

GROUP 3 PUMP DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

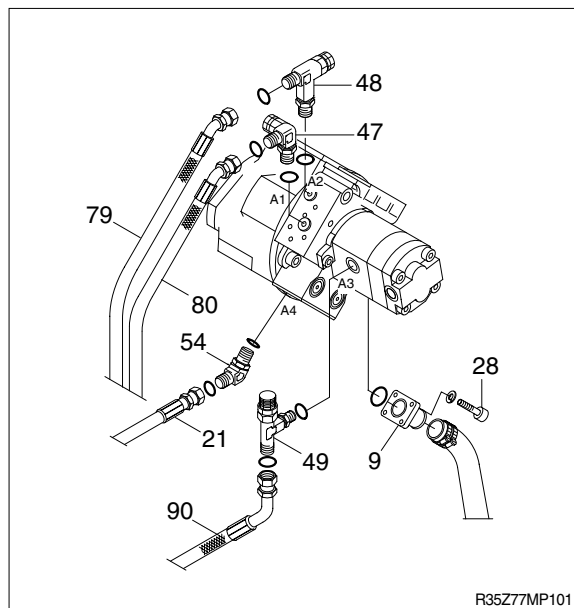
- (4) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.

· Hydraulic tank quantity : 37 l
(9.8U.S.gal)

- (5) Disconnect hoses(79, 80) and remove connectors(47, 48).
- (6) Disconnect pilot line hoses(21, 90) and remove connectors(49, 54).
- (7) Remove socket bolts(28) and disconnect pump suction tube(9).

※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

- (8) Sling the pump assembly and remove the pump mounting bolts.
 - Weight : 25kg(55lb)
- ※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.

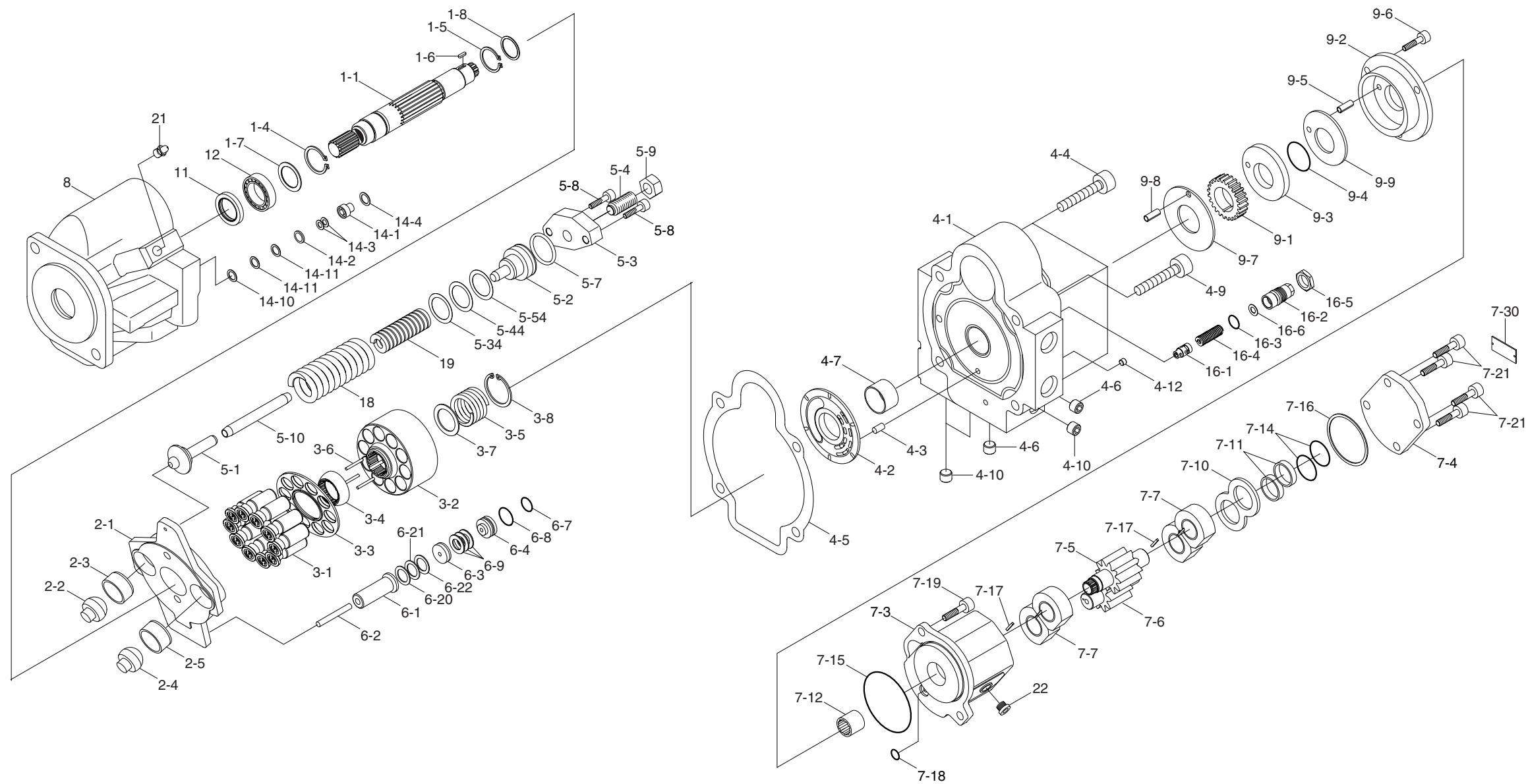


2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Remove the suction strainer and clean it.
- (3) Replace return filter with new one.
- (4) Remove breather and clean it.
- (5) After adding oil to the hydraulic tank to the specified level.
- (6) Bleed the air from the hydraulic pump.
 - ① Remove the air vent plug(1EA).
 - ② Tighten plug lightly.
 - ③ Start the engine, run at low idling, and check oil come out from plug.
 - ④ Tighten plug.
- (7) Start the engine, run at low idling(3~5 minutes) to circulate the oil through the system.
- (8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. MAIN PUMP

1) STRUCTURE



1 Shaft assy	3 Rotary group	4-4 Socket head screw	5-8 Socket head screw	6-9 Coned disc spring	7-14 O-ring	14-2 Distance piece	9-7 Thrust plate
1-1 Shaft	3-1 Piston assy	4-5 Packing	5-9 Hex nut	6-20 Shim	7-15 O-ring	14-3 Coned disc spring	9-8 Spring pin
1-4 Ring	3-2 Cylinder block	4-6 Plug	5-10 Guide	6-21 Shim	7-16 Square ring	14-4 Retaining ring	9-9 Plate
1-5 Ring retaining	3-3 Retainer	4-7 Bearing	5-34 Shim	6-22 Shim	7-17 Square ring	14-5 Shim	16 Relief valve assy
1-6 Key	3-4 Guide	4-9 Socket head screw	5-44 Shim	7 Gear pump	7-18 O-ring	14-6 Shim	16-1 Spool
1-7 Shim	3-5 Spring	4-10 plug	5-54 Shim	7-3 Housing	7-19 Bolt	14-7 Shim	16-2 Adjust screw
1-8 Shim	3-6 Pressure pin	4-12 Orifice	6 Control piston assy	7-4 Cover	7-21 Socket head screw	9 Trochoid pump assy	16-3 O-ring
2 Swash plate assy	3-7 Spring seat	5 Spring seat assy	6-1 Sleeve	7-5 Gear	7-30 Name plate	9-1 Gear	16-4 Spring
2-1 Swash plate	3-8 Retaining ring	5-1 Spring seat	6-2 Parallel pin	7-6 Gear	8 Housing assy	9-2 Case	16-5 Nut
2-2 Suction side guide	4 Port plate assy	5-2 Spring seat	6-3 Distance piece	7-7 Thrust plate assy	11 Oil seal	9-3 Thrust plate	16-6 Spring seat
2-3 Suction side bushing	4-1 Port plate	5-3 Cover	6-4 Piston	7-10 Plate	12 Bearing	9-4 O-ring	18 Spring
2-4 Delivery side guide	4-2 Control plate	5-4 Adjusting screw	6-7 O-ring	7-11 Guide	14 Stopper assy	9-5 Spring pin	19 Spring
2-5 Delivery side bushing	4-3 Parallel pin	5-7 O-ring	6-8 O-ring	7-12 Coupling	14-1 Guide	9-6 Socket head screw	21 Air vent valve
							22 Plug

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2) NECESSARY TOOLS AND JIGS

The following tools and jigs are necessary to disassemble and reassemble the pump.

(1) Tools

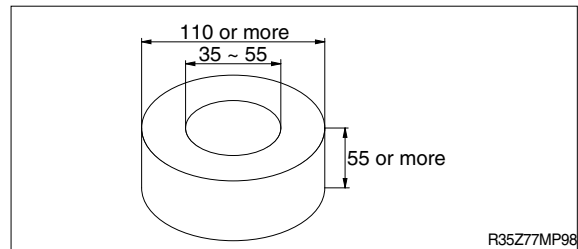
Name	Quantity	Size (nominal)
Hexagon socket screw key	One each	4, 6, 8, 10
Spanner	One each	14, 24
Plastic hammer	1	Medium size
Pliers for retaining ring	1	For hole (retaining ring for 22)
Pliers for retaining ring	1	For shaft (retaining ring for 20)
Torque wrench	-	Wrench which can tighten at the specified torque
Grease	Small amount	-
Adhesives	Small amount	Loctite (high tack sealant #98)

(2) Jigs

① Disassemble table

This is a plate to stand the pump facing downward.

A square block may be used instead of the shaft and does not contact.



② Jigs for disassemble the port plate

Jigs are necessary to protect the shaft, when disassembly and assembly the port plate.

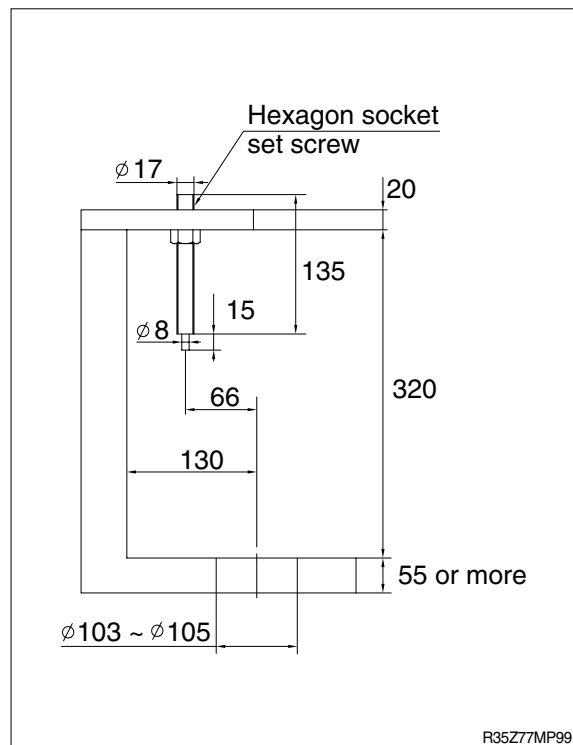
Disassembly

When hexagon socket head cap screws (4 pieces of size M12) are removed, the jig is necessary to prevent the port plate from lifting up diagonally due to the control spring.

Assembly

The jig is necessary to install the port plate parallel to the housing mounting surface.

The structure of the jig is shown as right. It can hold the port plate by means of applying the machined edge* of the hexagon socket set screw (M16×150) to the adjusting screw.



- ※ When the hex socket set screw is used, apply the machining work on the edge to shape it in size the dia of 8mm from the top edge to 15mm position.

3) CAUTIONS DURING DISASSEMBLING AND ASSEMBLING

(1) Cautions for disassembling

- ① Never attempt operating the adjusting screw unless absolutely necessary.
- ② Take utmost care during disassembly not to knock or drop each part.

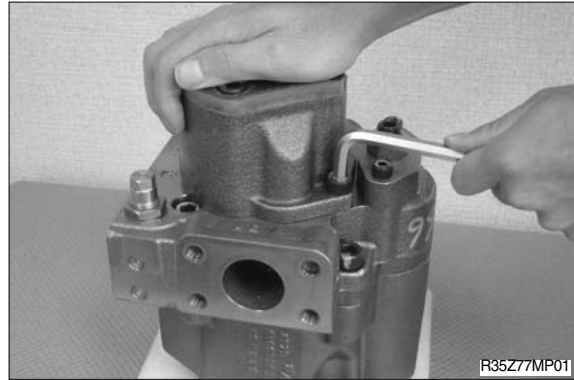
(2) Cautions for assembling

- ① Wash each part thoroughly.
- ② During assembling, take utmost care not to damage the part or allow foreign materials to enter.
- ③ As a rule, the O-ring and oil seal should not be reused.
- ④ In our assembly work, the torque wrench is used to control the torque.
Be sure to use torque wrench.

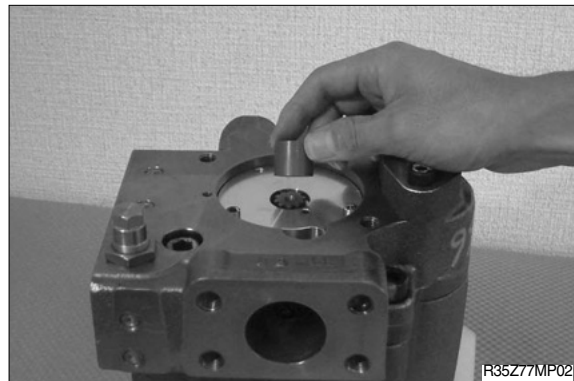
3. DISASSEMBLING PROCEDURE

1) DISASSEMBLING THE GEAR PUMP

- (1) Remove the hexagon socket head cap screw. (M10×25, 2 pieces)
Hexagon socket screw key (8 mm)
※ Be careful because the O-ring (at 2 pieces) are provided to the housing.

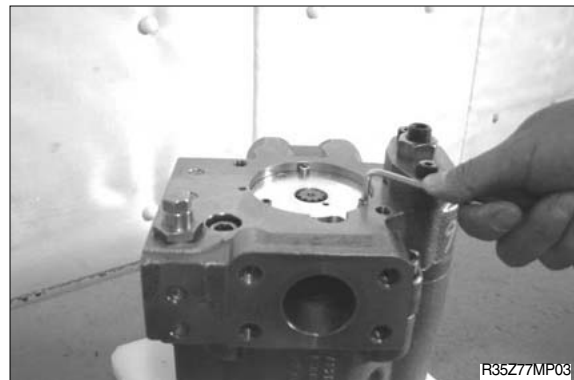


- (2) Remove the coupling.



2) DISASSEMBLING THE TROCHOID PUMP

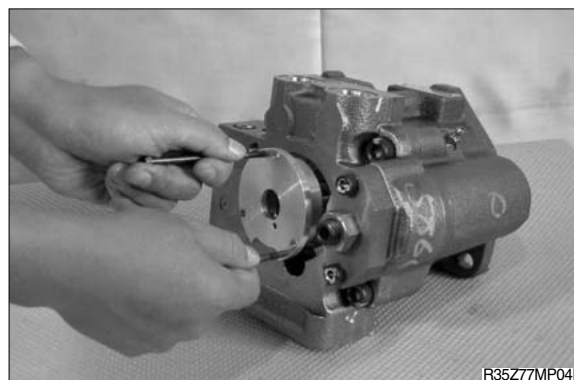
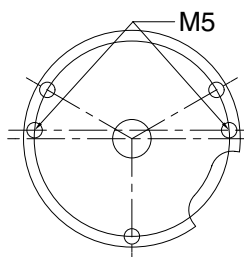
- (1) Remove the hexagon socket head cap screw. (M5×12, 3 pieces)
Hexagon socket screw key (4 mm)



- (2) Remove the case, the side plate (A), and the gear.

Use the hexagon socket head cap screws.

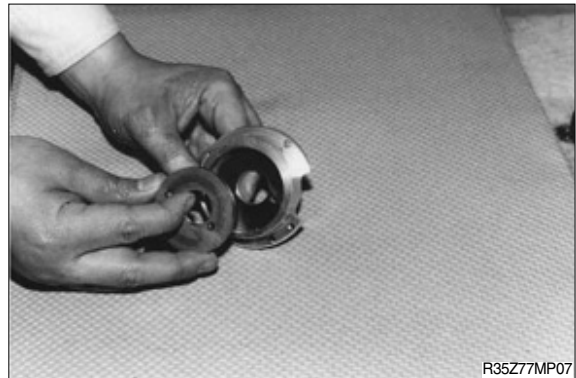
For example : M5×90, 2 pieces



(3) Remove the gear from the case.



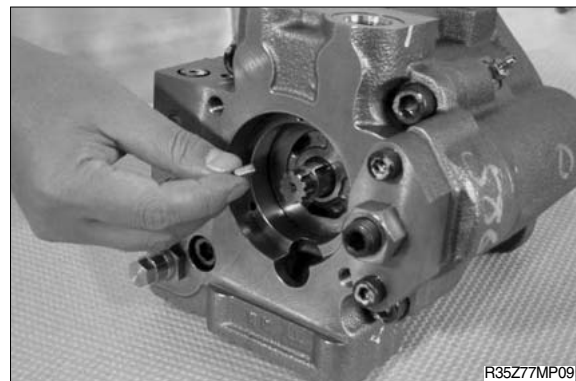
(4) Remove the side plate (A) from the case.



(5) Remove the side plate (B) from the port plate.

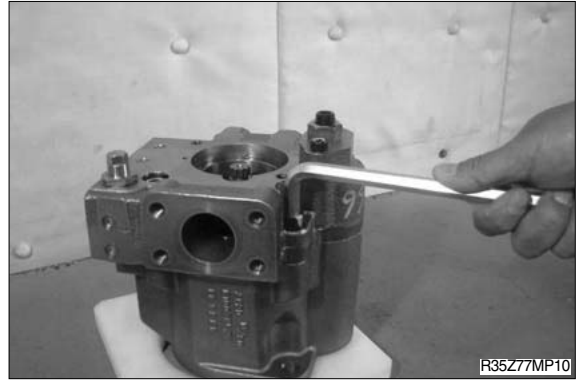
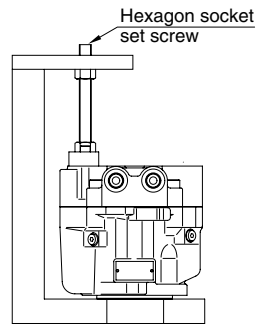


(6) Remove the key of the shaft.

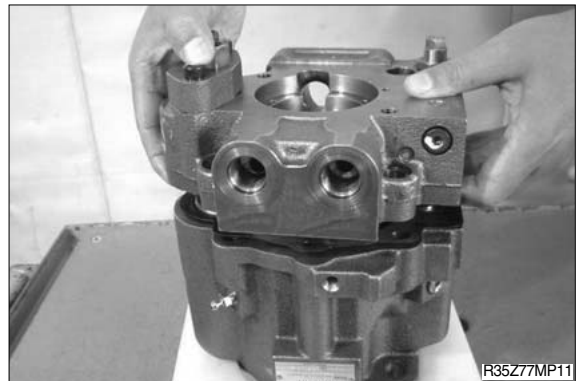
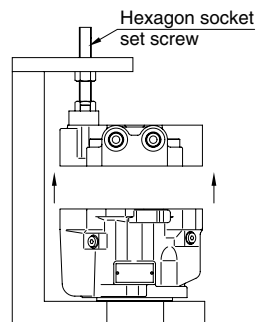


3) DISASSEMBLING THE MAIN PUMP

- (1) Remove the port plate since the force of the control spring is strong, remove the hexagon socket head cap screws holding the port plate by means of the jigs.
(M12 × 40, 3 pieces), (M12 × 55, 1 piece)
Hexagon socket screw key (10 mm)



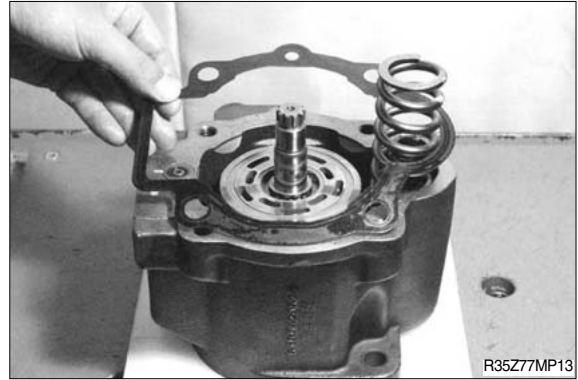
- (2) Remove the cover.
Use the jig to hold the port in a horizontal condition, and loosen the hexagon socket set screw of the jig slowly, to remove the port plate.
※ Be careful because the control plate is provided to the backside.



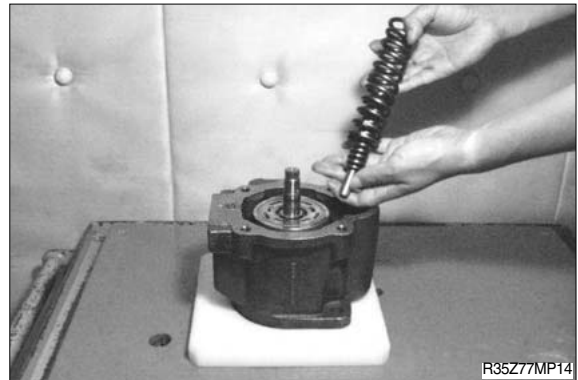
- (3) This photo shows the state with the port plate removed.



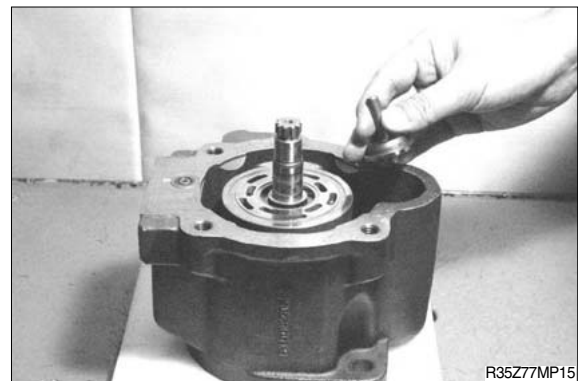
(4) Remove the packing.



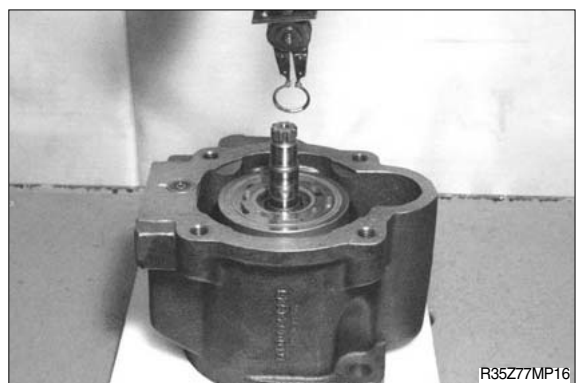
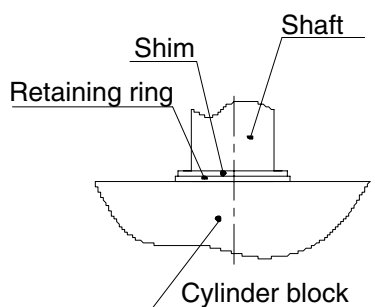
(5) Remove the control spring and the spring seat.
Remove the two springs (inner and outer), and the guide.



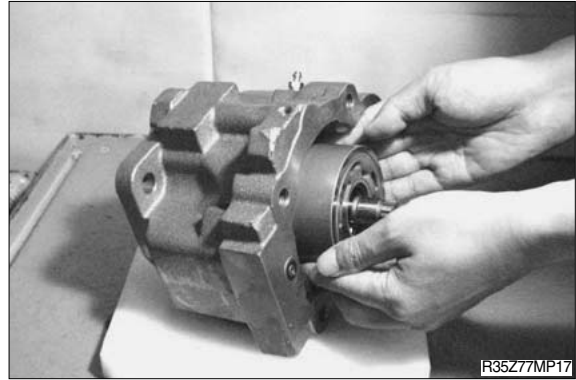
(6) Remove the spring seat.



(7) Remove the rotary group.
Remove the shim and the retaining ring.
(For shafts ; 20)
Pliers for retaining rings.
(For shafts ; Retaining ring for 20)

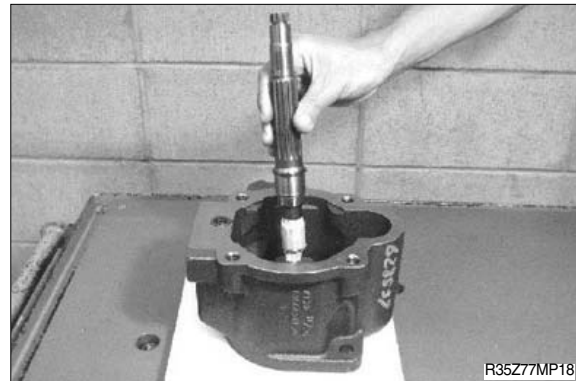


- (8) Push down sideways the pump. And takes out the rotary group from the shaft.



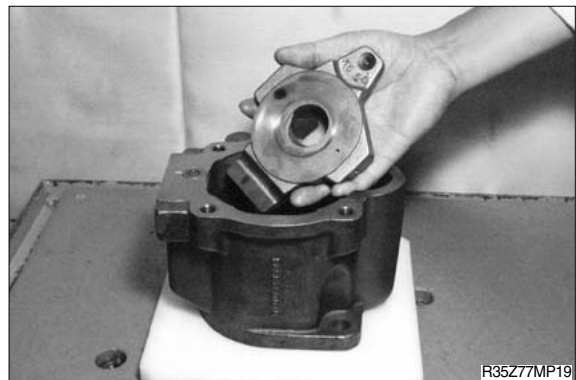
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- (9) Remove the shaft.
The protective taping around the spline part, and pull out straight the shaft, taking care not to damage the oil seal.



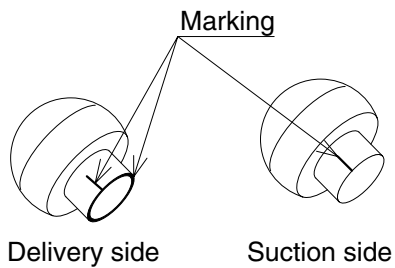
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- (10) Remove the swash plate assembly.
Remove the swash plate.



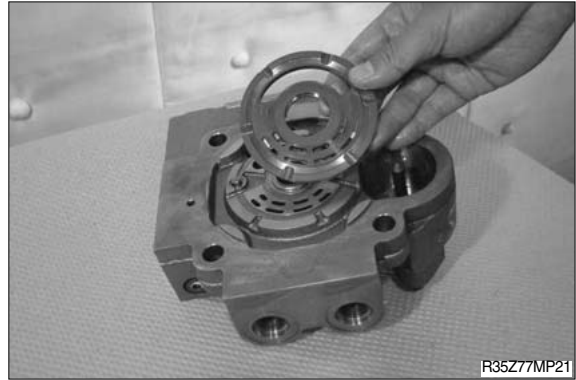
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- (11) Remove the guide.
※ Put the mark on the guides, to know the correct direction, and between right and left side.



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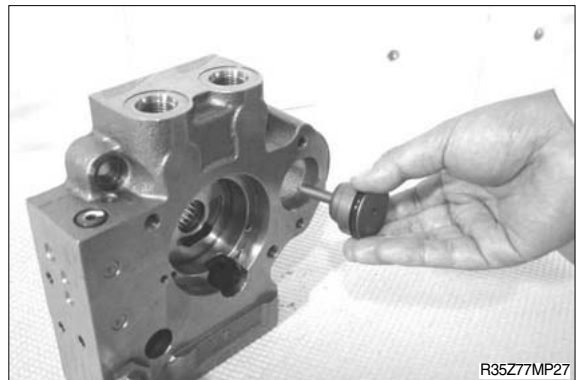
- (12) Disassemble the port plate assembly.
Remove the control plate.



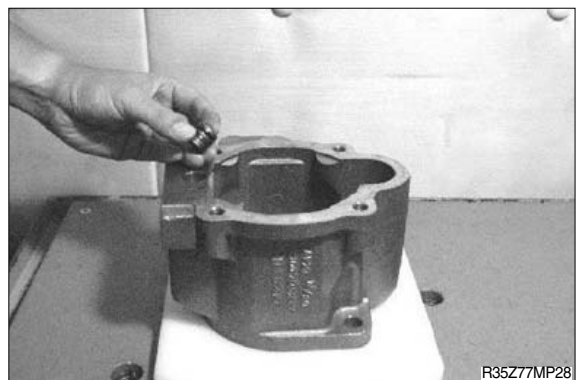
- (13) Remove the hexagon socket head cap screws (M8 × 30, 2 pieces), in order to remove the cover of the spring seat assembly.
Hexagon socket screw key (6mm)



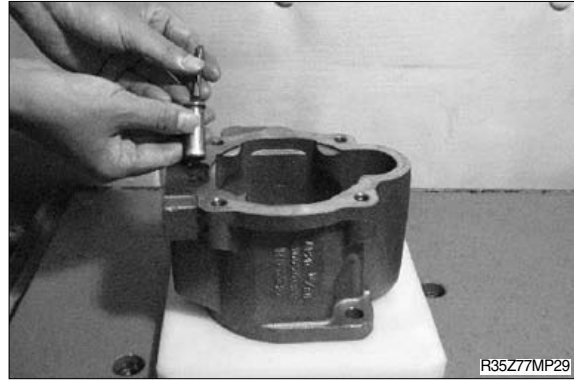
- (14) Remove the spring seat.



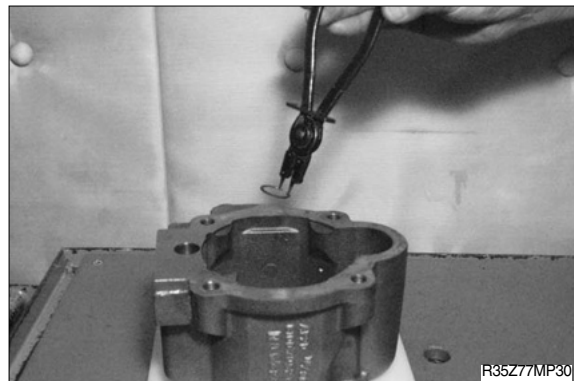
- (15) Disassemble the control piston assembly.
Remove the piston, the coned disk springs, the distance piece and the shim.



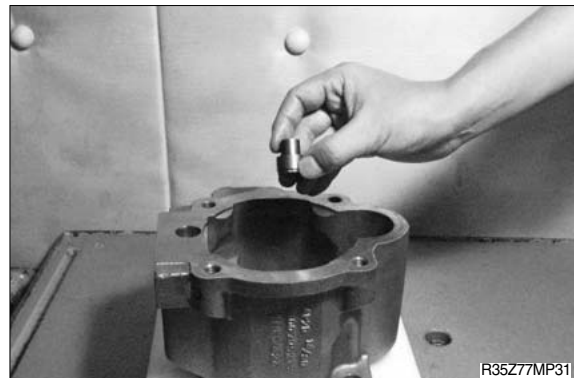
(16) Remove the parallel pin and the sleeve.



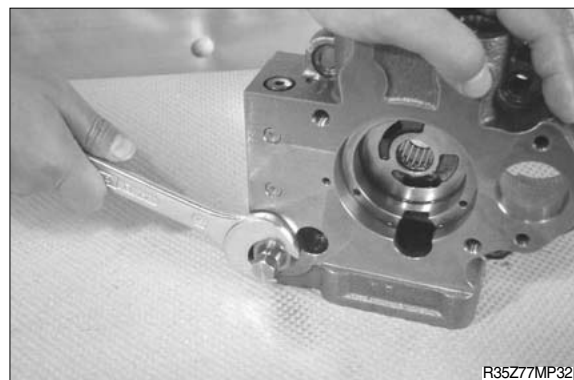
(17) Remove the minimum flow stopper.
Remove the retaining ring. (For holes; 22)
Pliers for retaining rings.
(For holes ; retaining ring for 22)



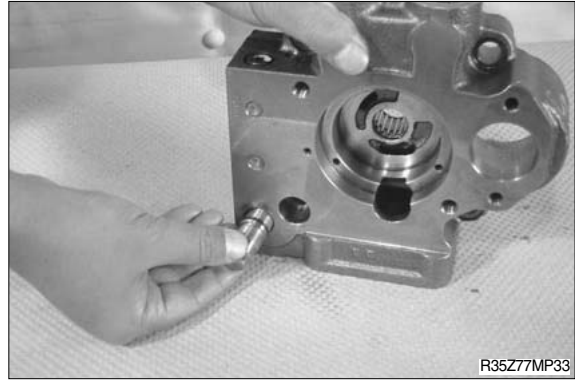
(18) Remove the guide, the coned disk springs, the distance piece, and shim.



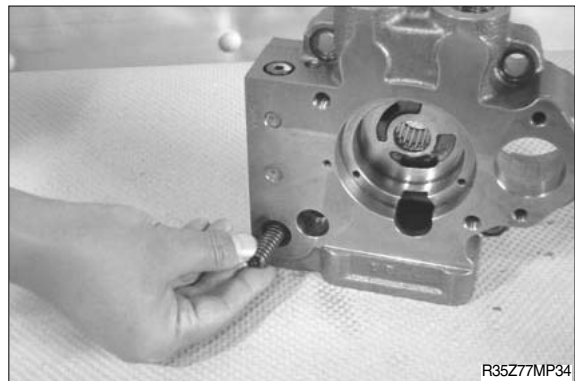
(19) Remove the relief valve.
Remove the hexagon nut.
Spanner (24 mm)
※ Since the pressure has set, you may remove this assembly, only when necessary.



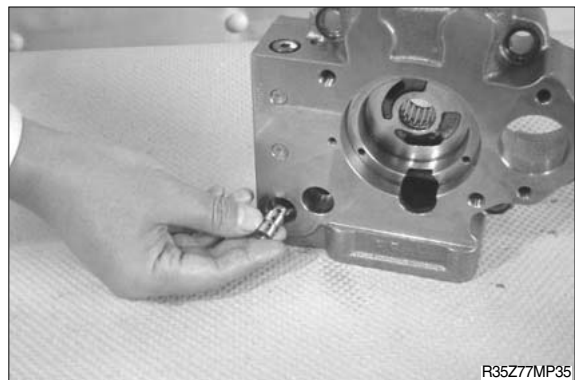
- (20) Remove the adjustment screw.
Spanner (14 mm)
※ Be careful because the shim is inserted.



- (21) Remove the spring.



- (22) Remove the spool.



4) DISASSEMBLING THE GEAR PUMP (GSP2)

- (1) Remove the hexagon socket head cap screws.
(M10 × 20, 4 pieces)
Hexagon socket screw key (8mm)



(2) Remove the cover.



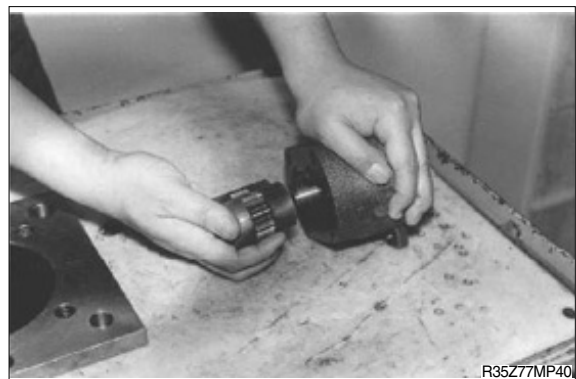
(3) Remove the square ring.



(4) Remove the plate, the guides, and the O-rings.



(5) Remove the drive gear, the idle gear, and the side plates.



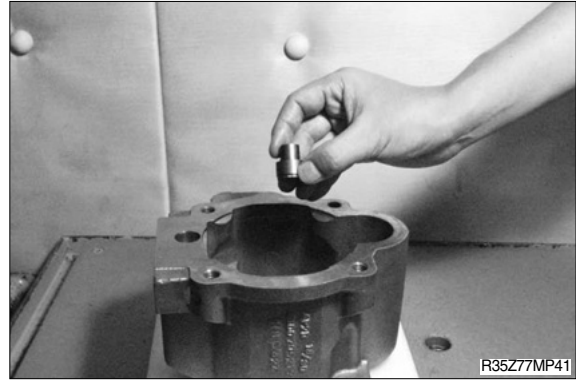
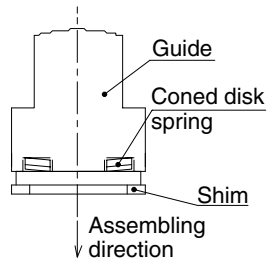
5. ASSEMBLING PROCEDURE

1) ASSEMBLE THE MAIN PUMP

- (1) Assemble the minimum flow stopper.

Install the guide, the coned disk springs, the distance piece, and the shim into the housing.

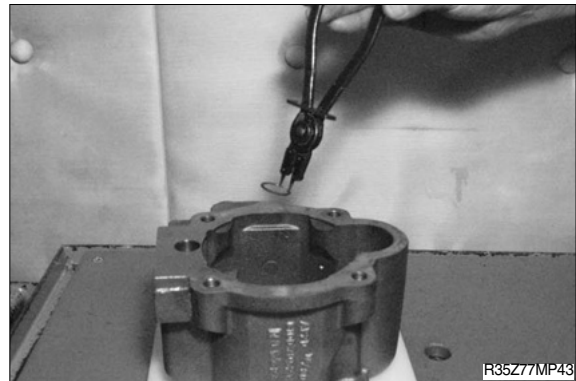
* Pay attention to the direction of the coned disk spring.



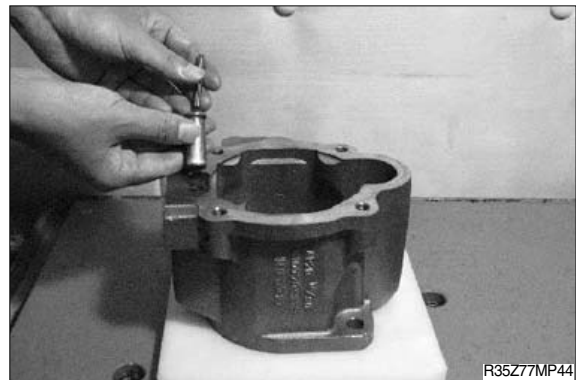
- (2) Install the retaining ring. (For holes; 22)

Pliers for retaining rings.

(For holes; retaining ring for 22)

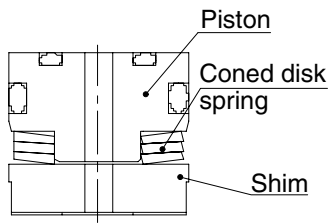


- (3) Install the parallel pin and the sleeve into the housing.

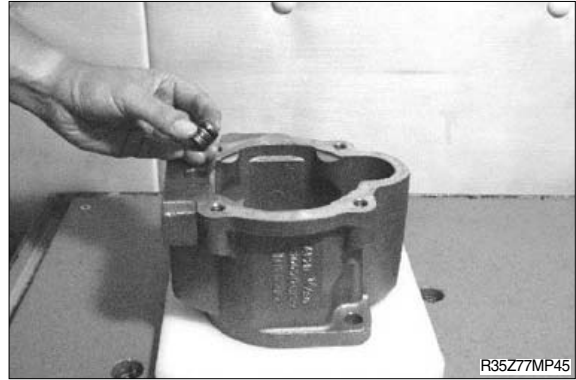


(4) Install the piston, the coned disk springs, the distance piece, and the shim into the housing.

※ Pay attention to the direction of the coned disk springs.

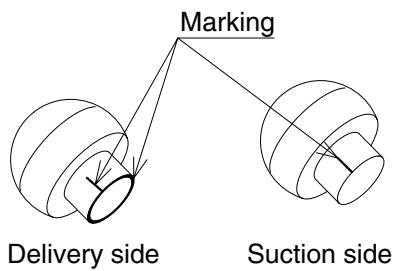


↓
Assembling
direction

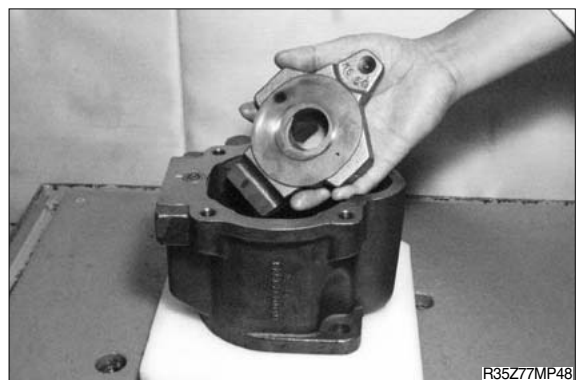


(5) Assemble the swash plate.
Install the guides into the housing.

※ Assemble the guides into the housing, taking care on the marking, which was put on during disassembling work.



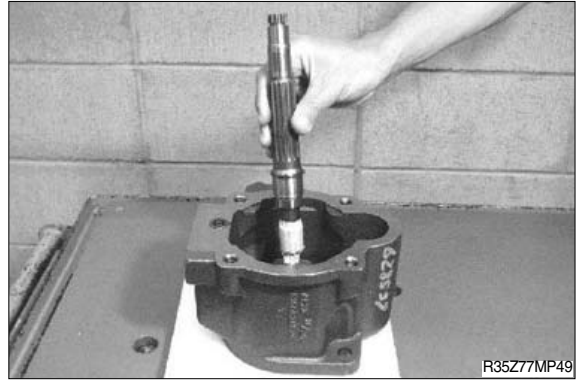
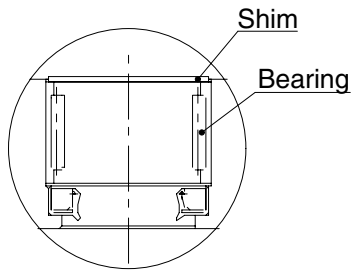
(6) Install the swash plate.



(7) Assemble the shaft.

The protective taping around the spline part, and install the shaft vertically, taking care not to damage the oil seal.

- ※ Confirm that the shim is installed above the bearing.



(8) Assemble the rotary group.

Install the pistons (10 pistons) into the retainer.

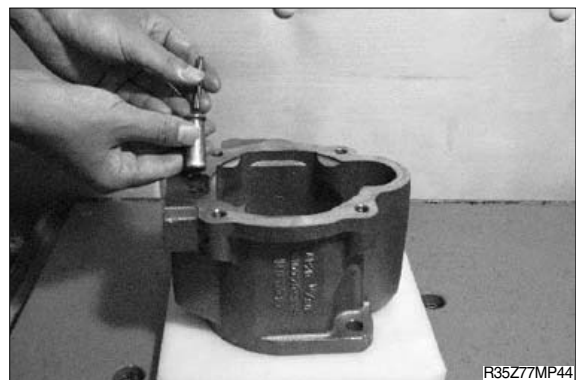


(9) Apply the grease to the spherical portion of the guide.

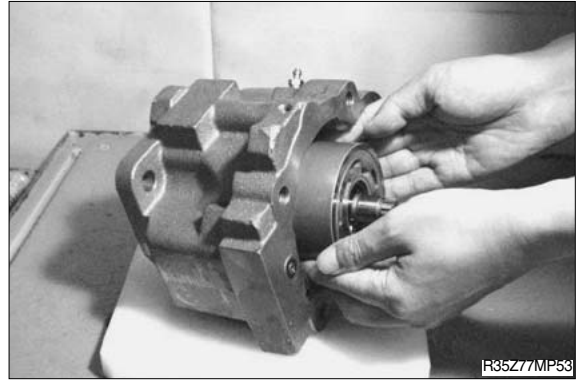


(10) Insert the guide between the retainer and the cylinder block and assemble the piston into the hole of the cylinder block.

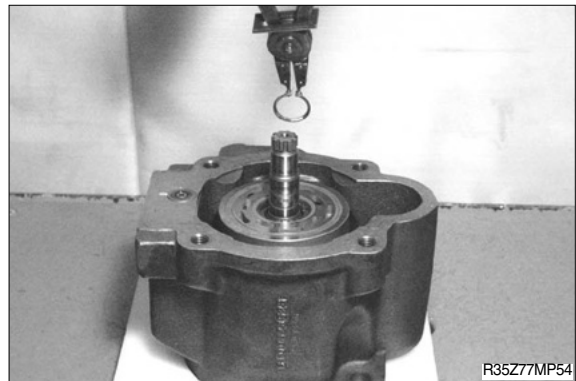
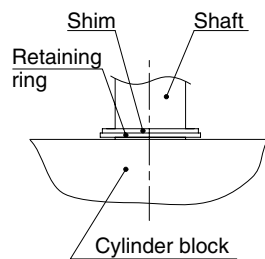
- ※ Apply grease to the end of the shoes.



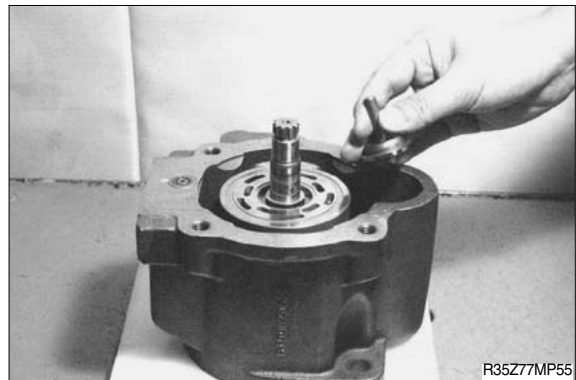
- (11) Install the rotary group.
Assemble the rotary group along the shaft spline.



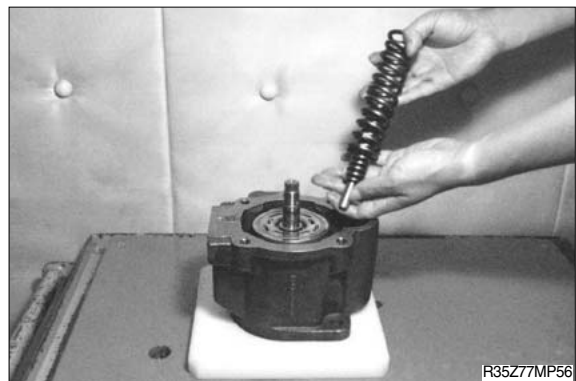
- (12) Install the retaining ring (For shafts; 20),
and install the shim.
Pliers for retaining rings.
(For shafts; retaining ring for 20)



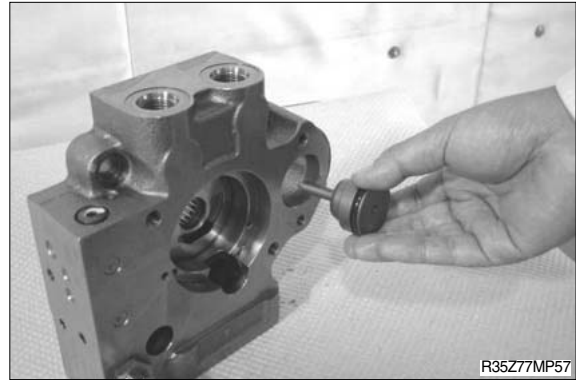
- (13) Assemble the control spring.
Apply grease to the spherical portion of
the spring seat before assembling.



- (14) Assemble the two springs (inner and
outer) and the guide.

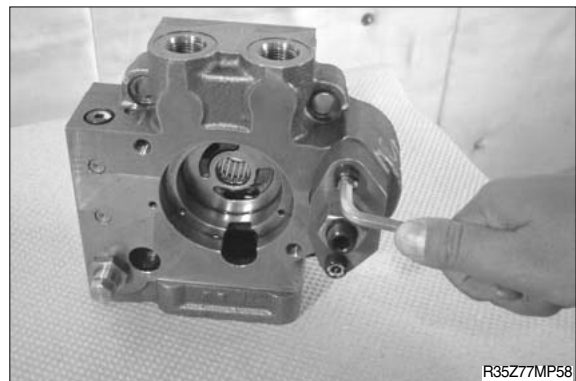


- (15) Assemble the port plate.
Assemble the spring seat into the port plate.

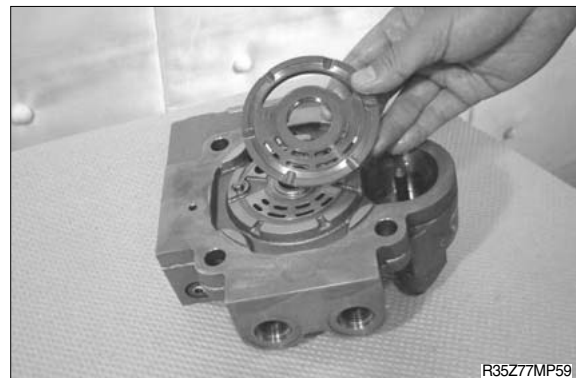


- (16) Assemble the cover of the spring seat assembly, and fix it with hexagon socket head cap screws. (M8 × 30, 2 pieces)
Hexagon socket screw key (6 mm)

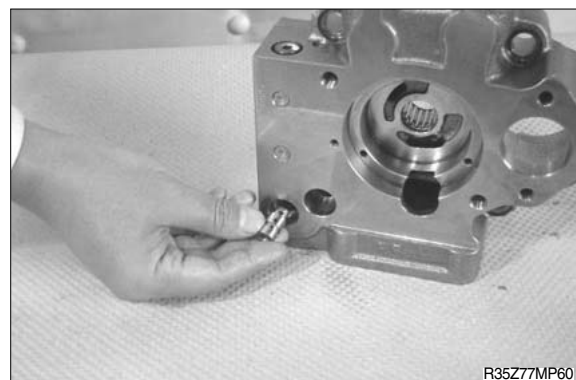
- Tightening torque : 3.6 kgf · m
(21~26 lbf · ft)



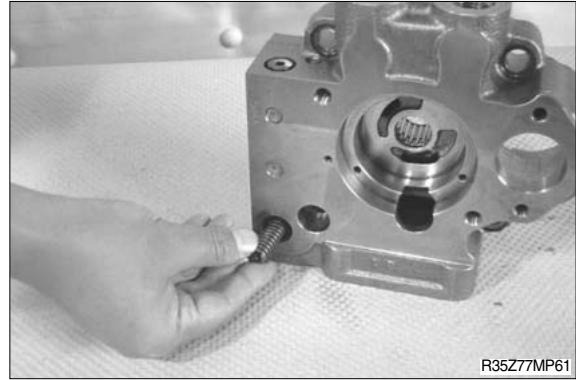
- (17) Apply grease to the backside of the control plate (to prevent dislodgement), and assembly it to the port plate while matching the knock hole.



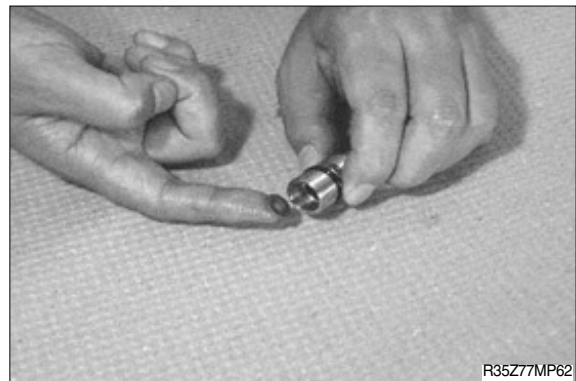
- (18) Assemble the relief valve.
Install the spool into the port plate.



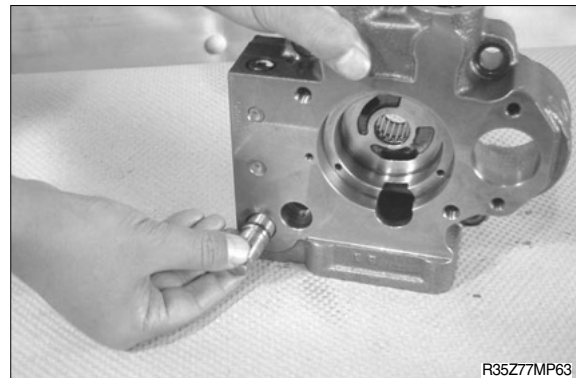
(19) Assemble the spring.



(20) Install the shim into the adjustment screw.



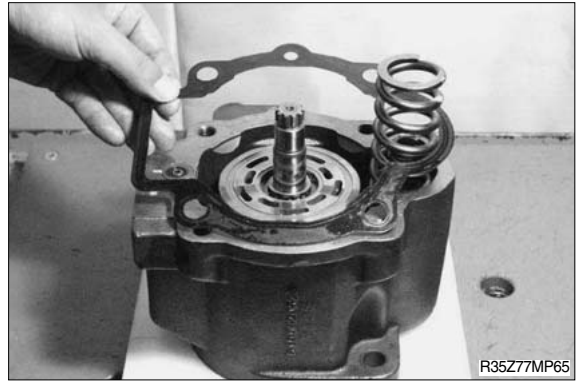
(21) Assemble the adjustment screw.
Spanner (14 mm)



(22) Tighten the hexagon nut.
※ After assembling, set the pressure and tighten the nut.
Spanner (24 mm)
· Tightening torque : 1.0 kgf · m
(7.2 lbf · ft)

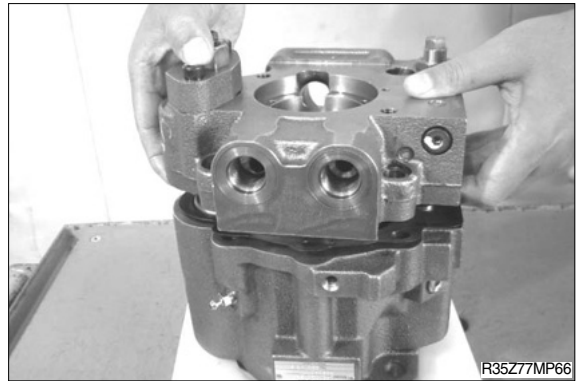
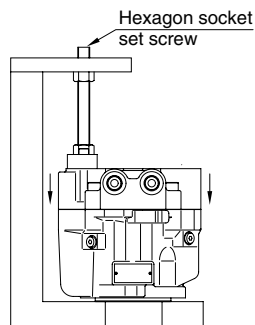


- (23) Assemble the port plate.
Install the packing.



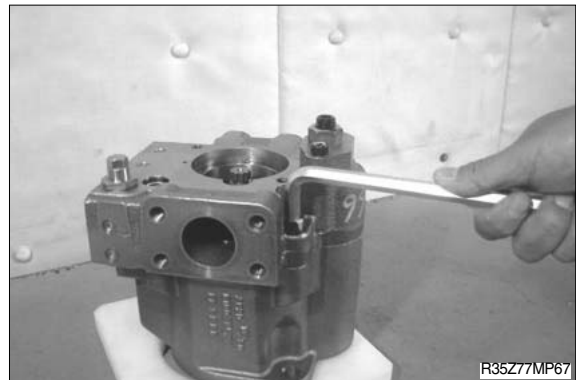
R35Z77MP65

- (24) Holding the cover in parallel condition, by using the jig, tightens slowly the hexagon socket set screw of the jigs, in order to install the port plate.



R35Z77MP66

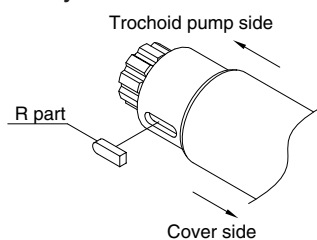
- (25) Fix the port plate with the hexagon socket head cap screws.
(M12 × 40, 3 pieces)
(M12 × 55, 1 pieces)
Hexagon socket screw key (10 mm)
· Tightening torque : 10~12.5 kgf · m
(72.3~91 lbf · ft)



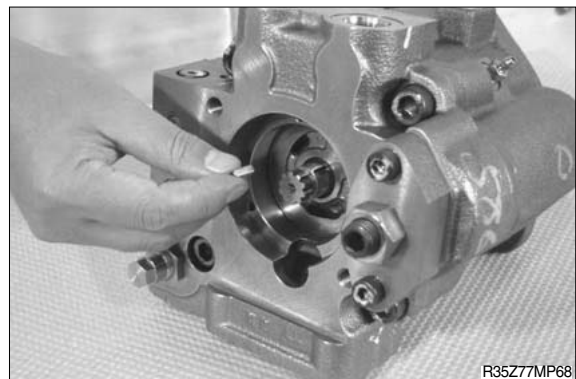
R35Z77MP67

2) ASSEMBLE THE TROCHOID PUMP

- (1) Install the key into the shaft.

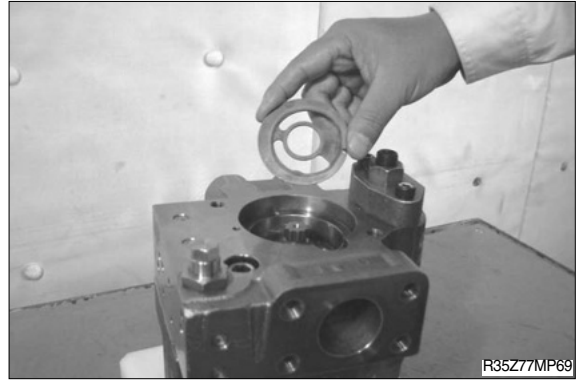


Install the key so that R side position in the trochoid pump side.

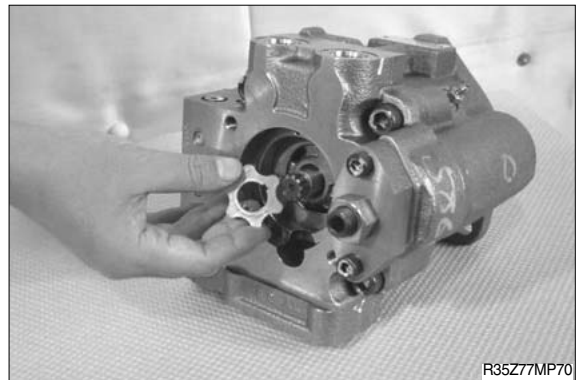
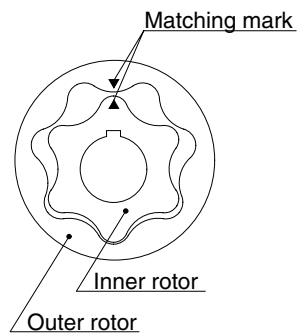


R35Z77MP68

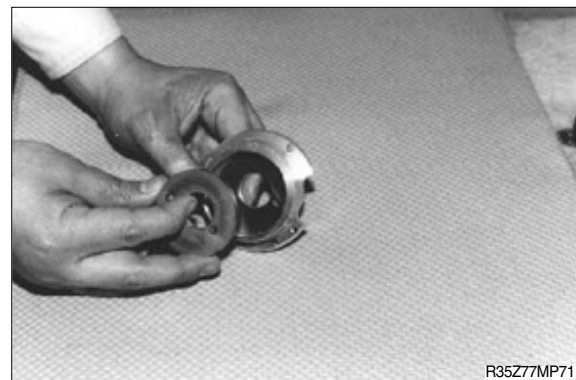
(2) Install the side plate (B) into the port plate.



(3) Install the gear (inner rotor) into the shaft.
※ The surface of matching mark should be positioned in the side plate (B) side.



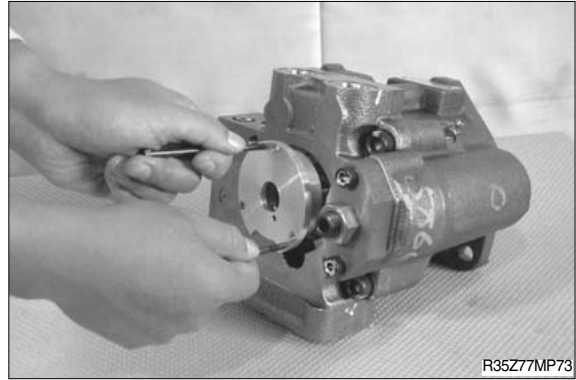
(4) Install the side plate (A) into the case.



(5) Install the gear (outer rotor) into the case.
※ The surface of matching mark should be positioned in the side plate (B) side.

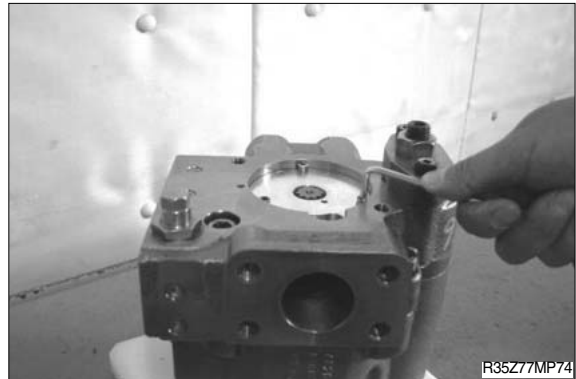


(6) Install the case into the port plate.



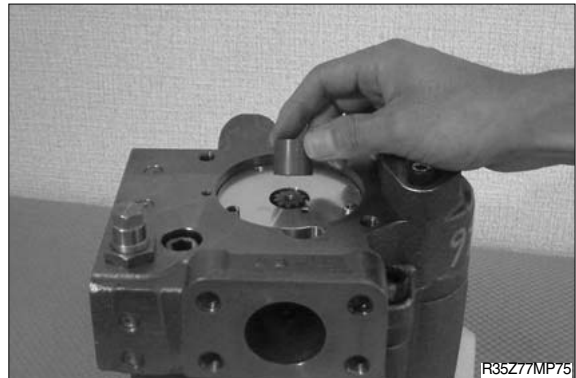
(7) Tighten the hexagon socket head cap screw. (M5 × 12, 3 pieces)
Hexagon socket screw key (4 mm)

- Tightening torque : 0.7~0.8 kgf · m
(5.1~6.1 lbf · ft)



3) ATTACH THE GEAR PUMP

(1) Install the coupling to the shaft end on the main pump.



(2) Connect the main pump and the gear pump.

And fix the gear pump with the hexagon socket head cap screws.

(M10 × 25, 2 pieces)

Hexagon socket screw key (8 mm)

- Tightening torque : 5.6~7.0 kgf · m
(41~51 lbf · ft)

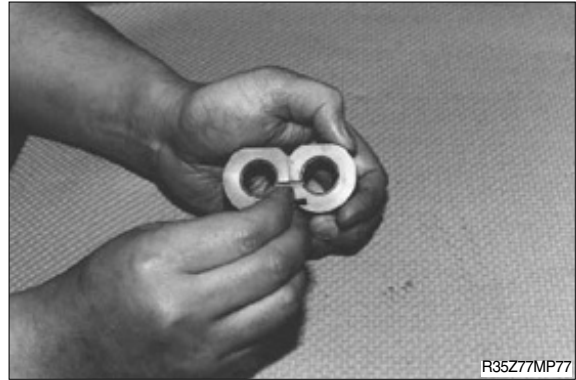
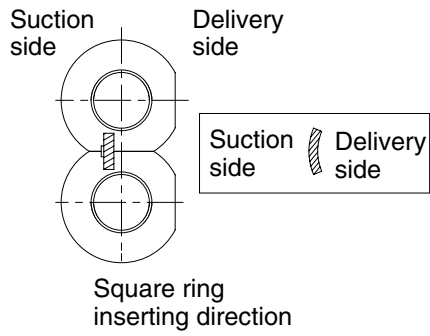


4) ASSEMBLE THE GEAR PUMP

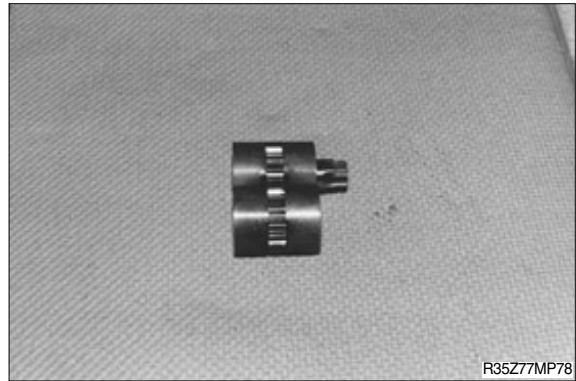
(1) Assemble the gear pump(GSP2)

Assemble the square ring into the side plate.

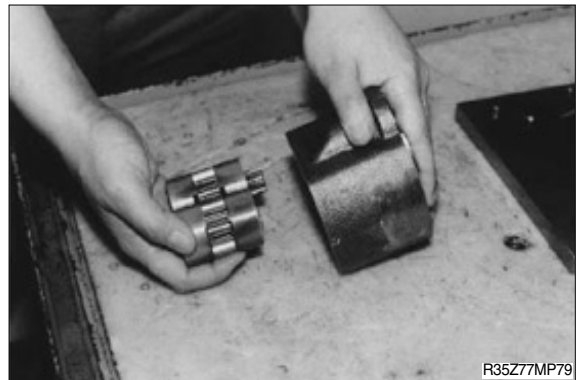
Pay attention to the suction and delivery directions.



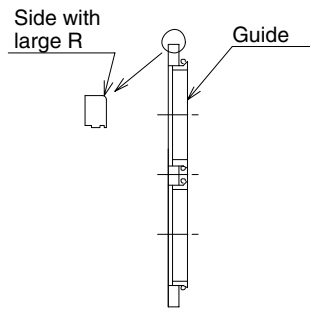
(2) Assemble the drive gear and the idle gear to the side plates.



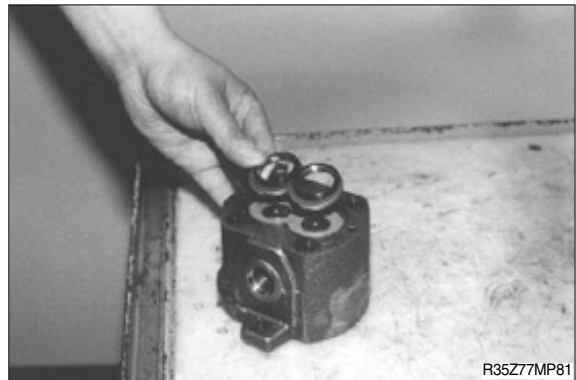
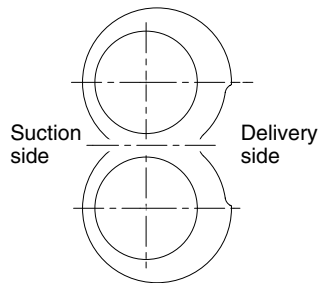
(3) Assemble the drive gear, the idle gear and the side plates in the housing.



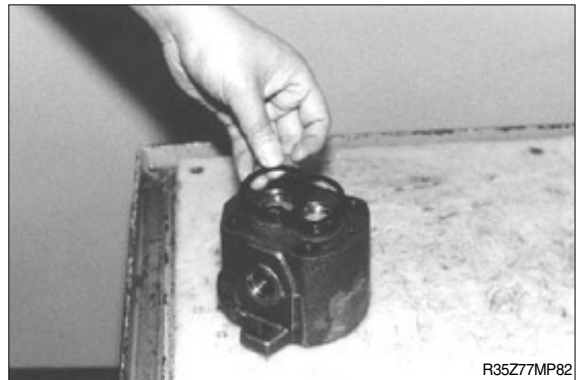
- (4) Insert the O-rings into the guides, then insert them into the plate.



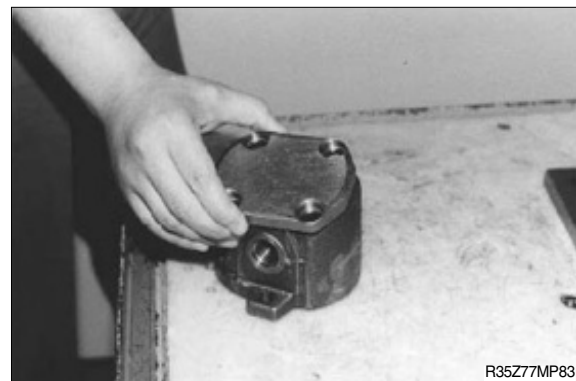
- (5) Assemble the plate, guides and O-rings. Pay attention to the suction and delivery directions.



- (6) Install the square ring.



- (7) Assemble the housing and the cover.



(8) Fix the housing and the cover with the hexagon socket head cap screws.

(M10 × 20, 4 pieces)

Hexagon socket screw key (8 mm)

- Tightening torque : 5.6~7.0 kgf · m
(41~51 lbf · ft)

