

SHOP MANUAL

KOMATSU

D65EX-12

D65PX-12

(EU SPEC.)

| MACHINE MODEL | SERIAL NUMBER |
|---------------|---------------|
|---------------|---------------|

| | |
|-----------------|---------------------|
| D65EX-12 | 65209 and up |
| D65PX-12 | 65275 and up |

- This shop manual may contain attachments and optional equipment that are not available in your area. Please consult your local Komatsu distributor for those items you may require. Materials and specifications are subject to change without notice.
- D65EX/PX-12 mount the SA6D125E-3 engine.
For details of the engine, see the SA6D125E Series Engine Shop Manual.

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METHOD OF DISASSEMBLING, CONNECTING PUSH-PULL TYPE COUPLER

! Before carrying out the following work, release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.

! Even if the residual pressure is released from the hydraulic tank, some hydraulic oil flows out when the hose is disconnected. Accordingly, prepare an oil receiving container.

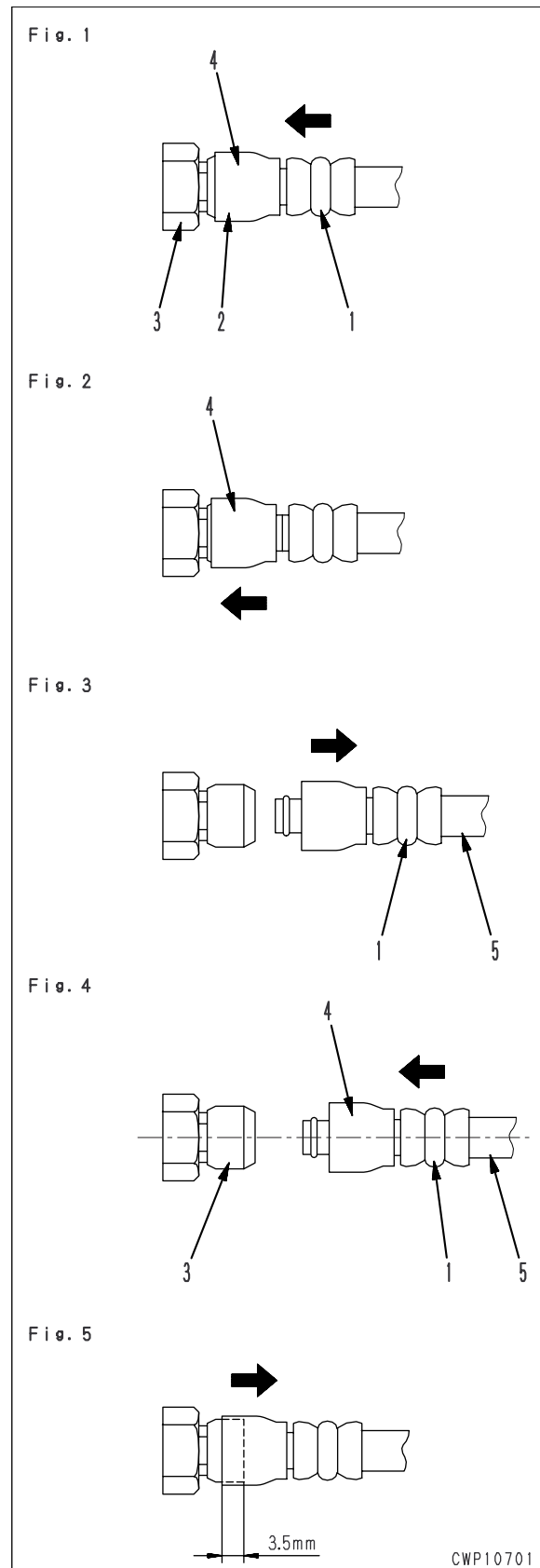
Disconnection

- 1) Release the residual pressure from the hydraulic tank. For details, see TESTING AND ADJUSTING, Releasing residual pressure from hydraulic tank.
- 2) Hold adapter (1) and push hose joint (2) into mating adapter (3). (Fig. 1)
 - ★ The adapter can be pushed in about 3.5 mm.
 - ★ Do not hold rubber cap (4).
- 3) After hose joint (2) is pushed into adapter (3), press rubber cap (4) against (3) until it clicks. (Fig. 2)
- 4) Hold hose adapter (1) or hose (5) and pull it out. (Fig. 3)
 - ★ Since some hydraulic oil flows out, prepare an oil receiving container.

Connection

- 1) Hold hose adapter (1) or hose (5) and insert it in mating adapter (3), aligning them with each other. (Fig. 4)
 - ★ Do not hold rubber cap (4).
- 2) After inserting the hose in the mating adapter perfectly, pull it back to check its connecting condition. (Fig. 5)
 - ★ When the hose is pulled back, the rubber cap moves toward the hose about 3.5 mm. This does not indicate abnormality, however.

Type 1



Liter to U.S. Gallon

1ℓ = 0.2642 U.S. Gal

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 0 | 0.264 | 0.528 | 0.793 | 1.057 | 1.321 | 1.585 | 1.849 | 2.113 | 2.378 |
| 10 | 2.642 | 2.906 | 3.170 | 3.434 | 3.698 | 3.963 | 4.227 | 4.491 | 4.755 | 5.019 |
| 20 | 5.283 | 5.548 | 5.812 | 6.076 | 6.340 | 6.604 | 6.869 | 7.133 | 7.397 | 7.661 |
| 30 | 7.925 | 8.189 | 8.454 | 8.718 | 8.982 | 9.246 | 9.510 | 9.774 | 10.039 | 10.303 |
| 40 | 10.567 | 10.831 | 11.095 | 11.359 | 11.624 | 11.888 | 12.152 | 12.416 | 12.680 | 12.944 |
| 50 | 13.209 | 13.473 | 13.737 | 14.001 | 14.265 | 14.529 | 14.795 | 15.058 | 15.322 | 15.586 |
| 60 | 15.850 | 16.115 | 16.379 | 16.643 | 16.907 | 17.171 | 17.435 | 17.700 | 17.964 | 18.228 |
| 70 | 18.492 | 18.756 | 19.020 | 19.285 | 19.549 | 19.813 | 20.077 | 20.341 | 20.605 | 20.870 |
| 80 | 21.134 | 21.398 | 21.662 | 21.926 | 22.190 | 22.455 | 22.719 | 22.983 | 23.247 | 23.511 |
| 90 | 23.775 | 24.040 | 24.304 | 24.568 | 24.832 | 25.096 | 25.361 | 25.625 | 25.889 | 26.153 |

Liter to U.K. Gallon

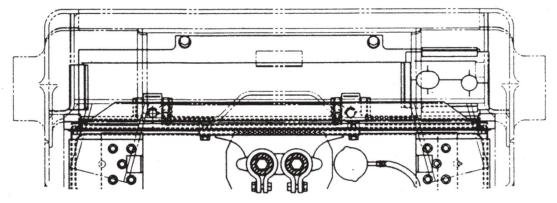
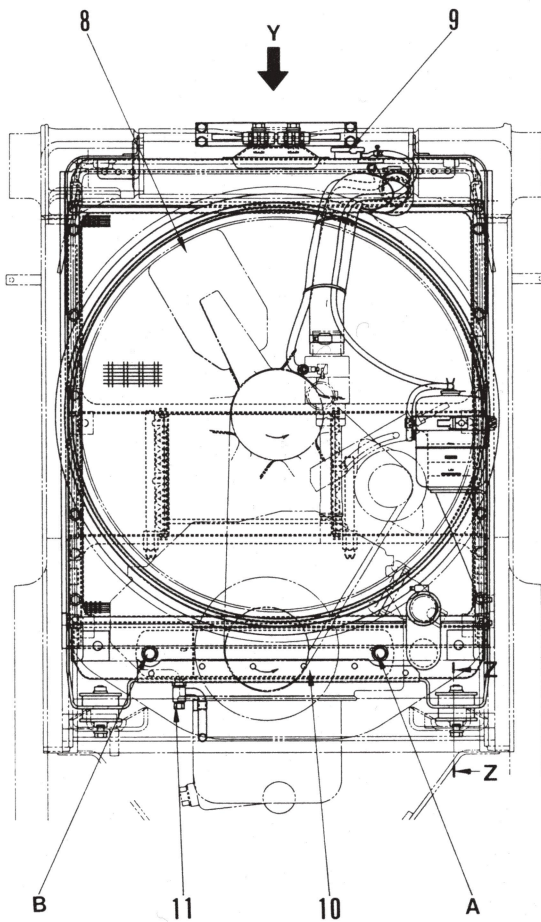
1ℓ = 0.21997 U.K. Gal

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0 | 0 | 0.220 | 0.440 | 0.660 | 0.880 | 1.100 | 1.320 | 1.540 | 1.760 | 1.980 |
| 10 | 2.200 | 2.420 | 2.640 | 2.860 | 3.080 | 3.300 | 3.520 | 3.740 | 3.950 | 4.179 |
| 20 | 4.399 | 4.619 | 4.839 | 5.059 | 5.279 | 5.499 | 5.719 | 5.939 | 6.159 | 6.379 |
| 30 | 6.599 | 6.819 | 7.039 | 7.259 | 7.479 | 7.699 | 7.919 | 8.139 | 8.359 | 8.579 |
| 40 | 8.799 | 9.019 | 9.239 | 9.459 | 9.679 | 9.899 | 10.119 | 10.339 | 10.559 | 10.778 |
| 50 | 10.998 | 11.281 | 11.438 | 11.658 | 11.878 | 12.098 | 12.318 | 12.528 | 12.758 | 12.978 |
| 60 | 13.198 | 13.418 | 13.638 | 13.858 | 14.078 | 14.298 | 14.518 | 14.738 | 14.958 | 15.178 |
| 70 | 15.398 | 15.618 | 15.838 | 16.058 | 16.278 | 16.498 | 16.718 | 16.938 | 17.158 | 17.378 |
| 80 | 17.598 | 17.818 | 18.037 | 18.257 | 18.477 | 18.697 | 18.917 | 19.137 | 19.357 | 19.577 |
| 90 | 19.797 | 20.017 | 20.237 | 20.457 | 20.677 | 20.897 | 21.117 | 21.337 | 21.557 | 21.777 |

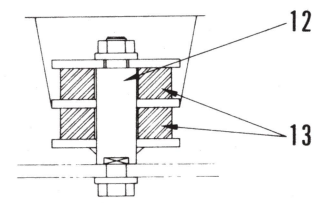
SPECIFICATIONS

| Machine model | | D65EX-12 | D65PX-12 | |
|----------------------------------|---|----------------------------------|------------------------------|--------------|
| Serial Numbers | | 65209 and up | 65275 and up | |
| Weight | Operating weight | | | |
| | • bare tracktor | 15,670 | 17,000 | |
| | • with straight tilt/dozer + cab | 18,900 | 20,250 | |
| | • with straight tilt + ripper + ROPS cab | [20,920] | [21,200] | |
| | • with straight tilt + T/winch + ROPS cab | [20,750] | [21,200] | |
| Performance | Min. turning radius | m | (Counterrotation turn) | |
| | Gradeability | deg | 30 | |
| | Stability (front, rear, left, right) | deg | 35 | |
| | Speed ranges | Forward 1st | km/h | 3.9 |
| | | Forward 2nd | km/h | 6.8 |
| | | Forward 3rd | km/h | 10.6 |
| | | Reverse 1st | km/h | 5.0 |
| | | Reverse 2nd | km/h | 8.6 |
| | | Reverse 3rd | km/h | 13.4 |
| | Ground pressure | Bare tractor | kPa {kg/cm ² } | 52.96 {0.54} |
| Straight tilt/dozer | | kPa {kg/cm ² } | 62.76 {0.64} | |
| E: Straight tilt + ripper + ROPS | | kPa {kg/cm ² } | [74.53 {0.76}] | |
| P: Straight tilt + ROPS | | kPa {kg/cm ² } | – 33.34 {0.34} | |
| Dimensions | Overall length | Bare tractor | mm | 4,365 |
| | | With straight tilt/dozer | mm | 5,260 |
| | Overall width | Bare tractor | mm | 2,390 |
| | | With straight tilt/dozer | mm | 3,415 |
| | Overall heights | To tip of exhaust pipe | mm | 2,990 |
| | | To top of operator's compartment | mm | 2,300 |

Note: The values for the weight and ground pressure in [] are reference values.



Y



Z - Z

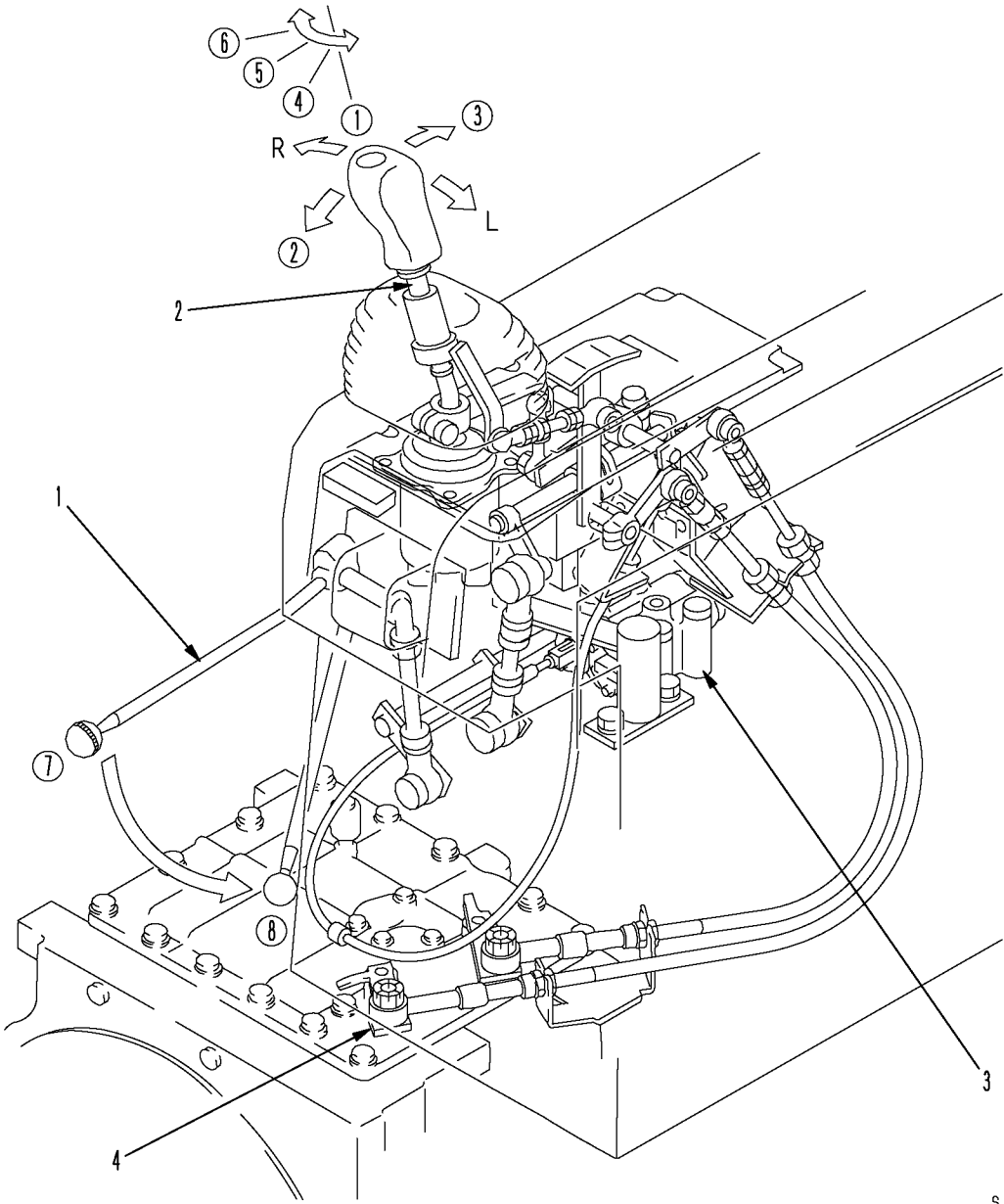
140F12002

OUTLINE

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

| | Radiator | Power train oil cooler (built into lower tank) | Hydraulic oil cooler |
|---|----------|---|----------------------|
| Core type | D-6 | PTO-LS | 3A-CS |
| Fin pitch (mm) | 3.0 | — | 3.5 |
| Heat dissipation capacity (kca/h) | 115,000 | 30,500 | 3,800 |
| Heat dissipation area (m ²) | 65.27 | 1.839 | 1.86 |

TRANSMISSION CONTROL



SJD04746

- Lever positions**
- ① NEUTRAL
 - ② FORWARD
 - ③ REVERSE
 - ④ 1st
 - ⑤ 2nd
 - ⑥ 3rd
 - ⑦ FREE
 - ⑧ LOCK

- 1. Safety lever
- 2. Joystick (directional change, gear shift)
- 3. Brake valve
- 4. Transmission control valve

OUTLINE

- The transmission controlled by joystick (2), which changes the direction of travel, and selects the gear shift.

MODULATING VALVE

OUTLINE

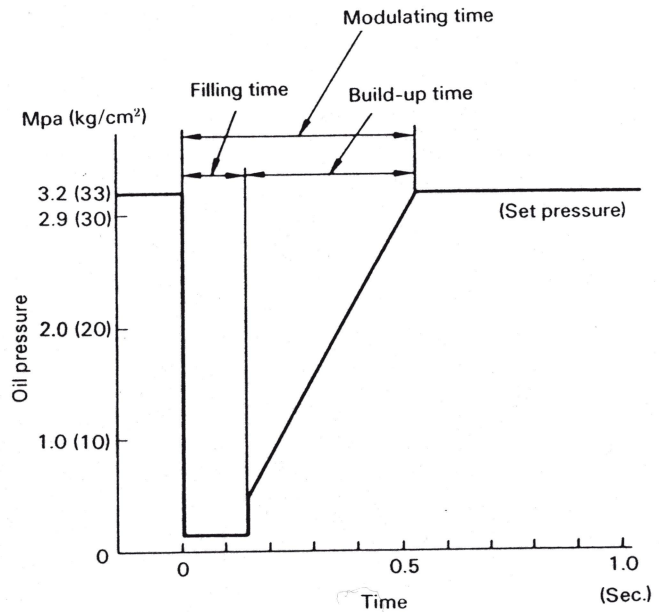
- The modulating valve consists of a modulating relief valve and a quick return valve, and acts to modulates the pressure.
- When the gear shift lever is operated to shift gear the clutch is pushed into close contact by the piston. However, is high pressure is suddenly applied, the piston will suddenly engage the clutch. This will make the machine suddenly start, and it will receive an excessive shock.
- To prevent this, the modulating valve is installed. When the gear shift lever is operated to shift gear, the pressure on the piston gradually rises to the set pressure and the clutch is engaged smoothly. This allows the machine to start without any shock, thereby improving the durability of the power train and at the same time providing a comfortable ride for the operator.
- The figure shows the relationship between the time and the increase in the hydraulic pressure of the modulating valve.

For example, when the gear is shifted from F1 and F2, the oil from the pump passes through the speed valve spool, flows to the second clutch and fills the circuit up to the clutch piston port.

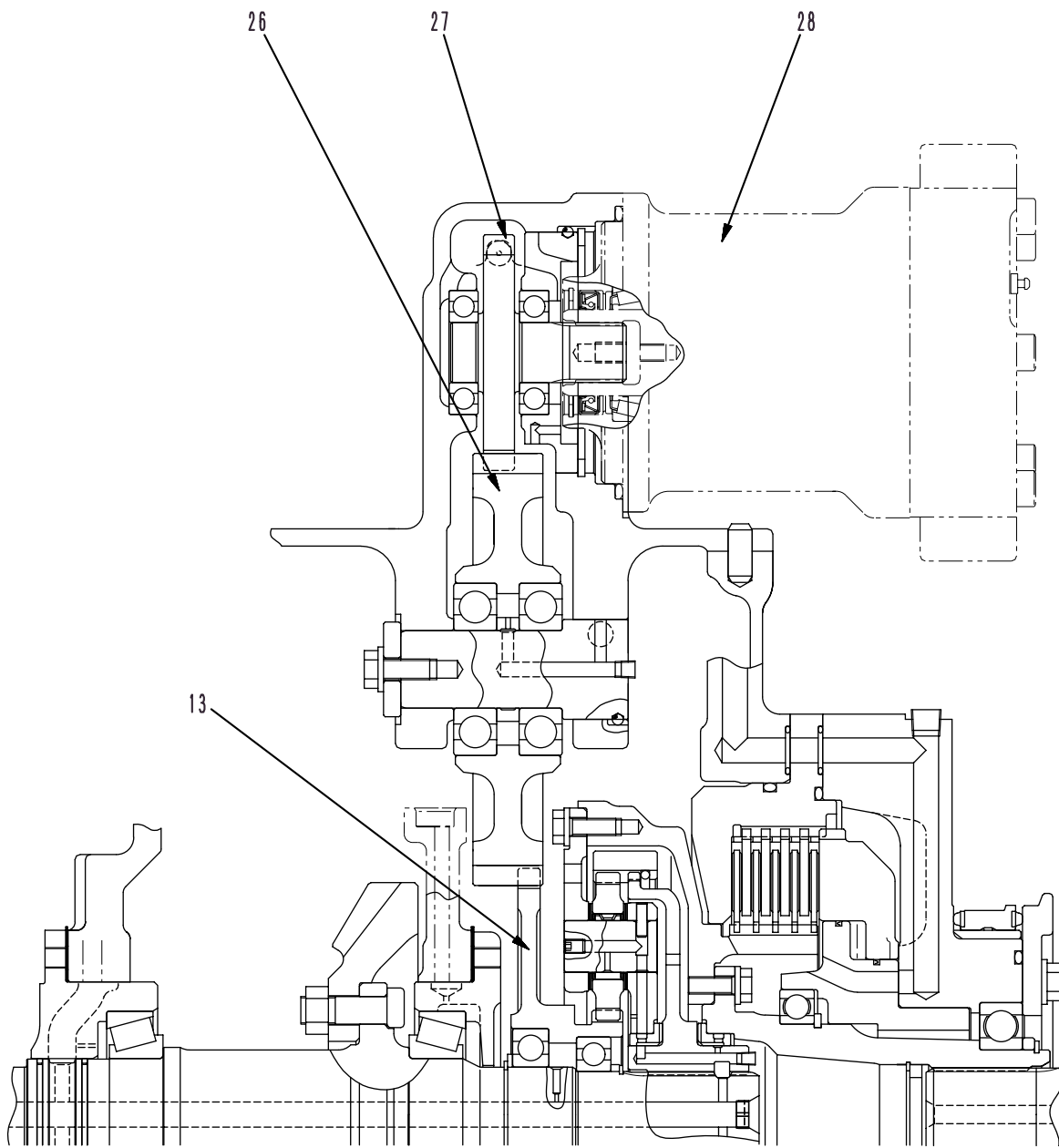
The time taken for the circuit to be filled up to the clutch piston port is called the "filling time", and the oil pressure during this time is 0 - 0.5MPa (0 - 5kg/cm².)

When the circuit up to the clutch piston port is filled with oil, the oil pressure starts to rise.

The time taken for the pressure to rise to the set pressure is called the "built-up time". The filling time and built-up time together are called the "modulating time".



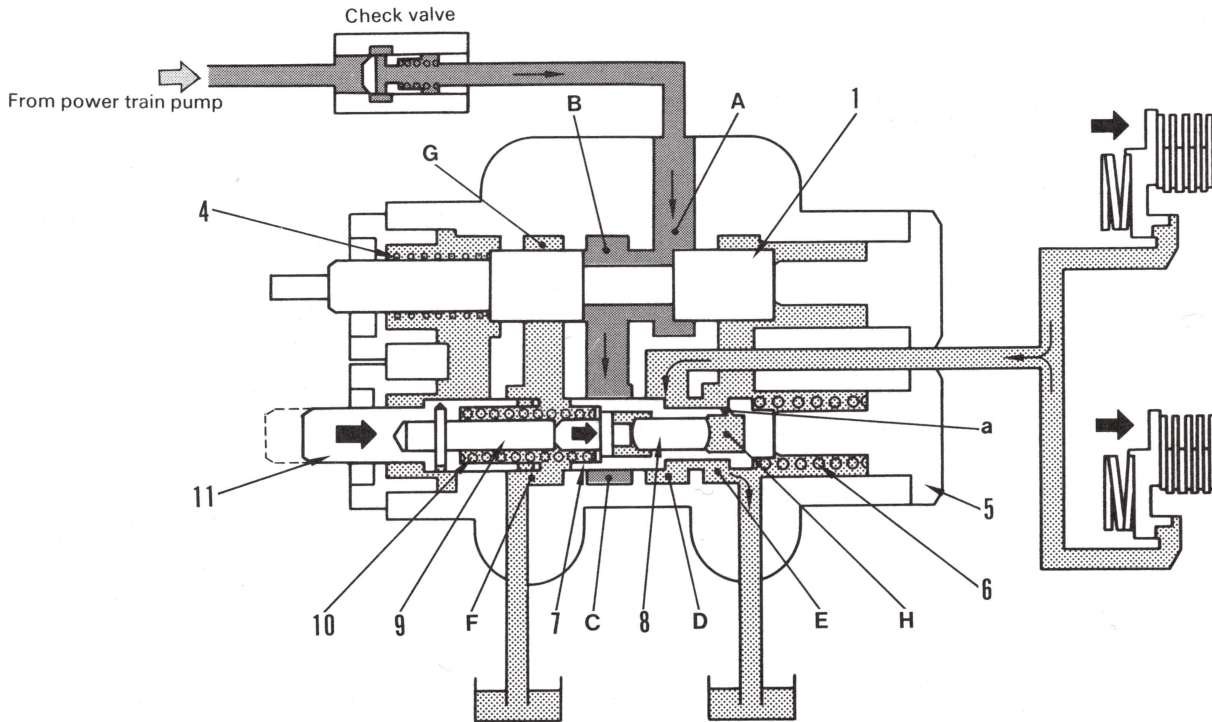
140F12049



B - B

SJD04035

2. When brake is applied (parking brake OFF, brake pedal depressed)



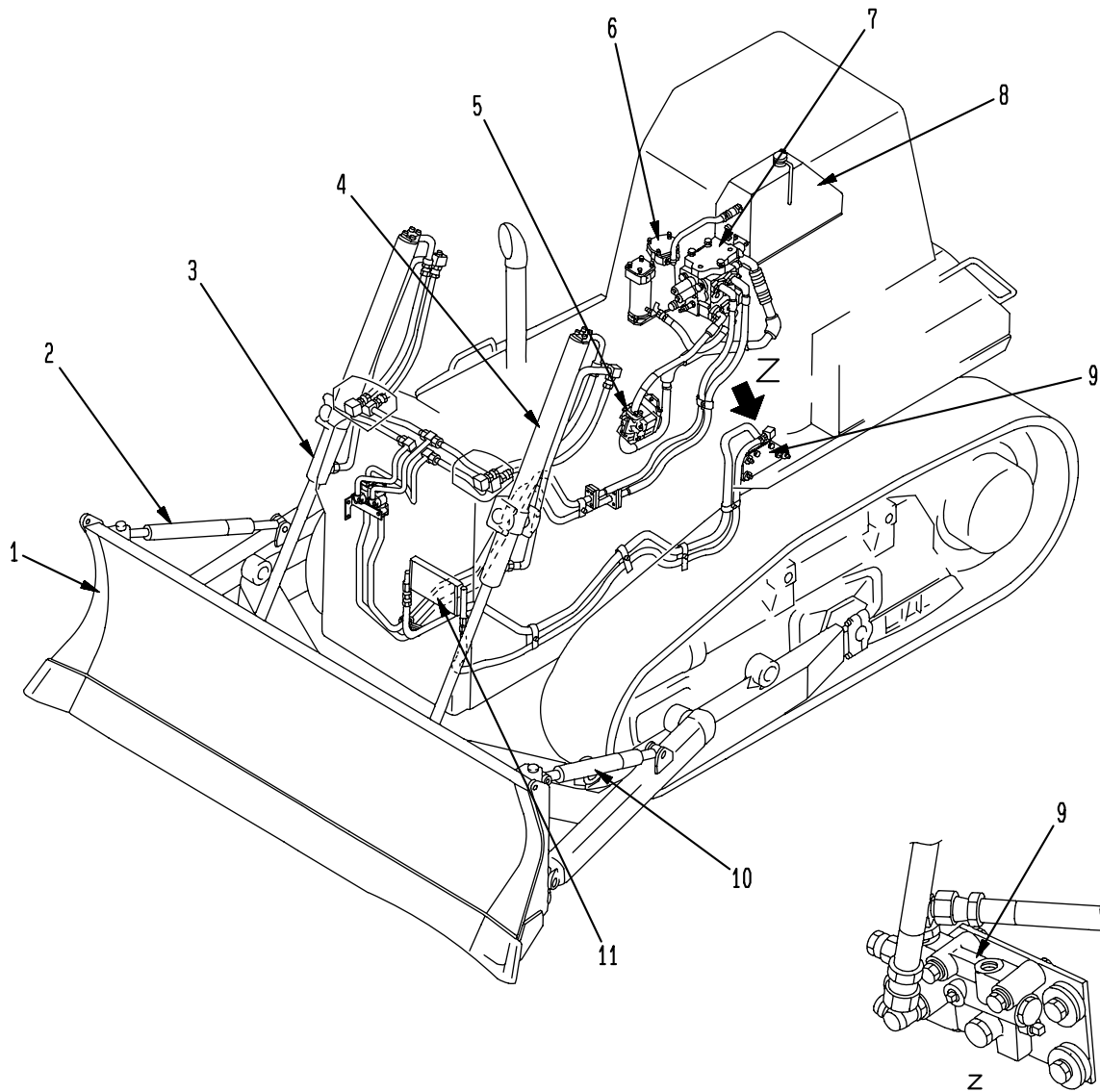
140F12086

- When the brake pedal is depressed, guide (11) and shaft (9) are pushed to the right in the direction of the arrow, and modulating spring (10) is compressed. The reaction force moves brake valve (7) to the right in the direction of the arrow. When this happens, ports C and D are closed, and port D and drain port E are opened, so the oil from the power train pump enters port A and stops at port C. Some of the oil flowing into the brake piston port and forming the back pressure is drained from port D and port E, and the rest of the oil passes from port D through orifice a and enters port H. However the oil beyond port D is drained to port E, so the oil pressure drops. The oil entering port H pushes piston (8) and the reaction force pushing brake valve (7) to the right in the direction of the arrow becomes smaller, so brake valve (7) is moved to the left in the direction of the arrow by the tension of return spring (6). This closes ports D and E, so the oil pressure beyond port D does not drop any further and is maintained at the same level.

- If the brake pedal is depressed further, the above operation is repeated, and when the valve reaches the end of its stroke, the brake is completely applied.
- The oil pressure beyond port D is determined by the tension of return spring (6), which changes the load according to the amount that the brake pedal is operated. Therefore, is the brake pedal is depressed only a short distance, the oil pressure beyond port D is set at a high level, and the brake is partially applied. If the brake pedal is depressed a large amount, the oil pressure is set at a low level and the brake is applied.

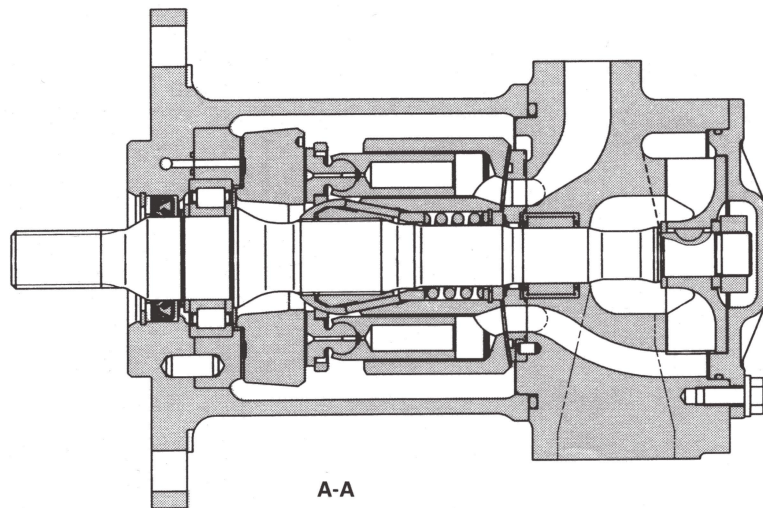
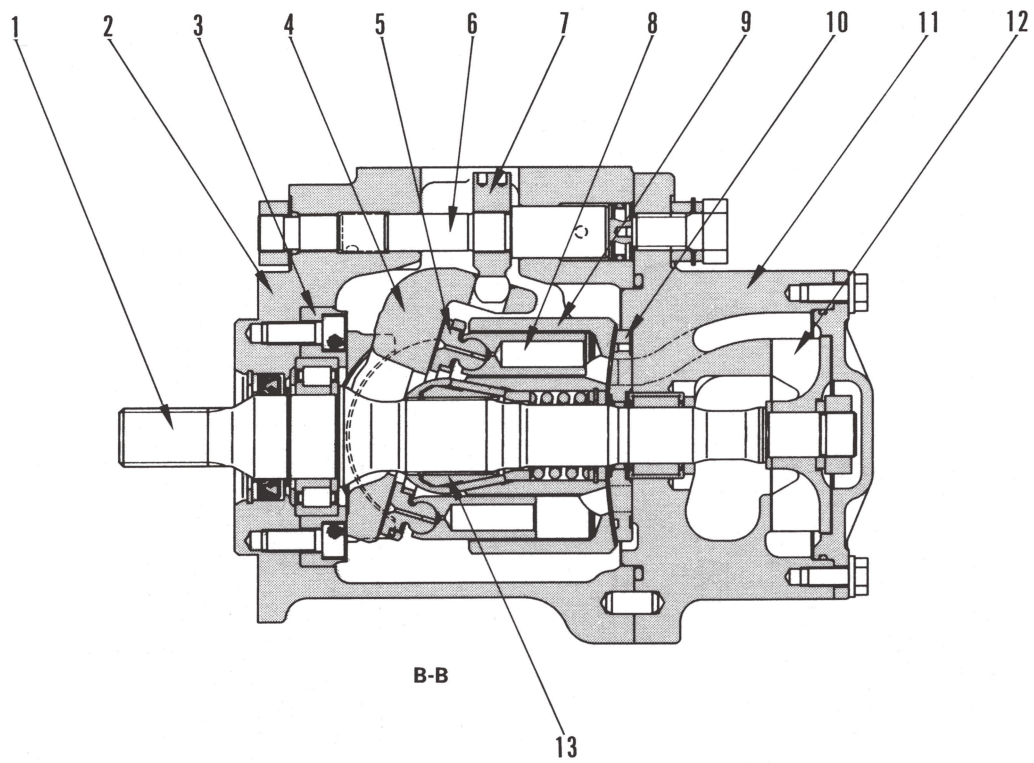
WORK EQUIPMENT HYDRAULIC PIPING DIAGRAM

ANGLEDOZER



SWD04750

1. Blade
2. Right brace
3. Right lift cylinder
4. Left lift cylinder
5. Hydraulic pump (SAL(1)-100)
6. Oil filter
7. Main control valve
8. Hydraulic tank
9. PPC charge valve
10. Left brace
11. Oil cooler



140F12116

- 1. Shaft
- 2. Case
- 3. Cradle
- 4. Rocker cam
- 5. Shoe
- 6. Servo piston
- 7. Rod

- 8. Piston
- 9. Cylinder block
- 10. Valve plate
- 11. End cap
- 12. Impeller
- 13. Spline

(2) Operation of variable throttle valve

1) Properties of variable throttle valve

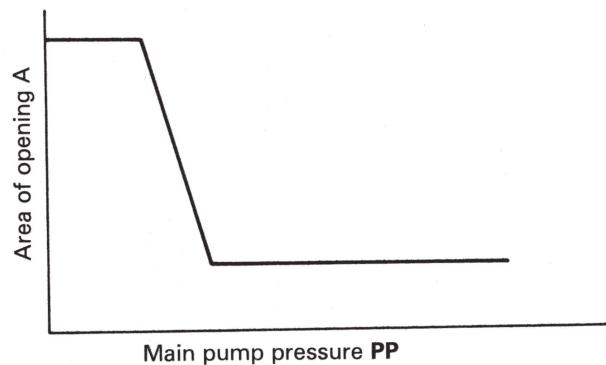
- Because the main pump controls its own pressure, there is a tendency for the response speed of the swash plate to be quick at high pressure and slow at low pressure.

The variable throttle valve has been installed between the **LS** valve and the port at the large diameter end of the servo piston for the following reasons.

- ① To reduce the swash plate speed between MIN and MAX at high pressure; to reduce the impact force on the rod and other parts of the main pump; and to prevent excessive response.
- ② To prevent cavitation at the suction port caused by the sudden increase in the suction volume when changing from MIN to MAX.

- The characteristics of the variable throttle valve are as shown in the diagram below.

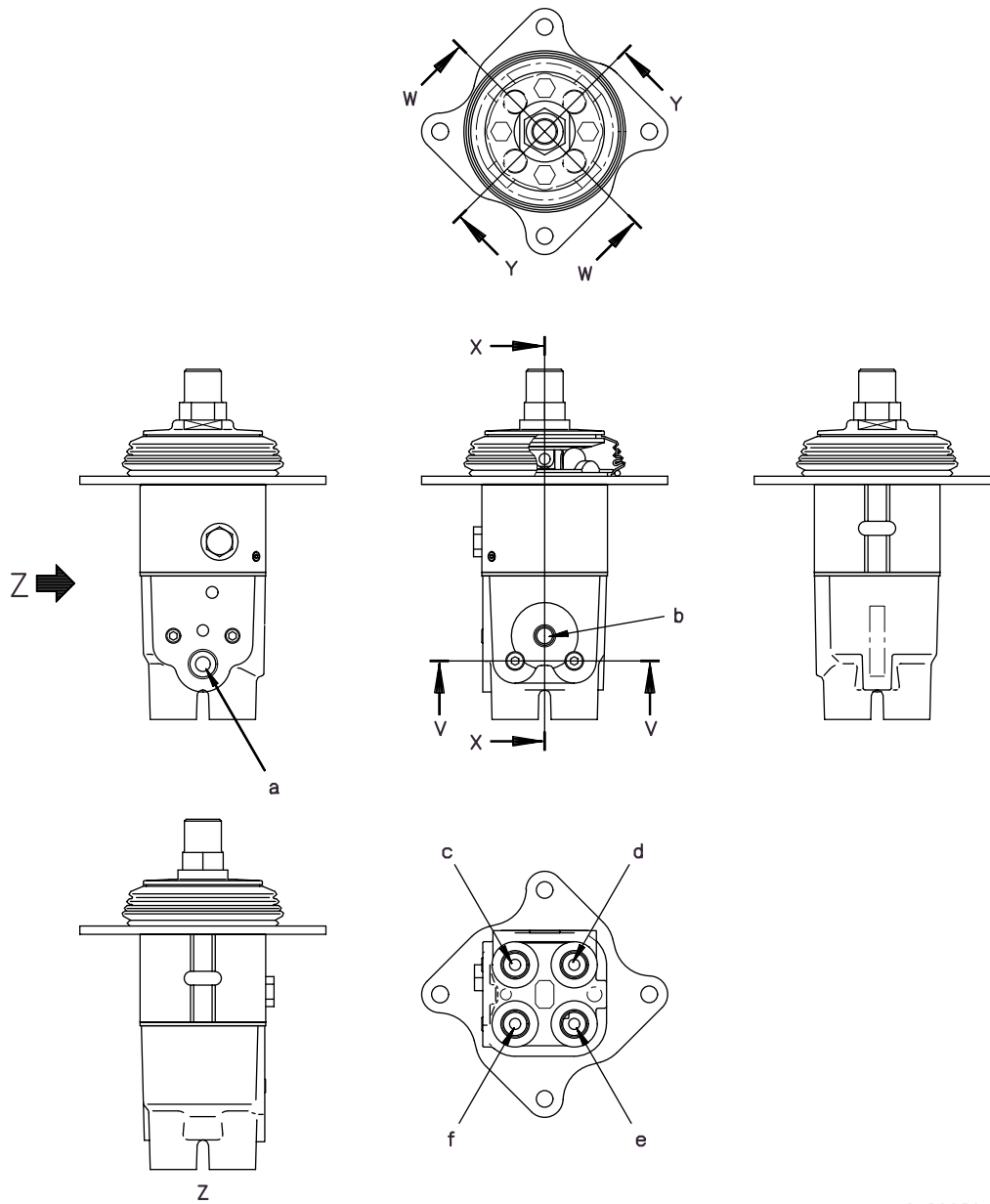
It has the function and property of maintaining the response during operations at low pressure by making the area of the opening smaller at high pressure and the area of the opening larger at low pressure, and by preventing the above problems ① and ② at high pressure.



140F12128

PPC VALVE

For blade lift, tilt

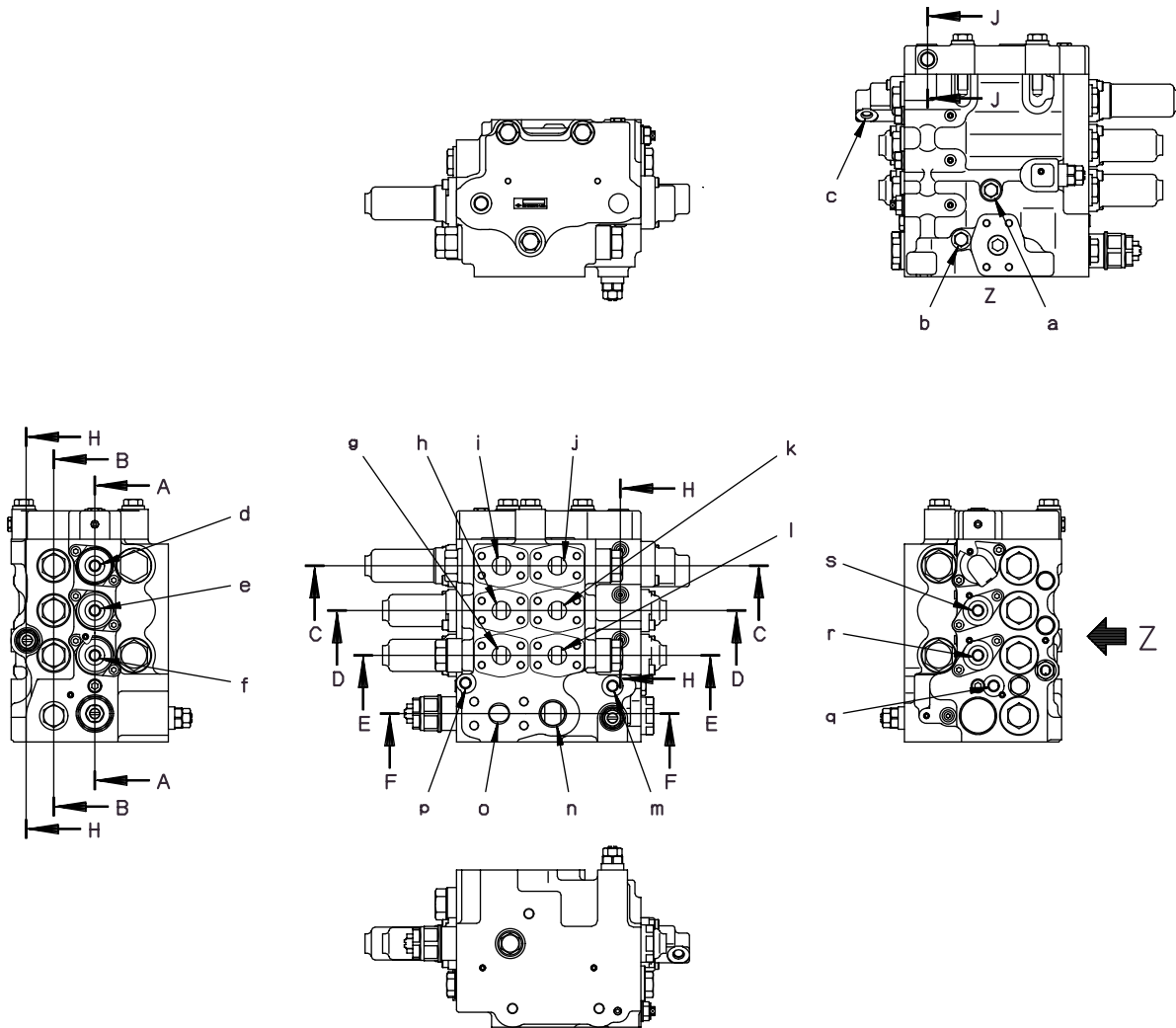


SKD00534

- a. Port **P** (from port **P1** of PPC charge valve)
- b. Port **T** (to tank)
- c. Port **P2** (to port **PB3** of blade lift valve)
- d. Port **P4** (to port **PB2** of blade tilt valve)
- e. Port **P1** (to port **PA3** of blade lift valve)
- f. Port **P3** (to port **PA2** of blade tilt valve)

MAIN CONTROL VALVE

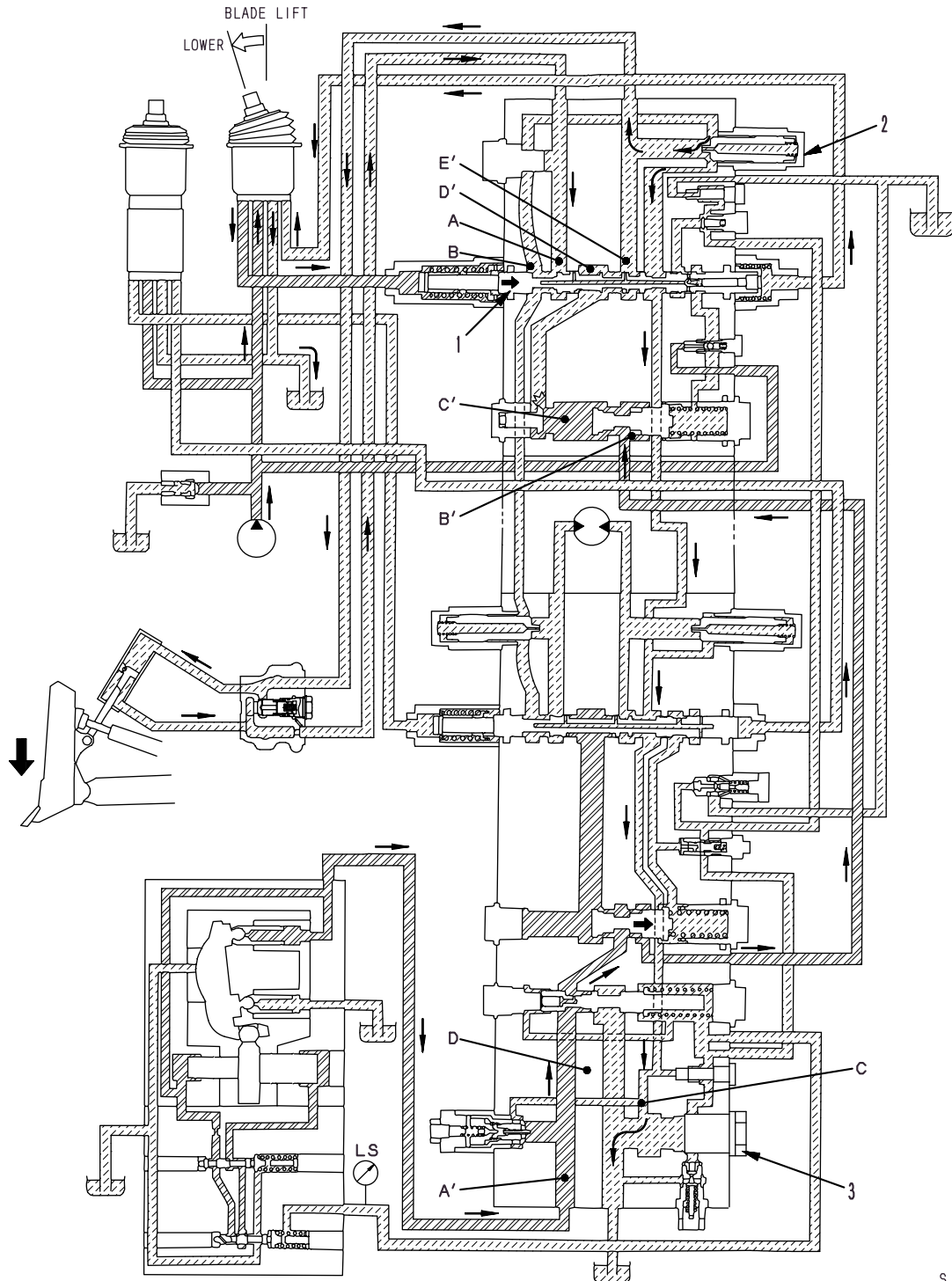
(3-SPOOL VALVE: BLADE LIFT + TILT + STEERING)



- a. Port **PC** (pump pressure plug)
- b. Port **PLSC** (LS pressure plug)
- c. Port **PB3** (from PPC valve)
- d. Port **PA3** (from PPC valve)
- e. Port **PA2** (from PPC valve)
- f. Port **PA1** (from PPC valve)
- g. Port **A1** (to HSS motor)
- h. Port **A2** (to tilt cylinder bottom)
- i. Port **A3** (to lift cylinder head)
- j. Port **B3** (to lift cylinder bottom)
- k. Port **B2** (to tilt cylinder head)
- l. Port **B1** (to HSS motor)
- m. Port **LS** (to pump LS valve)
- n. Port **T** (to tank)
- o. Port **P** (from pump)
- p. Port **TS** (to tank)
- q. Port **Pi** (from PPC pump)
- r. Port **PB1** (from PPC valve)
- s. Port **PB2** (from PPC pump)

SKD00558

(3) Meter-out control when blade moves down under its own weight

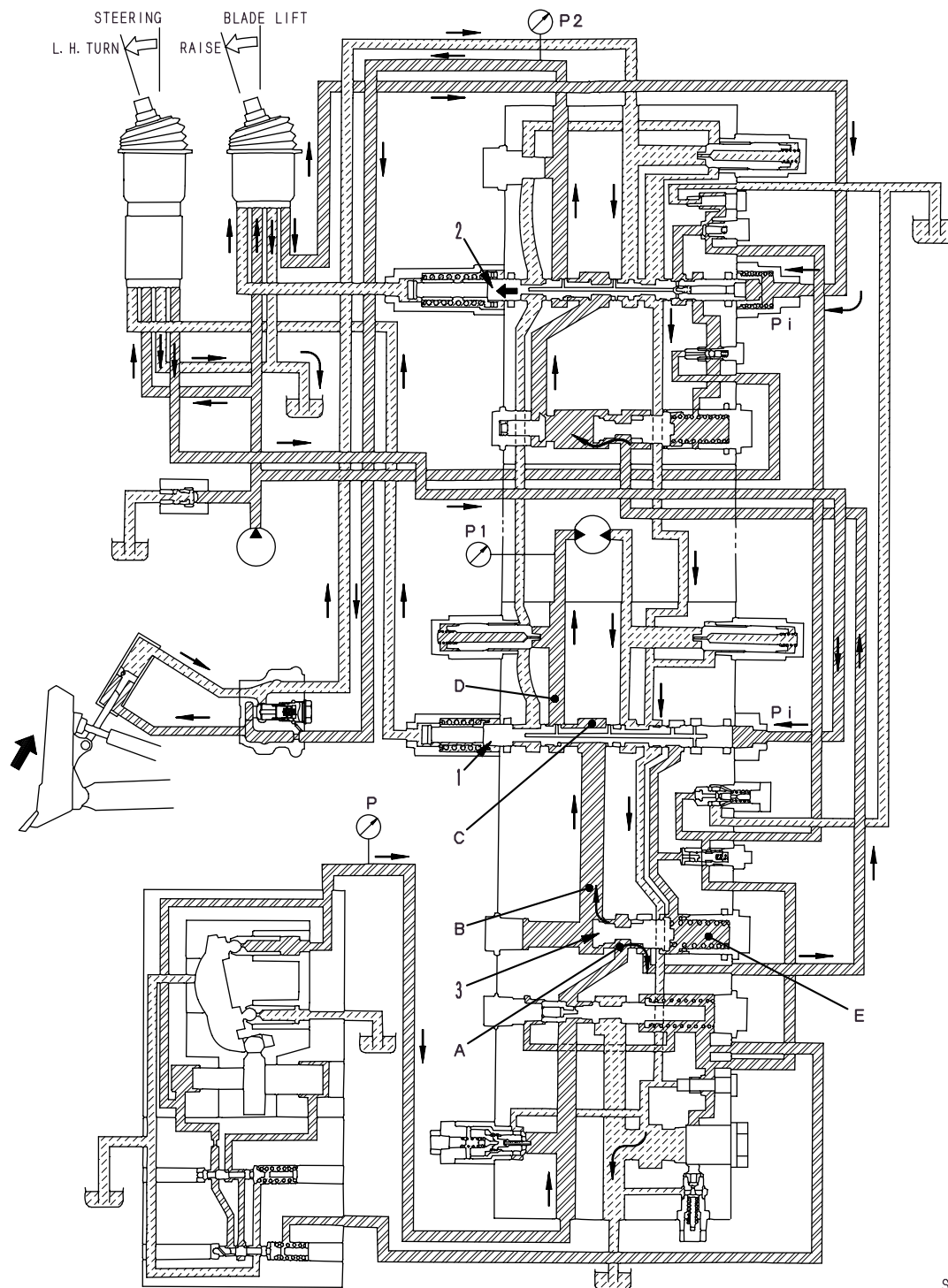


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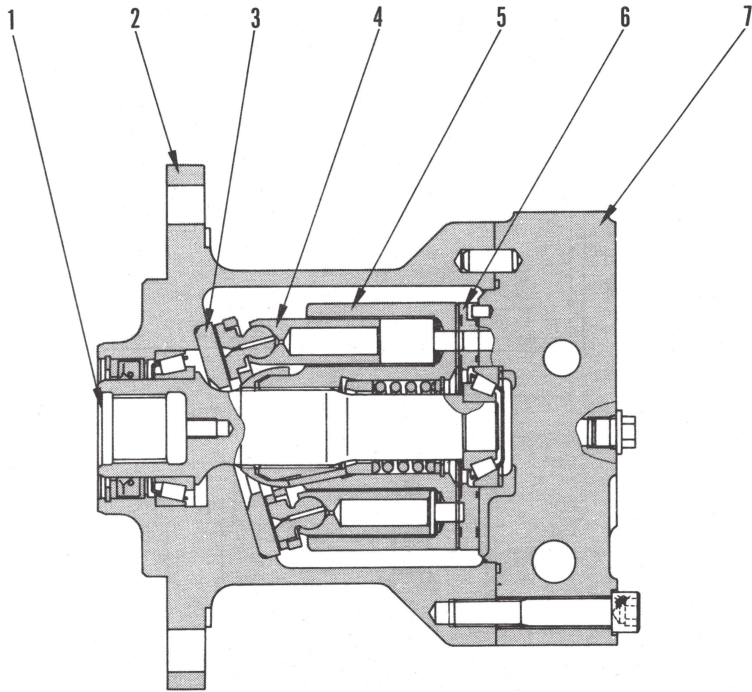
4. Compound operations

(1) Steering valve + work equipment valve

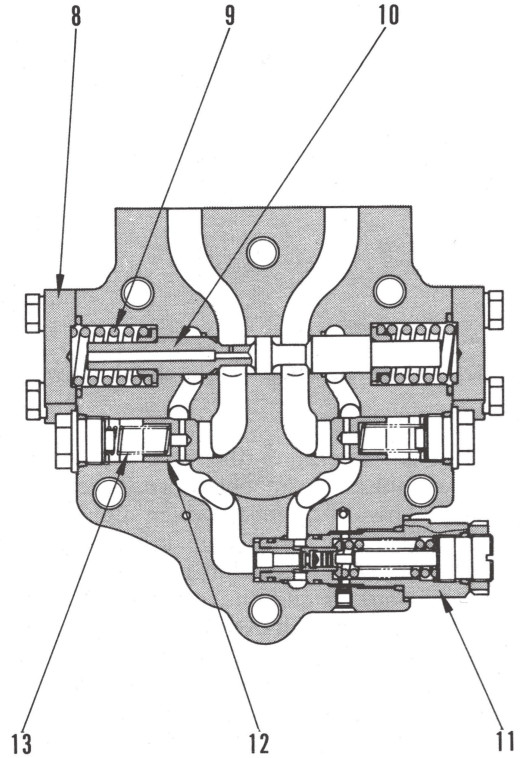
- ★ The diagram shows the condition when the steering and blade lift valve are operated at the same time.



SJD04758



X - X



Y - Y

140F12186

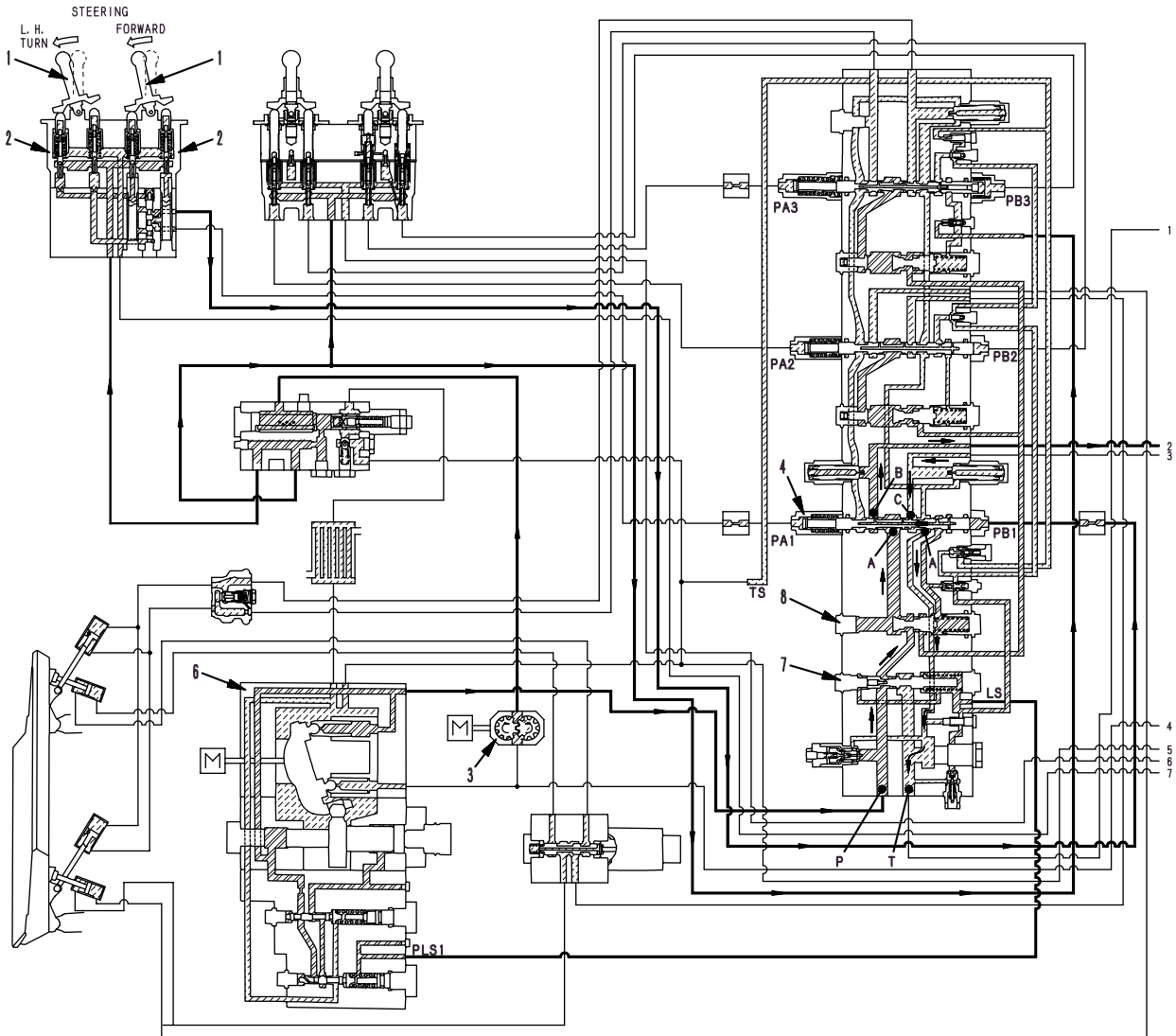
- 1. Output shaft
- 2. Motor case
- 3. Thrust plate
- 4. Piston
- 5. Cylinder
- 6. Valve plate

- 7. End cover
- 8. Brake valve assembly
- 9. Spool return spring
- 10. Counterbalance valve
- 11. Safety valve
- 12. Check valve
- 13. Check valve spring

STEERING

At FORWARD LEFT TURN

★ The diagram shows the D65PX-12.



SJD04767

Input and output signals DEUTSCH-24P [CN-EN1]

| Pin No. | Signal name | Input/Output signal |
|---------|-----------------------|---------------------|
| 1 | Battery direct (+24V) | Input |
| 2 | Battery direct (+24V) | Input |
| 3 | Type select 1 | Input |
| 4 | NC | — |
| 5 | NC | — |
| 6 | NC | — |
| 7 | GND (Power) | — |
| 8 | GND (Power) | — |
| 9 | NC | — |
| 10 | NC | — |
| 11 | NC | — |
| 12 | Pre-heater | Output |

DEUTSCH-40P [CN-EN2]

| Pin No. | Signal name | Input/Output signal |
|---------|----------------------------|---------------------|
| 1 | NC | — |
| 2 | NC | — |
| 3 | NC | — |
| 4 | RS-232C 1 RX | Input |
| 5 | NC | — |
| 6 | NC | — |
| 7 | NC | — |
| 8 | NC | — |
| 9 | Sensor power surplly (+5V) | Output |
| 10 | Fuel dial | Input |
| 11 | NC | — |
| 12 | CAN shield | — |
| 13 | NC | — |
| 14 | RS-232C 1 TX | Output |
| 15 | G Shield | — |
| 16 | Ne Shield | — |
| 17 | Fuel temperature sensor | Input |
| 18 | NC | — |
| 19 | Sensor power surplly (+5V) | Output |
| 20 | Boost pressure sensor | Input |

DEUTSCH-40P [CN-EN3]

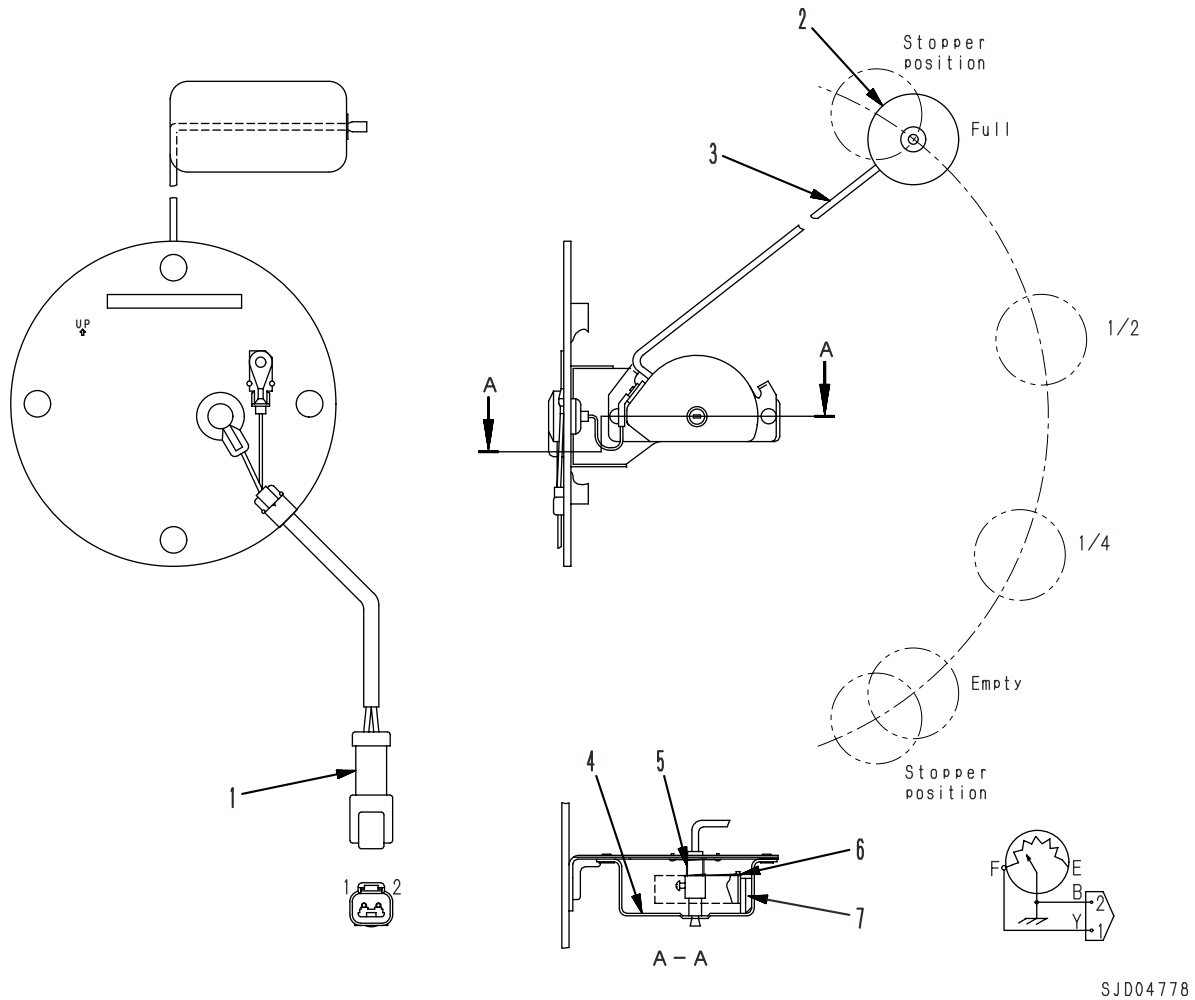
| Pin No. | Signal name | Input/Output signal |
|---------|-------------------------------------|---------------------|
| 1 | Power surplly (Injector, Feed pump) | — |
| 2 | Power surplly (Injector, Feed pump) | — |
| 3 | NC | — |
| 4 | NC | — |
| 5 | Injector3 (+) | Output |
| 6 | Injector2 (+) | Output |
| 7 | Transmission Neutral signal 1 | Input |
| 8 | NC | — |
| 9 | NC | — |
| 10 | NC | — |
| 11 | GND (Power) | — |
| 12 | Feed pump1 (+) | Output |
| 13 | Feed pump2 (+) | Output |
| 14 | Injector1 (+) | Output |
| 15 | Injector3 (-) | Output |
| 16 | Injector2 (-) | Output |
| 17 | Transmission Neutral signal 2 | Input |
| 18 | NC | — |
| 19 | NC | — |
| 20 | NC | — |

| Pin No. | Signal name | Input/Output signal |
|---------|-------------------------|---------------------|
| 13 | Key switch (ACC) | Input |
| 14 | NC | — |
| 15 | Engine oil pressure (H) | Input |
| 16 | NC | — |
| 17 | NC | — |
| 18 | NC | — |
| 19 | Key switch (ACC) | Input |
| 20 | Key switch (C) | Input |
| 21 | Engine oil pressure (L) | Input |
| 22 | NC | — |
| 23 | NC | — |
| 24 | NC | — |

| Pin No. | Signal name | Input/Output signal |
|---------|-----------------------------|---------------------|
| 21 | NC | — |
| 22 | CANO L | Input/Output |
| 23 | NC | — |
| 24 | Trigger | Input |
| 25 | G puls (-) | Input |
| 26 | Ne puls (-) | Input |
| 27 | Cooland temperature (H) | Input |
| 28 | NC | — |
| 29 | GND (Analog) | — |
| 30 | NC | — |
| 31 | NC | — |
| 32 | CANO H | Input/Output |
| 33 | NC | — |
| 34 | GND (232C) | — |
| 35 | G puls (+) | Input |
| 36 | Ne puls (+) | Input |
| 37 | Cooland temperature (L) | Input |
| 38 | Decel signal | Input |
| 39 | GND (Analog) | — |
| 40 | Common rail pressure sensor | Input |

| Pin No. | Signal name | Input/Output signal |
|---------|-------------------------------------|---------------------|
| 21 | Power surplly (Injector, Feed pump) | — |
| 22 | Feed pump1 | Output |
| 23 | Feed pump2 (-) | Output |
| 24 | Injector1 (-) | Output |
| 25 | Injector6 (-) | Output |
| 26 | Injector4 (-) | Output |
| 27 | NC | — |
| 28 | NC | — |
| 29 | NC | — |
| 30 | NC | — |
| 31 | GND (Power) | — |
| 32 | GND (Power) | — |
| 33 | Injector5 (+) | Output |
| 34 | Injector5 (+) | Output |
| 35 | Injector6 (-) | Output |
| 36 | Injector4 (-) | Output |
| 37 | NC | — |
| 38 | NC | — |
| 39 | NC | — |
| 40 | NC | — |

FUEL LEVEL SENSOR



SJD004778

- 1. Connector
- 2. Float
- 3. Arm

- 4. Body
- 5. Spring
- 6. Contact

- 7. Spacer

FUNCTION

- The fuel level sensor is installed to the center of front side of the fuel tank and its float (2) moves up and down according to the fuel level. The float operates the variable resistor through arm (3) and the signals are sent to the monitor panel to display the fuel level.

| D65PX-12 | | | | | |
|---------------------|-------------------|--|--|--|--|
| Standard value | Permissible value | | | | |
| Max. 100 | Max. 100 | | | | |
| Max. 200 | Max. 200 | | | | |
| Max. 200 | Max. 200 | | | | |
| — | — | | | | |
| $2.4^{+0.2}_{-0.5}$ | 2.9 | | | | |
| 1.4 ± 0.2 | 1.7 | | | | |

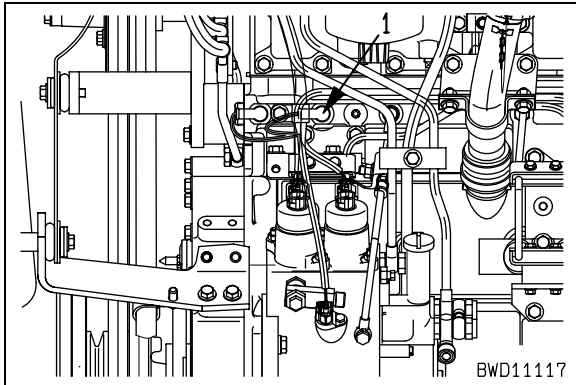
| Test measurement item | Symbol | Part No. | Part Name | Remarks |
|--|--------|------------------------|---------------|---------|
| Troubleshooting of wiring harness, sensor | L | 799-601-8000 | T-adapter kit | — |
| | | 799-601-9000 | T-adapter kit | |
| | | 799-601-9410 | Socket | |
| | | 799-601-9430 | Socket | |
| | | 799-601-9420 | Adapter | |
| | | 799-601-7100 | T-adapter kit | |
| Troubleshooting of voltage, resistance value | M | Commercially available | Tester | — |
| Measuring wear of sprocket tooth | P | 791-427-1220 | Wear gauge | — |

MEASURING ENGINE OIL PRESSURE

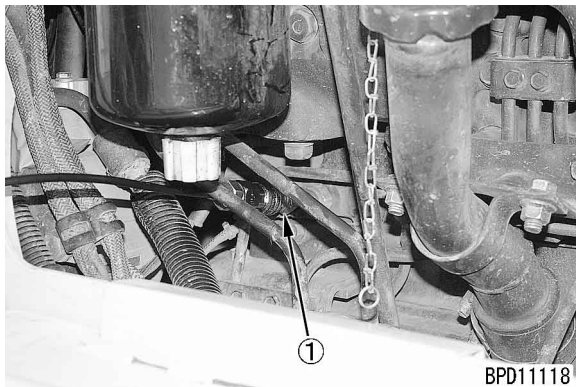
★ Measure the engine oil pressure under the following condition.

- Engine water temperature:
Within operating range

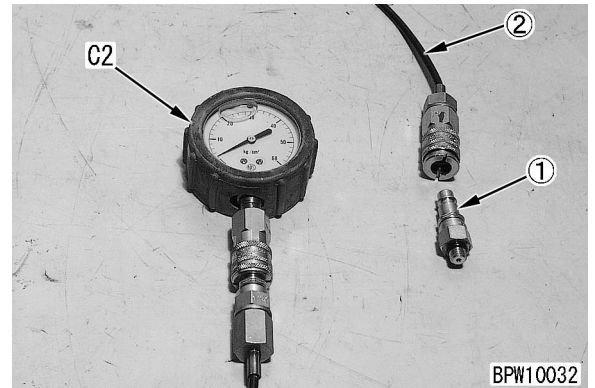
1. Remove low engine oil pressure switch (1).



2. Install nipple ① of hydraulic tester C1 and connect them to hydraulic tester C2.



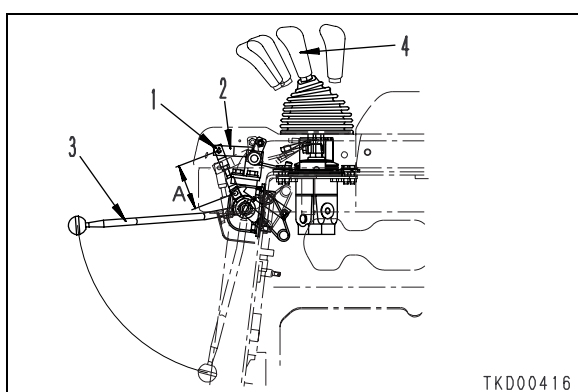
3. Run the engine at low idling and high idling and measure the engine oil pressure in each speed.



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

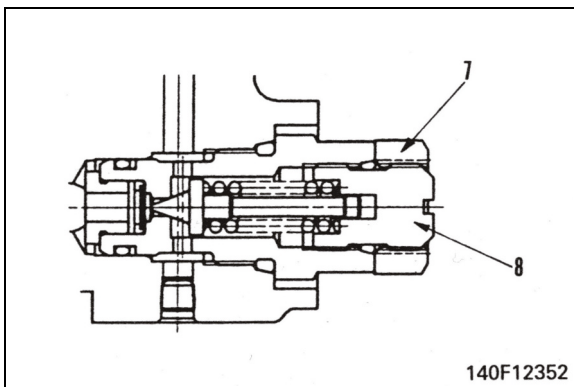
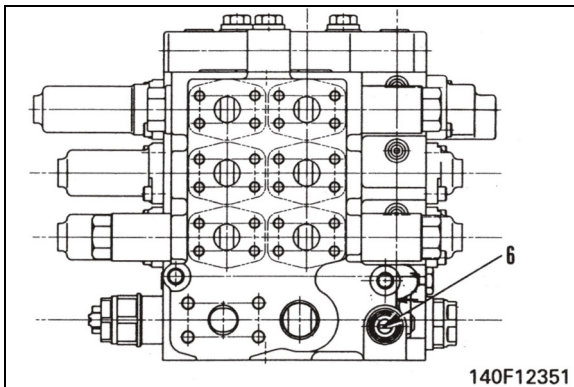
ADJUSTING WORK EQUIPMENT CONTROL LINKAGE

1. Set length of rod (1) to dimension **A**, and connect lever (2).
★ Dimension **A**: 83.5 mm
2. Move work equipment lock lever (3) from the FREE position to the LOCK position, and check that work equipment control lever (4) is returned from the FLOAT position to the HOLD position.
3. With work equipment lock lever (3) at the LOCK position, check that when work equipment control lever (4) is operated, work equipment lock lever (3) does not return to the FREE position.

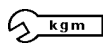


3. Adjusting steering load sensing relief valve (6) pressure

- Loosen locknut (7), and turn adjustment screw (8) as follows to adjust.

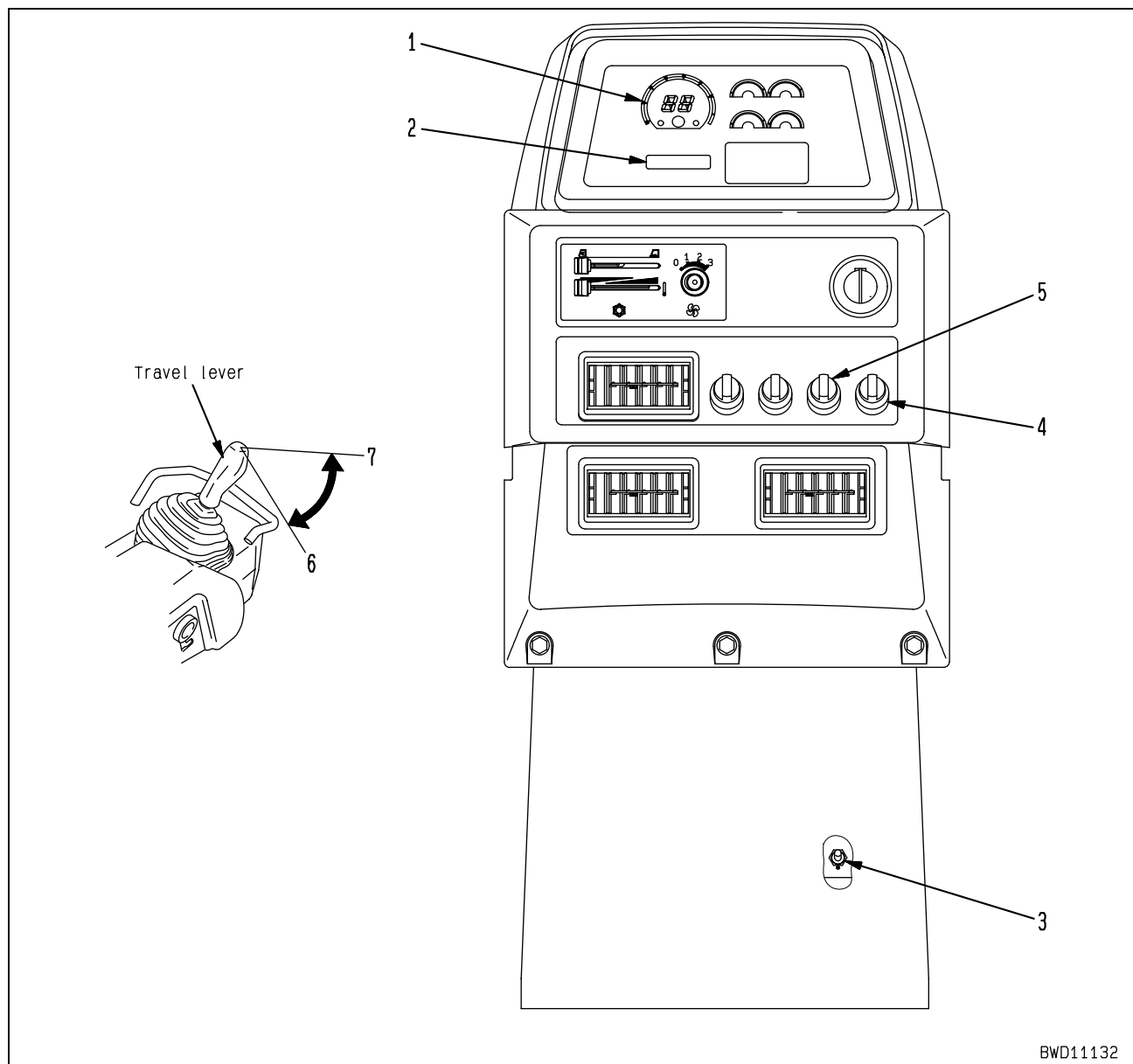


- ★ TO RAISE pressure, turn CLOCKWISE
TO LOWER pressure, turn COUNTER-CLOCKWISE
- ★ One turn of the adjustment screw adjusts the pressure by approx. 15.1 MPa (154kg/cm²).

 **kgm** Locknut: **73.6 ± 4.9 Nm**
(7.5 ± 0.5 kgm)

- ★ After adjusting, check the steering relief pressure and load sensing pressure again.

SPECIAL FUNCTIONS OF MONITOR PANEL (EMMS)



BWD11132

Display section of special functions

1. Upper display section
(Gear speed display section)
2. Lower display section
(Multi-information section)

Operation section 1 of special functions (Basic operation)

3. Service switch
4. Buzzer cancel switch

Operation section 2 of special functions (Change over operation)

5. Cursor switch
6. Shift-up operation
(2nd speed to 3rd speed)
7. Shift-down operation
(2nd speed to 1st speed)

★ **EMMS:** Equipment Management Monitoring System

4) Changing replacement interval time

i) Change the set time by operating information switch (5) and shift-up operation (6) (2nd to 3rd) or shift-down operation (7) (2nd to 1st).

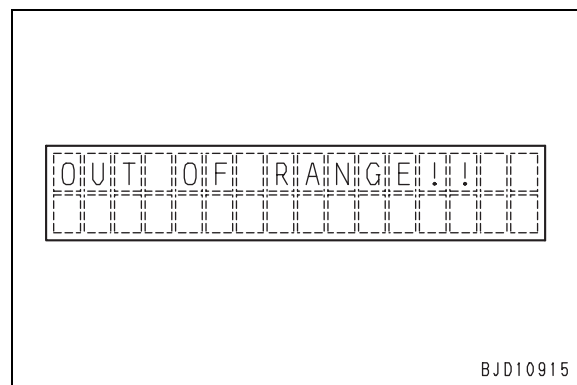
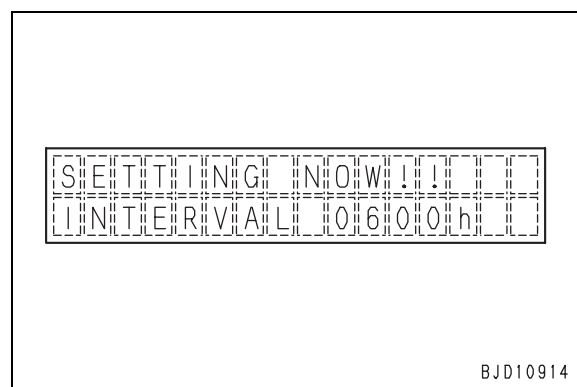
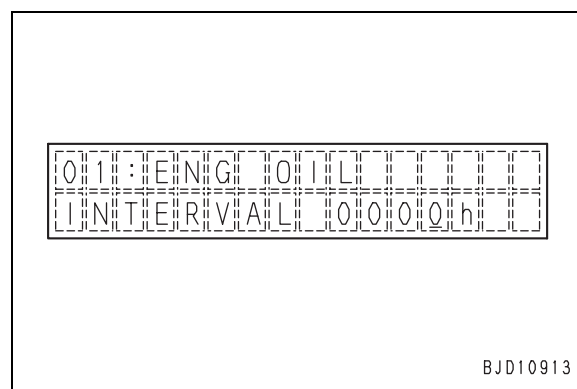
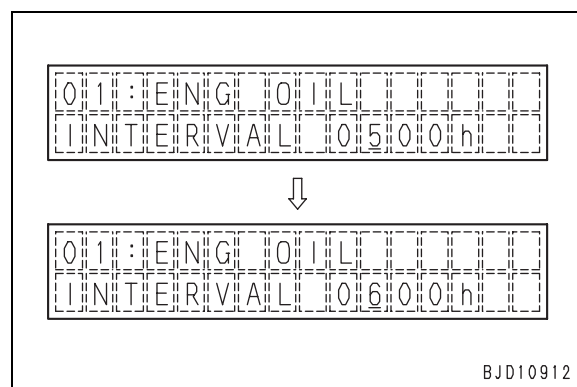
- [>]: Move cursor to right.
- [<]: Move cursor to left.
- [UP]: Increase number.
- [DOWN]: Decrease number.

★ If you do not use the maintenance function, set the all times to 0.

ii) If the input time is correct, enter the change of setting by operating buzzer cancel switch (4).

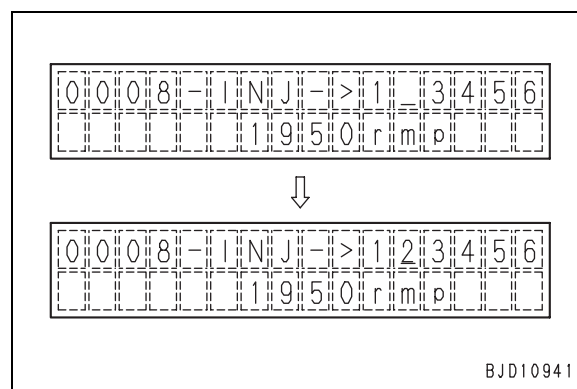
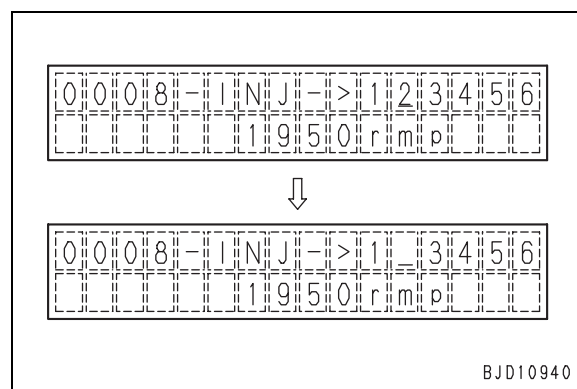
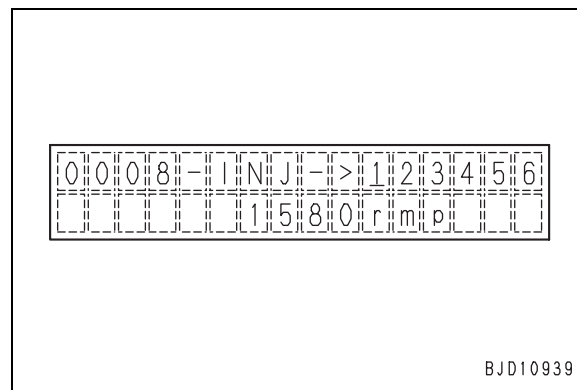
- [◇]: Enter change.
- ★ If the change is finished normally, the information display screen appears after the screen shown at right.

★ If the change is not finished normally, the information display screen before the change appears after the screen shown at right. In this case, execute the above operation again.



⑪ 0008:Common rail reduced cylinder mode

- ★ When the engine common rail system seems to be faulty, this code is used to stop injecting fuel into 1 or more cylinders (reduce the number of effective cylinders) while the engine is running and find out a faulty cylinder from the change of the engine speed.
- ★ Since a fault is detected by the difference of the engine speed in the reduced cylinder mode operation from that in the normal mode operation, use this function while the engine is running.
- The engine speed is displayed on the lower line (Display range: 0 – 3000).
- Using method:
 - Select the cylinders to be turned off for the reduced cylinder mode operation by operating information switch (5) and buzzer cancel switch (4).
 - Use this method to turn on the selected cylinders again, too.
 - [>]: Move cursor to right.
 - [<]: Move cursor to left.
 - [◇]: Execute or stop reduced cylinder mode operation.
- ★ The figure at right is an example that No. 2 cylinder is turned off for reduced cylinder mode operation and turned on again (The cylinder No. lamp is turned off in the reduced cylinder mode operation and on in the normal mode operation).
- ★ Only one or more cylinders can be turned off for the reduced cylinder mode operation.
- ★ If this code is turned off, its function is turned off.

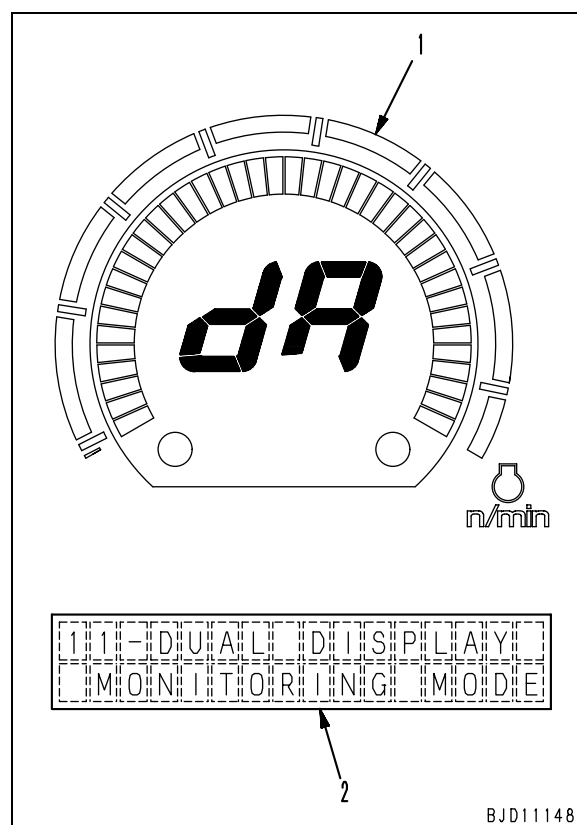


11. Dual display monitoring mode (11-DUAL DISPLAY MONITORING MODE)

In this mode, 2 monitored items can be displayed simultaneously.

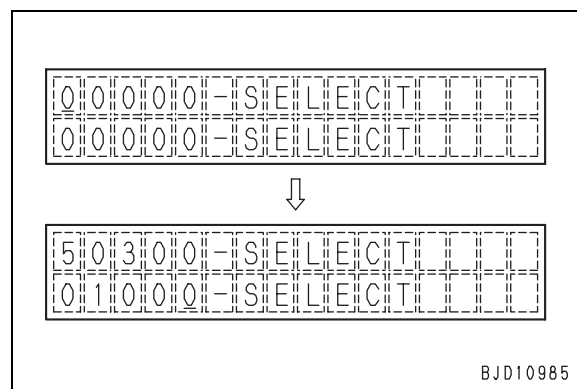
- ★ Note that only codes and monitoring information are displayed in this mode since the usable display columns are limited. (Item names and units cannot be displayed.)

- 1) Selecting and executing mode
 - i) Select "Dual display monitoring mode" on the mode selection screen.
 - ★ If the mode is selected, code (dR) is displayed on gear speed display section (1) and the title is displayed on multi-information section (2).
 - ii) Display the monitoring code input screen by operating buzzer cancel switch (4).
 - [\diamond]: Execute mode.

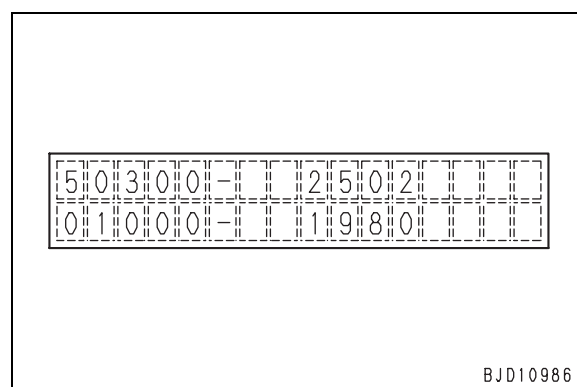


BJD11148

- 2) Selecting and entering monitored items
 - i) On the code input screen, input the 5-digit codes of the items to be monitored to the upper and lower lines by operating information switch (5), shift-up operation (2nd to 3rd) (6), and shift-down operation (2nd to 1st) (7).
 - [$>$]: Move cursor to right.
 - [$<$]: Move cursor to left.
 - [UP]: Increase number.
 - [DOWN]: Decrease number.
 - ii) After inputting the codes, display the monitoring screen by operating buzzer cancel switch (4).
 - [\diamond]: Enter input code.
 - ★ If the input codes are normal, the monitoring screen shown at right appears.



BJD10985



BJD10986

2) Removing, installing, and drying connectors and wiring harnesses

• Disconnecting connectors

① Hold the connectors when disconnecting. When disconnecting the connectors, hold the connectors and not the wires. 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

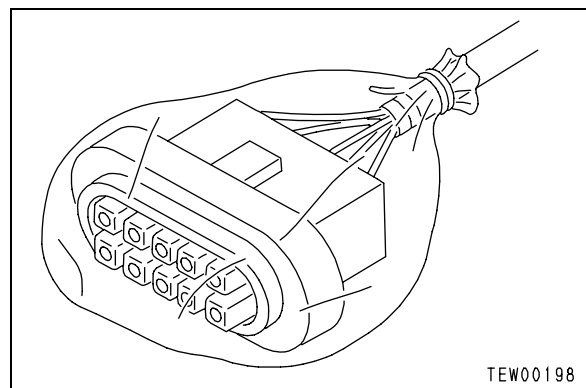
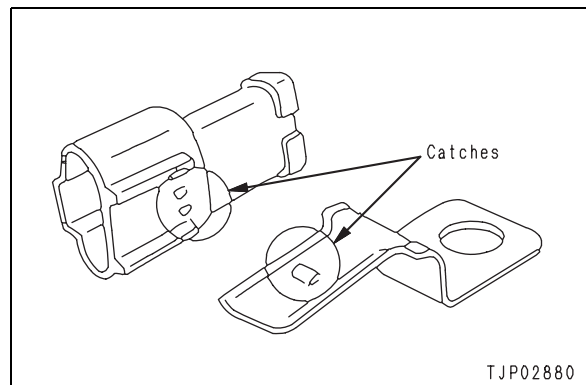
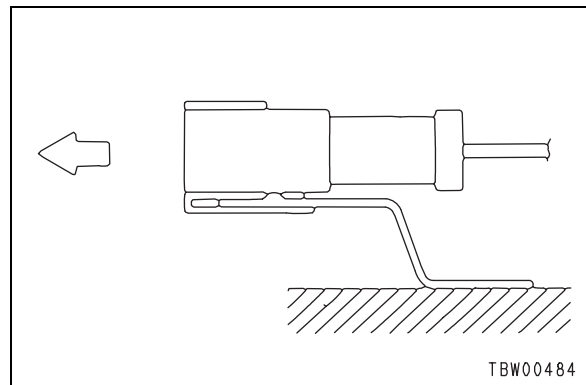
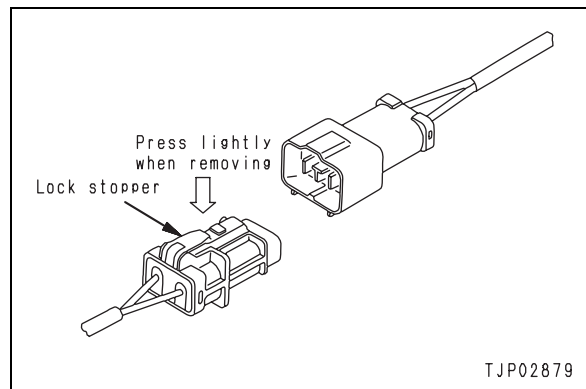
When removing a connector from a clip, pull the connector in a parallel direction to the clip.

★ 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.



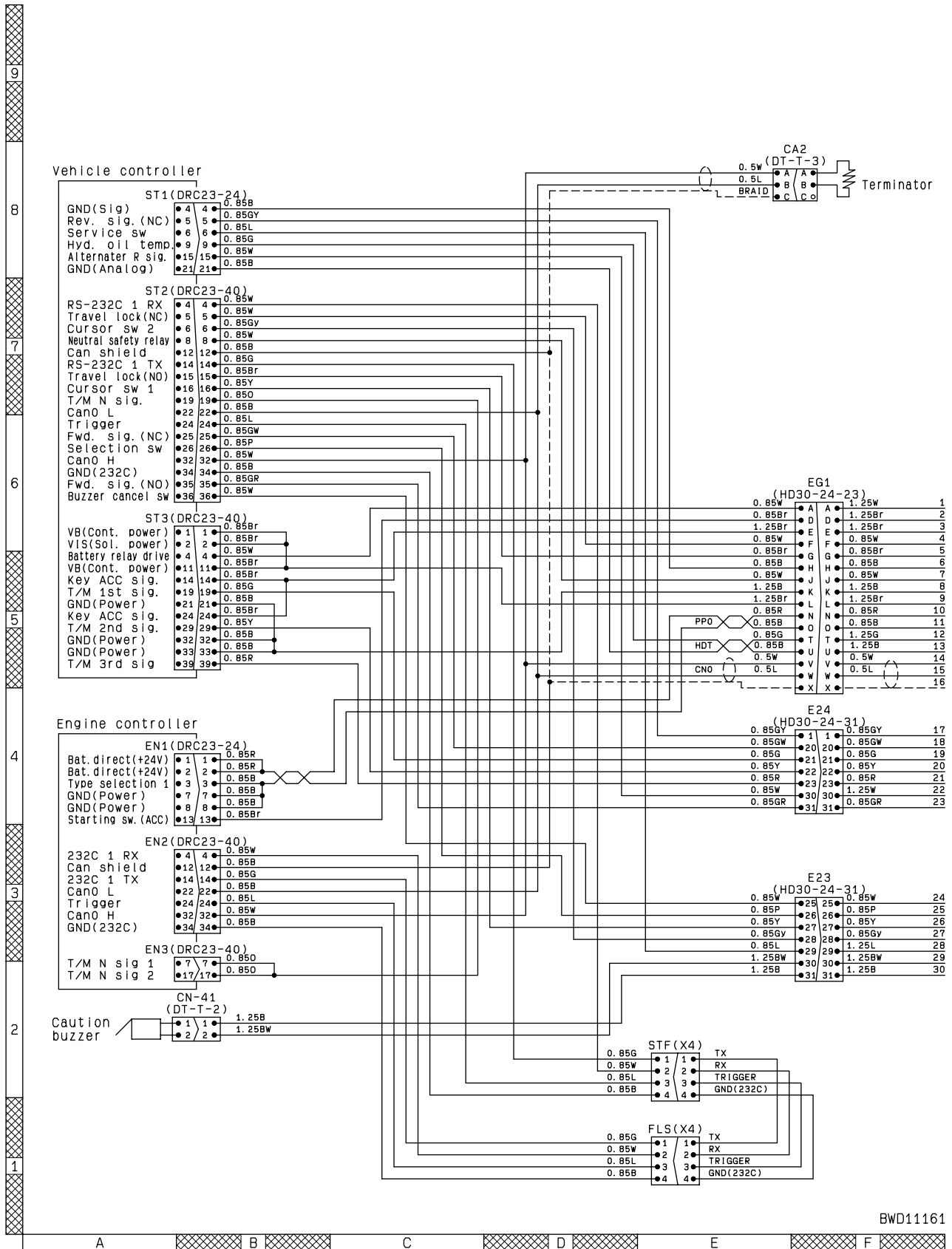
CONNECTOR ALLOCATION DRAWING AND ELECTRICAL CIRCUIT DIAGRAM FOR EACH SYSTEM

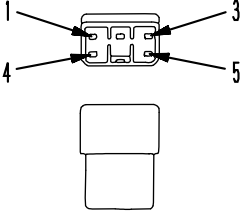
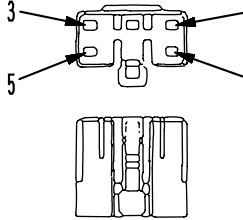
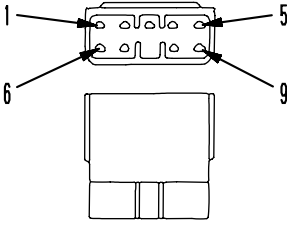
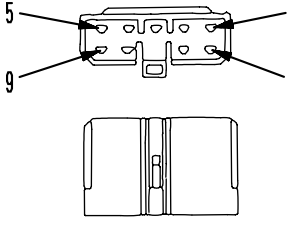
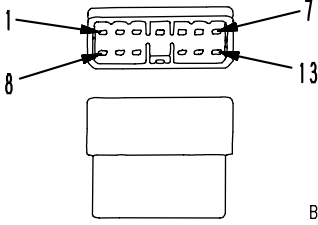
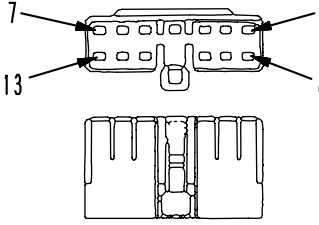
TABLE OF CONNECTORS

★ Addresses show approximate positions of these devices in single view layout drawings of connectors and electrical circuit diagrams of each system.

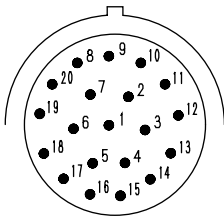
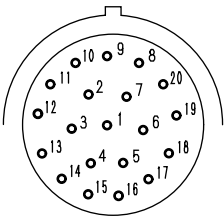
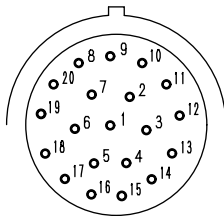
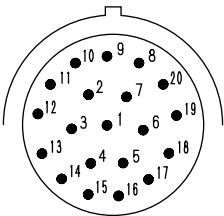
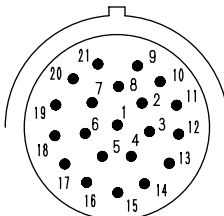
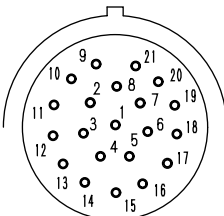
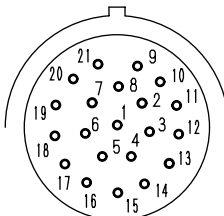
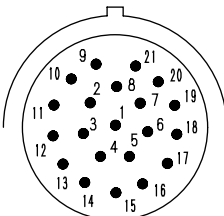
| Connector No. | Type of connector | Number of pins | Device name | Address | | | | |
|---------------|-------------------|----------------|--|-----------------------|---------------------------|----------------------------|-----------------------|----------------|
| | | | | 3-dimensional drawing | Engine controller circuit | Machine controller circuit | Monitor panel circuit | Others circuit |
| BUZ | KES | 3 | Buzzer switch | D8 | | | K8 | |
| CN1 | DT | 2 | Rear lamp | K8 | | | | K9 |
| CN2 | DT | 2 | Rear lamp (Additional) | K8 | | | | K8 |
| CN3 | DT | 2 | Fuel level sensor | L7 | B2 | | | |
| CN4 | SWP | 6 | Intermediate connector (Rear lamp, sensor) | C2 | C2 | | K6 | J5 |
| CN5 | DT | 2 | Left headlamp | G8 | B4 | | | A6 |
| CN6 | DT | 2 | Right headlamp | E2 | B5 | | | A7 |
| CN7 | 090 II | 2 | Horn | E1 | | | | A7 |
| CN8 | DT | 3 | Intermediate connector (Headlamp, horn) | H1 | C4 | | | C6 |
| CN9 | KES | 2 | Left window washer | G8 | | | | A9 |
| CN10 | KES | 2 | Right window washer | G8 | | | | A9 |
| CN11 | KES | 2 | Front window washer | G9 | | | | A8 |
| CN12 | KES | 2 | Rear window washer | H9 | | | | A8 |
| CN13 | SWP | 6 | Intermediate connector (Window washer) | I2 | | | | C8 |
| CN17 | DT | 4 | Intermediate connector (Starting motor, heater) | Q8 | I4 | H6 | | J4 |
| CN22 | DT | 2 | Horn switch | H9 | | | | G8 |
| CN23 | DT | 2 | Travel lock switch | A3 | F8 | K1 | | I8 |
| CN24 | DTHD #12 | 1 | Service power source | A2 | | | | |
| CN25 | DTHD #12 | 1 | Cab usual power source | A2 | | | | |
| CN26 | DT | 4 | Intermediate connector (Window washer switch) | A1 | | | | C8 |
| CN27 | DT | 3 | Back-up alarm switch | K3 | | | K3 | I8 |
| CN28 | DT | 2 | Torque converter oil temperature switch | K3 | B4 | | | |
| CN29 | DT | 2 | Pitch operation switch | H9 | | | | G8 |
| CN30 | DT | 4 | Intermediate connector (Monitor, switch) | A8 | E6 | J8 | I6 | |
| CN31 | SWP | 12 | Intermediate connector (Monitor) | A8 | E8 | J9 | H6 | |
| CN32 | SWP | 12 | Intermediate connector (Panel, switch) | A8 | E6 | J9 | J6 | F5 |
| CN33 | DT | 4 | Intermediate connector (Air conditioner) | A7 | E5 | J9 | J6 | F5 |
| CN34 | SWP | 2 | Diode (Air conditioner switch) | D7 | | | | B3 |
| CN36 | KES | 4 | Magnet relay (Air conditioner) | A7 | | | | B2 |
| CN37 | KES | 4 | Blower relay (Air conditioner) | A6 | | | | B5 |
| CN39 | KES | 3 | Blower resister (Air conditioner) | C6 | | | | B4 |
| CN41 | DT2 | 2 | Caution buzzer | L6 | K3 | | B2 | |
| CN43 | KES | 4 | Thermostat, dial pressure switch (Air conditioner) | D7 | | | | B1 |
| CN44 | KES | 4 | Blower switch (Air conditioner) | B9 | | | | B4 |
| CN45 | KES | 3 | Air conditioner switch | B9 | | | | B3 |
| CN47 | KES | 4 | Rear lamp switch | D7 | | | | F8 |
| CN48 | KES | 4 | Headlamp switch | D7 | | | | E8 |

CIRCUIT DRAWING FOR MONITOR PANEL SYSTEM



| Number of Pins | MIC Type Connector | | |
|----------------|---|--|-----------------------|
| | Male (Female housing) | Female (Male housing) | T-adapter Part Number |
| 7 | Body part number: 79A-222-2640 (Quantity: 5 pieces) | Body part number: 79A-222-2630 (Quantity: 5 pieces) | — |
| 11 | Body part number: 79A-222-2680 (Quantity: 5 pieces) | Body part number: 79A-222-2670 (Quantity: 5 pieces) | — |
| 5 |  <p>BWP04741</p> |  <p>BWP04742</p> | 799-601-2710 |
| | Body part number: 79A-222-2620 (Quantity: 5 pieces) | Body part number: 79A-222-2610 (Quantity: 5 pieces) | |
| 9 |  <p>BWP04743</p> |  <p>BWP04744</p> | 799-601-2950 |
| | Body part number: 79A-222-2660 (Quantity: 5 pieces) | Body part number: 79A-222-2650 (Quantity: 5 pieces) | |
| 13 |  <p>BWP04745</p> |  <p>BWP04746</p> | 799-601-2720 |
| | Body part number: 79A-222-2710 (Quantity: 2 pieces) | Body part number: 79A-222-2690 (Quantity: 2 pieces) | |

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

| Type (shell size code) | HD30 Series connector | | |
|---|--|--|--------------------------|
| | Body (plug) | Body (receptacle) | T-adapter Part Number |
| 18-20 (3) | Pin (male terminal) | Pin (female terminal) | 799-601-9230 |
| |  BWP05009 |  BWP05010 | |
| | Part number: 08191-31201, 08191-31202 | Part number: 08191-34101, 08191-34102 | |
| | Pin (female terminal) | Pin (male terminal) | 799-601-9230 |
|  BWP05011 |  BWP05012 | | |
| | Part number: 08191-32201, 08191-32202 | Part number: 08191-33101, 08191-33102 | |
| 18-21 (4) | Pin (male terminal) | Pin (female terminal) | 799-601-9240 |
| |  BWP05013 |  BWP05014 | |
| | Part number: 08191-41201, 08191-42202 | Part number: 08191-44101, 08191-44102 | |
| | Pin (female terminal) | Pin (male terminal) | 799-601-9240 |
|  BWP05015 |  BWP05016 | | |
| | Part number: 08191-42201, 08191-42202 | Part number: 08191-43101, 08191-43102 | |

Related circuit diagram

This is the excerpted circuit diagram related to trouble

- Connector No.: Indicates (Model-No. of pins) (Color).
- Arrow (⇒): Roughly indicates mounting place on machine.

TROUBLE CODE TABLE

★ Regarding trouble code provided with instruction “Refer to table”, check it against table below.

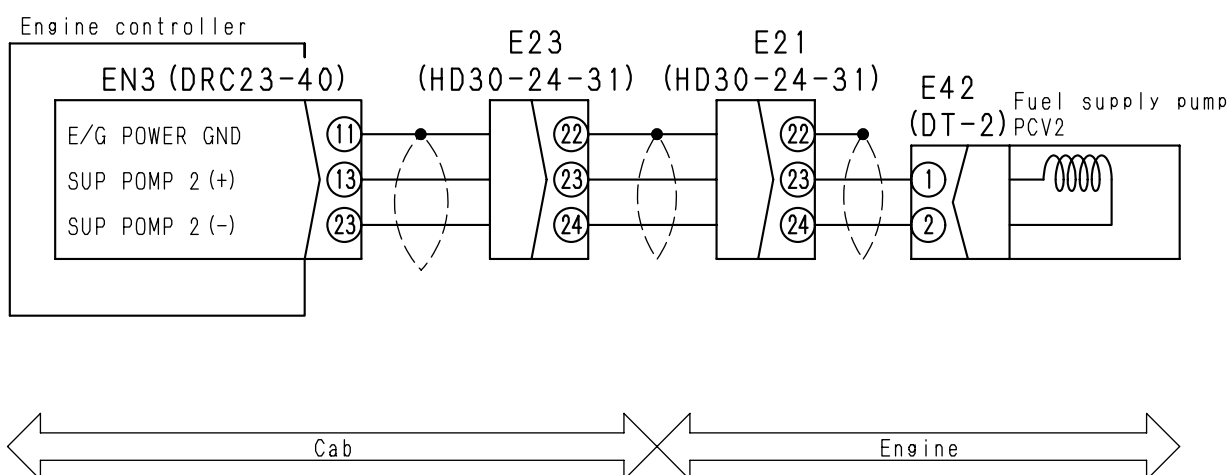
| Trouble code | Contents of trouble | Trouble code | Contents of trouble |
|--------------|------------------------------------|--------------|---|
| KA | Disconnection in wiring | L0 | Fill signals at two or more channels which are not set as combination are turned ON at the same time. |
| KB | Short circuit | L1 | Fill signal is ON when command current to ECMV is OFF. |
| KK | Source voltage reduction/ input | L2 | Fuel pressure is above maxim specified value. |
| KQ | Type select signal inconsistency | L3 | Object part is uncontrollable. |
| KR | Defective communication | L4 | ON and OFF signals at two systems are inconsistent. |
| KT | Abnormality in controller | L6 | Engine rotation signal, terminal C signal, oil pressure switch signal, water temperature sensor signal, etc. are inconsistent with operation state or stop state. |
| KX | Outside input signal range | L8 | Analog signals in two systems are inconsistent. |
| KZ | Disconnection or short circuit | LC | rpm signals in two systems are inconsistent. |
| MA | Malfunction | LD | Switch is pressed for usually unthinkable long time. |
| MB | Performance reduction | LH | Fill signal is OFF when command current to ECMV is ON. |
| MW | Sliding | | |
| NS | Overheat | | |
| ZG | Oil pressure reduction | | |
| ZK | Coolant level reduction | | |

ERROR CODE **AD51KA** (FUEL SUPPLY PUMP SOLENOID 2: DISCONNECTION IN WIRING (KA))

| | | | |
|---------------------------------|---|---------|---|
| Action code | Error code | Trouble | Fuel supply pump solenoid 2: Disconnection in wiring (KA) (Engine controller system) |
| CALL E03 | AD51KA | | |
| Contents of trouble | <ul style="list-style-type: none"> Disconnection in wiring occurred in fuel supply pump solenoid 2 (PCV2). | | |
| Action of controller | <ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Stops output to fuel supply pump solenoid 2 circuit. | | |
| Problem that appears on machine | <ul style="list-style-type: none"> If codes [AD11KA] and [AD11KB] are displayed at the same time, engine stops. | | |
| Related information | <ul style="list-style-type: none"> The special adapter (799-601-9430) is necessary for troubleshooting of fuel supply pump solenoid 1. Method of reproducing error code: Engine start | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | | | |
|--|------------------------------|---|--|--|------------|--|
| | | 1 | Defective fuel supply pump solenoid 2 (Internal disconnection in wiring) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | |
| E42 (male) | | | | Resistance | | |
| Between ① - ② | | | | 2.3 - 5.3Ω | | |
| Between ① - chassis ground | | | | Min. 1MΩ | | |
| 2 | | Disconnection in wiring harness (Disconnection in wiring or defective contact in connector) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | Wiring harness between EN3 (female) ⑬ - E42 (female) ① | Resistance | Max. 1Ω | |
| | | | Wiring harness between EN3 (female) ⑳ - E42 (female) ② | Resistance | Max. 1Ω | |
| | | | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| 3 | | Defective harness grounding (Contact with ground circuit) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | Wiring harness between EN3 (female) ⑳ - E42 (female) ② with chassis ground | Resistance | Min. 1MΩ | |
| 4 | | Defective engine controller | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | EN3 (male) | | Resistance | |
| | Between ⑬ - ⑳ | | 2.3 - 5.3Ω | | | |
| | Between ⑬ ⑳ - chassis ground | | Min. 1MΩ | | | |

Circuit diagram related to fuel supply pump solenoid 2



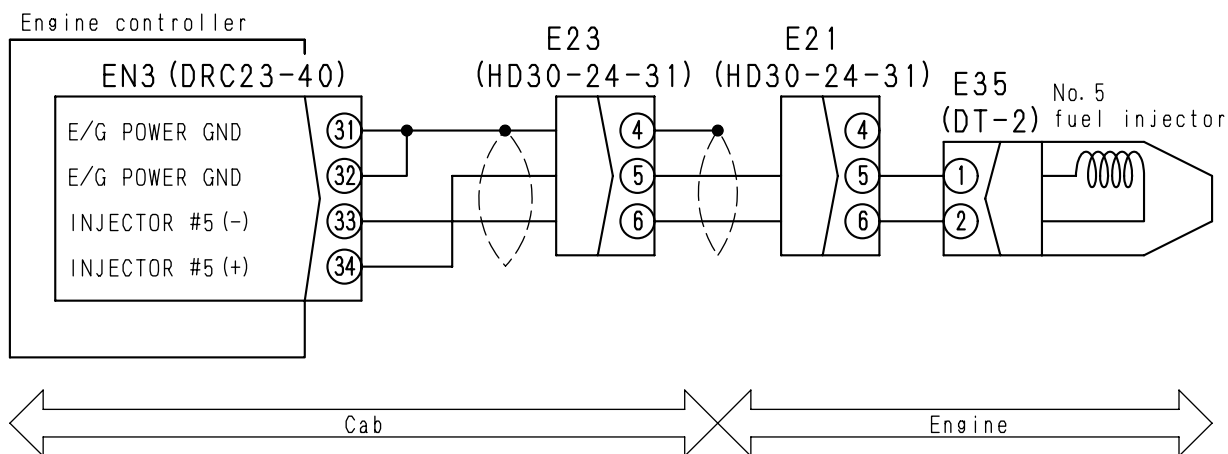
BJD11169

ERROR CODE **ADE1KA** (NO. 5 FUEL INJECTOR SOLENOID: DISCONNECTION (KA))

| | | | |
|---------------------------------|--|---------|--|
| Action code | Error code | Trouble | No. 5 fuel injector solenoid: Disconnection (KA) (Engine controller system) |
| E02 | ADE1KA | | |
| Contents of trouble | <ul style="list-style-type: none"> Disconnection occurred in No. 5 fuel injector solenoid (TWV#5) circuit. | | |
| Action of controller | <ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Stops output to No. 5 fuel injector solenoid circuit. | | |
| Problem that appears on machine | <ul style="list-style-type: none"> Engine output lowers. | | |
| Related information | <ul style="list-style-type: none"> Method of reproducing error code: Start engine. | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | | | |
|--|-----------------|---|--|--|------------|--|
| | | 1 | Defective No. 5 fuel injector solenoid (Internal disconnection) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | |
| E35 (male) | | | | Resistance | | |
| Between ① - ② | | | | 0.4 - 1.1Ω | | |
| 2 | | Disconnection in wiring harness (Disconnection in wiring or defective contact in connector) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | Wiring harness between EN3 (female) ③④ - E35 (female) ① | Resistance | Max. 1Ω | |
| | | | Wiring harness between EN3 (female) ③③ - E35 (female) ② | Resistance | Max. 1Ω | |
| | | | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| 3 | | Defective engine controller | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | EN3 (male) | | Resistance | |
| | Between ③④ - ③③ | | 0.4 - 1.1Ω | | | |

Circuit diagram related to No. 5 fuel injector solenoid



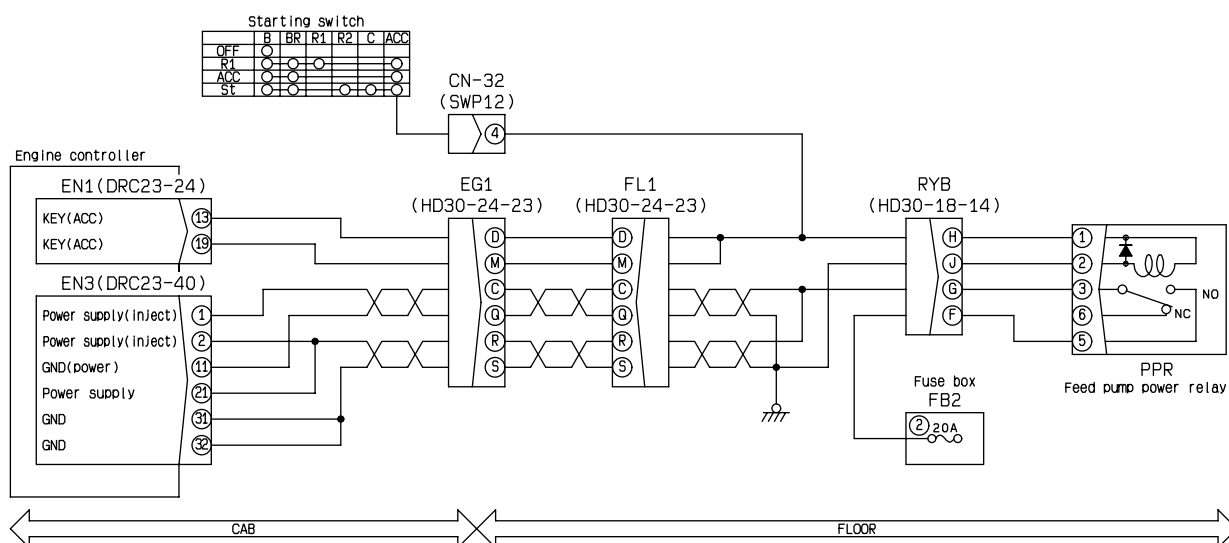
BJD11176

ERROR CODE **D1D0KB** (ENGINE CONTROLLER LOAD POWER SUPPLY: SHORT CIRCUIT (KB))

| | | | |
|---------------------------------|---|---------|---|
| Action code | Error code | Trouble | Engine controller load power supply relay: Short circuit (KB) (Engine controller system) |
| E02 | D1D0KB | | |
| Contents of trouble | <ul style="list-style-type: none"> Voltage is generated in controller load power supply circuit when starting switch is turned OFF. | | |
| Action of controller | <ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. | | |
| Problem that appears on machine | <ul style="list-style-type: none"> Does not take any particular action. | | |
| Related information | <ul style="list-style-type: none"> Method of reproducing error code: Turn starting switch OFF. ★ This error code detects abnormality in secondary side (contact side) of engine controller load power supply relay, but not in primary side (coil side) | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | | |
|--|--|--|--|--|--|
| | | 1 | Defective engine controller load power supply relay (Internal short circuit) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | |
| PPR (male) | | | | Resistance | |
| Between ③ – ⑤ | | Min. 1MΩ | | | |
| 2 | | Disconnection in wiring harness | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | |
| | Wiring harness between starting switch terminal ACC – EN1 (female) ⑬, ⑰. | | Resistance | Max. 1Ω | |
| 3 | Hot short circuit in wiring harness (Contact with 24V circuit) | ★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting. | | | |
| | | Short circuit of wiring harness between EN3 (female) ①, ②, ⑳ – PPR (female) ③ with chassis ground | Voltage | Max. 1V | |
| 4 | Defective engine controller | ★ Prepare with starting switch OFF, then carry out troubleshooting with starting switch OFF or ON. | | | |
| | | EN3 | Starting switch | Voltage | |
| | | Between ①, ②, ⑳ – chassis ground | OFF position | Max. 1V | |
| | | | ON position | Max. 8V | |

Circuit diagram related to engine controller



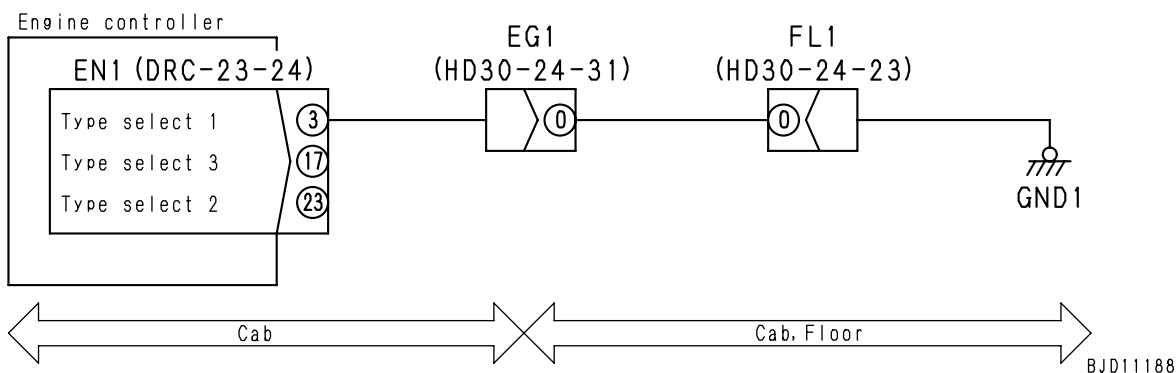
BWD11184

ERROR CODE **DB29KQ** (ENGINE CONTROLLER TYPE SELECT: TYPE SELECT SIGNAL INCONSISTENCY (KQ))

| | | | |
|---------------------------------|---|---------|--|
| Action code | Error code | Trouble | Engine controller type select: Type select signal inconsistency (KQ) (Engine controller system) |
| CALL E03 | DB29KQ | | |
| Contents of trouble | <ul style="list-style-type: none"> Type select signal directly acquired by engine controller is inconsistent with type select signal acquired via communication. | | |
| Action of controller | <ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Controls it as default-set type. | | |
| Problem that appears on machine | <ul style="list-style-type: none"> Machine does not provide normal output. | | |
| Related information | <ul style="list-style-type: none"> Method of reproducing error code: Turn starting switch ON. | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | |
|--|-----------------------------|---|--|---|
| | | 1 | Unsuitable engine controller or wiring harness | Check part No. of engine controller and wiring harness again. |
| 2 | | Disconnection in wiring harness (Disconnection in wiring or defective contact in connector) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | |
| | | | Wiring harness between EN1 (female) ③, ⑰, ⑳ – chassis ground | Resistance Max. 1Ω |
| 3 | Defective engine controller | ★ Prepare with starting switch OFF, turn starting switch ON and carry out troubleshooting. | | |
| | | EN1 | Voltage Max. 1V | |

Circuit diagram related to engine controller type select



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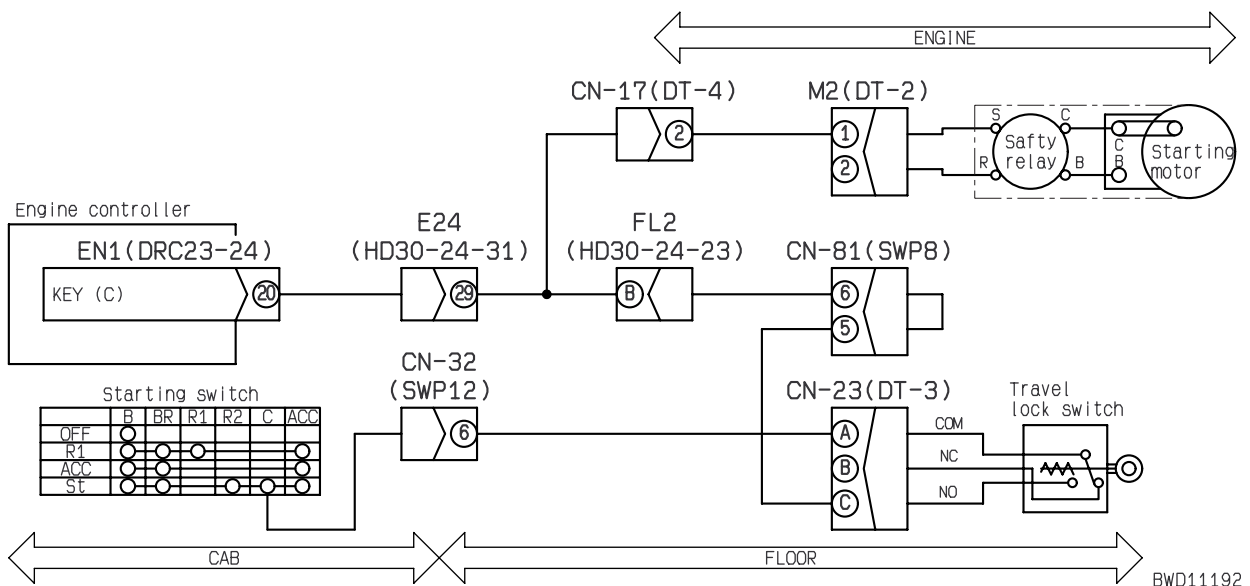
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ERROR CODE **DD11KB** (STARTING SWITCH: SHORT CIRCUIT (KB))

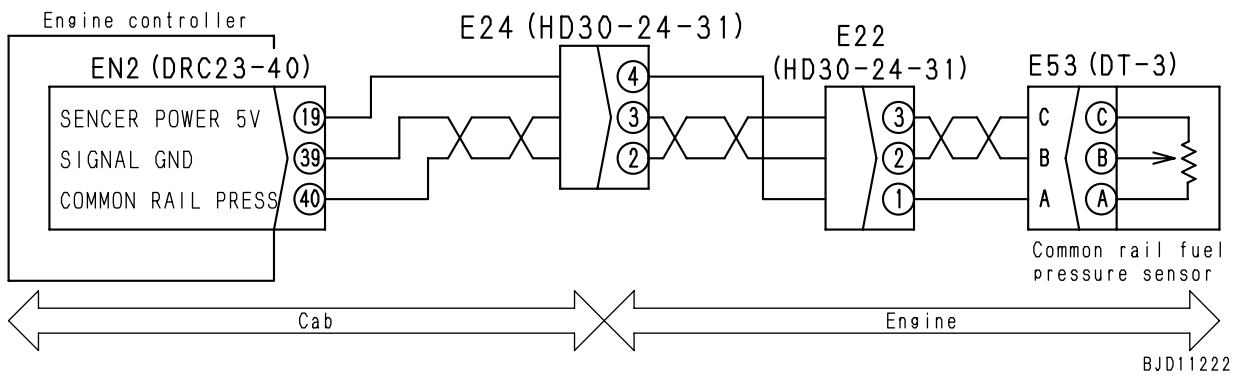
| | | | |
|---------------------------------|---|---------|--|
| Action code | Error code | Trouble | Starting switch: Short circuit (KB) (Engine controller system) |
| CALL E04 | DD11KB | | |
| Contents of trouble | <ul style="list-style-type: none"> Signal C of starting switch is input during running of engine. | | |
| Action of controller | <ul style="list-style-type: none"> Flashes caution lamp and turns on caution buzzer. Operate with normal control. | | |
| Problem that appears on machine | <ul style="list-style-type: none"> Operate normally 10 seconds after engine starts | | |
| Related information | <ul style="list-style-type: none"> Method of reproducing error code: Start engine. | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | | |
|--|-----------------------------|--|---|--|------------|
| | | 1 | Defective starting switch | ★ Prepare with starting switch OFF, then carry out troubleshooting with starting switch OFF or ON. | |
| Starting switch terminal | | | | Starting switch | Resistance |
| Between ② – ③ | | | | When OFF/ON | Min. 1MΩ |
| 2 | | Hot short circuit in wiring harness (Contact with 24V circuit) | ★ Prepare with starting switch OFF, turn starting switch ON and carry out troubleshooting. | | |
| | | | Short circuit of wiring harness between EN1 (female) ② – CN23 (female) ③ or M2 (female) ① with chassis ground | Voltage | Max. 1V |
| | | | Short circuit of wiring harness between CN23 (female) ① – starting switch terminal ③ with chassis ground | Voltage | Max. 1V |
| | | | | | |
| 3 | Defective engine controller | ★ Prepare with starting switch OFF, turn starting switch ON and carry out troubleshooting. | | | |
| | | EN1 | Voltage | | |
| | | Between ② – chassis ground | Max. 1V | | |

Circuit diagram related to starting switch signal C



Circuit diagram related to common rail pressure sensor



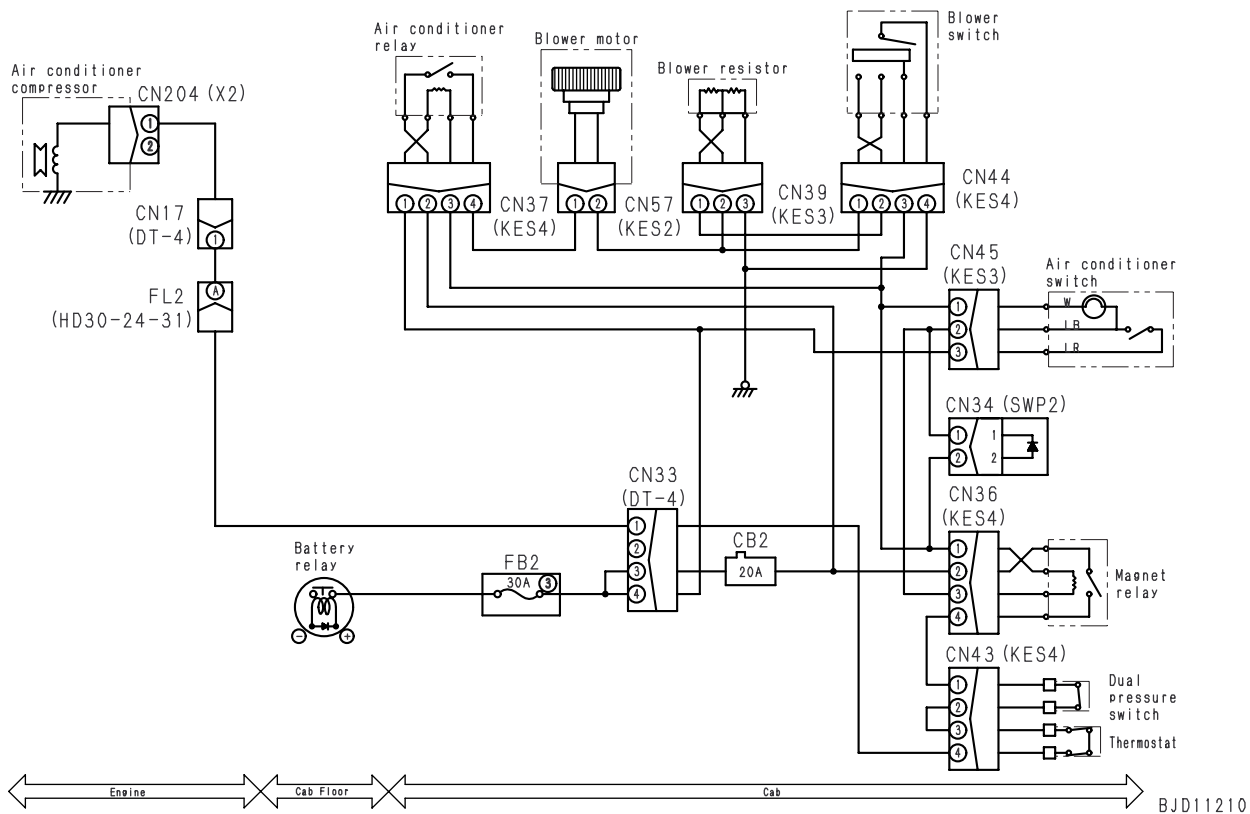
ERROR CODE DNCAKB (TRANSMISSION FNR DETECTION LIMIT SWITCH: SHORT CIRCUIT (KB))

| | | | |
|---------------------------------|---|---------|--|
| Action code | Error code | Trouble | Transmission FNR detection limit switch: Short circuit (KB) (Machine controller system) |
| E01 | DNCAKB | | |
| Contents of trouble | • Multiple directional signals have been input to controller, so direction (F or R) cannot be displayed. | | |
| Action of controller | • Monitor panel displays "--" | | |
| Problem that appears on machine | • Gearshifting mechanism is mechanical, so gearshifting can be carried out. (The actual speed range can be checked by the lever angle.) | | |
| Related information | • Method of reproduction error code: Turn starting switch ON. | | |

| | Cause | | Standard value in normal state/Remarks on troubleshooting | | | | |
|---------------------------------------|--|---|--|--|------------|----------|----------|
| | Possible causes and standard value in normal state | 1 | Defective FNR detection limit switch(Defective point or internal short) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | |
| | | | | Resistance | | | |
| | | | | | Forward | Neutral | Reverse |
| LMF (male) | | | | Between A – B | Max. 1Ω | Min. 1MΩ | Min. 1MΩ |
| | | | | Between A – C | Min. 1MΩ | Max. 1Ω | Max. 1Ω |
| | | CN27 (male) | Between A – B | Max. 1Ω | Max. 1Ω | Min. 1MΩ | |
| 2 | | Short circuit wiring harness(Contact with chassis ground) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | | | |
| | | | Wiring harness between ST2 (female) ②⑤ - LMF (female) B with chassis ground | Resistance | Min. 1MΩ | | |
| | | | Wiring harness between ST2 (female) ③⑤ - LMF (female) C with chassis ground | Resistance | Min. 1MΩ | | |
| | | | Wiring harness between ST1 (female) ⑤ - CN27 (female) B with chassis ground | Resistance | Min. 1MΩ | | |
| | | | Between above wiring harnesses and chassis ground and other wiring harness | Resistance | Min. 1MΩ | | |
| 3 | | Defective machine controller | ★ Prepare with starting switch OFF, then turn starting switch ON and carry out troubleshooting. | | | | |
| | | | | | Resistance | | |
| | | | | | Forward | Neutral | Reverse |
| | | | Wiring harness between ST2 ②⑤ - ST1 ④ | | Max. 1V | 8V | 8V |
| | Wiring harness between ST2 ③⑤ - ST1 ④ | | | 8V | Max. 1V | Max. 1V | |
| Wiring harness between ST1 ④D - ST1 ④ | | 20 – 30V | 20 – 30V | Max. 1V | | | |

| Possible causes and standard value in normal state | Cause | | Standard value in normal state/Remarks on troubleshooting | | |
|--|--|---|--|--|----------|
| | Possible causes and standard value in normal state | 5 | Disconnection in wiring harness(Disconnection in wiring or defective contact in connector) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | |
| Wiring harness between heater relay terminal C and RHR (female) ③ | | | | Resistance | Max. 1Ω |
| Wiring harness between RHR (female) ② and EN1 (female) ⑫ | | | | Resistance | Max. 1Ω |
| Wiring harness between RHR (female) ① and starting switch terminal ACC | | | | Resistance | Max. 1Ω |
| Wiring harness between RHR (female) ⑤ and FB1 ② | | | | Resistance | Max. 1Ω |
| Wiring harness between starting switch terminal B and FB2 ⑤ | | | | Resistance | Max. 1Ω |
| Wiring harness between heater relay terminal B and CN49 (female) ⑨ | | | | Resistance | Max. 1Ω |
| 6 | | Short circuit with ground in wiring harness (Contact with ground circuit) | ★ Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON. | | |
| | | | Wiring harness between heater relay terminal C and RHR (female) ③ with chassis ground | Resistance | Min. 1MΩ |
| | | | Wiring harness between RHR (female) ② and EN1 (female) ⑫ with chassis ground | Resistance | Min. 1MΩ |
| | | | Wiring harness between RHR (female) ① and starting switch terminal ACC with chassis ground | Resistance | Min. 1MΩ |
| | | | Wiring harness between RHR (female) ⑤ and FB1 ② with chassis ground | Resistance | Min. 1MΩ |
| | | | Wiring harness between starting switch terminal B and FB2 ⑤ with chassis ground | Resistance | Min. 1MΩ |
| | | | Wiring harness between heater relay terminal B and CN49 (female) ⑨ with chassis ground | Resistance | Min. 1MΩ |
| Between above wiring harnesses | Resistance | Min. 1MΩ | | | |

Circuit diagram related to air conditioner



H-2 TURNING SPEED IS SLOW (CANNOT TURN) OR LACKS POWER WHEN TURNING.

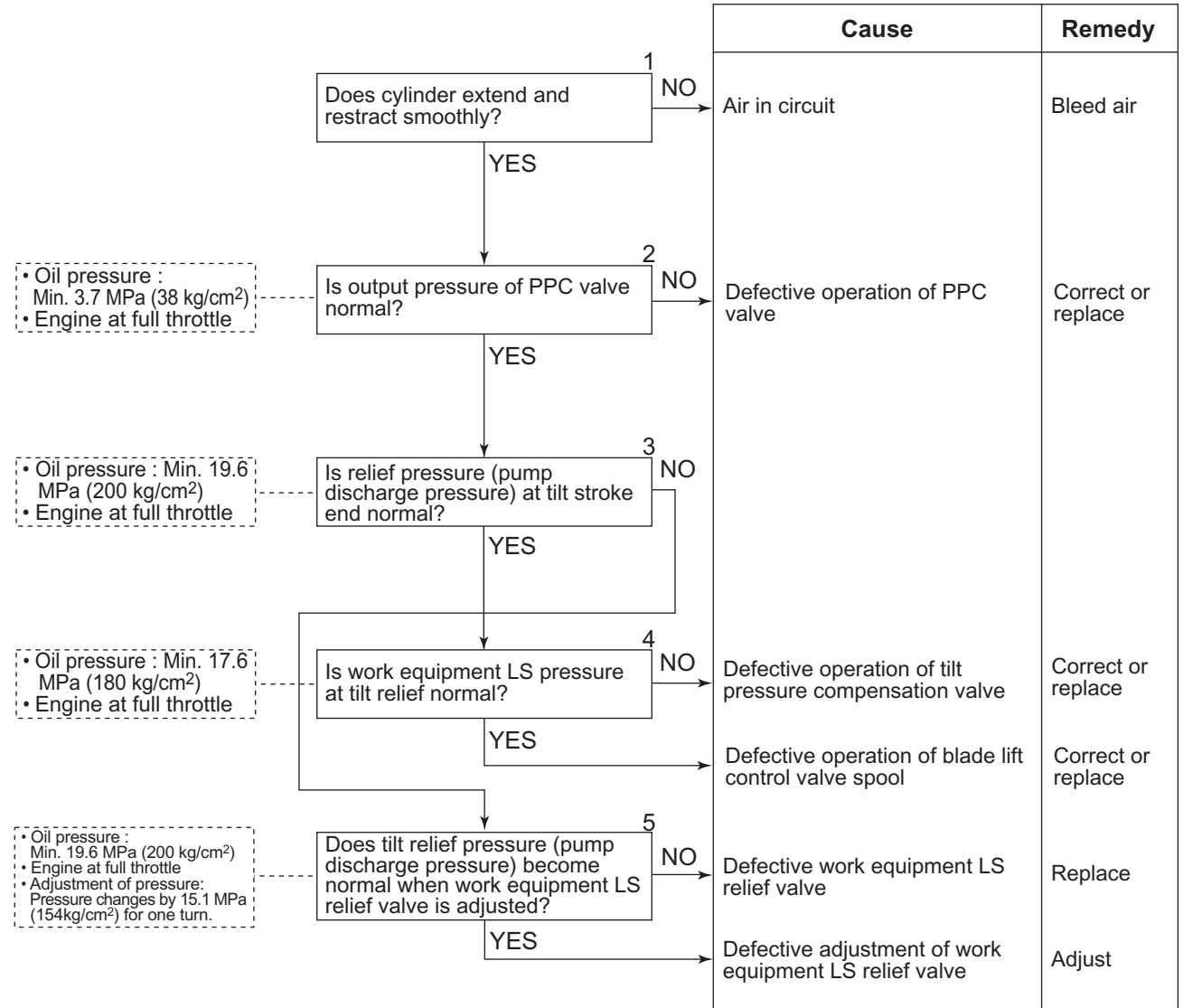
★ Check the oil level in the hydraulic tank before carrying out troubleshooting.

| | | Cause | Remedy |
|--|--|--|--------------------|
| <ul style="list-style-type: none"> • Oil pressure: Min. 3.7 MPa (38 kg/cm²) • Engine at full throttle. | <p>1</p> <p>Is PPC valve output pressure normal?</p> <p>NO</p> <p>YES</p> | Defective operation of PPC valve | Correct or replace |
| <ul style="list-style-type: none"> • Oil pressure: Min. 32.8 MPa (335kg/cm²). • Engine at full throttle. | <p>2</p> <p>Is steering relief pressure (pump discharge pressure) normal?</p> <p>NO</p> <p>YES</p> | | |
| <ul style="list-style-type: none"> • Oil pressure: Min. 30.9 MPa (315 kg/cm²) • Engine at full throttle. | <p>3</p> <p>Is steering LS pressure normal?</p> <p>NO</p> <p>YES</p> | Defective operation of steering pressure compensation valve | Correct or replace |
| <ul style="list-style-type: none"> • Max. 30 ℓ/min. • Engine at full throttle. | <p>4</p> <p>Is leakage from HSS motor normal?</p> <p>NO</p> <p>YES</p> | Defective HSS motor | Replace |
| | | Defective operation of steering control valve spool. (See Note 1.) | Correct or replace |
| <ul style="list-style-type: none"> • Oil pressure: Min. 32.8 MPa (335 kg/cm²) • Engine at full throttle. • Adjustment of pressure: Pressure changes by 17.6 MPa (179 kg/cm²) for one turn | <p>5</p> <p>Adjust steering LS relief valve. Does steering relief pressure (pump discharge pressure) become normal?</p> <p>YES</p> | Defective adjustment of steering LS relief valve | Adjust |
| <ul style="list-style-type: none"> • Oil pressure: Min. 32.8 MPa (335 kg/cm²) • Engine at full throttle. | <p>6</p> <p>Replace steering LS relief valve. Does condition become normal?</p> <p>NO</p> <p>YES</p> | Defective operation of steering LS relief valve | Correct or replace |
| <ul style="list-style-type: none"> • Oil pressure: Min 32.8 MPa (335 kg/cm²) • Engine at full throttle. | <p>7</p> <p>Replace main relief valve. Does steering relief pressure (pump discharge pressure) become normal ?</p> <p>NO</p> <p>YES</p> | Defective main relief valve | Replace |
| | | <ul style="list-style-type: none"> • Defective operation of steering control spool twisted. • Defective operation of unload valve spool. • Defective operation of work equipment • HSS pump | Correct or replace |
| | <p>8</p> <p>Is difference between steering relief pressure (pump discharge pressure) and steering LS pressure more than 3.43 MPa (35 kg/cm²)</p> <p>NO</p> <p>YES</p> | The confined pressure remaining in the LS circuit (LS bypass valve clogged with dirt or defective operation of LS | Correct or replace |

Note 1. Check that there is no clogging by dust or any deterioration of the spring, then move the spool by hand and judge if the spool moves smoothly.

H-13 BLADE LIFTING SPEED IS SLOW OR LACKS POWER

- ★ When hydraulic drift of blade is normal.
- ★ Check the oil level in the hydraulic tank before carrying out troubleshooting.
- ★ Check if the blade has been modified.




M-6 WARNING LAMP IS ABNORMAL

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


a) CAUTION ITEM LIGHT UP, BUT LAMP DOES NOT FLASH.

- ★ When a visual check shows that the bulb is not blown.
(If it is blown, replace the lamp)



| Cause | Remedy |
|-------------------------|---------|
| Defective monitor panel | Replace |

b) MONITOR DISPLAY IS NORMAL BUT LAMP FLASHES.



| Cause | Remedy |
|-------------------------|---------|
| Defective monitor panel | Replace |

PRECAUTIONS WHEN CARRYING OUT OPERATION

[When carrying out removal or installation (disassembly or assembly) of units, be sure to follow the general precautions given below when carrying out the operation.]

1. Precautions when carrying out removal work

- If the coolant contains antifreeze dispose of it correctly.
- After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
- When draining oil, prepare a container of adequate size to catch the oil.
- Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
- To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors.
- Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
- Check the number and thickness of the shims, and keep in a safe place.
- When raising components, be sure to use lifting equipment of ample strength.
- When using forcing screws to remove any components, tighten the forcing screws alternately.
- Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.

★ Precautions when handling piping during disassembling

Fit the following blind plugs into the piping after disconnecting it during disassembly operations.

1) Hoses and tubes using sleeve nuts

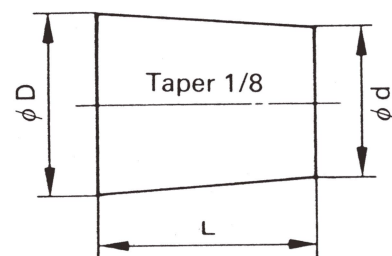
| Nominal number | Plug (nut end) | Sleeve nut (elbow end) |
|----------------|----------------|---------------------------------------|
| | | Use the two items below as a set |
| 02 | 07376-50210 | 07221-20210 (Nut), 07222-00210 (Plug) |
| 03 | 07376-50315 | 07221-20315 (Nut), 07222-00312 (Plug) |
| 04 | 07376-50422 | 07221-20422 (Nut), 07222-00414 (Plug) |
| 05 | 07376-50522 | 07221-20522 (Nut), 07222-00515 (Plug) |
| 06 | 07376-50628 | 07221-20628 (Nut), 07222-00616 (Plug) |
| 10 | 07376-51034 | 07221-21034 (Nut), 07222-01018 (Plug) |
| 12 | 07376-51234 | 07221-21234 (Nut), 07222-01219 (Plug) |

2) Split flange type hoses and tubes

| Nominal number | Flange (hose end) | Sleeve head (tube end) | Split flange |
|----------------|-------------------|------------------------|--------------|
| 04 | 07379-00400 | 07378-10400 | 07371-30400 |
| 05 | 07379-00500 | 07378-10500 | 07371-30500 |

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

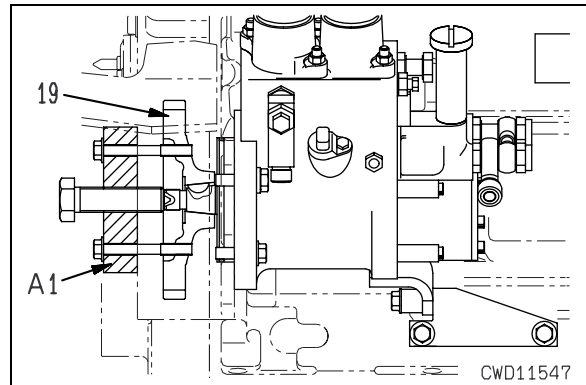
| Nominal number | Part Number | Dimensions | | |
|----------------|-------------|------------|------|----|
| | | D | d | L |
| 06 | 07049-00608 | 6 | 5 | 8 |
| 08 | 07049-00811 | 8 | 6.5 | 11 |
| 10 | 07049-01012 | 10 | 8.5 | 12 |
| 12 | 07049-01215 | 12 | 10 | 15 |
| 14 | 07049-01418 | 14 | 11.5 |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



202F2001

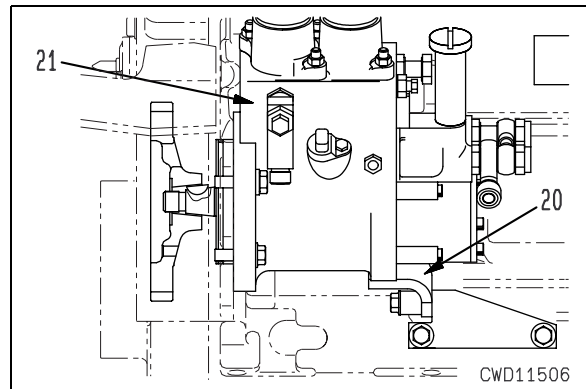
- 3) Remove the gear mounting nut and remove fuel supply pump drive gear (19) using tool A1.

★ Be careful so as not to allow the nuts, washers and woodruff key on the shaft to drop into the case. ※ 5



5. Fuel supply pump


Remove bracket (20) to remove fuel supply pump assembly (21).




INSTALLATION

- Carry out installation in the reverse order to removal.

※ 1

 kgm Fuel hoses (4) and (5):
14.7 - 19.6 Nm {1.5 - 2.0 kgm}


※ 2

 kgm Fuel tubes (7) and (8) on filter side and the fuel supply pump side:
24.5 - 34.3 Nm {2.5 - 3.5 kgm}

※ 3

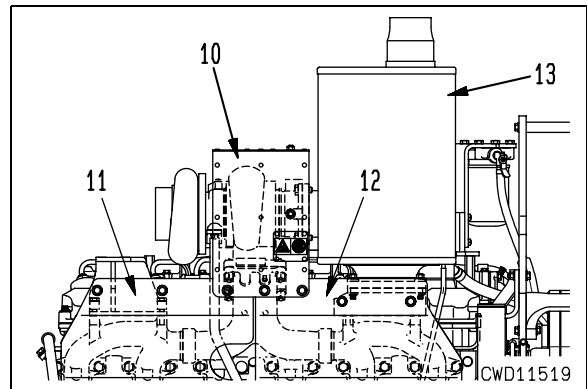
- ★ Mounting cover (12) with its slit facing the cylinder block.
- ★ Mounting cover (13) with its slit facing down.

※ 4

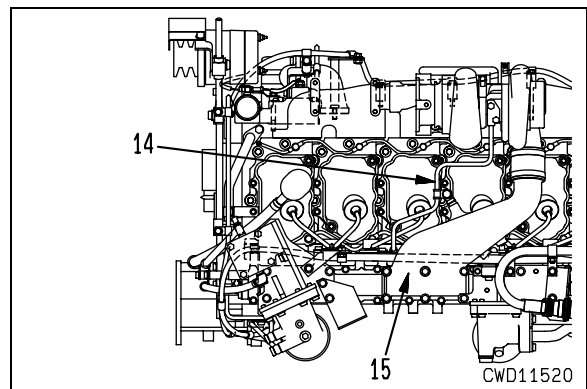
 kgm Lubrication tube (16)
On the fuel supply pump side:
7.9 - 12.7 Nm {0.8 - 1.3 kgm}
On the cylinder block side:
9.8 - 12.7 Nm {1.0 - 1.3 kgm}

4. Muffler assembly
 1) Remove drain tube.


- 2) Remove heat insulation panels (10), (11), and (12).
 3) Remove the turbocharger connecting bolts.
 4) Remove the mounting bolts and nuts and lift off muffler assembly (13).

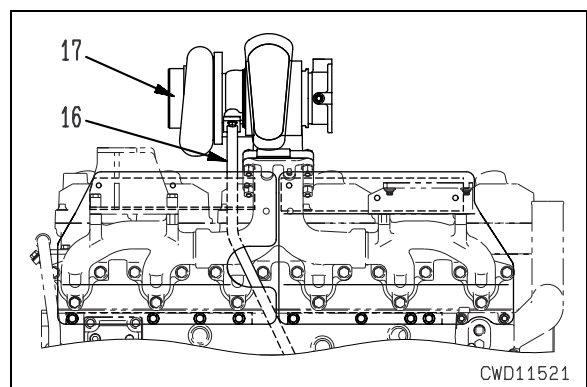


5. Remove turbocharger lubrication tube (14). ※ 4
 6. Remove air intake connector (15). ※ 5

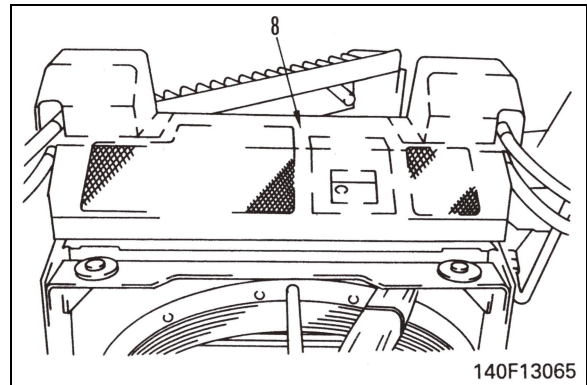


7. Turbocharger and exhaust manifold assembly
 1) Remove drain tube (16). ※ 6
 2) Sling turbocharger assembly (17) temporarily, then remove the exhaust manifold mounting bolts and turbocharger assembly. ※ 7

 Turbocharger and exhaust manifold assembly: **45 kg**

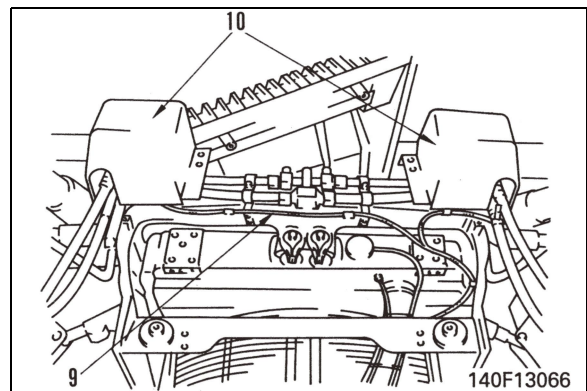


9. Remove radiator top cover (8).



10. Disconnect front lamp wiring (9) and horn wiring.

11. Remove front lamp assembly (10).



12. Disconnect hose (11) between radiator and reserve tank.

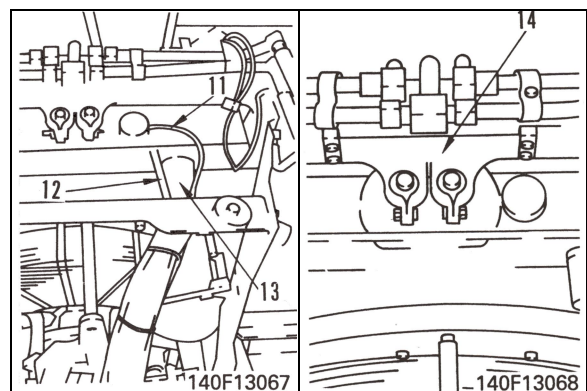
13. Disconnect aeration hose (12).

※ 3

14. Remove radiator inlet hose (13).

※ 4

15. Remove bracket (14).

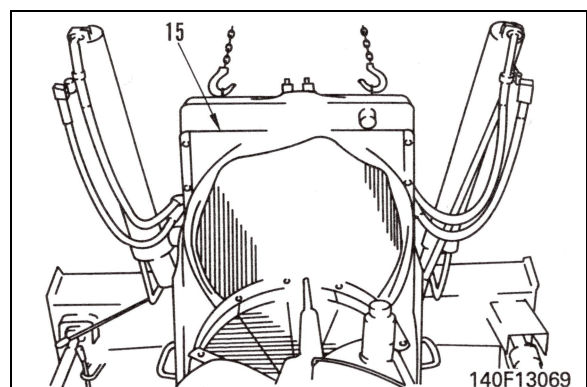


16. Remove 2 radiator bottom mount bolts, and raise radiator assembly (15) slowly, then remove.

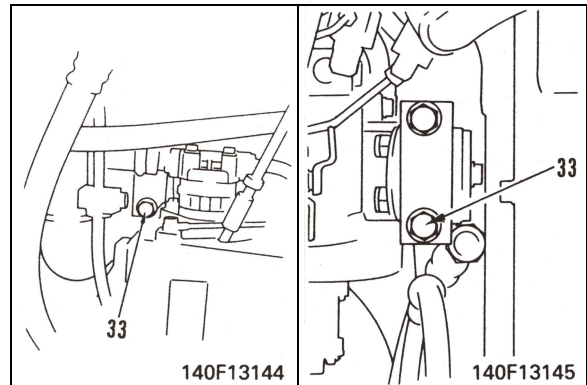
★ When removing the radiator, be extremely careful not to damage the seal or radiator core.



Radiator assembly: **45 kg**



25. Remove front mount bolts (33).

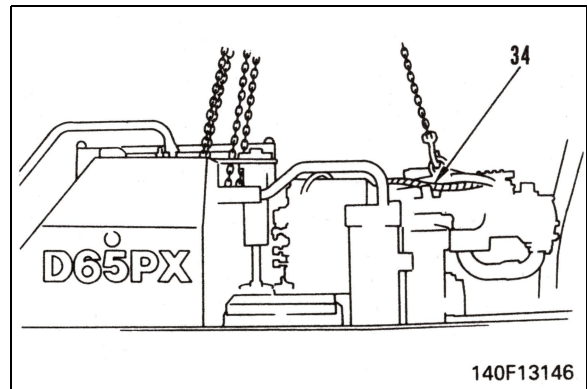


26. Lift off power train unit assembly (34).

- ★ Check that all wiring and piping has been disconnected before removing the power train unit assembly.



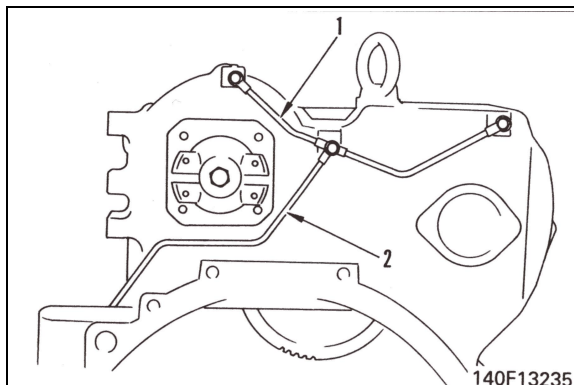
Power train unit assembly: **1700 kg**



DISASSEMBLY OF PTO ASSEMBLY

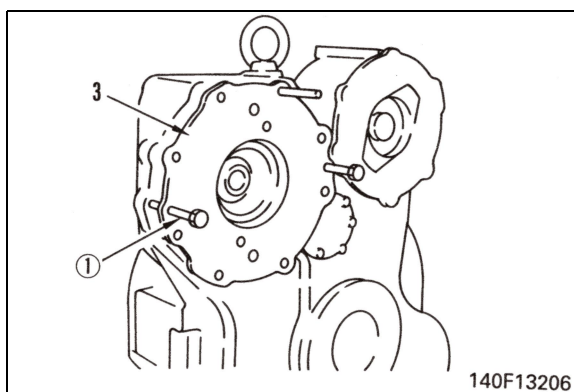
1. Lubrication tubes

Remove lubrication tubes (1) and (2).

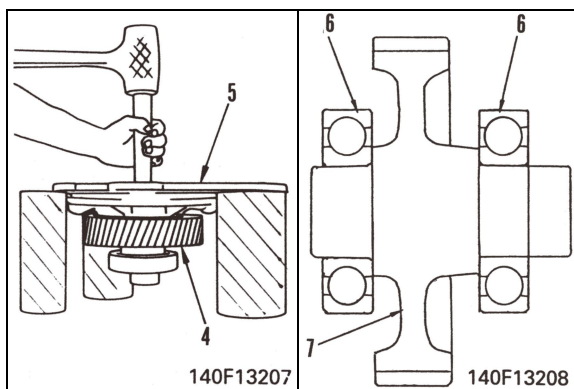


2. Cover assembly (right)

1) Remove mounting bolts, then using forcing screw ①, remove cover assembly (3).

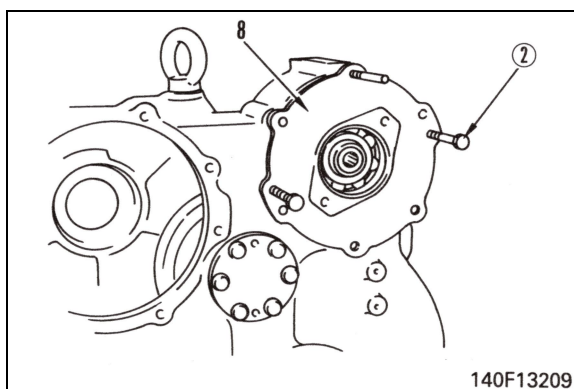


2) Knock out gear assembly (4) from cover (5) and remove.
3) Remove bearings (6) from gear (7).



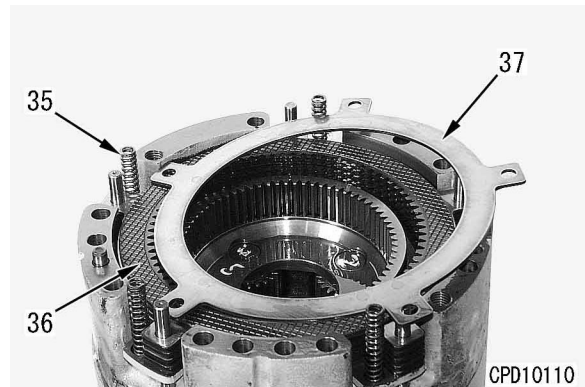
3. Cover assembly (left)

1) Remove mounting bolts, then using forcing screw ②, remove cover assembly (8).



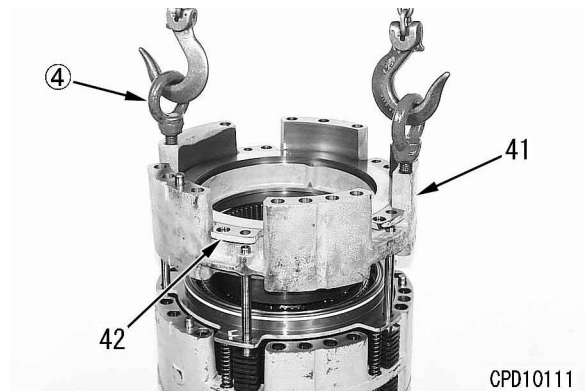
5. No. 1 discs, plates, and springs

- 1) Remove springs (35).
- 2) Remove discs (36) and plates (37).



6. No. 1 housing assembly

- 1) Using eyebolts ④, remove No. 1 housing assembly (41).
- 2) Remove piston (42) from the housing.



7. No. 2 piston

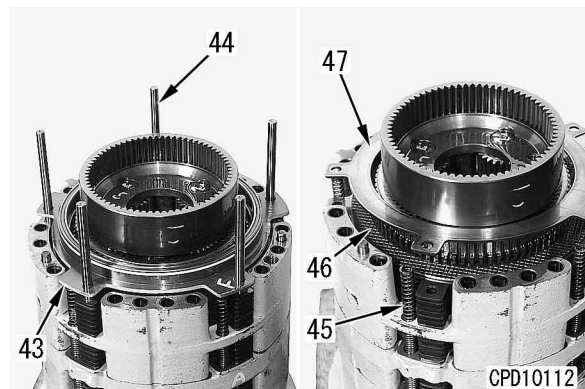
Remove No. 2 piston (43).

8. Guide pin

Remove guide pin (44).

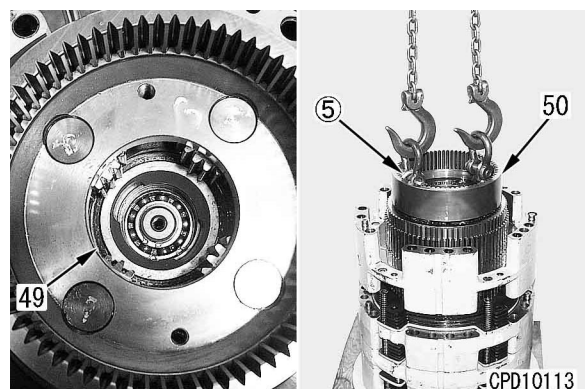
9. No. 2 discs, plates, and springs

- 1) Remove No. 2 clutch springs (45).
- 2) Remove discs (46) and plates (47).



10. No. 2 housing and No. 2 carrier assembly

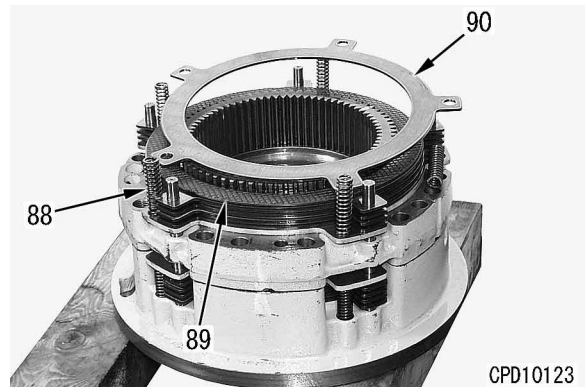
- 1) Push up the output shaft lightly from under-side.
- 2) Remove snap ring (49).
- 3) Using eyebolts ⑤, remove No. 2 housing and No. 2 carrier assembly (50).



9. No. 4 discs, plates, and springs

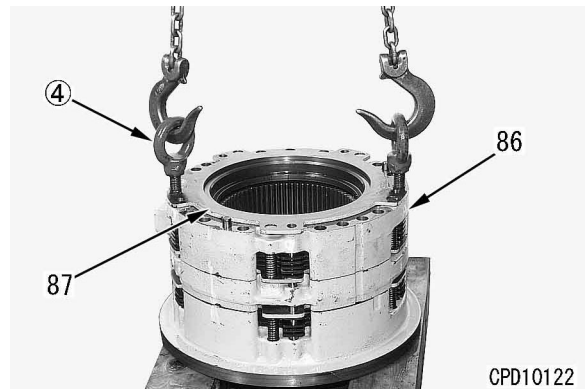
Install No. 4 discs (89), plates (90), and springs (88).

- ★ Discs: 4 pieces, Plates: 5 pieces
- ★ Free length of spring: 59 mm

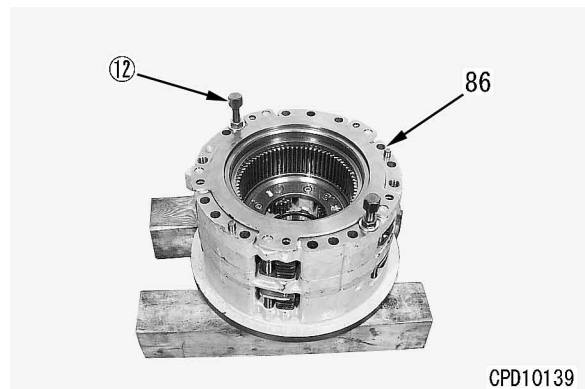


10. No. 3 housing assembly

- 1) Install the seal ring to No. 3 housing.
- 2) Install the seal ring and No. 3 piston (87).
 - ★ For installation of the seal ring, see assembly step 7.
- 3) Using eyebolts (4), install No. 3 housing (86).
 - ★ Check that the springs are fitted securely in the grooves.

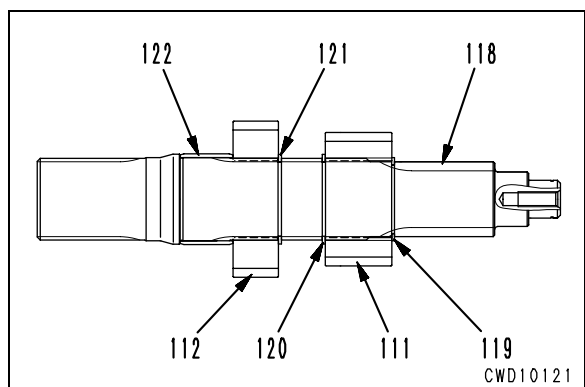


- 4) Using forcing screws (12), tighten No. 3 housing (86) and insert dowel pin in the housing securely.

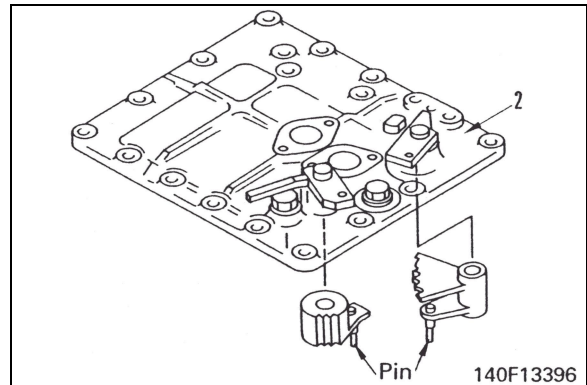


11. No. 3 carrier and output shaft assembly

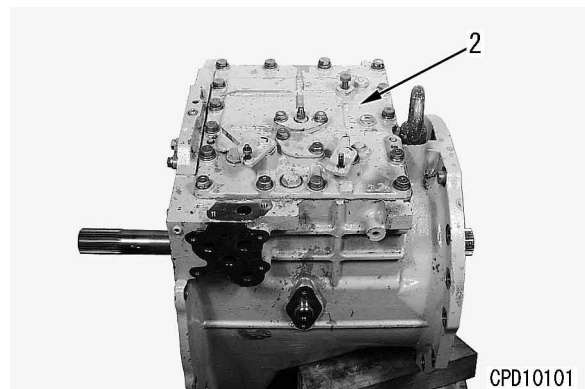
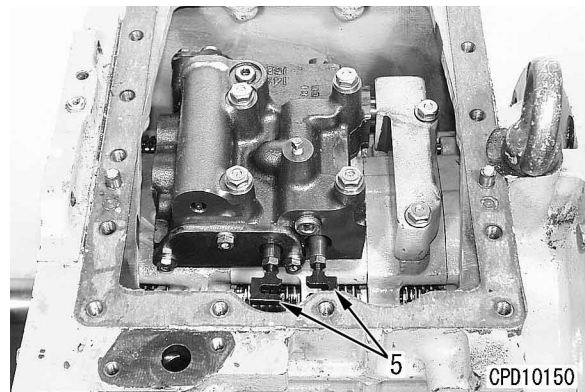
- 1) Assemble the output shaft according to the following procedure.
 - i) Install inner race (122) to output shaft (118).
 - ii) Install No. 5 sun gear (112) and snap rings (121) and (120).
 - iii) Install No. 4 sun gear (111) and snap ring (119).



- 4) Set the yoke of spool (5) to the positions of the pins of the forward-reverse lever and gear shift lever of cover assembly (2).
- ★ Measure the distance from the holes for the cover assembly mounting bolts, then position the yoke.

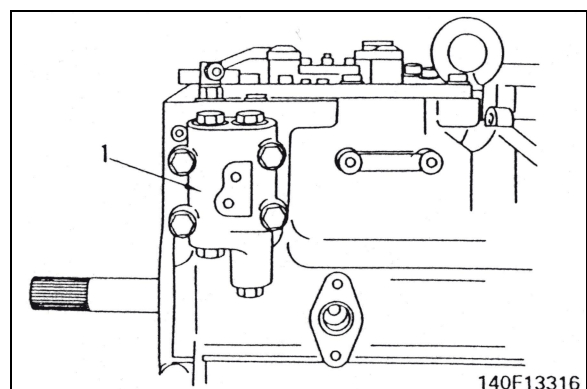


- 5) Fit the gasket and insert cover assembly (2) in the dowel pin lightly, checking the engagement of the pins and yoke through the clearance between the case and cover.
- ★ Move the forward-reverse lever and gear shift lever to check that the pins and yoke are engaged securely, then insert the cover in the dowel pin to the end and tighten the bolts.
 - ★ If the pins are not engaged with the yoke, remove the cover and repeat the above procedure again.

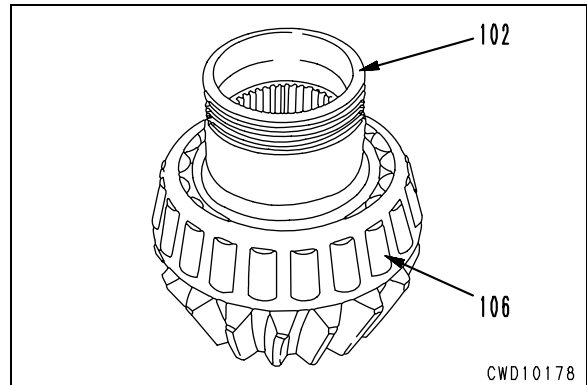


27. Relief valve assembly

Install relief valve assembly (1).

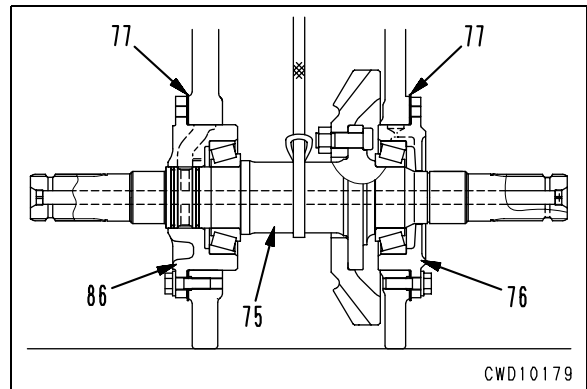


- vi) Remove bearing (106) from bevel pinion (102).

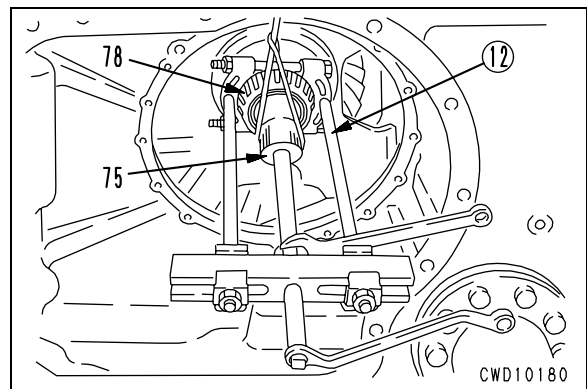


8. Bevel gear shaft and bevel gear

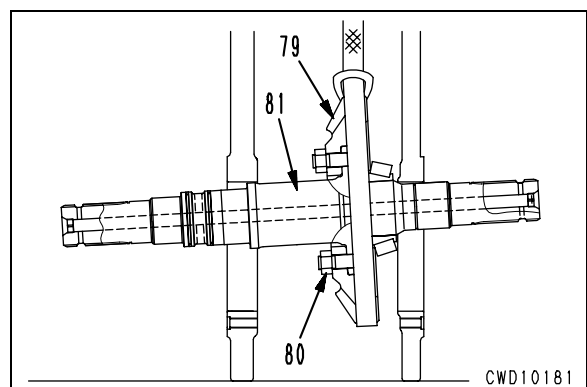
- 1) Sling bevel gear and shaft assembly (75) temporarily.
- 2) Remove cage assemblies (76) and (86).
 - ★ Check the thickness, quantity, and positions of shims (77).
 - ★ Since both cages are different from each other, make marks on them.



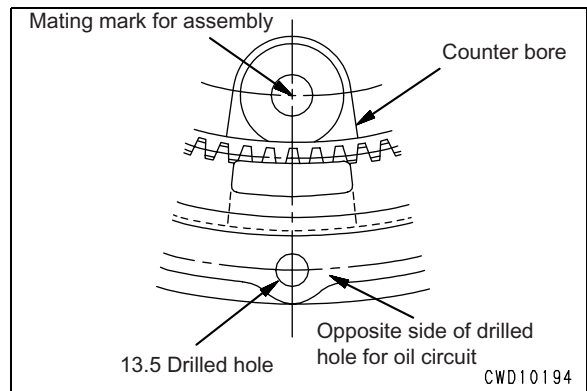
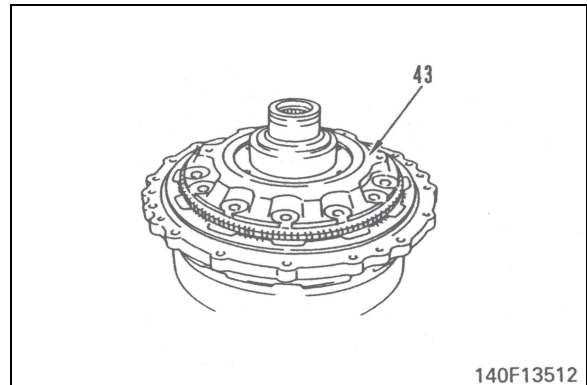
- 3) Move bevel gear and shaft assembly (75) to the left end and remove bearing (78) with puller ⑫ .
 - ★ Remove only the bearing on the left side of the machine.



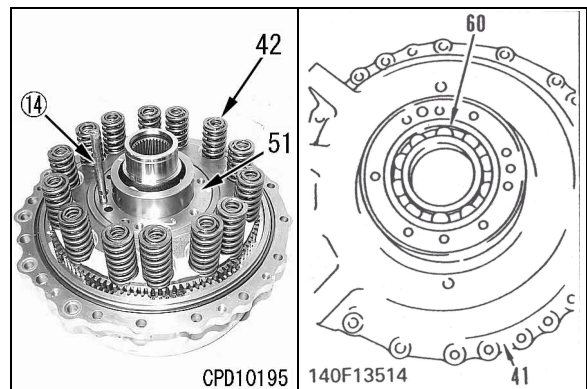
- 4) Sling bevel gear (79) and remove mounting nut (80) and pull out bevel gear shaft assembly (81) to the right side of the machine.



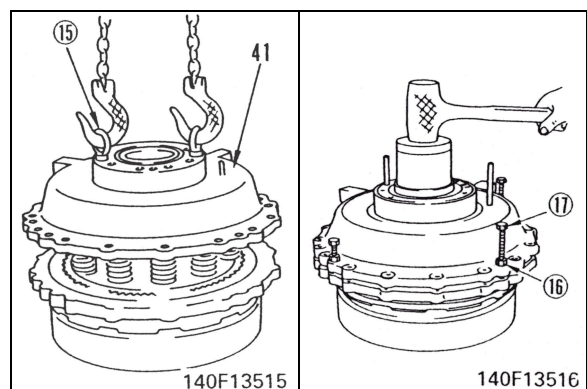
- 9) Install the seal ring to piston (43).
- 10) Install piston (43), matching the center of the spot-face having the match mark to the drilled hole "13.5 in diameter" (on the opposite side of the side hole).



- 11) Install spring (42).
- 12) Install guide bolt (14) to age (51).
- 13) Install bearing (60) to cover (41).



- 14) Using eyebolts (15) and matching to the guide bolt, set cover (41).
 - ★ Check that the spring is fitted securely to both of the piston and case.
- 15) Compressing the spring with forcing screws (17) and nuts (16), press fit the inner race side of the bearing to the hub assembly.



DISASSEMBLY OF TRANSMISSION CONTROL VALVE ASSEMBLY

1. Disassembly of quick return valve

- 1) Remove snap ring (2) from valve body (1).
- 2) Pull out spacer (3), and remove snap ring (4).
- 3) Remove plug (5), pull out valve (6) and sleeve (7), then remove snap ring (8).

2. Disassembly of speed valve

- 1) Remove spool assembly (10) from valve body (9).
- 2) Loosen nut (11), and disconnect spool (12) and yoke (13).

3. Disassembly of directional valve, modulation valve

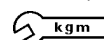
- 1) Remove snap ring (14), then remove stopper (15).
- 2) Loosen nut (16), and remove yoke (17).
- 3) Remove cover (18), shim (19), and spacer (20), then remove spring (21), washer (22), and springs (23) and (24).
- 4) Remove cover (25).
- 5) Remove collar (26) and spool (27).
- 6) Remove valve assembly (28).
- 7) Remove snap ring (29), stopper (30), valve (31), spring (32), valve (33), and valve (34) from valve assembly (28).

ASSEMBLY OF TRANSMISSION CONTROL VALVE ASSEMBLY

- ★ Clean all parts, and check for dirt or damage. Coat the sliding surfaces of all parts with engine oil before installing.

1. Assembly of directional valve, modulation valve.

- 1) Assemble valves (34) and (33). Spring (32), and valve (31) to valve (28) fit stopper (30), then install snap ring (29).
- 2) Assemble valve assembly (28) to body (9), then assemble springs (24) and (23), washer (22), and spring (21) from opposite side, and install spacer (20).
- 3) Install shim (19) and cover (18).

 Locknut:

30.9 ± 3.4 nm {3.2 ± 0.35 kgm}

- ★ Dimension a for mounting yoke:
29.1 mm

2. Assembly of speed valve

- 1) Assemble nut (11) to yoke (13), and install to spool (12).

 Locknut:

30.9 ± 3.4 nm {3.2 ± 0.35 kgm}

- 2) Assemble spool assembly (10) to body (9).

3. Assembly of quick return valve


- 1) Install plug (5) to body (1), assemble valve (6) and sleeve (7), then install snap ring (8).
- 2) Assemble spacer (3) to body (1), then fit snap rings (4) and (2).

ASSEMBLY OF HSS MOTOR ASSEMBLY

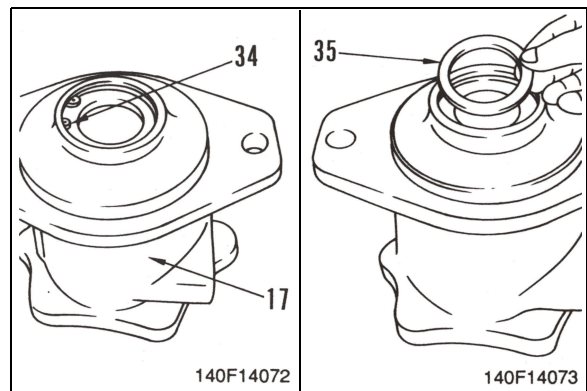
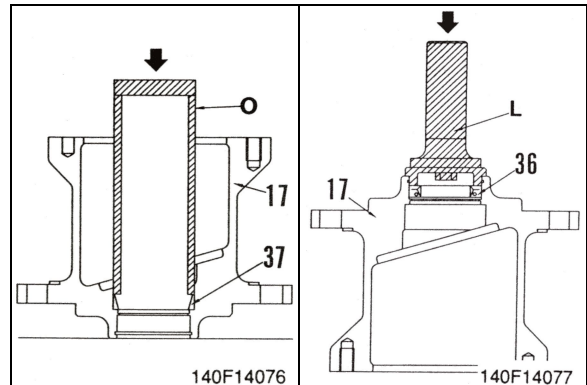
- ★ Clean all parts, and check for dirt or damage.
- ★ Coat the sliding surface of all parts with engine oil (EO10-CD) before installing.

1. Motor case

- 1) Using tool **O**, press fit outer race (37) to motor case (17).
- 2) Using tool **L**, install oil seal (36) to motor case (17).

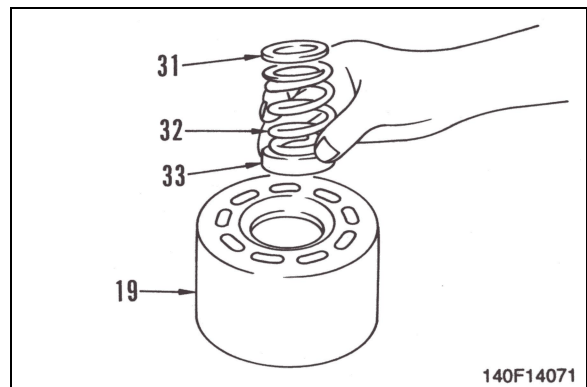
 Lip of oil seal: **Grease (G2-LI)**

- 3) Fit spacer (35) and install snap ring (34).
 - ★ Check that the snap ring is securely fitted into the groove.

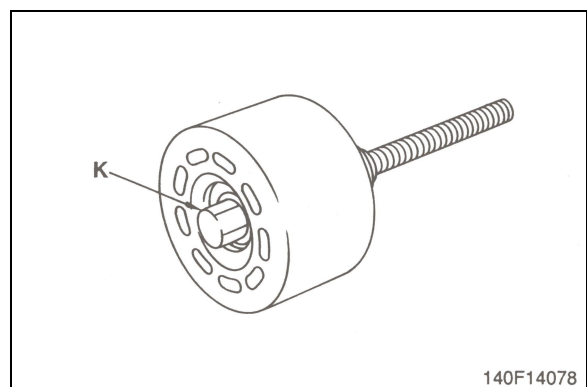


2. Cylinder block, piston assembly

- 1) Assembly of cylinder block
 - i) Assemble spacer (33), spring (32), spacer (31) to cylinder block (19).
 - ★ Assemble spacer (33) with the inside taper facing down.



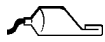
- ii) Set tool **K** to cylinder block (19).
- iii) Hold bolt of tool **K** with wrench, tighten nut and compress spring (29), then install snap ring (30).
 - ★ Check that the snap ring is securely fitted into the groove.
- iv) Remove tool **K**.



INSTALLATION OF FINAL DRIVE ASSEMBLY

- Carry out installation in the reverse order to removal.

※ 1



Thread of bracket mounting bolt:
Thread tightener (LT-2)

※ 2

- ★ Be careful not to damage the seal when installing.



Cover mounting bolt:
110.3 ± 12.3 Nm {11.25 ± 1.25 kgm}

※ 3



Final drive assembly mounting bolt:
549 ± 59 Nm {56 ± 6 kgm}

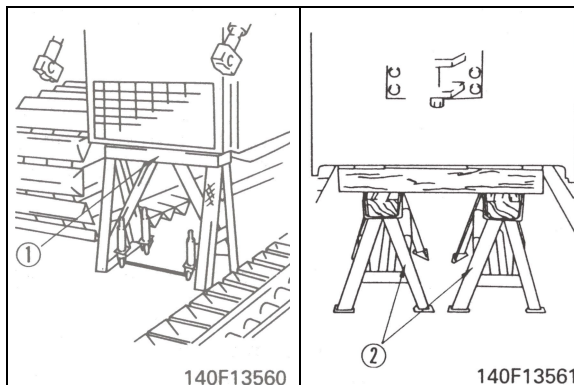
※ 4



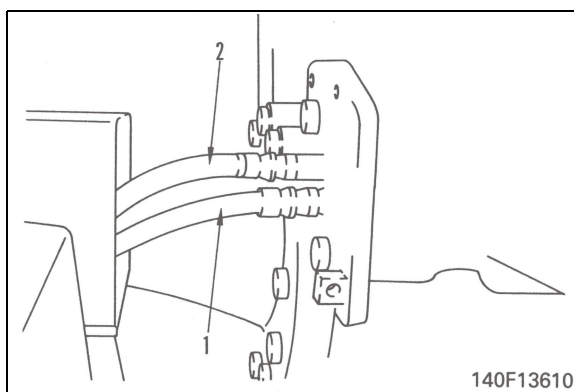
Cover mounting bolt:
277 ± 32 Nm {28.25 ± 3.25 kgm}

REMOVAL OF TRACK FRAME ASSEMBLY

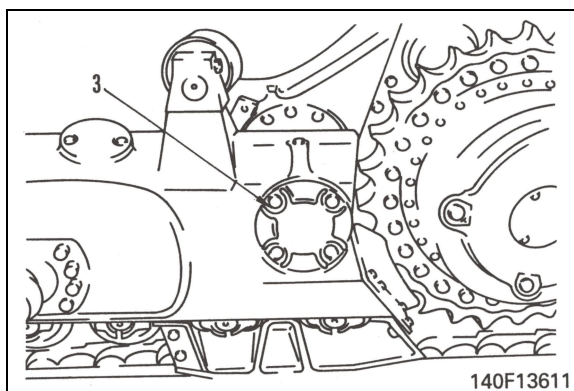
1. Remove track shoe assembly.
For details, REMOVAL OF TRACK SHOE ASSEMBLY.
2. Using jack (50 ton), jack up chassis, then set stands ① and ② (height: Approx. 900 mm) under front frame and steering case.



3. Remove tilt cylinder hose protection cover, then disconnect hoses (1) and (2). (On inside of track frame on right side of chassis).



4. Remove pivot shaft cover (3). ※ 1
5. Remove equalizer bar side pin (4). ※ 2
 - ★ Sling the track frame assembly, remove cover (5) and outside bushing (6), then knock out the pin and remove inside bushing (7).
 - ★ When knocking out the pin, catch the inside bushing and be careful not to drop it.
6. Remove pivot shaft bolt (8) and plate (9), then lift off track frame assembly (10). ※ 3

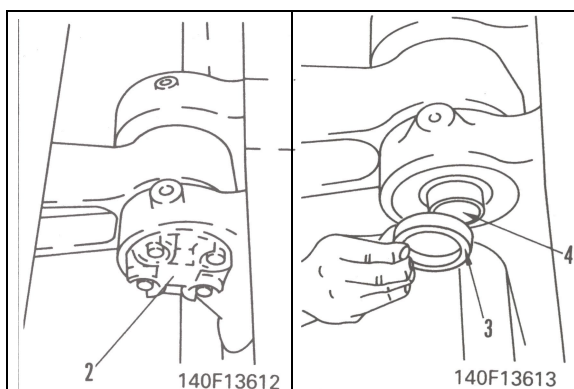


Track frame assembly:

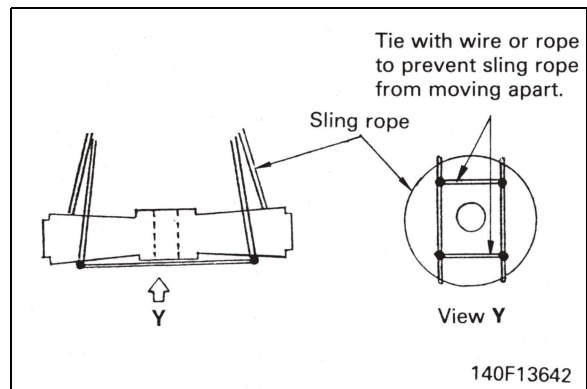
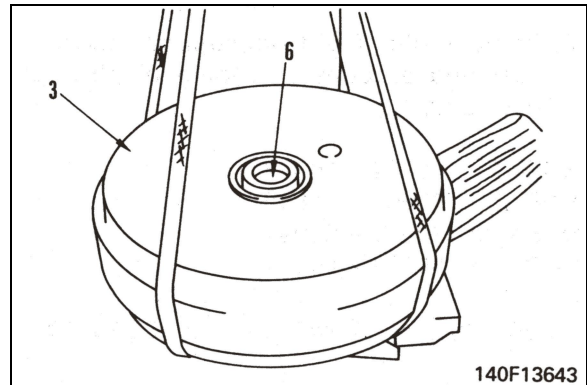
1600 kg (D65EX)
1800 kg (D65PX)



Pivot chamber: **Approx. 4.5 l**



6. Raise idler (3) and assemble to shaft and support assembly (6).



7. Using tool **G4**, assemble floating seal (7) to idler (3).

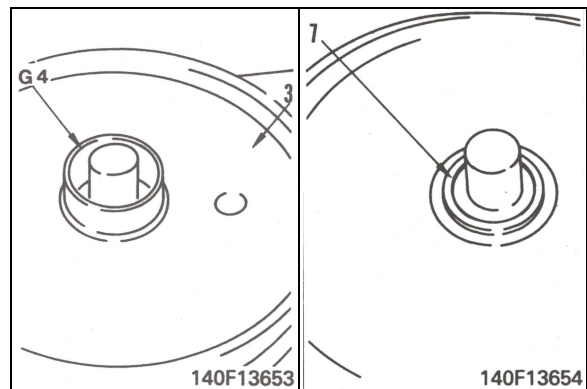
- ★ When assembling the floating seal, clean the thick line portion (O-ring and O-ring contact surface), remove all oil and grease, and dry it.



8. Refill idler with oil.

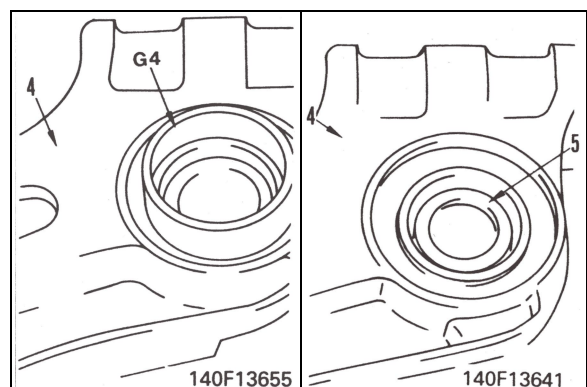


Idler: **150 cc (EO-30)**



9. Using tool **G4**, assemble floating seal (5) to support (4).

- ★ When assembling the floating seal, clean the thick line portion (O-ring and O-ring contact surface), remove all oil and grease, and dry it.



CHECKING BEFORE REMOVAL OF TRACK SHOE ASSEMBLY

⚠ In some cases, it may be extremely dangerous to remove the track shoe assembly. To prevent danger, carry out the following checks before removing the track shoe assembly.

- **Check before starting**

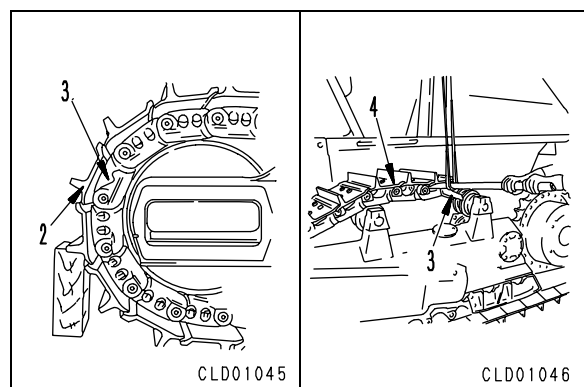
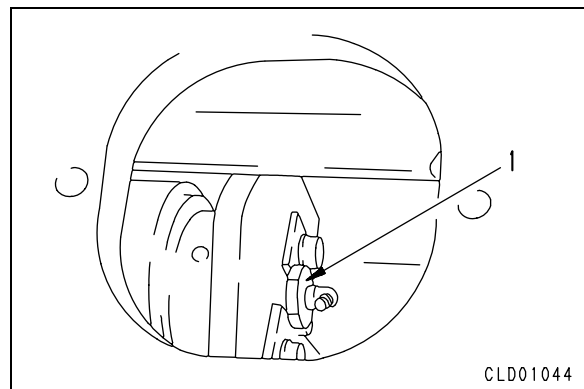
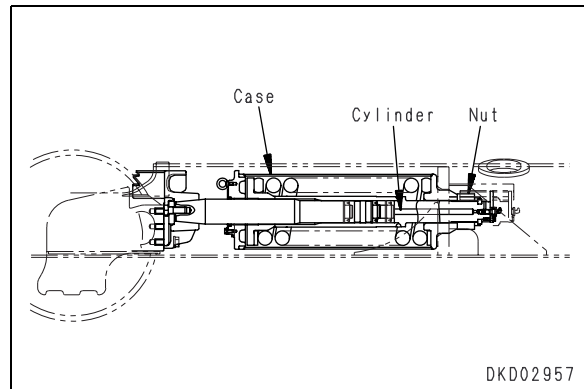
- 1) Loosen the lubricator at the adjustment cylinder, remove the grease, move the machine backwards and forwards a short distance, and check that the track tension is relieved. If the track tension is not relieved and the track shoe assembly remains tense, there may be an abnormality inside the track frame (the recoil spring cylinder is broken, or the nut at the end of shaft has fallen off).

⚠ Never loosen the lubricator more than one turn.

REMOVAL OF TRACK SHOE ASSEMBLY (NORMAL)

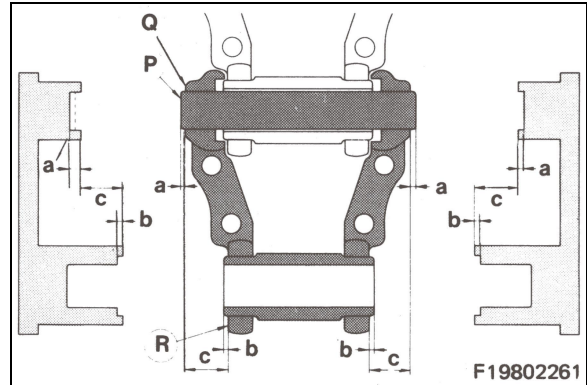
★ If CHECKING BEFORE REMOVAL OF TRACK SHOE ASSEMBLY shows that there is no abnormality, do as follows.

1. Set master link in position
 - ★ Set a block (height: approx. 300 mm) so that the master link is approx. 500 mm from the ground at the front.
2. Relieve track shoe tension. ※ 1
 - ⚠** Never loosen lubricator (1) more than one turn.
 - ★ If the track is not relieved by loosening the lubricator, move the machine backwards and forwards.
3. Remove mounting bolts of track shoe (2) and master link (3). ※ 2
4. Raise tip of master link, move machine forwards slowly, and lay out track shoe assembly (4).



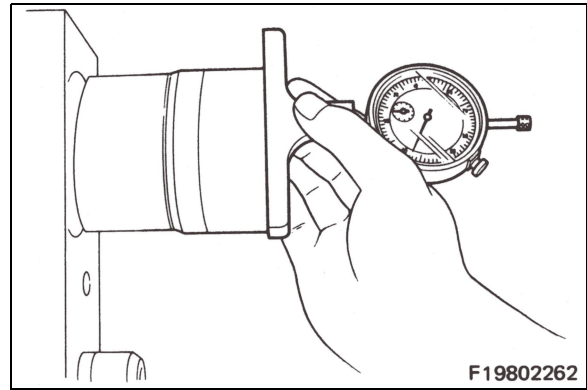
7) In order to keep the protrusion of the pin and bushing constant and the installation dimensions of the steel within the specified value during assembly, adjust the press-fitting jig dimensions of the link press.

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



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

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



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

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

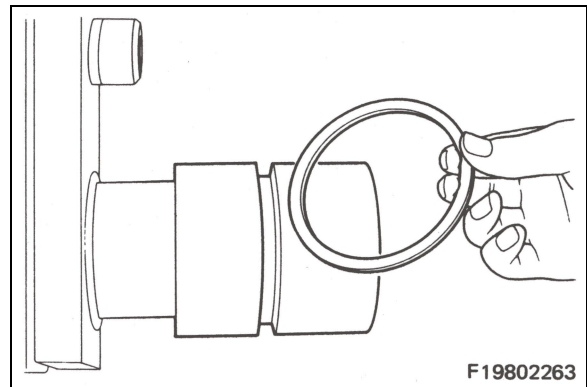
★ If the pushing force is too strong, excessive force will be brought to bear on the spacer, and it will be pushed against the bushing. This will cause the spacer to break or will cause abnormal wear between the spacer and bushing end face.

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

★ Set pushing force of pin and bushing:
588 KN (60 ton)

Set pushing force $\approx 1.8 \times$ average pushing force

(Adjust the relief pressure of link press to fix the set pushing force)



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

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

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

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

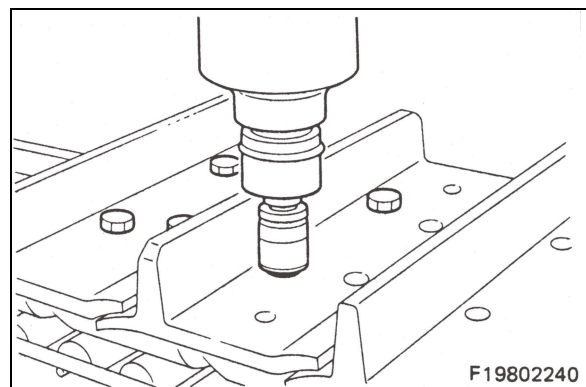
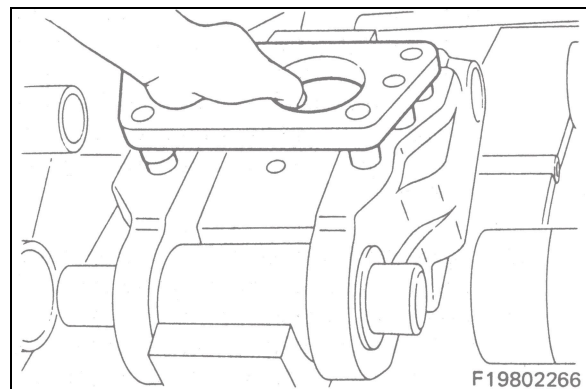
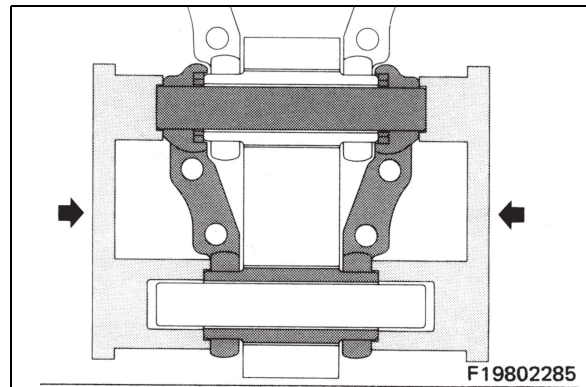
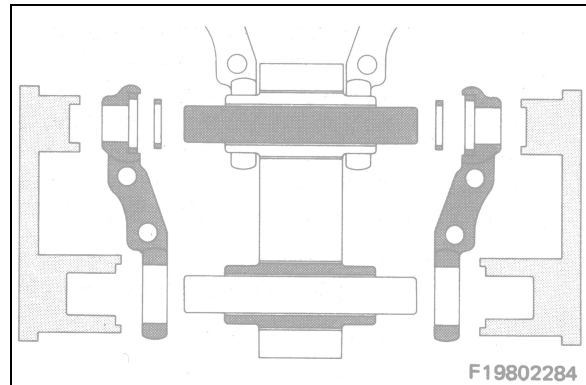
★ When press fitting, the seal may come off the link due to the play, so press fit smoothly. If the seal comes off the link, stop the press-fitting operation and fit the seal correctly on the link, then start the press-fitting operation again.

★ Set pushing force of pin and bushing:
 $588 \text{ KN } \{60 \text{ ton}\}$
 Set pushing force $\approx 1.8 \times$ average pushing force
 (Adjusting the relief pressure of link press to fix the set pushing force)

8) Using a shoe bolt hole pitch gauge, check that the distance between the shoe bolt holes is within the standard value.


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

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



3. Shoe (regular link portion)

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

 Shoe bolt (regular link):
 Initial tightening torque:
 $392.3 \pm 39.2 \text{ Nm } \{40 \pm 4 \text{ kgm}\}$
 Tightening angle: $120 \pm 10^\circ$

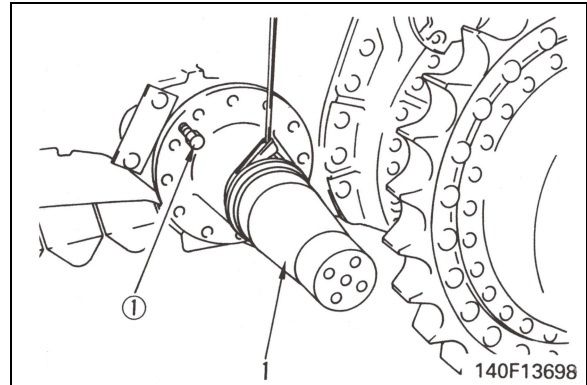
REMOVAL OF PIVOT SHAFT ASSEMBLY

1. Remove track frame assembly.
For details, see REMOVAL OF TRACK FRAME ASSEMBLY.
2. Sling pivot shaft assembly (1).
3. Remove mounting bolts, then forcing screws ①, raise pivot shaft assembly and pull out. ※ 1



Pivot shaft assembly:

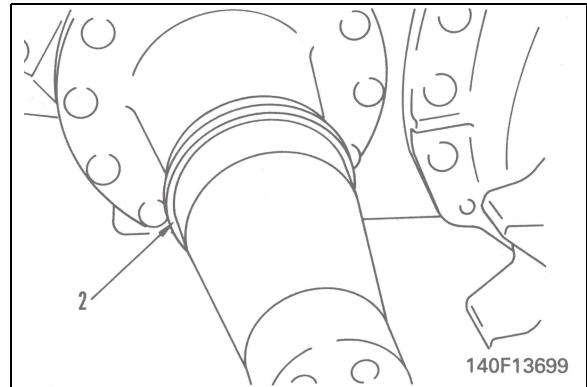
90 kg (D65EX)
100 kg (D65PX)



4. Remove seal (2). ※ 2
5. Remove ring (3). ※ 3

INSTALLATION OF PIVOT SHAFT ASSEMBLY

- Carry out installation in the reverse order to removal.



※ 1

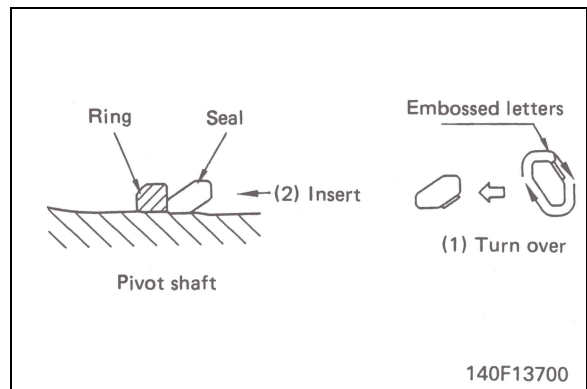


Pivot shaft mounting bolt:

594 ± 59 Nm {56 ± 6 kgm}

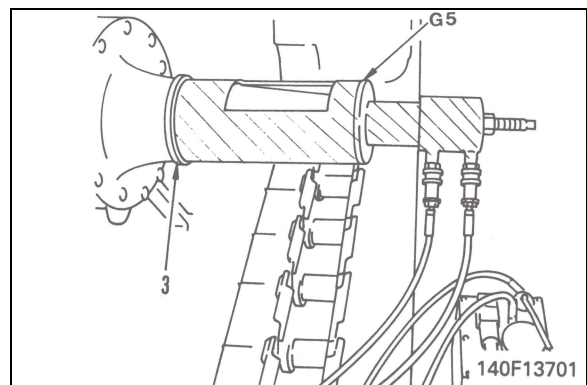
※ 2

- ★ Assemble the seal as follows (see diagram on right)
 - 1) Turn over the seal so that the embossed letters on the seal are on the inside.
 - 2) With the seal turned over, insert the seal on the shaft.
- ★ When inserting the seal, be careful not to damage the surface.

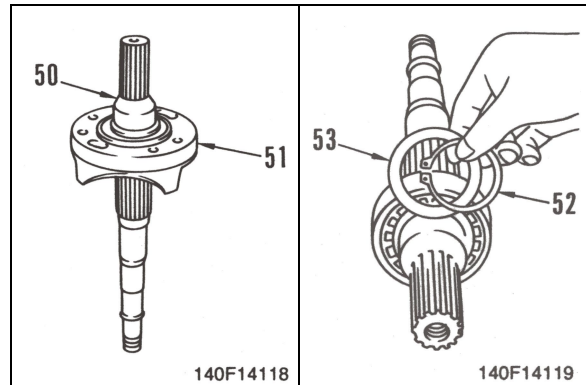


※ 3

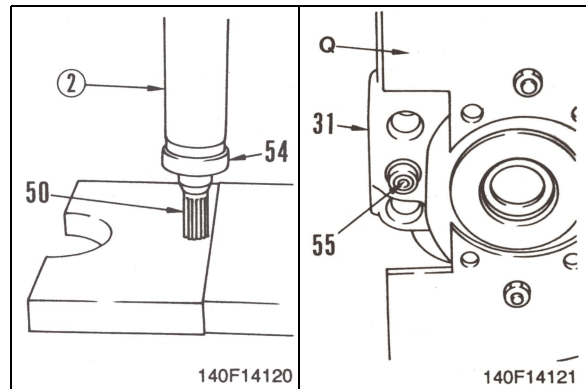
- ★ Press fit ring (3) using tool G5.
- ★ Press fitting force: 1.9 ton



- Disassembly of shaft, cradle assembly
- 1) Push cradle (51) with a hydraulic press, taking care that it is not at an angle, and remove from shaft (50).
 - 2) Remove snap ring (52), then remove washer (53).

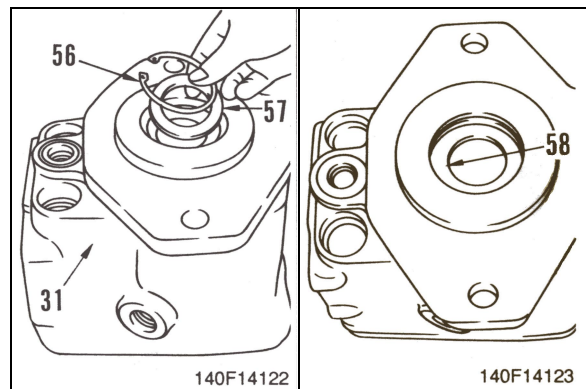


- 3) Using push tool ②, pull out bearing (54) from shaft (50).
 - ★ Bearing (54) divides into two parts (flange and bearing), so be careful not to lose either part.
 - ★ Check the direction of assembly of the bearing.



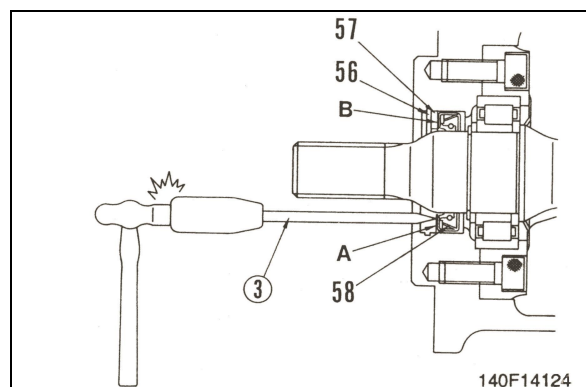
8. Disassembly of pump case

- 1) Loosen nut of swash plate adjustment screw (55), remove screw (55), then remove pump case (31) from tool Q.
 - ★ Before loosening the nut, measure the dimension between the end face of the case and the end face of screws.
- 2) Remove snap ring (56) from pump case (31), then remove spacer (57).
- 3) Remove oil seal (58).




9. When replacing oil seal only (there is no need to disassemble), replace oil seal as follows.

- 1) Remove snap ring (56) and spacer (57).
- 2) Hit end of bar ③ with a hammer to pierce oil seal (58) to the core, then twist to remove.
 - ★ Hit at a point close to the middle of the inside and outside diameter of the oil seal, and twist at two places on opposite sides as shown by A and B in the diagram. This marks it easier to remove.
 - ★ Be careful not to damage the shaft.




REMOVAL OF PPC PUMP ASSEMBLY

1. Drain hydraulic oil.

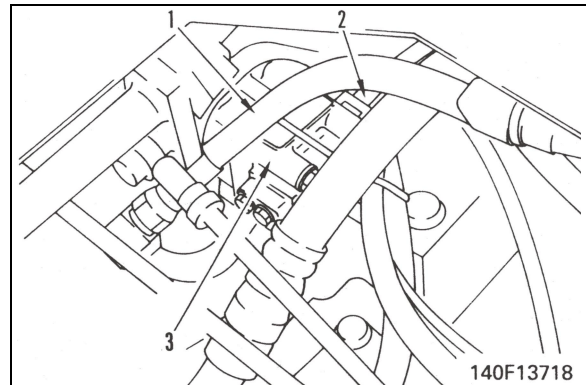
 Hydraulic tank: **55 ℓ**

2. Remove operator's seat assembly, then remove right side cover.

 Operator's seat assembly: **35 kg**

3. Disconnect hoses (1) and (2).

4. Remove PPC valve pump assembly (3).



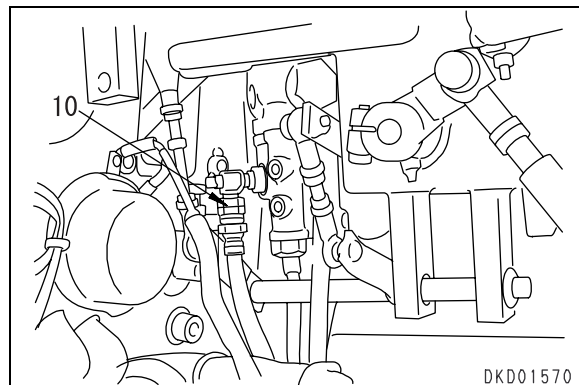
INSTALLATION OF PPC PUMP ASSEMBLY

- Carry out installation in the reverse order to removal.
- **Refilling with oil (hydraulic tank)**
 - ★ Add oil through oil filler to the specified level.
Run the engine to circulate the oil through the system.
Then check the oil level again.

10. Disconnect 4 PPC valve assembly mounting houses (10). ※ 2

- ★ Mark the hose with tabs to prevent any mistake when assembling the hoses.

11. Remove PPC valve assembly (11).



INSTALLATION OF PPC VALVE ASSEMBLY

FOR STEERING


- Carry out installation in the order to removal.


※ 1

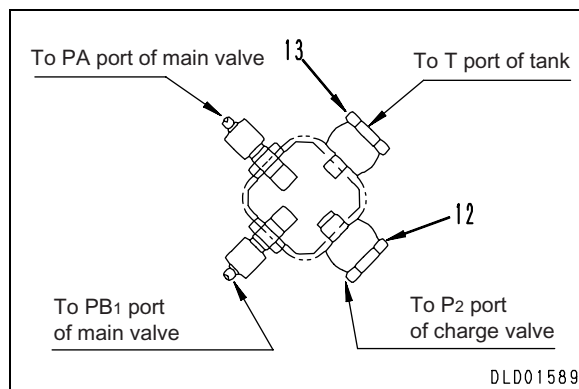
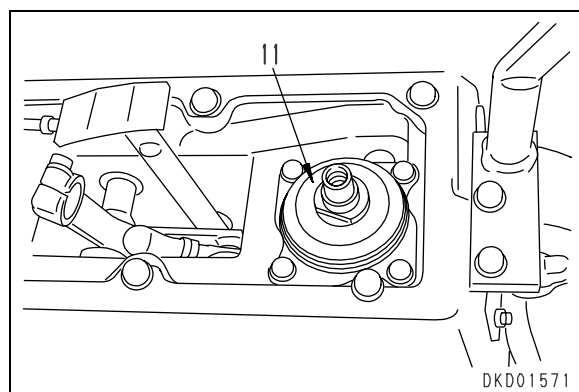
- ★ Adjust the cable.
For details, see TESTING AND ADJUSTING, Adjusting fuel control linkage.

※ 2

- ★ Connect the PPC hoses as shown in the diagram.

 kgm Hose mount joint bolt (12):
39.2 ± 4.9 Nm {4.0 ± 0.5 kgm}

 kgm Hose mount joint bolt (13):
29.4 ± 4.9 Nm {3.0 ± 0.5 kgm}



DISASSEMBLY OF HYDRAULIC CYLINDER ASSEMBLY (BLADE LIFT, BLADE TILT CYLINDER)

1. Remove tube from cylinder assembly.

2. Set cylinder assembly (1) to tool H1.

3. Piston rod assembly

- Lift cylinder

1) Using tool H2, disconnect cylinder head assembly (2).

2) Pull out piston rod assembly (3).

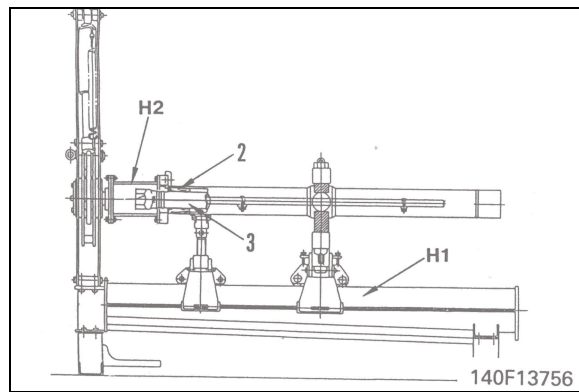
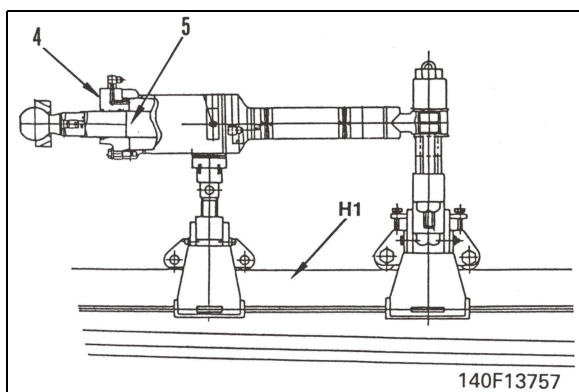
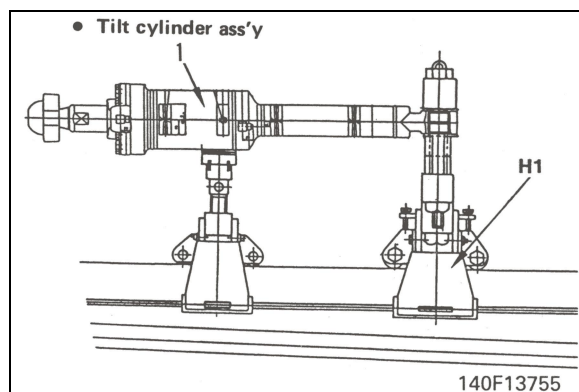
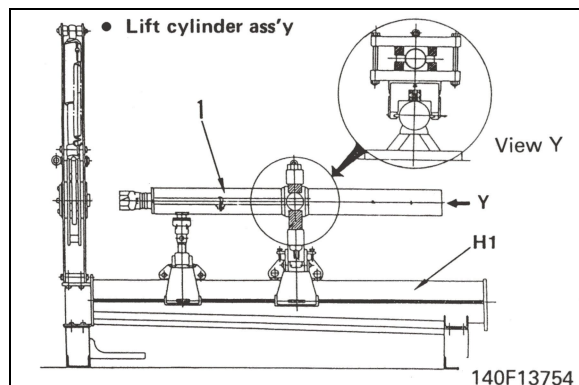
★ Place an oil container under the cylinder to catch the oil.

- Tilt cylinder

1) Remove mounting bolts, and disconnect cylinder head assembly (4).

2) Pull out piston rod assembly (5).

★ Place an oil container under the cylinder to catch the oil.



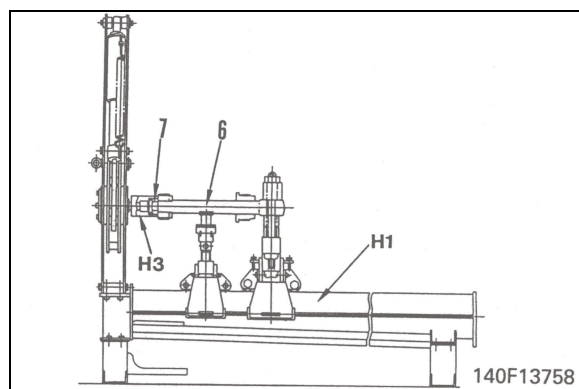
4. Piston, head assembly

- Lift, tilt cylinder

1) Set piston rod assembly (6) to tool H1.


2) Using tool H3, remove nut (7).

| Cylinder | Width across flat of nut |
|---------------|--------------------------|
| Lift cylinder | 50 mm |
| Tilt cylinder | 80 mm |



8. Sling right straight frame (9), assemble to blade, then install pin (10), and set block under straight frame.

 Pin: **Grease (G2-LI)**

 Straight frame: **255 kg**

9. Sling right center brace (7), and assemble to straight frame, then install pin (8).


 Pin: **Grease (G2-LI)**

10. Sling tilt cylinder (3), and install pin (5), then assemble shim to spherical surface at cylinder rod end and tighten with bolt (6).

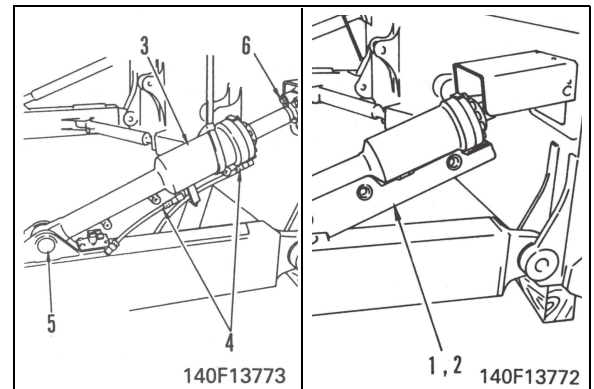
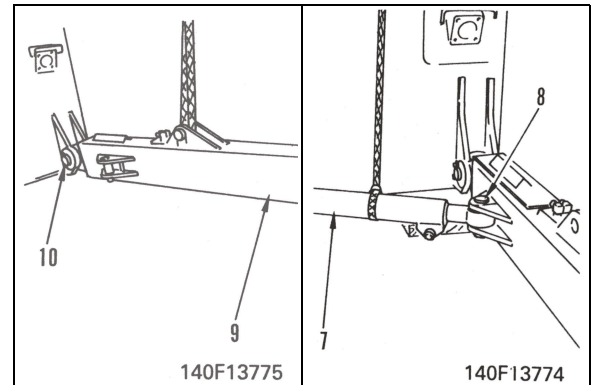
★ Check the thickness and number of shims that were removed, and assemble them in the same place.

Standard shim thickness: **5 mm**

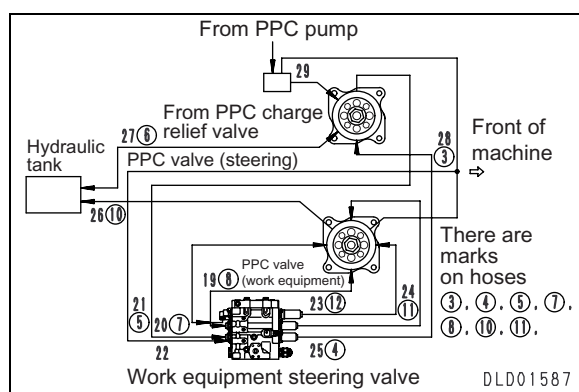
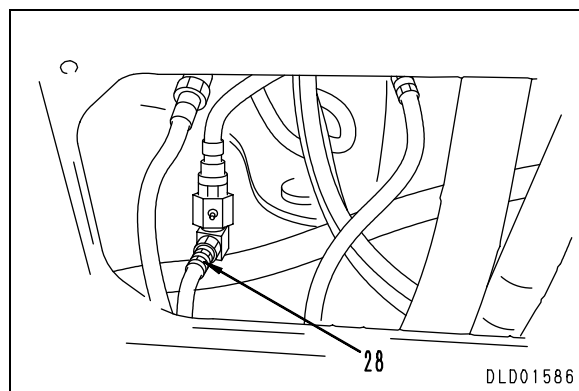
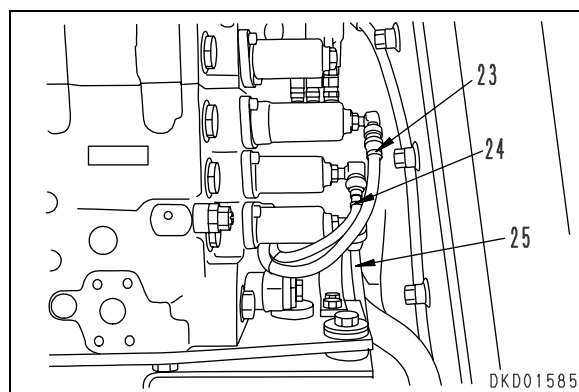
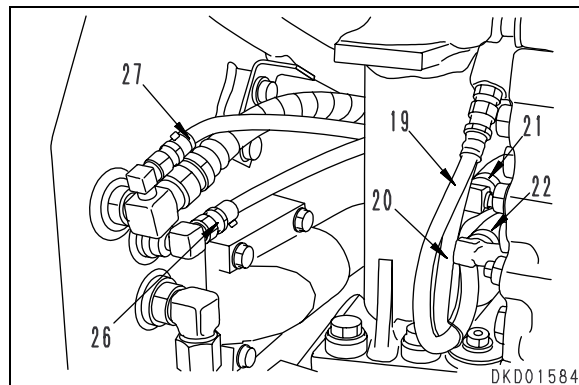
 Pin: **Grease (G2-LI)**

 Tilt cylinder: **75 kg**

11. Connect hose (4) and install covers (2) and (1).



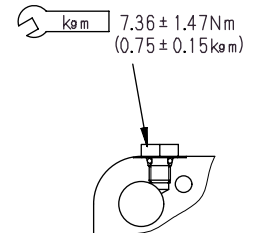
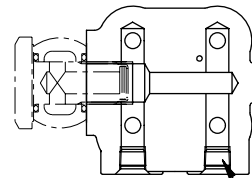
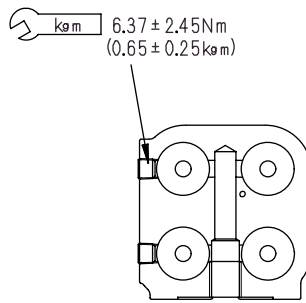
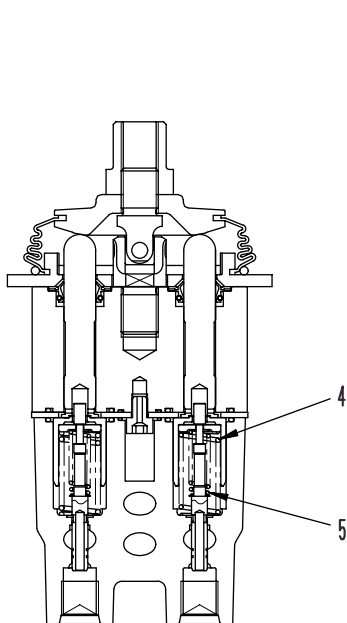
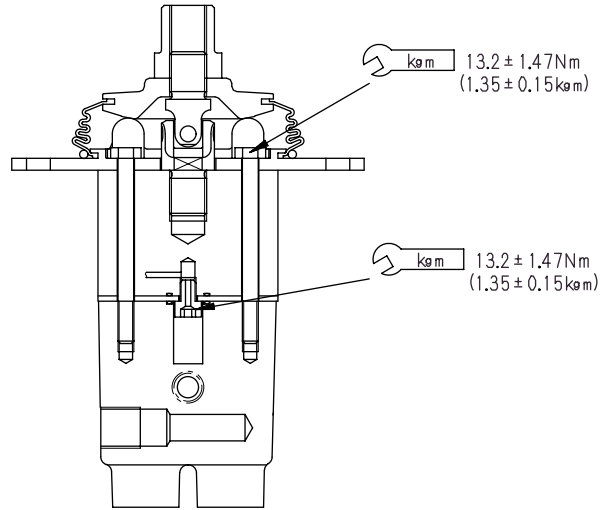
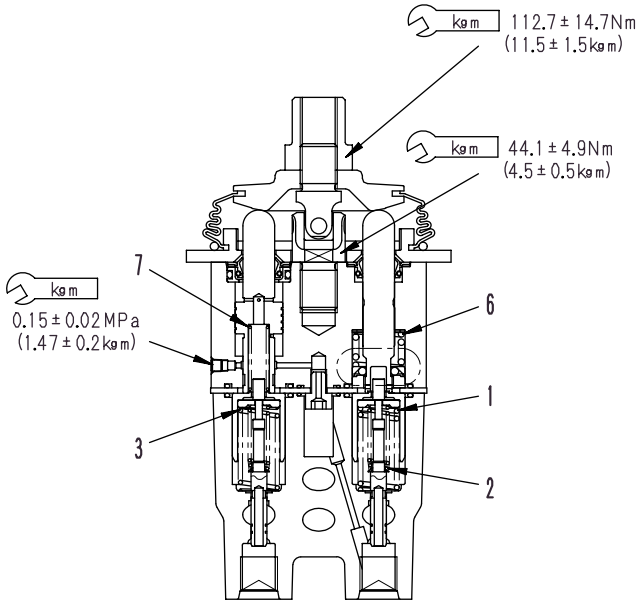
17. Disconnect pilot hoses (19), (20), (21), (22), (23), (24), (25), (26), (27) and (28).



Unit: mm

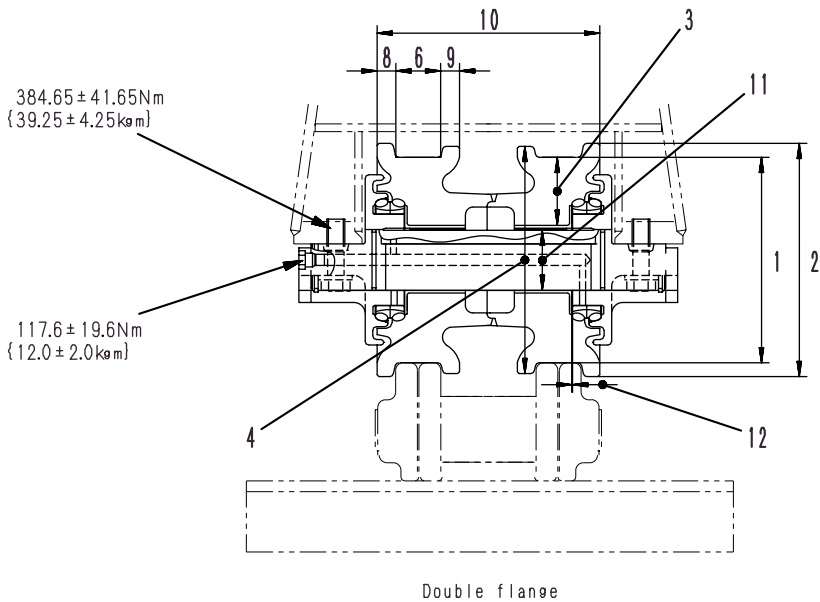
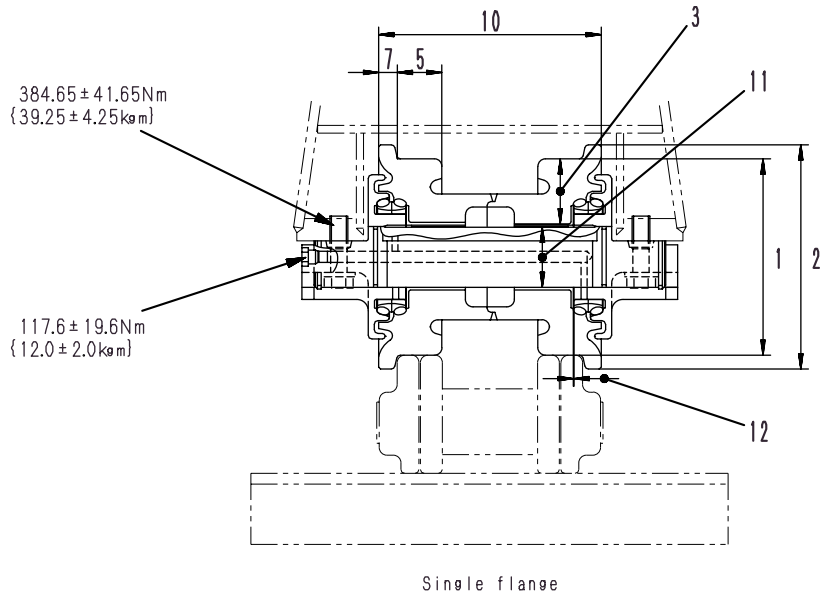
| No. | Check item | Criteria | | | | | Remedy |
|-----|---|------------------------------|---------------------------|--|--------------|------------------------------|---------|
| | | Standard size | | | Repair limit | | |
| 1 | No.1 clutch spring (X10) | Free length | Installed length | Installed load | Free length | Installed load | Replace |
| | | 69.5 | 58.7 | 233 N {23.8 kg} | 65.3 | 198 N {20.2 kg} | |
| | | 2 | No. 2 clutch spring (X10) | 69.5 | 63.6 | 127 N {13.0 kg} | |
| 3 | No. 3 clutch spring (X10) | 59 | 44.1 | 146 N {14.9 kg} | 55.5 | 125 N {12.7 kg} | |
| 4 | No. 4 clutch spring (X10) | 59 | 44.5 | 142 N {14.5 kg} | 55.5 | 121 N {12.3 kg} | |
| 5 | No. 5 clutch spring (X10) | 59 | 44.3 | 144 N {14.7 kg} | 55.5 | 123 N {12.5 kg} | |
| 6 | Total assembled thickness of No. 1 clutch | Standard size | | Tolerance | | Repair limit | |
| | | 36.2 | | ± 0.3 | | 32.2 | |
| 7 | Total assembled thickness of No. 2 clutch | 49.4 | | ± 0.4 | | 43.8 | |
| 8 | Total assembled thickness of No. 3 clutch | 29.6 | | ± 0.3 | | 26.4 | |
| 9 | Total assembled thickness of No. 4 clutch | 29.6 | | ± 0.3 | | 26.4 | |
| 10 | Total assembled thickness of No. 5 clutch | 23.0 | | ± 0.3 | | 20.6 | |
| 11 | Thickness of No. 1 – 5 clutch discs | 3.4 | | ± 0.1 | | 2.6 | |
| 12 | Thickness of No. 1 – 5 clutch plates | 3.2 | | ± 0.1 | | 2.9 | |
| 13 | Wear of seal ring on transmission input shaft | Width: 3.0 Thickness: 2.3 | | Width: -0.01 -0.03 Thickness: ± 0.10 | | Width: 2.7 Thickness: 2.2 | |

● FOR BLADE LIFT, BLADE TILT



SKD00595

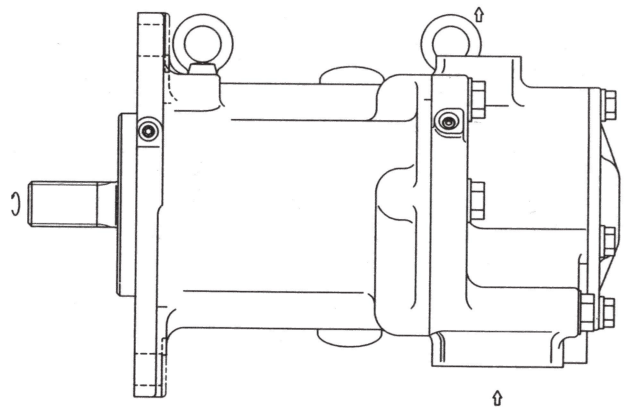
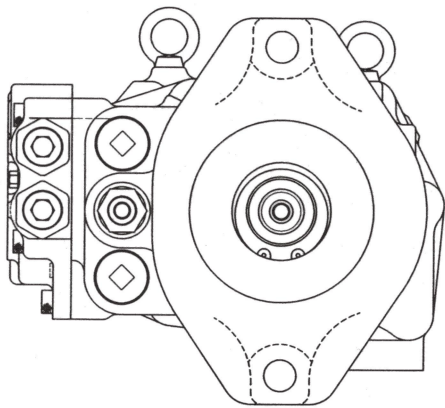
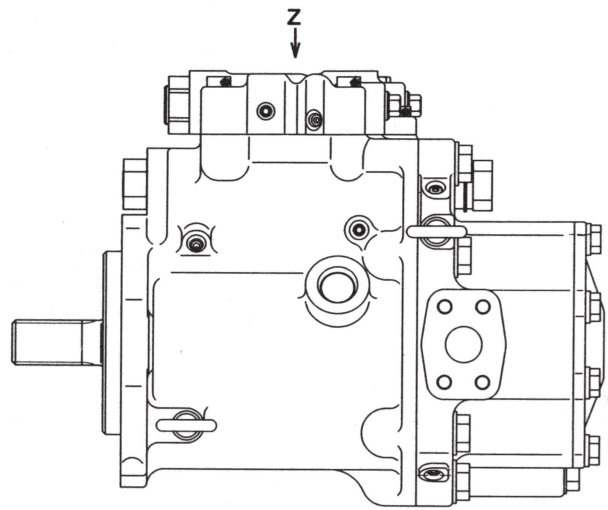
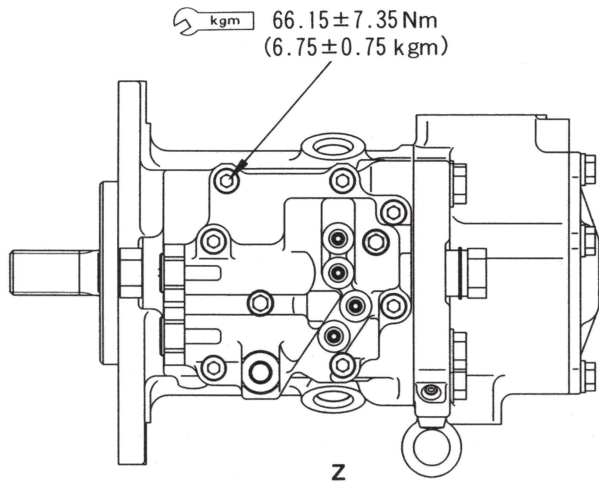
TRACK ROLLER



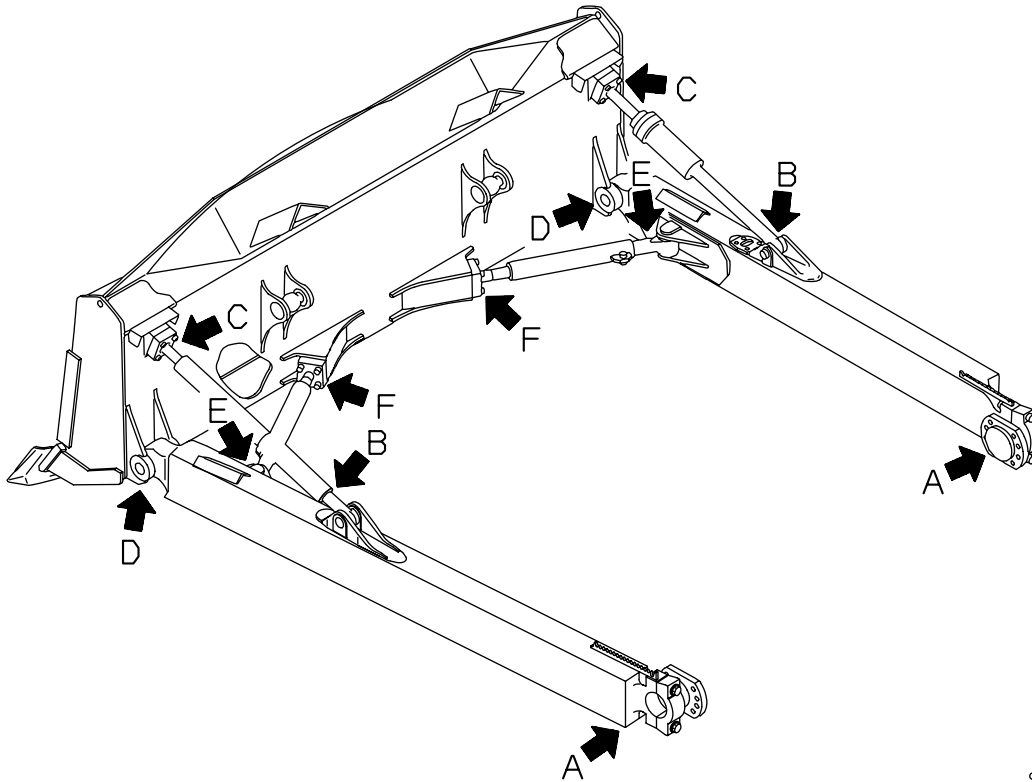
SWD04055

HYDRAULIC, HSS PUMP

- HPV 95



140F12248



SJD04785

Unit: mm

| No. | Check item | Criteria | | | | | Remedy | |
|-------|--|-------------------------|--------------|--------------|--------------------|-----------------|------------------------|--|
| | | Standard size | Tolerance | | Standard clearance | Clearance limit | | |
| Shaft | Hole | | | | | | | |
| 1 | Clearance between trunnion and spherical surface of cap | 140 | -0.1 -0.5 | +1.5 0 | 0.1 — 2.0 | 3 | Replace | |
| 2 | Clearance between brace mounting pin and bracket | 50 | -0.2 -0.4 | +0.2 0 | 0.2 — 0.6 | 2 | | |
| 3 | Clearance between brace mounting pin and brace | 50 | -0.2 -0.4 | +0.2 0 | 0.2 — 0.6 | 2 | | |
| 4 | Clearance between bracket and spherical surface of brace | 90 (Shaft) 91 (Hole) | -0.1 -0.3 | +1 0 | 0.2 — 0.5 | 2 | Adjust shim or replace | |
| 5 | Clearance between bearing and spherical surface of bushing | Straight tiltdozer | 90 | -0.1 -0.5 | +0.5 0 | 0.1 — 1.0 | 2 | |
| | | Semi U-dozer | 100 | -0.1 -0.5 | +0.5 0 | 0.1 — 1.0 | 2 | |
| 6 | Clearance between brace mounting pin and bracket | 55 | 0 -0.3 | +0.6 -0.2 | 0.2 — 0.9 | 2 | Replace | |
| 7 | Clearance between frame mounting pin and bearing | 55 | 0 -0.3 | +0.5 +0.2 | 0.2 — 0.8 | 2 | | |
| 8 | Clearance between brace mounting pin and bracket | 50 | -0.2 -0.4 | +0.2 0 | 0.2 — 0.6 | 2 | | |
| 9 | Clearance between brace mounting pin and brace | 50 | -0.2 -0.4 | +0.2 0 | 0.2 — 0.6 | 2 | | |
| 10 | Clearance between bracket and spherical surface of brace | 90 (Shaft) 91 (Hole) | -0.1 -0.3 | +1 0 | 0.2 — 0.5 | 2 | Adjust shim or replace | |

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