SHOP MANUAL

KOMATSU

PC750SE-6K

MACHINE MODEL	SERIAL NUMBER
PC750SE-6K	**K30001 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.
- PC750SE-6K mount the CUMMINS QSK19 engine.
  For details of the engine, see the QSK19 Engine Shop Manual

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HOISTING INSTRUCTIONS

HOISTING

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

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

WIRE ROPES

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

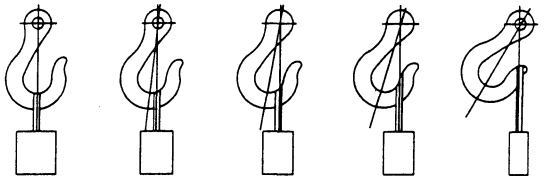
Wire ropes
(Standard "Z" or "S" twist ropes without galvanizing)

Rope diameter	Allowable load	
mm	kN	tons
10	9.8	1.0
11.2	13.7	1.4
12.5	15.7	1.6
14	21.6	2.2
16	27.5	2.8
18	35.3	3.6
20	43.1	4.4
22.4	54.9	5.6
30	98.1	10.0
40	176.5	18.0
50	274.6	28.0
60	392.2	40.0

★ The allowable load value is estimated to be one-sixth or one-seventh of the breaking strength of the rope used.

2) Sling wire ropes from the middle portion of the hook.

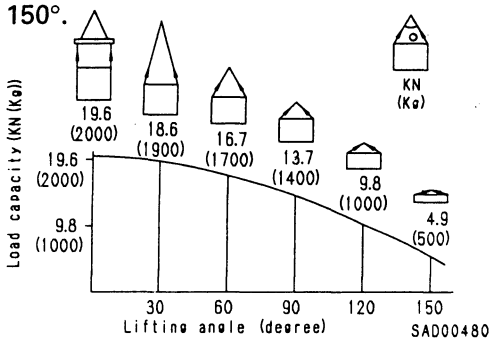
Slinging near the edge of the hook may cause the rope to slip off the hook during hoisting, and a serious accident can result. Hooks have maximum strength at the middle portion.



SAD00479

3) Do not sling a heavy load with one rope alone, but sling with two or more ropes symmetrically wound onto the load.
⚠ Slinging with one rope may cause turning of the load during hoisting, untwisting of the rope, or slipping of the rope from its original winding position on the load, which can result in a dangerous accident.

4) Do not sling a heavy load with ropes forming a wide hanging angle from the hook. When hoisting a load with two or more ropes, the force subjected to each rope will increase with the hanging angles. The table below shows the variation of allowable load kN {kg} when hoisting is made with two ropes, each of which is allowed to sling up to 9.8 kN {1000 kg} vertically, at various hanging angles.
When two ropes sling a load vertically, up to 19.6 kN {2000 kg} of total weight can be suspended. This weight becomes 9.8 kN {1000 kg} when two ropes make a 120° hanging angle. On the other hand, two ropes are subjected to an excessive force as large as 39.2 kN {4000 kg} if they sling a 19.6 kN {2000 kg} load at a lifting angle of 150°.



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kgm to ft. lb

1 kgm = 7.233 ft. lb

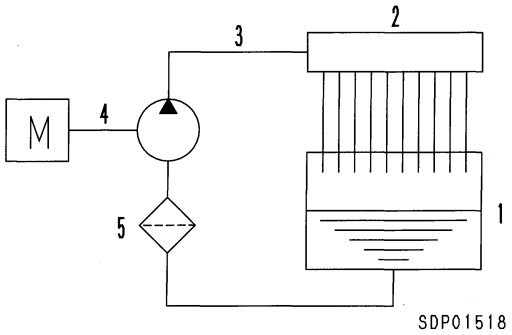
	0	1	2	3	4	5	6	7	8	9
0	0	7.2	14.5	21.7	28.9	36.2	43.4	50.6	57.9	65.1
10	72.3	79.6	86.8	94.0	101.3	108.5	115.7	123.0	130.2	137.4
20	144.7	151.9	159.1	166.4	173.6	180.8	188.1	195.3	202.5	209.8
30	217.0	224.2	231.5	238.7	245.9	253.2	260.4	267.6	274.9	282.1
40	289.3	296.6	303.8	311.0	318.3	325.5	332.7	340.0	347.2	354.4
50	361.7	368.9	376.1	383.4	390.6	397.8	405.1	412.3	419.5	426.8
60	434.0	441.2	448.5	455.7	462.9	470.2	477.4	484.6	491.8	499.1
70	506.3	513.5	520.8	528.0	535.2	542.5	549.7	556.9	564.2	571.4
80	578.6	585.9	593.1	600.3	607.6	614.8	622.0	629.3	636.5	643.7
90	651.0	658.2	665.4	672.7	679.9	687.1	694.4	701.6	708.8	716.1
100	723.3	730.5	737.8	745.0	752.2	759.5	766.7	773.9	781.2	788.4
110	795.6	802.9	810.1	817.3	824.6	831.8	839.0	846.3	853.5	860.7
120	868.0	875.2	882.4	889.7	896.9	904.1	911.4	918.6	925.8	933.1
130	940.3	947.5	954.8	962.0	969.2	976.5	983.7	990.9	998.2	1005.4
140	1012.6	1019.9	1027.1	1034.3	1041.5	1048.8	1056.0	1063.2	1070.5	1077.7
150	1084.9	1092.2	1099.4	1106.6	1113.9	1121.1	1128.3	1135.6	1142.8	1150.0
160	1157.3	1164.5	1171.7	1179.0	1186.2	1193.4	1200.7	1207.9	1215.1	1222.4
170	1129.6	1236.8	1244.1	1251.3	1258.5	1265.8	1273.0	1280.1	1287.5	1294.7
180	1301.9	1309.2	1316.4	1323.6	1330.9	1338.1	1345.3	1352.6	1359.8	1367.0
190	1374.3	1381.5	1388.7	1396.0	1403.2	1410.4	1417.7	1424.9	1432.1	1439.4

SPECIFICATIONS

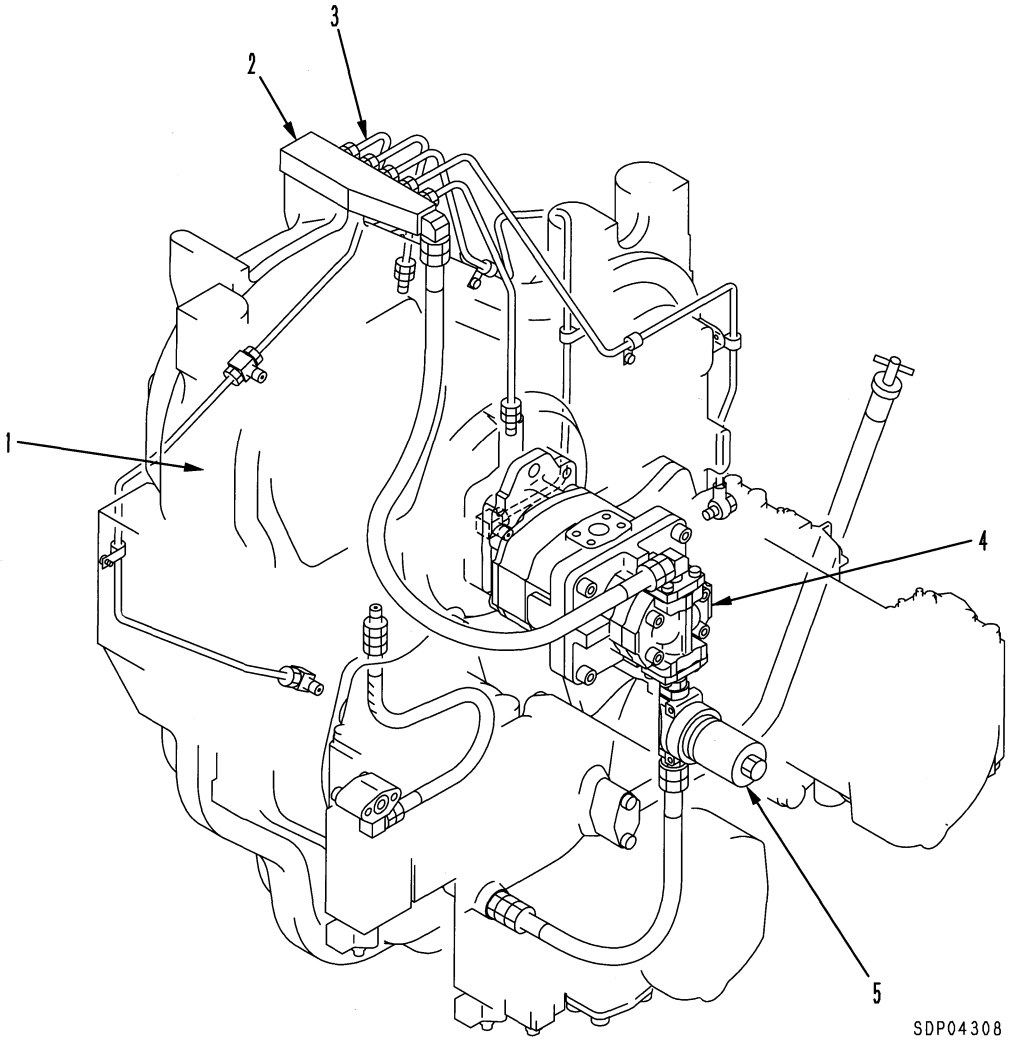
Machine model				PC750SE-6K (STD)	PC750SE-6K (OPTINAL WORK EQUIPMENT)
Serial Number				30001 and up	30001 and up
Bucket capacity			m^3	4.0	3.4
Weight of machine			kg	76,245	76,560
Performance	Working ranges	Max. digging depth	mm	7,015	8,445
		Max. vertical wall depth	mm	4,930	5,865
		Max. digging reach	mm	12,155	13,660
		Max. reach at ground level	mm	11,865	13,400
		Max. digging height	mm	11,510	11,955
		Max. dumping height	mm	7,565	8,235
	Max. digging force		kN {kg}	391.3 {39,900}	309 {31,500}
	Swing speed		rpm	5.7	5.7
	Swing max. slope angle		deg.	12	12
	Travel speed		km/h km/h	Low speed: 2.7 High speed: 4.2	Low speed: 2.7 High speed: 4.2
	Gradeability		deg.	35	35
	Ground pressure (standard double grouser shoe width: 610 mm)		kPa {kg/cm²}	123.9 {1.263}	123.9 {1.263}
Dimensions	Overall length		mm	12,870	13,820
	Overall width		mm	4,405	4,405
	Overall width of track (when extended)		mm	3,390 (4,110)	3,390 (4,110)
	Overall height		mm	4,705	4,785
	Overall height to top of machine		mm	4,515	4,515
	Ground clearance of upper structure		mm	1,555	1,555
	Min. ground clearance		mm	840	840
	Tail swing radius		mm	4,300	4,300
	Min. swing radius of work equipment		mm	5,385	5,830
	Height of work equipment at min. swing radius		mm	9,685	10,430
	Length of track on ground		mm	4,500	4,500
	Track gauge (when extended)		mm	2,780 (3,500)	2,780 (3,500)
	Height of machine cab		mm	3,515	3,515

PTO LUBRICATION SYSTEM

Hydraulic circuit diagram



Hydraulic piping diagram

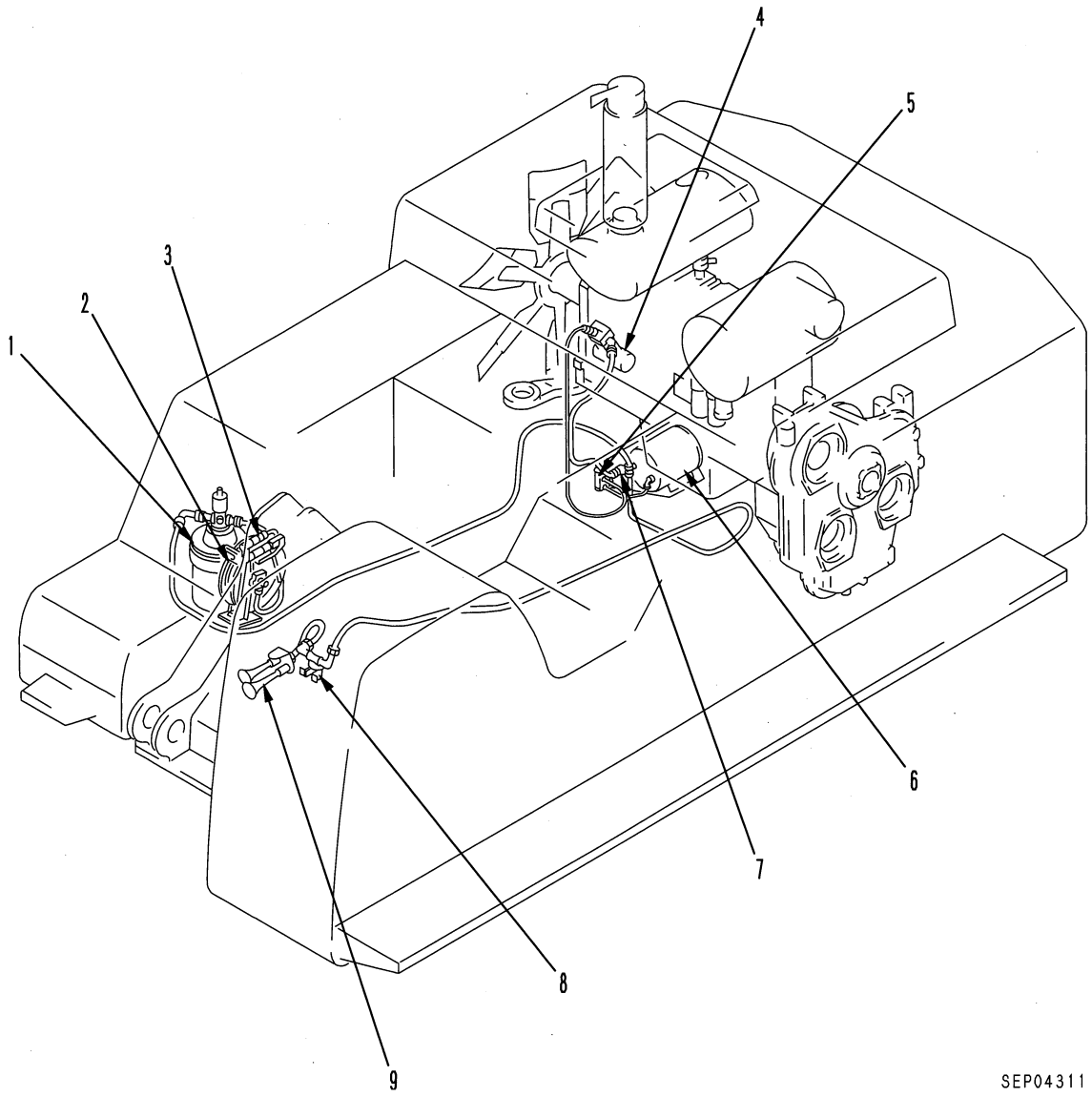


1. PTO case
2. Divider block
3. Lubricating pipe
4. Control, PTO lubricating pump (SAR80+8)
5. Oil filter

Outline

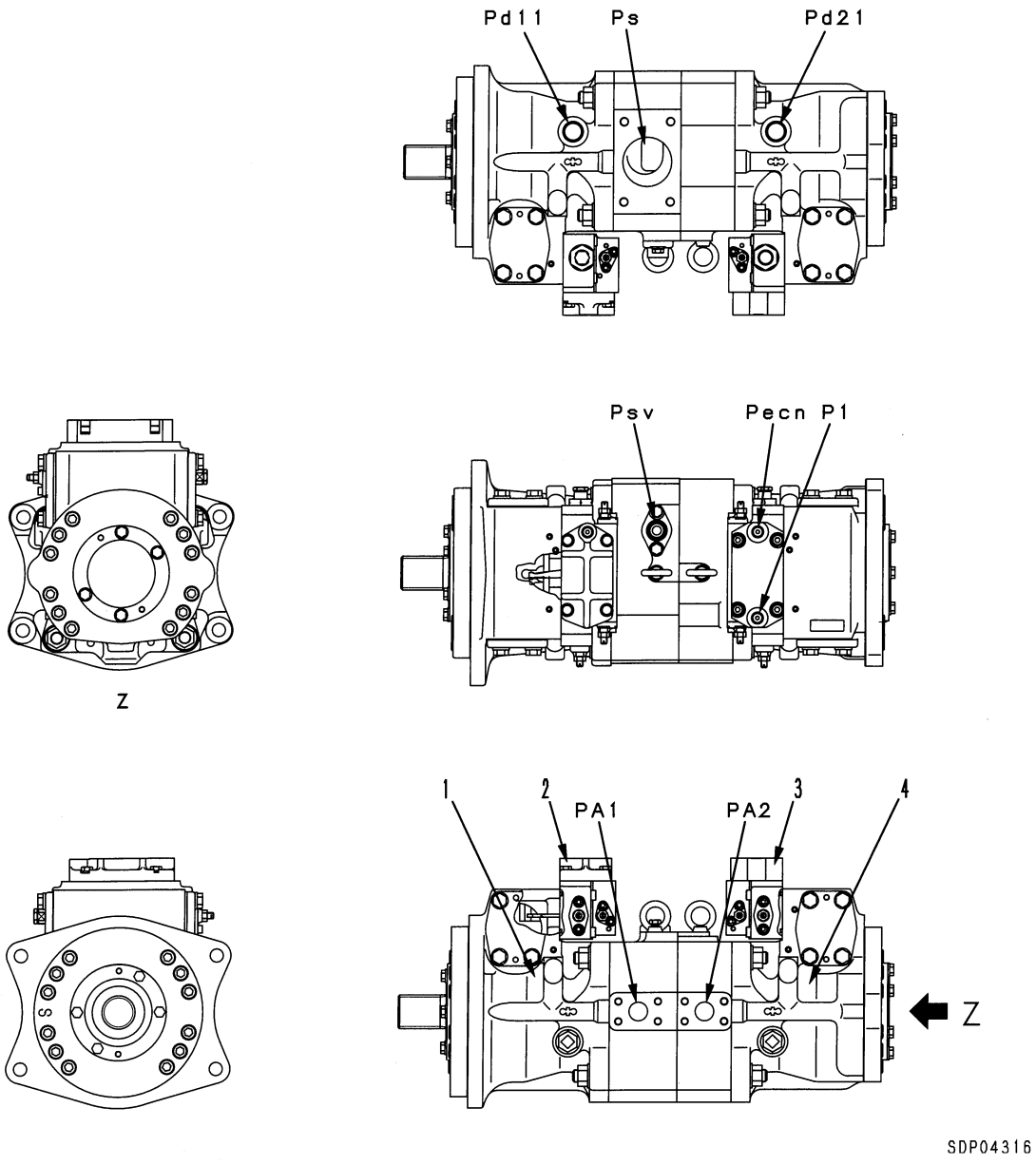
The PTO uses the SAR8 of control and PTO lubricating pump (4). The lubricating oil inside PTO case (1) passes through oil filter (5), is sent to top divider block (2), and is then divided to various parts of the PTO to lubricate and cool the gears.

AIR PIPING DRAWING



1. Grease pump
2. Grease reel
3. Grease gun
4. Air compressor
5. Safety valve
6. Air tank
7. Air governor
8. Horn valve
9. Air horn

- **No. 2 pump**
  HPV105+105



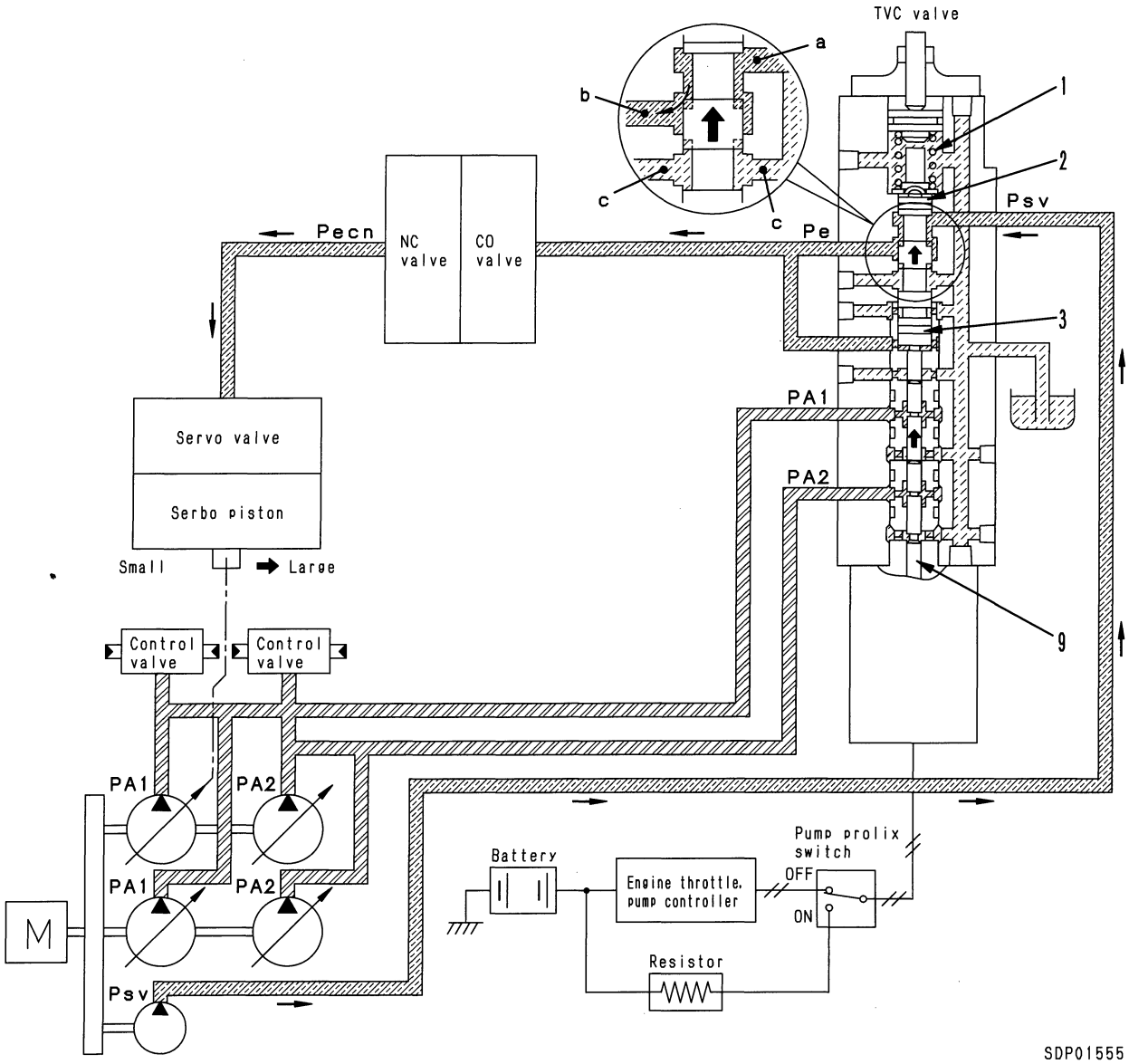
1. Front pump
2. Front servo valve
3. Rear servo valve
4. Rear pump

PA1. Discharge port
PA2. Discharge port
Ps. Suction port
P1. Pilot pressure IN port
Psv. Servo basic pressure supply port

Pecn. CO, NC valve output pressure detection port
Pd11. Drain port
Pd21. Drain port

OPERATION AND FUNCTION OF TVC VALVE

1) When command current value from controller is small in DH and H mode



Function

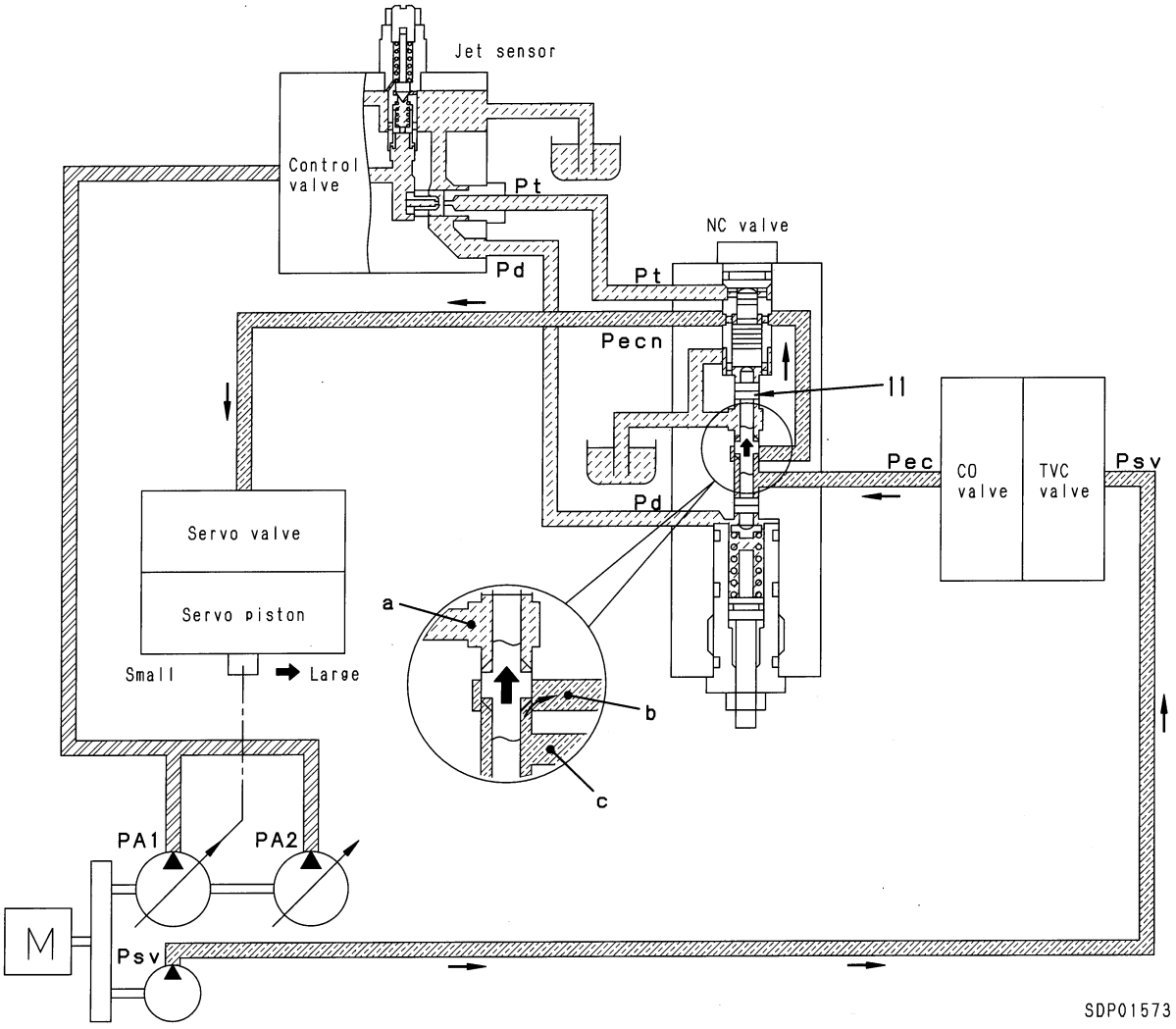
- When the power mode is at DH mode or H mode, the pump discharge amount is controlled to the optimum amount by the command current sent from the controller in accordance with the variation in the engine speed.
- In G mode or when the pump prolix switch is ON, the pump discharge amount is controlled according to the pump discharge pressure (load) by hydraulic sensing which follows a constant pump absorption torque.

★ For details, see MACHINE CONTROL SYSTEM.

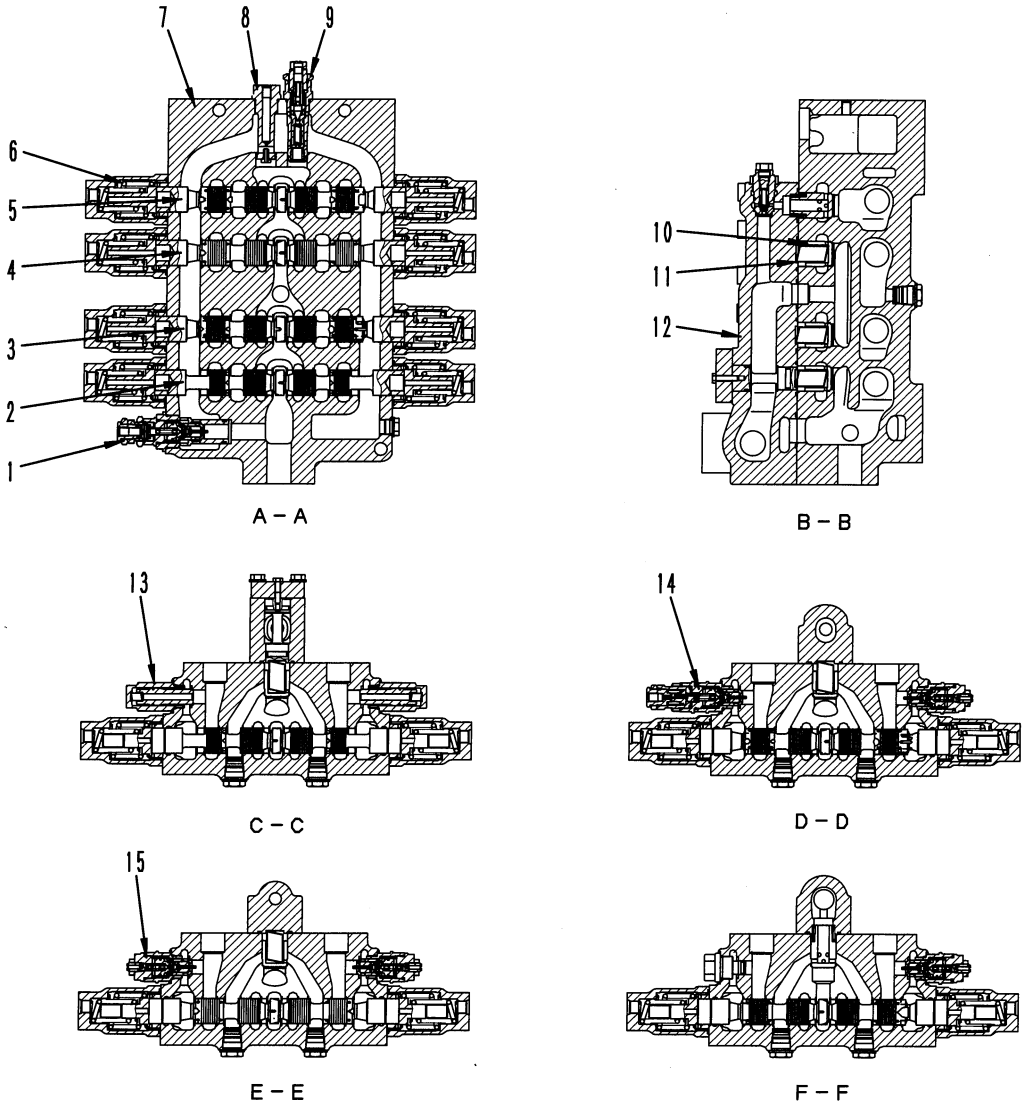
Operation

- The command current sent from the controller actuates solenoid push pin (9) and spool (2) moves. When this happens, the piston stops at a point where it balances the total of the force of spring (1), the force of push pin (9), and the force of TVC output pressure **Pe** acting on piston (3). The command current at this point is small, so spool (2) is balanced at the bottom. As a result, port **a** and port **b** are almost completely open, so the pressure oil from the control pump is almost all output as TVC output pressure **Pe**. In this way, the pump discharge amount becomes the maximum.

2) When control lever is operated

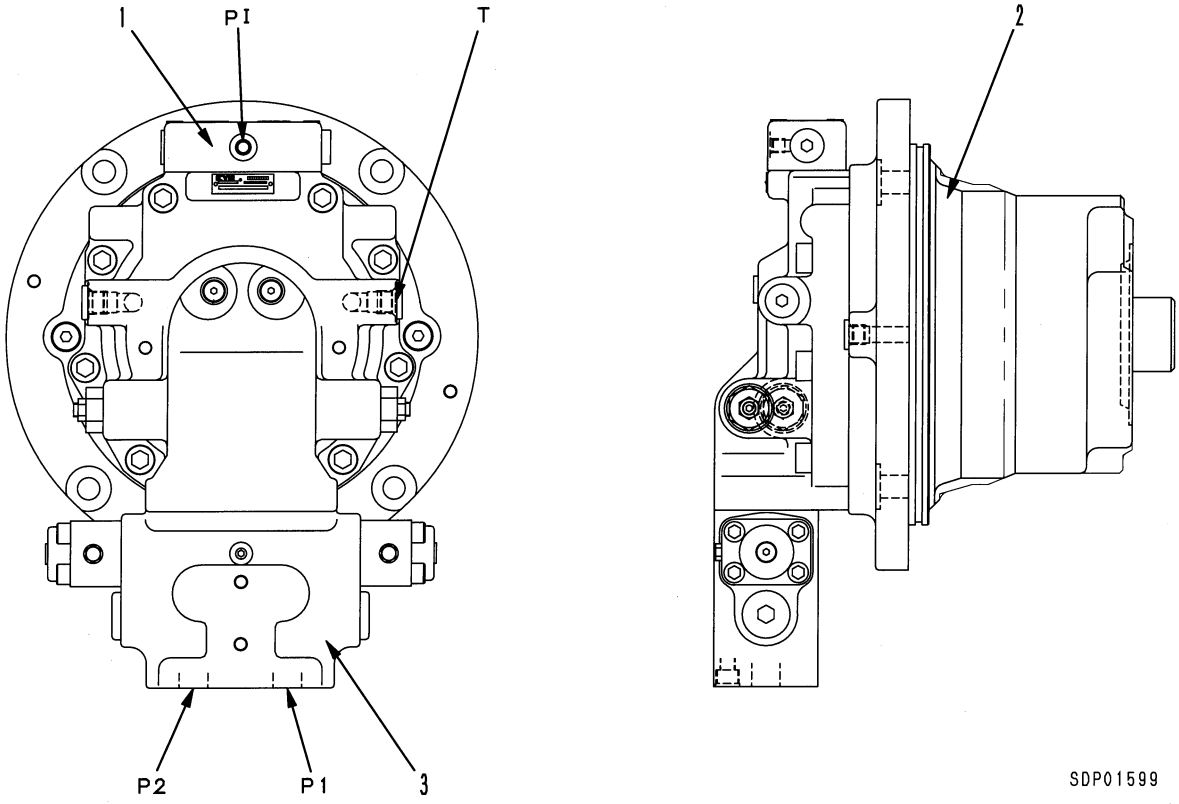


- When the control valve is moved, the jet sensor differential pressure (**Pt** – **Pd**) goes down in accordance with the movement of the control valve. Spool (11) is pushed up, and the area of the opening of port **c** and port **b** becomes larger.
  In this way, NC valve output pressure **Pecn** becomes larger and the discharge amount from the main pump increases. In other words, the pump discharge amount increases according to the amount the control lever is operated.



1. Main relief valve
2. Spool (R.H. travel)
3. Spool (boom Lo)
4. Spool (bucket Lo)
5. Spool (arm Hi)
6. Spool return spring
7. Valve body
8. Jet sensor orifice
9. Jet sensor relief valve
10. Check valve
11. Check valve spring
12. Straight-travel valve
13. Suction valve
14. Suction-safety valve
15. Suction-safety valve

TRAVEL MOTOR
MSF-340VP

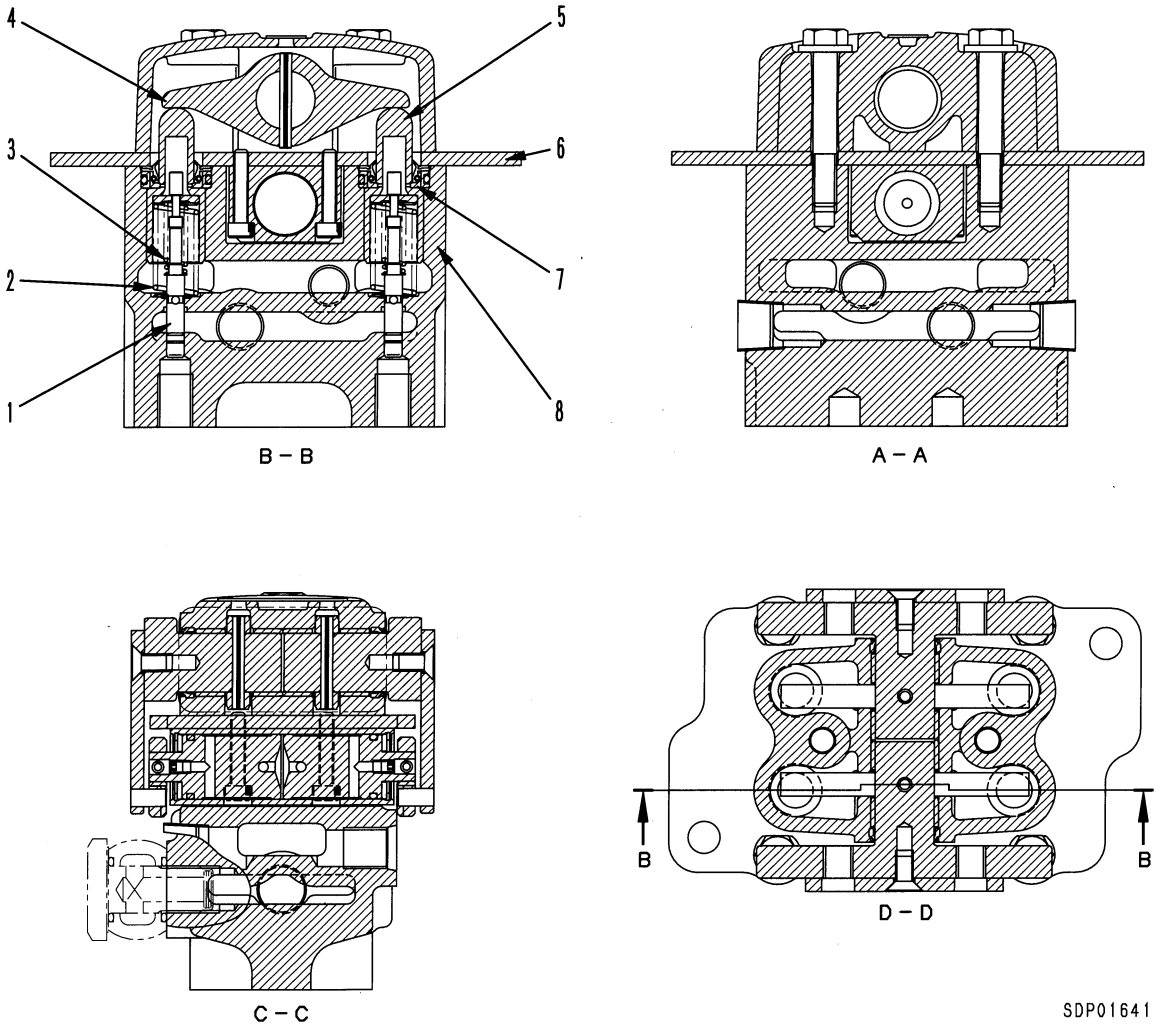


1. Travel selector valve
2. Motor
3. Travel brake valve

P1. From control valve
P2. From control valve
P1. From travel speed solenoid valve
T. To hydraulic tank

Specifications

Model	: MSF-340VP
Theoretical delivery	: 1st 337.2 cc/rev
	: 2nd 212.6 cc/rev
Rated pressure	: 31.4 MPa {320 kg/cm²}
Rated speed	: 1st 1,483 rpm (at 500 ℓ/min.)
	: 2nd 2,352 rpm (at 500 ℓ/min.)
Brake release pressure	: 1.7 MPa {17 kg/cm²}

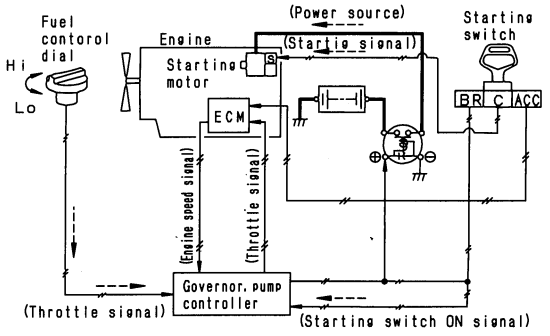


1. Spool
2. Metering spring
3. Centering spring
4. Disc
5. Piston
6. Plate
7. Collar
8. Body

1. Operation of system

Starting engine

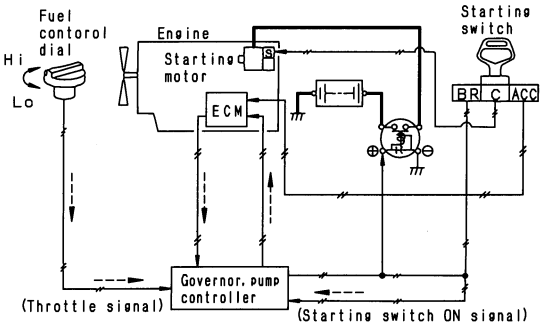
- When the starting switch is turned to the START position, the starting signal flows to the starting motor, and the starting motor turns to start the engine.
  When this happens, the engine throttle and pump controller checks the signal from the fuel control dial and sets the engine speed to the speed set by the fuel control dial.



SEP04329

Engine speed control

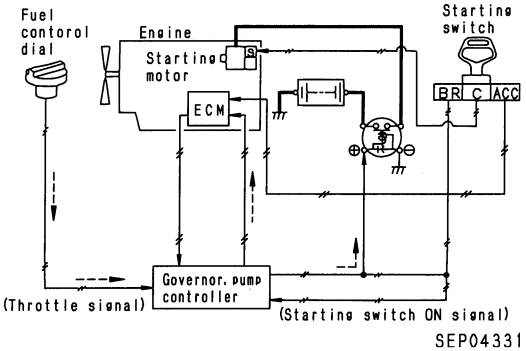
- The fuel control dial sends a signal to the engine throttle and pump controller according to the position of the dial.
  The engine throttle and pump controller calculates the throttle signal voltage according to this signal, and sends a signal to ECM (Engine Control Module).
  When this happens, engine speed signal is sent to the engine throttle and pump controller from ECM.



SEP04330

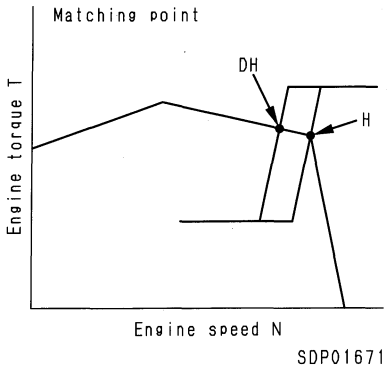
Stopping engine

- When ECM detects that the starting switch is turned to the STOP position, it shuts off fuel to the engine and so engine will stop.
- When this happens, to maintain the electric power in the system until the engine stops completely, the engine throttle and pump controller itself drives the battery relay.



SEP04331

1) Control method in each mode
DH, H mode



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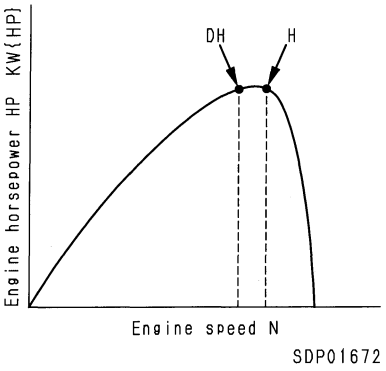

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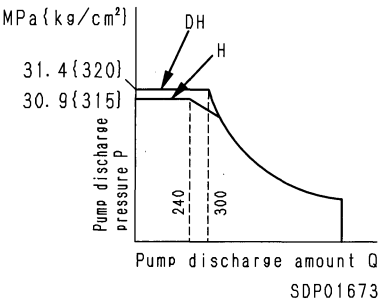


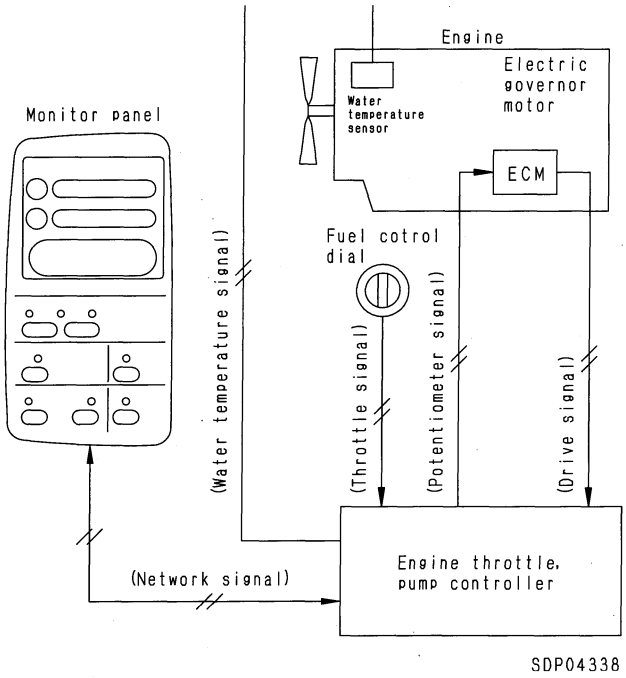
SDP01673

- Matching point in DH, H mode: Rated output point

Model / Mode	PC750SE-6K
DH	330 kW/1,800 rpm {443 HP/1,800 rpm}
H	316 kW/1,830 rpm {424 HP/1,830 rpm}

- When the load on the pump rises and the pressure rises, the engine speed goes down. When this happens, the pump discharge amount is reduced, and the engine speed is controlled so that it becomes close to the rated speed.
  If the reverse happens and the pressure goes down, the system is controlled so that the pump discharge amount is increased until the engine speed reaches close to the rated speed.
  By repeating this control, the engine can always be used at near the rated output point.
- The DH mode uses the CO cancel so it can generate a greater discharge of oil than in the H mode at high pressure. (H mode: 240 L/min → DH mode: 300 ℓ/min)

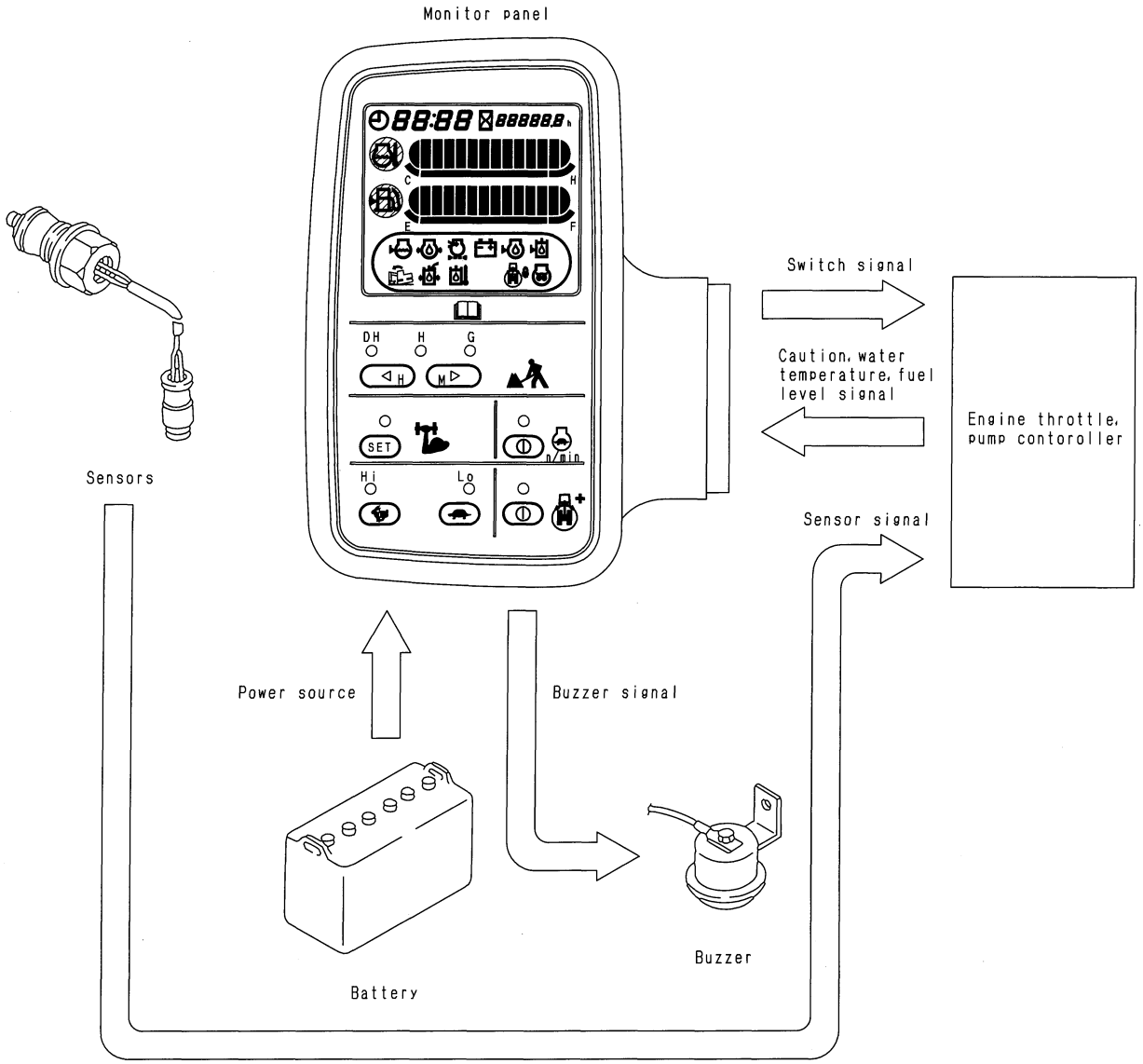
6. Automatic warming-up and engine overheat prevention function



Function

- If the water temperature is low, this automatically raises the engine speed to warm up the engine after it is started. In addition, if the water temperature rises too high during operations, it reduces the load of the pump to prevent overheating.

MACHINE MONITOR SYSTEM



Function

- The machine monitor system uses the sensors installed to all parts of the machine to observe the condition of the machine. It processes this information swiftly, and displays it on a panel to inform the operator of the condition of the machine.
- The content of the information displayed on the machine can broadly be divided as follows.

1. Monitor portion
   This gives an alarm if any abnormality occurs in the machine.
2. Gauge portion
   This always displays the condition of the machine (coolant temperature, fuel level).

- The monitor panel also has various built-in mode selector switches, and functions as the control panel for the machine control system.

STANDARD VALUE TABLE FOR ENGINE RELATED PARTS

Machine model			PC750SE-6K	
Engine			QSK19	
Item	Measurement condition	Unit	Standard value	Permissible value
Engine speed	High idling Low idling Rated speed	rpm	1,980 ± 50 750 ± 50 1,800	1,980 ± 50 750 ± 50 —
Intake air pressure	At rated output	kPa {mmHg}	129 – 156 {965 – 1,170}	129 – 156 {965 – 1,170}
Exhaust gas color	At sudden acceleration	Capacity	Max. 20% —	Max. 20% 3.0
Valve clearance	(normal temperature) Intake valve Exhaust valve	mm	0.28–0.43 0.74–0.89	— —
Blow-by pressure	(Coolant temperature: within operating range) (SAE30 oil) At rated output	kPa mmH_2O	See chart in 'MEASURING BLOW BY PRESSURE'	See chart in 'MEASURING BLOW BY PRESSURE'
Oil pressure	(Coolant temperature: within operating range) At high idling At low idling	MPa {kg/cm^2}	0.38 – 0.43 {3.88 – 4.36} 0.21 – 0.24 {2.11 – 2.46}	0.38 – 0.43 {3.88 – 4.36} 0.21 – 0.24 {2.11 – 2.46}
Oil temperature	All speed range (inside oil pan)	°C	80 – 110	120
Alternator belt tension		Nm {ft-lb}	225 {165}	225 {165}
Fan belt tension	Protrusion of adjustment bolt	mm	54 ± 2	—

STANDARD VALUE TABLE FOR ELECTRICAL PARTS

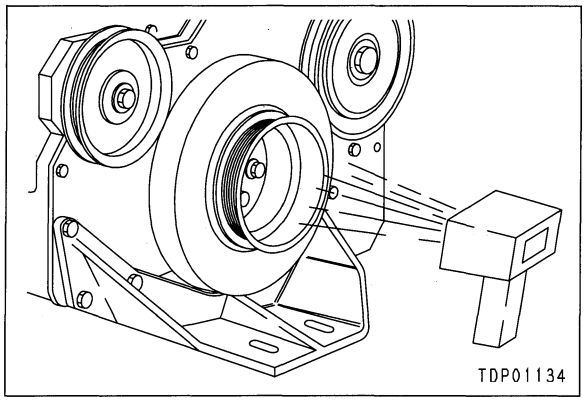
System	Name of component	Connector No.	Inspection method	Judgment table	Measurement conditions
Controller system	Power source Voltage	C01 C02	Measure voltage	If the condition is as shown in the table below, it is normal Between CO1⑦,⑬ – C01⑥,⑫: 20 – 30 V Between CO1⑪,㉑ – C01⑥,⑫: 20 – 30 V	1) Turn starting switch ON. 2) Insert T-adapter.
	Fuel control dial	E06 (male)	Measure resistance	If the condition is within the range shown in the table below, it is normal Between ① – ②: 0.25 – 7 kΩ Between ② – ③: 0.25 – 7 kΩ Between ① – ③: 4 – 6 kΩ	1) Turn starting switch OFF. 2) Disconnect connector.
		C03	Measure voltage	If the condition is as shown in the table below, it is normal Between ⑦ – ⑰ (power source): 4.75 – 5.25 V Between ④ – ⑰ (low idling): 4.0 – 4.75 V Between ④ – ⑰ (high idling): 0.25 – 1.0 V	1) Turn starting switch ON. 2) Insert T-adapter.
	Controller: No. 2 throttle signal	Monitoring code 10 or 16	Engine speed	If the condition is as shown in the table below, it is normal D.H: Approx. 1,980 (High idling (rpm)) H: Approx. 1,980 G: Approx. 1,980	1) Start engine. 2) Set monitoring code to 10 or 16 (command value) 3) Operate working mode switch.
	Controller: Model selection	C17 – C02	Continuity	If the condition is as shown in the table below, it is normal (all open) Model selection 1: C17⑤ – CO2⑪: No continuity Model selection 2: C17⑬ – CO2⑪: No continuity Model selection 3: C17⑥ – CO2⑪: No continuity Model selection 4: C17⑭ – CO2⑪: No continuity Model selection 5: C17⑦ – CO2⑪: No continuity	1) Turn starting switch OFF. 2) Disconnect connector. 3) Insert T-adapter into wiring harness end.

MEASURING ENGINE SPEED

Engine Speed (RPM) With a Verified Tachometer

TDP01271

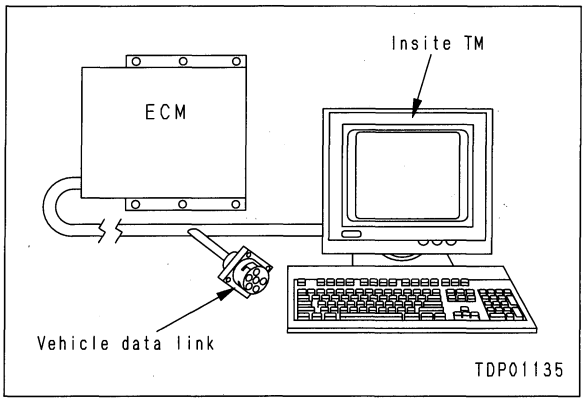
Use digital optical tachometer, Part No. 3377462, to check and verify engine speed.



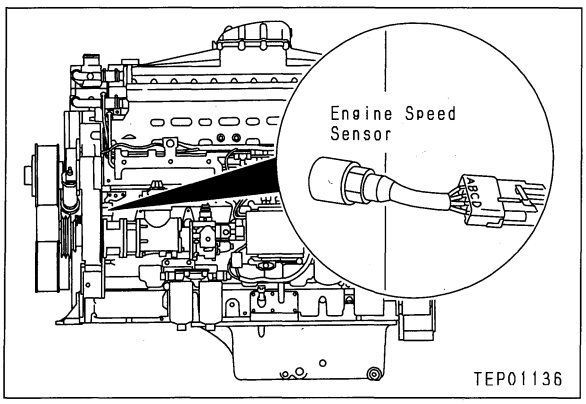
Insite™ Description

INSITE™ is a service tool for the QSK Fuel System. Use INSITE™ to:

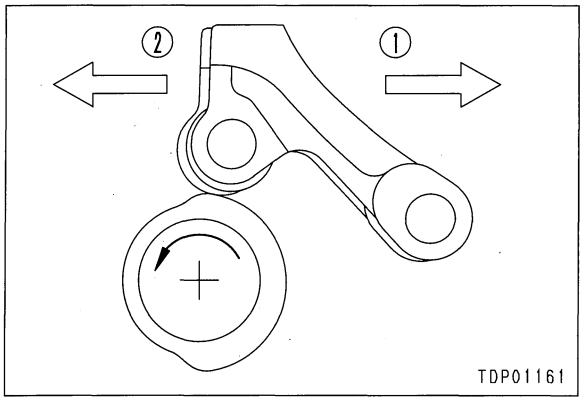
- Program owner specified information into the ECM (parameters and features).
- Aid in troubleshooting the engine.
- Change the engine power or rated speed calibration.



The ESS provides engine speed and position information. The sensor is located on the back side of the cylinder block gear housing flange just below the accessory drive.

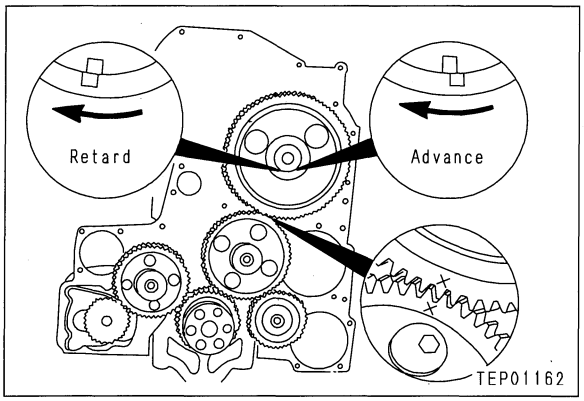


Injection timing changes are accomplished by **advancing** or **retarding** the cam follower action in relation to the piston position.
This is accomplished by changing the orientation of the camshaft lobe to the cam follower using different camshaft gear keys.
Gear train timing (index mark alignment) always remains the same.

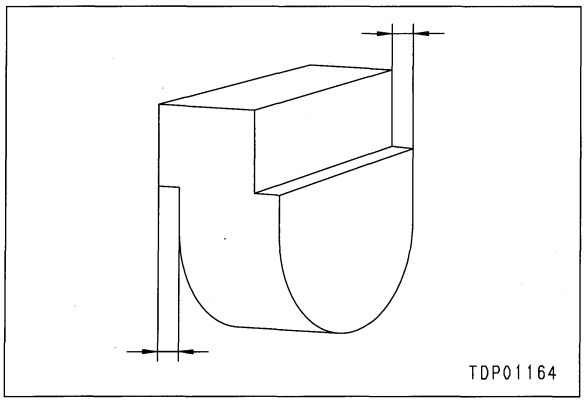


The camshaft key provides a means of indexing the camshaft with the gear.
Offset keys allow the camshaft profile to be rotated slightly while the gear train timing remains the same. The more the top of the offset is moved in the direction of the camshaft normal rotation, the more the injection timing will be retarded. The push rod travel numerical value will increase.
NOTE: This applies to **ALL** Cummins engines.
NOTE: The direction of normal rotation on a QSK19 engine crankshaft is clockwise as viewed from the front.

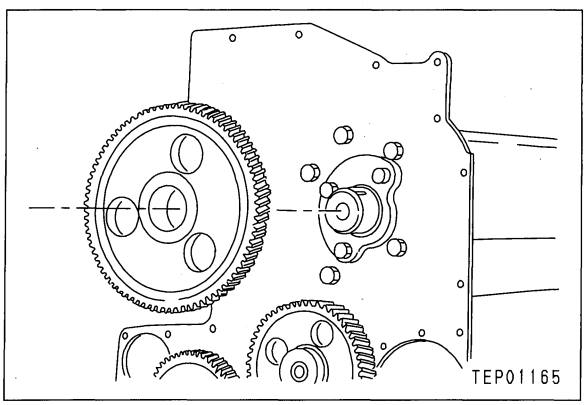
- **Without** Adapter:
  — **Torque Value** : 60 Nm [45 ft-lb]



Offset keys can be identified by measuring the offset and referring to the following chart.
NOTE: Each 0.025 mm [0.001 inch] of offset will cause a 0.0127 mm [0.0005 inch] change in the push rod travel from a straight key.

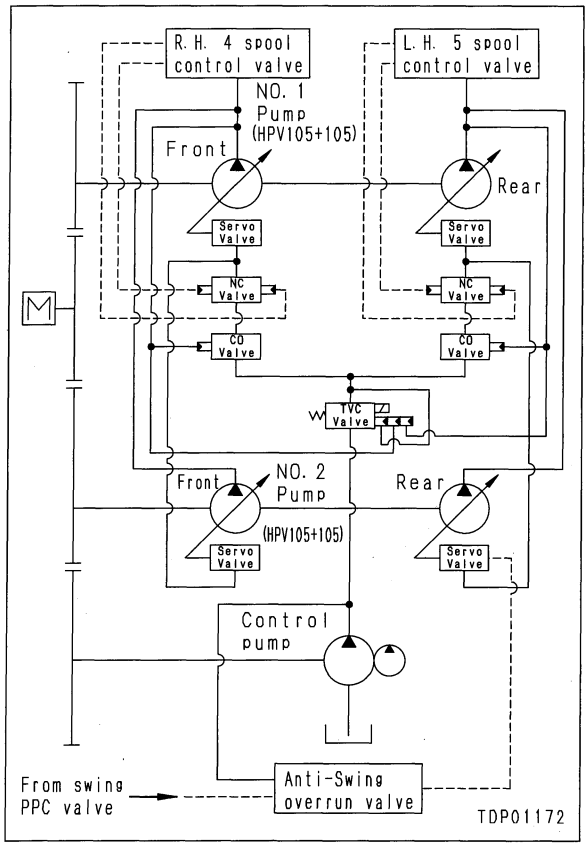


If checking or setting the injection timing, it is recommended to use a testing gear. A testing gear is a camshaft gear that has been modified to provide a slip-fit on the camshaft.



2. Output pressure of CO valve and NC valve

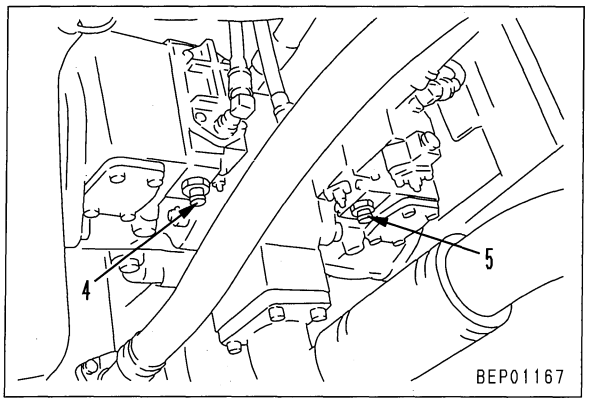
- The output pressure of the NC valve goes to the servo valve and controls the amount of oil discharged from the piston pump.
  The oil flows as follows: TVC valve → CO valve → NC valve → servo valve. The output pressure varies as follows according to the operation of the control lever for work equipment.
  1) Control levers at neutral
     Because of the differential pressure of the jet sensor, the NC valve is actuated and the output pressure drops below 0.54 MPa {5.5 kg/cm²}.
     (The pump discharge becomes the minimum.)
  2) Hydraulic cylinder relieved
     The CO valve moves and reduces the pressure below 0.54 MPa {5.5 kg/cm²} before the oil enters the NC valve. The NC valve supplies the oil at this pressure to the servo valve.
     (The pump discharge amount in this case is also the minimum.)
  3) Work equipment, swing, travel operated
     The output pressure of the TVC valve is not influenced by the CO valve or the NC valve, and supplies oil as it is to the servo valve.
     (The pump discharge amount varies from the maximum to the point where the CO valve is actuated.)
  4) CO cancel operated
     In the D.H mode, the CO valve is not actuated even near the relief pressure. Therefore, in the same way as in Item 3), the output pressure of the TVC valve is supplied as it is to the servo valve.



Measuring

★ Oil temperature when measuring: **45 – 55°C**

- Remove pressure pickup plug (4) or (5) (Thread dia.=10mm, Pitch=1.25mm), then install oil pressure gauge **C1** (5.88 MPa {60 kg/cm²}).
  - Plug (4): For front pump (on top of No. 1 pump)
  - Plug (5): For rear pump (on top of No. 1 pump)
  - ★ The plugs are under the body of the servo valve.



2. Adjusting

If the result of the measurement is not within the standard value, adjust as follows.

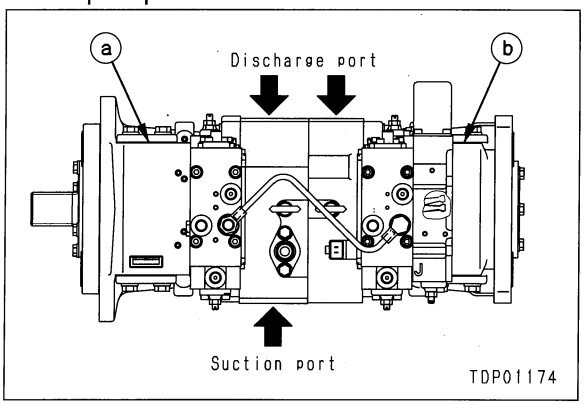
★ Adjustment procedure

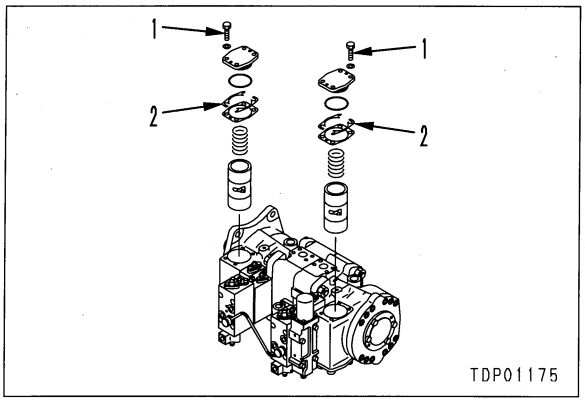
Deviation to right	Deviation to left
Adjust by adding shim at front pump end ⓐ	Adjust by adding shim at rear pump end ⓑ

- If the above adjustment procedure is followed but the travel deviation is still not within the standard value after adjustment, see "TROUBLESHOOTING - Excessive travel deviation".

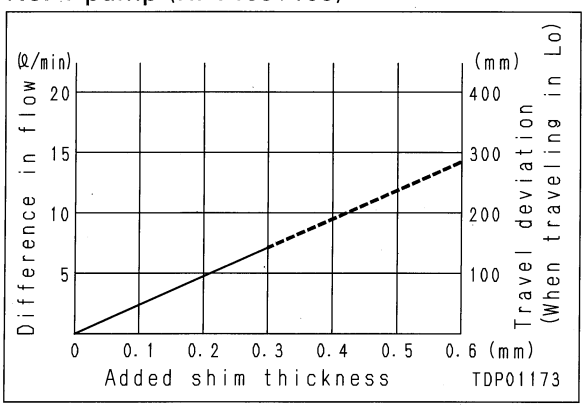
1) Loosen 4 bolts (1).
   ★ The shim is a split type, so it is not necessary to remove the cap.
2) Add a thickness of shim (2) that matches the amount of the deviation, then tighten bolt (1).
   ★ Add a maximum shim thickness of 0.3 mm.
   kgm Mounting bolt :
   66.15 ± 7.35 Nm {6.75 ± 0.75 kgm}
   ★ Amount of deviation and shim thickness to add
   See graph

No. 1 pump





No. 1 pump (HPV105+105)



BLEEDING AIR

Air bleeding item / Nature of work	Air bleeding procedure				
	1	2	3	4	5
	Bleed air from pump	Start engine	Bleed air from cylinder	Bleed air from swing motor	Start operations
• Change hydraulic oil • Clean strainer	○ →	○ →	○ →	○ → (note)	○
• Replace return filter element		○ →	→	→	○
• Replace, repair pump • Remove suction piping	○ →	○ →	○ →	→	○
• Replace, repair control valve		○ →	○ →	→	○
• Replace cylinder • Remove cylinder piping		○ →	○ →	→	○
• Reoplace swing motor • Remove swing motor piping		○ →	→	○ →	○
• Replace travel motor, swivel • Remove travel motor, swivel piping		○ →	→	→	○

Note: Bleed the air from the swing motor only when the oil inside the motor case has been drained.

1. Bleeding air from pump

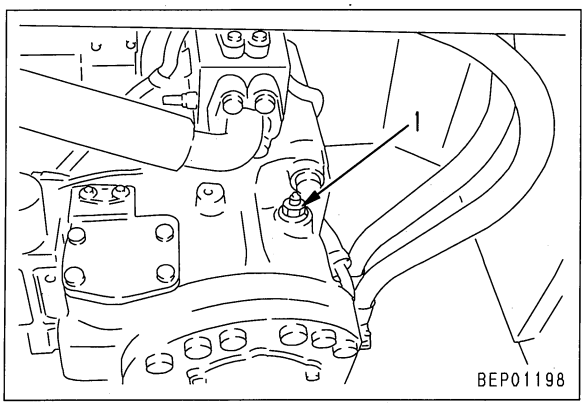
1) Loosen air bleed plug (1), and check that oil oozes out from the plug.
2) When oil oozes out, tighten plug (1).
   kgm Air bleed plug:
   8.82 ± 0.98 Nm {0.9 ± 0.1 kgm}

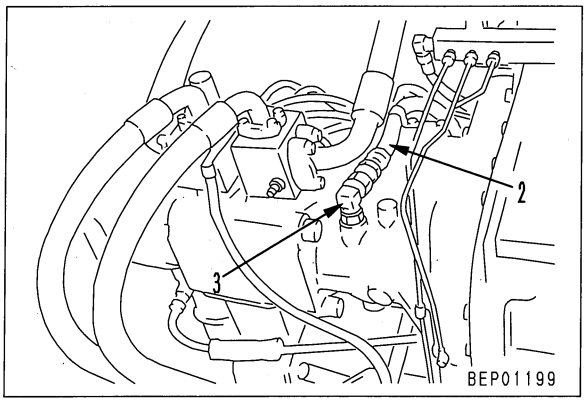
★ If no oil oozes out from the air bleed plug:

3) Leave plug (1) loosened and remove drain hose (2) and elbow (3).
4) Pour in oil through the elbow mount hole until oil oozes out from plug (1).
5) Fit elbow (3) and install drain hose (2).
6) Tighten air bleed plug (1).
   kgm Air bleed plug:
   8.82 ± 0.98 Nm {0.9 ± 0.1 kgm}

★ Precautions when starting the engine
After completing the above procedure and starting the engine, run the engine at low idling for approx. 10 minutes.

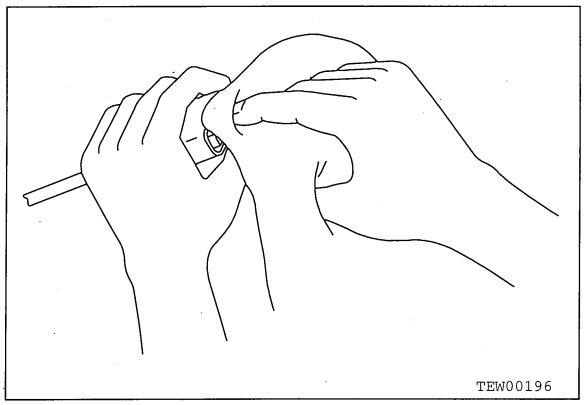
★ If the coolant temperature is low and automatic warming-up is carried out, cancel it by using the fuel control dial.



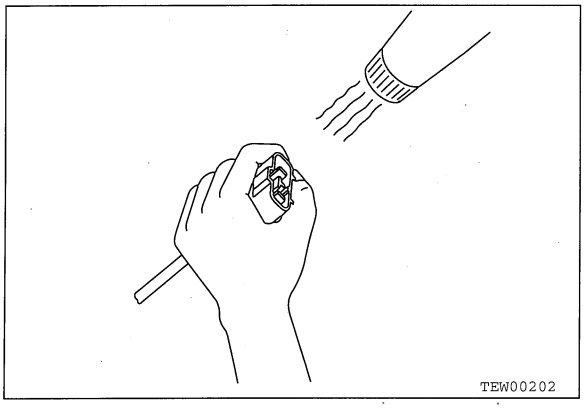


- **Drying wiring harness**
  If there is any oil or dirt on the wiring harness, wipe it off with a dry cloth. Avoid washing it in water or using steam. If the connector must be washed in water, do not use high-pressure water or steam directly on the wiring harness.

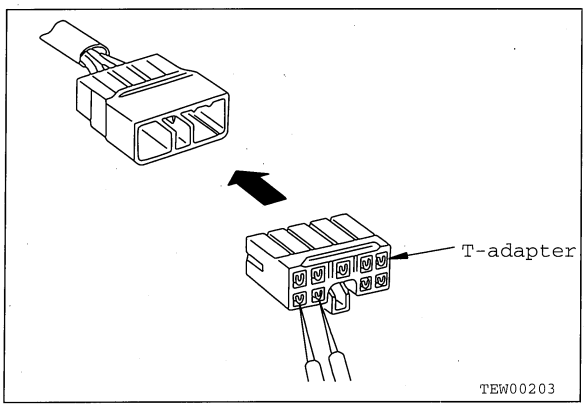
  If water gets directly on the connector, do as follows.
  ① Disconnect the connector and wipe off the water with a dry cloth.
  ★ If the connector is blown dry with compressed air, there is the risk that oil in the air may cause defective contact, so remove all oil and water from the compressed air before blowing with air.



② Dry the inside of the connector with a dryer.
If water gets inside the connector, use a dryer to dry the connector.
★ Hot air from the dryer can be used, but regulate the time that the hot air is used in order not to make the connector or related parts too hot, as this will cause deformation or damage to the connector.

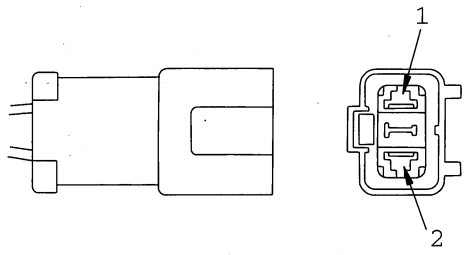
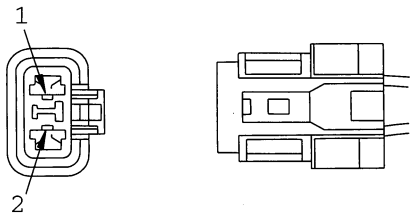
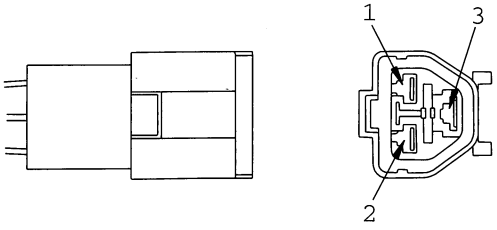
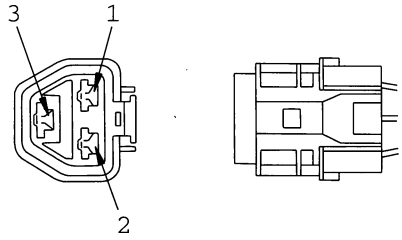
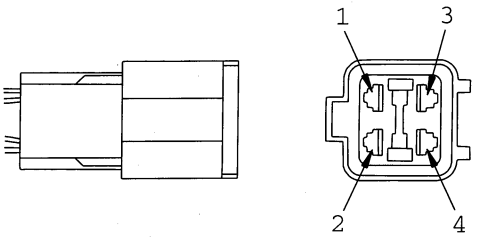
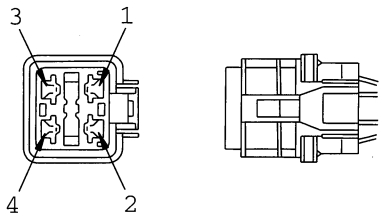


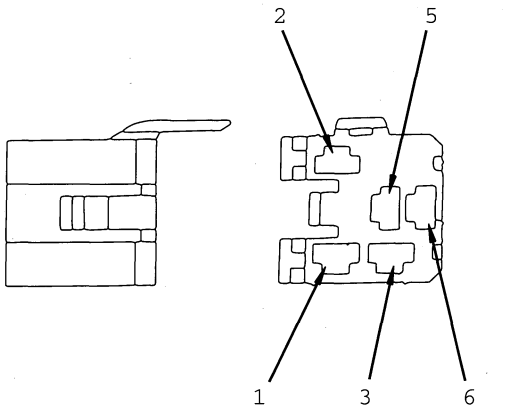
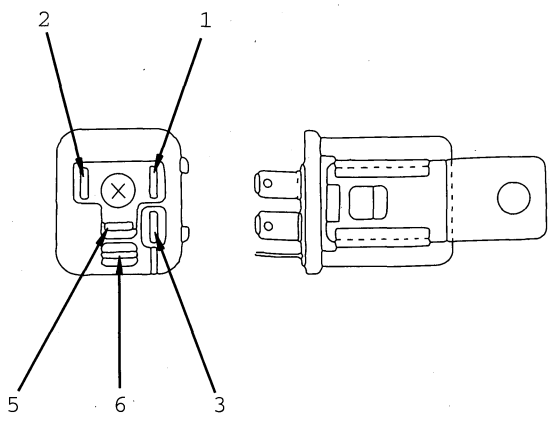
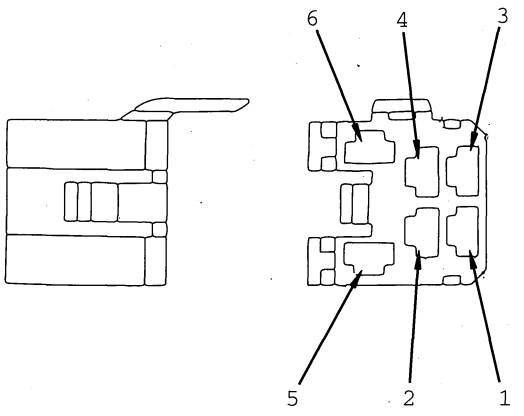
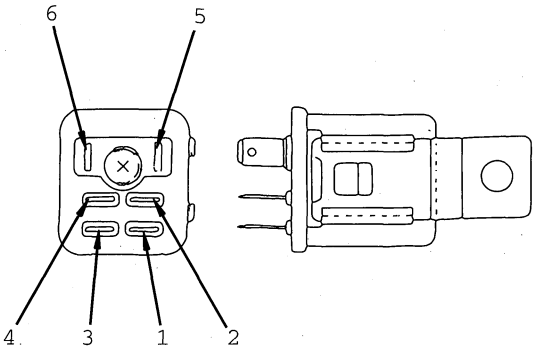
③ Carry out a continuity test on the connector.
After drying, leave the wiring harness disconnected and carry out a continuity test to check for any short circuits between pins caused by water.
★ After completely drying the connector, blow it with contact restorer and reassemble.



CONNECTION TABLE FOR CONNECTOR PIN NUMBERS

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

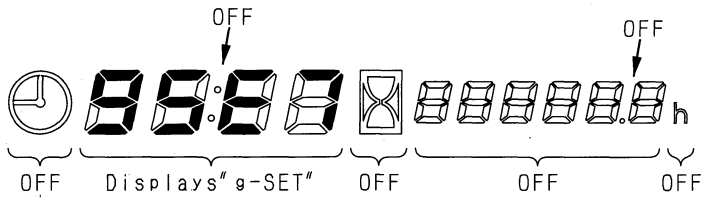
No. of pins	X type connector	
	Male (female housing)	Female (male housing)
2	 TEW00221	 TEW00222
3	 TEW00223	 TEW00224
4	 TEW00225	 TEW00226

No. of pins	Relay connector	
	Male (female housing)	Female (male housing)
5	 BLP00073	 BLP00074
6	 BLP00075	 BLP00076

Code	Content	Bit	Details (condition when lighted up)	
49	Monitor panel input condition 2	(1)	KEY ON SW	OFF
		(2)	Terminal BR	Voltage Hi
		(3)	LIGHT SW	OFF
		(4)	Preheating switch	OFF
		(5)	START C	Sometimes turns ON
		(6)		
4A	Monitor panel output condition	(1)	Time switch	OFF
		(2)	PPC oil pressure selector switch	OFF
		(3)	Overload selector switch	OFF
		(4)	STD/DLX selection	STD
		(5)	Swing lock switch	OFF
		(6)	Buzzer cancel switch	OFF

4. Governor motor adjustment mode

This is used when adjusting the linkage between the governor motor and the injection pump. (For details of the procedure, see TESTING AND ADJUSTING.)

Operation	Display
1. To set to the governor motor adjustment mode, press the time switch + R.H. travel speed switch + R.H. working mode switch.	1. 
2. To return to the time display mode use the same procedure as in Step 1.	2. Buzzer sounds once a second TDP00350

5. Time adjustment mode

To adjust the time, do as follows.

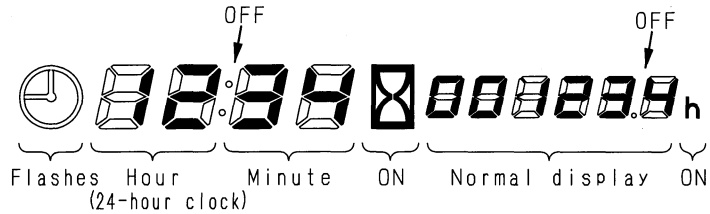
Operation	Display
1. To set to the time adjustment mode, keep the time switch depressed for 2.5 seconds. 2. Use the L.H. working mode switch to advance the hour. 3. Use the R.H. working mode switch to advance the minute. 4. To return to the time display mode use the same procedure as in Step 1.	1. The time mark portion flashes  TDP00351 ★ The example shows the situation when setting to 12:34.

TABLE OF SERVICE CODES

Service code	Abnormal system	User code
E101	Abnormality in error data	
E102	Abnormality in time data	
E103	Short circuit in buzzer output, contact with buzzer drive wiring harness 24V	
E104	Air cleaner clogging detected	
E106	Engine oil pressure sensor (Hi) abnormality detected	
E108	Water temperature above 105°C	
E201	Disconnection in CO cancel solenoid system	
E202	Disconnection in straight travel solenoid system	
E203	Short circuit in swing holding brake solenoid system	E03
E204	Short circuit in 2-stage relief solenoid system	
E205	Short circuit in swing priority solenoid system	
E206	Short circuit in travel speed selector solenoid system	
E207	Short circuit in swing overrun prevention system	
E208	Disconnection in swing overrun prevention system	
E211	Disconnection in CO cancel solenoid system	
E212	Disconnection in straight travel solenoid system	
E213	Disconnection in swing holding brake solenoid system	E03
E214	Disconnection in 2-stage relief solenoid system	
E215	Disconnection in swing priority solenoid system	
E216	Disconnection in travel speed selector solenoid system	
E217	Machine model selection input error	
E218	Network response overtime error	
E227	Abnormality in engine speed sensor system	
E232	Short circuit in TVC solenoid system	E02
E233	Disconnection in TVC solenoid system	E02
E306	Abnormality in feedback potentiometer system	
E308	Abnormality in fuel control dial input value	
E315	Short circuit in battery relay output system	
E316	Governor motor step-out	
E317	Disconnection in governor motor system	E05
E318	Short circuit in governor motor system	E05

Service code	Abnormal system	User code

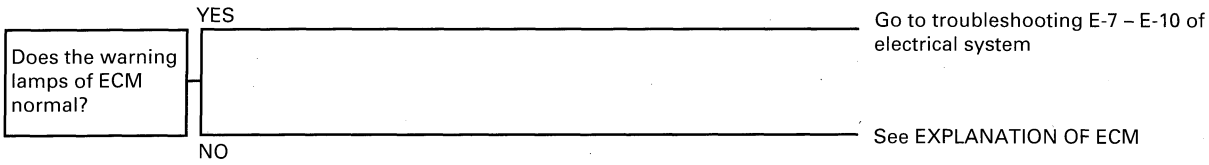
POINTS TO REMEMBER WHEN CARRYING OUT TROUBLE-SHOOTING OF GOVERNOR, PUMP CONTROLLER SYSTEM

1. Points to remember when there is abnormality which is not displayed by user code

The engine is controlled by the governor and pump controller.
The problems that may occur with this system include the following.

1. Idling speed is too high (too low)
2. High idling speed is too low
3. Auto-deceleration speed is too high (too low)
4. Engine speed for automatic warming-up operation is too high (too low)
5. There is hunting
6. Engine does not stop

If any abnormality occurs, and the abnormality is displayed on the time display portion of the monitor panel, use the troubleshooting table to determine the appropriate troubleshooting flow chart from E-1 to E-10.However, if there is any abnormality in the machine and no abnormality display is given, it is necessary to determine whether the problem is in the mechanical system or in the electrical system. If ECM isn't Good, problems 1 to 6 listed above may occur. Therefore, if there is no abnormality display, but one of problems 1 to 6 above has occurred, carry out troubleshooting as follows.



2. Points to remember if abnormality returns to normal by itself

In the following two cases, there is a high probability that the same problem will occur again, so it is desirable to follow up this problem carefully.

1) If any abnormality returns to normal by itself, or
2) If the connector is disconnected and the T-adapter is inserted, or if the T-adapter is removed and the connector is returned to its original position when carrying out troubleshooting of the failure, and the service code is no longer displayed, or if the monitor display returns to normal.
3) After completing troubleshooting, always erase the service code from memory.

3. User code memory retention function

When displaying the abnormality code in memory and carrying out troubleshooting, note down the content of the display, then erase the display. After trying to re-enact the problem, carry out troubleshooting according to the failure code that is displayed.
(There are cases where mistaken operation or abnormalities that occur when the connector is disconnected are recorded by the memory retention function. Erasing the data in this way saves any wasted work.)

E-3 [E306] Abnormality in feedback potentiometer system is displayed

★ **This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the service code E is not displayed, the problem has been removed.**
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.

	Cause	Remedy
1 Is resistance between each pin of C03 (female) (7) – (14) between each pin and chassi as shown in Table1? • Turn starting switch OFF. • Disconnect C03.		
YES	Defective governor, pump controller	Replace
NO	Defective wiring harness in system with defective resistance	Replace

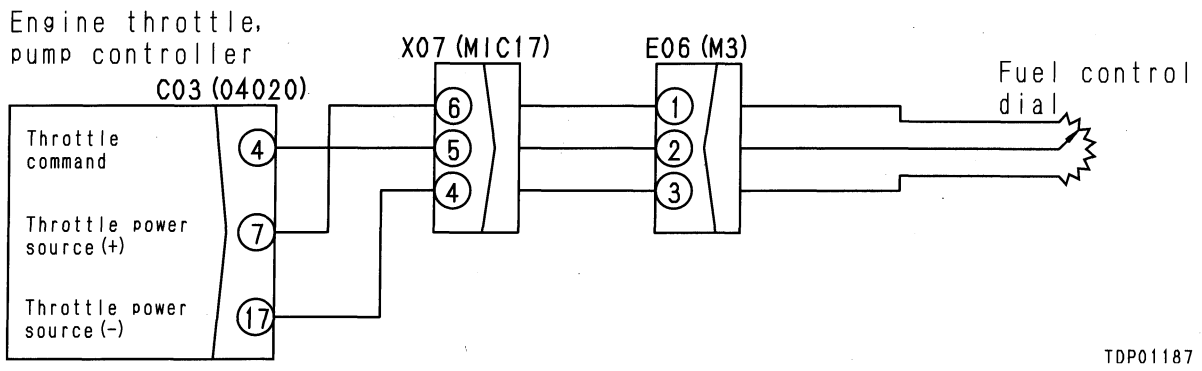
★ If E308 also occurs at the same time, check the wiring harness below.
- Wiring harness between C03 (female) (7) – X07 (6) – E06 (female) (1) short circuiting with ground, or contact with other wiring harness

Table 1

C03 (female)	Resistance value
(7) – (17)	2 – 3kΩ
Between each pin and chassis	Min. 1 MΩ

★ When E06 is still connected.

E-3 Related electric circuit diagram



E-8 Lack of output (engine high idling speed is too low)

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

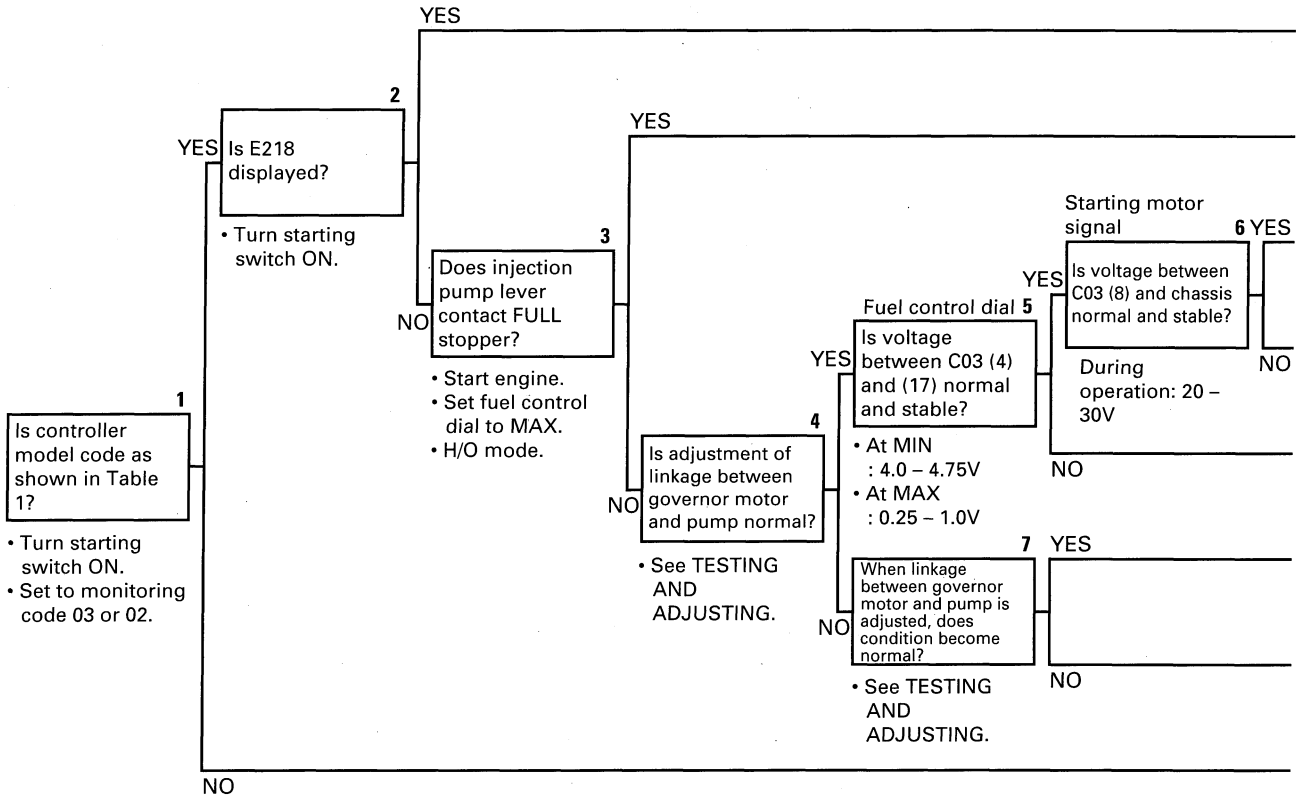


Table 1

Controller model code
03 ---

TDP01191

★ The diagram shows monitoring code 03.

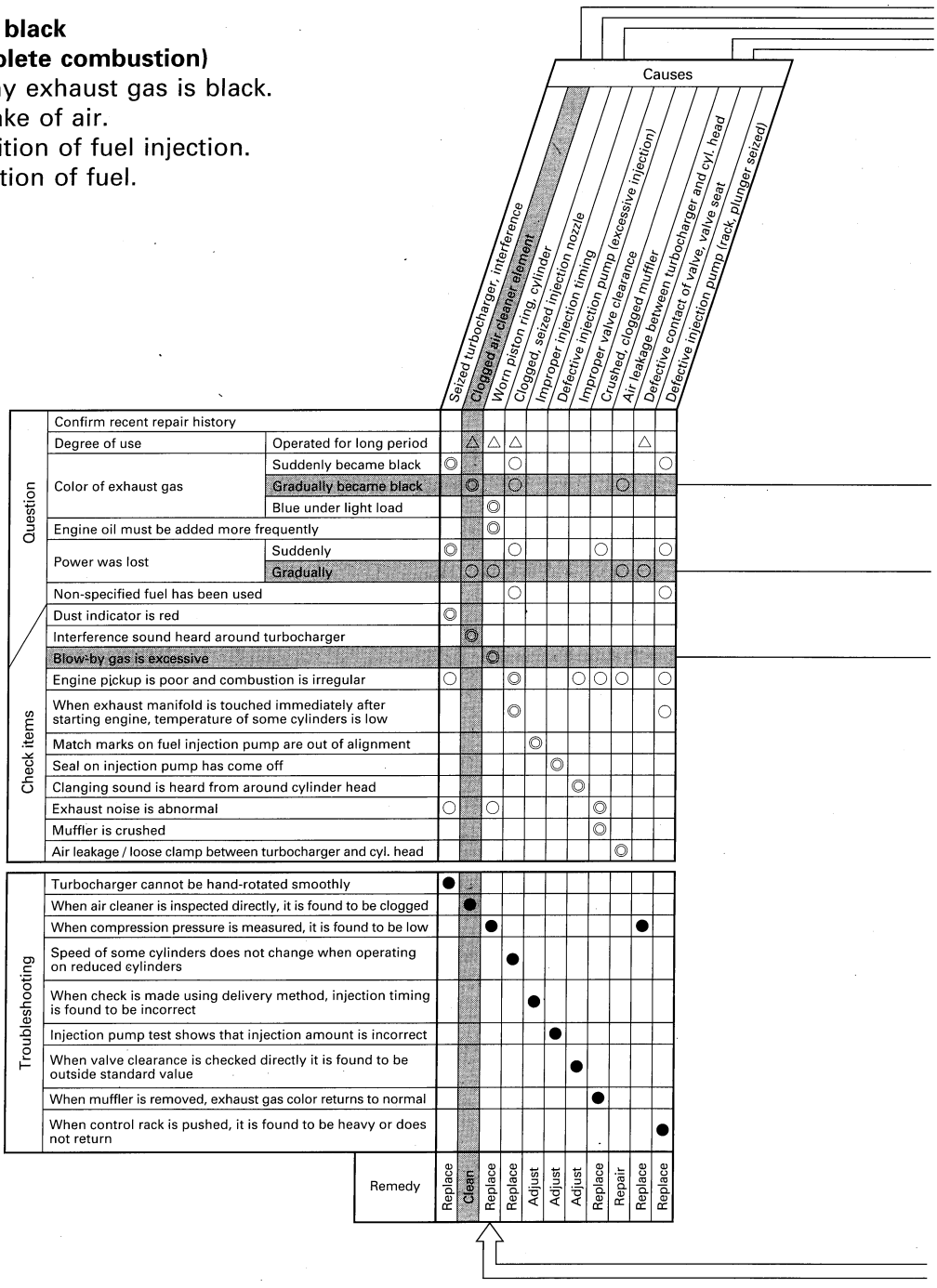
- **Example of troubleshooting when exhaust gas is black**

Let us assume that [Clogged air cleaner] is taken to be the cause of black exhaust gas. Three symptoms have a causal relationship with this problem: [Exhaust gas gradually became black], [Power gradually became weaker], and [Dust indicator is red].
If we look from these three symptoms to find the causes, we find that there is a relationship with 5 causes. Let us explain here the method of using this causal relationship to pinpoint the most probable cause.

S-7 Exhaust gas is black (incomplete combustion)

General causes why exhaust gas is black.

- Insufficient intake of air.
- Improper condition of fuel injection.
- Excessive injection of fuel.



S-7 Exhaust gas is black (incomplete combustion)

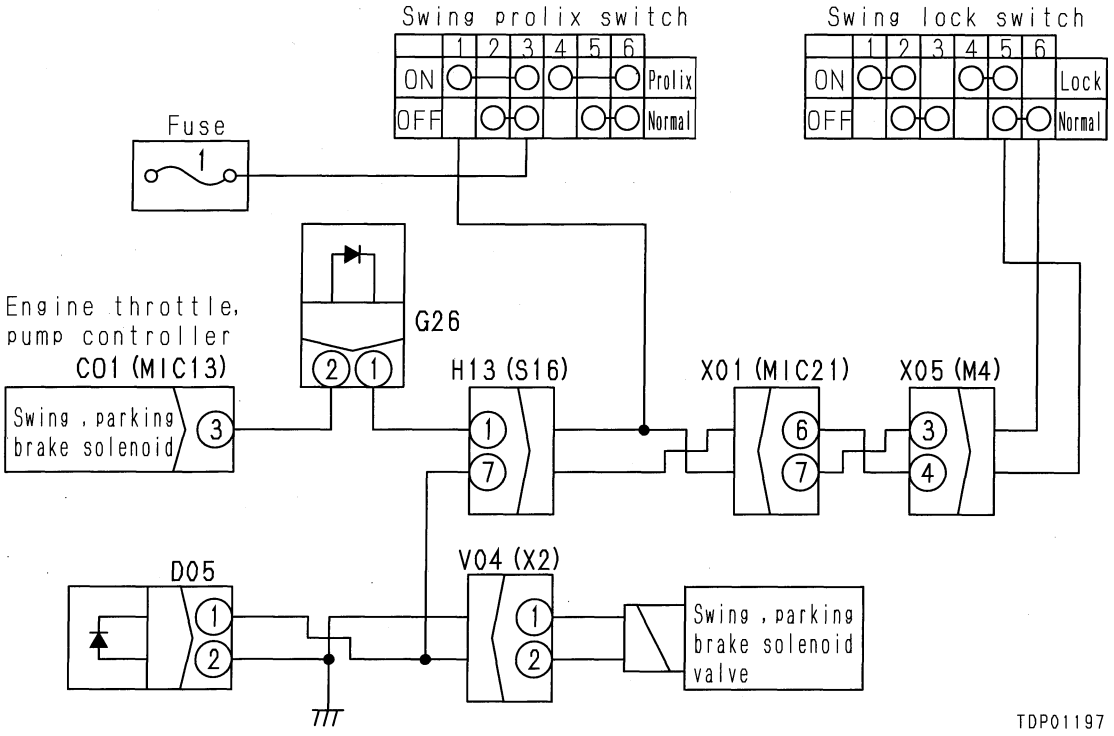
General causes why exhaust gas is black.
- Insufficient intake of air.
- Improper condition of fuel injection.
- Excessive injection of fuel.

			Causes: Seized turbocharger, interference	Clogged air cleaner element	Worn piston ring, cylinder	Clogged, seized injection nozzle	Improper injection timing	Defective injection pump (excessive injection)	Improper valve clearance	Crushed, clogged muffler	Air leakage between turbocharger and cyl. head	Defective contact of valve, valve seat	Defective injection pump (rack, plunger seized)
Question	Confirm recent repair history												
	Degree of use	Operated for long period		△	△	△						△	
	Color of exhaust gas	Suddenly became black	◎			○							○
		Gradually became black		◎		○					○		
		Blue under light load			◎								
	Engine oil must be added more frequently				◎								
	Power was lost	Suddenly	◎			○				○			○
		Gradually		○	○						○	○	
	Non-specified fuel has been used					○							○
Check item	Dust indicator lamp is ON			◎									
	Interference sound heard around turbocharger		◎										
	Blow-by gas is excessive				◎								
	Engine pickup is poor and combustion is irregular		○			◎			○	○	○		○
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low					◎							○
	Match marks on fuel injection pump are out of alignment						◎						
	Seal on injection pump has come off							◎					
	Clanging sound is heard from around cylinder head								◎				
	Exhaust noise is abnormal		○			○				◎			
	Muffler is crushed									◎			
	Air leakage / loose clamp between turbocharger and cyl. head										◎		
Troubleshooting	Turbocharger cannot be hand-rotated smoothly		●										
	When air cleaner is inspected directly, it is found to be clogged			●									
	When compression pressure is measured, it is found to be low				●							●	
	Stop fuel injection to one cylinder at a time. If there is no change in engine speed, that cylinder is not working.					●							
	※ When injection timing is checked, injection timing is found to be incorrect						●						
	Injection pump test shows that injection amount is incorrect							●					
	When valve clearance is checked directly it is found to be outside standard value								●				
	When muffler is removed, exhaust gas color returns to normal									●			
	When control rack is pushed, it is found to be heavy or does not return												●
		Remedy	Replace	Clean	Replace	Replace	Adjust	Adjust	Adjust	Replace	Repair	Replace	Replace

※ See TESTING AND ADJUSTING

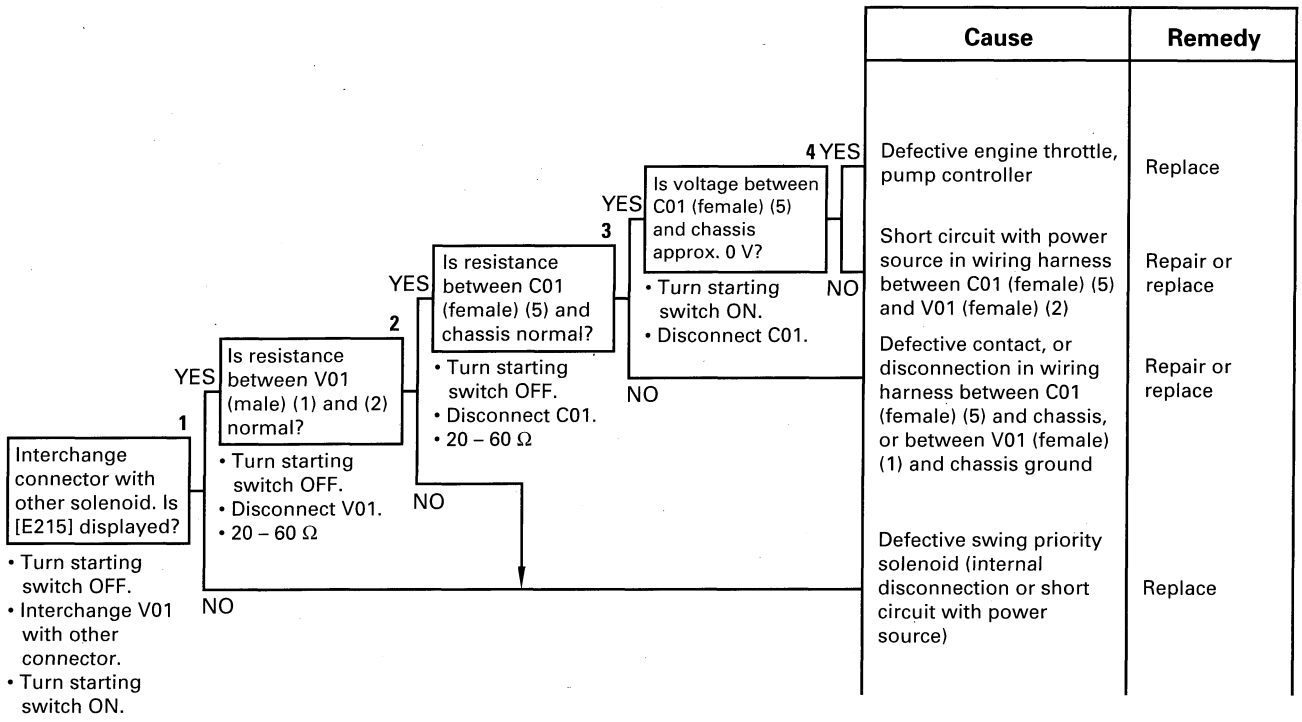
User code	Service code	Abnormal system	Nature of abnormality
—	E207	Short circuit in swing overrun prevention solenoid system	1. Short circuit with ground, short circuit inside swing overrun prevention solenoid 2. Short circuit with ground in wiring harness between controller C01 (9) and solenoid V08 (2) ((+) side) 3. Defective engine throttle, pump controller
—	E211	Disconnection in CO cancel solenoid system	1. Disconnection, defective contact inside CO cancel solenoid 2. Disconnection, defective contact, short circuit with power source in wiring harness between controller C01 (8) and solenoid V07 (2) ((+) side) 3. Disconnection, defective contact in wiring harness between controller V07 (1) and chassis ground ((–) side) 4. Defective engine throttle, pump controller
—	E215	Disconnection in swing priority solenoid system	1. Disconnection, defective contact inside swing priority solenoid 2. Disconnection, defective contact, short circuit with power source in wiring harness between controller C01 (5) and solenoid V01 (2) ((+) side) 3. Disconnection, defective contact in wiring harness between controller V03 (2) and chassis ground ((–) side) 4. Defective engine throttle, pump controller
—	E208	Disconnection in swing overrun prevention solenoid system	1. Disconnection, defective contact inside swing overrun prevention solenoid 2. Disconnection, defective contact, short circuit with power source in wiring harness between controller C01 (9) and solenoid V08 (2) ((+) side) 3. Disconnection, defective contact in wiring harness between controller V08 (1) and chassis ground ((–) side) 4. Defective engine throttle, pump controller
—	E218	Network response overtime error	1. Disconnection, short circuit, short circuit with ground in network wiring harness 2. Abnormality in engine throttle, pump controller 3. Abnormality in monitor panel
—	E227	Abnormality in engine speed sensor system	1. Disconnection, defective contact, short circuit with ground inside engine speed sensor 2. Disconnection, defective contact, short circuit with ground in wiring harness between controller C16 (1) and speed sensor E07 (2) ((–) side), and between C16 (2) and E07 (1) (SIG side) 3. Defective engine throttle, pump controller

C-4 Related electric circuit diagram

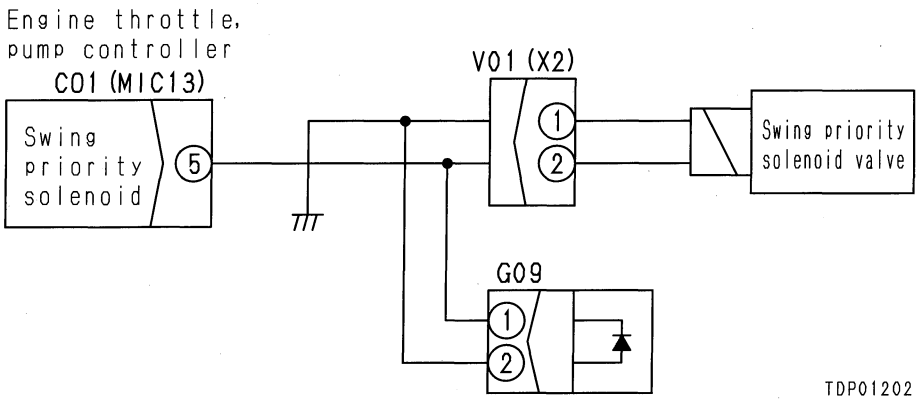


C-13 [E215] Disconnection in swing priority solenoid system is displayed

★ **This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if an E service code is not displayed, the problem has been removed.**
★ If the starting switch is turned OFF after an abnormality occurs, turn the starting switch ON and check if an E service code is displayed. (If it is not displayed, the problem has been removed.)
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on to the next step.



C-13 Related electric circuit diagram

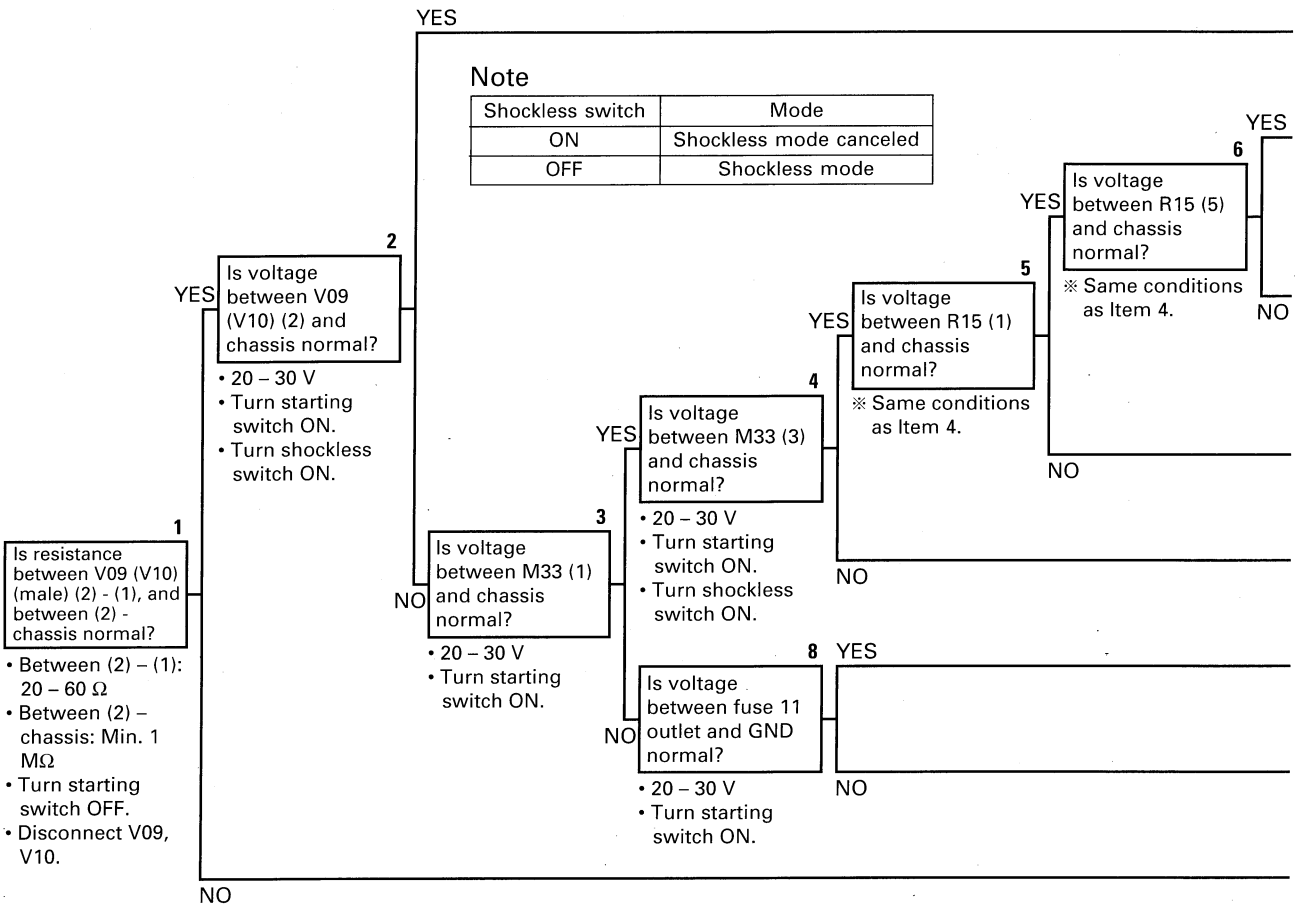


C-21 Abnormality in shockless boom solenoid system (no service code displayed)

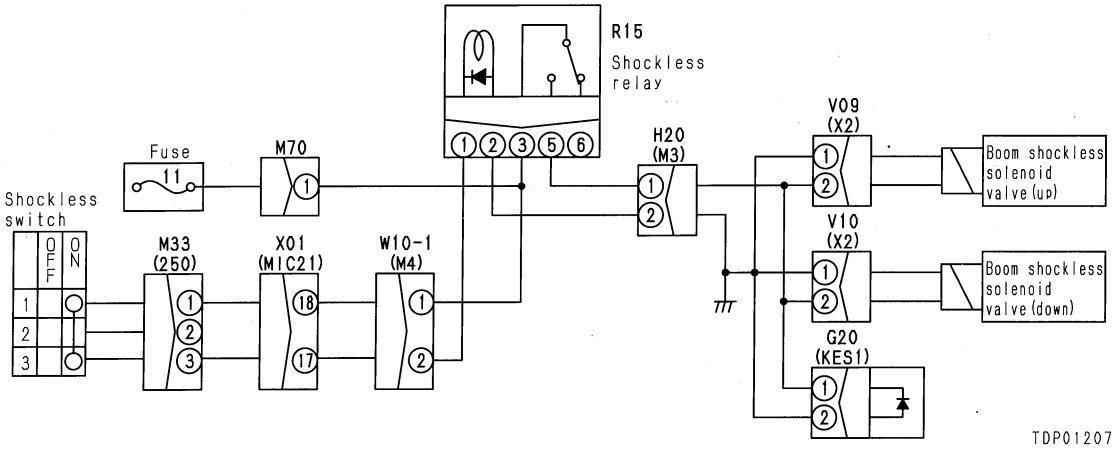
★ Even if an abnormality occurs in the shockless boom solenoid system, no service code is displayed on the monitor panel.
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on to the next step.
★ Solenoid V09: RAISE; solenoid V10: LOWER

a) Shockless mode cannot be canceled (solenoid is not switched ON)

★ Check that fuse 11 is not blown.
(If the fuse is blown, check for a short circuit with the ground in the wiring harness.)



C-21 Related electric circuit diagram



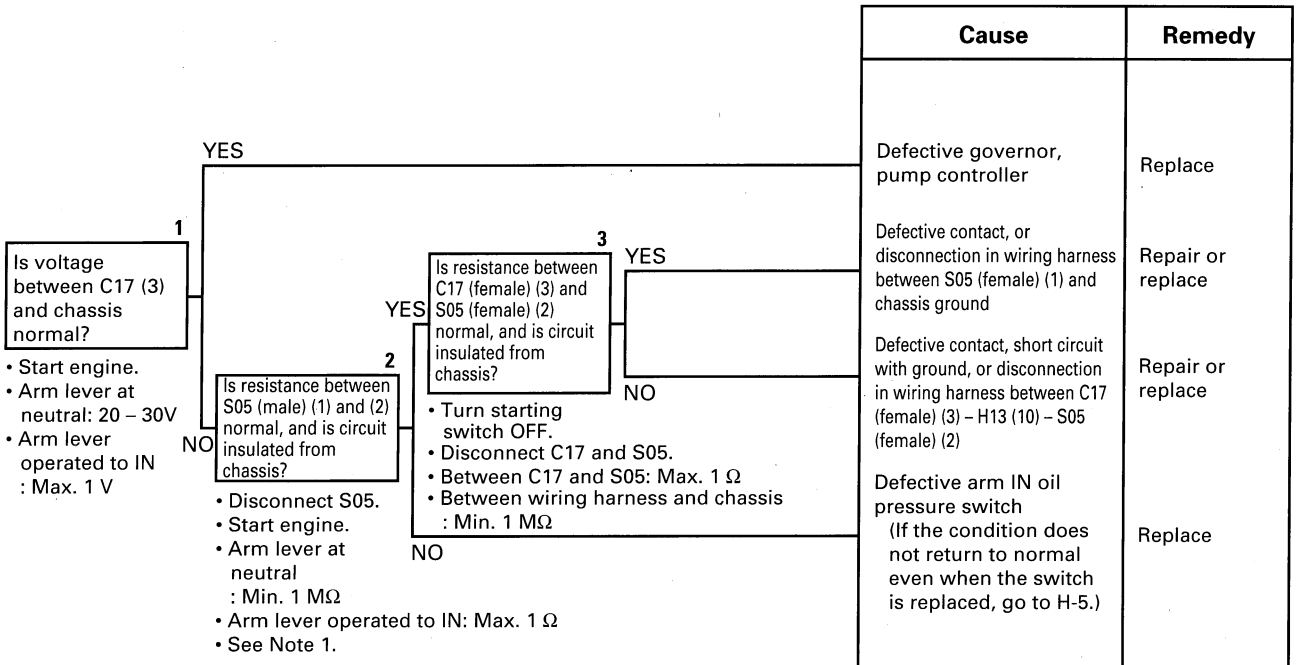
F-5 Bit pattern 20-(5) Arm IN oil pressure switch does not light up

★ **This troubleshooting is carried out when there is still an abnormality, so when disconnecting the connector and inserting the T-adapter, or when removing the T-adapter and returning the connector to its original position, if the monitor code display returns to normal, the problem has been removed.**

⚠ When measuring with the engine running, operate the lever slightly and make sure that the work equipment does not move.
(When measuring with the engine stopped, charge the accumulator first.)

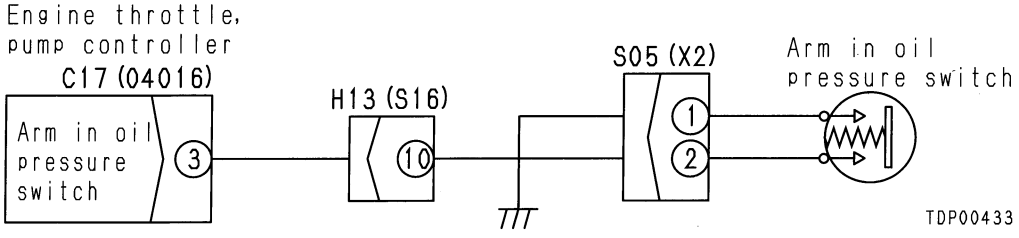
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.

★ Always connect any disconnected connectors before going on the next step.



Note 1: It is also possible to fit a short connector and judge the condition. In this case, check the voltage between C17 (3) and the chassis.
- If it is 20 – 30V: Go to YES
- If it is less than 1V: Go to NO

F-5 Related electric circuit diagram



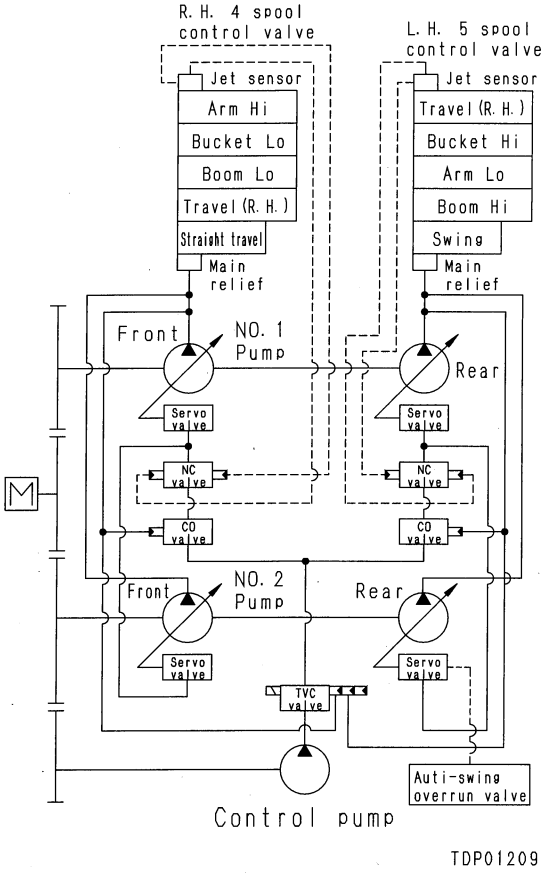
BEFORE CARRYING OUT TROUBLESHOOTING OF HYDRAULIC SYSTEM (H MODE)

1. Actuation and combination of main pumps

One each of piston pumps HPV105+105 and HPV105+105 are used in the work equipment and travel circuits. The oil from the No. 1 front pump and No. 2 front pump merges and flows to the R.H. 4-spool valve; and the oil from the No. 1 rear pump and No. 2 rear pump merges and flows to the L.H. 5-spool valve.

The No. 2 pump is controlled by the control pressure (NC valve output pressure) from the No. 1 pump, so it is controlled in the same way as the No. 1 pump. If the differential pressure of the jet sensor is defective or the NC valve output pressure is defective, the No. 1 front pump (rear pump) and No. 2 front pump (rear pump) are affected at the same time.

Therefore, if the work equipment and travel speed is slow or lacks power, or there is travel deviation, check using the following procedure and the troubleshooting chart to determine if the problem is in the pump system (and to find which of the four pump systems has the problem) or if the problem is in the control valve system.



TDP01209

2. Judgement procedure

If the work equipment is slow and the machine deviates to the left, the cause is probably one of the following:

1) Drop in main relief pressure of L.H. 5-spool control valve
2) Defective jet sensor differential pressure of L.H. 5-spool control valve
3) Defective NC valve output pressure for No. 1 rear pump
4) Defective No. 1 rear pump or No. 2 rear pump

It is possible to judge if the main relief pressure, jet sensor differential pressure, and NC valve output pressure are correct by measuring the oil pressure. However, as explained in Item 1 above, in the case of the pumps, the No. 2 pump is simultaneously controlled by the output pressure of the NC valve installed to the No. 1 pump, so it is impossible to judge if the problem is in the No. 1 front pump or the No. 2 front pump.

If the outlet port hoses of the No. 1 pump are interchanged between the front and rear, it is possible to judge which pump is defective.

1) If deviation is to left, No. 2 rear pump is defective
2) If deviation is to right, No. 1 rear pump is defective
3) If the travel speed is slow on both the left and right, the output pressure for the No. 1 rear pump NC valve is defective or the jet sensor of the L.H. 5-spool control valve is defective (if the relief pressure is normal when both the left and right travel are relieved).

In addition, if it is judged that the No. 1 rear pump or No. 2 rear pump is defective and the NC valve output pressure is normal, the next step is to check if the defect is in the servo valve or in the pump itself. To make this judgement, remove the servo valve and carry out a test on the individual part, or see TESTING AND ADJUSTING, Measuring servo piston stroke to judge if the servo valve is defective or not.

※ When testing the servo valve as an individual part, carry out the test at the specified maintenance work shop.

★ If the work equipment speed is slow and the machine deviates to the right when traveling, replace "front" for "rear" in the above explanation.

H-9 Excessive time lag

★ When the work equipment speed is normal. (If the work equipment speed is also slow, carry out troubleshooting first from Item 2 of H-6.)

Cause	Remedy
Defective operation of suction valve	Replace

Time lag unit: sec

Boom	Max. 3.0
Arm	Max. 3.0
Bucket	Max. 3.0

H-10 Excessive shock when boom is stopped

Cause	Remedy
Defective operation of shockless valve (defective closing of check valve)	Repair or replace
Defective operation of shockless solenoid valve (valve remains open)	Repair or replace

1 Does shockless solenoid valve move smoothly?
- YES
- NO

H-11 Defective actuation of machine push-up function

★ When electrical system is normal.

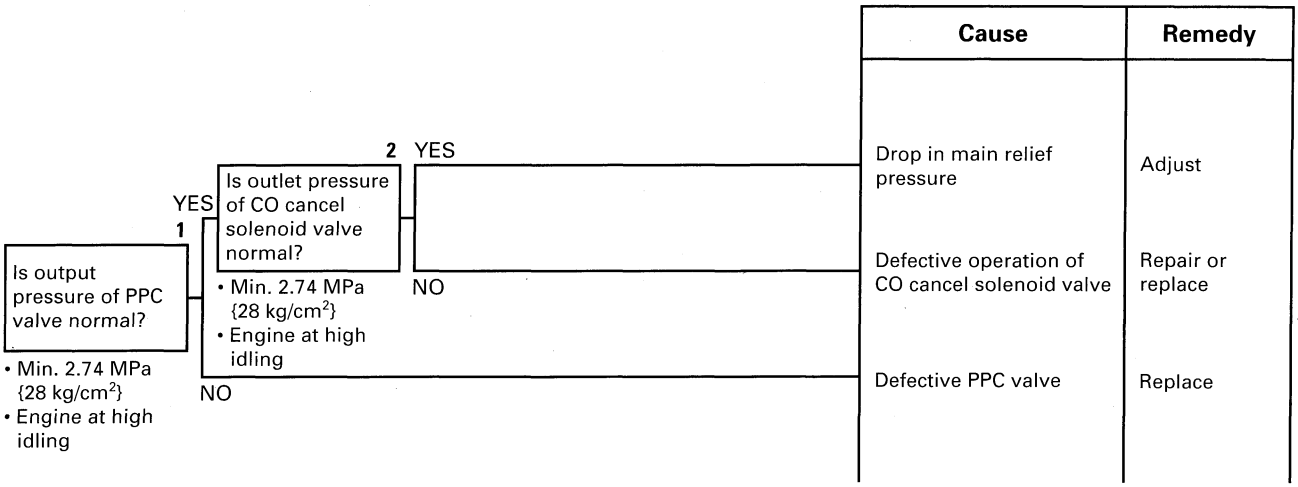
Cause	Remedy
Defective safety valve	Replace
Defective operation of solenoid valve	Correct or replace

1 Is output pressure of machine push-up solenoid valve normal?
- YES
- NO

- At low pressure setting: Min. 2.74 MPa {28 kg/cm^2}
- At high pressure setting: 0
- Engine at high idling

H-16 Travel speed is slow

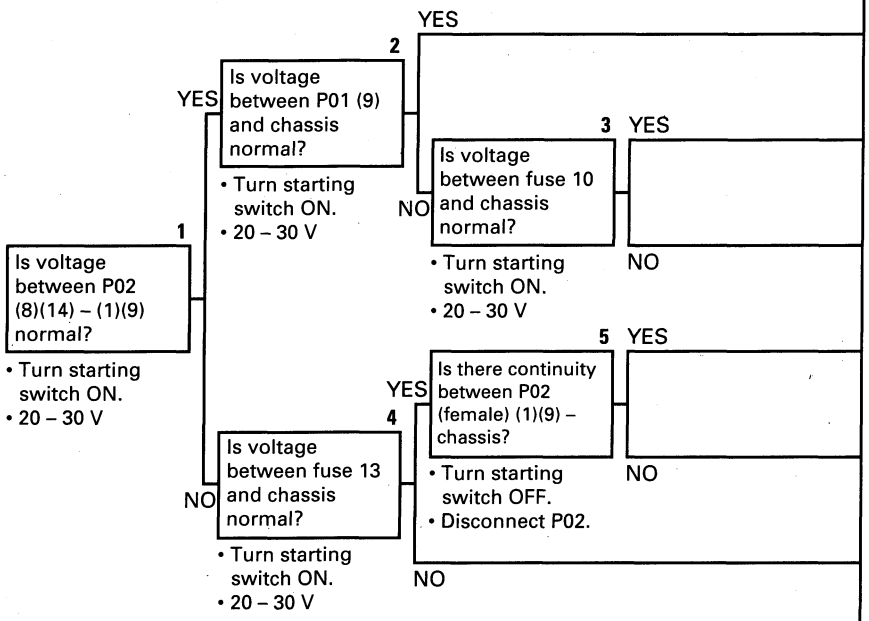
★ When there is no travel deviation.
★ Carry out troubleshooting in the D.H mode.
※ If main relief pressure has dropped, the work equipment will lack power even during normal operations.



M-6 When starting switch is turned ON, none of lamps on monitor panel light up for 3 seconds

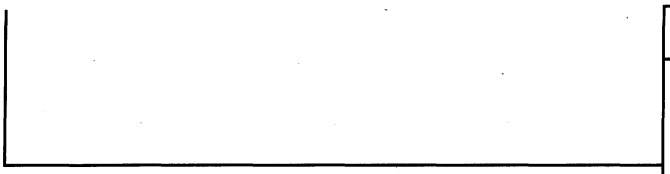
★ Check that fuses 10 and 13 are not blown.
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on to the next step.

a) None of lamps on monitor panel light up



Cause	Remedy
Defective monitor panel	Replace
Disconnection, defective contact, short circuit with ground in wiring harness between P01 (female) (9) and fuse 10	Repair or replace
Disconnection, defective contact, short circuit with ground in wiring harness between fuse 10 – H15 (2) – M14 (2)(1) – battery relay M	Repair or replace
Disconnection, defective contact, short circuit with ground in wiring harness between P02 (female) (8)(14) and fuse 13	Repair or replace
Defective contact, or disconnection in wiring harness between P02 (female) (1)(9) – H14 (2) – chassis ground	Repair or replace
Disconnection, defective contact, short circuit with ground in wiring harness between fuse 13 – H14 (1) – M11 (2)(1) – battery relay B	Repair or replace

b) Some of lamps on monitor panel do not light up



Cause	Remedy
Defective monitor panel	Replace

M-12 When starting switch is turned ON and engine is started, caution items, emergency items flash (when there is no abnormality in engine or items to check before troubleshooting)

★ 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)  **(engine oil pressure) flashes**

SAP00520

★ Check that the engine oil pressure is normal before carrying out troubleshooting.

Cause	Remedy
See M-10 b)	—

b)  **(coolant level) flashes**

SAP00519

★ Check that the coolant level is normal before carrying out troubleshooting.

Cause	Remedy
See M-9 a)	—

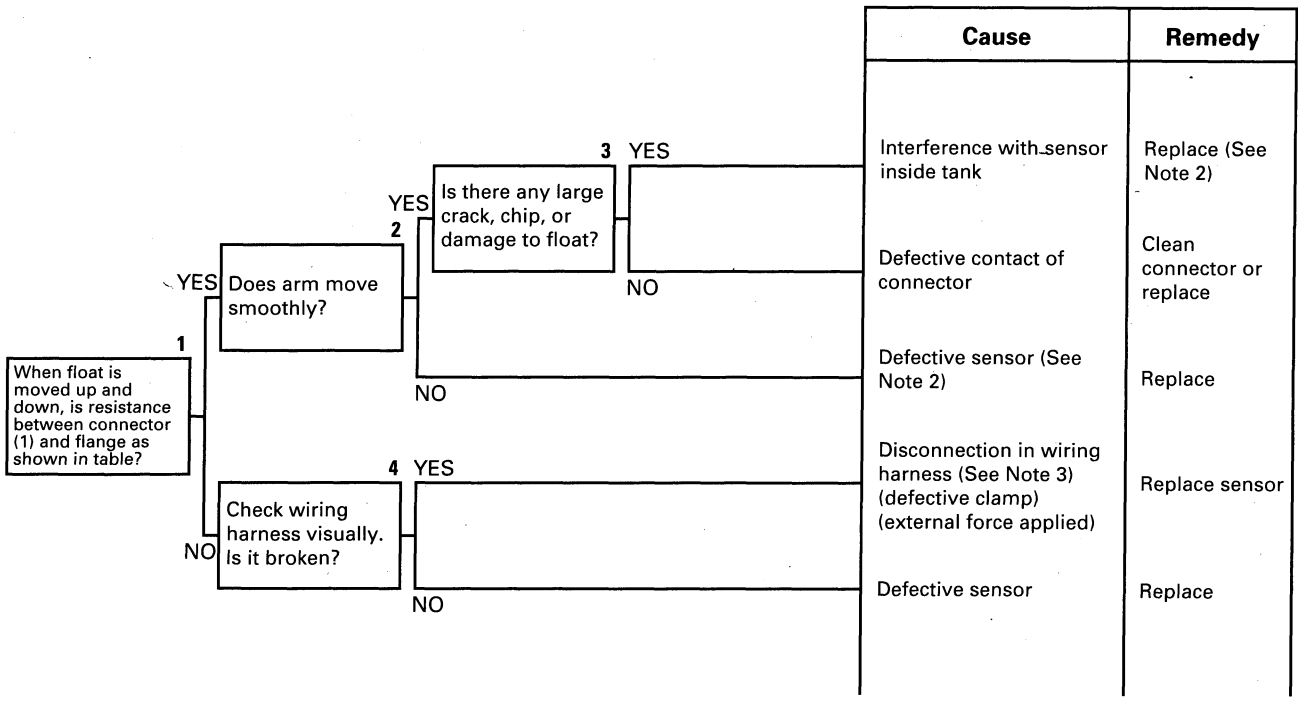
c)  **(battery charge) flashes**

SAP00522

Cause	Remedy
See M-10 a)	—

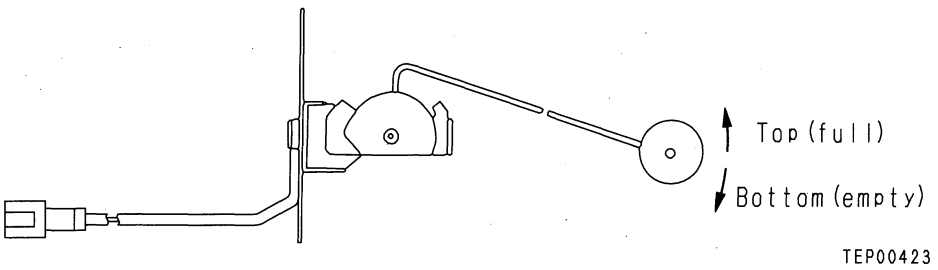
M-24 Defective fuel level sensor system

★ Remove the fuel level sensor when carrying out the troubleshooting.



Table

Top (FULL) stopper position	Approx. 12 Ω or below
Bottom (EMPTY) stopper position	Approx. 85 – 110 Ω



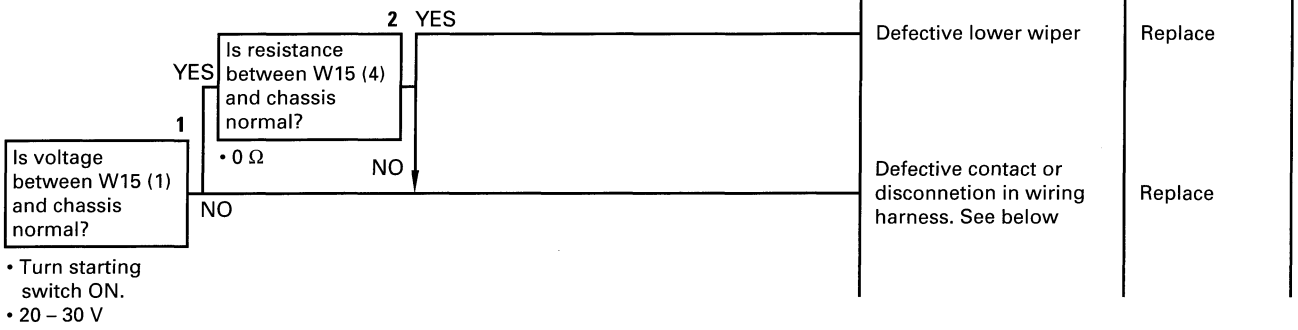
Note 1: Difference between fuel level and gauge display
For gauge display position 14 (FULL), the amount of fuel is 78-100%; and for display position 1 (EMPTY) it is below 14.5%. If the chassis is at an angle, the displayed amount of fuel will be different from the actual amount. Therefore, when checking, stop the machine at a horizontal place and wait for at least 2 minutes before checking the gauge. (The display is given a time delay so that the gauge can deal with sudden changes in the fuel level.)

Note 2: There is the possibility of defective installation or interference with the sensor inside the tank, so be careful when installing.

Note 3: Check for vibration at the connector mount. If there is excessive vibration, take the appropriate action.

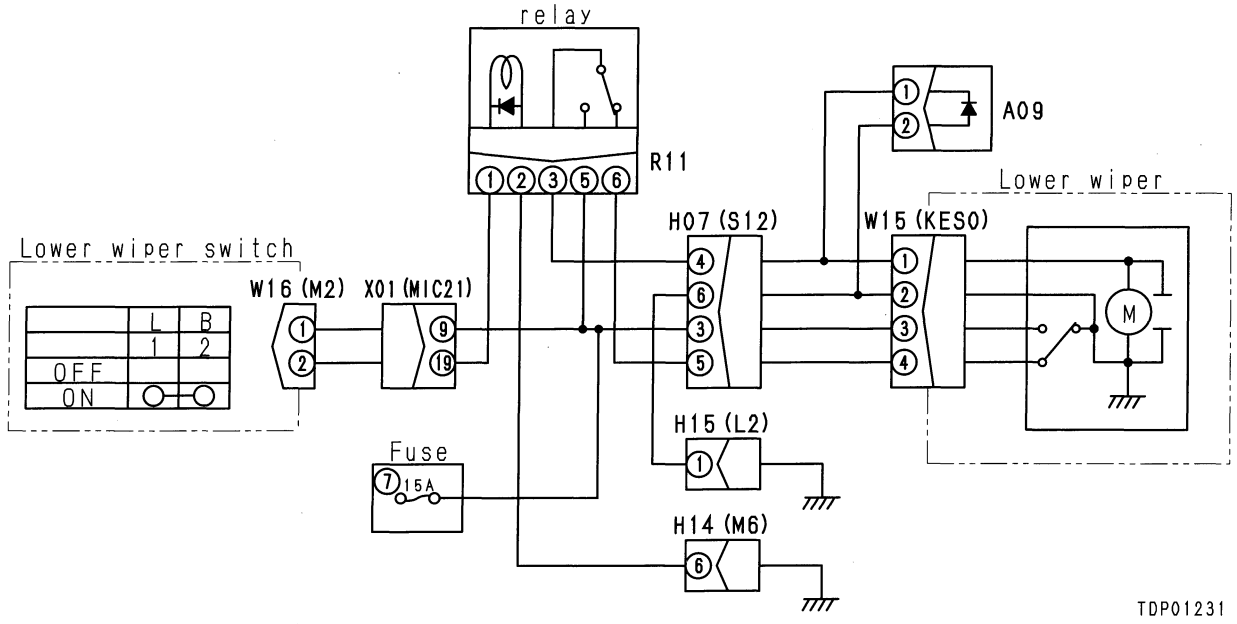
M-31 Lower wiper does not work

★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.
★ Check Fuse 7 is normal.



Cause	Remedy
Defective lower wiper	Replace
Defective contact or disconnetion in wiring harness. See below	Replace

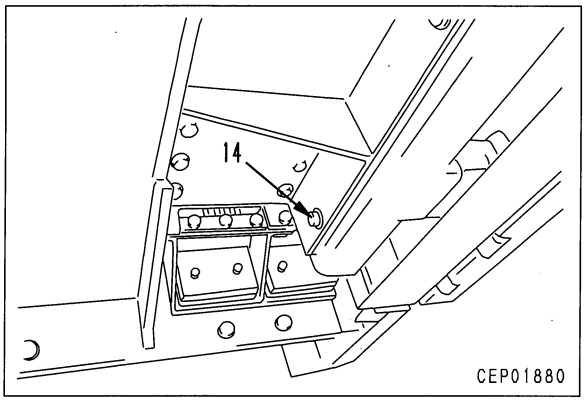
M-31 Related electric circuit diagram



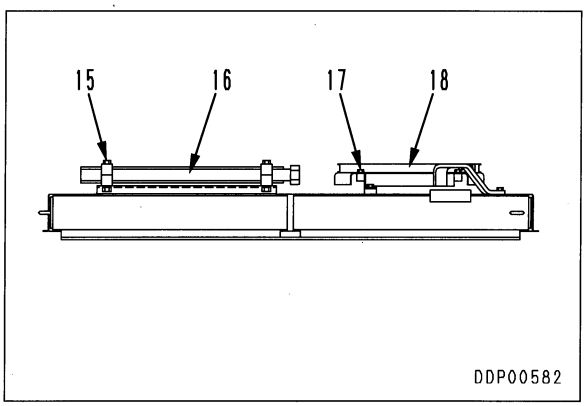
Component	Symbol		Part No.	Part Name	Q'ty	New/ remodel	Sketch	Nature of work, remarks	
Travel motor assembly	K		796-660-1560	Guide bolt	2	N		Removal, installation	Removal, installation of travel motor assembly
Idler assembly	L	1	790-201-2680	Plate	1			Disassembly, assembly	Press fitting of idler bushing
		2	796-675-1510	Installer	1				Installation of idler floating seal
Carrier roller assembly		3	791-630-1270	Wrench	1			Disassembly, assembly	Removal, installation of carrier roller round nut
		4	791-515-1520	Installer	1				Installation of floating seal
		5	791-630-1280	Push tool	*1				Press fitting of floating seal collar
		6	791-601-1000	Oil pump	1				Filling with oil, checking sealing
			or						
			791-646-8002	Oil lubricator	1				
			790-701-3000	Seal checker	1				
		7	791-401-1700	Lifting tool	1				Removal, installation of carrier roller assembly
			791-401-1761	Adapter	1				
			791-401-1540	Shackle	2				
			791-401-1770	T-bolt	2				
Track roller assembly		8	791-401-1700	Lifting tool	1				Removal, installation of track roller assembly
			791-401-1761	Adapter	1				
			791-401-1540	Shackle	2				
			791-401-1770	T-bolt	2				
		9	791-580-1520	Installer	1				Installation of floating seal
		10	790-201-2670	Plate	1				Press fitting of track roller bushing
		11	791-601-1000	Oil pump	1				Filling with oil, checking sealing
			or						
			791-646-8002	Oil lubricator	1				
			790-701-3000	Seal checker	1				
Track shoe assembly	M	1	791-680-9501	Remover, installer	1			Removal, installation	Removal, installation of master pin
			791-101-4300	Cylinder (1,471 kN {150 ton})	1				
			791-101-4200	Puller (294 kN {30 ton})					
			791-101-1102	Pump					
		2	790-331-1100	Wrench					Tightening shoe bolt angle
Recoil spring assembly		3	791-685-8501	Compressor	1			Disassembly, assembly	Disassembly, assembly of recoil spring
			791-635-3160	Extension	1				
			796-630-1110	Plate	1				
			01010-51640	Bolt	2				
			791-630-1120	Spacer	1				
			790-101-1600	Cylinder (686 kN {70 ton})	1				
			790-010-1102	Pump	1				
			796-630-1110	Plate	1				

5. Sling hydraulic cooler and aftercooler assembly, and remove mounting bolts (14).
   ★ Remove 4 bolts each of the left and right.
6. Remove hydraulic cooler assembly.

   kg Hydraulic cooler assembly: **550 kg**



7. Remove 4 bolts (15) and remove fuel cooler (16). Remove 4 bolts (17) and remove air condenser (18).



INSTALLATION OF HYDRAULIC COOLER ASSEMBLY

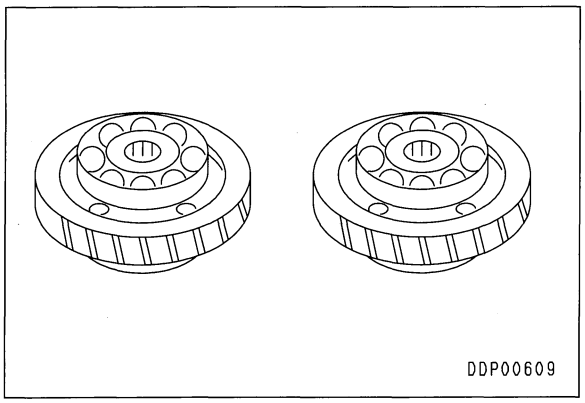
- Carry out installation in the reverse order to removal.

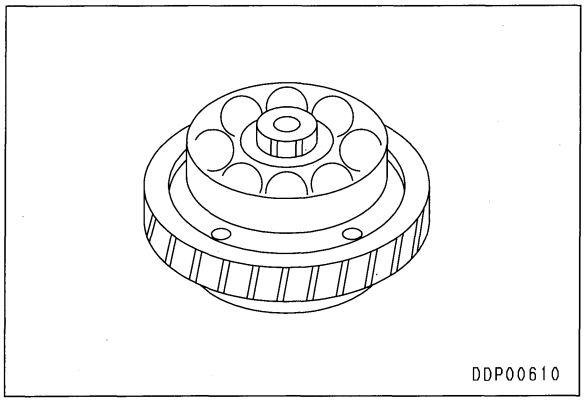
- **Refilling with oil (hydraulic tank)**
  ★ Add oil through oil filler to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
- **Charging air conditioner with gas**
  ★ Using tool **X**, charge the air conditioner circuit with refrigerant (R134a).

ASSEMBLY OF PTO ASSEMBLY

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

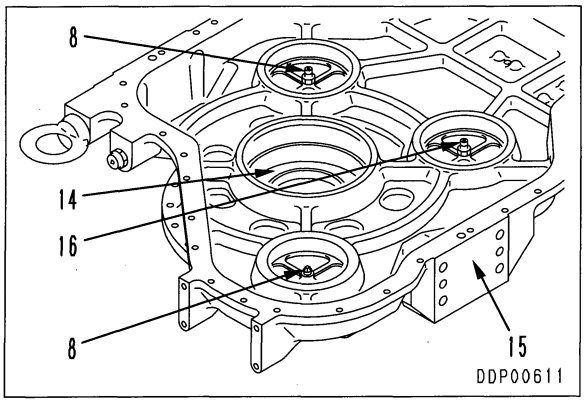
1. Bearings
Install bearings to gears.



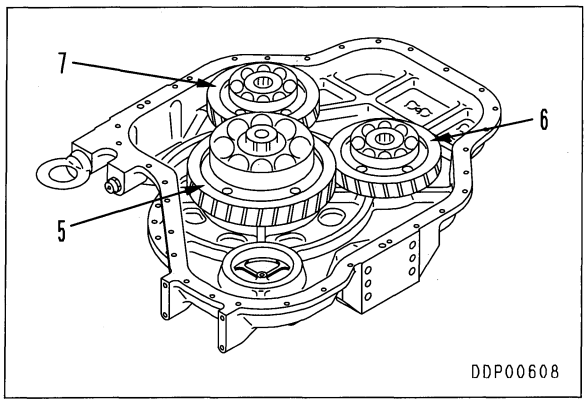


2. Outer race at case end
Press fit outer race (14) to case (15).

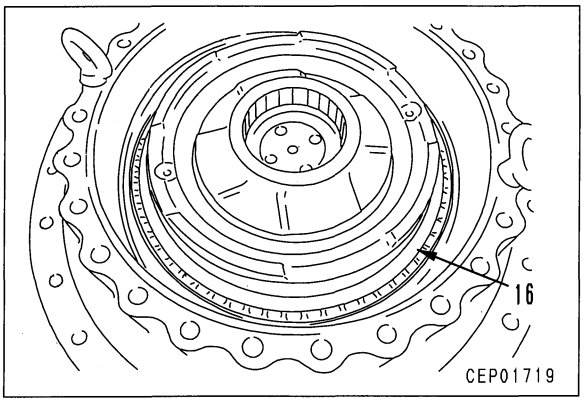
3. Nipples, plug
Install nipples (8) and blind plug (16).



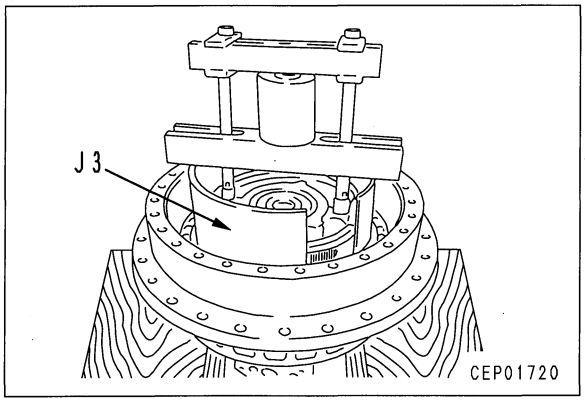
4. Gears
1) Install gears (5) and (7).
2) Install gear (6).
3) Rotate gears, check that each gear rotates smoothly, then coat with red lead (minium), and check tooth contact.
Bearing: **Grease (G2-LI)**



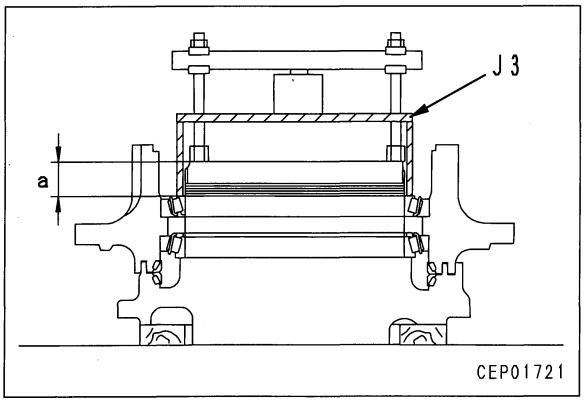
6) Outside bearing
Install bearing (16).



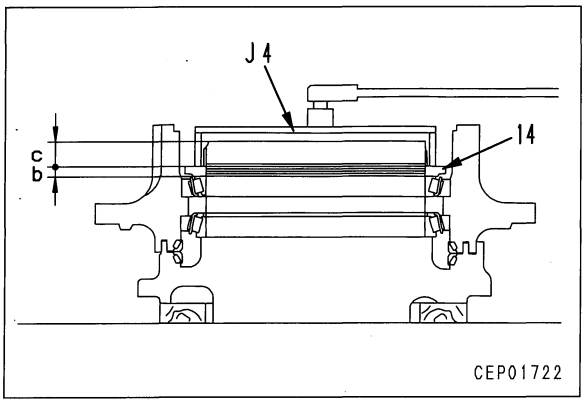
7) Install nut as follows.
   i) Set tool **J3** in position.
   ii) Push bearing inner race portion with specified force.
   ★ Pushing force:
   34.3 – 38.2 kN {3.5 – 3.9 ton}
   iii) Rotate hub assembly 2 – 3 times to settle bearing.



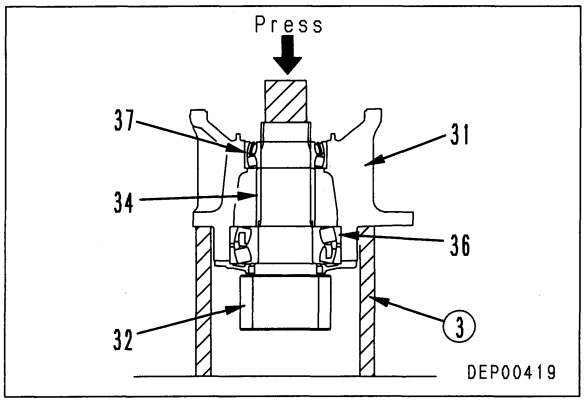
   iv) Measure dimension **a** in the condition above.

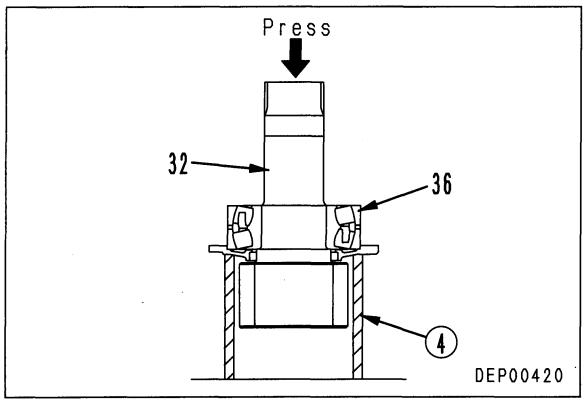


   v) Measure thickness **b** of nut (14) as an individual part.
   vi) Calculate **a** – **b** = **c**.
   vii) Using tool **J4**, tighten nut (14) to a point where dimension **c** = $^{0}_{-0.1}$ mm.

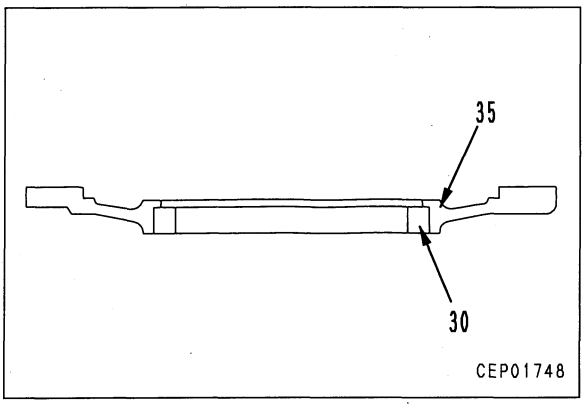


2) Put block ③ in contact with case (31), then set in press.
   ★ Set the block height so that there is a clearance of approx. 120 mm between the pinion and the press stand.
3) Push pinion shaft (32) from top to remove pinion shaft.
   ★ The bearing will come out: bottom part (36) is the outer race and top part (37) is the inner race.
   ★ The bearing is a spherical type, so do not press it continuously with the press. Release the pressure at intervals, and repeat the pushing operation.
4) Remove spacer (34).
5) Support position of bolt hole of cover (29) with block ④, and set in press.
   ★ Set the block height so that there is a clearance of approx. 120 mm between the pinion and the press stand.
6) Push pinion shaft (32) and pull out from bearing (36).
   ★ The shaft will go at an angle, so push perpendicularly.
7) Remove cover assembly (29) from pinion shaft (32).



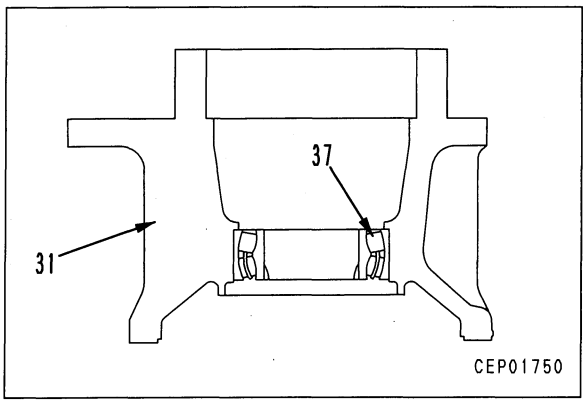


8) Remove oil seal (30) from cover (35).



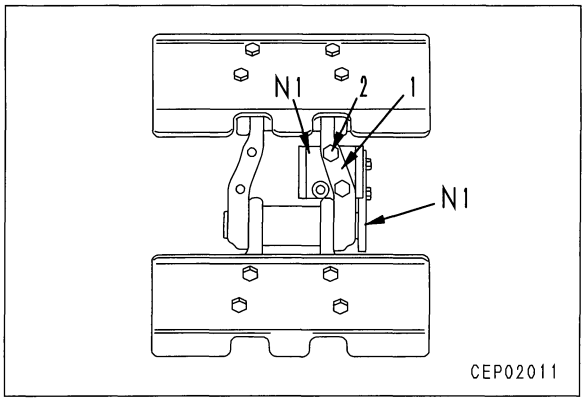
12. Bearing

Remove bearing (37) from case (31).

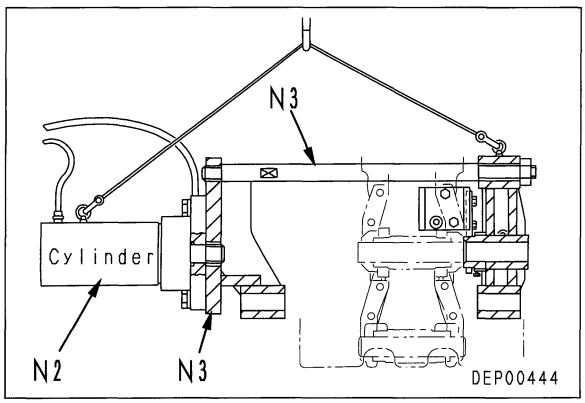


DISASSEMBLY OF ONE LINK IN FIELD

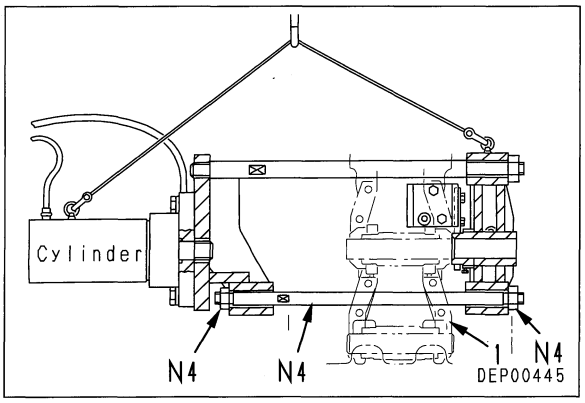
1. Using two bolts (2), install tool **N1** (adapter, guide, bolt) to link (1).
   ★ It is also possible to use two track bolts for bolt (2).



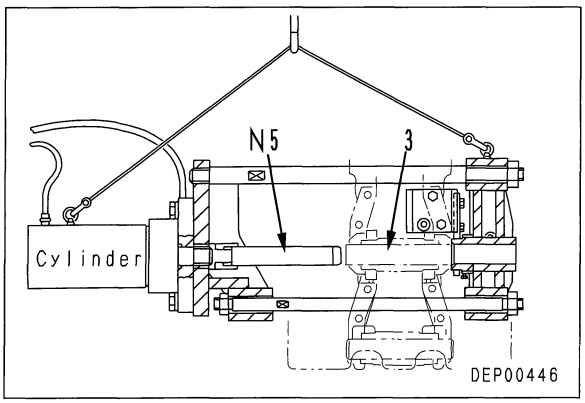
2. Assemble tool **N2** (pump, cylinder 1471 kN {150t}) and tool **N3** (frame, rod, adapter, bolt x 1, eyebolt), then raise chassis and set on track.



3. Insert rod of tool **N4** from cylinder end, and install with two nuts.
   ★ Pass the rod through the hole in link (1) to install.

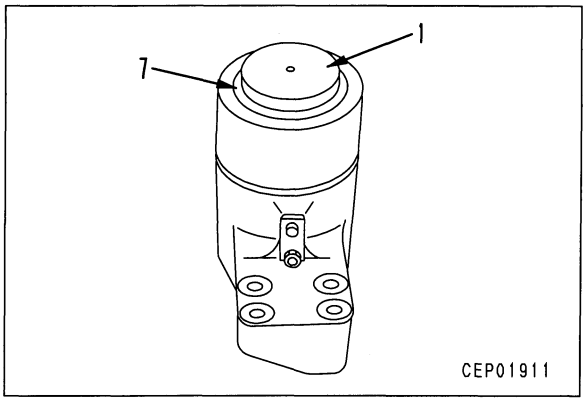


4. Set tool **N5** (adapter, guide, pusher) in position, then apply hydraulic pressure and remove pin (3).
   When the cylinder reaches the end of its stroke, insert extension **N5** between the adapter and guide, and repeat the operation.



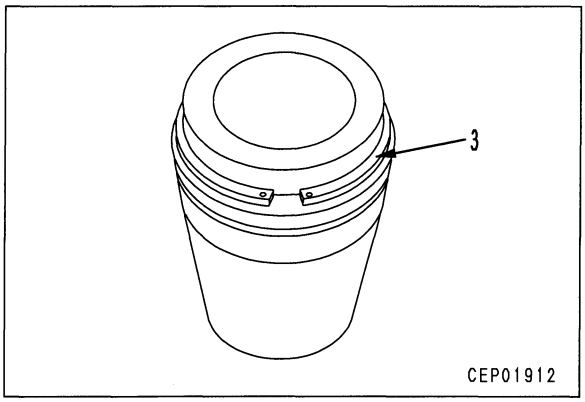
DISASSEMBLY OF IDLER ADJUSTMENT CYLINDER ASSEMBLY

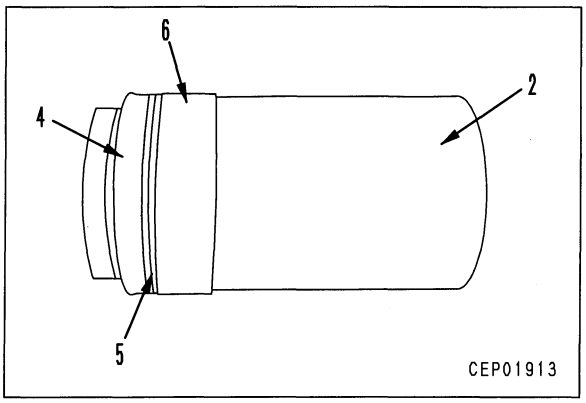
1. Remove plunger assembly (1).
2. Remove snap ring (3), then remove packing (4), backup ring (5), and wear ring (6) from plunger (2).
3. Remove dust seal (7).



ASSEMBLY OF IDLER ADJUSTMENT CYLINDER ASSEMBLY

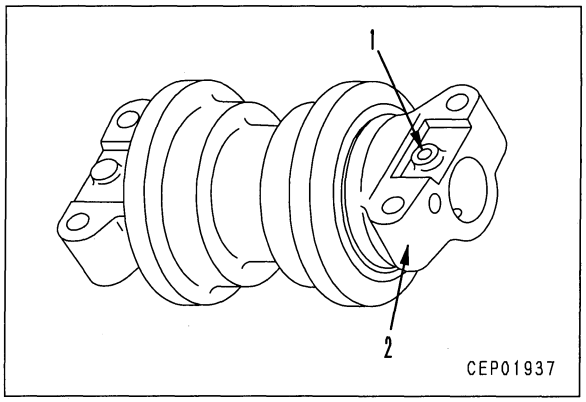
1. Install wear ring (6) to plunger (2).
2. Assemble backup ring (5) and packing (4) to plunger (2), and install snap ring (3).
3. Fill inside with grease (G2-LI), then assemble plunger assembly (1) in piston.
4. Install dust seal (7).



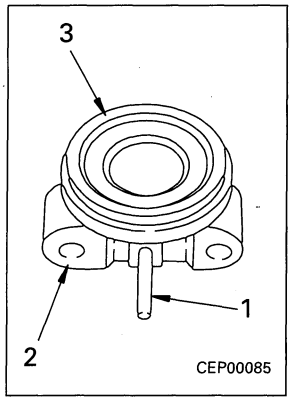


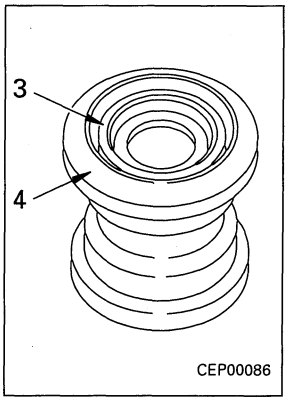
DISASSEMBLY OF TRACK ROLLER ASSEMBLY

1. Remove plug and drain oil.
   ★ Rotate the shaft while draining the oil.\
   Track roller: **Approx. 420 – 480 cc**

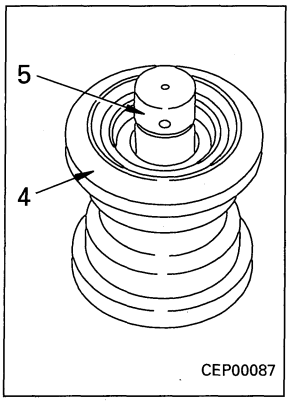


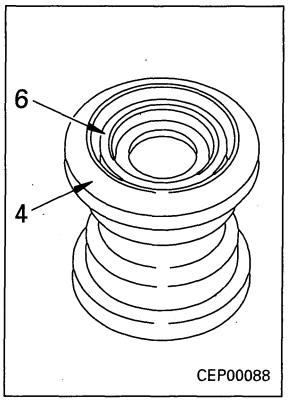
2. Remove pin (1), then remove collar (2).
3. Remove floating seal (3) from collar (2) and roller (4).
4. Pull out roller (4) from shaft (5).
   ★ It is filled with 280 – 310 cc. of oil, so drain the oil at this point or lay a cloth to prevent the area from becoming dirty.



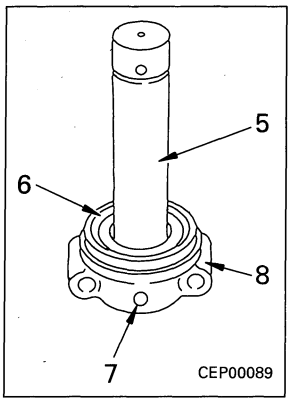


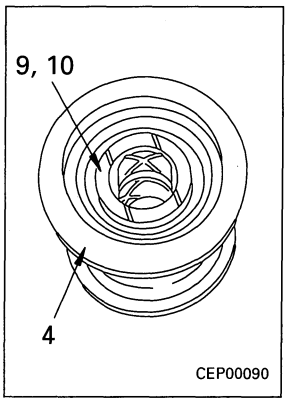
5. Remove floating seal (6) on opposite side from roller (4) and collar (8).





6. Remove pin (7), then remove collar (8) from shaft (5).
7. Remove bushings (9) and (10) from roller (4).

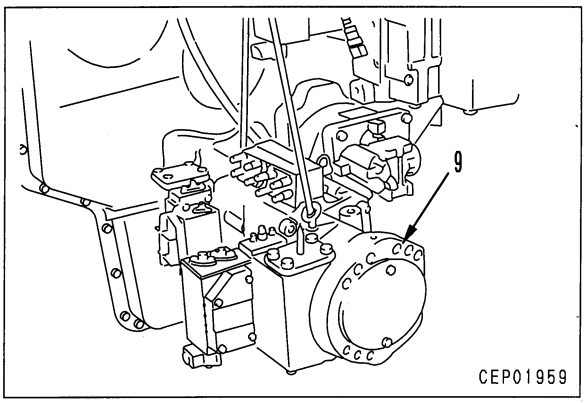




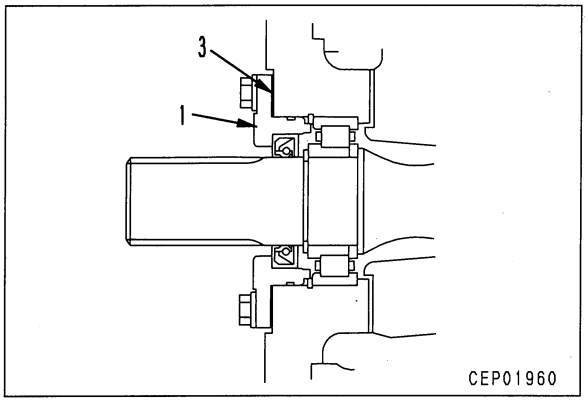
REMOVAL OF MAIN PUMP INPUT SHAFT OIL SEAL

1. Remove main pump assembly.
   For details, see REMOVAL OF MAIN PUMP ASSEMBLY.

2. Remove cover (1).
   ★ Be careful not to lose shims (2) and (3).



3. Remove oil seal (4) from cover (1).



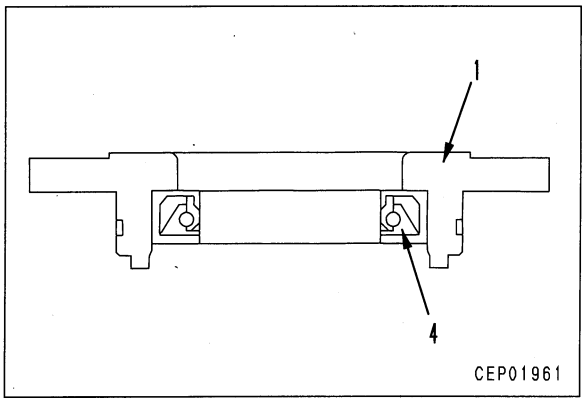
INSTALLATION OF MAIN PUMP INPUT SHAFT OIL SEAL

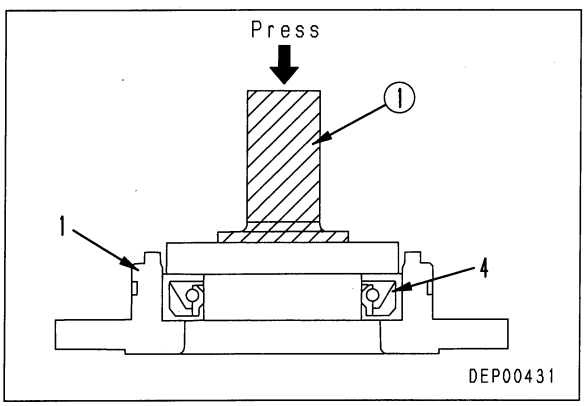
- Carry out installation in the reverse order to removal.

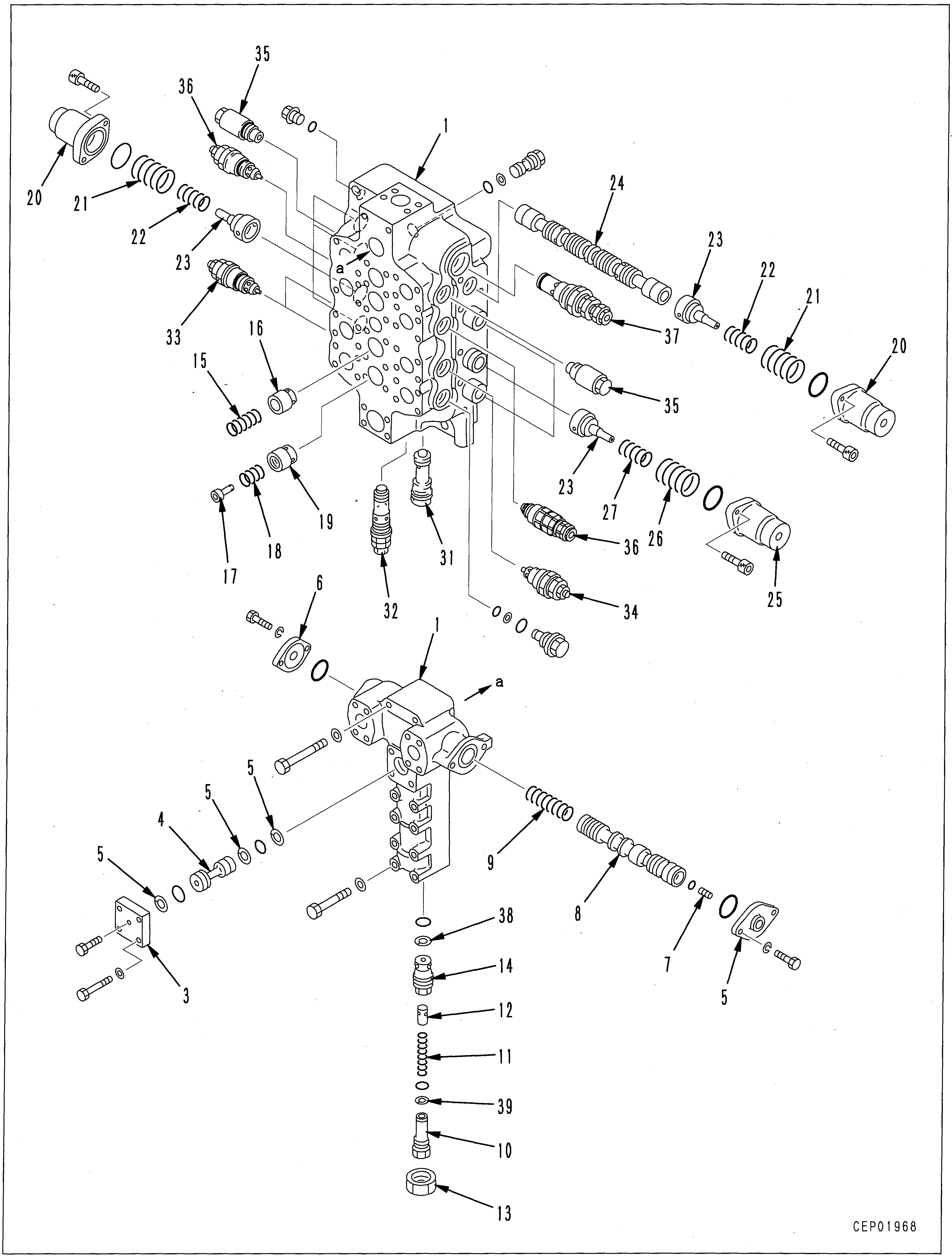
※ 1

Lip of oil seal: **Grease (G2-LI)**
Coat the outside circumference of the oil seal thinly with grease (G2-LI), then press fit.

★ Using tool ①, press fit oil seal (4).



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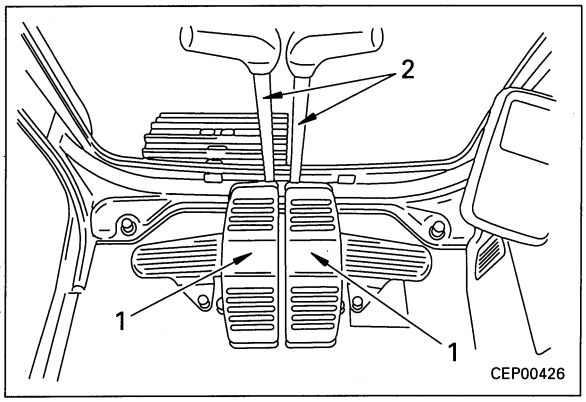
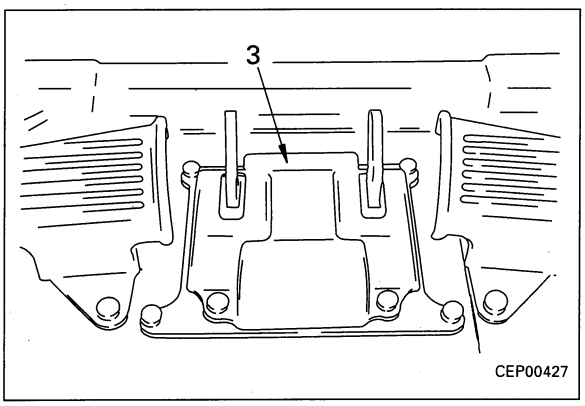
CEP01968

REMOVAL OF TRAVEL PPC VALVE ASSEMBLY

⚠ Lower the work equipment completely to the ground and stop the engine. Then loosen the oil filler cap slowly to release the pressure inside the hydraulic tank.

1. Remove travel PPC valve undercover.
2. Remove floor mat.
3. Remove pedal (1) and lever (2).
4. Remove cover (3). ※ 1
5. Remove covers (4), then remove springs (5).
6. Disconnect 6 PPC hoses (7), then remove travel PPC valve assembly (8). ※ 2



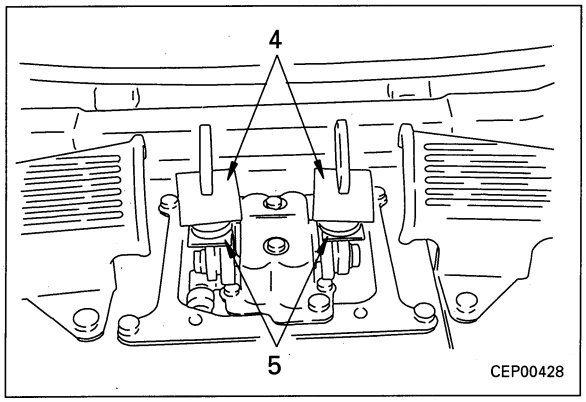


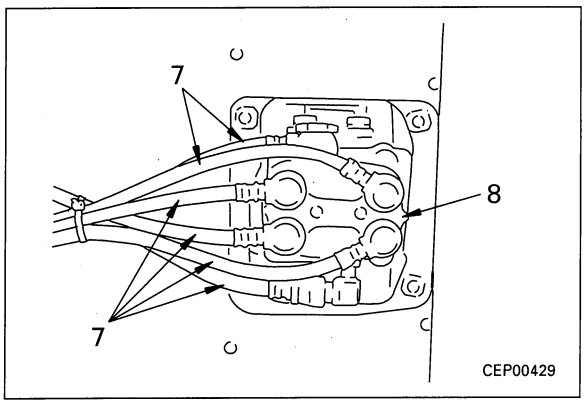
INSTALLATION OF TRAVEL PPC VALVE ASSEMBLY

- Carry out installation in the reverse order to removal.

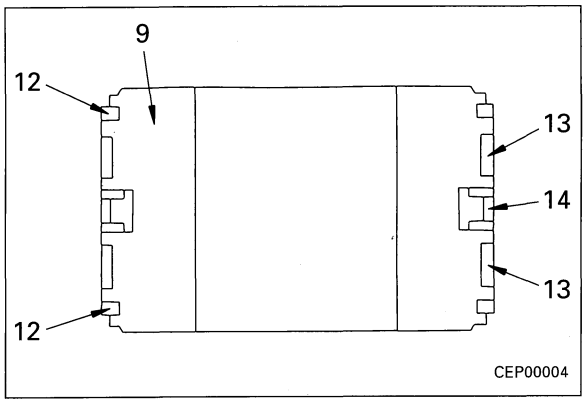
※ 1
kgm Cover mounting bolt:
19.6 ± 1.9 Nm {2.0 ± 0.2 kgm}

※ 2
kgm Hose mounting joint bolt
(width across flats: 30 mm):
32.9 ± 4.9 Nm {4.9 ± 0.5 kgm}
kgm Hose mounting joint bolt
(width across flats: 22 mm):
29.4 ± 4.9 Nm {3.0 ± 0.5 kgm}

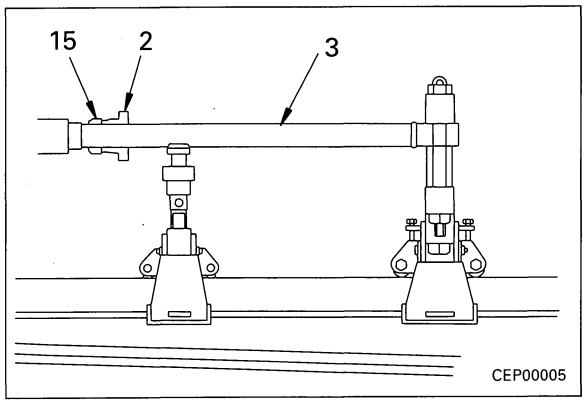




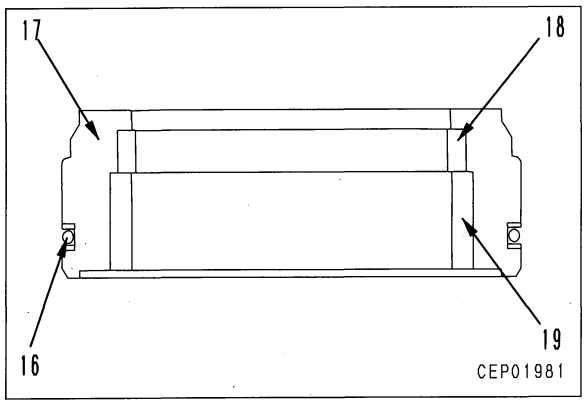
6) Disassembly of piston assembly
   i) Remove ring (12).
   ii) Remove wear ring (13).
   iii) Remove piston ring (14).



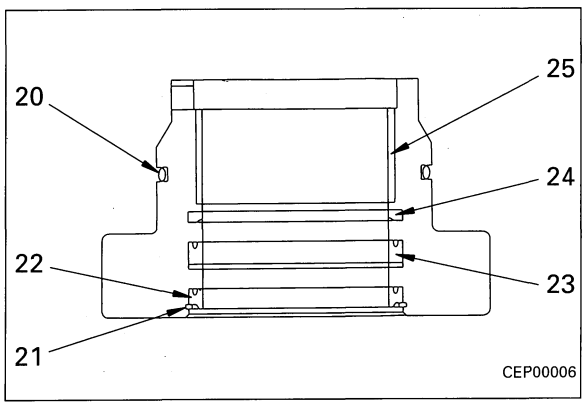
7) Remove collar assembly (15) and head assembly (2) from piston rod (3).



8) Disassembly of collar
   i) Remove O-ring and backup ring (16).
   ii) Remove rings (18) and (19) from collar (17).



9) Disassembly of head assembly
   i) Remove O-ring and backup ring (20).
   ii) Remove snap ring (21), then remove dust seal (22).
   iii) Remove rod packing (23).
   iv) Remove buffer ring (24).
   v) Remove bushing (25).



REMOVAL OF BUCKET, ARM ASSEMBLY

⚠ Extend the bucket cylinder piston rod to the end of the CURL stroke, and the arm cylinder piston rod to a point approx. 200 mm before the end of the IN stroke. Then lower the work equipment completely to the ground, and set the safety lock lever to the LOCK position.

1. Set block ① to boss portion of bucket cylinder bottom mount on arm.

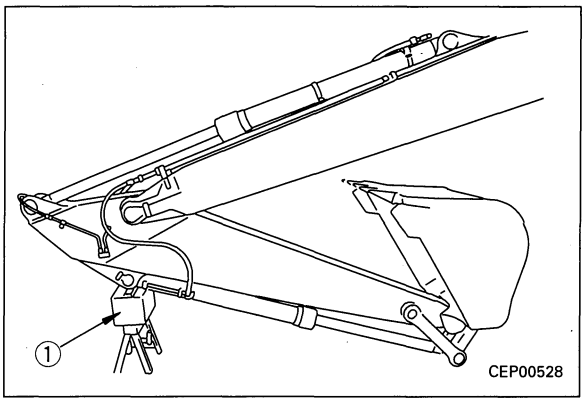
2. Disconnect grease hose (1).

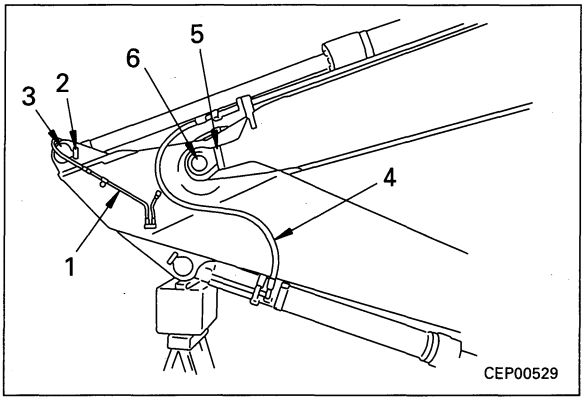
3. Remove plate (2), then pull out arm cylinder head pin (3). ※ 1
   ★ If the pin does not come out, use tool **V2** and remove the pin from the head end.

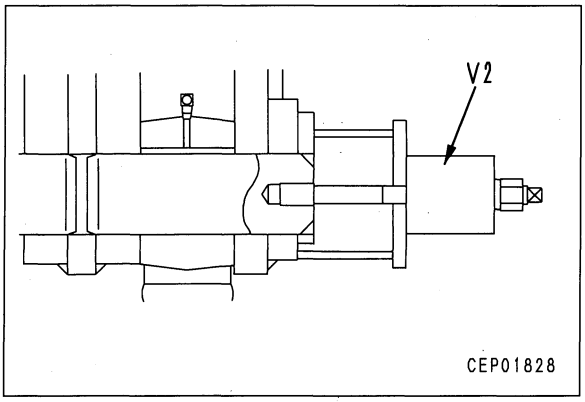
4. Start engine, and retract piston rod, then tie piston rod with wire to prevent it from coming out.
   ⚠ Stop the engine and release the remaining pressure in the circuit. For details, see TESTING AND ADJUSTING, Releasing pressure in hydraulic circuit.

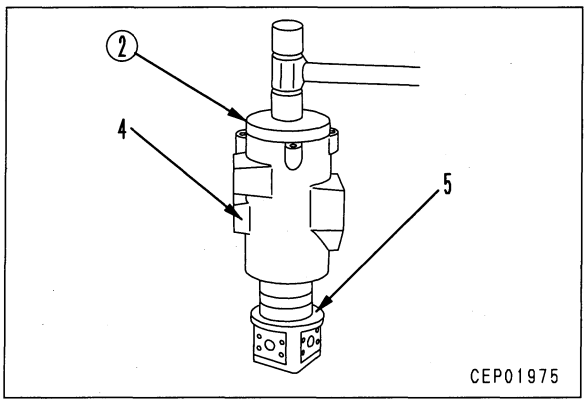
5. Disconnect 2 bucket cylinder hoses (4).
   ★ There are shims installed, so check the number, thickness, and position, and keep in a safe place.

6. Remove plate (5), then using tool **V3**, pull out boom top pin (6). ※ 2

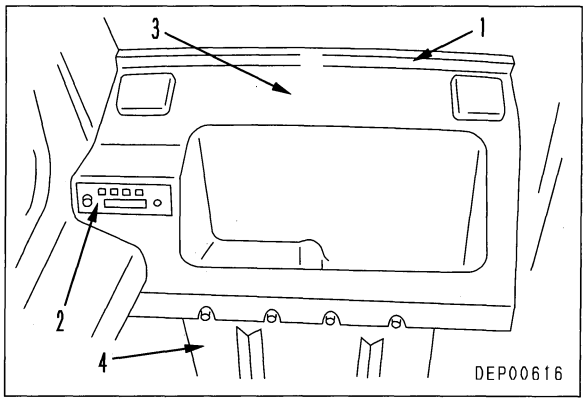






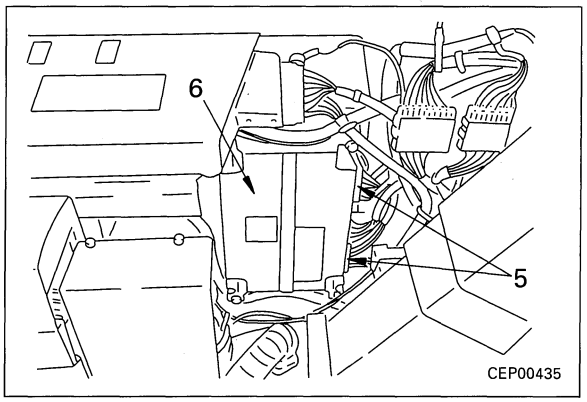


REMOVAL OF GOVERNOR, PUMP CONTROLLER ASSEMBLY



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

1. Remove Radio (2) if fitted.
2. Remove plate (1), then remove cover (2), (3).
3. Lift cover (3) away carefully to locate speaker harness connector. Disconnect and remove panel completely.
4. Remove divider board (6).
5. Disconnect wiring connector (5), and remove governor, pump controller assembly.



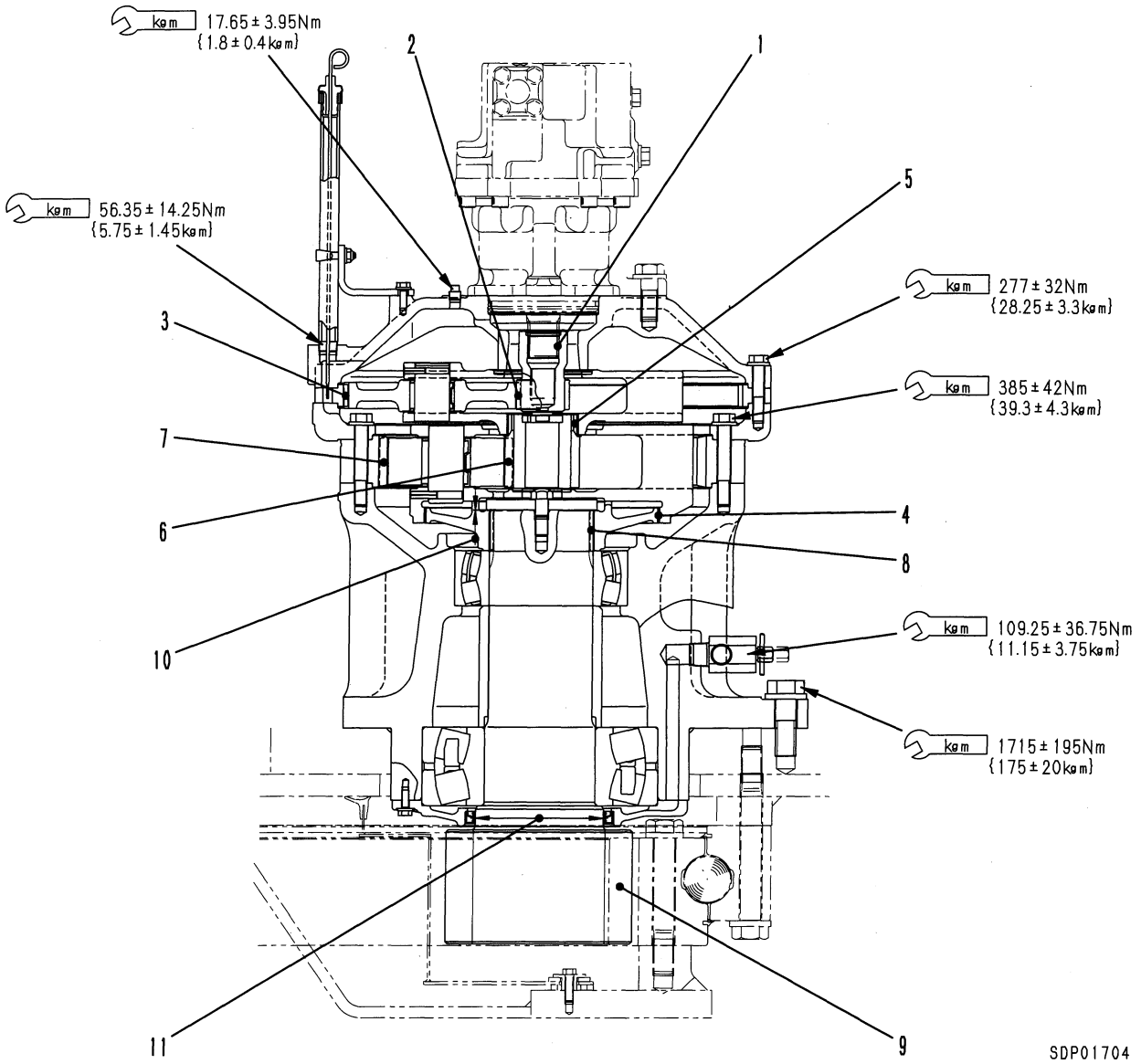
INSTALLATION OF GOVERNOR, PUMP CONTROLLER ASSEMBLY

- Carry out installation in the reverse order to removal.

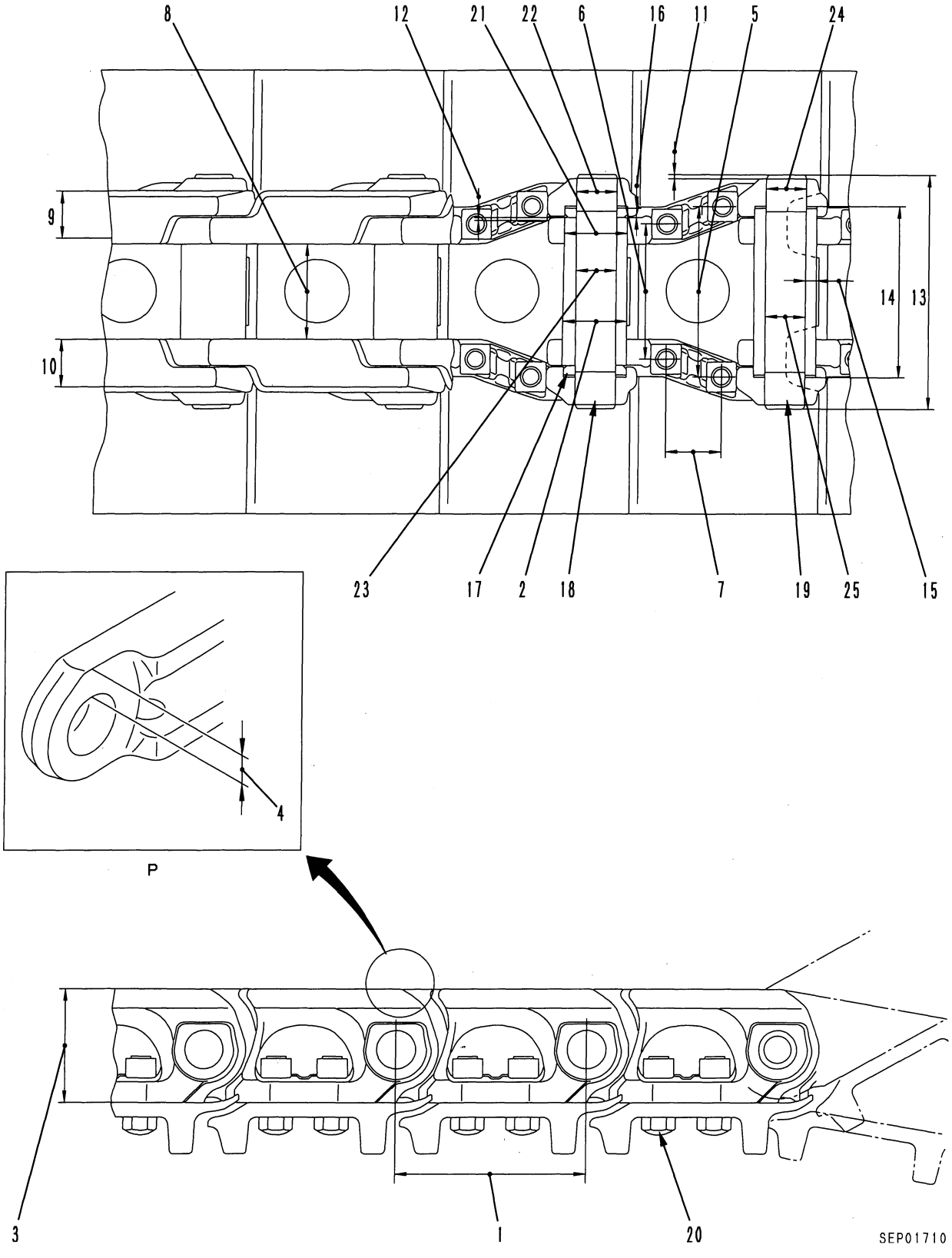
※ 1

- Check the performance of the work equipment, travel, and swing. For details, see TESTING AND ADJUSTING.

SWING MACHINERY



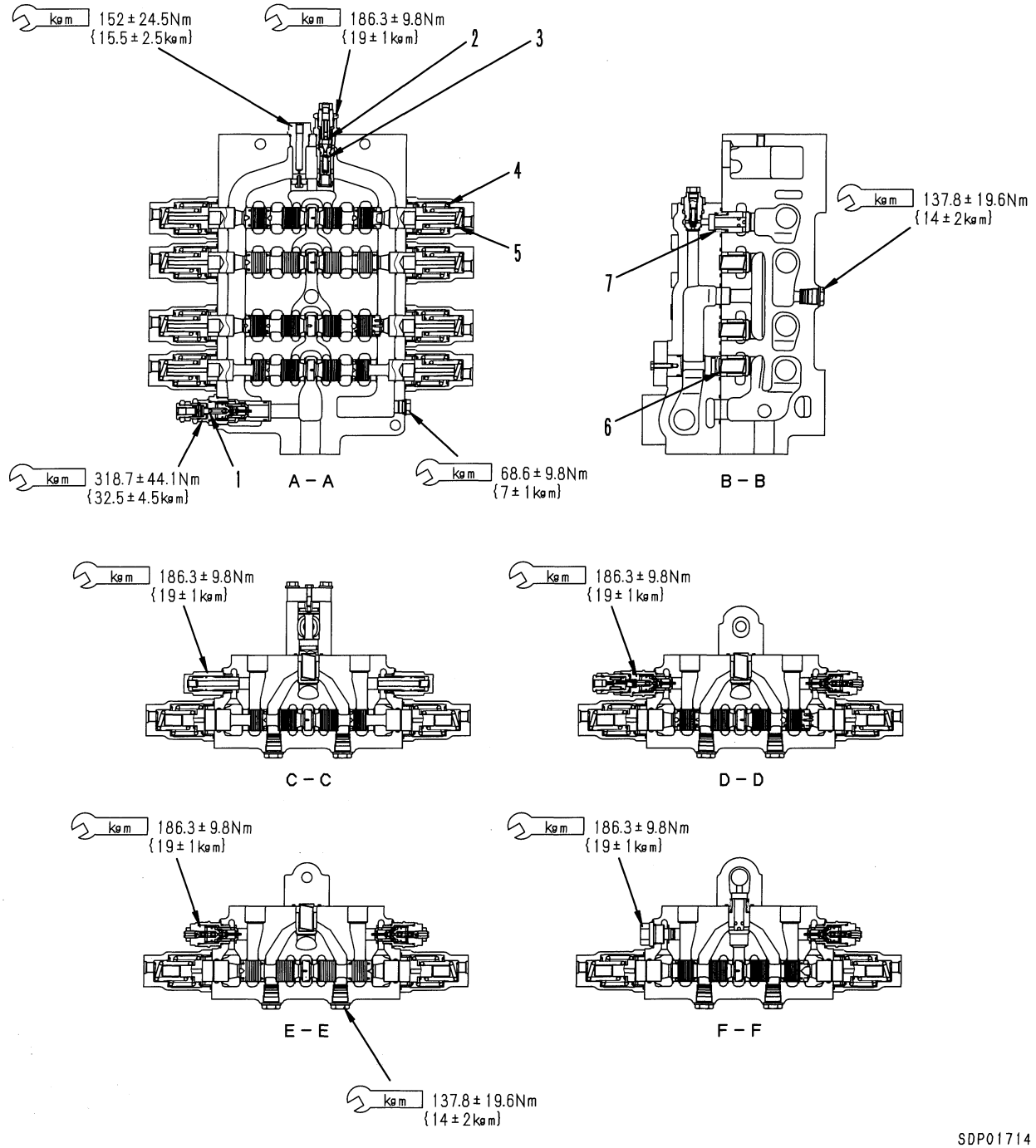
TRACK SHOE
(1/2)



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

R.H. 4-SPOOL CONTROL VALVE

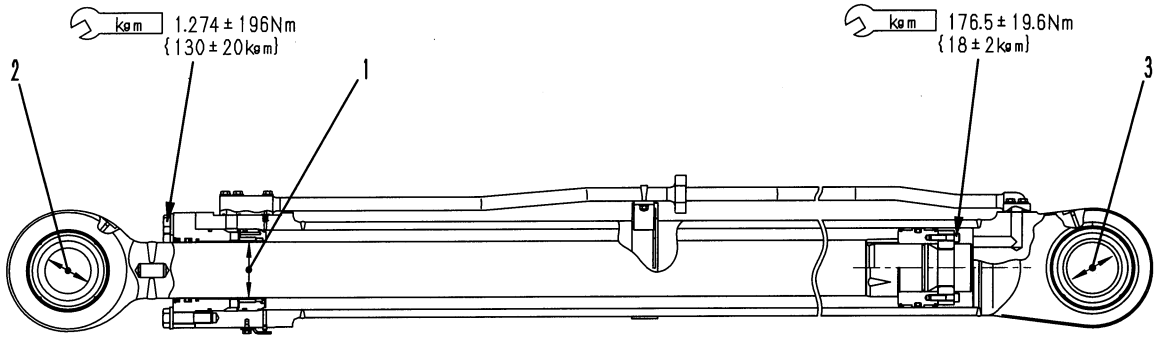
R.H. 4-SPOOL CONTROL VALVE



SDP01714

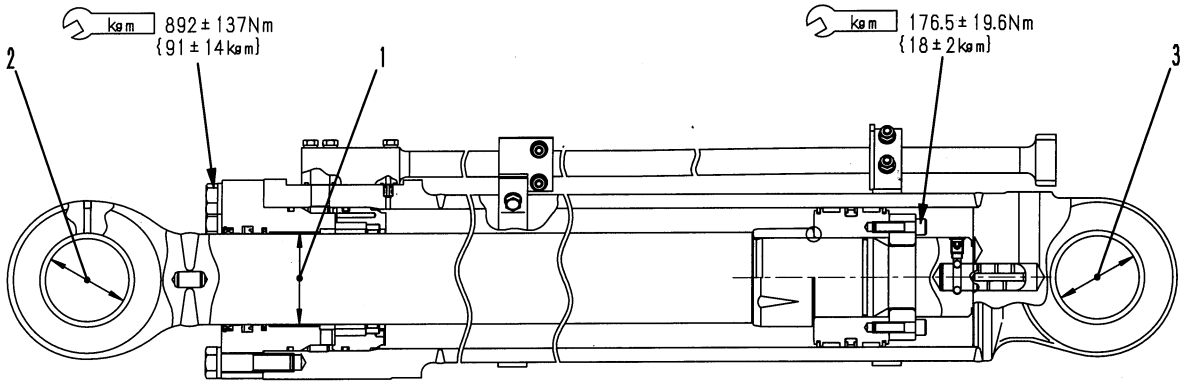
HYDRAULIC CYLINDER

BOOM CYLINDER



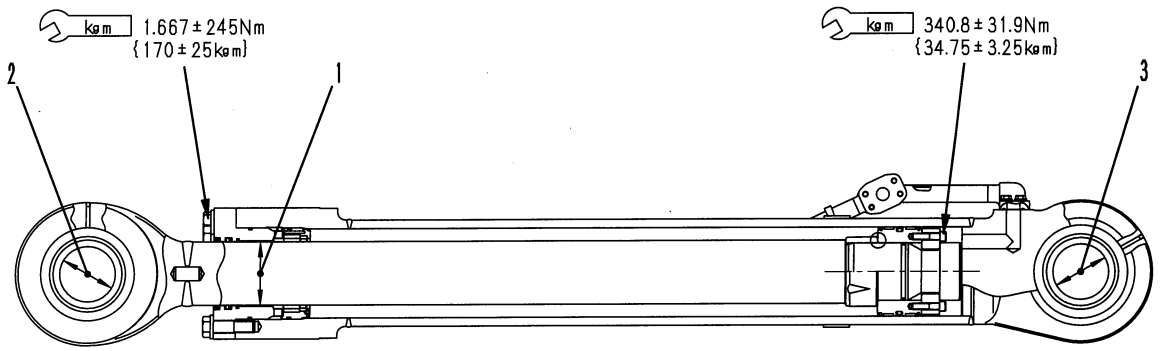
SDP01721

ARM CYLINDER



SDP04263

BUCKET CYLINDER



SDP04264