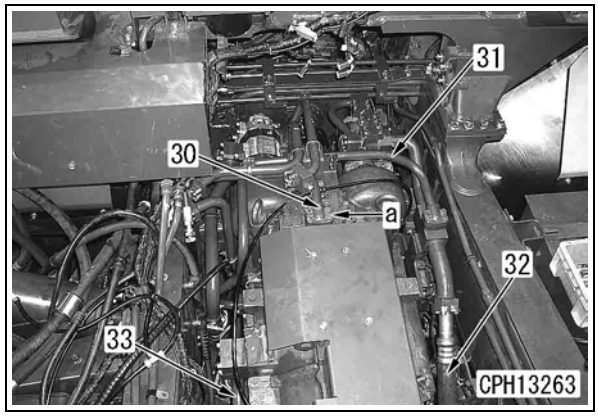
[*1]

★ Install only 1 bolt (a).

Tool: Torque wrench (socket)

Mounting bolt for tube (30): Width across flats 17mm, M10

Tube mounting bolt (a):
44.1 to 53.9 Nm{4.5 to 5.5 kgm}



[*2]

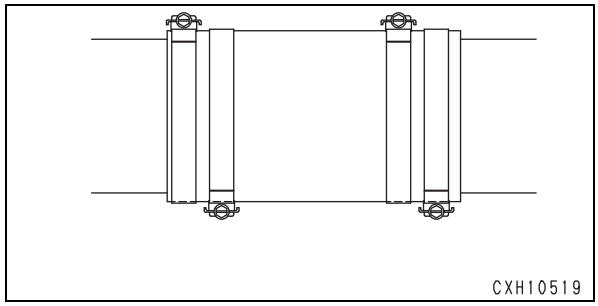
★ When the clamping bolts are loosened.

★ When using 2 clamps, set them 180° apart from each other as shown in the figure.

Tool: Torque wrench (socket)

Clamp for tube (34): Width across flats 9.5mm

Clamping bolt:
13.2 to 14.2 Nm{1.35 to 1.45 kgm}



[*3]

Tool: Torque wrench (socket)

Mounting bolt (39) for front drive shaft assembly: Width across flats 19mm, M12

Front drive shaft:
Adhesive (LT-2)

Front drive shaft:
98 – 123 Nm {10.0 – 12.5 kgm}

[*4]

★ See the procedure for aligning the engine assembly and torque converter and transmission assembly.

Tool: Torque wrench (socket)

Mounting bolt for rear drive shaft assembly (41): Width across flats 22mm, M14

Rear drive shaft:
Adhesive (LT-2)

Rear drive shaft:
157 – 196 Nm {16 – 20 kgm}

[*5]

★ When the clamping bolts are loosened.

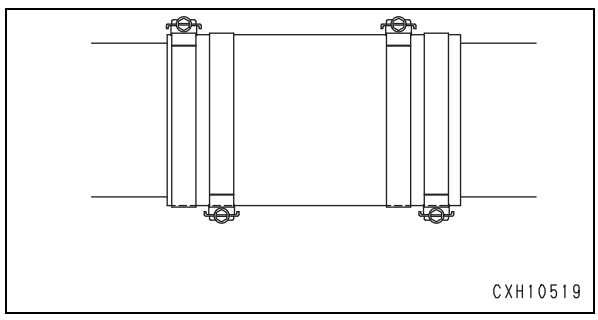
Tool: Torque wrench (socket)

Clamp for tube (51), (52), (53): Width across flats 9.5mm

Clamping bolts (51) and (53):
13.2 to 14.2 Nm{1.35 to 1.45 kgm}

Clamping bolt (52):
10.1 – 12.4 Nm {1.03 – 1.26 kgm}

★ When using 2 clamps, set them 180 degrees apart from each other as shown in the figure.

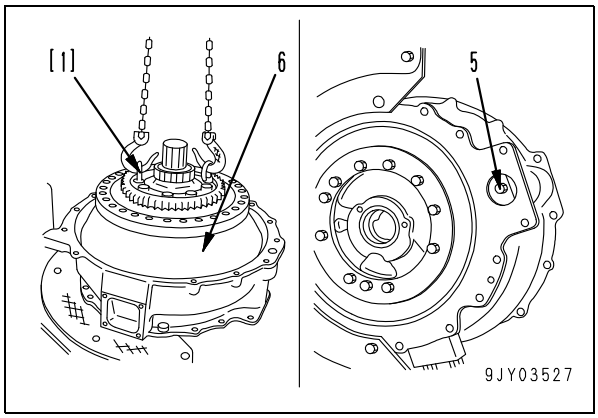


12. Turbine • clutch assembly

Using eye bolts [1], set turbine assembly (6) on mounting position, then tighten 30 mounting bolts (5).

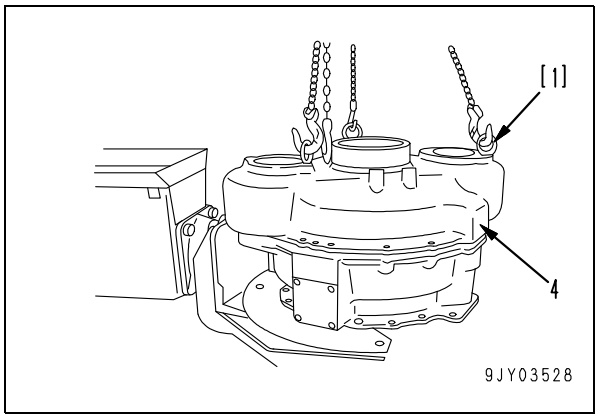
Mounting bolt:
Adhesive (LT-2)

Mounting bolt:
49.0 – 58.8 Nm {5 – 6 kgm}



13. PTO assembly

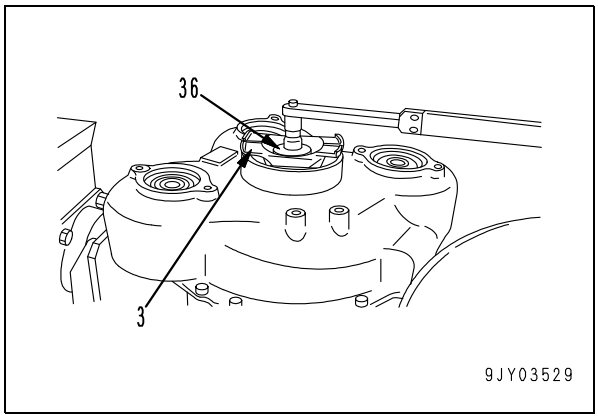
1) Fit O-ring, using eye bolt: [1], install PTO assembly (4).



2) Fit O-ring, install input coupling (3), then install holder (36).

Mounting:
Adhesive (LT-2)

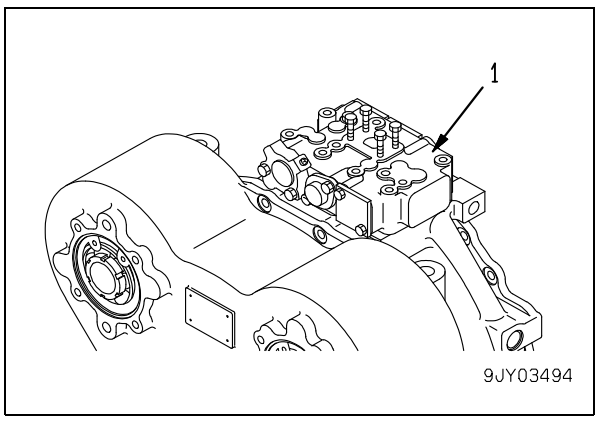
Mounting bolt:
245.2 – 308.9 Nm {25 – 31.5 kgm}



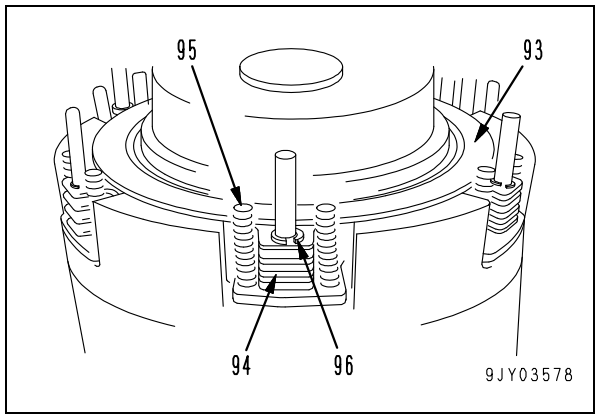
14. Control valve assembly

Fit gasket, then install control valve assembly (1).

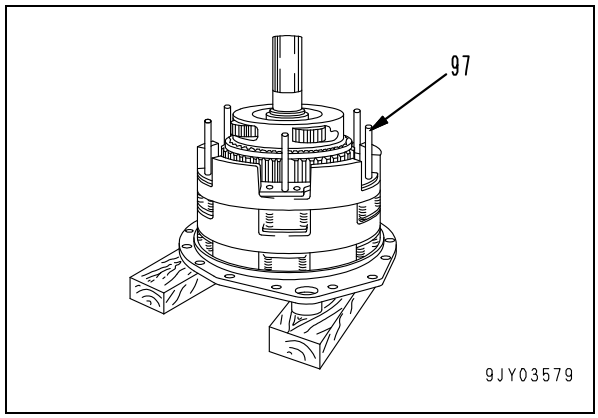
Mounting bolt:
44.1 – 53.9 Nm {4.5 – 5.5 kgm}



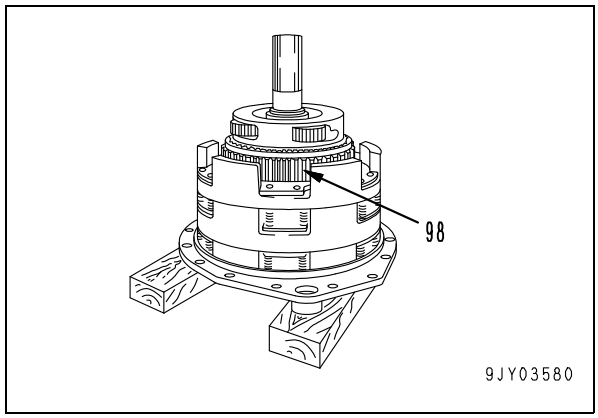
19. No. 5 clutch discs • plates • springs
    Remove discs (93), plates (94) and springs (95) and (96).



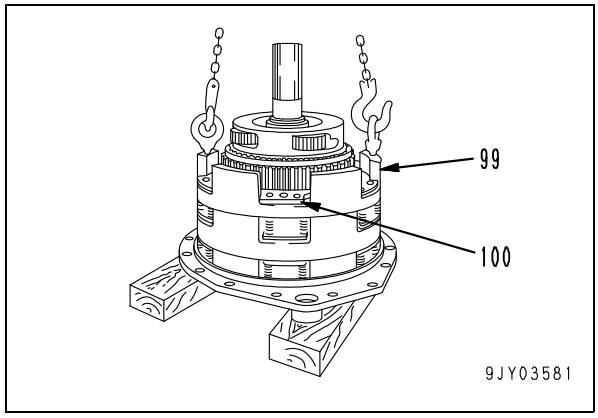
20. Guide pins
    Remove guide pins (97).



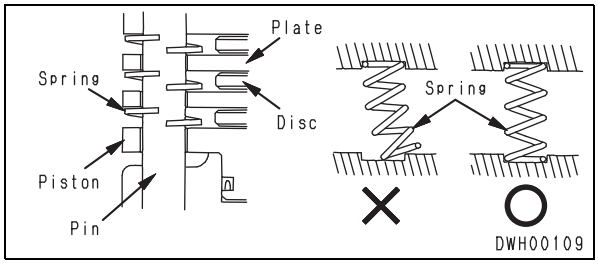
21. No. 5 clutch ring gear
    Remove ring gear (98).



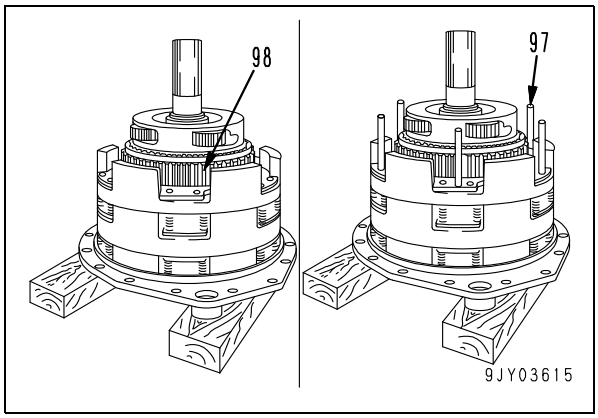
22. No. 5 housing, piston
    Using eyebolts, remove No. 5 housing (99) together with piston (100).



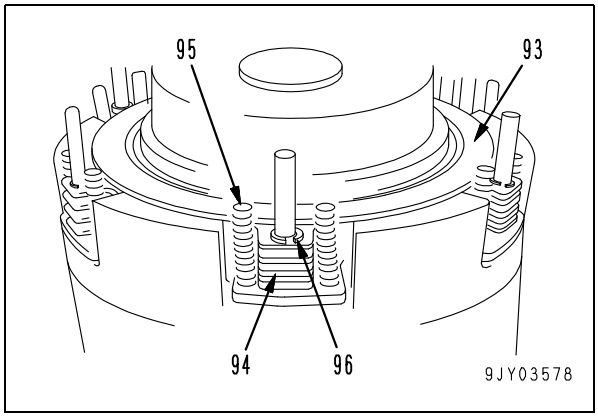
★ Knock in dowel pin with plastic hammer.
★ Check that the spring is fitted securely into the seat of the piston and housing.



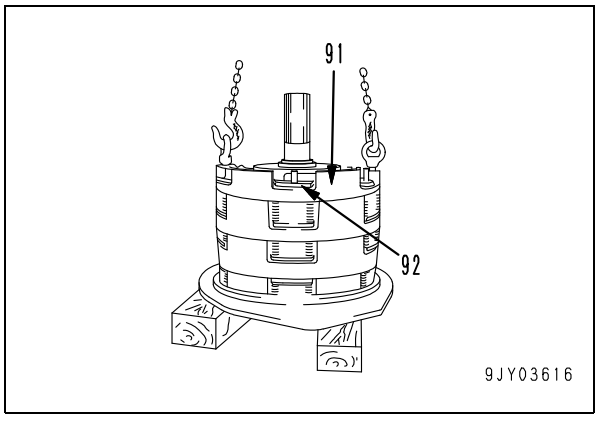
11. No. 5 ring gear
Install ring gear (98).
★ Install ring gear so that inner gear which is cut faces lower.
12. Guide pins
Install guide pins (97).



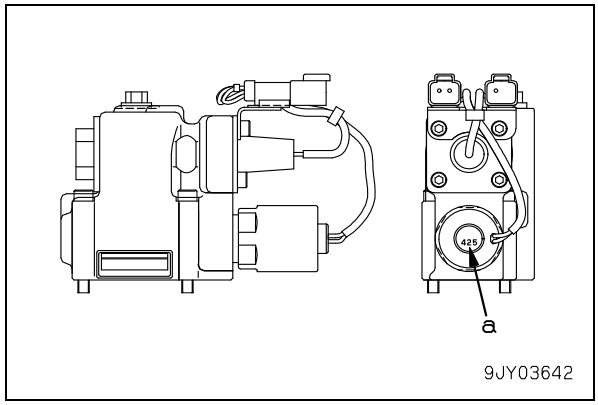
13. No. 5 clutch discs, plate, springs
Install discs (93), plates (94) and springs (95) and (96).
★ There are five discs and four plates.
★ Free length of spring (95): 77 mm



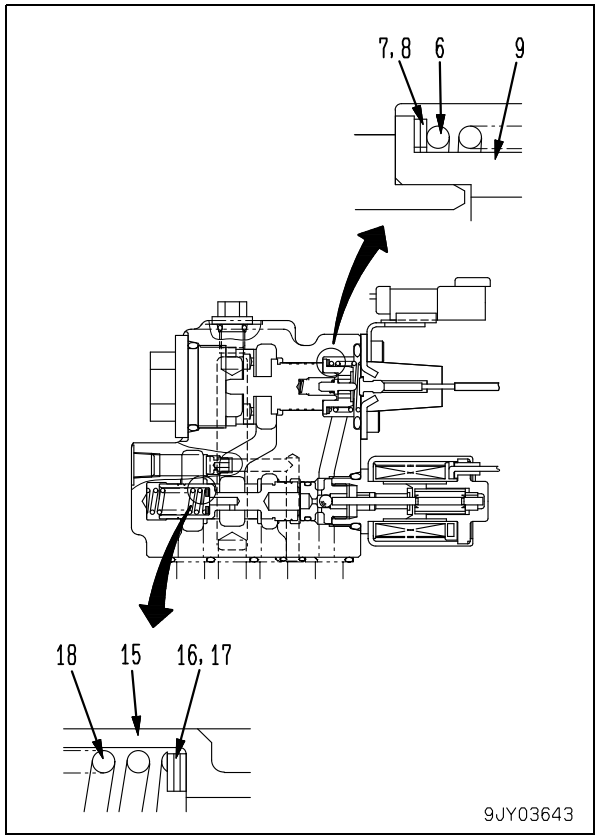
14. No. 4 housing, No. 4 piston
1) Assemble seal ring, then install piston (92) in housing.
★ Install seal ring with groove side facing pressure receiving side.
2) Align spline, then install housing (91).



2) Install ball (13) and O-ring to valve (14).
   - O-ring:
     Grease (G2-LI)
3) Install spool (15) and valve (14) to valve body (1).
   - Valve:
     19.6 (+2.0/0) Nm {2.0 (+0.2/0) kgm}
4) Fit the O-ring to solenoid valve (12) and install them to valve body (1).
   - O-ring:
     Grease (G2-LI)
   - Solenoid valve:
     49.0 ± 5.0 Nm {5.0 ± 0.5 kgm}
   - ★ When installing the solenoid valve, check the solenoid ID No. 425 (part a).
   - ★ When reusing all of solenoid valve (12), valve (14), spool (15) and spring (18), insert the shims of the number checked when disassembled.
   - ★ When replacing solenoid valve (12), check that spring (18) is installed securely.



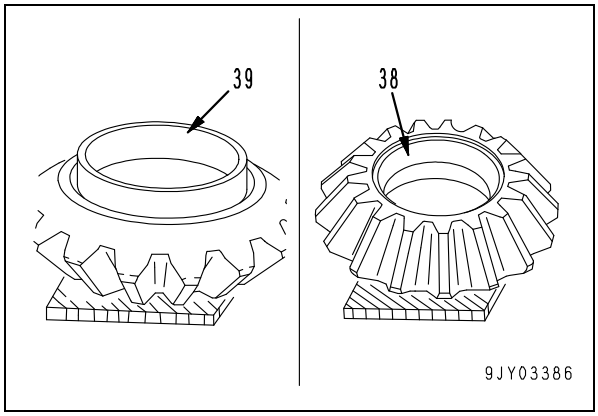
2. Flow sensor valve
   1) Install pin (10) and spring (11) to seat (9).
   2) Fit the O-ring to plug (2), install spool (3) to valve body (1), and install plug (2).
      - O-ring:
        Grease (G2-LI)
   3) Install seat (9), shims (8) and (7) and spring (6) to valve body (1).
      - Standard number of shims: 2
      - Standard thickness of shims: 1.0 mm (Thickness of 1 shim: 0.5 mm)
      - Kinds of shims: 0.2, 0.5 mm
   4) Install switch assembly (5) and bracket (4).
      - Mounting bolt:
        4.9+2.0/0Nm{0.5+0.2/0kgm}
3. Measuring of ECMV oil pressure
   Measure the ECMV oil pressure. For details, see Testing and adjusting, "Measuring ECMV oil pressure".
4. Adjusting ECMV oil pressure
   Adjust the ECMV oil pressure. For details, see Testing and adjusting, "Adjusting ECMV oil pressure".



ECMV for lockup clutch

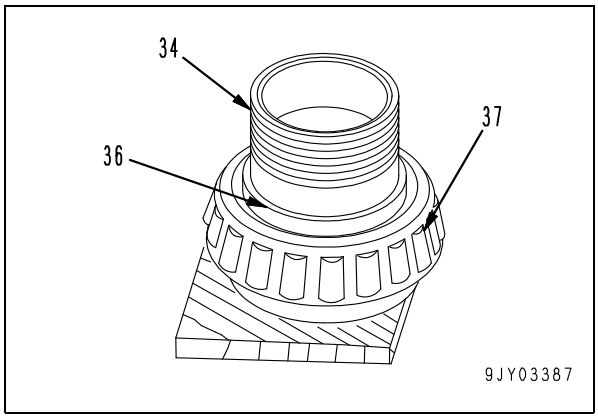
★ If the pressure control section was disassembled or any part in it was replaced, be sure to check the oil pressure.
★ Clean all the parts and check them for dirt or damage. Coat their sliding surfaces with axle oil before installing.

2] Expand fit outer races (39) and (38).
★ Dry ice cooling time:
Approx. 5 minutes

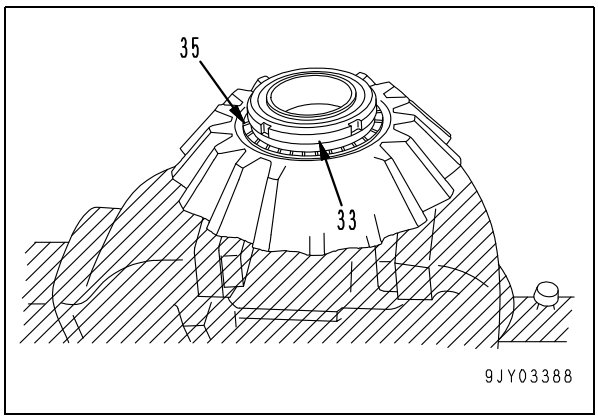


2) Sleeve, bearing
1] Shrink fit bearing (37) to sleeve (34).
★ Shrink-fitting temperature:
At 100°C for approx. 10 minutes
2] Install inside circumference seat (36).

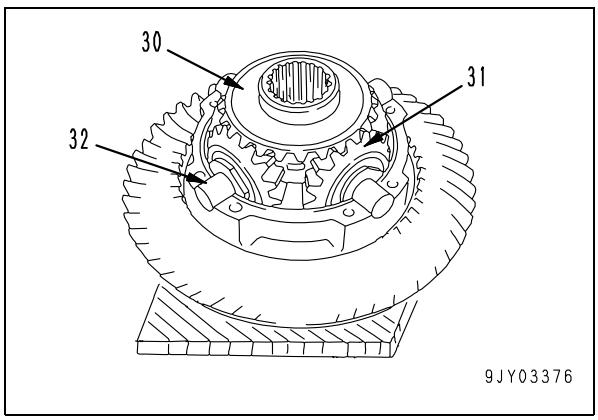
3) Pinion, bearing, nut
1] Install pinion (31) to sleeve (34), and shrink fit bearing (35).
★ Shrink-fitting temperature:
At 100°C for approx. 10 minutes



2] Using tool H5, tighten nut (33).
Nut:
Thread tightener (LT-2)
Nut:
490 – 610 Nm {50 – 62 kgm}
★ After tightening the nut, rotate the pinion at least five turns, and check that it rotates smoothly.
Starting torque:
1.27 ± 1.27 Nm {0.13 ± 0.13 kgm}



3. Pinion, cross shaft, bevel gear (small)
1) Assemble pinion (31) to cross shaft (32).
2) Align dowel pin of case with groove of sleeve (34) and install.
★ If the dowel pin is not fitted completely into the groove in the sleeve, the cross shaft will come up and the pinion will not rotate smoothly, so check these two points.
3) Install bevel gear (small) (30).



Disassembly and assembly of rear final drive assembly

Special tools to be used when you disassembly and assembly of rear final drive assembly

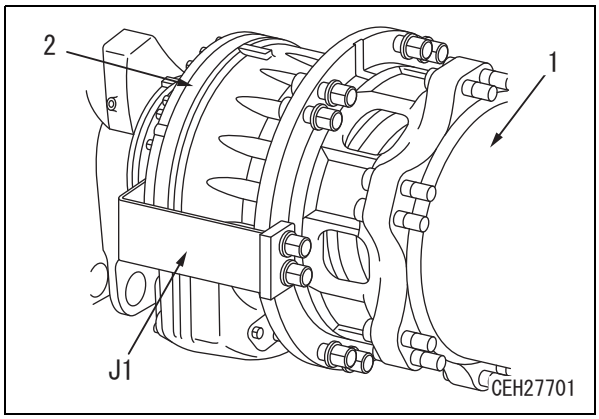
Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
J	1	792-127-1000	Fixture	2		
	4	792-520-2121	Installer	1		
		791-580-1600	Push tool	1		
		792-520-2110	Installer	1		
		792-530-1600	Push tool	1		

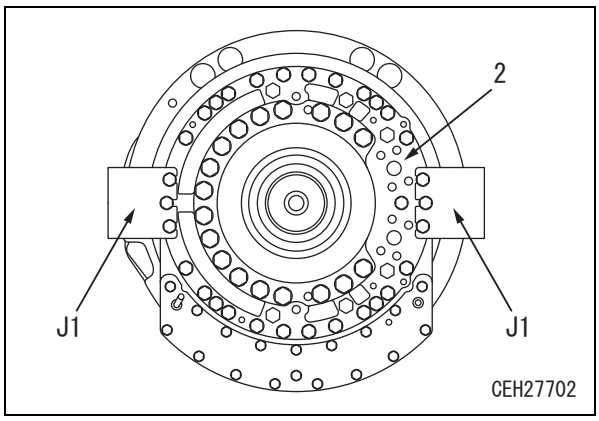
Disassembly

1. Rear wheel assembly
   For details, see "Removal of rear wheel assembly".
2. Final drive carrier assembly
   For details, see "Removal of rear final drive carrier assembly".

Final drive assembly

3. Using the tool J1, secure the wheel hub (1) and cylinder (2).
   - ★ To install the tool J1, use the nut on the wheel hub side, and remove the outer gear mount bolt on the cylinder side, and then fix it on each side.
   - ★ Be sure to install it to protect the floating seal before you remove the retainer (4).





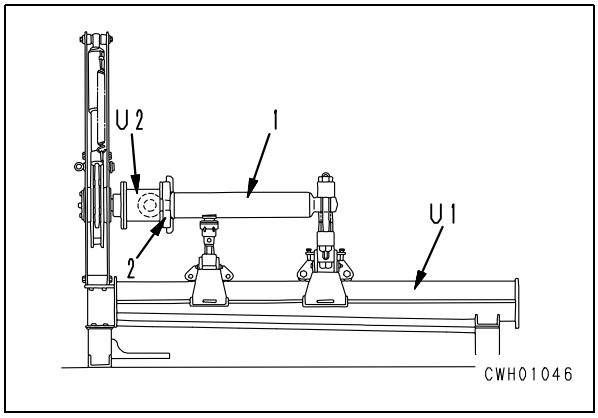
Disassembly and assembly of steering cylinder assembly

Special tools to be used when you disassembly and assembly of steering cylinder assembly

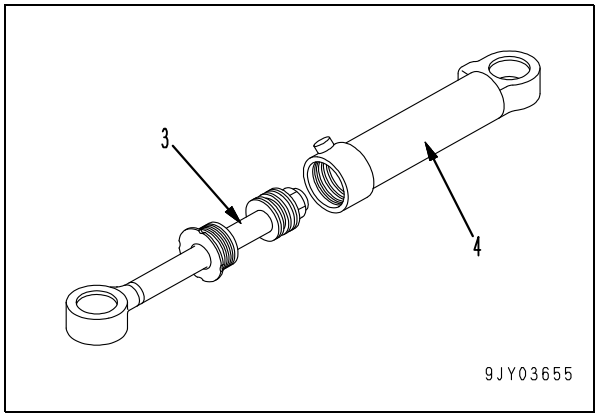
Symbol		Part No.	Part name	Q'ty	Sketch	Remarks
U	1	790-502-1003	Cylinder repair stand	1		
	3	790-102-2303 or 790-330-1100	Wrench assembly	1		
	4	790-302-1270	Socket	1		
	9	790-201-1570	Plate	1		
		790-101-5021	Grip	1		
		01010-50816	Bolt	1		
	12	796-720-1640	Ring	1		
		07281-00909	Clamp	1		

Disassembly

1. Set cylinder assembly (1) in tool U1.
2. Raise lock of cylinder head nut, and using tool U2, remove cylinder head assembly (2).



3. Pull out cylinder head and piston rod assembly (3) from cylinder (4) and remove.
   ★ When the piston rod assembly is pulled out from the cylinder, oil will come out, so catch it in a container.
4. Remove cylinder (4) from tool U1.



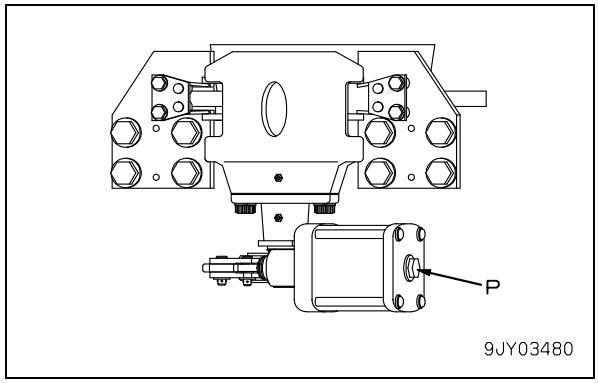
Installation

- Carry out installation in the reverse order to removal.

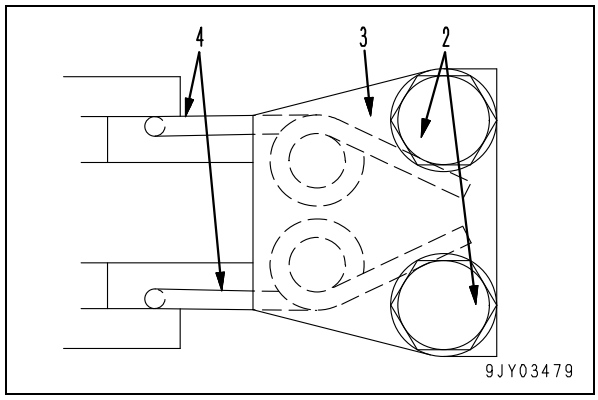
[*1]

★ Install the springs as follows.

1) Connect the slack adjuster and spring cylinder and apply oil pressure of 2.94 MPa – 5.88 MPa {30 – 60 kg/cm²} to port P (M20 x 1.5) of the spring cylinder.



2) Fit spring (4) in bracket (3) and install to position 1.



★ For details of the mounting position for each spring.

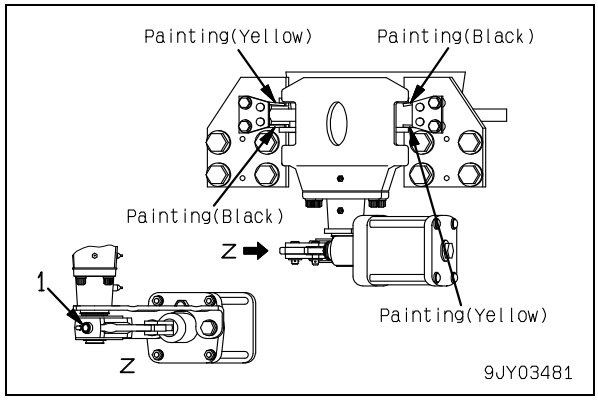
★ Screw in mounting bolts (2) of the bracket 2 – 3 turns so that the bracket moves freely.

3) Turn adjustment bolt (1) counter clockwise to bring both pads into close contact with disc, then tighten to a point where it becomes difficult to turn bolt.

4) Tighten mounting bolts (2) and be careful that bracket does not come out of position.

★ After installing to the machine, check that the clearance between the pad and disc is at least 0.05 mm (each side).

If there is not sufficient clearance, move the bracket in the direction to increase the clearance, install it again, and check that the clearance is correct.



Tool: Torque wrench (socket)

Bolt (2): Width across flats 19mm, M12

Bolt (2):
98 to 123Nm{10 to 12.5kgm}

[*2]

★ Align the grooves of the pad and the caliper with both sides of the plate securely.

Tool: Torque wrench (socket)

Bolt (5): Width across flats 36mm, M24

Plate mounting bolt:
Thread tightener (LT-2)

Plate mounting bolt:
824 – 1,030 Nm {84 – 105 kgm}

[*3]

★ Adjust the clearance between brake pad and disc. For details, see "Testing and adjusting of parking break".

Installation

- Carry out installation in the reverse order to removal.

[*1]

Tool: Torque wrench (socket)

Front suspension cylinder valve: Width across flats 24mm, M16

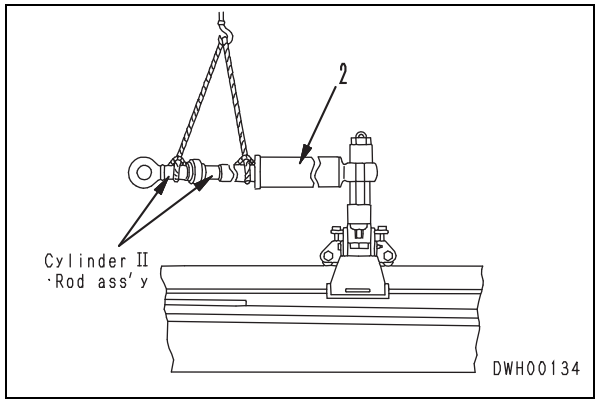
Valve:

39.2 – 49 Nm {4 – 5 kgm}

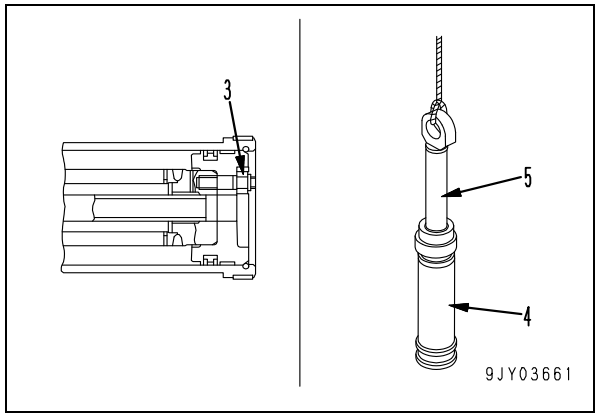
- Refilling with oil, charging nitrogen gas
- Adjust front suspension cylinder. For details, see "Testing and adjusting of front suspension cylinder".
- Bleeding air

  Bleed air from the brake circuit. For details, see TESTING AND ADJUSTING, "Bleeding air from brake circuit".

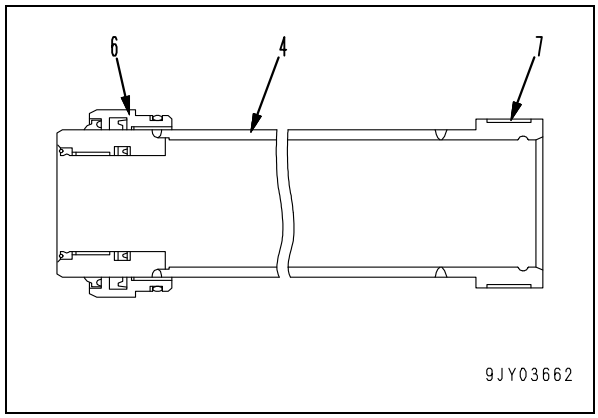
3. Remove cylinder Ⅱ and rod assembly from cylinder Ⅰ (2).



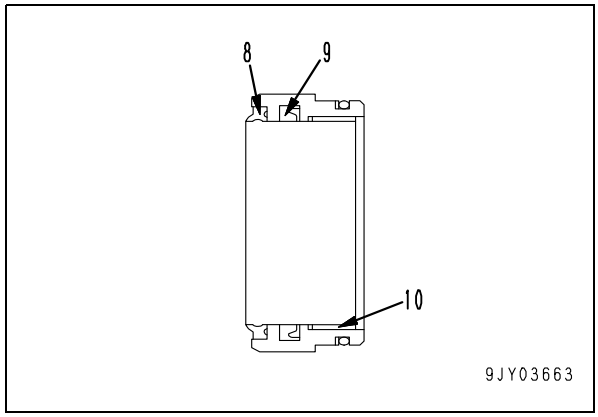
4. Remove piston nut (3), then lift off rod (5) from cylinder Ⅱ (4).



5. Remove cylinder head assembly (6) from cylinder Ⅱ (4).
6. Remove wear ring (7).

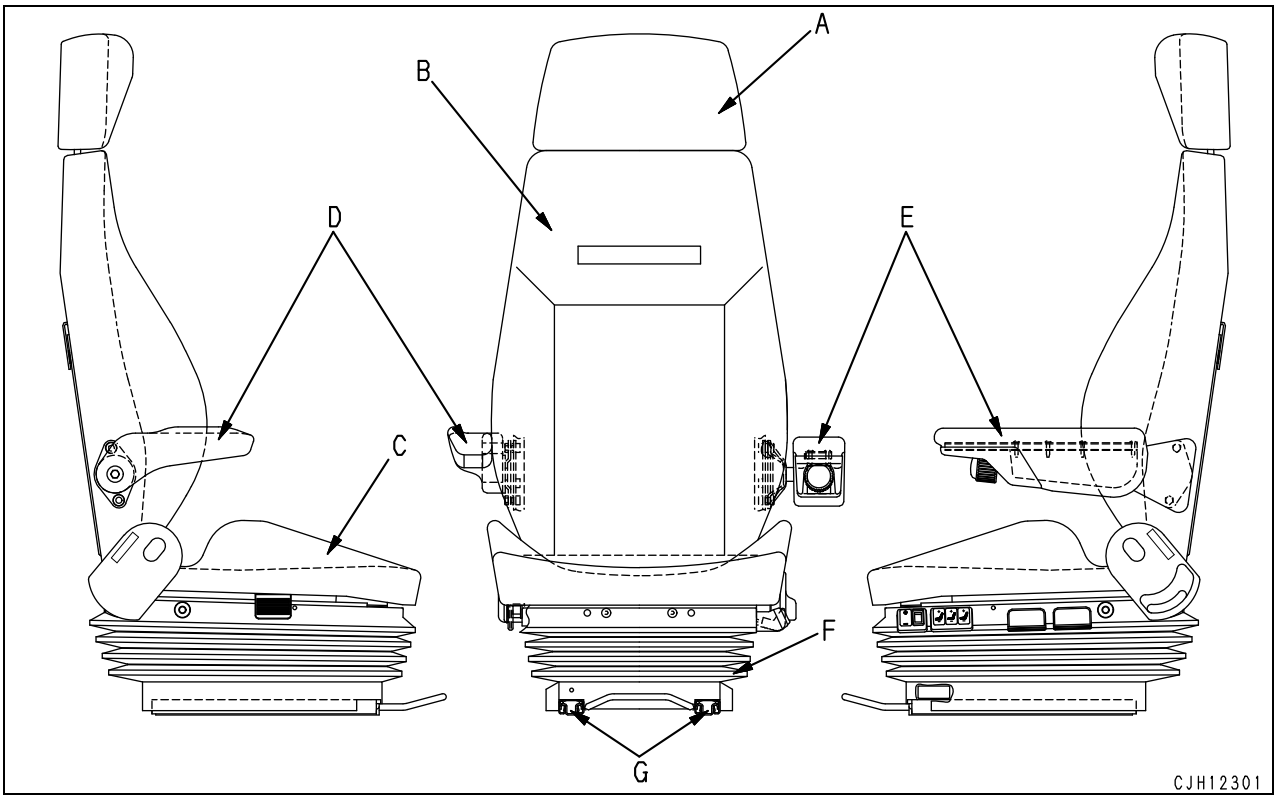


- Disassembly of cylinder head assembly
  1) Remove O-ring, then remove dust seal (8) and rod packing (9).
  2) Remove bushing (10).



Disassembly and assembly of operator's seat assembly

★ The procedure for disassembling and assembling the operator's seat assembly (air suspension (Isring hausen)) is shown below.



A: Headrest
B: Seatback
C: Seat cushion
D: Right-hand armrest
E: Left-hand armrest
F: Suspension cover
G: Rails

Disassembly

1. Headrest
   1) Referring to the figure, check the positions of the 2 clips (2) of headrest stay (1) on both sides.