SEN04597-06

Shop Manual

HYDRAULIC
EXCAVATOR

PC45MR-3
PC55MR-3

SERIAL NUMBERS PC45MR- 5001 and up
PC55MR- 15001

KOMATSU

PC45MR, PC55MR-3 Hydraulic excavator

Form No. SEN04599-06

KOMATSU

Explanation of terms for maintenance standard

The maintenance standard chapter explains the criteria for replacing or reusing products and parts in the machine maintenance work. The following terms are used to explain the criteria.

1. **Standard size and tolerance**
   - To be accurate, the finishing size of parts is a little different from one to another.
   - To specify a finishing size of a part, a temporary standard size is set and an allowable difference from that size is indicated.
   - The above size set temporarily is called the "standard size" and the range of difference from the standard size is called the "tolerance".
   - The tolerance with the symbols of + or – is indicated on the right side of the standard size.

Example:

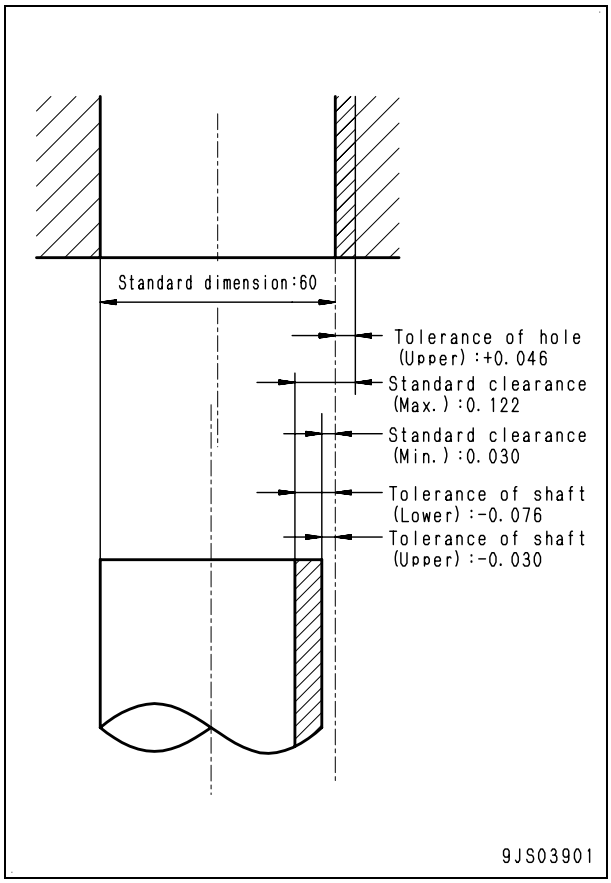
Standard size	Tolerance
120	-0.022 -0.126

★ The tolerance may be indicated in the text and a table as [standard size (upper limit of tolerance/lower limit of tolerance)].
Example) 120 (–0.022/–0.126)

- Usually, the size of a hole and the size of the shaft to be fitted to that hole are indicated by the same standard size and different tolerances of the hole and shaft. The tightness of fit is decided by the tolerance.
- Indication of size of rotating shaft and hole and relationship drawing of them

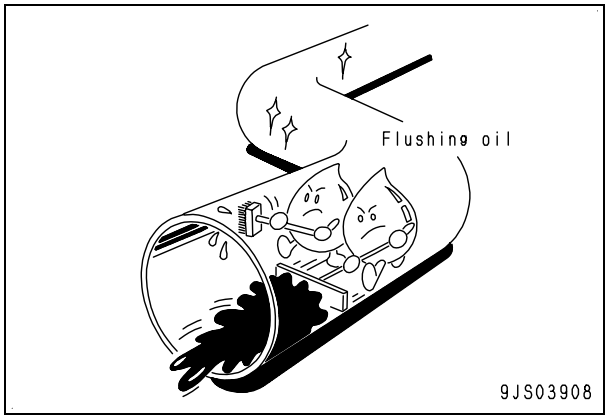
Example:

Standard size	Tolerance	
	Shaft	Hole
60	-0.030 -0.076	+0.046 0

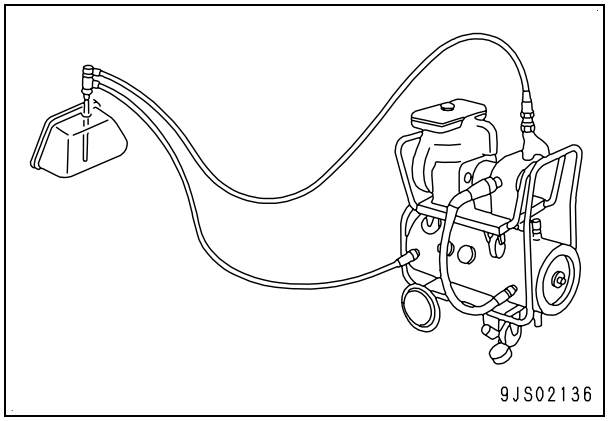


5. **Change hydraulic oil when the temperature is high**
   When hydraulic oil or other oil is warm, it flows easily. In addition, the sludge can also be drained out easily from the circuit together with the oil, so it is best to change the oil when it is still warm. When changing the oil, as much as possible of the old hydraulic oil must be drained out. (Drain the oil from the hydraulic tank; also drain the oil from the filter and from the drain plug in the circuit.) If any old oil is left, the contaminants and sludge in it will mix with the new oil and will shorten the life of the hydraulic oil.

6. **Flushing operations**
   After disassembling and assembling the equipment, or changing the oil, use flushing oil to remove the contaminants, sludge, and old oil from the hydraulic circuit. Normally, flushing is carried out twice: primary flushing is carried out with flushing oil, and secondary flushing is carried out with the specified hydraulic oil.



7. **Cleaning operations**
   After repairing the hydraulic equipment (pump, control valve, etc.) or when running the machine, carry out oil cleaning to remove the sludge or contaminants in the hydraulic oil circuit. The oil cleaning equipment is used to remove the ultra fine (about 3 μ) particles that the filter built in the hydraulic equipment cannot remove, so it is an extremely effective device.



Method of disassembling and connecting push-pull type coupler

⚠ Before carrying out the following work, loosen the oil filler cap of the hydraulic tank gradually to release the residual pressure from the 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 container.

Type 1

1. **Disconnection**
   1) 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 portion (4).
   2) With hose joint (2) pushed into adapter (3), press rubber cap portion (4) against adapter (3) until it clicks. (Fig. 2)
   3) Hold hose adapter (1) or hose (5) and pull it out. (Fig. 3)
      ★ Since some hydraulic oil flows out, prepare an oil container.

Fig. 1

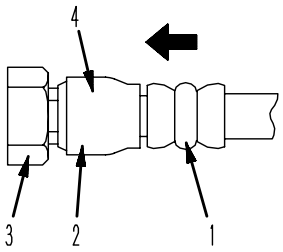


Fig. 2

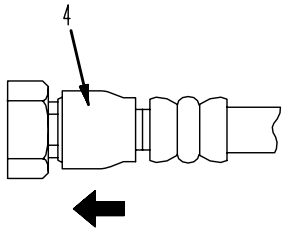
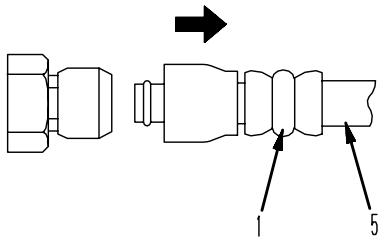


Fig. 3



9JS02109

2. **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 portion (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 portion moves toward the hose about 3.5 mm. This does not indicate abnormality, however.

Fig. 4

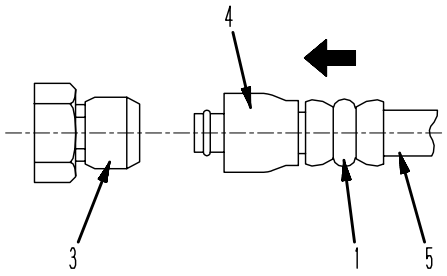
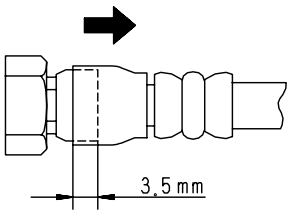


Fig. 5



9JS02110

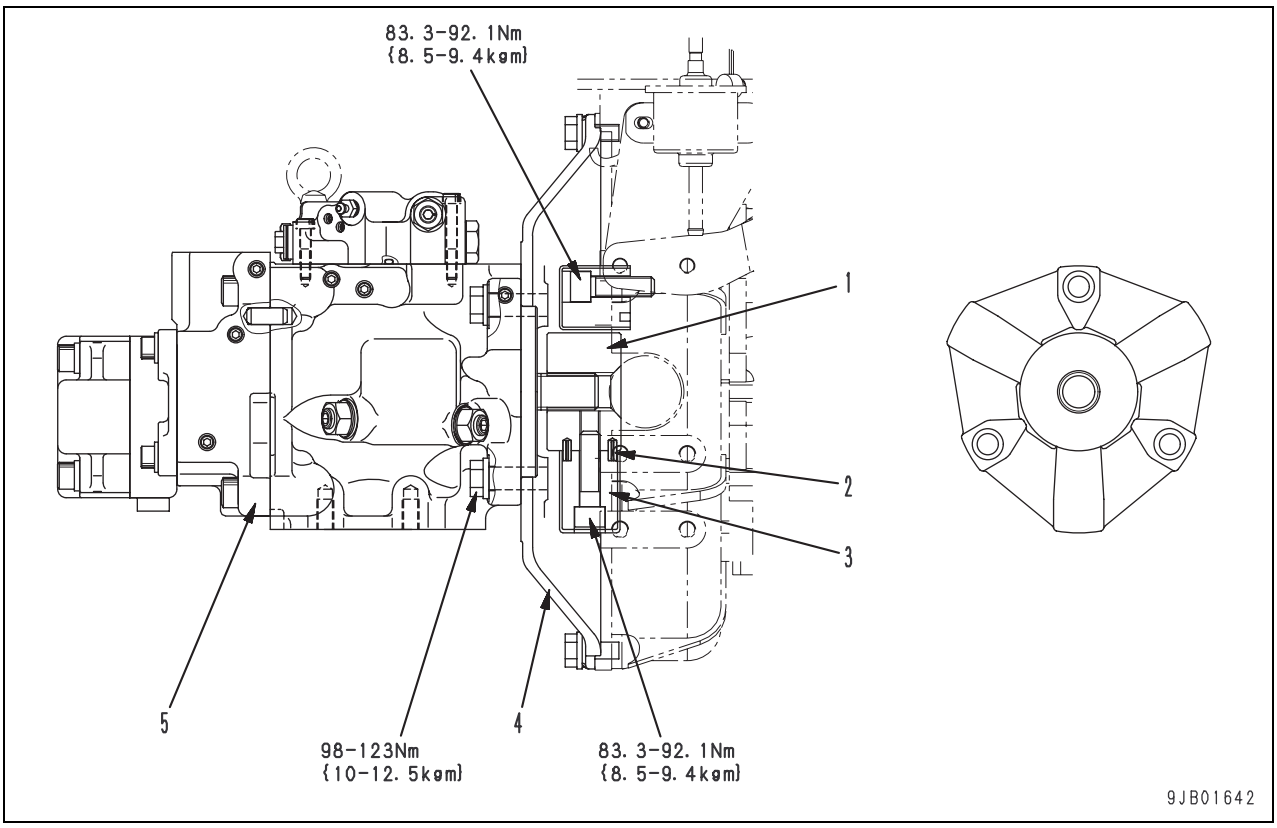
kg/cm^2 to lb/in^2

1 kg/cm^2 = 14.2233 lb/in^2

	0	1	2	3	4	5	6	7	8	9
0	0	14.2	28.4	42.7	56.9	71.1	85.3	99.6	113.8	128.0
10	142.2	156.5	170.7	184.9	199.1	213.4	227.6	241.8	256.0	270.2
20	284.5	298.7	312.9	327.1	341.4	355.6	369.8	384.0	398.3	412.5
30	426.7	440.9	455.1	469.4	483.6	497.8	512.0	526.3	540.5	554.7
40	568.9	583.2	597.4	611.6	625.8	640.1	654.3	668.5	682.7	696.9
50	711.2	725.4	739.6	753.8	768.1	782.3	796.5	810.7	825.0	839.2
60	853.4	867.6	881.8	896.1	910.3	924.5	938.7	953.0	967.2	981.4
70	995.6	1,010	1,024	1,038	1,053	1,067	1,081	1,095	1,109	1,124
80	1,138	1,152	1,166	1,181	1,195	1,209	1,223	1,237	1,252	1,266
90	1,280	1,294	1,309	1,323	1,337	1,351	1,365	1,380	1,394	1,408
100	1,422	1,437	1,451	1,465	1,479	1,493	1,508	1,522	1,536	1,550
110	1,565	1,579	1,593	1,607	1,621	1,636	1,650	1,664	1,678	1,693
120	1,707	1,721	1,735	1,749	1,764	1,778	1,792	1,806	1,821	1,835
130	1,849	1,863	1,877	1,892	1,906	1,920	1,934	1,949	1,963	1,977
140	1,991	2,005	2,020	2,034	2,048	2,062	2,077	2,091	2,105	2,119
150	2,134	2,148	2,162	2,176	2,190	2,205	2,219	2,233	2,247	2,262
160	2,276	2,290	2,304	2,318	2,333	2,347	2,361	2,375	2,389	2,404
170	2,418	2,432	2,446	2,460	2,475	2,489	2,503	2,518	2,532	2,546
180	2,560	2,574	2,589	2,603	2,617	2,631	2,646	2,660	2,674	2,688
190	2,702	2,717	2,731	2,745	2,759	2,773	2,788	2,802	2,816	2,830
200	2,845	2,859	2,873	2,887	2,901	2,916	2,930	2,944	2,958	2,973
210	2,987	3,001	3,015	3,030	3,044	3,058	3,072	3,086	3,101	3,115
220	3,129	3,143	3,158	3,172	3,186	3,200	3,214	3,229	3,243	3,257
230	3,271	3,286	3,300	3,314	3,328	3,343	3,357	3,371	3,385	3,399
240	3,414	3,428	3,442	3,456	3,470	3,485	3,499	3,513	3,527	3,542

Machine model				PC55MR-3	
				Canopy specification	Cab specification
Serial number				15001 and up	
Engine	Model			4D88E-6	
	Type			4-cycle, water cooled, in-line direct injection type	
	No. of cylinders – bore x stroke		mm	4 – 88 × 90	
	Piston displacement		l {cc}	2.189 {2,189}	
	Performance	Flywheel horsepower	kW/rpm {HP/rpm}	28.5 / 2,400 {38.2 / 2,400}	
		Maximum torque	Nm/rpm {kgm/rpm}	137 / 1,440 {14.0 / 1,440}	
		High idle speed	rpm	2,550	
		Low idle speed	rpm	1,175	
	Starting motor			12 V, 2.3 kW	
	Alternator			12 V, 40 A	
	Battery (*1)			12 V, 72 Ah × 1 (115D31L)	
	Radiator • Core type			CF68-4	
Undercarriage	Carrier roller			1 on each side	
	Track roller			4 on each side	
	Track shoe (Rubber shoe)			Unit-type rubber crawler	
	Track shoe (Steel shoe)			Assembly-type double grouser: 39 each side	
Hydraulic system	Hydraulic pump	Type x no.		Variable displacement piston type × 1, gear type × 1	
		Theoretical capacity	cm^3/rev	22.3 × 2 + 14.1 + 5.2	
		Set pressure			
		For travel, work equipment	MPa {kg/cm^2}	26.5 {270}	
		For swing	MPa {kg/cm^2}	18.6 {190}	
		For blade	MPa {kg/cm^2}	21.6 {220}	
	Control valve	Type x no.		9-spool type × 1	
		Control method		Hydraulic assist type	
	Hydraulic motor	Travel motor		Variable-displacement piston motor (with counter-balance valve, parking brake) × 2	
		Swing motor		Fixed-displacement piston motor (with brake valve, swing shaft brake) × 1	
	Hydraulic tank			Box-shaped, open type	
	Hydraulic oil filter			Tank return side	
	Hydraulic oil cooler			Air cooled (CF40-1)	

PTO



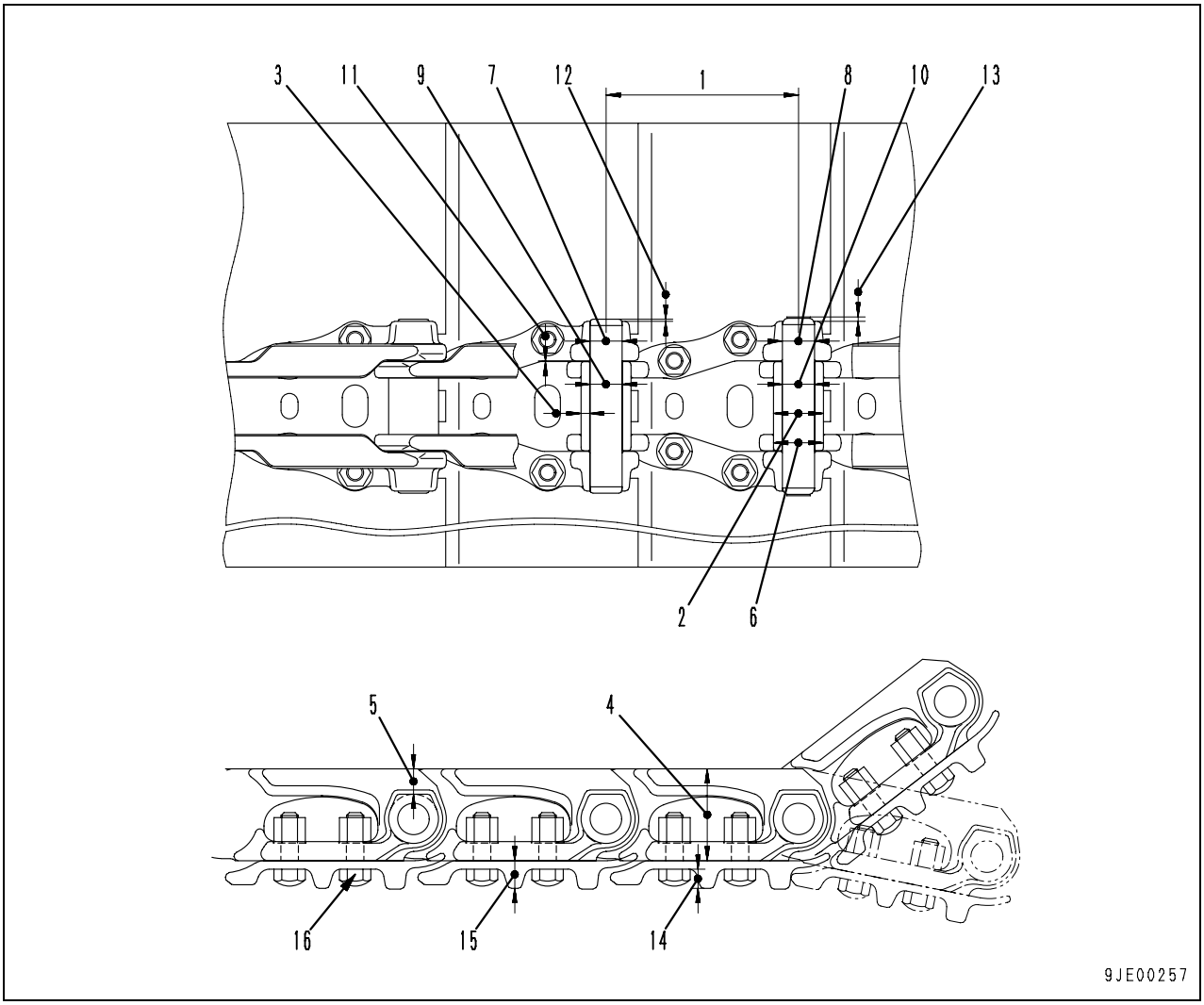
1. Boss
2. Spring pin
3. Rubber
4. Cover
5. Hydraulic pump

PC45MR, PC55MR-3 Hydraulic excavator

Form No. SEN04605-00

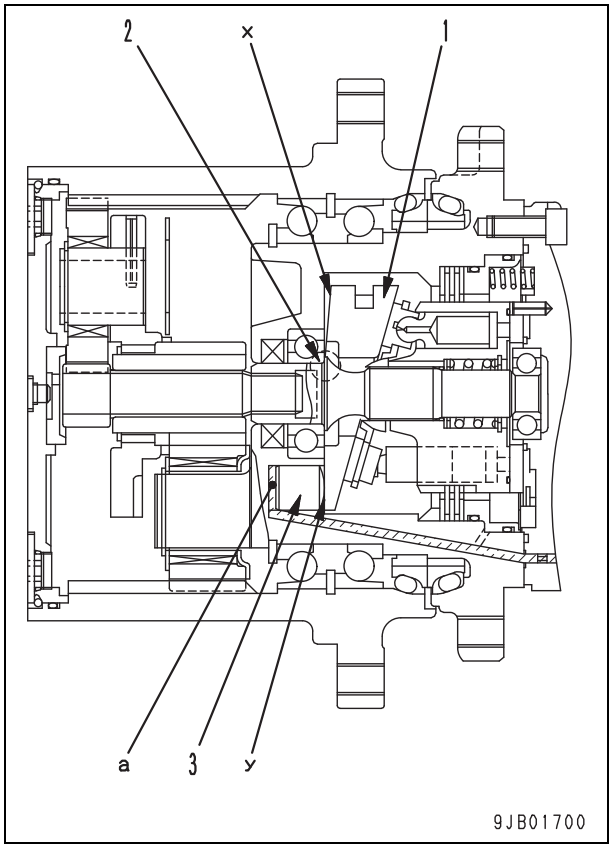
Triple grouser shoe

(If equipped)



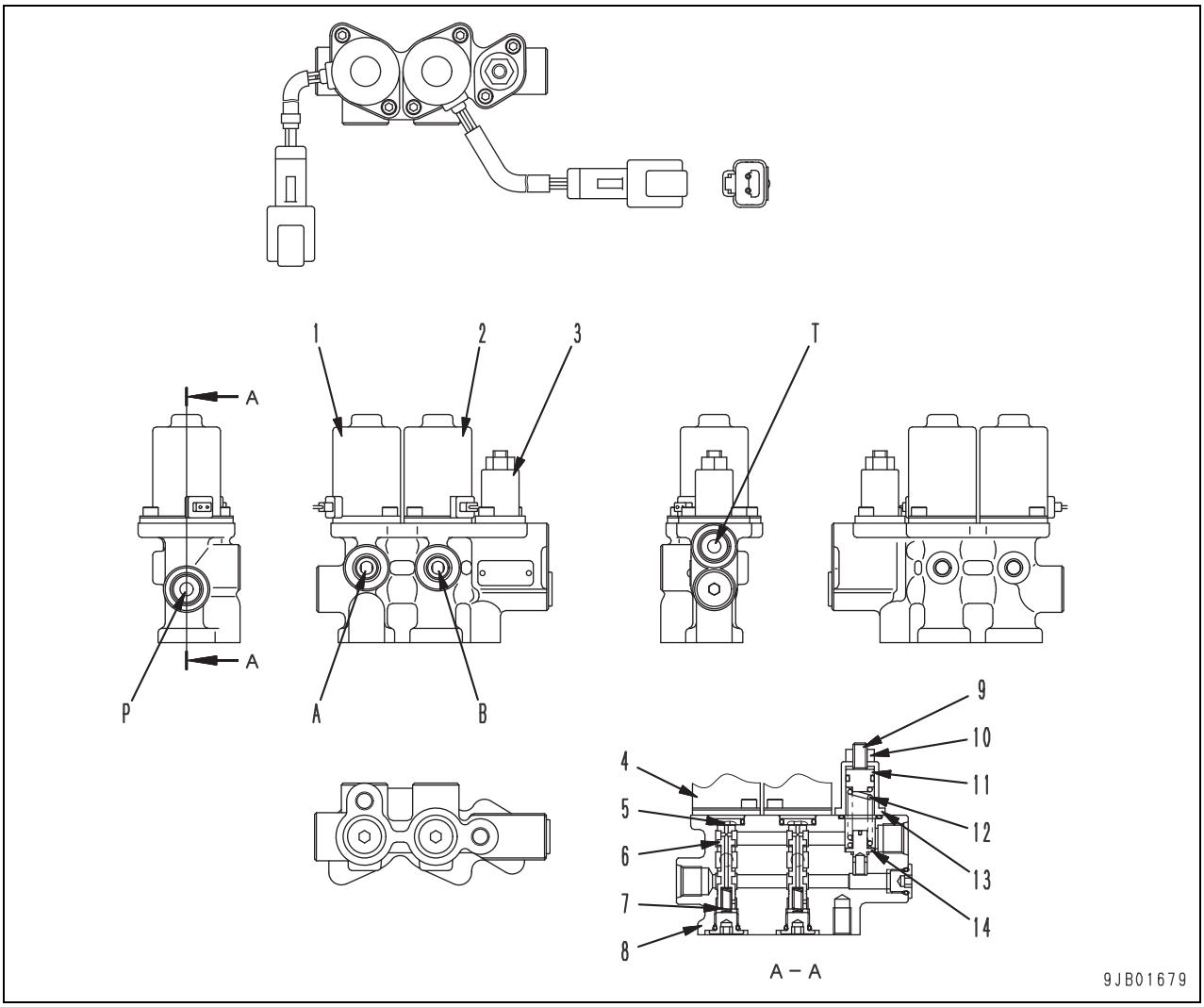
Outline

- Swash plate (1) has two rear faces (x) and (y), and is supported by ball (2).
- The travel speed is switched by pressurized oil from control chamber (a) acting on control piston (3). This switches the angle of swash plate (1) between the maximum angle and minimum angle to determine the travel speed.



Solenoid valve

2-spool solenoid valve



A : To PPC valve
B : To 2nd travel speed selector valve
P : From hydraulic pump
T : To hydraulic tank

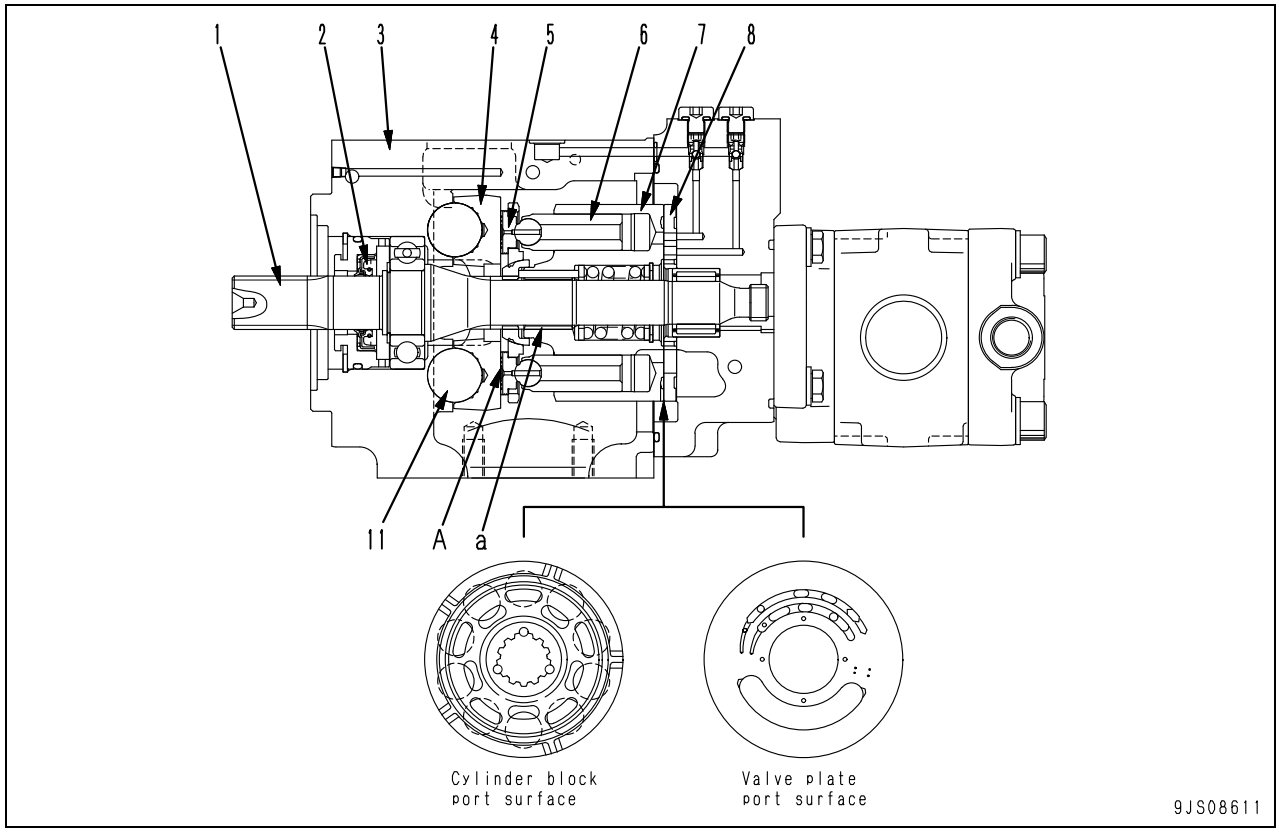
1. PPC lock solenoid valve
2. 2nd travel speed selector solenoid valve
3. Control relief valve

Solenoid valve

4. Coil (ON/OFF type)
5. Push pin
6. Valve spool
7. Return spring
8. Valve body

Control relief valve

9. Adjustment screw
10. Locknut
11. Plug
12. Return spring
13. Cover
14. Plunger



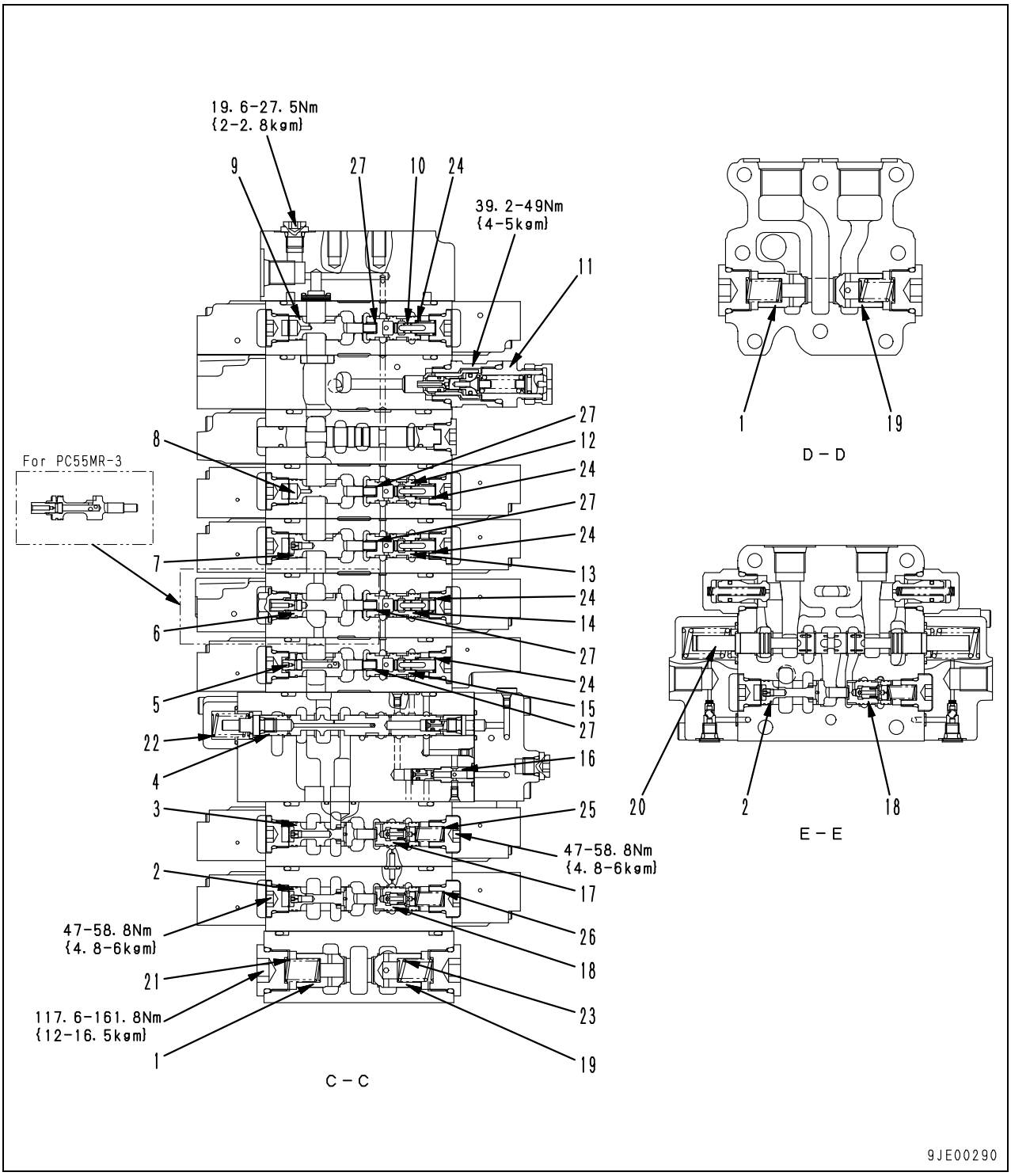
Function

- The engine rotation and torque transmitted to the pump shaft is converted into hydraulic energy, and pressurized oil is discharged according to the load.
- It is possible to change the pump delivery by changing the swash plate angle.
- It has two discharge ports and it enables to supply the pressure individually to each one.

Structure

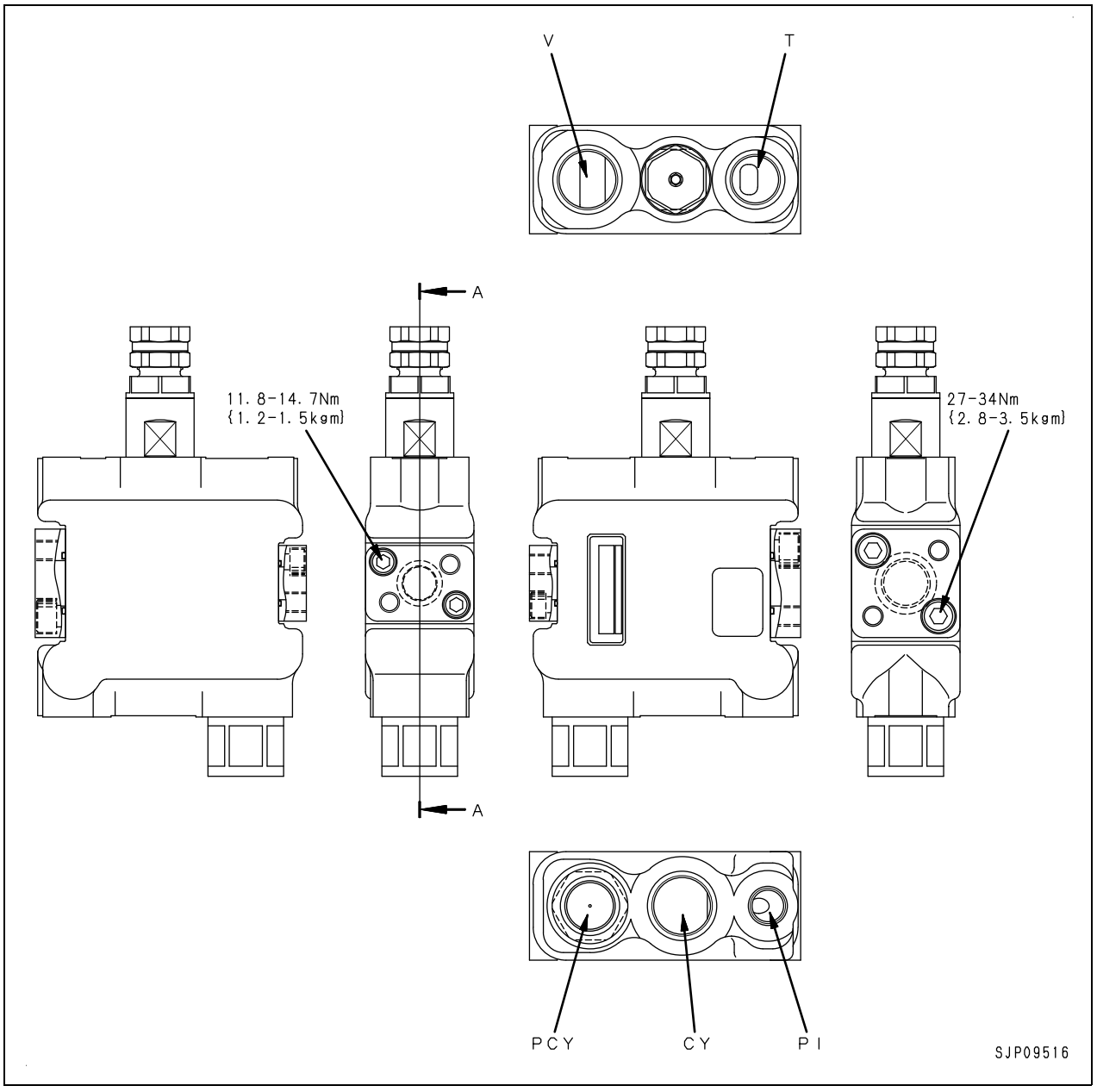
- Cylinder block (7) is supported to shaft (1) by spline (a), and shaft (1) is supported by the front and rear bearings.
- The tip of piston (6) is a concave ball, and shoe (5) is caulked to it to form one unit. Piston (6) and shoe (5) form a spherical bearing.
- Rocker cam (4) has flat surface (A). Shoe (5) is kept pressed against the flat surface (A) and it slides circularly on flat surface (A). Rocker cam (4) slides around ball (11).
- Piston (6) carries out relative movement in the axial direction inside each cylinder chamber of cylinder block (7).
- Cylinder block (7) seals the pressure oil to valve plate (8) and carries out relative rotation. This surface is designed so that the oil pressure balance is maintained at a suitable level.
- The oil inside each cylinder chamber of cylinder block (7) is sucked in and discharged through valve plate (8).
- Hole number of cylinder block (7) is an even number. So, it is fitted to two grooves of valve plate (8) alternately.

(2/4)


19.6-27.5Nm
{2-2.8kgm}
9
27
10
24
39.2-49Nm
{4-5kgm}
11
8
For PC55MR-3
7
6
5
22
4
3
2
47-58.8Nm
{4.8-6kgm}
21
117.6-161.8Nm
{12-16.5kgm}
1
27
12
24
27
24
13
24
14
27
24
15
27
16
25
47-58.8Nm
{4.8-6kgm}
17
26
18
23
19
C-C
1
19
D-D
20
2
18
E-E
9JE00290

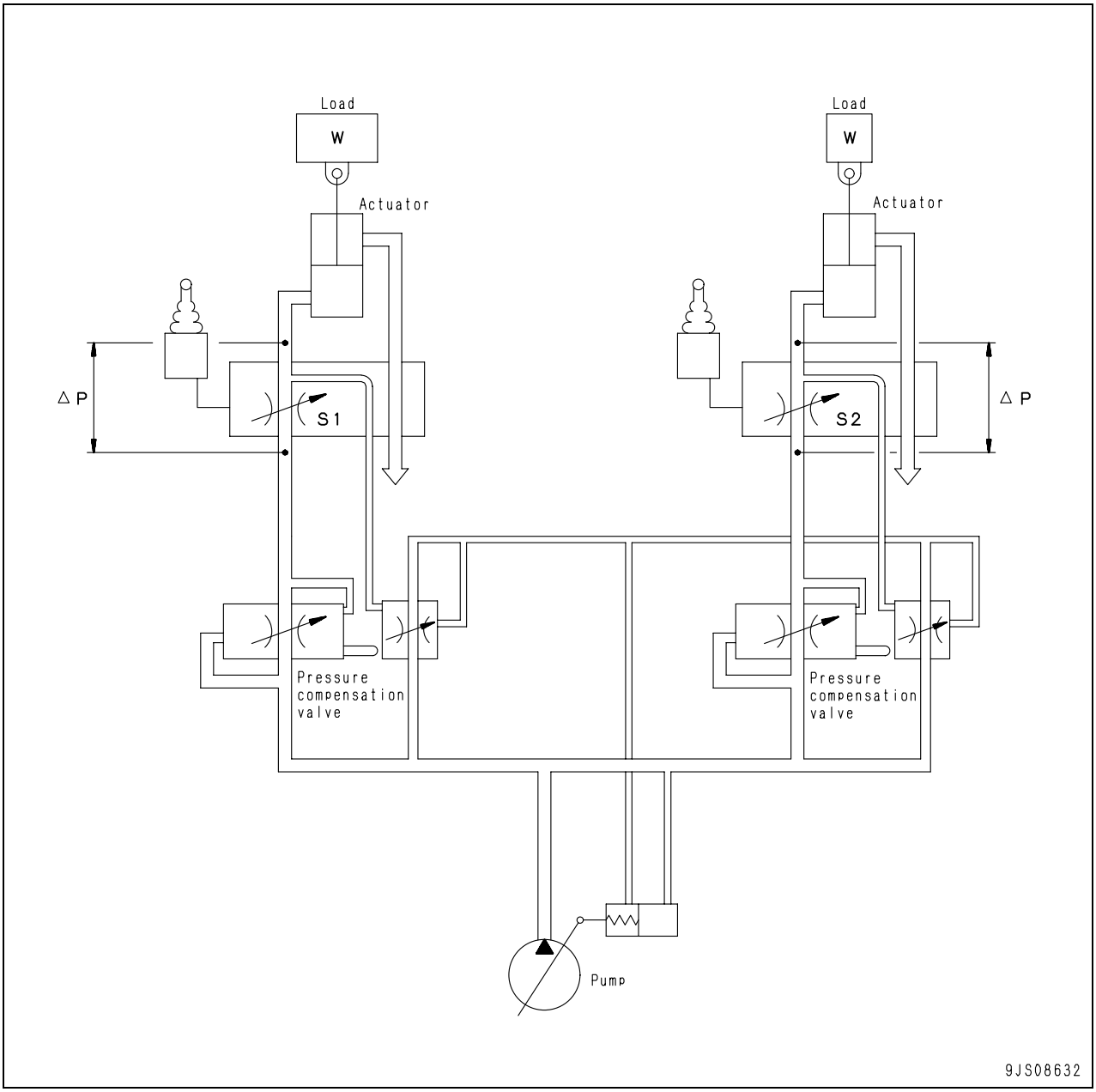
Anti-drop valve

PC55MR-3
(For New Zealand)



V : From work equipment control valve
T : To hydraulic tank
CY : To work equipment hydraulic cylinder
PI : From PPC valve
PCY : For pressure pickup port and equalizer oil circuit

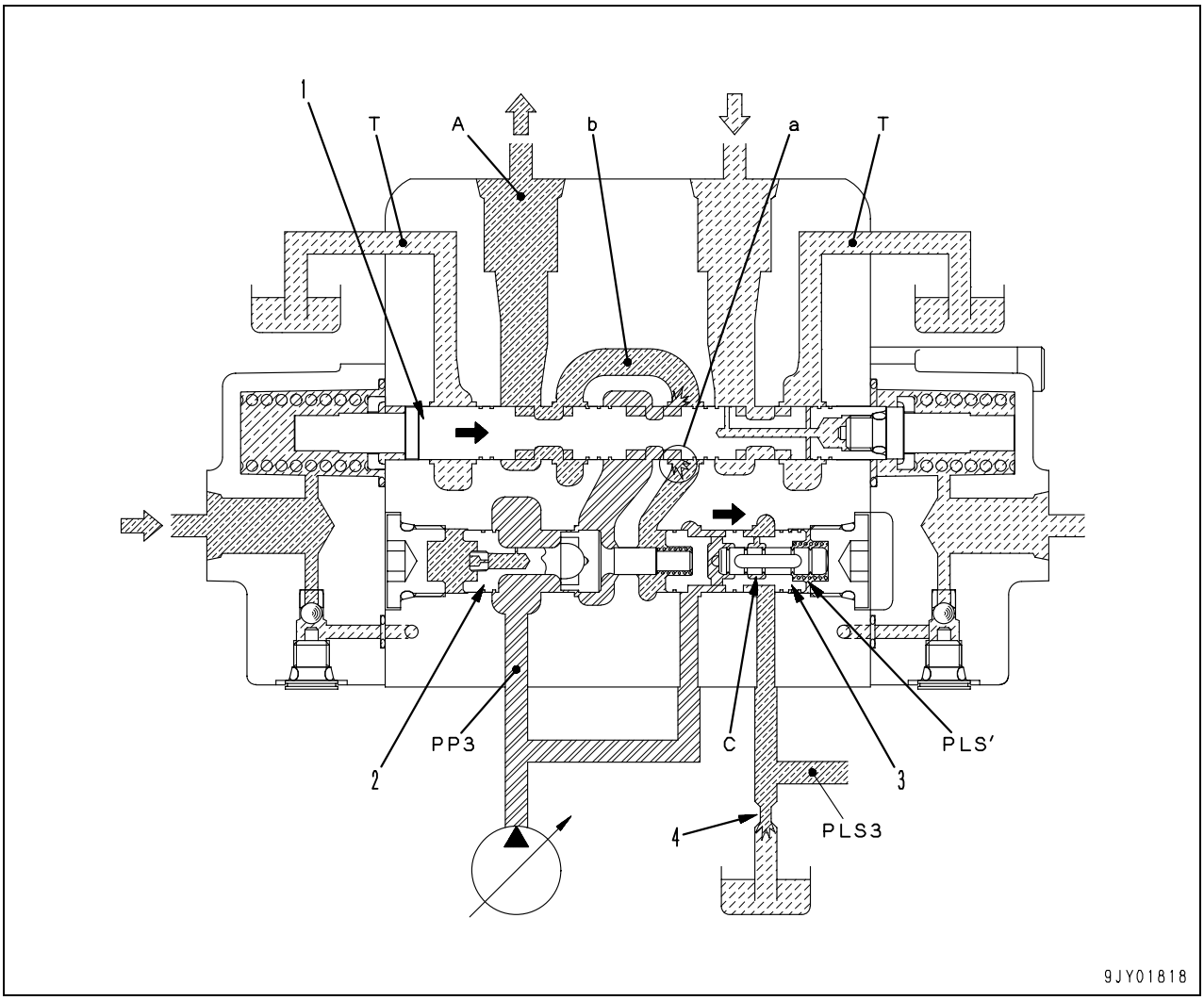
Pressure compensation control



- A pressure compensation valve is installed to the outlet port side of the control valve spool to balance the load.
- When two actuators are operated together, this valve acts to make pressure difference (ΔP) between the upstream (inlet port) and downstream (outlet port) the same, regardless of the size of the load (pressure).
- The flow of oil from the pump is divided (compensated) in proportion to the area of openings (S1) and (S2) of each valve when it is operated.

Introduction of LS pressure

Work equipment valve (Boom, arm, bucket, boom swing)



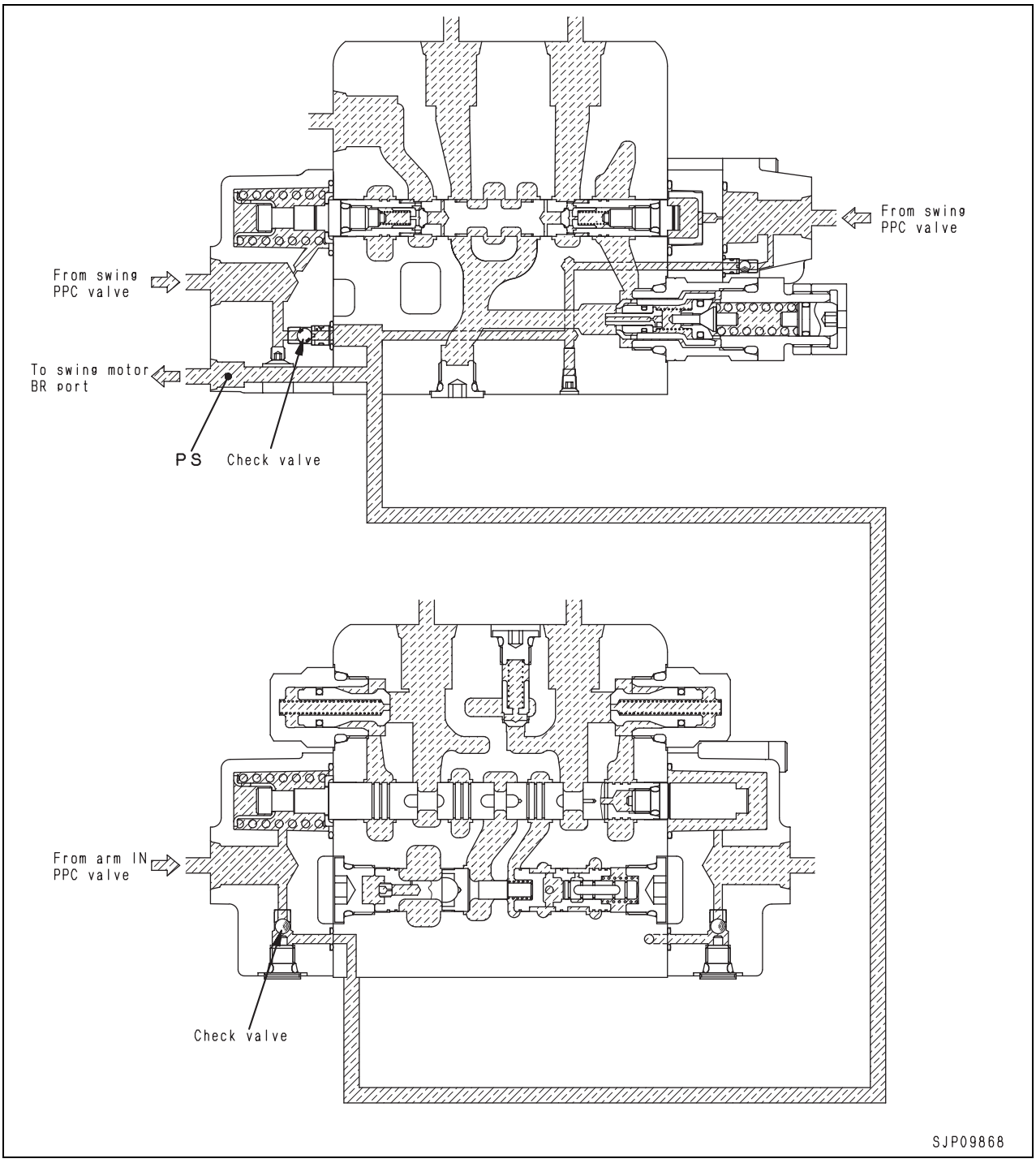
Function

- The LS pressure is the actuator load pressure at the outlet port end of the control valve.
- With the control valve, it actually reduces pump pressure (PP3) at reducing valve (3) of the pressure compensation valve to the same pressure as actuation circuit pressure (A), and sends it to the LS circuit (PLS3).

Operation

- When spool (1) is operated, pump pressure (PP3) flows from flow control valve (2) and notch (a) in the spool through bridge passage (b) to actuator circuit (A).
- At the same time, reducing valve (3) also moves to the right, so pump pressure (PP3) is reduced by the pressure loss at notch (c). It goes to LS circuit (PLS3), and then goes to spring chamber (PLS').
- When this happens, LS circuit (PLS3) is connected to tank circuit (T) from LS bypass valve (4) (see the section on the LS bypass valve).
- The actuator circuit pressure (A) acts on the left end of reducing valve (3). The reduced pump pressure (PP3) acts on at the other end.
- As a result, reducing valve (3) is balanced at a position where actuator circuit pressure (A) and the pressure of spring chamber (PLS') are the same. Pump pressure (PP3) reduced at notch (a) becomes actuator circuit pressure (A) and is taken to LS circuit (PLS3).

Swing holding brake cancel system



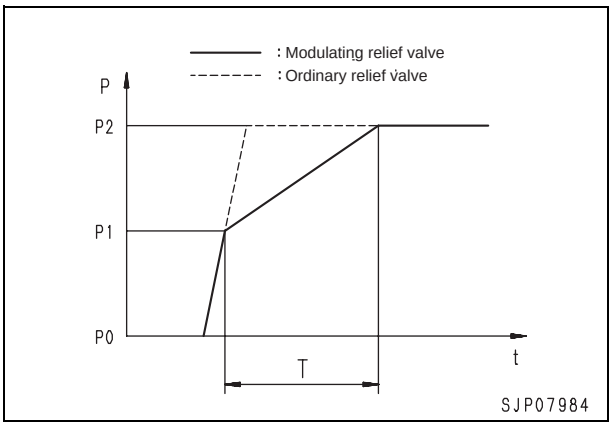
Operation

- The left and right swing PPC pressure and the arm IN PPC pressure each pass through check valve inside spring case, are output to port (BR) from port (PS), and the swing holding brake is canceled. [The highest pressure is output to port (BR).]
- The arm and swing are connected by the pilot circuit inside the control valve.

Modulating relief valve

Function

The relief valve for the swing motor prevents the relief pressure from rising sharply to reduce shocks when the machine starts and stops swinging.



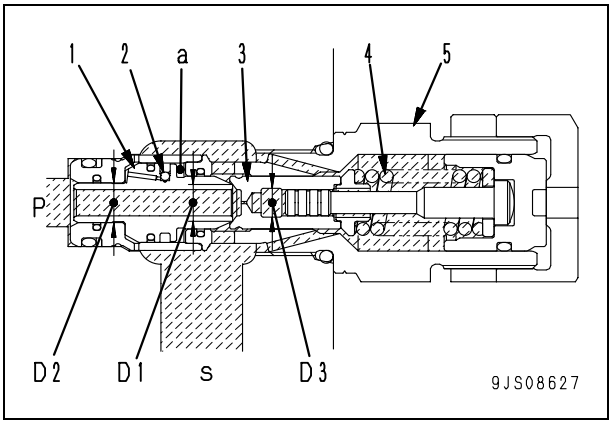
Operation

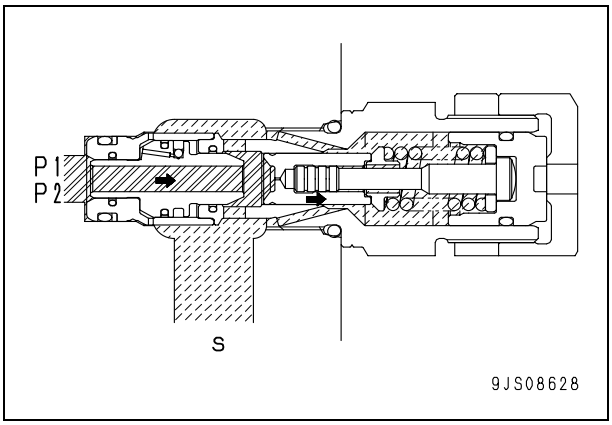
When circuit pressure is P0

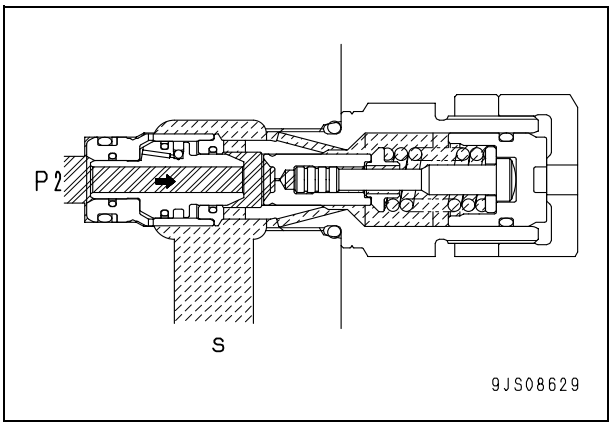
- The relief valve does not operate.

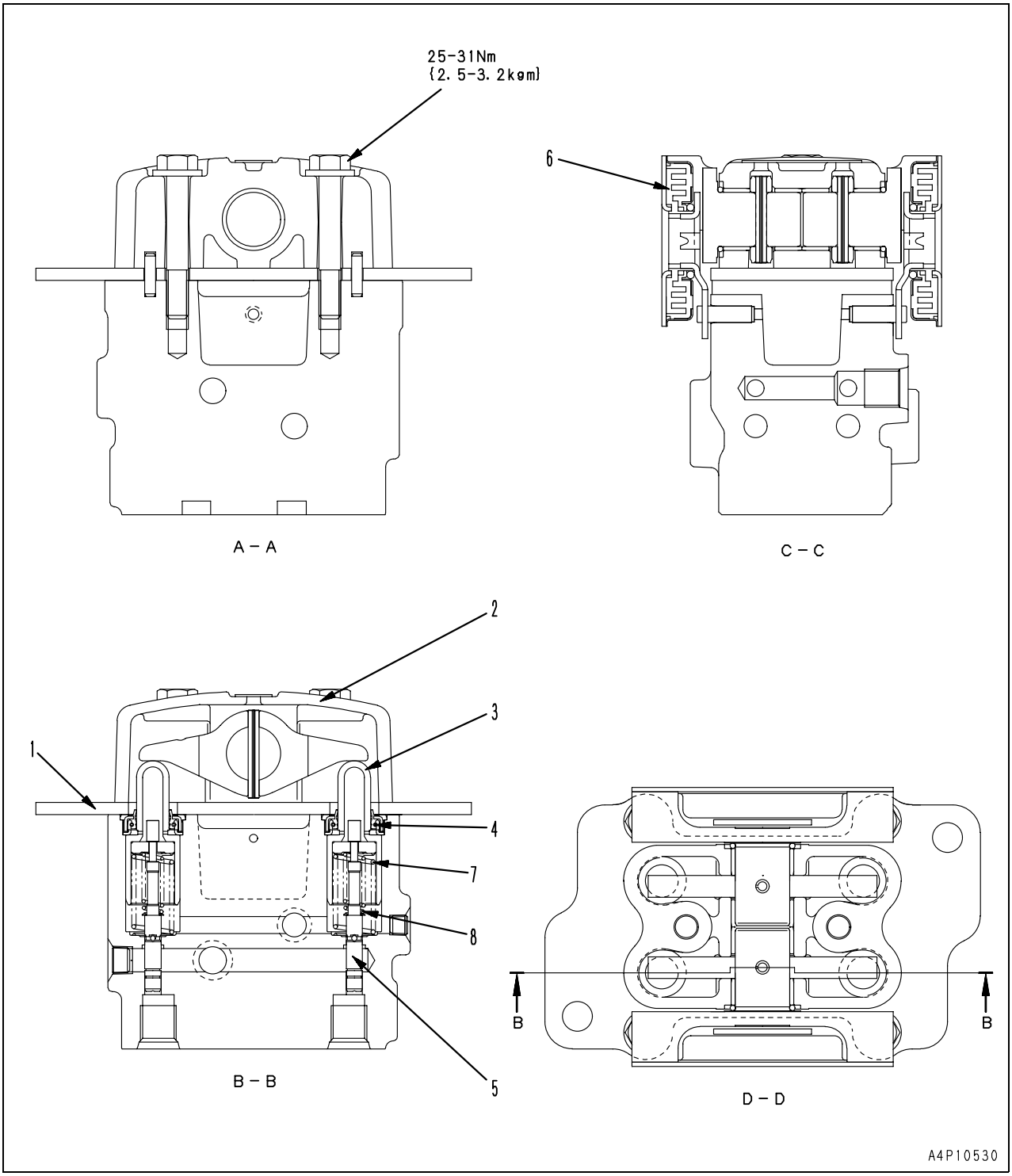
When circuit pressure rises sharply

- When circuit pressure rises to (P1), the hydraulic pressure acts on the area difference between (D1) and (D3) (D1 > D3) and pushes spring (4) to open valve (3).
- At this time, pressure acts on the area difference between (D1) and (D2) (D2 > D1), so seat (1) follows valve (3).
- As seat (1) moves, the passage for the pressurized oil in chamber (a) to flow into port (S) is narrowed by ball (2). Accordingly, seat (1) does not move so fast as valve (3).
- As a result, the relief pressure rises gradually from (P1) to (P2) while seat (1) is moving to sleeve (5).



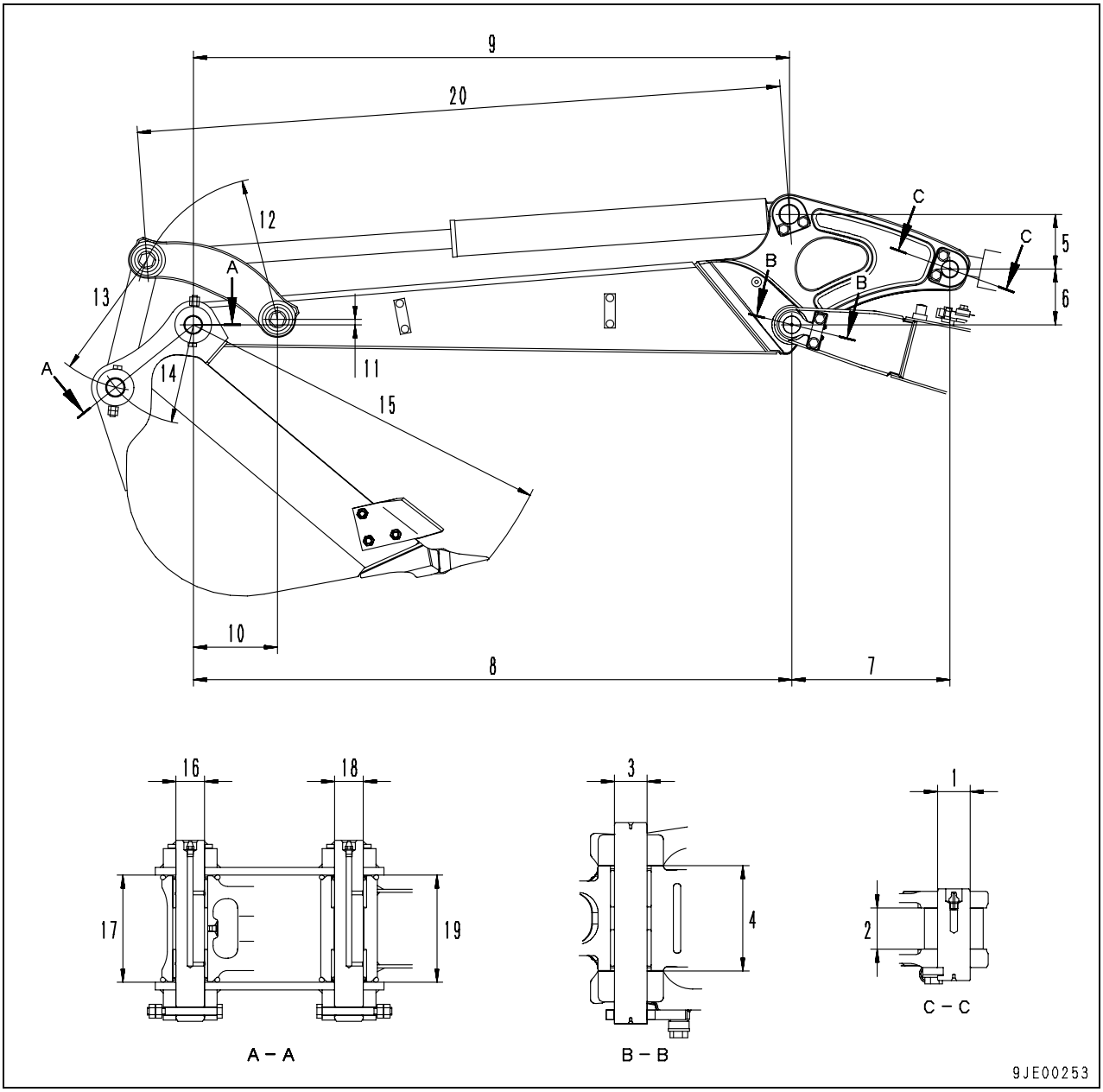




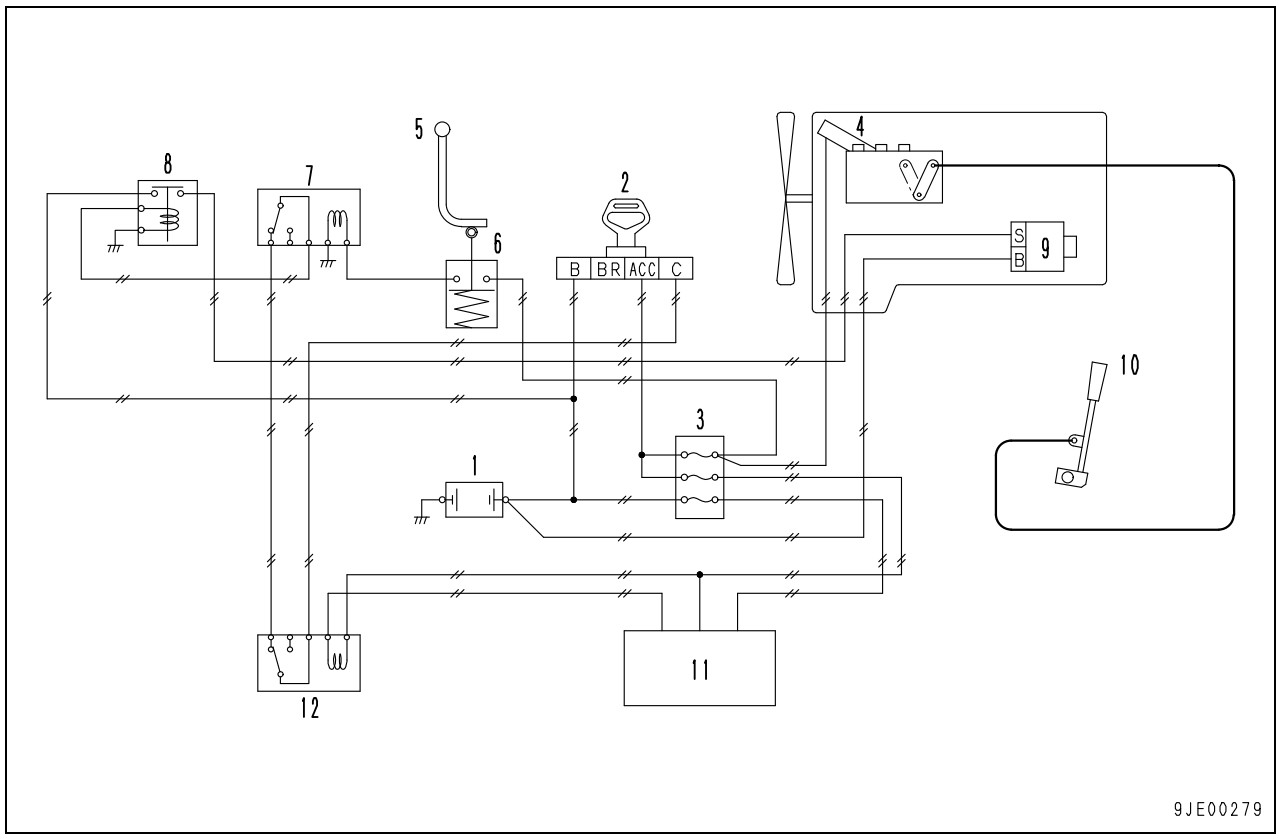

25-31Nm
{2.5-3.2kgm}
6
A – A
C – C
2
3
1
4
7
8
5
B – B
B
B
D – D
A4P10530

Dimensions of each part of work equipment

Arm section (STD)



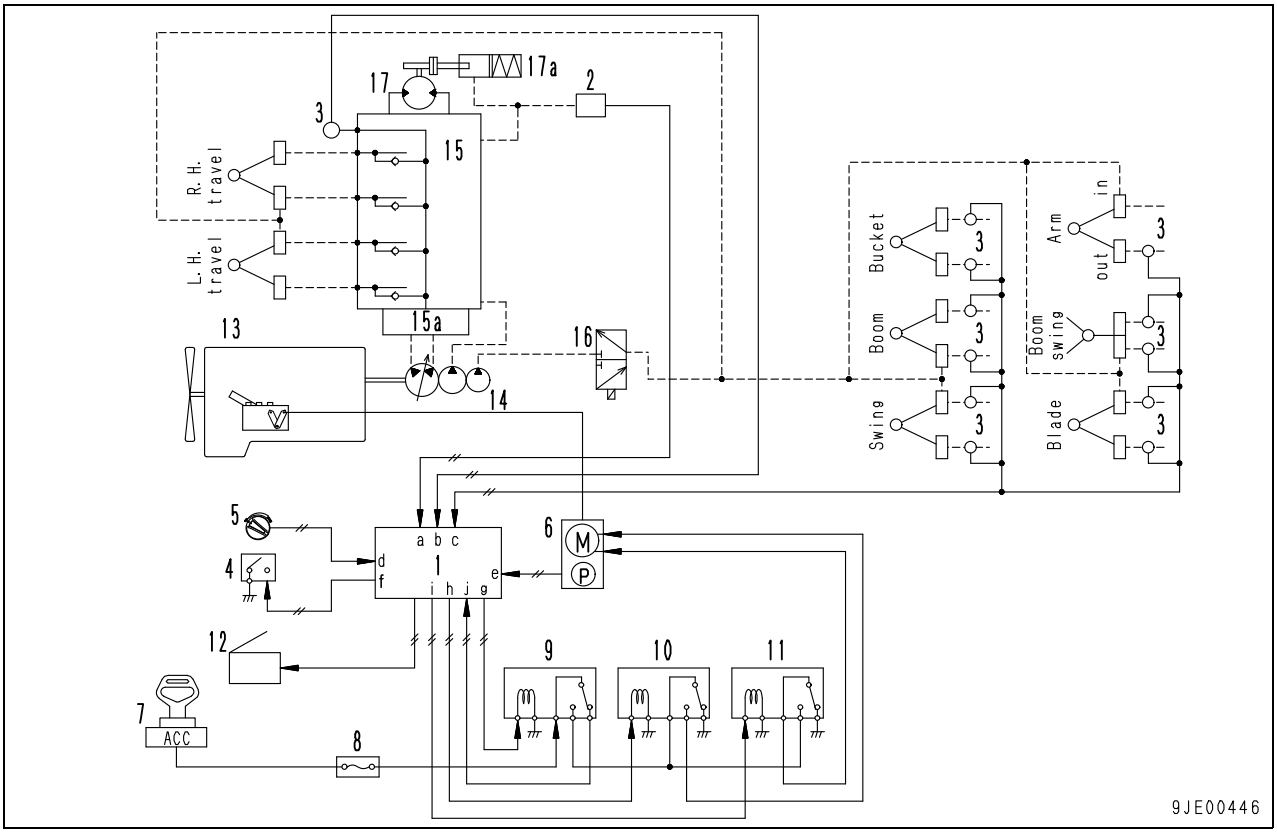
Engine control system



1. Battery
2. Starting switch
3. Fuse box
4. Engine stop solenoid
5. Lock lever
6. PPC lock switch
7. Neutral engine start relay
8. Safety relay
9. Starting motor
10. Fuel control lever
11. KOMTRAX terminal
12. KOMTRAX engine cut-out relay

Auto-deceleration function

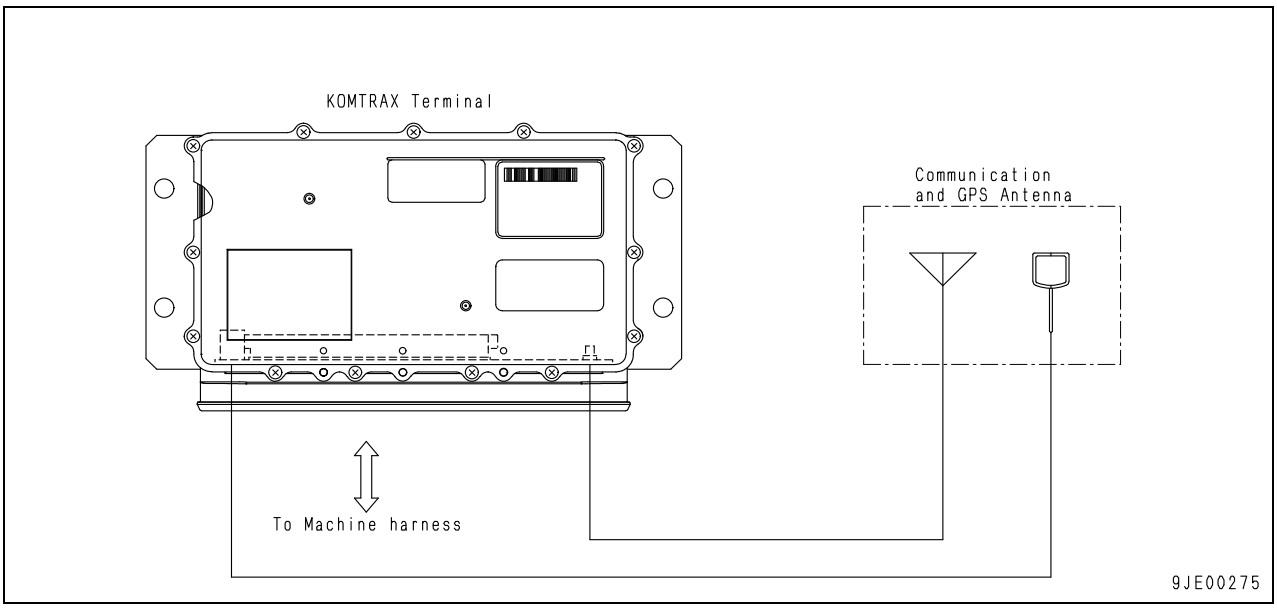
General system drawing
(Auto-deceleration specification)



1. Controller (Auto-deceleration)
2. Oil pressure sensor
3. Oil pressure switch
4. Auto-deceleration switch
5. Fuel control dial
6. Fuel control motor
7. Starting switch
8. Fuse box
9. Fuel control motor relay (For driving)
10. Fuel control motor relay (For acceleration)
11. Fuel control motor relay (For deceleration)
12. Travel alarm
13. Engine
14. Hydraulic pump
15. Control valve
    15a. Self-pressure reducing valve
16. PPC lock solenoid valve
17. Swing motor
    17a. Swing holding brake

a. Swing holding brake release sensor signal (Input as operation signal of Swing [Left-Right] and Arm [in] to controller)
b. Travel control lever, operation oil pressure switch signal
c. Work equipment control lever, operation oil pressure switch signal
d. Fuel control dial, potentiometer signal
e. Fuel control motor, potentiometer signal
f. Auto-deceleration switch, ON/OFF signal
g. Fuel control motor, drive signal
h. Fuel control motor, acceleration signal
i. Fuel control motor, deceleration signal
j. Fuel control motor, secondary monitor signal of drive signal

KOMTRAX system



- The KOMTRAX terminal transmits various kinds of machine information wirelessly. The KOMTRAX operator can refer to the information at the office to provide various kinds of services for customers.

  ★ To provide the services, a separate arrangement for setting up the KOMTRAX terminal is required.

  Information transmittable from KOMTRAX terminal system includes the following.
  1. Operation information
  2. Service meter
  3. Location information
  4. Fuel level

PC45MR, PC55MR-3 Hydraulic excavator

Form No. SEN04612-02

Applicable model: PC55MR-3

Machine model					PC55MR-3	
Category	Item	Measurement conditions		Unit	Standard value for new machine	Service limit value
Engine speed	Speed when 1 pump is relieved	• Hydraulic oil temperature: 45 – 55°C • Engine oil pressure: Within operating range • Engine coolant temperature: Within operating range • Relief of 1 pump: Relieve bucket circuit. • Relief of 2 pumps: Relieve bucket and swing circuits.		rpm	Min. 2,220	Min. 2,220
	Speed when 2 pumps are relieved				Min. 2,150	Min. 2,150
Stroke of control valve spool	Boom control valve	★ For details, see **Fig. A** at the end of this section.		mm	ℓ = 30 a = 6 b = 6	ℓ = 30 a = 6 b = 6
	Arm control valve					
	Bucket control valve					
	Swing control valve					
	Breaker control valve					
	Boom swing control valve					
	Blade control valve					
	Left travel control valve					
	Right travel control valve					
Stroke of control lever and pedal	Boom control lever	• Stop engine. • Measure at center of lever grip. • Measure at pedal tip. • Read max. value to stroke end (excluding neutral play).	N → RAISE, LOWER	mm	85 ± 10	85 ± 10
	Arm control lever		N → IN, OUT		85 ± 10	85 ± 10
	Bucket control lever		N → CURL, DUMP		85 ± 10	85 ± 10
	Swing control lever		N → Swing to LEFT, RIGHT		85 ± 10	85 ± 10
	Boom swing control pedal		N → Swing boom to LEFT, RIGHT		25 ± 5	25 ± 5
	Blade control lever		N → RAISE, LOWER		50 ± 5	50 ± 5
	Travel control lever		N → FORWARD, REVERSE		100 ± 10	100 ± 10
	Fuel control lever		SLOW ↔ FULL THROTTLE		160 ± 20	160 ± 20
	Play of control lever		Work equipment, swing		Max. 5	Max. 5
			Travel		Max. 5	Max. 5

PC45MR-3, PC55MR-3 Hydraulic excavator

Form No. SEN04648-01

Testing compression pressure

★ Measuring instruments for compression pressure

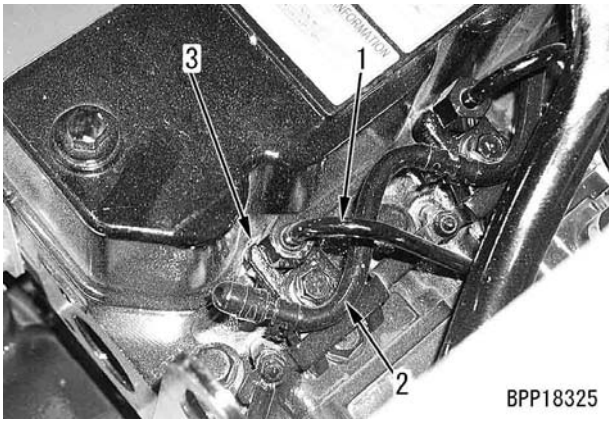
Symbol		Part No.	Part Name
E	1	795-502-1590	Compression gauge
	2	795-111-1130	Adapter
	3	795-101-1571	Joint

⚠ **When measuring the compression pressure, take care not to burn yourself on the exhaust manifold, muffler, etc. or get caught in the fan, fan belt, or another rotating part.**

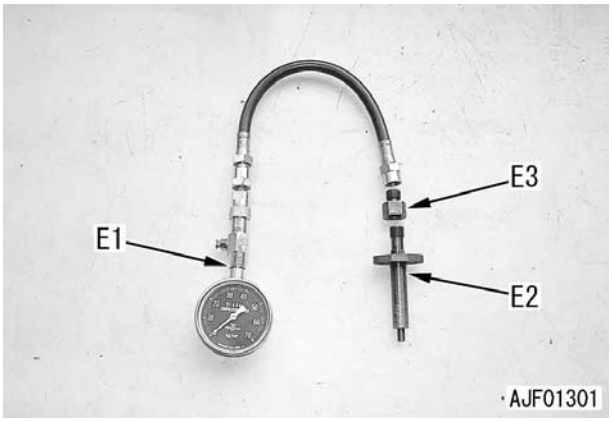
1. Adjust the valve clearance.
   For details, see “Testing and adjusting valve clearance”.

2. Warm up the engine until the engine oil temperature rises to 40 – 60°C.

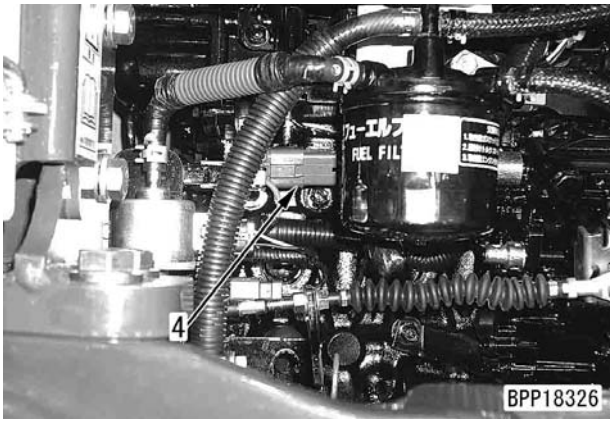
3. Remove fuel tube (1), spill hose (2) and nozzle holder assembly (3) of the cylinder to be measured.



4. Install adapter **E2** and joint **E3** to the nozzle holder mounting part and connect compression gauge **E1**.
   Adapter mounting nut:
   4.41 ± 0.49 Nm {0.45 ± 0.05 kgm}



5. Disconnect connector (4) of the engine stop motor.



6. Crank the engine with the starting motor and measure the compression pressure.
   ★ Read the compression gauge when its pointer is stabilized.
   ★ After measuring the compression pressure, install the nozzle holder assembly.
   Nozzle holder assembly mounting nut:
   4.41 ± 0.49 Nm {0.45 ± 0.05 kgm}
   Fuel tube mounting nut:
   29 – 34 Nm {3.0 – 3.5 kgm}

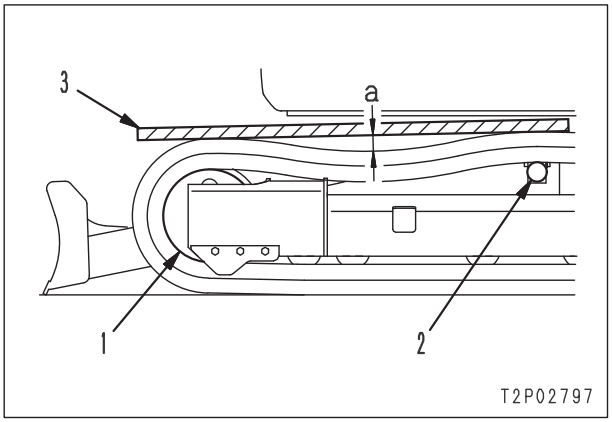
Testing and adjusting track shoe tension

Testing

1. Run the engine at low idle and move the machine by the length of track on ground, then stop slowly.

2. Place wood block (3) on the track shoe between idler (1) and carrier roller (2).

3. Measure maximum slack (a) between the top of the track shoe and wood block (3).
   - Standard slack (a):
     Rubber shoe: 1 – 3 mm
     Road liner, steel shoe: 10 – 30 mm



Adjusting

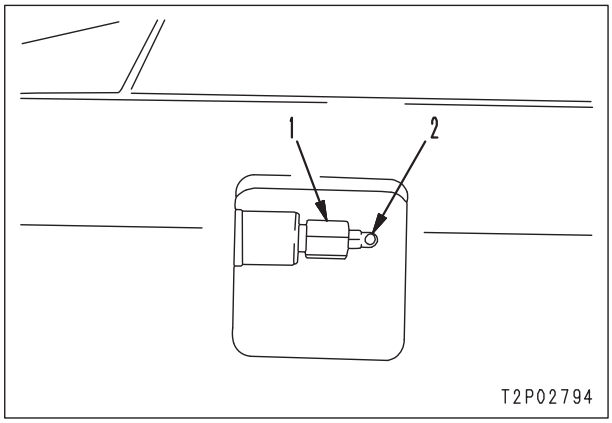
★ If the track shoe tension is abnormal, adjust it according to the following procedure.

1. When tension is too high

1) Loosen valve (1) and discharge grease.
   ⚠ **Do not loosen the valve more than 1 turn. If it is loosened more, it may jump out because of the high-pressure grease in it.**
   ★ If the grease does not flow out, move the machine slowly forward and in reverse.
2) To check that the tension is normal, run the engine at low idle and move the machine forward by the length of track on ground, then stop slowly.
3) Test the track shoe tension again. If it is abnormal, adjust it again.

2. When tension is low

1) Supply grease through grease fitting (2).
   ★ If the shoe is not tensed properly, move the machine slowly forward and in reverse.
   Grease fitting: **Grease (G2-LI)**
2) To check that the tension is normal, run the engine at low idle and move the machine forward by the length of track on ground, then stop slowly.
3) Test the track shoe tension again. If it is abnormal, adjust it again.



Testing and adjusting control pump circuit oil pressure

★ Measuring instruments for control pump circuit oil pressure

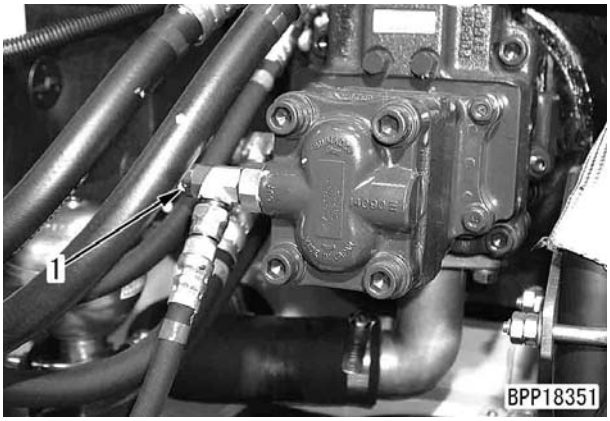
Symbol		Part No.	Part Name
K	1	799-101-5002	Oil pressure gauge kit (Analog)
		790-261-1204	Oil pressure gauge kit (Digital)
	2	799-101-5220	Nipple
		07002-11023	O-ring

Measuring

★ Hydraulic oil temperature for measurement: 45 – 55°C

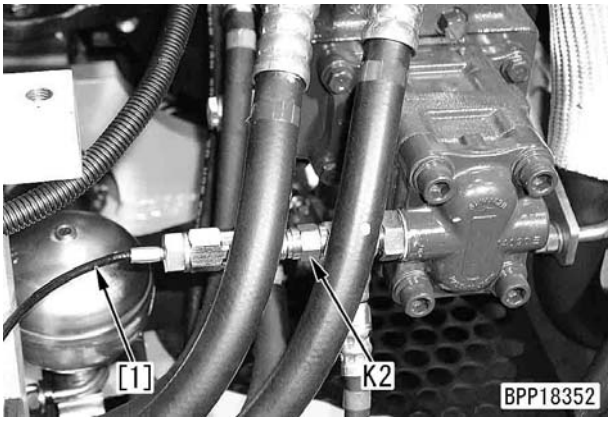
★ Remove the triangular cover from the left rear of the machine.

1. Remove oil pressure pickup plug (1) of the control pump outlet hose.



2. Install nipple **K2** and connect hose [1] to oil pressure gauge **K1** (6 MPa {60 kg/cm²}).

3. Run the engine at full throttle, set the control lever in neutral, and measure the circuit oil pressure.



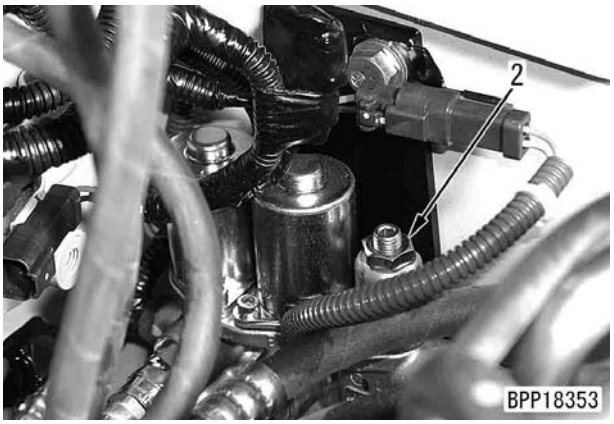
Adjusting

★ If the control circuit oil pressure is abnormal, adjust control relief valve according to the following procedure.

★ Tilt up the floor frame.
For details, see “How to open and close (tilt) floor”.

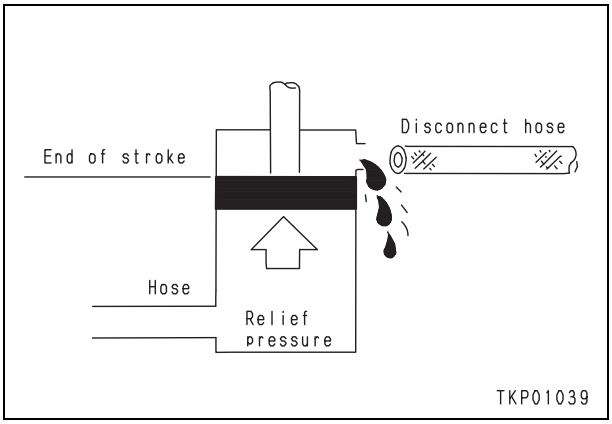
1. Loosen locknut (3) of relief valve (2) and turn adjustment screw (4).
   ★ If the adjustment screw is
      - Turned to the right, the pressure is increased.
      - Turned to the left, the pressure is decreased.
   ★ Amount of adjustment per turn of adjustment screw: **0.92 MPa {9.4 kg/cm²}**

2. After adjusting, tighten locknut (3).
   Locknut: **9.8 Nm {1.0 kgm}**



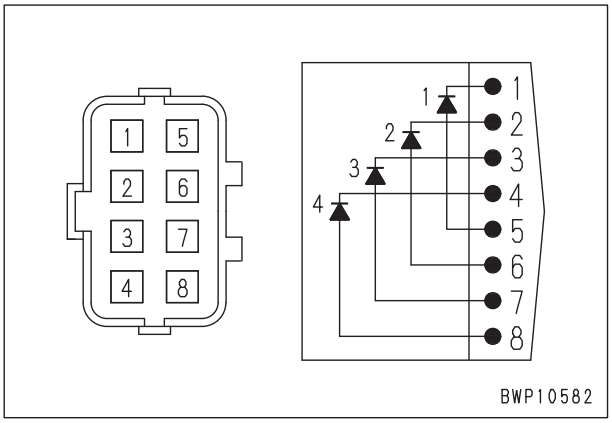
3. Run the engine at full throttle and apply the relief pressure to the bottom side of the cylinder.
   ★ Boom cylinder: Operate to RAISE the boom.
   Arm cylinder: Operate to move the arm IN.
   Bucket cylinder:
   Operate to CURL the bucket.

4. Relieve the oil for 30 seconds, and then measure the oil leakage for 1 minute.

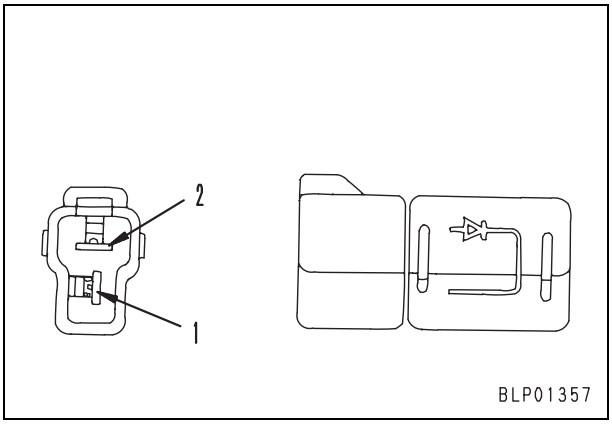


Inspection procedures for diode

★ Check an assembled-type diode (8 pins) and single diode (2 pins) in the following manner.



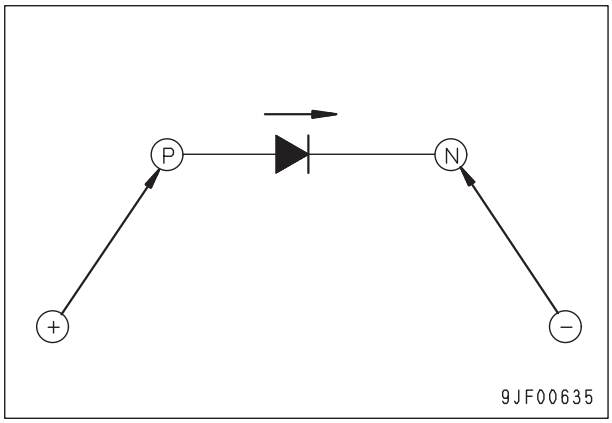
★ The conductive direction of each diode is marked on its surface as shown below.



1. When using digital type circuit tester

1) Switch the testing mode to diode range and confirm the indicated value.
   ★ Voltage of the battery inside is displayed with conventional circuit testers.
2) Put the red probe (+) of the test lead to the anode (P) and the black probe (–) to the cathode (N) of diode, and confirm the displayed value.
3) Determine if a specific diode is good or no good with the indicated value.
   - No change in the indicated value: No continuity (defective).
   - Change in the indicated value: Continuity established (normal) (Note)

   Note: A silicon diode shows a value between 460 and 600.



2. When using analog type circuit tester

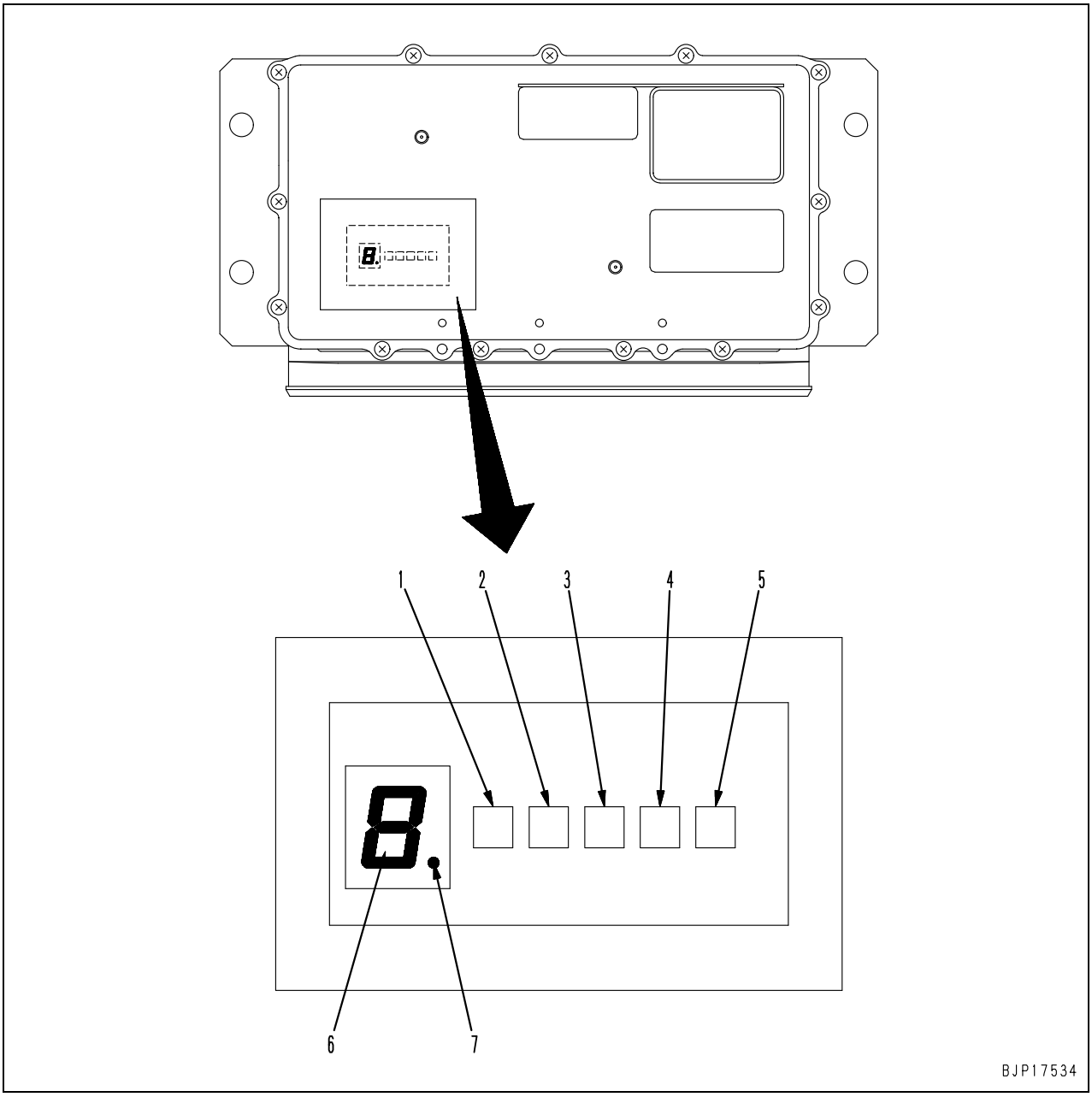
1) Switch the testing mode to resistance range.
2) Check the needle swing in case of the following connections.
   i) Put the red probe (+) of the test lead to the anode (P) and the black probe (–) to the cathode (N) of diode.
   ii) Put the red probe (+) of the test lead to the cathode (N) and the black probe (–) to the anode (P) of diode.
3) Determine if a specific diode is good or no good by the way the needle swings.
   - If the needle does not swing in Case i), but swings in Case ii): Normal (but the breadth of swing (i.e. resistance value) will differ depending on a circuit tester type or a selected measurement range)
   - If the needle swings in either case of i) and ii): Defective (short-circuited internally)
   - If the needle does not swing in any case of i) and ii): Defective (short-circuited internally)

3. A/D Inputs

CH	Specification	Signal name	Connector No.	Input type	Function	Remarks
0	A_IN_0	-	CN1-10	For power supply terminal R only		
1	A_IN_1	-	CN1-29	General-purpose A/D Input 0-5 V	220 KΩ Pull Down	POT power supply 0
2	A_IN_2	-	CN1-48			POT power supply 0
3	A_IN_3	Right attachment switch (sub)	CN1-57			POT power supply 0
4	A_IN_4	-	CN1-11			POT power supply 0
5	A_IN_5		CN1-30			POT power supply 0
6	A_IN_6	Attachment switch (main)	CN1-49			POT power supply 0
7	A_IN_7	Fuel control dial	CN1-68			POT power supply 1
8	A_IN_8	Governor stroke sensor	CN1-12			POT power supply 1
9	A_IN_9	-	CN1-31	A/D Input for temperature sensor	5 V 4.7 KΩ Pull Up	
10	A_IN_10	-	CN1-50			
11	A_IN_11	-	CN1-69	A/D Input for fuel sensor	5 V 150 Pull Up	

Failure code				
Hundreds	Tens	Units	Failure content	Phenomenon
6	8	5	Spare	
		6	Spare	
		7	Spare	
		8	Spare	
		9	Spare	
	9	0	Spare	
		1	Spare	
		2	Spare	
		3	Spare	
		4	Spare	
		5	Spare	
		6	Spare	
		7	Spare	
		8	Spare	
		9	Spare	

Lamp display of KOMTRAX terminal



CPU LED

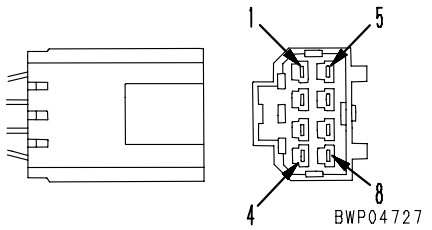
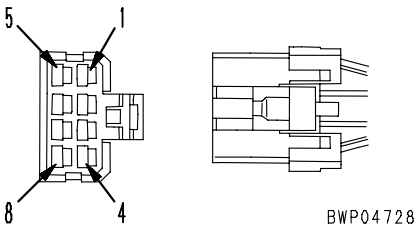
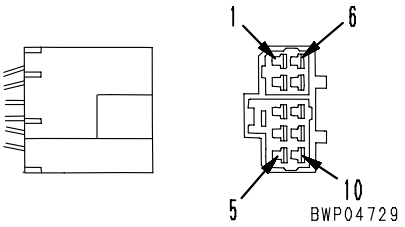
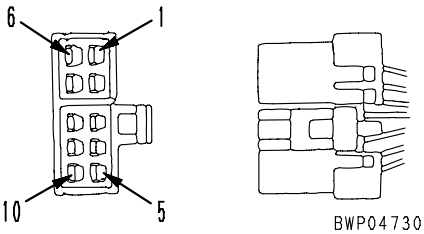
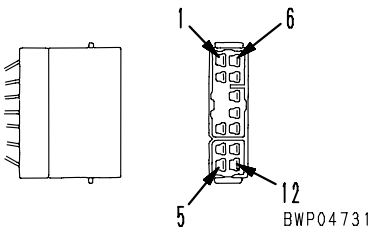
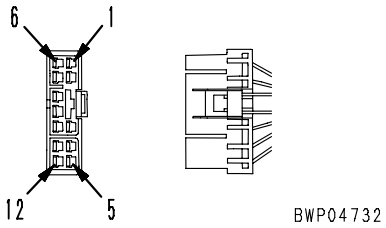
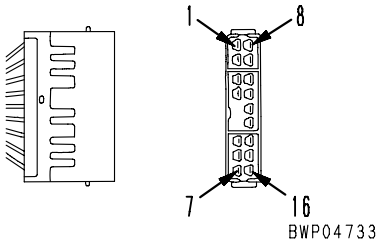
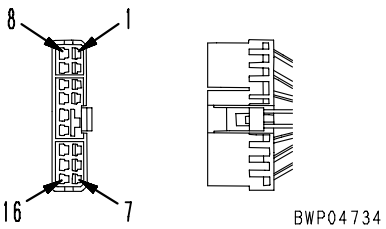
1. LED-1 [Green] (R signal and ACC signal)
2. LED-2 [Red] (Starting output status)
3. LED-3 [Yellow] (S-NET status and C signal status)
4. LED-4 [Green] (Fuel sensor and CAN connection status)
5. LED-5 [Red] (Downloading and writing status)

7-segment and dot for CPU

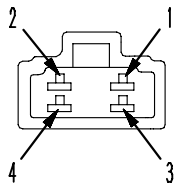
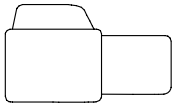
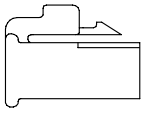
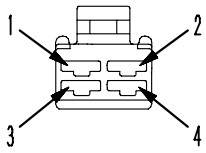
6. 7-segment [Red] (Sign-up test status and operation status)
7. Dot [Red] (GPS positioning status and test connector disconnection/connection status))

Checks before troubleshooting

	Item	Judgement value	Action
Lubricating oil, coolant	1. Check fuel level, type of fuel	—	Add fuel
	2. Check for impurities in fuel	—	Clean, drain
	3. Check for clogging of fuel filter cartridge	—	Replace
	4. Check engine oil level in oil pan, type of oil	—	Add oil
	5. Check for clogging of engine oil filter	—	Replace
	6. Check coolant level	—	Add coolant
	7. Check for clogging of air cleaner	—	Clean or replace
	8. Check hydraulic oil level, type of oil	—	Add oil
	9. Check for clogging of hydraulic oil strainer	—	Clean, drain
	10. Check for clogging of hydraulic oil filter	—	Replace
	11. Check swing machinery oil level, type of oil	—	Add oil
	12. Check final drive oil level, type of oil	—	Add oil
Electrical equipment	1. Check for looseness, corrosion of battery terminal, wiring	—	Tighten or replace
	2. Check for looseness, corrosion of alternator terminal, wiring	—	Tighten or replace
	3. Check for looseness, corrosion of starting motor terminal, wiring	—	Tighten or replace
Hydraulic, mechanical equipment	1. Check for abnormal noise, smell	—	Repair
	2. Check for oil leakage	—	Repair
	3. Carry out air bleeding	—	Bleed air
Electrics, electrical equipment	1. Check battery voltage (engine stopped)	10 – 15V	Charge or replace
	2. Check battery electrolyte level	—	Add or replace
	3. Check for discolored, burnt, exposed wiring	—	Replace
	4. Check for missing wiring clamps, hanging wiring	—	Repair
	5. Check for water leaking on wiring (be particularly careful attention to water leaking on connectors or terminals)	—	Disconnect connector and dry
	6. Check for blown, corroded fuses	—	Replace
	7. Check alternator voltage (engine running at 1/2 throttle or above)	After running for several minutes : 13.5 – 14.5V	Replace
	8. Check operating sound of battery relay (when switch is turned ON/OFF)	—	Replace

No. of pins	S type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8			799-601-7140
	Part No. : 08056-10871	Part No. : 08056-10881	
10 (White)			799-601-7150
	Part No. : 08056-11071	Part No. : 08056-11081	
12 (White)			799-601-7350
	Part No. : 08056-11271	Part No. : 08056-11281	
16 (White)			799-601-7330
	Part No. : 08056-11671	Part No. : 08056-11681	

9JS04894

No. of pins	F type connector				T-adapter Part No.
	Male (female housing)		Female (male housing)		
4		 BWP03905		 BWP03906	—
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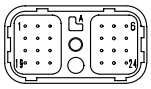
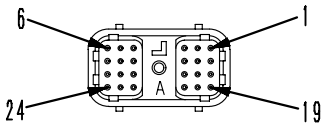
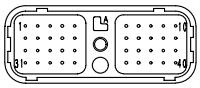
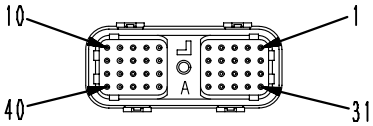
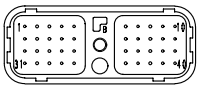
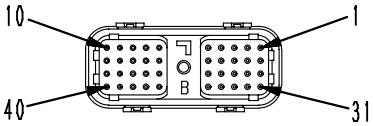
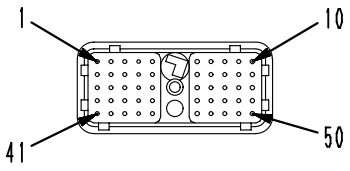
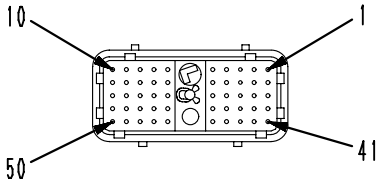
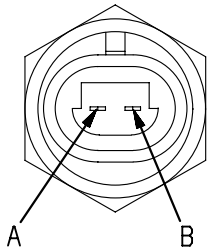
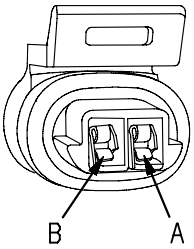
9JS04903

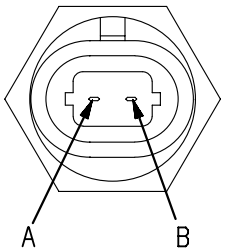
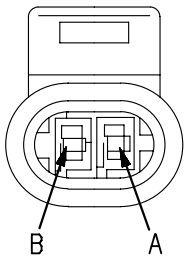
[The pin No. is also marked on the connector (electric wire insertion end)]

No. of pins	DRC26 Series connector		
	Male pin (female housing)	Female pin (male housing)	T-adapter Part No.
24	 BJD12722	 BJD12723	799-601-9360 (Kit:799-601-9300)
	–	Part No. :08194-01101	
40 (A)	 BJD12724	 BJD12725	799-601-9350 (Kit:799-601-9300)
	–	Part No. :08194-02101	
40 (B)	 BJD12726	 BJD12727	799-601-9350 (Kit:799-601-9300)
	–	Part No. :08194-02102	
50	 9JS02951	 9JS02952	799-601-4211 (Kit:799-601-4101)
	–	Part No. :08194-03103	

BJH13184

PACKARD conncetor for engine

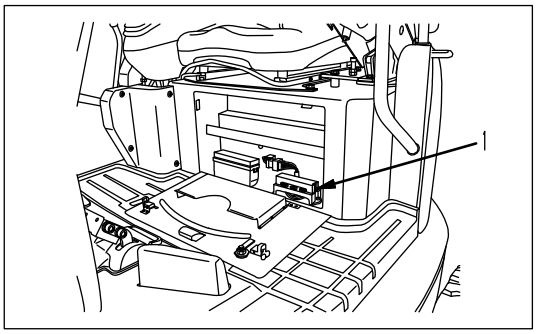
No. of pins	Temperature sensor of coolant, fuel and lubricating oil (95, 107, 114, 125, 140, 170, 12V140 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
2			795-799-5530 (Kit : 799-601-4101) (Kit : 799-601-4201)
	☆ Non-polarity	—	

No. of pins	Boost (air intake) temperature sensor (125, 140, 170, 12V140 engine)		
	Sensor side (plug)	Harness side (receptacle)	T-adapter Part No.
2			795-799-5540 (Kit : 799-601-4101) (Kit : 799-601-4201)
	☆ Non-polarity	—	

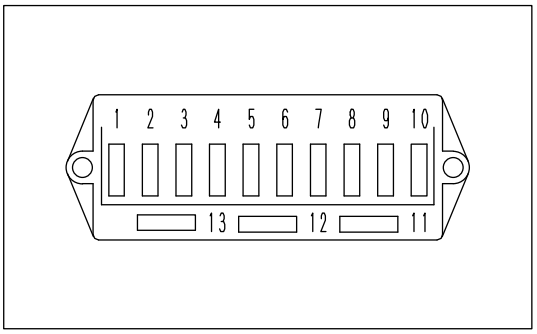
BJH13182

Fuse box locations and fuse Nos

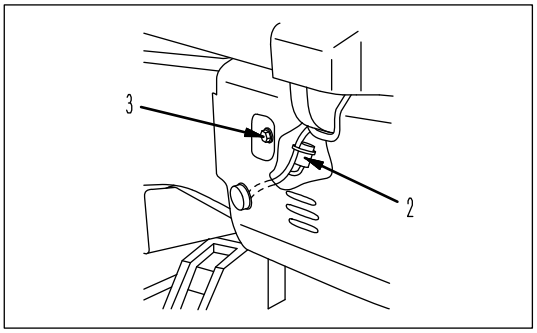
Fuse box 1



Number of fuse box 1



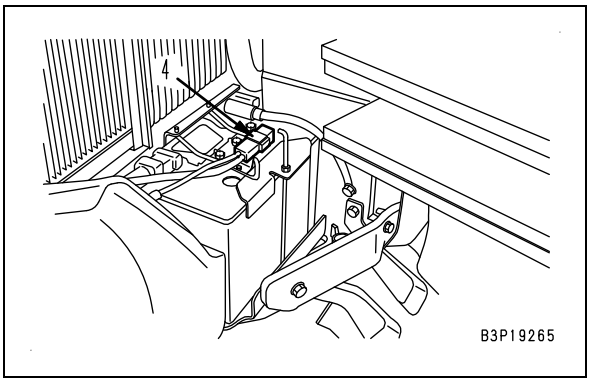
Fuse box 2



★: Fuse box 2 is fixed to the external power supply harness on the front left side of the machine. When replacing a fuse, remove bolt (3) and cover.

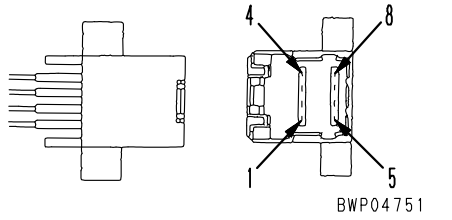
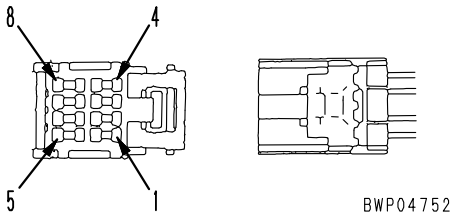
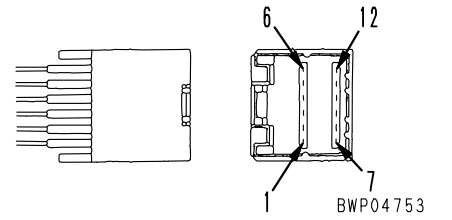
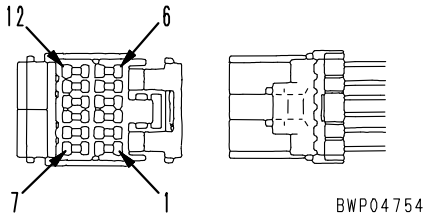
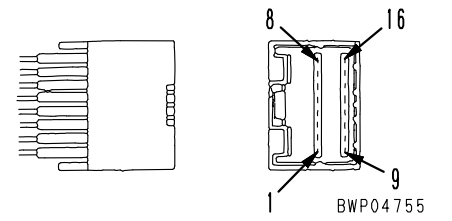
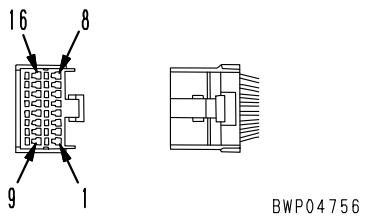
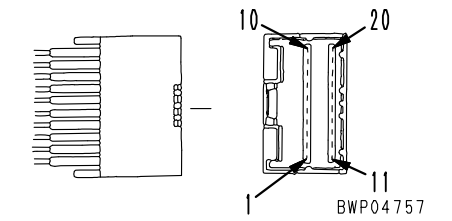
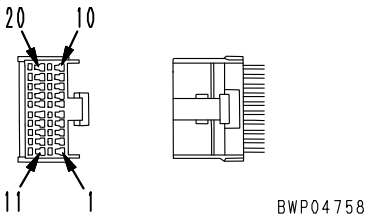
B4P24026

Fusible link location



Possible faults and troubleshooting Nos.

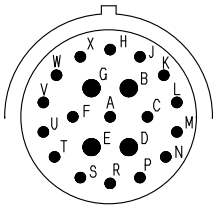
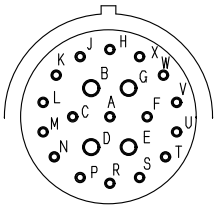
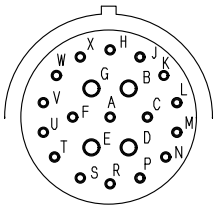
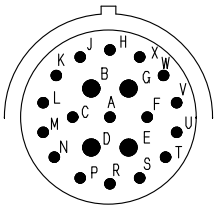
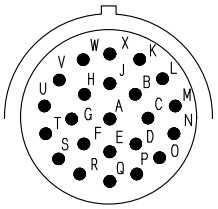
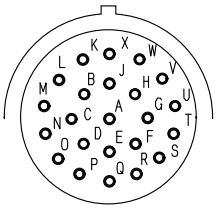
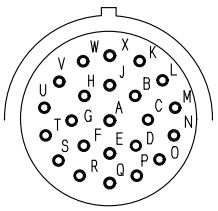
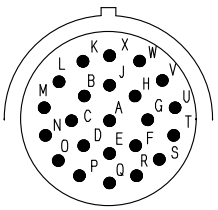
No.	Possible fault		Troubleshooting		
			E-mode	H-mode	S-mode
Possible faults related to engine					
1	Engine does not start easily (It always takes time to start)				S-1
2	Engine does not start	Engine does not crank	E-1		S-2
3		Engine cranks but exhaust smoke does not come out			S-2
4		Exhaust smoke comes out but engine does not start			S-2
5	Engine speed does not rise sharply (Follow-up performance is low)				S-3
6	Engine stops during operation				S-4
7	Engine rotation is abnormal (Engine hunts)				S-5
8	Output is insufficient or power is low				S-6
9	Exhaust gas color is bad (Incomplete combustion)				S-7
10	Oil is consumed much or exhaust gas color is bad				S-8
11	Oil becomes dirty quickly				S-9
12	Fuel is consumed much				S-10
13	Coolant contains oil, blows back, or reduces				S-11
14	Engine oil pressure caution lamp lights up (Oil pressure lowers)				S-12
15	Oil level rises (Water or fuel is mixed in oil)				S-13
16	Coolant temperature rises too high (Overheating)				S-14
17	Abnormal sound comes out				S-15
18	Vibration is excessive				S-16
19	Engine does not stop		E-2		
20	Engine is not preheated normally		E-8		
Possible faults related to work equipment, travel, swing, and blade					
21	Speed or power of whole work equipment, travel, swing, and blade is low			H-1	
22	Engine speed lowers extremely or engine stalls			H-2	
23	Work equipment, travel, swing, and blade systems do not work			H-3	
24	Abnormal sound comes out from around hydraulic pump			H-4	
25	Fine control performance or response is low			H-5	
Possible faults related to work equipment					
26	When work equipment lock lever is set in LOCK position, work equipment still moves		E-14		
27	Speed or power of boom is low			H-6	
28	Speed or power of arm is low			H-7	
29	Speed or power of bucket is low			H-8	
30	Speed or power of boom swing is low			H-9	
31	Work equipment does not move singly			H-10	
32	Hydraulic drift of work equipment is large			H-11	
33	Time lag of work equipment is large			H-12	

No. of pins	AMP040 type connector		
	Male (female housing)	Female (male housing)	T-adapter Part No.
8	 BWP04751	 BWP04752	799-601-7180
	—	Housing part No. : 79A-222-3430 (Q'ty:5)	
12	 BWP04753	 BWP04754	799-601-7190
	—	Housing part No. : 79A-222-3440 (Q'ty:5)	
16	 BWP04755	 BWP04756	799-601-7210
	—	Housing part No. : 79A-222-3450 (Q'ty:5)	
20	 BWP04757	 BWP04758	799-601-7220
	—	Housing part No. : 79A-222-3460 (Q'ty:5)	

★ Terminal part No. : 79A-222-3470 (No relation with number of pins)

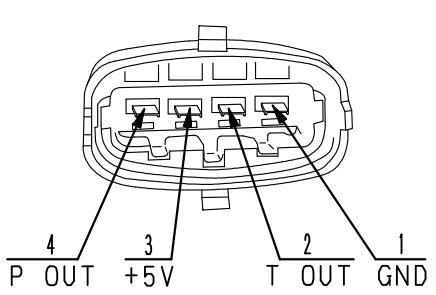
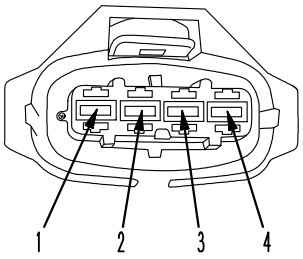
9JS04898

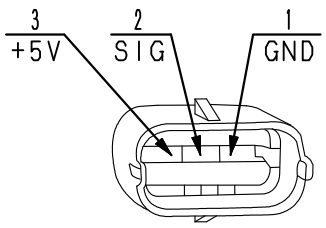
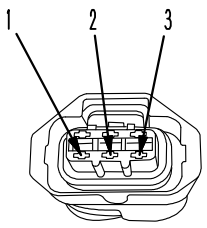
[The pin No. is also marked on the connector (electric wire insertion end)]

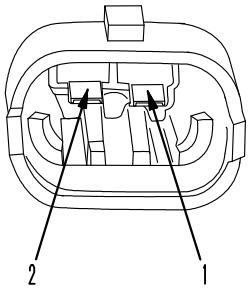
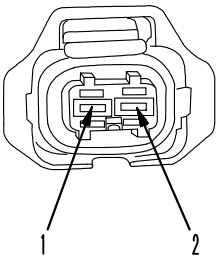
Type (shell size code)	HD30 Series connector		
	Body (plug)	Body (receptacle)	T-adapter Part No.
24-21 (7)	Pin (male terminal)	Socket (female terminal)	799-601-9270
	 BWP05025	 BWP05026	
	Part No. :08191-71201, 08191-71202, 08191-71205, 08191-71206	Part No. :08191-74101, 08191-74102, 08191-74105, 08191-74106	
	Socket (female terminal)	Pin (male termial)	799-601-9270
	 BWP05027	 BWP05028	
	Part No. :08191-72201, 08191-72202, 08191-72205, 08191-72206	Part No. :08191-73101, 08191-73102, 08191-73105, 08191-73106	
24-23 (8)	Pin (male terminal)	Socket (female terminal)	799-601-9280
	 BWP05029	 BWP05030	
	Part No. :08191-81201, 08191-81202, 08191-81203, 08191-81204, 08191-81205, 08191-80206	Part No. :08191-84101, 08191-84102, 08191-84103, 08191-84104, 08191-84105, 08191-84106	
	Socket (female terminal)	Pin (male termial)	799-601-9280
	 BWP05031	 BWP05032	
	Part No. :08191-82201, 08191-82202, 08191-82203, 08191-82204, 08191-82205, 08191-82206	Part No. :08191-83101, 08191-83102, 08191-83103, 08191-83104, 08191-83105, 08191-83106	

9JS04907

BOSCH connector for engine

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

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

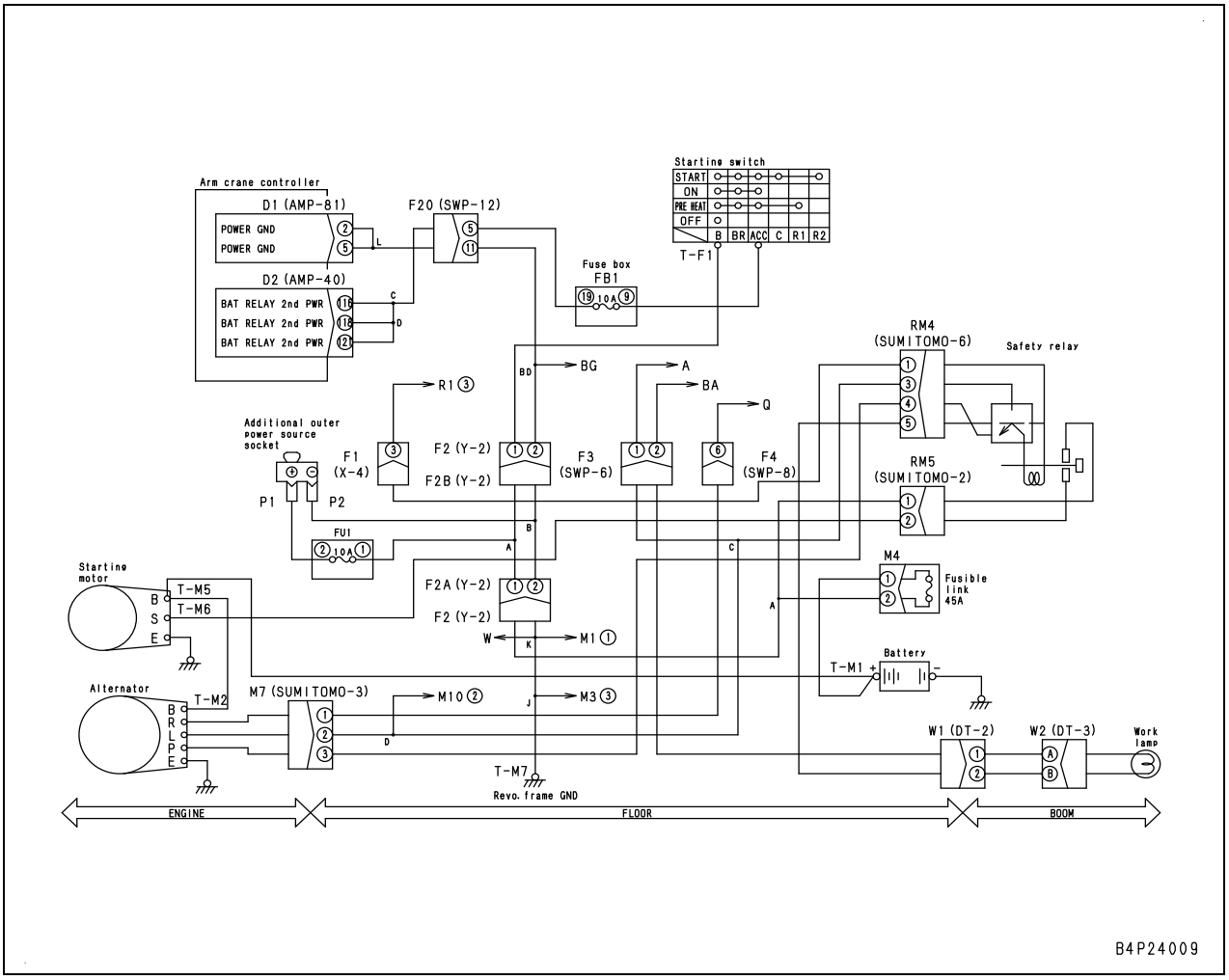
No. of pins	Fuel supply pump (95, 107 engine) and fuel injector (95 engine)		
	Valve side (plug)	Harness side (receptacle)	T-adapter Part No.
2			799-601-4340 (Kit:799-601-4101) (Kit:799-601-4201)
	—	—	

BJH13175

Part No.	Part name	Number of pins	Identification symbol	T-adapter kit														Out of kit
				799-601-2500	799-601-2700	799-601-2800	799-601-7000	799-601-7100	799-601-7400	799-601-7500	799-601-8000	799-601-9000	799-601-9100	799-601-9200	799-601-9300	799-601-4101	799-601-4201	
799-601-9330	Case											●						
799-601-9340	Case												●					
799-601-9350	Adapter for DRC	40	DRC-40												●			
799-601-9360	Adapter for DRC	24	DRC-24												●			
799-601-9410*	Socket for engine (CRI-T2)	2	G															●
799-601-9420	Adapter for engine (CRI-T2) Adapter for engine (CRI-T3) PFUEL Oil pressure sensor	3	A3													●	●	
799-601-9430*	Socket for engine (CRI-T2) Socket for engine (CRI-T3) PCV	2	P													●	●	
799-601-9440*	Socket for engine (CRI-T2)	3	1,2,3															●
795-799-5520*	Socket for engine (HPI-T2)	2	S															●
795-799-5530*	Socket for engine (HPI-T2) Socket for engine (CRI-T3) Temperature sensor	2	C													●	●	
795-799-5540*	Socket for engine (HPI-T2) Socket for engine (CRI-T3) TIM	2	A													●	●	
795-799-5460	Cable for engine (HPI-T2)	3	—															●
795-799-5470	Cable for engine (HPI-T2)	3	—															●
795-799-5480	Cable for engine (HPI-T2)	3	—															●
799-601-4110	Adapter for engine (140-T3) PIM	4	ITT3N													●	●	
799-601-4130	Adapter for engine (CRI-T3) NE, CAM	3	FCIN													●	●	
799-601-4140	Adapter for engine (CRI-T3) Atomosphere pressure	3	FCIG													●	●	
799-601-4150	Adapter for engine (CRI-T3) POIL	3	FCIB													●	●	
799-601-4160	Adapter for engine (CRI-T3) Oil pressure switch	2	4160													●	●	
799-601-4180	Adapter for engine (CRI-T3) PEVA	3	4180													●	●	
799-601-4190*	Socket for engine (CRI-T3) Commonrail pressure	3	1,2,3L													●	●	
799-601-4230*	Socket for engine (CRI-T3) Air intake pressure/temperature	4	1,2,3,4C													●	●	
799-601-4240*	Socket for engine (CRI-T3) PAMB	3	1,2,3A													●	●	
799-601-4250*	Socket for engine (CRI-T3) PIM	3	1,2,3B													●	●	
799-601-4330*	Socket for engine (CRI-T3) G	3	1,2,3,G													●	●	
799-601-4340*	Socket for engine (CRI-T3) Pump actuator	2	2,PA													●	●	
799-601-4380*	Socket for engine (CRI-T3)(95) Air intake pressure/temperature	4	1,2,3,4T															●
799-601-4260	Adapter for controller (ENG)	4	DTP4													●	●	
799-601-4211	Adapter for controller (ENG)	50	DRC50													●		
799-601-4220	Adapter for controller (ENG)	60	DRC60													●		
799-601-4390*	Socket for controller (95 ENG)	60	—															●
799-601-4280	Box for controller (PUMP)	121	—															●
799-601-9720	Adapter for controller (HST)	16	HST16A															●
799-601-9710	Adapter for controller (HST)	16	HST16B															●
799-601-9730	Adapter for controller (HST)	26	HST26A															●
799-601-9890	Multi-adapter for DT2 – 4 and DTM2	2, 3, 4	—															●

"*" Shows not T-adapter but socket.

Related circuit diagram

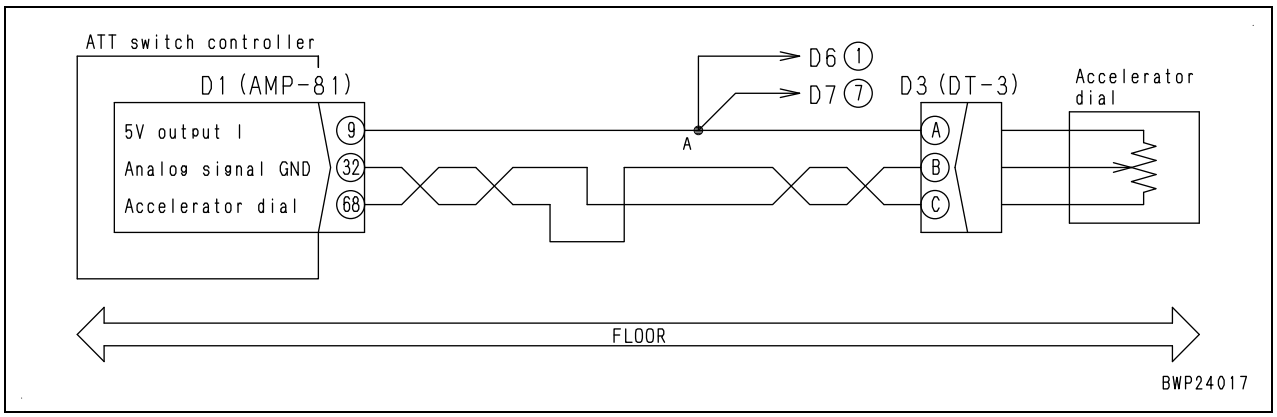


Failure code [DK10KB] Fuel control dial potentiometer error (Hot short circuit)

User code	Failure code	Trouble	Fuel control dial potentiometer error (Hot short circuit)
E533	**DK10KB**		
Contents of trouble	• Signal voltage from fuel control dial changed to 4.7 V or above.		
Action of controller	• If trouble occurs while starting switch is in ON position, controller operates machine with voltage fixed to value just before trouble is detected • If starting switch is turned ON with trouble unrepaired, controller operates machine with value of low idle. • Even if trouble disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Engine speed cannot be controlled with fuel control dial.		
Related information	• Failure code recurrence method: Turn starting switch to ON position.		

Possible causes and standard value in normal state		Cause	Standard value in normal state/Remarks on troubleshooting		
	1	Defective fuel control dial (Internal failure)	★ Be ready with starting switch OFF, then perform troubleshooting without turning starting switch ON.		
			D3(male)	Resistance	
			Between (A) – (C)	4.0 – 6.0 kΩ	
			Between (B) – (A)	0.25 – 5.0 kΩ	
			Between (B) – (C)	0.25 – 5.0 kΩ	
	2	Hot short circuit of wiring harness (Contact with 12 V circuit)	★ Be ready with starting switch OFF, then turn starting switch to ON position and perform troubleshooting.		
			Between wiring harness D1 (female) (9) and D3 (female) (A)	Voltage	Max. 5.3 V
			Between wiring harness D1 (female) 68 - D3 (female) (B)	Voltage	Max. 4.7 V
	3	Defective attachment switch controller	★ Be ready with starting switch OFF, then turn starting switch to ON position and perform troubleshooting.		
			D1	Voltage	
			Between (9) – (32)	4.7 – 5.3 V	

Related circuit diagram



Failure code [D1E1KZ] Motor drive relay (+) error (Disconnection or hot short circuit)

User code	Failure code	Trouble	Motor drive relay (+) error (Disconnection or hot short circuit)
E612	**D1E1KZ**		
Contents of trouble	• When output to motor drive relay (+) was turned OFF, disconnection or hot short circuit was detected in motor drive relay (+) coil circuit.		
Action of controller	• Stops outputting of motor drive relay (+) and motor power supply relay. • Even if trouble disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Engine speed cannot be changed.		
Related information	• Method of reproducing failure code: Turn starting switch ON.		

	Cause		Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective motor drive relay (+)	★ Be ready with starting switch OFF, then perform troubleshooting without turning starting switch ON.		
			R12 (male)	Resistance	
			Between (1) – (2)	80 ± 8 Ω	
			Between (3) – (6)	Max. 1 Ω	
			Between (3) – (5)	Min. 1 MΩ	
	2	Disconnection in wiring harness (Disconnection or defective contact in connector)	★ Be ready with starting switch OFF, then perform troubleshooting without turning starting switch ON.		
			Wiring harness between D2 (female) (109) and R12 (female) (1)	Resistance	Max. 1 Ω
			Between R12 (female) (2) and ground	Resistance	Max. 1 Ω
	3	Hot short circuit of wiring harness (Contact with 12 V circuit)	★ Be ready with starting switch OFF, then turn starting switch to ON position and perform troubleshooting.		
			Between wiring harness D2 (female) (109) and R12 (female) (1)	Voltage	Max. 1 V
			Between R12 (female) (2) and ground	Voltage	Max. 1 V
	4	Defective attachment switch controller	If causes 1 - 3 are not detected, attachment switch controller may be defective. (Since trouble is in system, troubleshooting cannot be carried out.)		

Failure code [D1E0KA] Fuel control motor power supply relay contact sticking (NC side)

User code	Failure code	Trouble	Fuel control motor power supply relay contact sticking (NC side)
E706	**D1E0KA**		
Contents of trouble	• Governor motor power supply relay contact is stuck (NC side).		
Action of controller	• Stops outputting of motor power supply relay. • Even if trouble disappears, system does not reset itself until starting switch is turned OFF.		
Problem that appears on machine	• Engine speed cannot be changed.		
Related information	• ON/OFF output of motor power supply relay can be checked with monitoring function. (Code: 97 ON-OFF output 1 (Right))		

		Cause	Standard value in normal state/Remarks on troubleshooting		
Possible causes and standard value in normal state	1	Defective motor power supply relay	★ Be ready with starting switch OFF, then turn starting switch to ON position and perform troubleshooting. (Check while moving fuel control dial slowly between slow and full)		
			R11	Voltage	
			(3) – (5)	10 – 15 V	
			(3) – (6)	Max. 1 V	
	Remarks	If R11 is judged defective in 1 above, exchange it with R12 or R13 and check again.			
	2	Hot short circuit of wiring harness (Contact with 12 V circuit)	★ Be ready with starting switch OFF, then turn starting switch to ON position and perform troubleshooting.		
			Between wiring harness D1 (female) (41) and R11 (female) (6)	Voltage	Max. 1 V

Before carrying out troubleshooting of electrical system

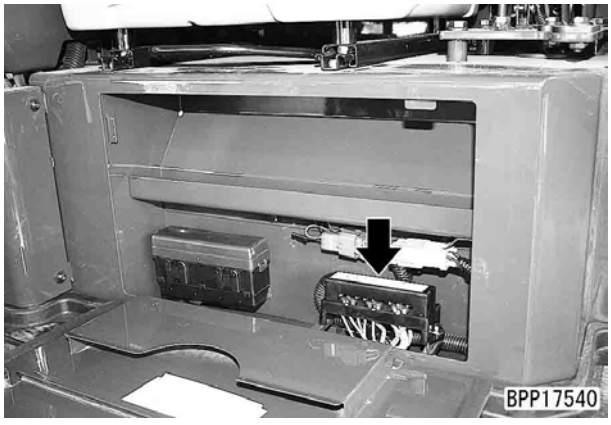
Connection table of fuse box and slow blow fuse

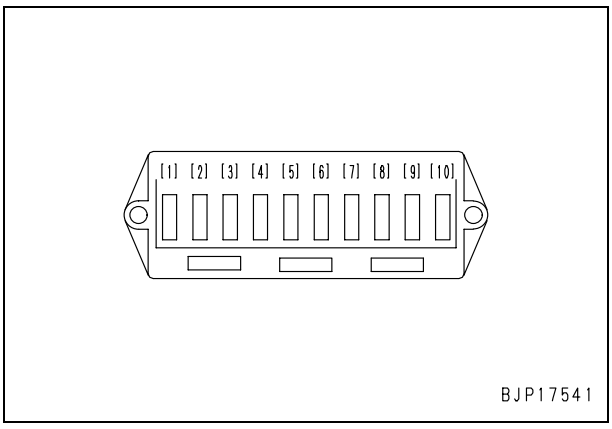
★ This connection table indicates the devices to which the power of the fuse box and slow blow fuse is supplied. (A switch power supply is a device which supplies powers while the starting switch is in the ON position and unswitched power supply is a device which supplies power while the starting switch is in the OFF and ON positions).

★ When carrying out troubleshooting related to the electrical system, you should check the fuses and slow blow fuse to see if the power is supplied normally.

Type of power supply (Power source)	Fuse No.	Fuse capacity	Destination of power supply
Accessory power supply (Starting switch ACC terminal)	1	30 A (CAB) 10 A (CAN)	Working lamp
	2	10 A	Fuel pump
			PPC lock solenoid relay
			Horn switch
	3	10 A	Machine monitor
			Alarm buzzer
			Speedup solenoid relay, PPC lock switch
	4	10 A	Arm crane
	5	20 A (CAB) 10 A (CAN)	Air conditioner
			Heater
			Travel alarm
	6	20 A (CAB)	Room lamp (CAB)
			Radio (CAB)
			Wiper motor (CAB)
			Washer motor (CAB)
	7	30 A	Engine stop solenoid
Unswitched power supply (Fusible link of 45 A: M4)	8	10 A	Machine monitor
			Arm crane controller
			Radio
Accessory power supply (Starting switch ACC terminal)	9	10 A	For optional equipment
—	10	—	(Spare)

- CAB: Cab specification, CAN: Canopy specification





E-2 Engine does not stop

Failure information	• Engine does not stop.
Relative information	

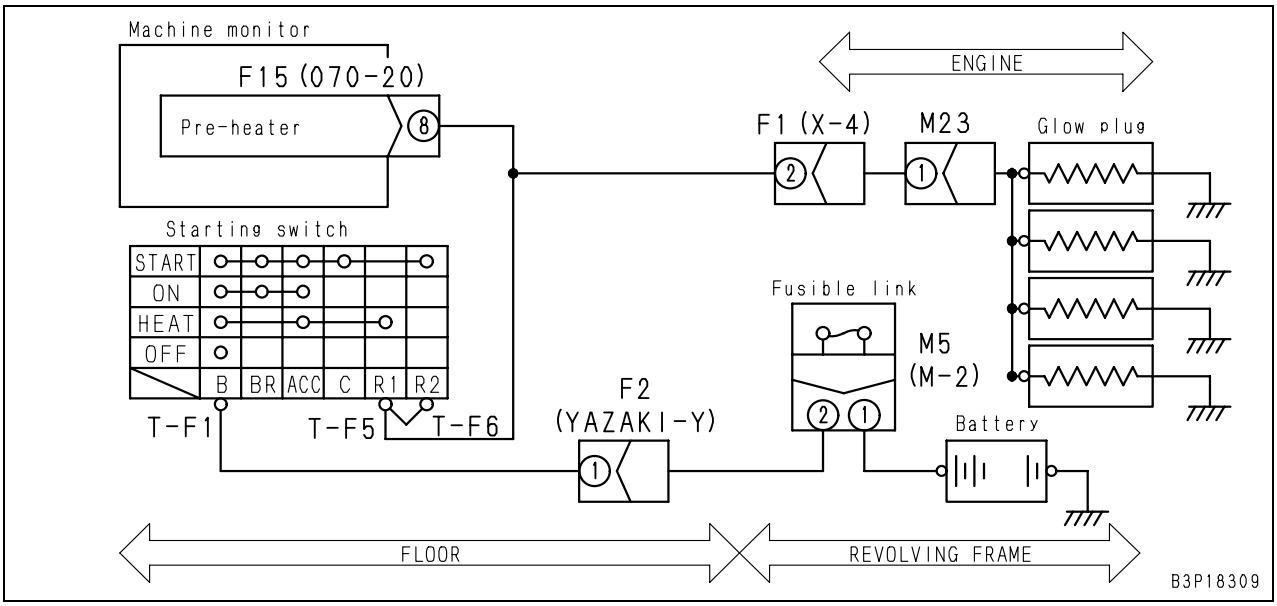
<table>
<tr><td rowspan="9">Presumed cause and standard value in normalcy</td><td colspan="2">Causes</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td rowspan="3">1</td><td rowspan="3">Defective engine stop solenoid (Internal defect)</td><td colspan="4">1) Turn starting switch OFF.
2) Disconnect connector M13.
3) Connect T-adapter to M13 (male).</td></tr>
<tr><td colspan="3">M13 (male)</td><td>Resistance</td></tr>
<tr><td colspan="3">Between (1) and (3)</td><td>22 – 28 Ω</td></tr>
<tr><td rowspan="3">2</td><td rowspan="3">Defective starting switch (Internal short circuit)</td><td colspan="3">Between (2) and (3)</td><td>0.63 – 0.77 Ω</td></tr>
<tr><td colspan="4">1) Turn starting switch from START to OFF for troubleshooting.</td></tr>
<tr><td>Starting switch</td><td>Position</td><td>Voltage</td></tr>
<tr><td>Between (T-F2) terminal BR and ground</td><td>OFF</td><td>Max. 1 V</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">Short circuit with power source in wiring harness (Contact with 12 V circuit)</td><td colspan="4">1) Prepare with starting switch OFF, then carry out troubleshooting without turning starting switch ON.</td></tr>
<tr><td colspan="2">Between wiring harness between T-F2 and M13 (female) (1) and ground</td><td>Voltage</td><td>Max. 1 V</td></tr>
</table>

E-8 Preheating system does not operate or preheater does not become hot

Failure information	• When the starting switch is set to HEAT, the following preheating system of the monitor panel does not operate. 1) The preheating indicator flashes (for about 18 seconds). 2) The buzzer sounds at start and end of preheating.
Relative information	• Check that the fusible link is not broken. • Refer to troubleshooting E-3, too.

	Causes		Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	1	Defective fusible link	If the fusible link is burned, the circuit probably has a grounding fault.		
	2	Defective air heater (Internal disconnection)	1) Prepare with starting switch OFF. 2) Turn starting switch ON and carry out troubleshooting.		
			Between M23 (female) (1) and ground	Voltage	10 – 15 V
	3	Defective starting switch (Internal defective contact)	1) Turn starting switch OFF. 2) Disconnect negative (–) terminal of battery.		
			Between T-F1 and T-F5 or T-F6	Resistance	Max. 1 Ω
	4	Disconnection in wiring harness (Disconnection in wiring harness or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect related connectors and terminals. 3) Connect T-adapter to female side of F15.		
			Wiring harness between M23 (female) (1), F1 (2) and T-F5, T-F6 or F15 (female) (8)	Resistance	Max. 1 Ω
			Wiring harness between T-F1 and F2 (1) and M5 (2) (1) and positive (+) terminal of battery	Resistance	Max. 1 Ω

Related circuit diagram



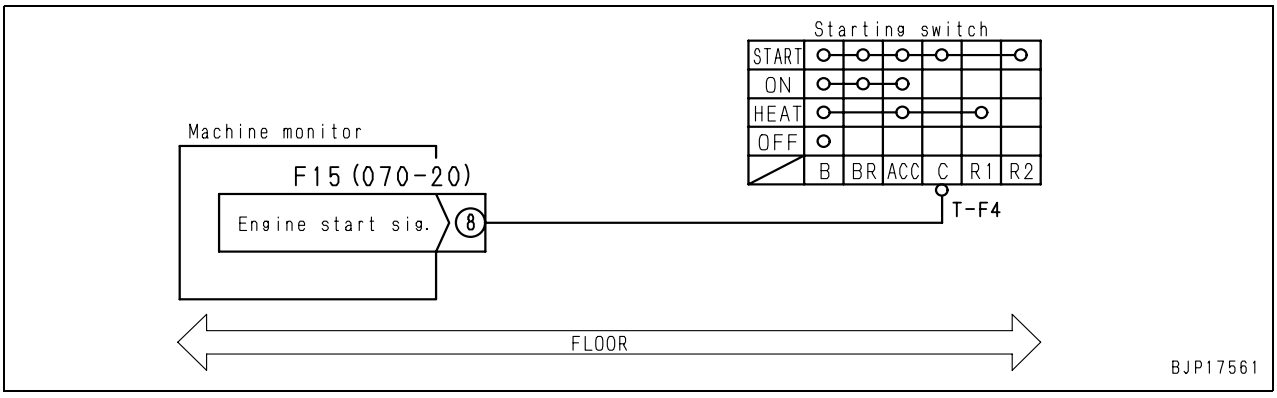
E-11 Service meter does not operate while engine is running

1) Engine oil pressure caution is turned ON

Failure information	1) Service meter (Operating hour integrator) does not operate while engine is running.	Engine oil pressure caution is turned ON.
Relative information	• While the engine is running, the service meter operates even if the machine does not move at all. • While the engine is stopped, the service meter does not operate. • Refer to troubleshooting E-3, too. ★ Carry out troubleshooting “E-6 Engine oil pressure caution is turned ON” first, then carry out the following troubleshooting.	

	Causes		Standard value in normalcy and references for troubleshooting		
Presumed cause and standard value in normalcy	1	Disconnection in wiring harness (Disconnection in wiring harness or defective contact in connector)	1) Turn starting switch OFF. 2) Disconnect connector F15. 3) Connect T-adapter to F15 (female). 4) Turn starting switch to START (Do not hold for long time, however).		
			Between T-F4 and ground	Voltage	10 – 15 V
			Between F15 (female) (8) and ground	Voltage	10 – 15 V
	2	Defective monitor panel	If the wiring harness is normal, the monitor panel is defective.		

Related circuit diagram



E-15 Windshield wiper does not operate

Failure information	• Windshield wiper does not operate.
Relative information	• The engine can start. (If the engine cannot start, carry out troubleshooting E-1 first.)

<table>
<tr><td rowspan="15">Presumed cause and standard value in normalcy</td><td colspan="2">Causes</td><td colspan="4">Standard value in normalcy and references for troubleshooting</td></tr>
<tr><td>1</td><td>Defective fuse (6) – (16)</td><td colspan="4">If the fuse is broken, the circuit probably has a grounding fault.</td></tr>
<tr><td rowspan="7">2</td><td rowspan="7">Defective wiper switch (Internal disconnection or defective contact)</td><td colspan="4">1) Turn starting switch OFF.
2) Disconnect connector wiper switch terminal.</td></tr>
<tr><td>Wiper switch</td><td>Position</td><td colspan="2">Resistance</td></tr>
<tr><td>Between terminals (1) and (2)</td><td>OFF (Do not move)</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td>Between terminals (2) and (3)</td><td>ON (1st position)</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td>Between terminals (2) and (3)</td><td>WASH (2nd position)</td><td colspan="2">Max. 1 Ω</td></tr>
<tr><td colspan="4">1) Turn starting switch from OFF to ON for troubleshooting.</td></tr>
<tr><td>Wiper switch</td><td>Position</td><td colspan="2">Voltage</td></tr>
<tr><td>Between terminal (2) and ground</td><td>ON (1st position)</td><td colspan="2">10 – 15 V</td></tr>
<tr><td rowspan="4">3</td><td rowspan="4">Disconnection in wiring harness (Disconnection in wiring harness or defective contact in connector)</td><td colspan="4">1) Turn starting switch OFF.
2) Disconnect wiper switch terminal.</td></tr>
<tr><td colspan="2">Wiring harness between fuse (16), F24 (1), F7 (4) and wiper switch terminal (3)</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between wiper switch terminal (2) and wiper motor (+) side</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td colspan="2">Wiring harness between wiper motor (–) side, F7 (1), F24 (2), F2 (2) and ground</td><td>Resistance</td><td>Max. 1 Ω</td></tr>
<tr><td rowspan="3">4</td><td rowspan="3">Short circuit with chassis ground in wiring harness (Contact with ground circuit)</td><td colspan="4">1) Turn starting switch OFF.
2) Disconnect wiper switch terminal.</td></tr>
<tr><td colspan="2">Between wiring harness between fuse (16), F24 (1), F7 (4) and wiper switch terminal (3) and ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
<tr><td colspan="2">Between wiring harness between wiper switch terminal (2) and wiper motor (+) side and ground</td><td>Resistance</td><td>Min. 1 MΩ</td></tr>
</table>

6) Defective heating (Defective hot-water circuit)

Failure information	• Defective heating (Defective hot-water circuit)
Relative information	• Check that water is not leaking from the hot-water circuit. • Check that air is blowing out of the air outlet.

	Causes		Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Clogging of heater core fins	Check. If heater core fins are clogged, clean them. ★ If this item is the cause, both temperatures at the heater core hot-water inlet and outlet are high.
	2	Air leakage from air conditioner unit	Check. If leakage is detected, repair or replace. ★ If this item is the cause, both temperatures at the heater core hot-water inlet and outlet are high.
	3	Defective water control valve (Clogging or defect in valve)	Check. If clogging or defect is detected, repair or replace. ★ If this item is the cause, the temperatures at the heater core hot-water inlet is high and that at the heater core hot-water outlet is low.
	4	Clogging in heater core	Check. If clogging is detected, repair or replace. ★ If this item is the cause, the temperatures at the heater core hot-water inlet is high and that at the heater core hot-water outlet is low.
	5	Clogging up to heater core hot-water inlet	Check. If clogging is detected, repair or replace. ★ If this item is the cause, the temperatures at the heater core hot-water inlet is low.

7) Abnormal sound comes out

Failure information	• Abnormal sound comes out.
Relative information	—

	Causes		Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Defective installation of case bolts (screws)	Check. If abnormality is detected, repair.
	2	Interference of fan case or breakage of fan	Check. If abnormality is detected, repair or replace.
	3	Foreign matter in blower motor or defective blower motor	Check. If abnormality is detected, remove foreign matter and repair or replace.
	4	Defective expansion valve	Check. If abnormal sound (blowing or leaking sound) comes out, replace valve.
	5	Looseness or wear of compressor V-belt	Check. If looseness or wear is detected, repair or replace.
	6	Improper quantity of refrigerant	Check quantity of refrigerant, then adjust it properly, if necessary.
	7	Defective compressor	Check. If abnormality is detected, repair or replace.

3) Speed or power of swing and blade is low

Failure information	• Speed or power of swing and blade is low.
Relative information	• Before starting troubleshooting, check that the oil level in the hydraulic tank is proper. • When starting troubleshooting, warm up the hydraulic oil to 45 – 55°C. • If a phenomenon disappears as the engine speed is increased, it is not a fault.

	Causes		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective adjustment or malfunction of gear pump relief valve	★ Prepare with engine stopped, then run engine at full throttle and carry out troubleshooting.	
			Control lever	Main relief pressure
			Relieve blade lower circuit	$21.6^{+0.98}_{-0.49}$ MPa {220^{+10}_{-5} kg/cm^2}
			If the oil pressure does not become normal after adjustment, the gear pump relief valve may have a malfunction or a defect in it. Check it directly.	
	2	Defective gear pump	If the condition does not become normal after the relief valve is adjusted or replaced, the performance of the gear pump may be lowered.	

4) Speed or power of whole work equipment and blade is low

Failure information	• Speed or power of whole work equipment and blade is low.
Relative information	• Before starting troubleshooting, check that the oil level in the hydraulic tank is proper. • When starting troubleshooting, warm up the hydraulic oil to 45 – 55°C. • If a phenomenon disappears as the engine speed is increased, it is not a fault.

	Causes		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Defective centralized safety valves	★ Prepare with engine stopped, then run engine at full throttle and carry out troubleshooting.	
			Control lever	Main pump pressure and gear pump relief pressure
			• Work equipment control lever (Both directions) • Swing control lever (Right swing)	26.5 ± 0.98 MPa {270 ± 10 kg/cm^2}
			• Blade control lever (Lower)	$21.6^{+0.98}_{-0.49}$ MPa {220^{+10}_{-5} kg/cm^2}
			If the oil pressure is lower through all of the above measurements, the centralized safety valves may be defective. Check them directly. ★ The centralized safety valves act on both sides of the boom, arm, and bucket, on the head side of the boom swing, and on the bottom side of the blade.	

H-8 Speed or power of bucket is low

Failure information	• Speed or power of bucket is low.
Relative information	• Before starting troubleshooting, check that the oil level in the hydraulic tank is proper. • When starting troubleshooting, warm up the hydraulic oil to 45 – 55°C.

	Causes		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction of right PPC valve (bucket circuit)	★ Prepare with engine stopped, then run engine at full throttle and carry out troubleshooting.	
			Right work equipment control lever	PPC valve output pressure
			Set in neutral	0 MPa {0 kg/cm^2}
			Operated to move CURL bucket Operated to move bucket DUMP	$2.94\,^{+0.49}_{-0.1}$ MPa {$30\,^{+5}_{-1}$ kg/cm^2}
	2	Malfunction of bucket control valve (spool)	The bucket control valve spool may have a malfunction. Check it directly.	
	3	Malfunction of bucket control valve (pressure compensation valve)	The pressure compensation valve of the bucket control valve may be malfunction. Check it directly.	
	4	Malfunction or defective seal of bucket control valve (suction valve)	Since the suction valves of the bucket control valve (on the bottom side and head side) may have a malfunction, check them directly.	
	5	Malfunction or defective seal of centralized safety-suction valves	The centralized safety-suction valves of the control valve may have a malfunction or defective seal. Check them directly.	
	6	Defective bucket cylinder	★ Prepare with engine stopped, then run engine at full throttle and carry out troubleshooting.	
			Bucket cylinder	Leakage from cylinder
			Relieved in bucket-CURL operation	10 cc/min

H-18 Travel motor does not work

1) Travel motors on both sides do not work

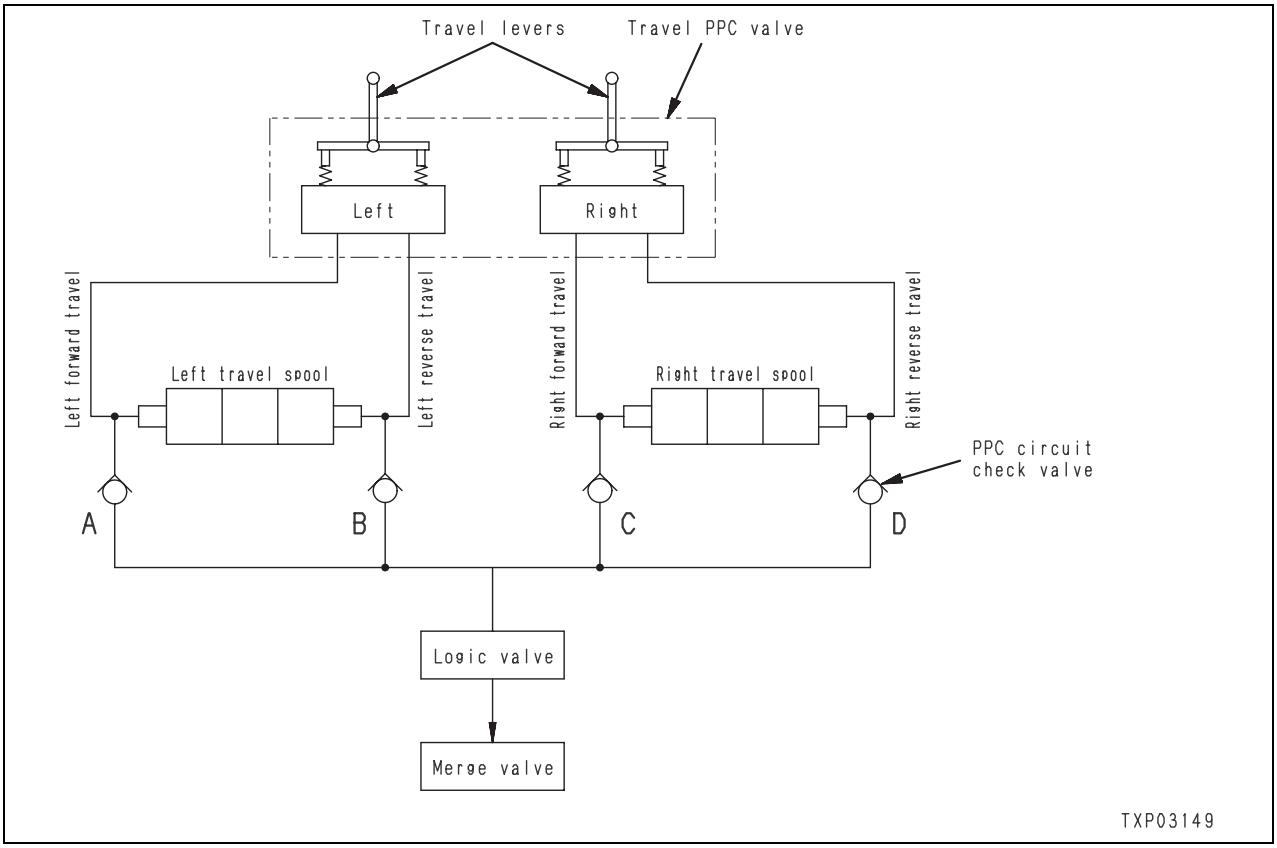
Failure information	• Travel motors on both sides do not work.
Relative information	• Before starting troubleshooting, check that the oil level in the hydraulic tank is proper. • When starting troubleshooting, warm up the hydraulic oil to 45 – 55°C.

Presumed cause and standard value in normalcy	Causes		Standard value in normalcy and references for troubleshooting
	1	Defective PPC circuit check valve (for pump merge-divider valve drive pressure)	If the PPC circuit pressure of only one of the left travel (forward and reverse) and right travel (forward and reverse) systems is normal, the PPC circuit check valve of that system may have a malfunction. Check it directly.

[Remarks]
Relationship between defect of PPC circuit check valve and “Travel motor does not work”

PPC circuit check valves (A) – (D) are installed as shown in the following figure to take out the signal pressure for changing the pump merge valve from the travel PPC pressure.
If the checking function of check valves (A) – (D) is lost, the travel motors may not work.

Example: When checking function of (A) is lost
- Operation in which travel motors work normally: “Left forward”, “Left forward + Right forward”, “Left forward + Right reverse”
- Operation in which travel motors may not work normally: “Left reverse”, “Right forward”, “Right reverse”, “Left reverse + Right forward”, “Left reverse + Right reverse”



H-25 Hydraulic drift of swing is large

1) Hydraulic drift of swing is large (while swing holding brake is applied)

Failure information	• Hydraulic drift of swing is large (when swing holding brake is applied).
Relative information	• When the control levers on the swing and arm IN side are in neutral, the swing holding brake operates and the upper structure is fixed by the disc brake.

	Causes		Standard value in normalcy and references for troubleshooting	
Presumed cause and standard value in normalcy	1	Malfunction or internal defect of swing motor (holding brake section)	★ Prepare with engine stopped, then run engine at full throttle and carry out troubleshooting.	
			Control lever	Swing motor holding brake release pressure
			Set in neutral	0 MPa {0 kg/cm²}
			Operate to swing	$2.94\,^{+0.49}_{-0.1}$ MPa $\{30\,^{+5}_{-1}$ kg/cm²$\}$
			If the above hydraulic pressure is normal, the holding brake section of the swing motor may have a malfunction or a defect in it. Check it directly.	

2) Hydraulic drift of swing is large (while swing holding brake is released)

Failure information	• Hydraulic drift of swing is large (while swing holding brake is released).
Relative information	• If the arm is moved IN, the swing brake is released and the upper structure is held by only hydraulic pressure.

	Causes		Standard value in normalcy and references for troubleshooting
Presumed cause and standard value in normalcy	1	Defective seal of swing control valve (spool)	The seal of the swing control valve spool may be defective. Check it directly.
	2	Defective seal of swing motor (safety valve)	The safety valve of the swing motor may have a malfunction. Check it directly.
	3	Defective seal of swing motor (suction valve)	The suction valve of the swing motor may have a malfunction. Check it directly. (Replace the suction valves on both sides and judge the faulty part by the change of the phenomenon.)

S-1 Starting performance is poor

General causes why starting performance is poor
- Defective electrical system
- Insufficient supply of fuel
- Insufficient intake of air
- Improper selection of fuel

			Causes													
			Clogged air cleaner element	Defective contact of valve, valve seat	Worn piston ring, cylinder	Clogged air breather hole of fuel tank cap	Leaking or clogged fuel piping, entry of air	Clogged fuel filter, element	Defective fuel injection pump (Stuck rack or plunger)	Defective fuel injection nozzle	Defective intake air heater system	Defective alternator (regulator section)	Defective alternator (generator section)	Defective, deteriorated battery	Defective fuel pump	
Questions	Confirm recent repair history															
	Degree of use of machine	Operated for long period	△					△						△		
	Starting performance	Became worse gradually	○	◎	◎			○								
		Engine starts easily when warm									◎			◎		
	Non-specified fuel is being used							○	○	○						
	Replacement of filters has not been carried out according to Operation and Maintenance Manual		◎					◎	○	○						
	Engine oil must be added more frequently				◎											
	When engine is preheated or when temperature is low, preheating monitor does not indicate normally										◎					
	During operation, charge level monitor indicates abnormal charge											◎	◎			
Check items	Dust indicator is red		◎													
	Air breather hole of fuel tank cap is clogged					◎										
	Fuel is leaking from fuel piping						◎		○							
	Starting motor cranks engine slowly													◎		
	When starting switch is turned ON and air bleeding plug of fuel filter is removed, fuel does not flow out							◎							◎	
	While engine is cranked with starting motor	When fuel injection pipe sleeve nut is loosened, fuel does not flow out							◎							
	When exhaust manifold is touched immediately after starting engine, temperature of some cylinders is low									◎						
	Engine does not pick up smoothly and combustion is irregular			○	○					◎						
	There is hunting from engine (rotation is irregular)					○	◎	○								
	Blow-by gas is excessive				◎											
Troubleshooting	Inspect air cleaner directly		●													Carry out troubleshooting in E-mode
	When compression pressure is measured, it is found to be low			●	●											
	When air is bled from fuel system, air comes out						●									
	Inspect fuel filter, strainer directly							●								
	Control rack is heavy to push or does not return								●							
	When a cylinder is cut out for reduced cylinder mode operation, engine speed does not change									●						
	When starting switch is turned to HEAT, intake air heater mount does not become warm										●					
	Is voltage 10 – 15 V between alternator terminal L and terminal E with engine at low idle?	Yes										●				
		No											●			
	When specific gravity of electrolyte and voltage of battery are measured, they are low													●		
		Remedy	Clean	Replace	Replace	Clean	Correct	Clean	Replace	Replace	Replace	Replace	Replace	Replace	—	

S-9 Oil becomes contaminated quickly

General causes why oil becomes contaminated quickly
- Entry of exhaust gas into oil due to internal wear
- Clogging of lubrication passage
- Use of improper fuel
- Use of improper oil
- Operation under excessive load

			Causes						
			Worn valve, valve guide	Worn piston ring, cylinder liner	Clogged breather, breather hose	Clogged oil filter	Defective oil filter safety valve	Exhaust smoke is bad	
Questions	Confirm recent repair history								
	Degree of use of machine	Operated for long period	△	△					
	Non-specified fuel is being used			○		○			
	Engine oil must be added more frequently			◎					
Check items	Metal particles are found when oil is drained		○	○		◎			
	Inside of exhaust pipe is dirty with oil		◎						
	Color of exhaust gas	Blue under light load		◎					
		Black						◎	
	Amount of blow-by gas	Excessive	○	◎					
		None			◎				
Troubleshooting	When compression pressure is measured, it is found to be low		●	●				See S-7	
	Check breather and breather hose directly				●				
	Inspect oil filter directly					●			
	Spring of oil filter safety valve is hitched or broken						●		
		Remedy	Replace	Replace	Clean	Replace	Replace	—	

How to read this manual

(Rev. 2009.01)

1. Removal and installation of assemblies

Special tools

- Special tools which are necessary for removal or installation of parts are described as **A1, ••• X1** etc. and their part numbers, part names and quantities are described in the special tool list.
- Also the following information is described in the special tool list.

1) Necessity
   - ■ : Special tools that cannot be substituted and should always be used
   - ● : Special tools that will be useful if available and are substitutable with tools available on the market
2) Distinction of new and existing special tools
   - N : Tools newly developed for this model. They have a new part number respectively.
   - R : Tools made available by redesigning the existing tools which were developed for other models. Each of them has a new part number assigned by setting forward the part number of the existing tool.
   - Blank : Tools already available for other models. They can be used without any modification.
3) Circle mark ○ in sketch column:
   - The sketch of the special tool is presented in the section of “Sketches of special tools”.
   - Part No. of special tools starting with 79★T-★★★-★★★★: means that they are not available from Komatsu Ltd. (i.e. tools to be made locally).

Removal

- In “Removal” section, the work procedures, precautions and know-how to do the work, and the amount of oil and coolant to be drained are described.
- Common tools that are necessary for removal are described as [1], [2]••• etc. and their part numbers, part names and quantities are not described.
- Various symbols used in “Removal” section are explained and listed below.

⚠ : Precautions related to work safety
★ : Guidance or precautions for the work
[*1] : This mark shows that instructions or precautions for parts installation work are given in “Installation” section.
: Amount of oil or coolant to be drained
: Weight of part or component

Installation

- Unless otherwise instructed, installation of parts is to be done in the reverse order to removal.
- Instructions and precautions for parts installation is shown with the mark ([*1], [*2]...) which corresponds to the mark in “Removal” section.
- Common tools that are necessary for installation are described as [1], [2]••• etc. and their part numbers, part names and quantities are not described.
- Marks shown in the “Installation” section stand for the following.

⚠ : Precautions related to work safety
★ : Guidance or precautions for the work
: Type of coating material
: Tightening torque
: Amount of oil or coolant to be replenished

Sketches of special tools

- Various special tools are illustrated for the local manufacture.

PC45MR, PC55MR-3 Hydraulic excavator

Form No. SEN04654-01

Removal and installation of engine and hydraulic pump assembly

Removal

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

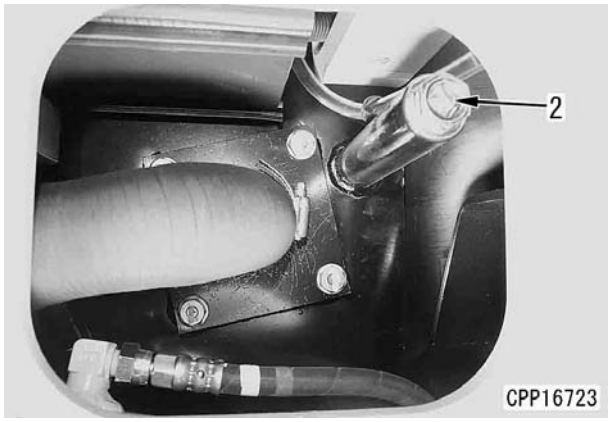
1. Release the pressure inside the hydraulic tank. For details, see Testing and adjusting, “Releasing residual pressure from hydraulic tank”.

2. Open drain plug (1) to drain the coolant.

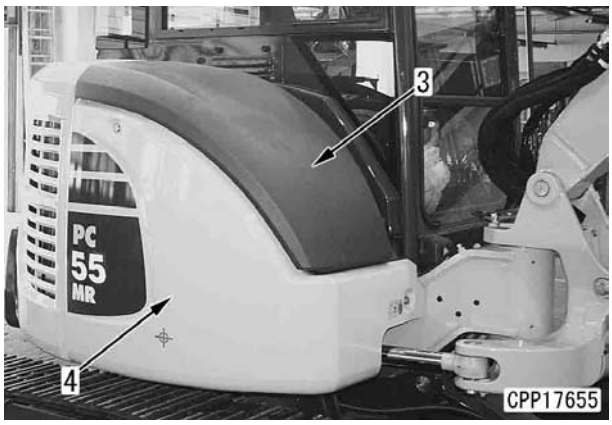
   Coolant: **8.5 ℓ**

3. Loosen drain plug (2) to drain the hydraulic oil.

   Hydraulic oil: **20 ℓ**



4. Open cover (3) and remove cover (4).

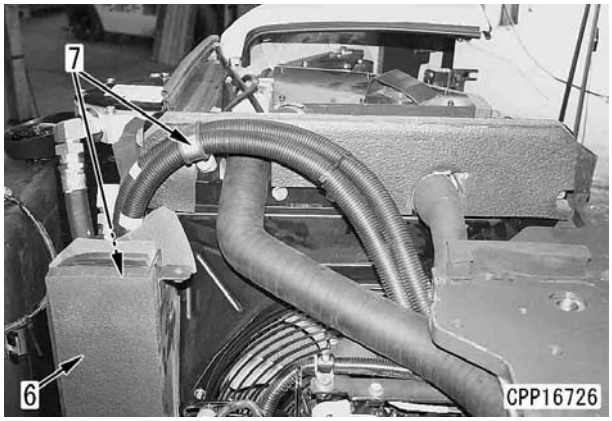


5. Tilt open the floor frame. For details, see Testing and adjusting, “How to open and close (tilt) floor”.

   ★ If the machine has the operator cab, tilt open the operator cab and floor frame assembly.

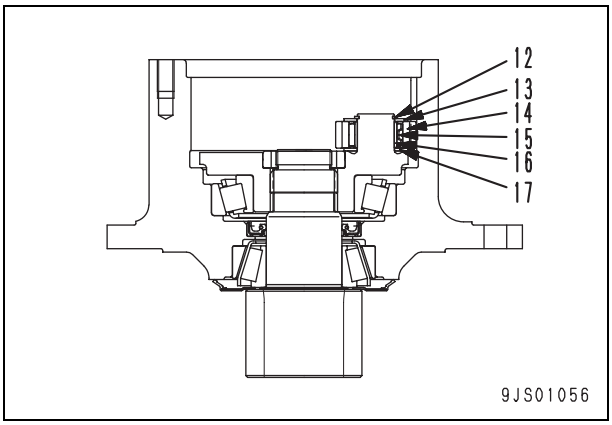
6. Remove cover (5).

7. Remove cover (6) and 2 clamps (7) and move the 2 heater hoses.

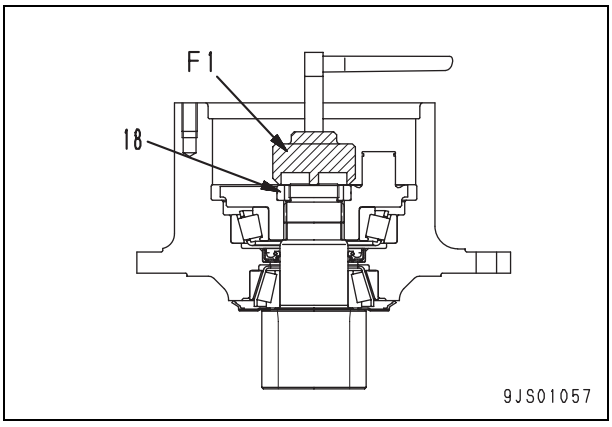


4. No. 2 planetary carrier assembly

1) Remove snap ring (12), thrust washer (13), No. 2 planetary gear (14), needle roller bearing (15), spacer (16), and thrust washer (17).

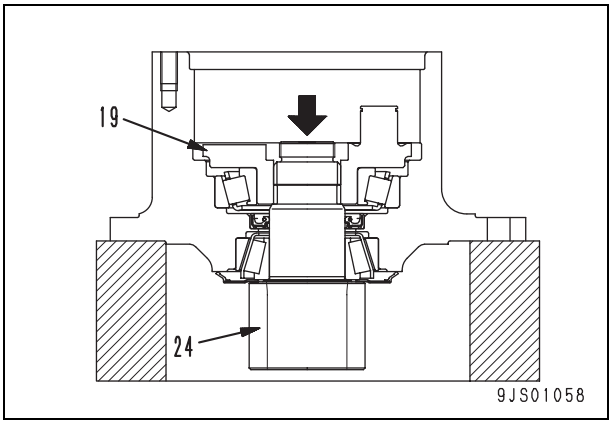


2) Using tool **F1**, remove nut (18)

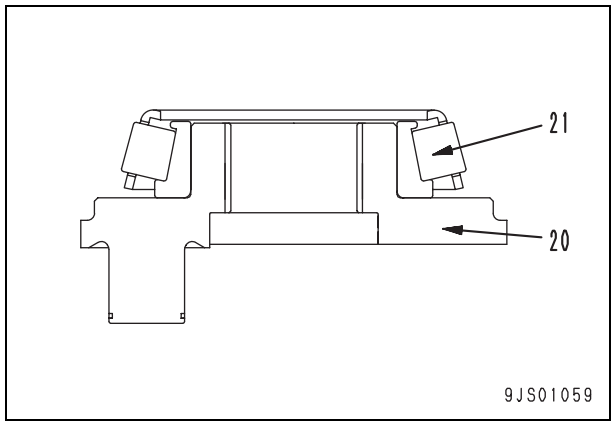


.

3) Remove No. 2 planetary carrier and bearing assembly (19).
   ★ Using a press, etc., push the end of pinion shaft (24) to remove the No. 2 pinion shaft and bearing assembly.

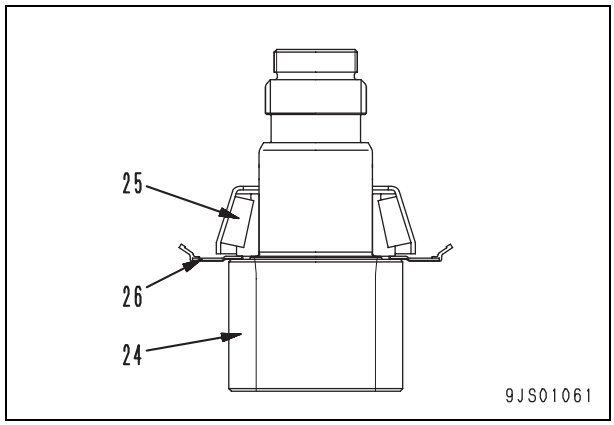


4) Remove bearing (21) from No. 2 planetary carrier (20).



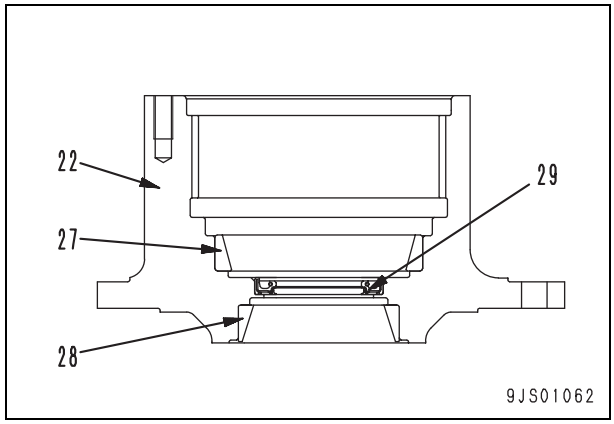
5. Pinion shaft and bearing assembly

Remove bearing (25) and seal (26) from pinion shaft (24).



6. Swing machinery case

Remove outer races (27) and (28) and oil seal (29) from swing machinery case (22).



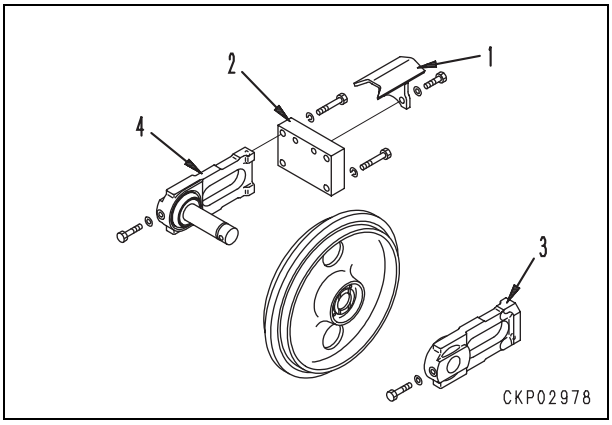
5. Install support and shaft assembly (4) to idler.

6. Fill inside of idler with engine oil.
   Inside portion of idler:
   Approx. 20 cc (EO30-CD)

7. Install support (3).
   Mounting bolt: **Thread tightener (LT-2)**

8. Install bracket (2).
   Mounting bolt: **Thread tightener (LT-2)**
   Mounting bolt:
   98 – 123 Nm {10.0 – 12.5 kgm}

9. Install cover (1).



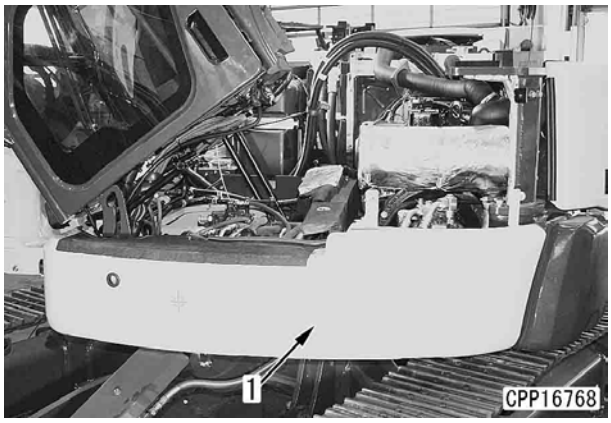
Removal and installation of center swivel joint assembly

Removal

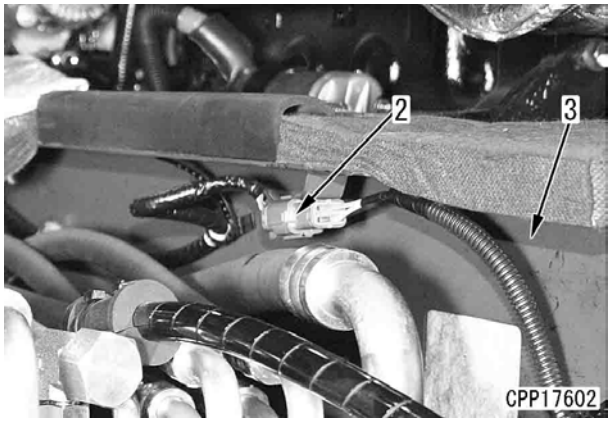
1. Release the pressure inside the hydraulic tank. For details, see Testing and adjusting, “Releasing residual pressure from hydraulic tank”.

2. Tilt open the floor frame. For details, see Testing and adjusting, “How to open and close (tilt) floor”.
   ⚠ Disconnect the cable from the negative (–) terminal of the battery.

3. Remove left side cover (1).

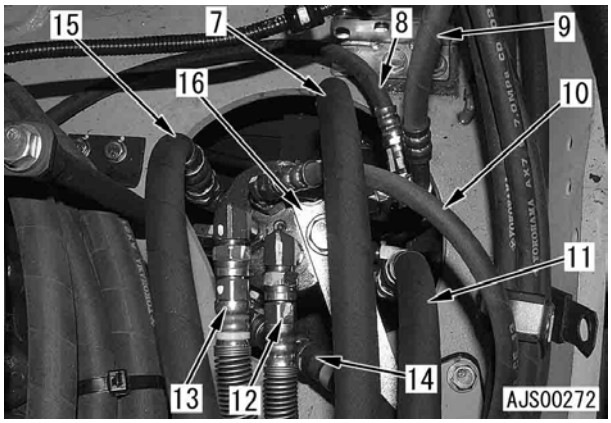


4. Remove connector (2) from the bracket and remove cover (3).

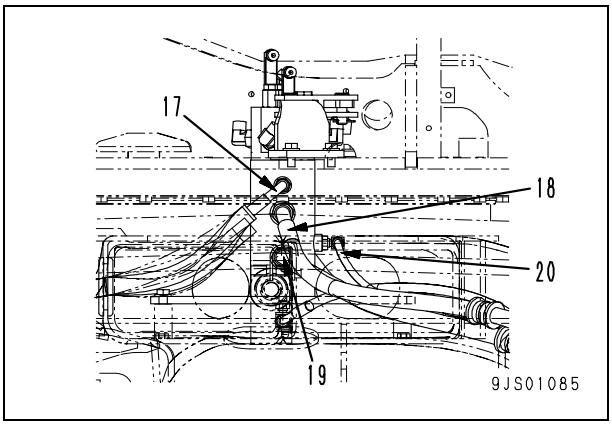


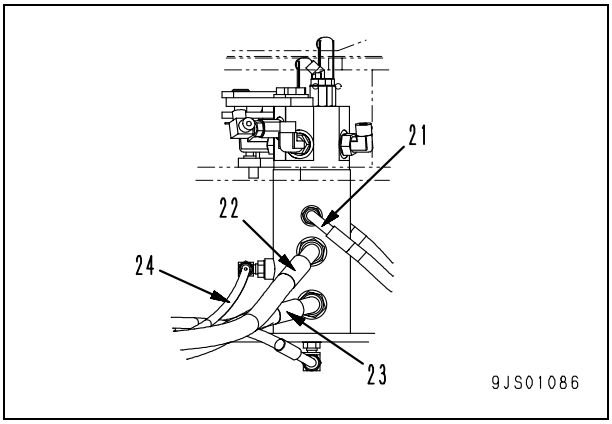
5. Disconnect hoses (7) – (15).

6. Remove lever (16) from the center swivel joint. [*1]



7. Disconnect hoses (17) – (24).



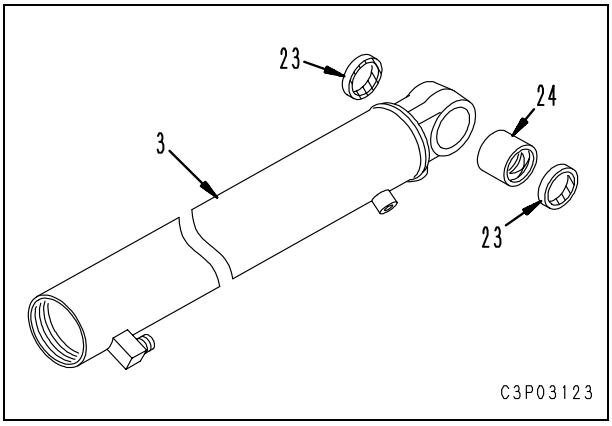


Assembly

★ The contents of this section are common to all the cylinders, unless otherwise specified.
★ Take care not to damage the packings, dust seals, O-rings, etc.
★ Clean each part thoroughly. After assembling, close the piping ports and pin inserting holes so that dirt will not enter them.
★ Do not insert each backup ring forcibly, but warm it in water at 50 – 60°C and then insert it.

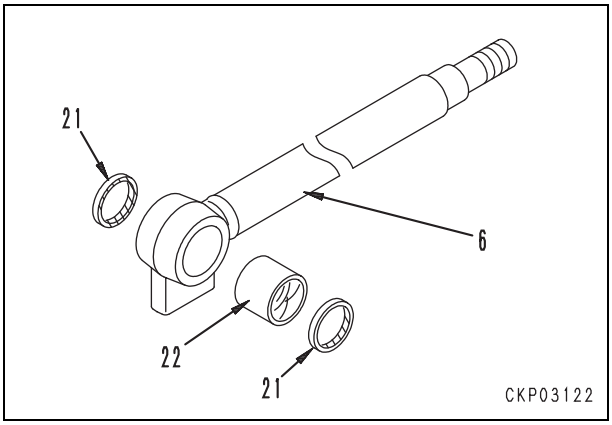
1. Cylinder

1) Press fit bushing (24) to cylinder (3).
2) Press fit 2 dust seals (23) to cylinder (3).



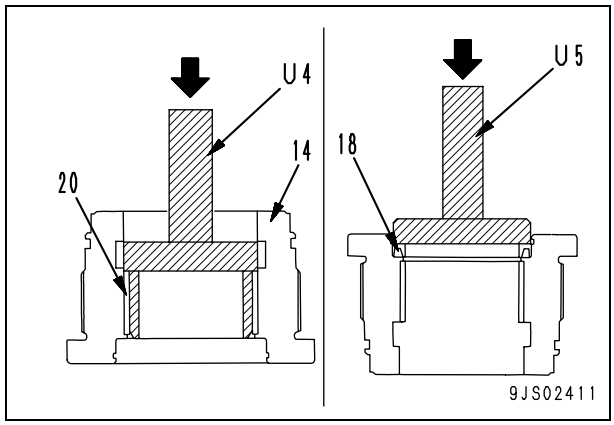
2. Piston rod

1) Press fit bushing (22) to piston rod (6).
2) Press fit 2 dust seals (21).

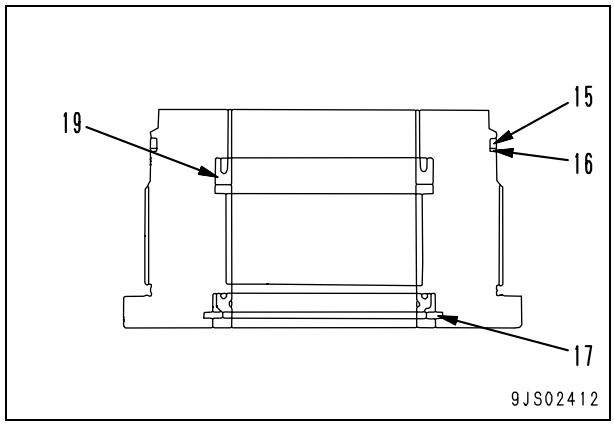


3. Cylinder head assembly

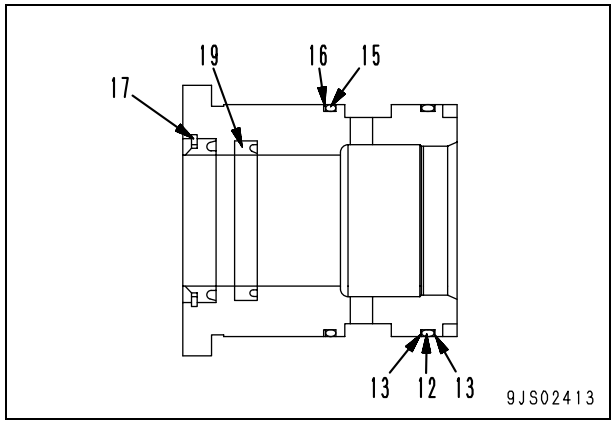
1) Using tool **U4**, press fit bushing (20) to cylinder head (14).
   ★ Except boom cylinder
2) Using tool **U5**, press fit dust seal (18).



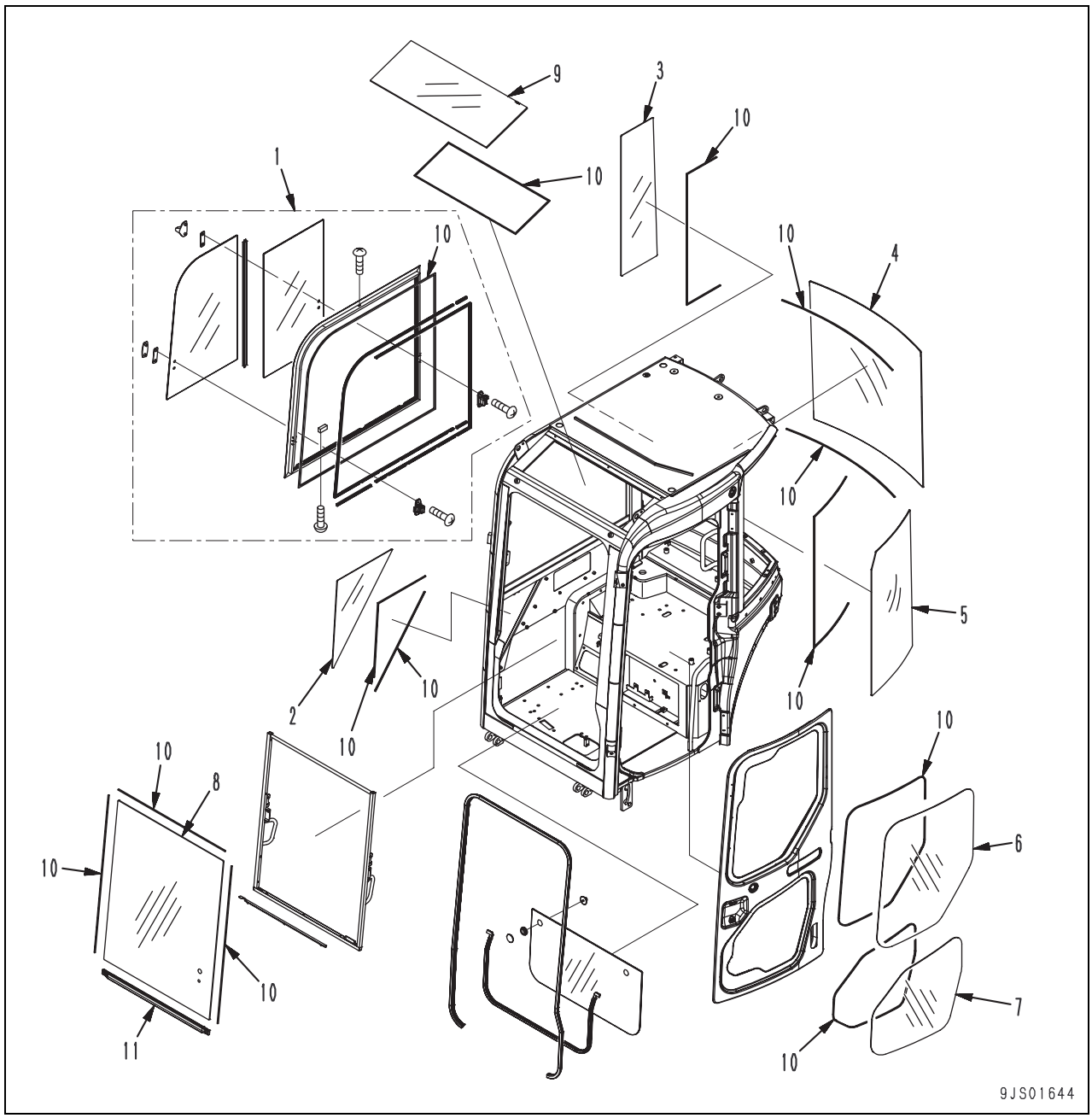
3) Using snap ring pliers, install snap ring (17).
4) Install rod packing (19).
5) Install O-ring (15) and backup ring (16).



6) Install O-ring (12) and 2 backup rings (13).
   ★ Boom cylinder only



Removal and installation of operator's cab glass (stuck glass)



★ On the 5 faces of the operator's cab, including the ceiling, panes (1) – (9) are stuck. (Ceiling (9) is a clear plate.)
★ When replacing front window glass (8), remove front window assembly. (It is impossible to replace only the front window glass while the front window assembly is installed to the operator's cab.)
★ For the procedure for replacing the front window assembly, see "Removal and installation of front window assembly".

(1) Right sash window glass assembly
(2) Right front lower triangular window glass
(3) Right rear window glass
(4) Rear window glass
(5) Left rear window glass
(6) Door upper window glass
(7) Door lower window glass
(8) Front window glass
(9) Clear plate
(10) Double-sided adhesive tape
(11) Center trim seal

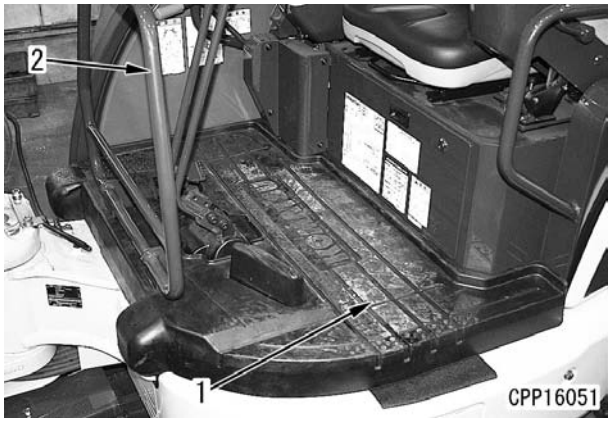
Removal and installation of floor frame assembly (Canopy specification)

Removal

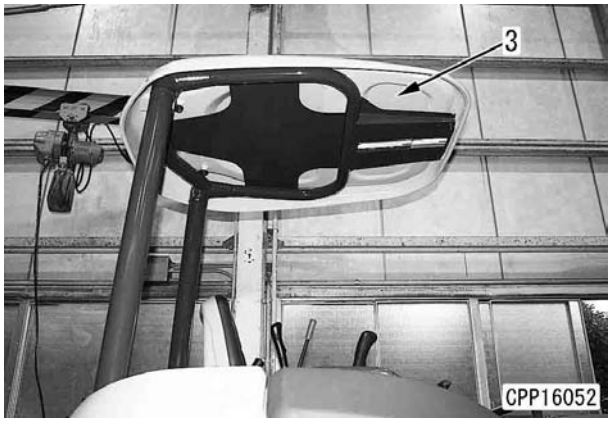
⚠ Disconnect the cable from the negative (–) terminal of the battery.

1. Release the air pressure in the hydraulic tank. For details, see Testing and adjusting, “Releasing residual pressure from hydraulic tank”.

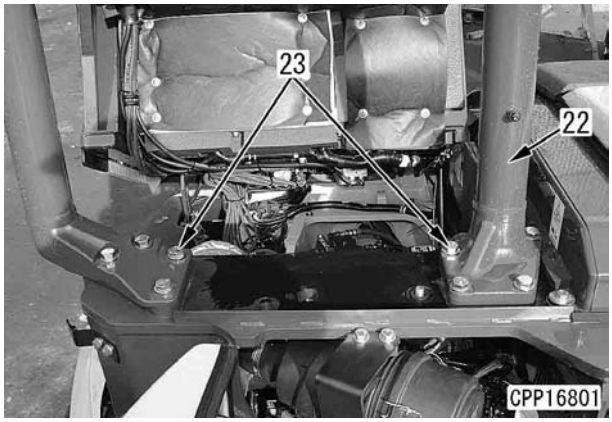
2. Remove floor mat (1) and bar (2).



3. Remove canopy according to the following procedure.
   1) Remove roof (3).

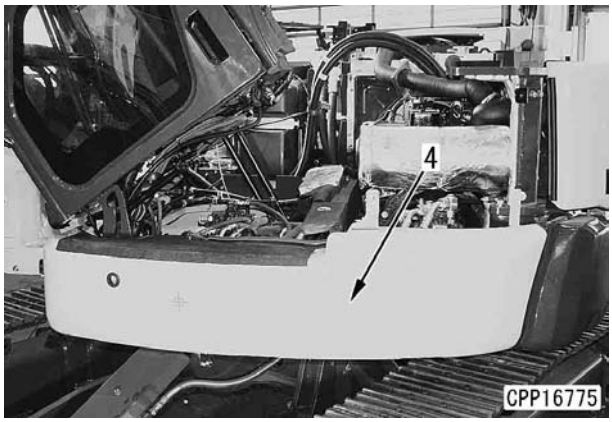


   2) Tilt up the floor frame.
   For details, see Testing and adjusting, “How to open and close (tilt) floor”.
   3) Sling canopy (22) temporarily, and remove 8 mounting bolts (23).



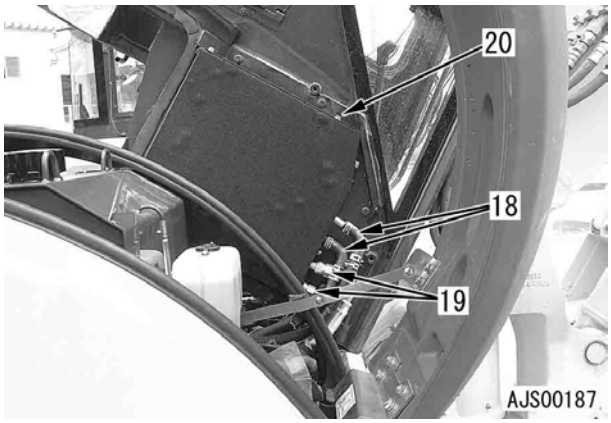
   4) Lift off canopy (22).
   Canopy assembly: **90 kg**

4. Remove cover (4).



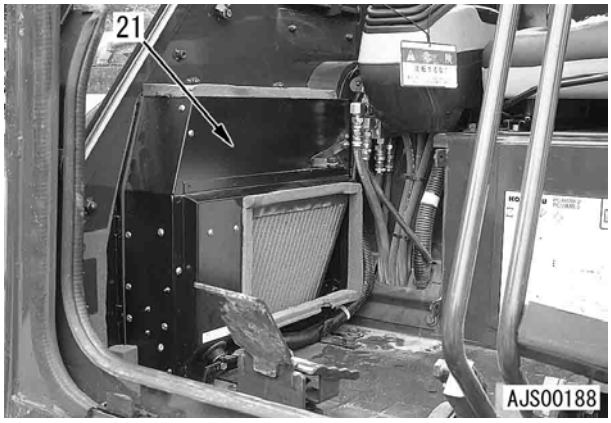
12. Disconnect 2 heater hoses (18) and 2 air conditioner tubes (19). [*2]
    ★ Plug the hoses to prevent dirt from entering them.

13. Remove 4 air conditioner unit assembly mounting bolts (20).



14. Tilt down the floor frame.

15. Pull air conditioner unit assembly (21) toward you and remove it and control panel together.
    ★ After pulling out the air conditioner unit assembly halfway, disconnect connector F11.



Installation

- Carry out installation in the reverse order to removal.

★ When installing, check that the O-ring is fitted to each joint of the air conditioner hoses.
★ Check that each O-ring is free from damage and deterioration.

[*1]
★ Charge the air conditioner circuit with refrigerant (R134a).
★ Refrigerant (R134a): 550 ± 50 g

[*2]
★ Apply compressor oil (ND-OIL8) to the threaded part of each refrigerant pipe and tighten the pipe with double spanner.
  M16 x 1.5 thread of tube:
  11.8 – 14.7 Nm {1.2 – 1.5 kgm}
  M24 x 1.5 thread of tube:
  29.4 – 34.3 Nm {3.0 – 3.5 kgm}

- **Refilling with coolant**
  ★ Add coolant through the coolant filler to the specified level. Run the engine to circulate the coolant through the system. Then, check the coolant level again.

HYDRAULIC EXCAVATOR

PC45MR-3
PC55MR-3

Machine model	Serial number
PC45MR-3	5001 and up
PC55MR-3	15001 and up

90 Diagrams and drawings
200 Electrical diagrams and drawings