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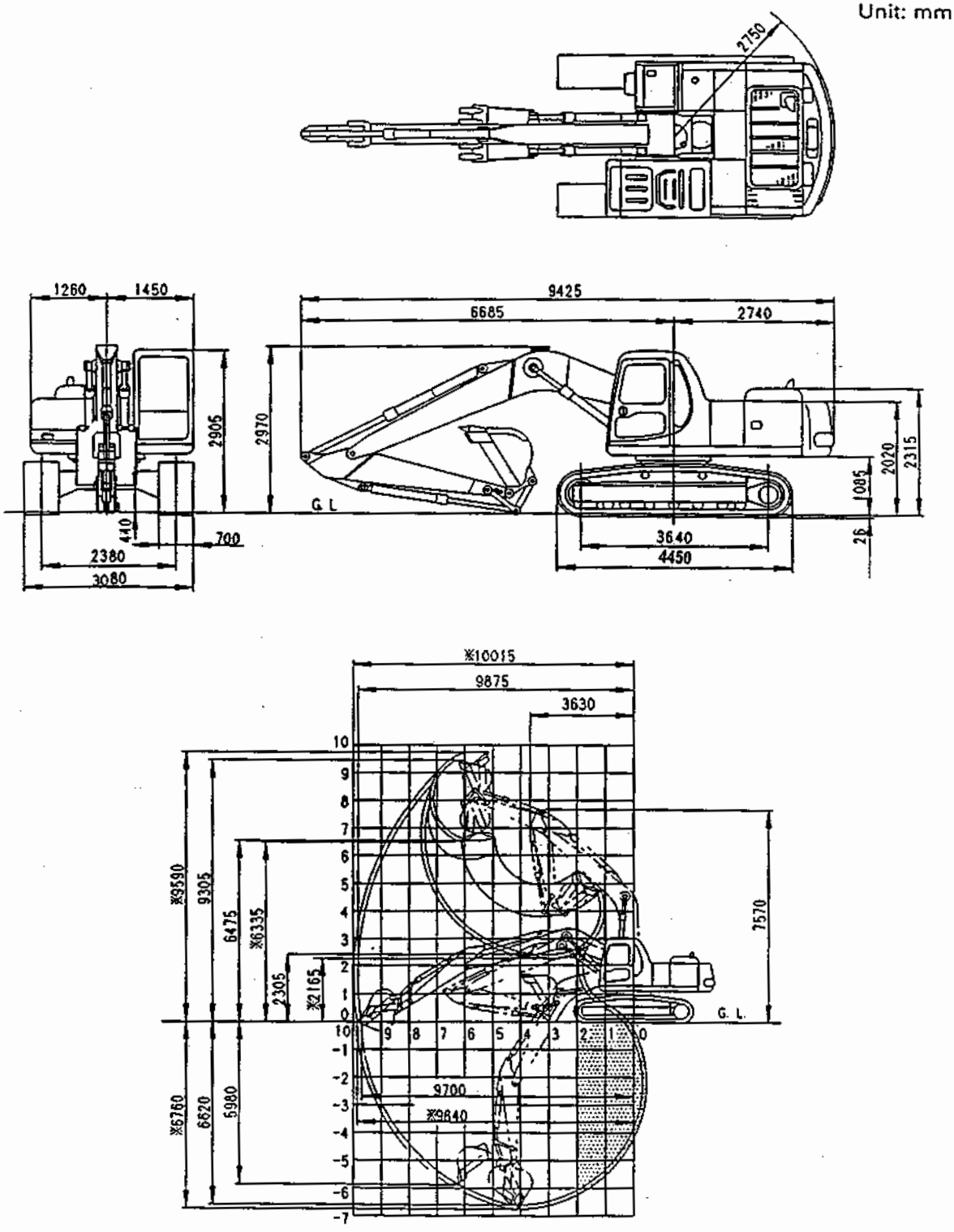
SPECIFICATION DIMENSION DRAWINGS

Unit: mm



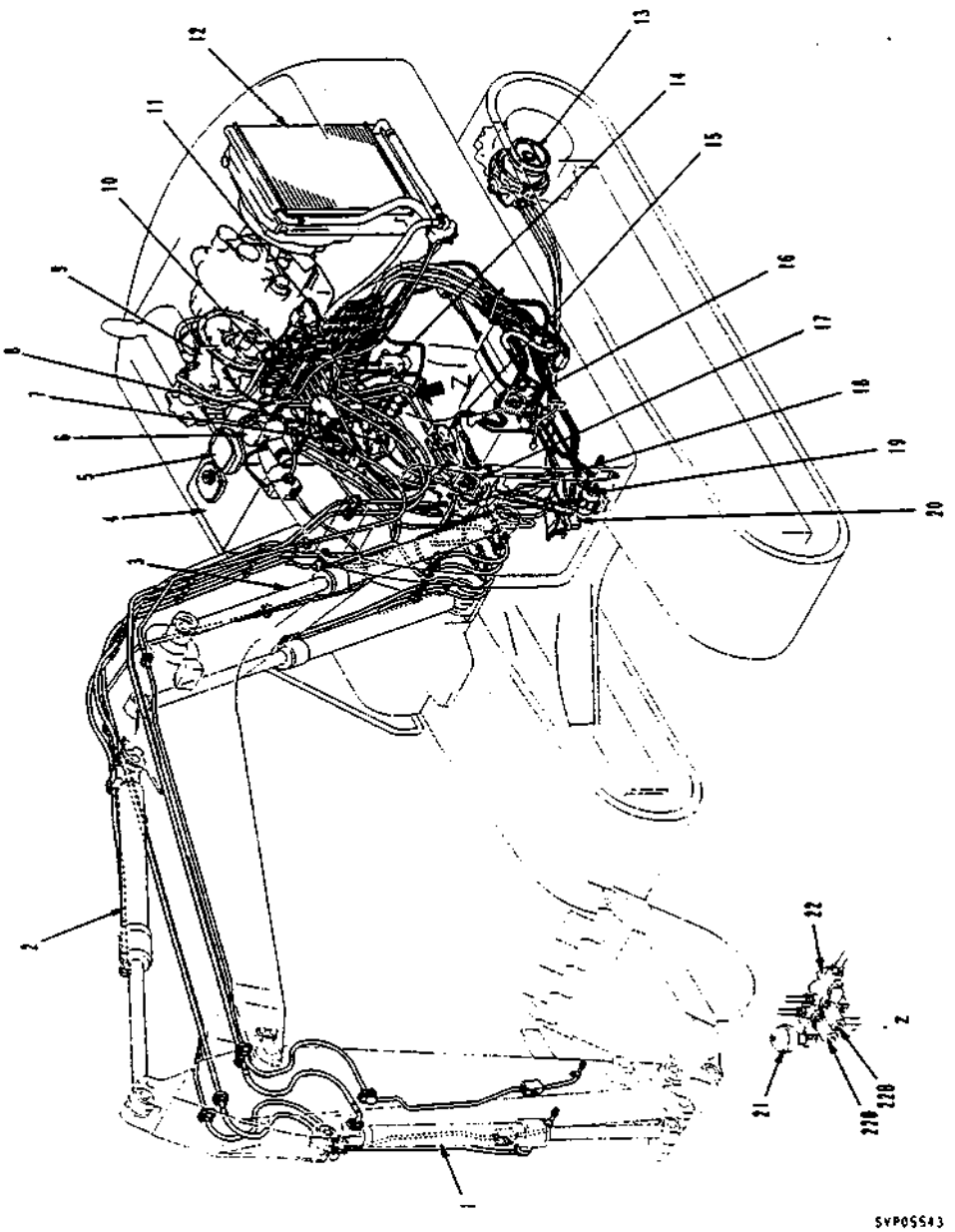
SVP05541

★ The values marked ※ are for shovel operations.

HYDRAULIC PIPING DRAWING

★ For details of this page, see page 90-3.

1. Bucket cylinder
2. Arm cylinder
3. Boom cylinder
4. Hydraulic tank
5. Hydraulic filter
6. Filter (for breaker)
7. Swing motor
8. R.H. travel motor
9. Hydraulic pump
10. Control valve
11. Junction box
12. Oil cooler
13. L.H. travel motor
14. Arm holding valve
15. Boom holding valve
16. L.H. PPC valve
17. R.H. PPC valve
18. Center swivel joint
19. Travel PPC valve
20. Service PPC valve
21. Accumulator
22. EPC solenoid valve
    22A. PPC lock solenoid valve
    22B. Swing brake solenoid valve
    22C. 2 step relief solenoid valve
    22D. Travel speed solenoid valve



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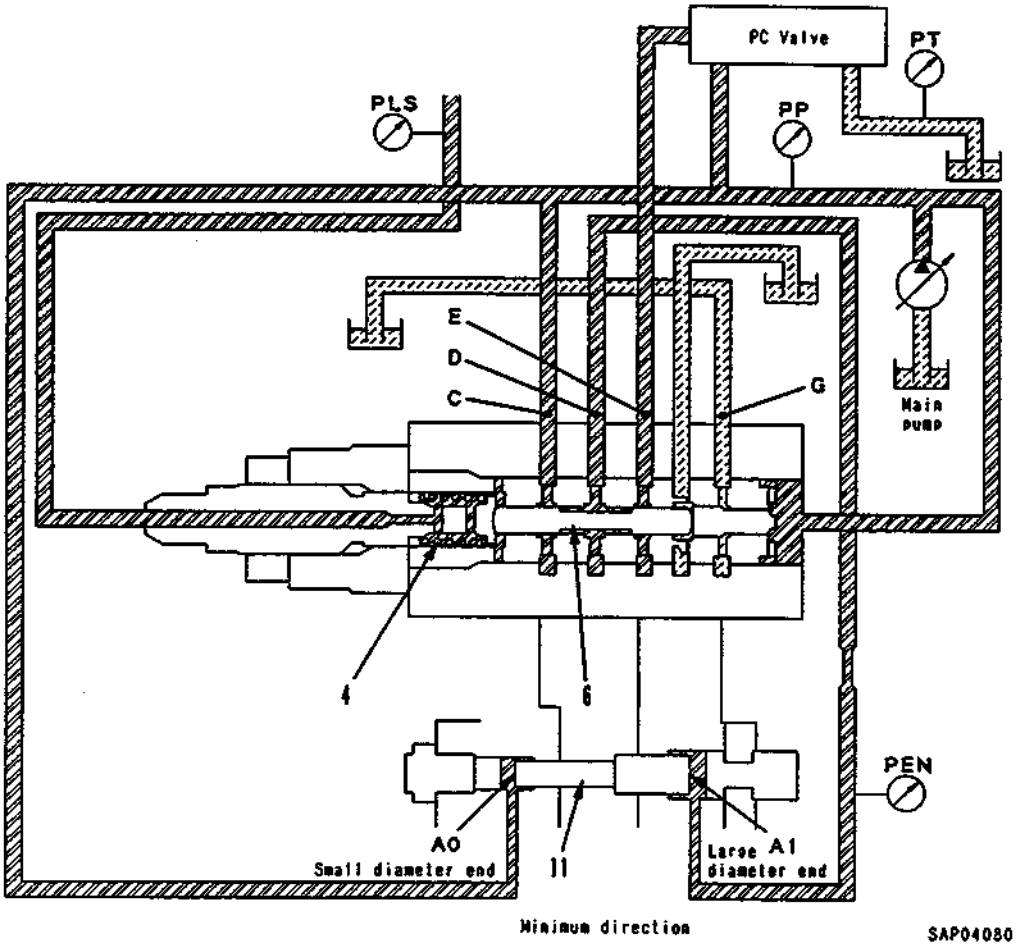
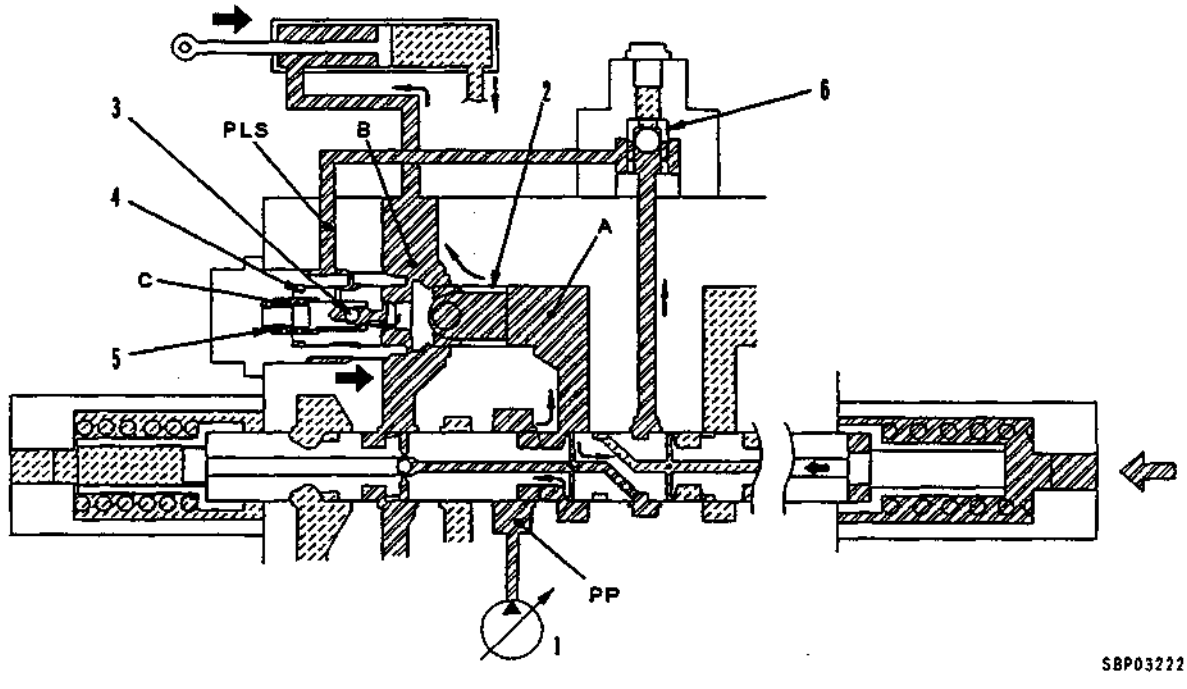


4) When servo piston is balanced

- Let us take the area receiving the pressure at the large diameter end of the piston as **A1**, the area receiving the pressure at the small diameter end as **A0**, and the pressure flowing into the large diameter end of the piston as **Pen**. If the main pump pressure **PP** of the LS valve and the combined force of force **Z** of spring (4) and LS pressure **PLS** are balanced, and the relationship is **A0 × PP = A1 × Pen**, servo piston (11) will stop in that position, and the swash plate will be kept at an intermediate position. (It will stop at a position where the opening of the throttle from port **D** to port **E** and from port **C** to port **D** of spool (6) is approximately the same.)
- At this point, the relationship between the area receiving the pressure at both ends of piston (11) is **A0 : A1 = 1 : 2**, so the pressure applied to both ends of the piston when it is balanced becomes **PP : Pen = 2 : 1**.
- The position where spool (6) is balanced and stopped is the standard center, and the force of spring (4) is adjusted so that it is determined when **PP – PLS = 2.2 MPa** {22.5 kg/cm²}.

4. Pressure compensation valve



1. Main pump
2. Valve
3. Shuttle valve
4. Piston
5. Spring
6. LS shuttle valve

Function

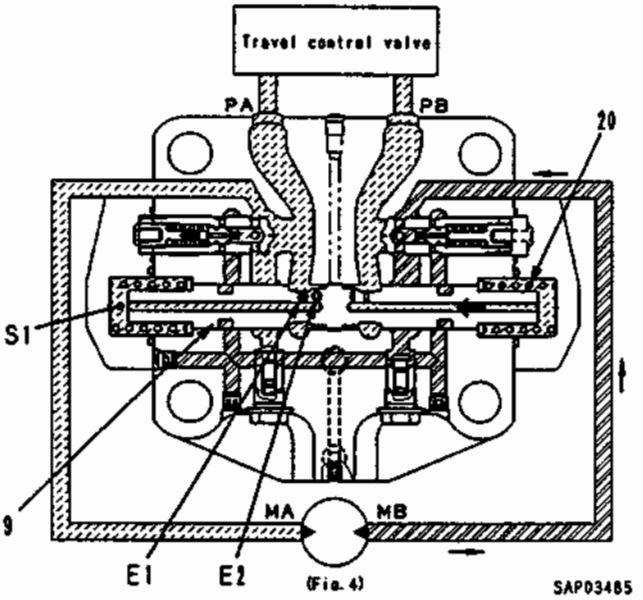
- When the maximum load pressure is generated during compound operations and during independent operations, and the load pressure is higher than other actuators, the pressure compensation valve acts as a load check valve to prevent reverse flow in the circuit.

Operation

- If pump pressure PP and LS pressure PLS are lower than actuator circuit B, shuttle valve (3) inside the pressure compensation valve moves to the left in the direction of the arrow to interconnect spring chamber C.
- When this happens, piston (4) is pushed to the right in the direction of the arrow by spring (5).
- As a results, valve (2) is also pushed to the right in the direction of the arrow by piston (4), so pump outlet circuit A closes. This prevents the oil from flowing back from actuator circuit B to pump outlet circuit A.

Operation of brake when traveling downhill

- If the machine tries to run away when traveling downhill, the motor will turn under no load, so the pressure at the motor inlet port will drop, and the pressure in chamber **S1** through orifices **E1** and **E2** will also drop. When the pressure in chamber **S1** drops below the spool switching pressure, spool (19) is returned to the left in the direction of the arrow by spring (20), and outlet port **MB** is throttled.
  As a result, the pressure at the outlet port side rises, resistance is generated to the rotation of the motor, and this prevents the machine from running away.
  In other words, the spool moves to a position where the pressure at outlet port **MB** balances the pressure at the inlet port and the force generated by the weight of the machine. It throttles the outlet port circuit and controls the travel speed according to the amount of oil discharged from the pump. (Fi.g 4)



(Fig. 4) SAP03485

2) Safety valve

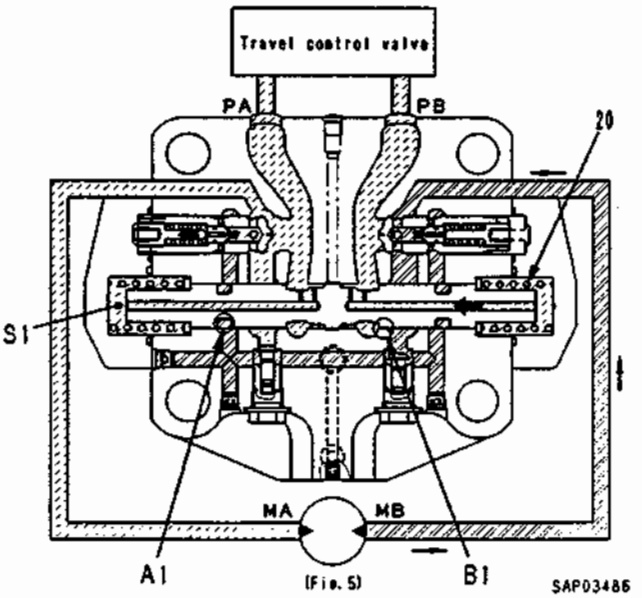
Function

- When travel is stopped (or when traveling downhill), the circuits at the inlet and outlet ports of the motor are closed by the counterbalance valve, but the motor is rotated by inertia, so the pressure at the outlet port of the motor will become abnormally high and damage the motor or piping. The safety valve acts to release this abnormal pressure and send it to the inlet port side of the motor to prevent damage to the equipment.

Operation

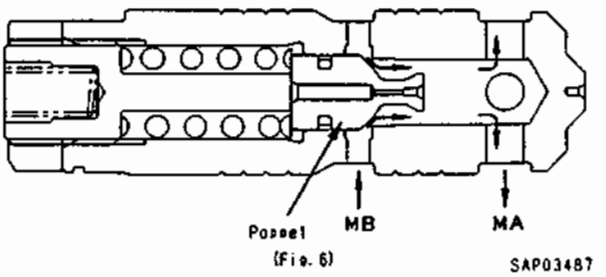
1) When travel is stopped (or when traveling downhill, rotating to right)

- When the motor inlet port pressure (pressure **PA**) goes down, the pressure in chamber **S1** also goes down. When it goes below the switching pressure of the spool, spool (19) is returned to the left by spring (20), and outlet port passage **B1** is throttled. When this happens, the motor continues to rotate under inertia, so the outlet pressure (pressure **MB**) rises. (Fig. 5)



(Fig. 5) SAP03486

- If the pressure goes above the set pressure of suction-safety valve (18A), the poppet opens. The oil then passes through large notch **A1** in counterbalance valve spool (19) and flows to chamber **MA** in the circuit on the opposite side. (Fig. 6)

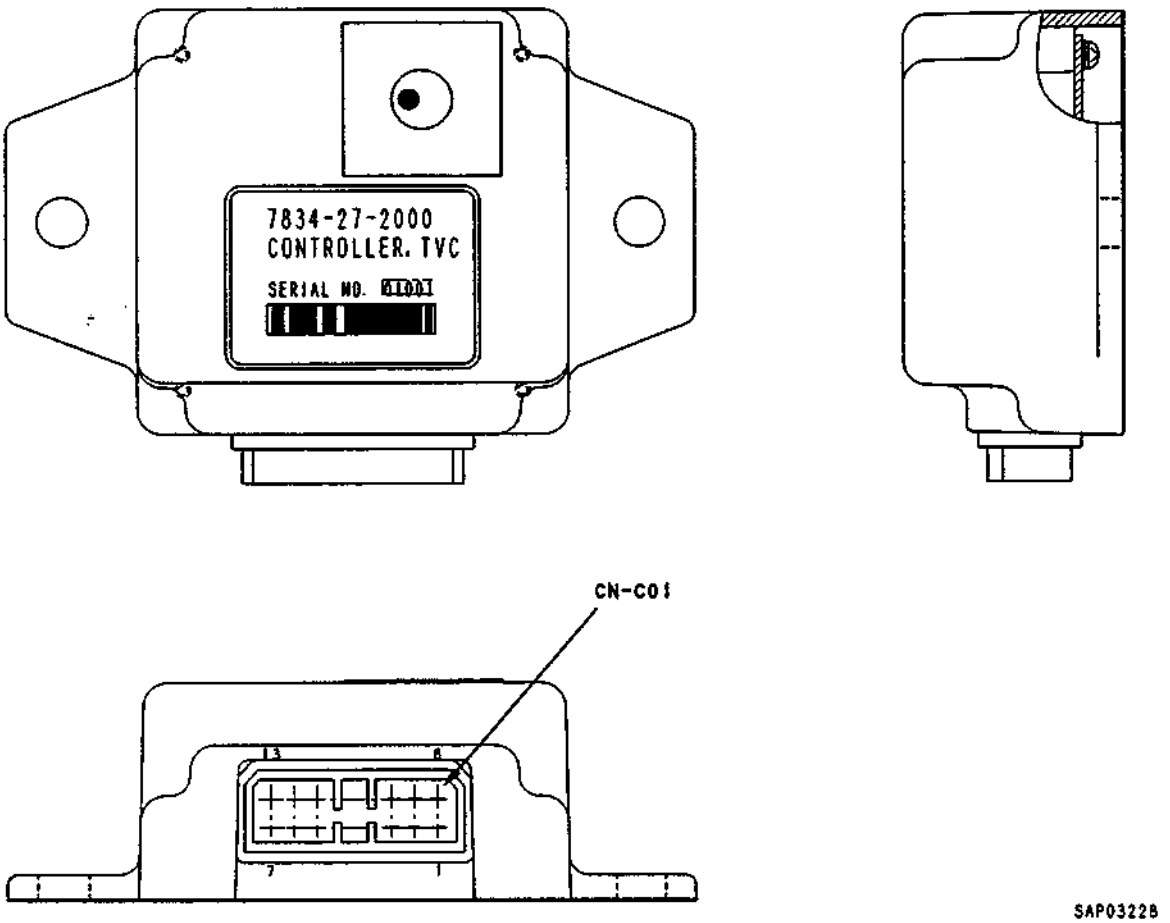


(Fig. 6) SAP03487

2) When rotating to left

The operation is the reverse of when rotating to the right.

Pump controller



SAP03228

Input/output signals

CN-C01

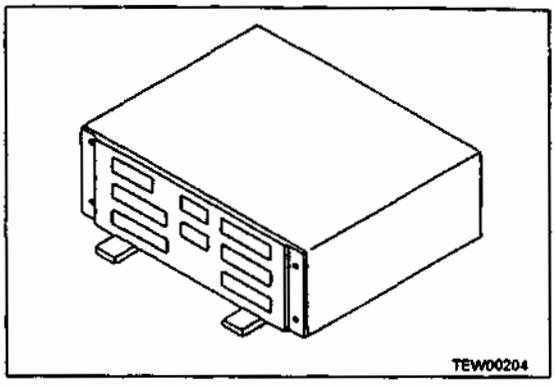
Pin No.	Name of signal	Input/output
1	Power source (24V)	Input
2	NC	—
3	Engine speed sensor	Input
4	Engine speed sensor GND	Input
5	Model selection 1	Input
6	Model selection 2	Input
7	EPC solenoid (+)	Output

Pin No.	Name of signal	Input/output
8	GND	Input
9	NC	—
10	Model selection GND	Input
11	Kerosene mode	Input
12	Prolix resistance	Input
13	EPC solenoid (–)	Output

3) **Handling control box**

① The control box contains a microcomputer and electronic control circuits. These control all of the electronic circuits on the machine, so be extremely careful when handling the control box.

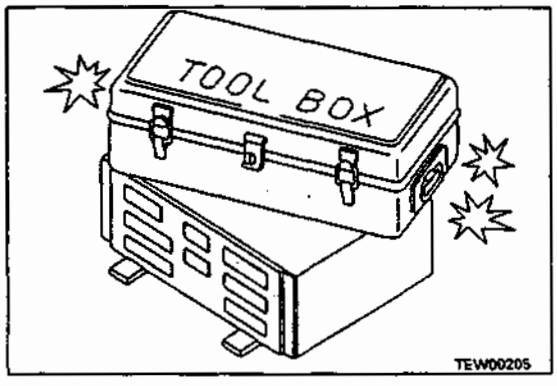
② Do not open the cover of the control box unless necessary.



③ Do not place objects on top of the control box.

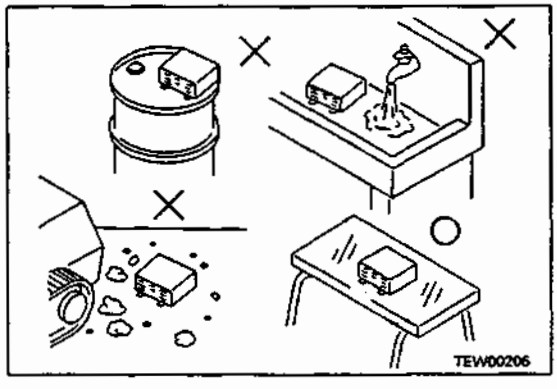
④ Cover the control connectors with tape or a vinyl bag.
Never touch the connector contacts with your hand.

⑤ During rainy weather, do not leave the control box in a place where it is exposed to rain.



⑥ Do not place the control box on oil, water, or soil, or in any hot place, even for a short time.
(Place it on a suitable dry stand).

⑦ Precautions when carrying out arc welding
When carrying out arc welding on the body, disconnect all wiring harness connectors connected to the control box. Fit an arc welding ground close to the welding point.



2. Points to remember when troubleshooting electric circuits

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

E-2 Abnormality in travel speed selector system (travel speed does not switch)

★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on to the next step.
★ Check that fuse 5 is normal.

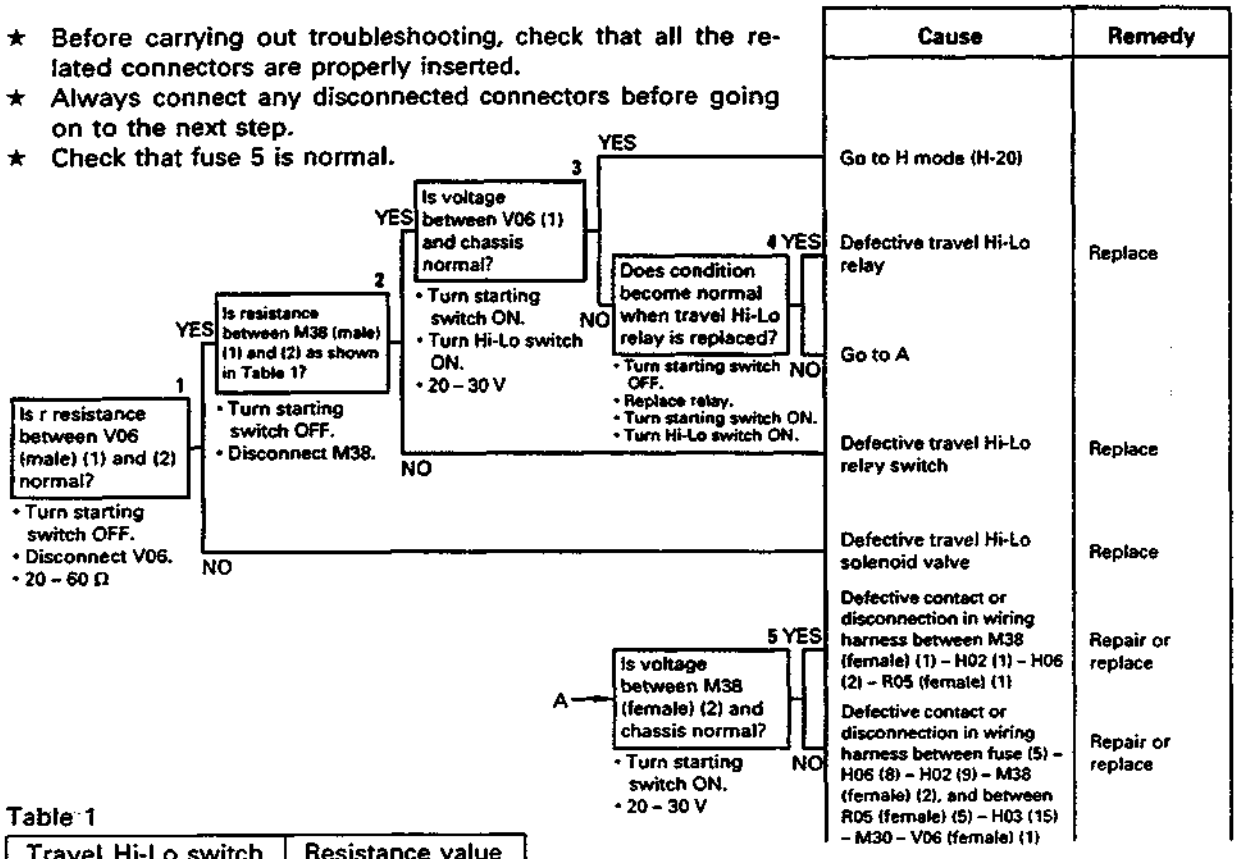
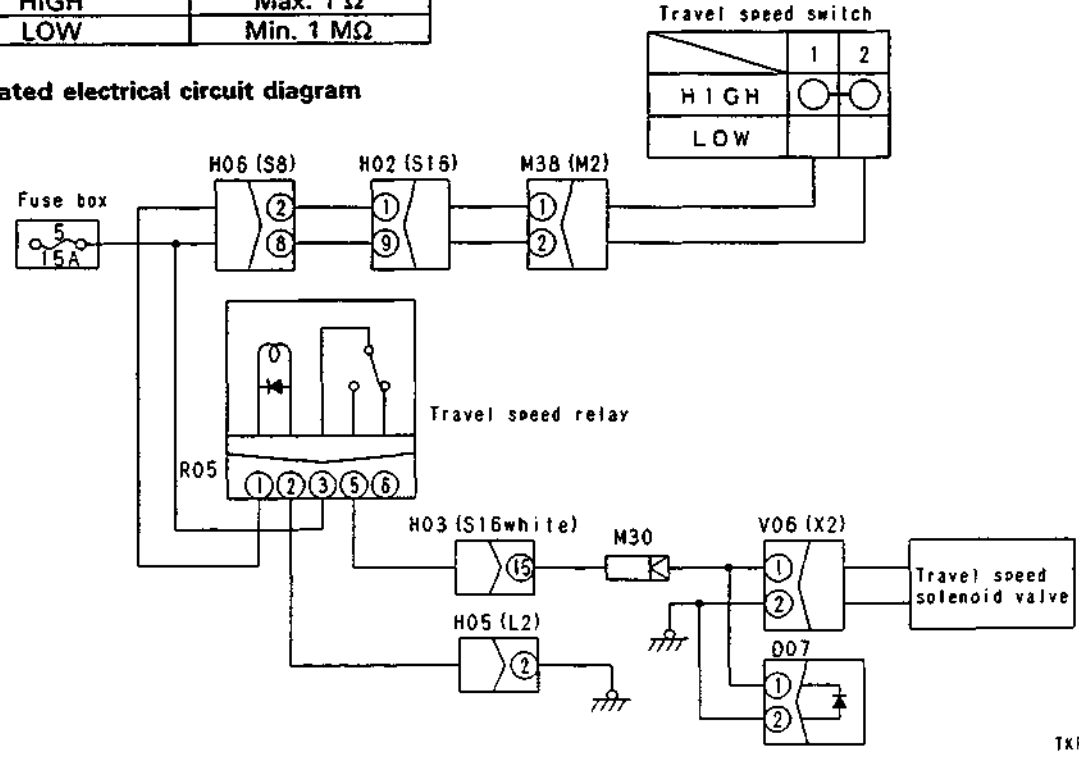


Table 1

Travel Hi-Lo switch	Resistance value
HIGH	Max. 1 Ω
LOW	Min. 1 MΩ

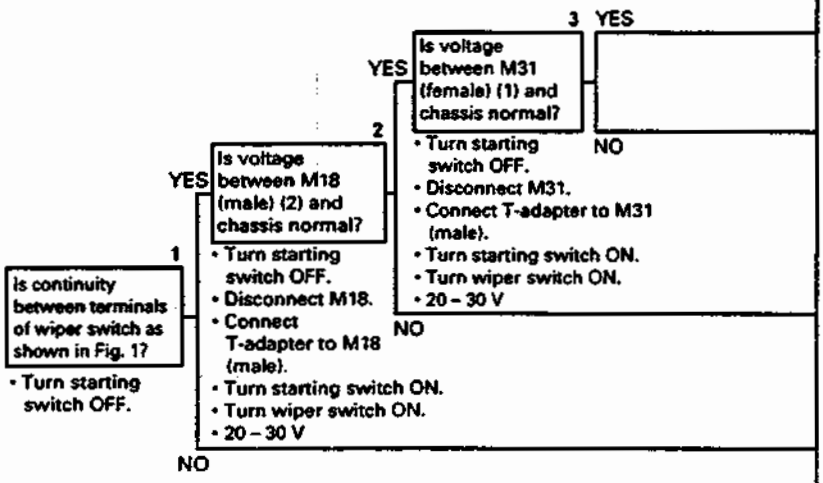
E-2 Related electrical circuit diagram



M-15 Wiper does not move, or does not stop moving

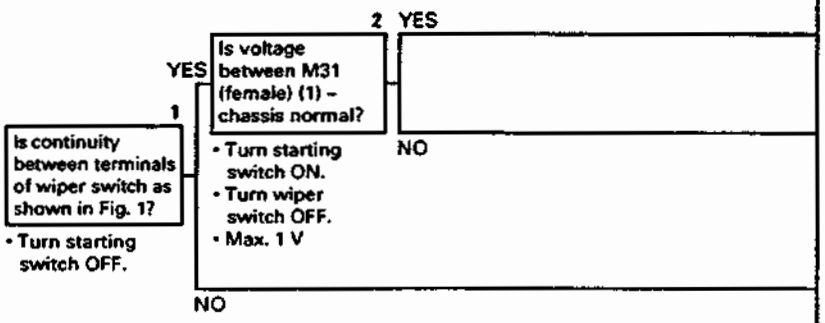
★ Before carrying out troubleshooting, check that all the related connectors are properly inserted.
★ Always connect any disconnected connectors before going on the next step.
★ Check that fuse 3 is normal.

a) Wiper does not move when wiper switch is turned to ON



Cause	Remedy
Defective wiper motor	Replace
Defective contact or disconnection in wiring harness between M18 (female) (2) – H02 (15) – M17 (1) – M31 (female) (1), or short circuit with ground	Repair or replace
Defective contact or disconnection in wiring harness between fuse 3 – H03 (8) – H02 (6) – M18 (1) – wiper switch terminal B, or between wiper switch terminal L and M18 (male) (2), or short circuit with ground	Repair or replace
Defective wiper switch	Replace

b) Wiper moves even when wiper switch is not turned to ON



Cause	Remedy
Defective wiper motor	Replace
Power short in wiring harness between M18 (female) (2) – H02 (15) – M17 (1) – M31 (female) (1)	Repair or replace
Defective wiper switch	Replace

※ 8
Spill tube joint bolt :
8 ± 2 Nm {0.81 ± 0.20 kgm}

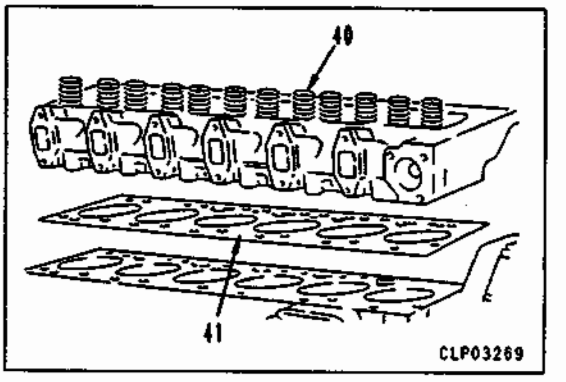
※ 9
Nozzle holder assembly :
60 ± 9 Nm {6.12 ± 0.92 kgm}

※ 10
Head cover mounting bolt :
24 ± 4 Nm {2.45 ± 0.41 kgm}

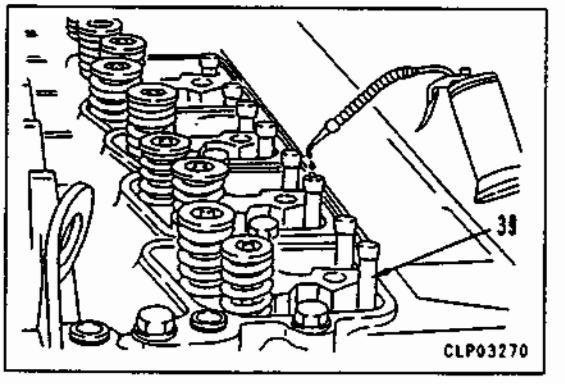
※ 11 ※ 12 ※ 13 ※ 14
- Install the rocker arm assembly and cylinder head assembly as follows.
- ★ Check that there is no dirt or dust on the cylinder mount surface or inside the cylinder.

1) Set cylinder head gasket (41) to cylinder block.
   - ★ Check that the gasket is aligned correctly with the holes in the block.

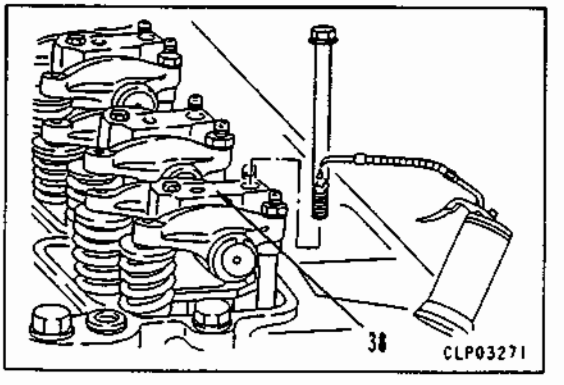
2) Raise cylinder head assembly (40) and set to cylinder block.



3) Assemble push rod (39).
   - Add **engine oil (15W-40)** to the push rod socket portion.

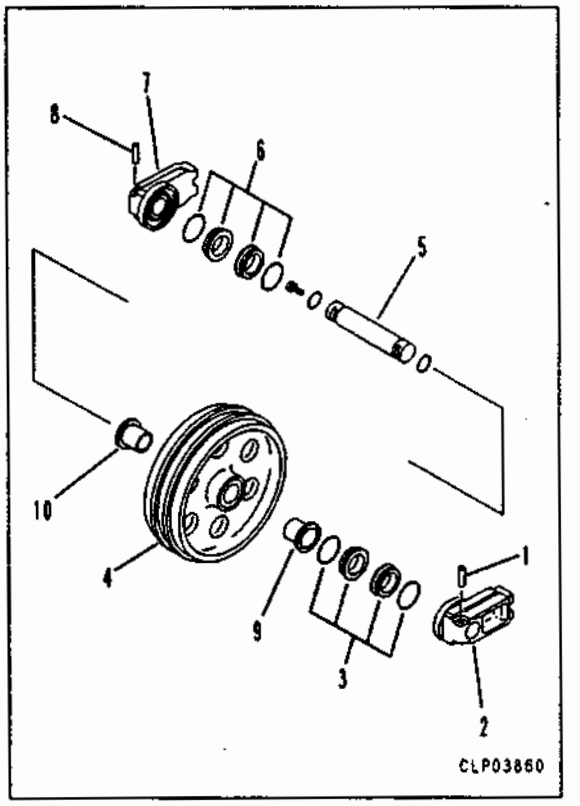


4) Fit rocker arm assembly (38), and tighten mounting bolts by hand.
   - ★ Check that the ball portion of the adjustment screw is fitted securely in the socket portion of the push rod.
   - Put **engine oil (15W-40)** on the seat surface and thread of the 8 mm and 12 mm diameter mounting bolts.

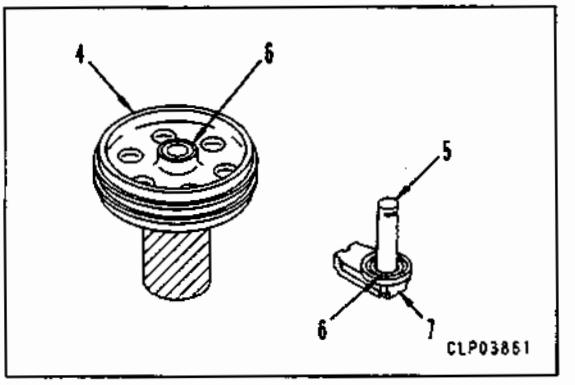


DISASSEMBLY OF IDLER ASSEMBLY

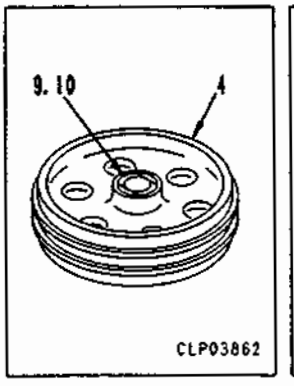
1. Remove dowel pin (1), then remove support (2).
2. Remove floating seal (3) from support (2) and idler (4).
3. Pull out idler (4) from shaft (5) and support (7) assembly.
   ★ It is filled with 80 cc. of oil, so drain the oil at this point or lay a cloth to prevent the area from becoming dirty.

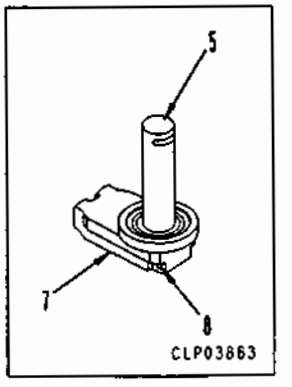


4. Remove floating seal (6) on opposite side from idler (4) and shaft (5) and support (7) assembly.

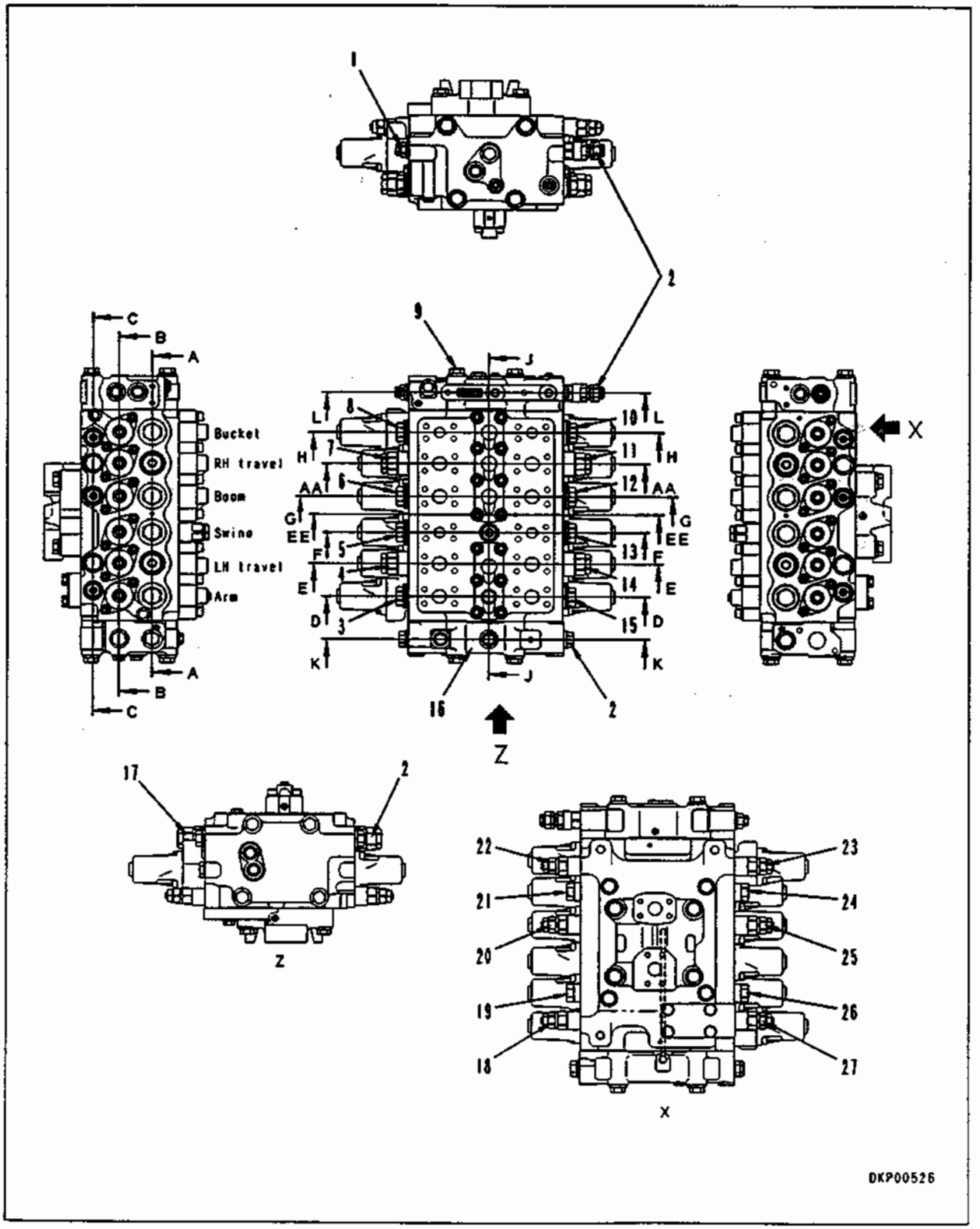


5. Remove dowel pin (8), then remove support (7) from shaft (5).
6. Remove bushings (9) and (10) from idler (4).





ASSEMBLY OF CONTROL VALVE ASSEMBLY (1/3)

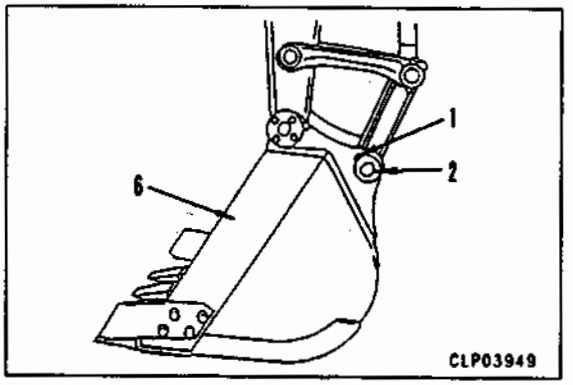


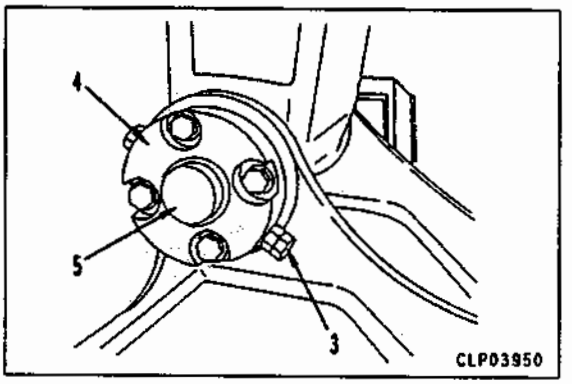
REMOVAL OF BUCKET ASSEMBLY

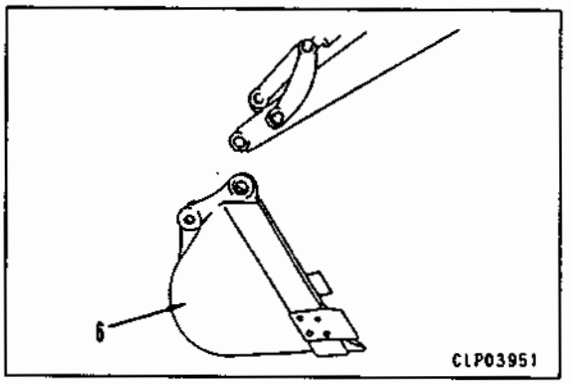
⚠ Set the back of the bucket facing down, lower the work equipment completely to the ground, and set the safety lock lever to the LOCK position.

1. Remove lock bolt (1). ※ 1
2. Remove connecting pin (2) between link and bucket. ※ 2
   ★ There are shims installed, so check the number and thickness, and keep in a safe place.
3. Start engine, and retract piston rod, then tie piston rod with wire to prevent it from coming out.
4. Remove lock bolt (3). ※ 3
5. Remove plate (4), the remove connecting pin (5) between arm and bucket. ※ 4
   ★ There are shims installed, so check the number and thickness, and keep in a safe place.
6. After raising work equipment, swing to disconnect bucket assembly (6).

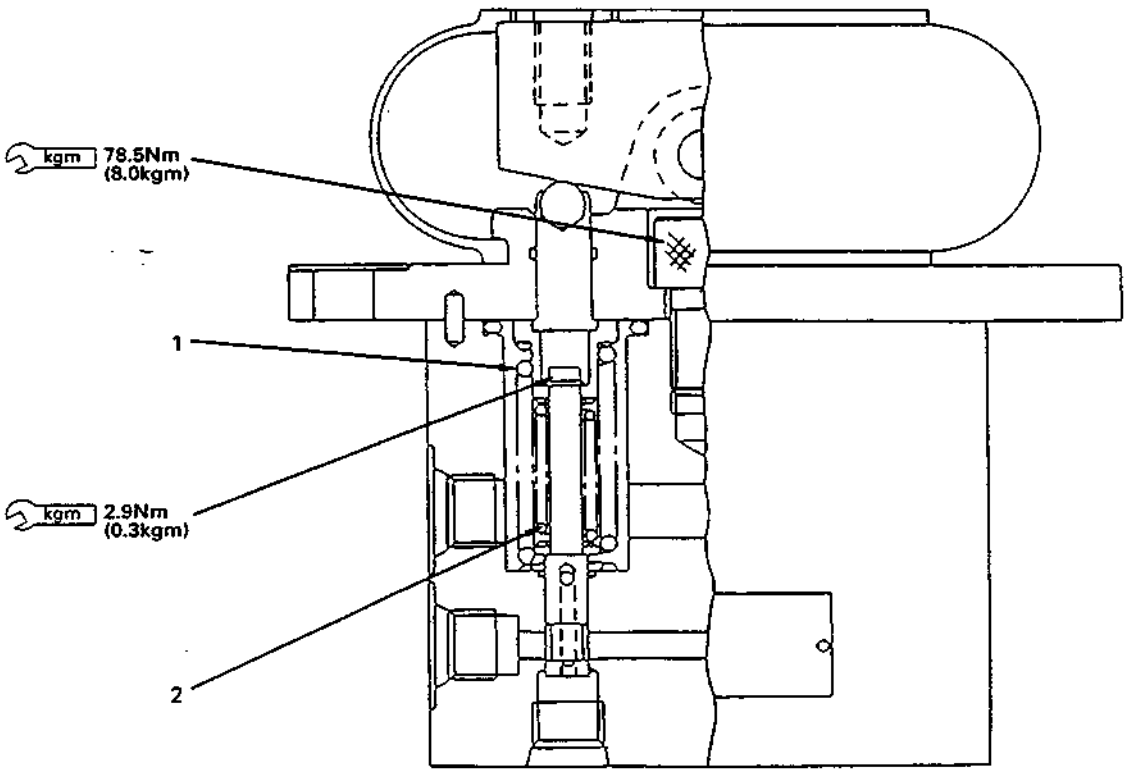
   kg Bucket assembly : 650 kg







SERVICE PPC VALVE



Unit: mm

No.	Check item	Criteria					Remedy
		Standard size			Repair limit		
1	Centering spring	Free length × O .D.	Installed length	Installed load	Free length	Installed load	Replace spring if any damages or deformations are found.
		64.8 × 16.6	40.5	46.1 N (4.7 kg)	(62.9)	44.1 N (4.5 kg)	
2	Metering spring	26.0 × 10.5	25.0	25.5 N (2.6 kg)	(25.2)	24.5 N (2.5 kg)	