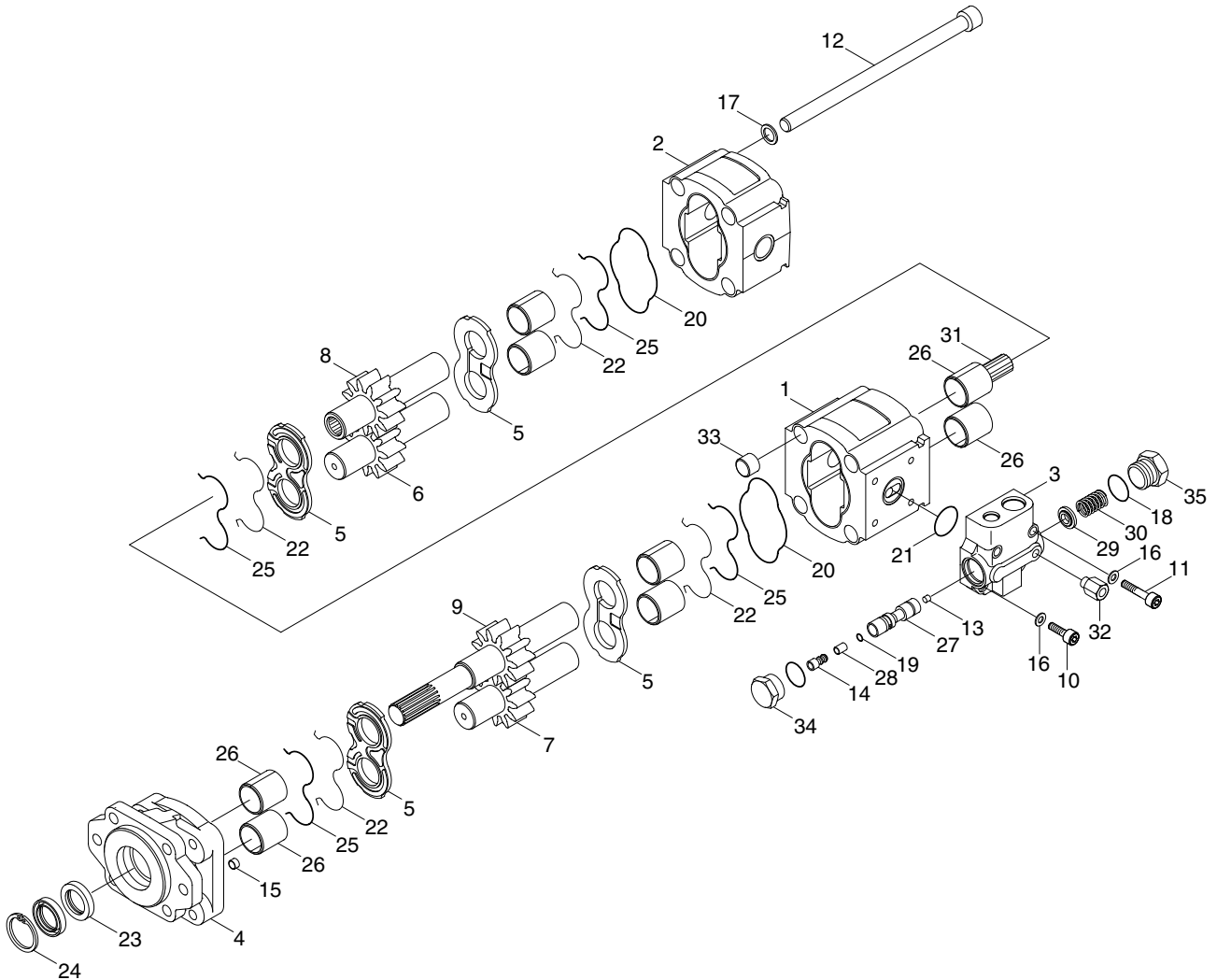


## GROUP 4 DISASSEMBLY AND ASSEMBLY

### 1. MAIN PUMP

#### 1) STRUCTURE



HB100WE21

1	Body	13	Screw	25	Ring
2	Body	14	Screw	26	Sleeve bearing
3	Rear end cover	15	Screw	27	Spool
4	Front cover	16	Washer	28	Filter
5	Thrustplate	17	Washer	29	Spring seat
6	Driven gear	18	O-ring seal	30	Spring
7	Driven gear	19	O-ring seal	31	Hub
8	Drive shaft	20	Ring	32	Connection
9	Drive shaft	21	O-ring seal	33	Steel bushing
10	Screw	22	Seal	34	Plug
11	Screw	23	Shaft seal		
12	Screw	24	Ring		

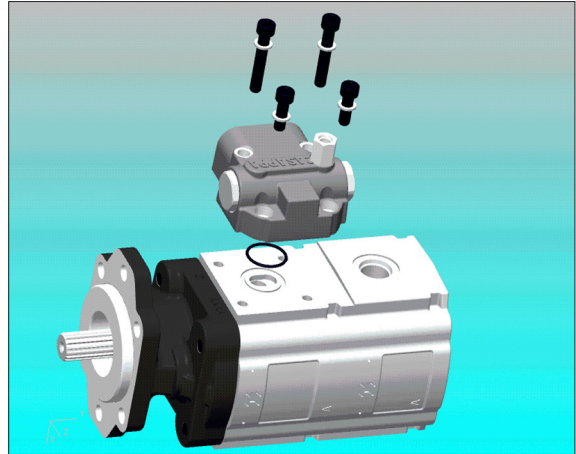
## 2) GENERAL INSTRUCTIONS

- (1) Check immediately that any spare parts you receive have not been damaged in shipment.
- (2) Always work in a clean environment.
- (3) Wash all components in solvent and blow dry with compressed air before refitting.
- (4) Take care not to damage rubber seals.
- (5) Avoid damaging precision machined surfaces.
- (6) Components should fit into their housings without excessive force. If force is necessary, this normally means that the component does not have the correct dimensional tolerances or is aligned incorrectly.
- (7) When hand pressure is insufficient, only use presses or rubber hammer to fit components.
- (8) Never strike components with steel hammers.
- (9) Steel bushing must be fitted only with a suitable press.
- (10) Do not use hammers to fit bearings.
- (11) Always respect the direction of rotation when assembling components.

### 3) DISASSEMBLY

#### (1) LS priority valve

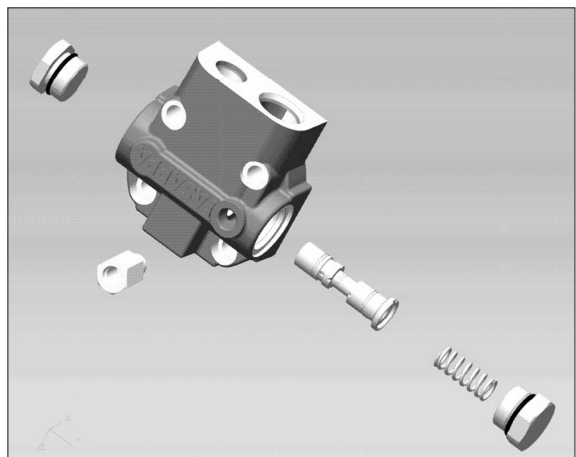
- ① Loosen and remove the assembling bolts and washers from the pump.



HB100WE51

- ② Loosen and remove plug and take out spring & spool. (Only when it is needed to replace components inside).

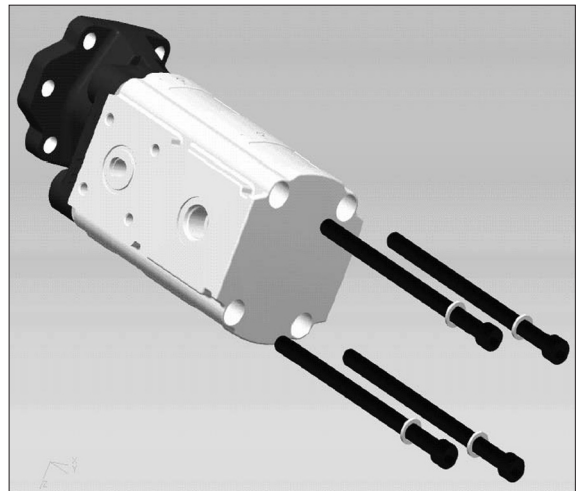
- ※ Pay attention not to give any damage on the surface of the spool and contamination to the orifices prearranged at the spool.



HB100WE52

#### (2) Mounting flange

- ① Loosen and remove the assembling bolts and washers from the pump.

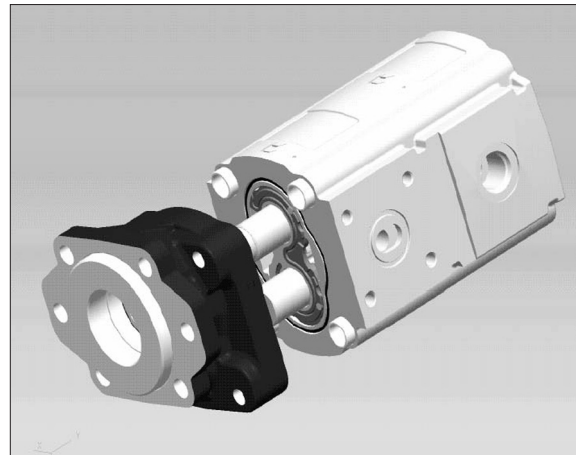


HB100WE53

- ② Remove mounting flange taking care to keep it as straight as possible during removal.

Tap around the edge with rubber mallet in order to break away from the body.

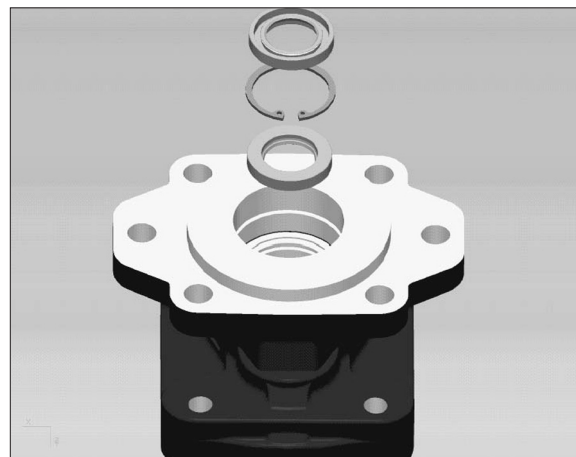
- ※ Ensure that while removing it, the drive shaft and other components remain position.



HB100WE54

- ③ Remove shaft seal with (-) screwdriver and take out snap ring with proper tool and shaft seal again.

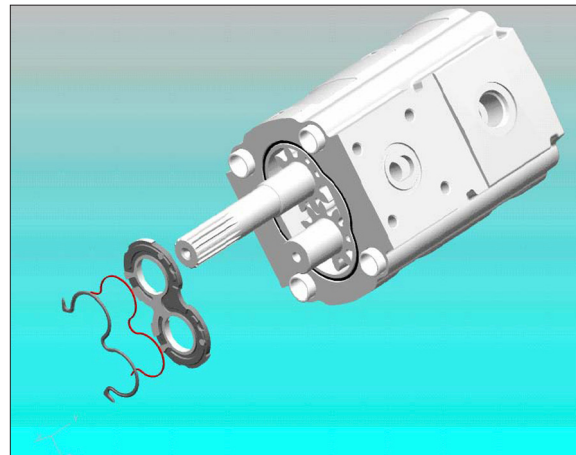
- ※ Take out the shaft seals only needed. Shaft seals disassembled from the mounting flange is not reusable.



HB100WE55

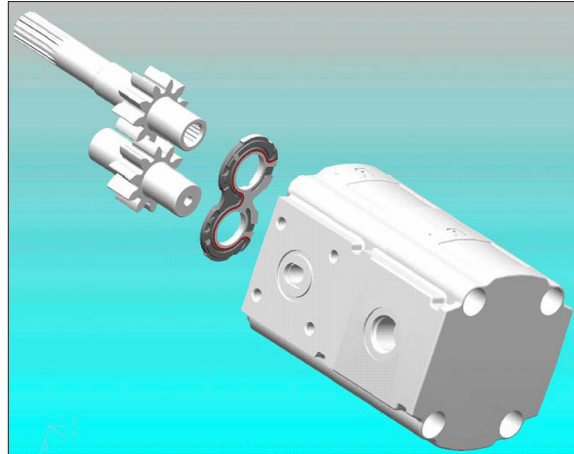
### (3) 1st working section

- ① Remove the pressure plate with prearranged parts, O-ring & back up ring from the working section and examine it carefully.



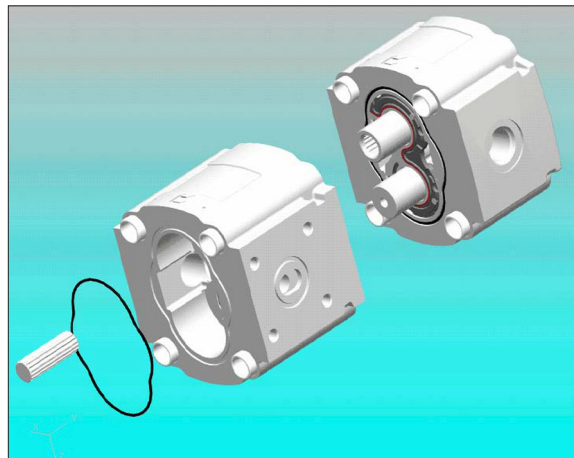
HB100WE56

- ② Pull out driving gear & driven gear keeping gears as straight as possible.
- ③ Remove other pressure plate on rear side with same way for front side.



HB100WE57

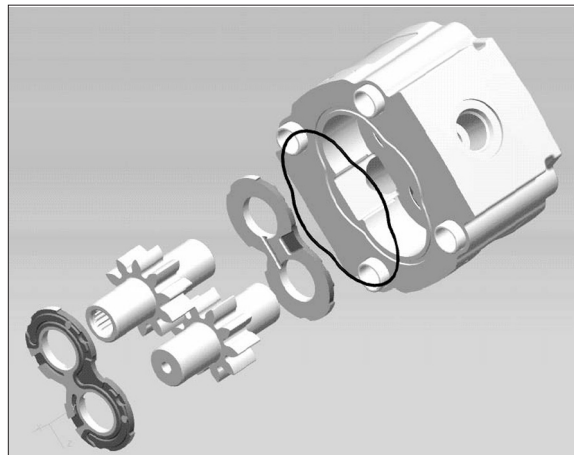
- ④ Remove square O-ring on the groove of body.
- ⑤ Remove through shaft and front body.
- ※ Tap around marked points with rubber mallet all around to break away first body from second.  
Do not wedge between the bodies, it may give serious damage on the surface.



HB100WE58

**(4) 2nd working section**

- ① Remove all components inside of second body with same way for 1st section.
- ② Remove the square O-ring if necessary.



HB100WE59

#### 4) ASSEMBLY

##### (1) Preassembly

###### Pressure plates

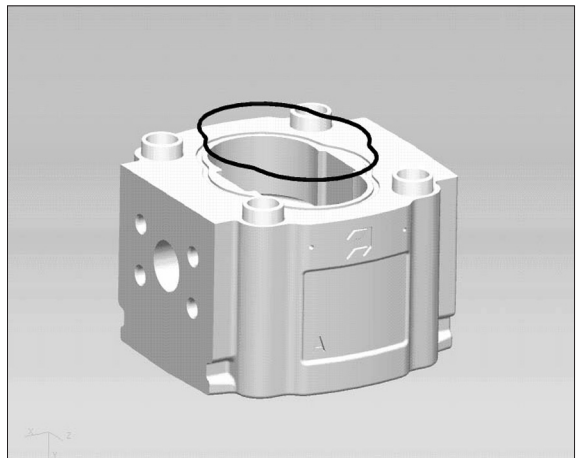
- ① Locate O-ring into the groove on the aluminum pressure plate.
- ② Locate back-up ring upon the O-ring.
- ③ Smear clean grease on the O-ring & back-up ring to fix their position while moving.



HB100WE60

###### Working body

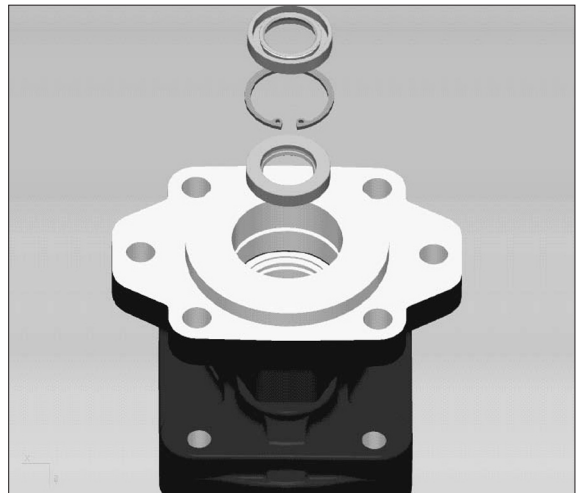
- ① Insert square rings into grooves.  
Shape of square ring is different depend on type of bodies.



HB100WE61

###### Mounting flange

- ① Locate shaft seal inside shaft hole to the end.
- ② Insert snap ring and locate it into the groove prearranged on the mounting flange.
- ③ Locate shaft seal again but different direction.

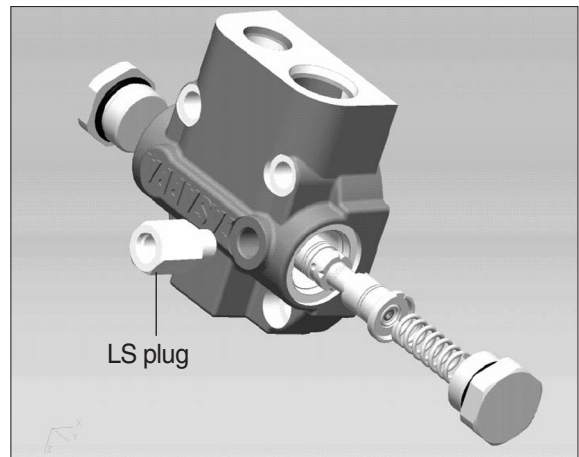


HB100WE62

### LS - priority valve

① Insert the spool prearranged all orifice first, and spring, plugs.

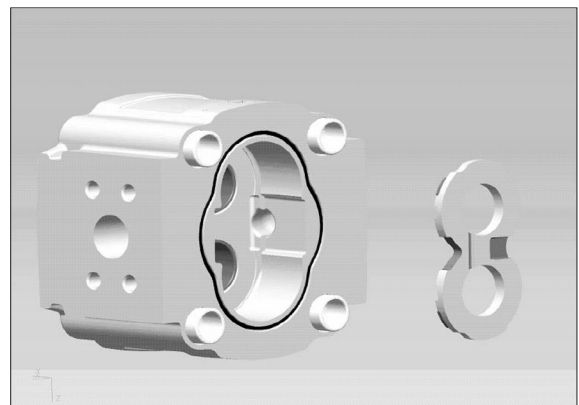
- Torque value of both sides plugs :  
10.2 kgf · m (73.8 lbf · ft)
- Torque value of LS plug :  
1.53 kgf · m (11.1 lbf · ft)



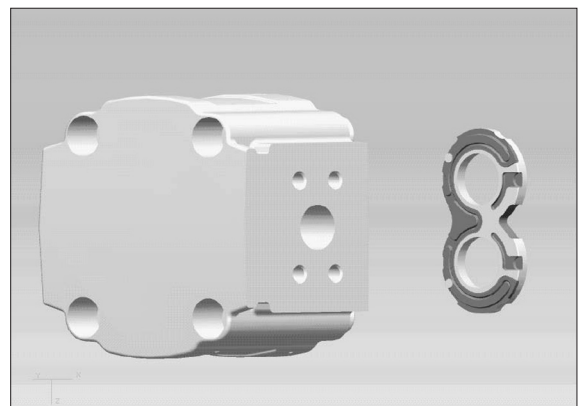
HB100WE63

### (2) Assembling

- ① Prepare cleaned 2nd body prearranged guard pins and square O-ring.
  - ② Insert a pressure plate prearranged O-ring & back-up ring inside of body.
- ※ Opened area of O-ring should face to suction side. And O-ring side should face to the body.



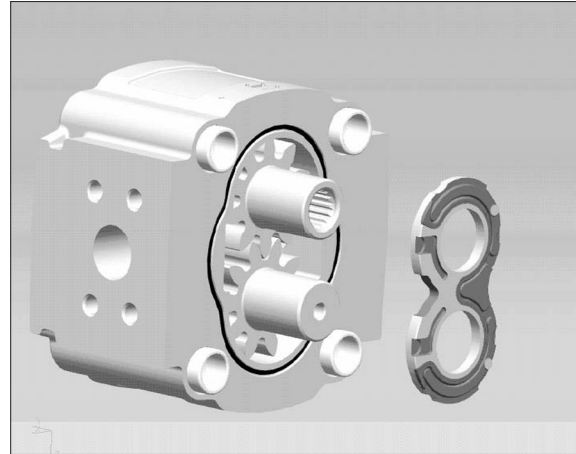
HB100WE64



HB100WE65

③ Locate driving gear and driven gear keeping as straight as possible during assembling.

④ Locate one of pressure plates prepared.

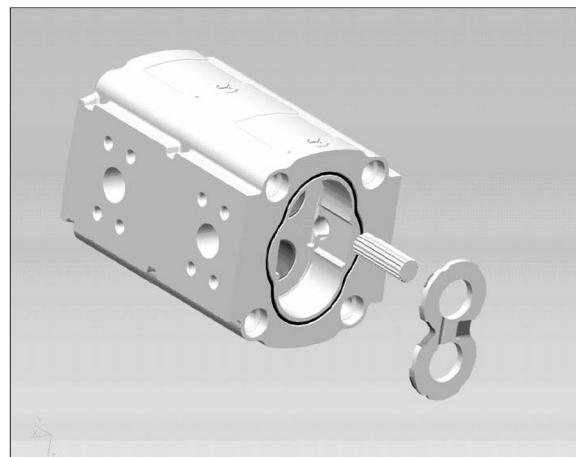


HB100WE66

⑤ Locate 1st body on the 2nd body tapping around the body with rubber mallet to fit it completely.

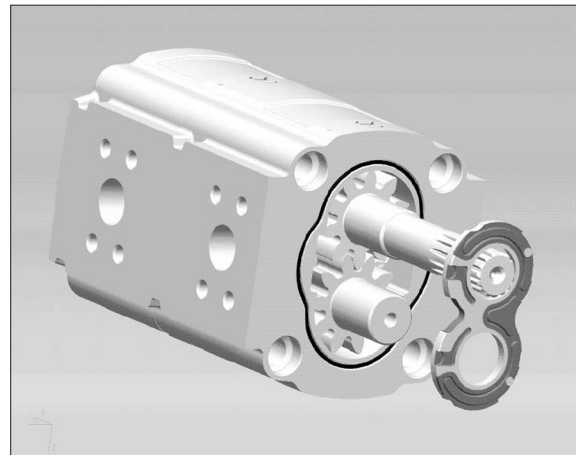
⑥ Locate through shaft on the driving gear.

⑦ Locate pressure plate with same way for 2nd body.



HB100WE67

⑧ Locate driving gear and driven gear and last pressure plate also.

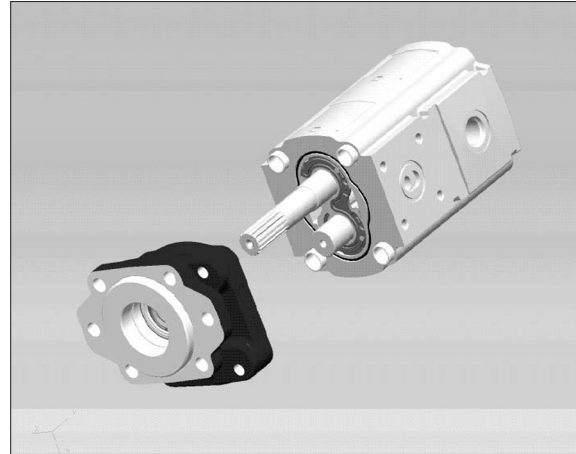


HB100WE68



- ⑨ Assemble mounting flange to the body, taking care not to give any damage on the shaft seals by sharp edge of shaft.

※ Smear clean grease on the lips of shaft seals before assembling.



HB100WE69

- ⑩ Assemble the bolts and tighten the bolts with in a crisscross pattern to a torque value of 14.3 kgf · m (103 lbf · ft).

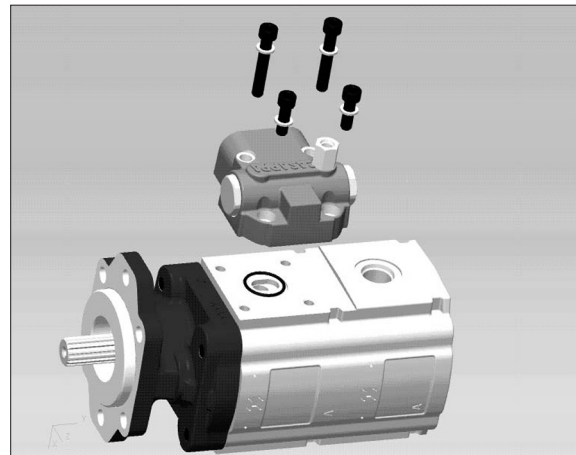
- ⑪ Check that the pump rotates freely when the drive shaft is turned by hand, if not a possible, plate seal may be pinched.



HB100WE70

- ⑫ Locate an O-ring into the groove on the body.

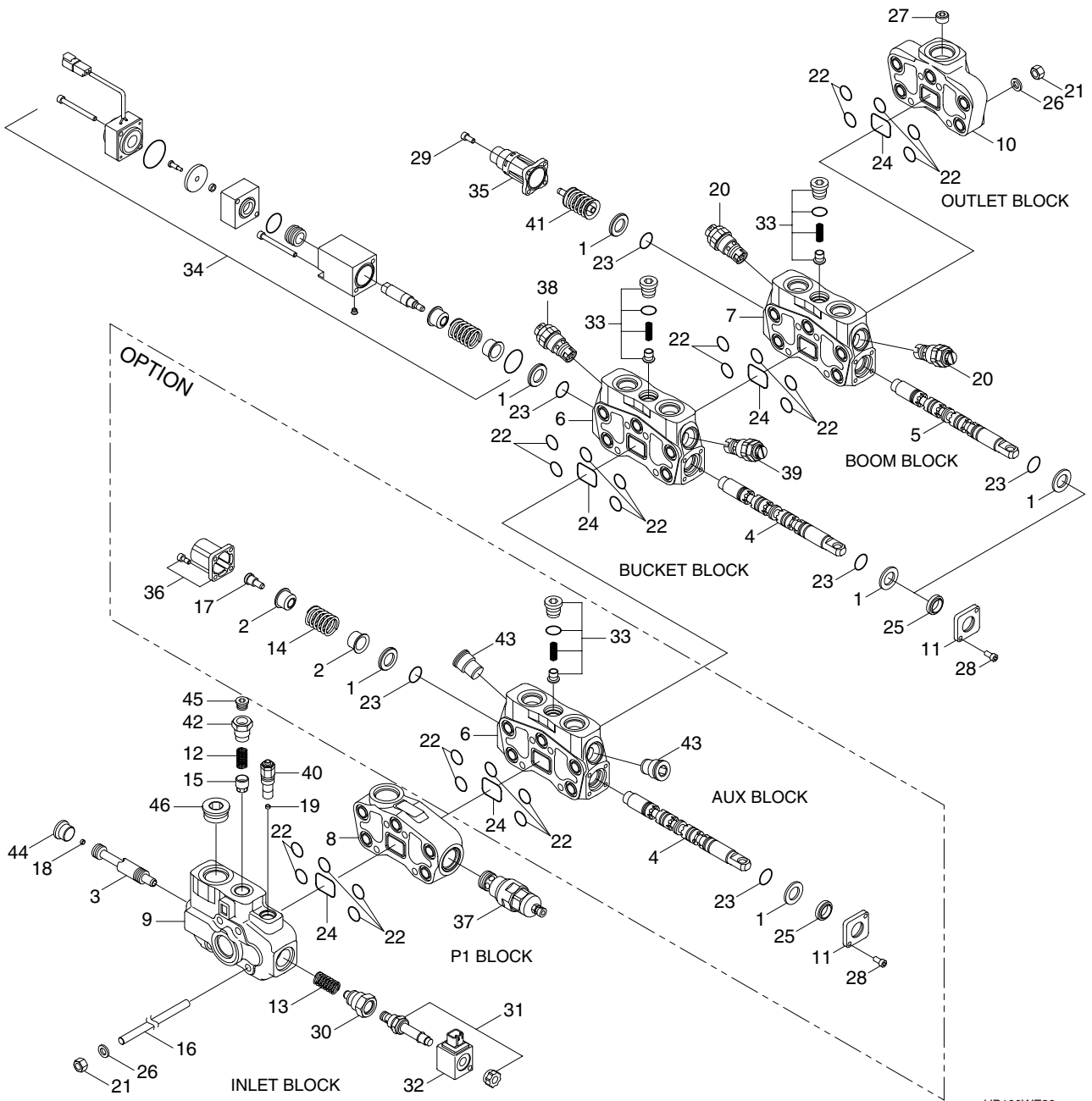
- ⑬ Locate preassembled LS - priority valve on the 1st working section and tighten the bolts with in a crisscross pattern to a torque value of 7.14 kgf · m (51.6 lbf · ft).



HB100WE71

## 2. MAIN CONTROL VALVE (LOADER)

### 1) STRUCTURE



HB100WE36

1	Spacer	13	Spring	25	Seal	37	Relief valve
2	Bushing	14	Spring	26	Spring washer	38	Relief valve
3	Spool	15	Poppet	27	Plug	39	Relief valve
4	Spool	16	Tie rod	28	Screw	40	Relief valve
5	Spool	17	Screw	29	Screw	41	Spring kit
6	Element	18	Dowel	30	Joint	42	Adapter
7	Element	19	Screw	31	Solenoid valve	43	Plug
8	Element	20	Relief valve	32	Body	44	Plug
9	Inlet cover	21	Nut	33	Check valve	45	Plug
10	Outlet cover	22	O-ring	34	Valve kit	46	Plug
11	Flange	23	O-ring	35	Cap		
12	Spring	24	O-ring	36	Cap kit		

## 2) INITIAL SETUP OF THE VALVE ON ASSEMBLY BENCH

- (1) Clean the table.
- (2) Wear safety goggles.
- (3) Place the stacked valve with inlet to the left side as shown in the picture.
- (4) Clean the valve using compressed air so that valve is free from any dust or dirt.



## 3) CHECK VALVE ASSEMBLY

- (1) Assemble the check valve into the check valve cavity.
- (2) Make sure that O-ring is present in the check valve.



- (3) Tighten in to 4.28 kgf · m (31 lbf · ft) torque (wrench 08) using pneumatic torque gun.



## 4) P PORT PLUG ASSEMBLY

- (1) Close the top inlet port with SAE 16 plug and tighten it to 4.28 kgf · m (31 lbf · ft) torque (wrench 12) using pneumatic torque gun. (Make sure that O-ring is present in the plug.)



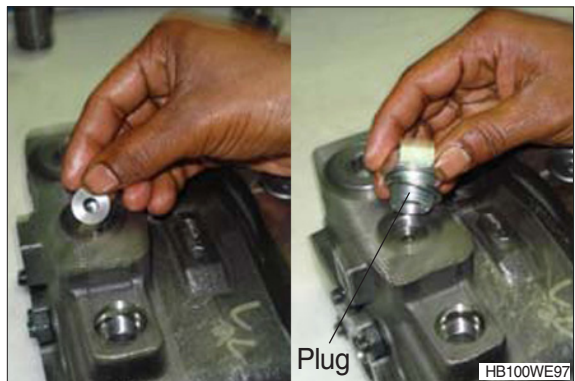


## 5) MANOMETER PLUG ASSEMBLY

- (1) Insert the poppet in the manometer cavity.
- (2) Then insert the spring on to the poppet.



- (3) Insert the spacer on top of the spring.



- (4) Assemble the BSP 1/2" plug and tighten it to 4.28 kgf · m (31 lbf · ft) torque (wrench 27) using pneumatic torque gun. (Make sure that washer is present in the plug.)



## 6) PRIORITY INLET SPOOL ASSEMBLY

- (1) Insert orifice of ( $\varnothing 0.75$  mm) in the spool as shown in picture.
- (2) Lubricate the spool cavity with hypsin VG46.



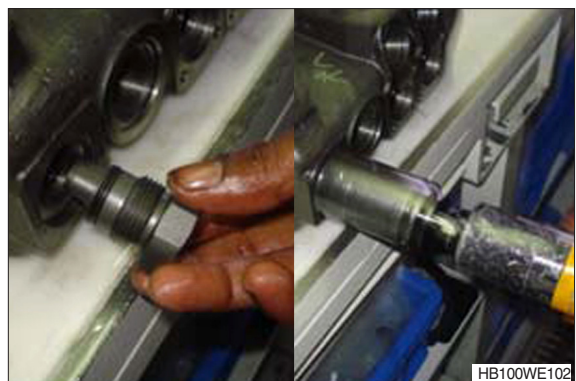
- (3) Insert the spool into the spool cavity with orifice face should go inside.



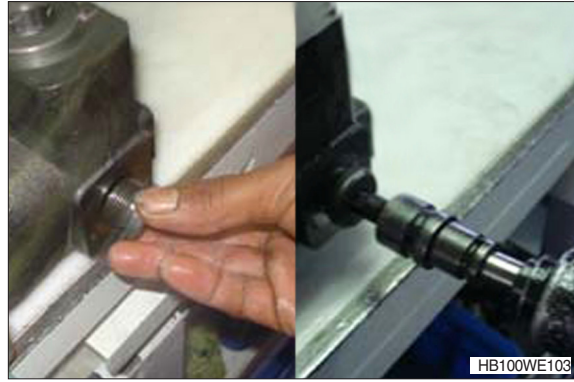
- (4) Insert the spring on to the spool seat.



- (5) Assemble the adapter and tighten it to  $4.28 \text{ kgf} \cdot \text{m}$  ( $31 \text{ lbf} \cdot \text{ft}$ ) torque (wrench 32) using pneumatic torque gun. (Make sure that washer & O-rings are present in the adapter.)

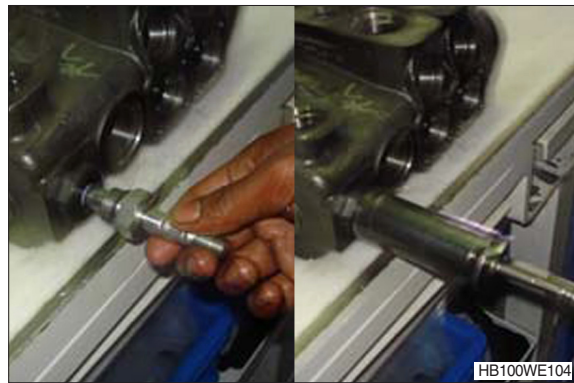


- (6) Plug the other side of the spool cavity with M22×1.5 mm plug and tighten it to 4.28 kgf · m (31 lbf · ft) torque (wrench 12) using pneumatic torque gun. (Make sure that O-ring is present in the adapter.)

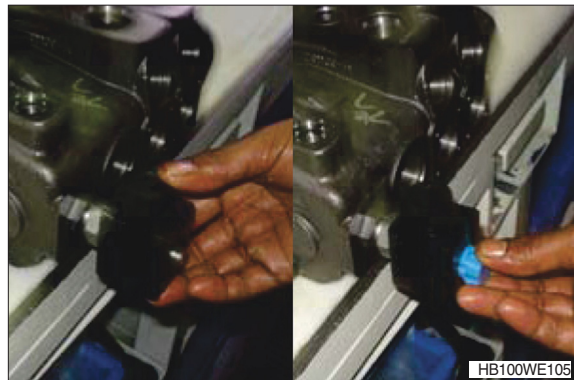


## 7) UNLOADING SOLENOID VALVE ASSEMBLY

- (1) Assemble the solenoid as shown in the picture and tighten it to 5.10 kgf · m (36.9 lbf · ft) torque (wrench 24) using pneumatic torque gun.



- (2) Insert the coil into the solenoid.  
(3) Assemble the insulator.

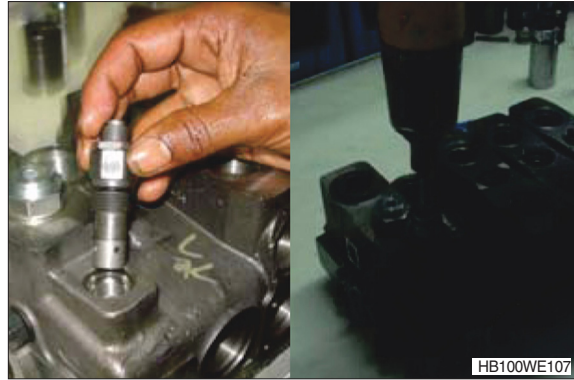


## 8) LS VALVE ASSEMBLY

- (1) Insert orifice of (∅ 1.25 mm) in the LS cavity as shown in picture.

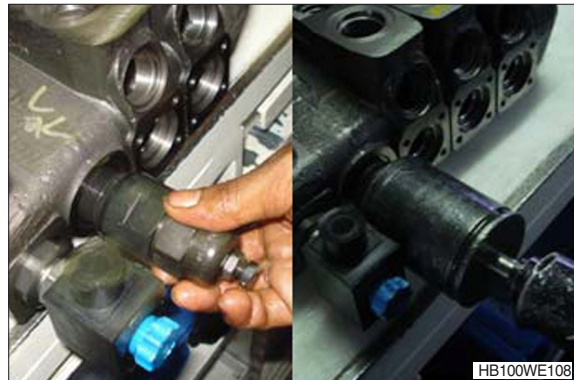


- (2) Assemble the LS valve into LS cavity and tighten it to 2.45 kgf · m (17.7 lbf · ft) torque (wrench 19) using pneumatic torque gun.



### 9) MAIN RELIEF VALVE ASSEMBLY

- (1) Assemble main relief valve into the main relief valve cavity as shown in picture and tighten it to 4.28 kgf · m (31 lbf · ft) torque (wrench 36) using pneumatic torque gun.



### 10) PORT RELIEF VALVE ASSEMBLY

- (1) Assemble the port relief valve into the port relief valve cavity as describe below and tighten it to 2.45 kgf · m (17.7 lbf · ft) torque (wrench 19) using pneumatic torque gun.

- 1st section (from inlet) : ZTAL-00206
- 2nd section (bucket) : ZTAL-00196/00197
- 3rd section (boom) : ZTAL-00148



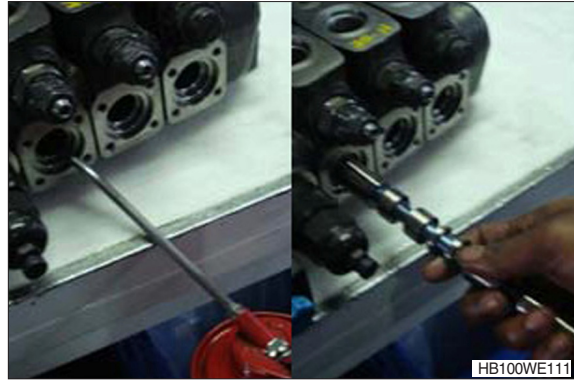
### 11) PORT RELIEF VALVE CAVITY PLUG ASSEMBLY

- (1) Plug remaining port relief cavities with P3T plugs (i.e. on B1 & B2 port) and tighten it to 4.28 kgf · m (31 lbf · ft) torque (wrench 12) using pneumatic torque gun.



## 12) SPOOL ASSEMBLY

- (1) Lubricate all the spool cavities with hypspin VG46.
- (2) Insert spool as describe below with eye end of the spool is on the lever side.
  - 1st section (Aux) : ZTAL-00167
  - 2nd section (bucket) : ZTAL-00167
  - 3rd section (boom) : ZTAL-00168
- (3) Move the spools in and out two to three times for free movement.



## 13) O-RING AND SPACER ASSEMBLY ON CONTROL KIT SIDE

- (1) Assemble the O-ring in the O-ring groove as shown in the picture.
- (2) Assemble the spacer into the spacer groove provided in spool cavity (chamfered face should go inside the cavity).



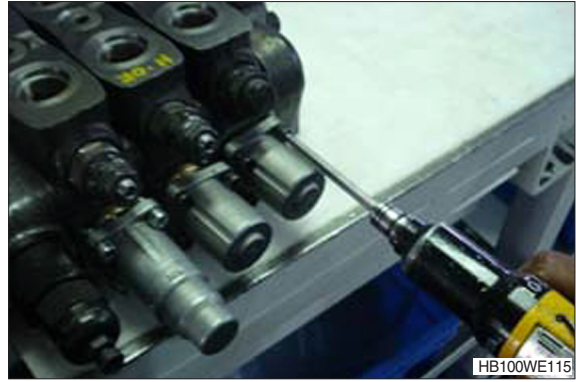
## 14) CONTROL KIT ASSEMBLY ON BOTH SIDE OF THE VALVE

- (1) Apply a drop of loctite #270 thread locker on control kit screw threads.
- (2) Place control kit spring in between two bushes as shown, and then assemble these into the spool with control kit screw. (Bucket control kit : ZTAL-00192, boom control kit : ZTAL-00234)
- (3) Tighten the control kit to 0.99 kgf · m (7.16 lbf · ft) torque (wrench 04) using pneumatic torque gun.
- (4) Lubricate the proper quantity of grease to all control kits.



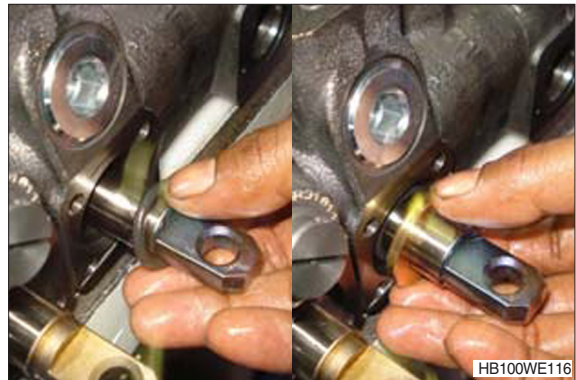


- (5) Assemble the end cap with M6 screws and tighten to 0.67 kgf · m (4.85 lbf · ft) torque using pneumatic torque gun.

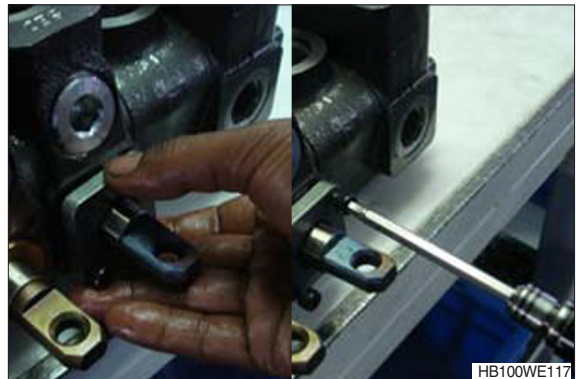


### 15) LEVER KIT ASSEMBLY

- (1) Assemble the O-ring in the O-ring groove as shown in the picture.
- (2) Assemble the spacer into the spacer groove provided in spool cavity (chamfered face should go inside the cavity)



- (3) Assemble lever cap and tighten it with M6 screws to 0.99 kgf · m (7.16 lbf · ft) torque using pneumatic torque gun.



### 16) RE PLUG ASSEMBLY

- (1) Assemble the RE plug (M18 × 1.5 mm) in tank port as shown in the picture and tighten it with allen key.

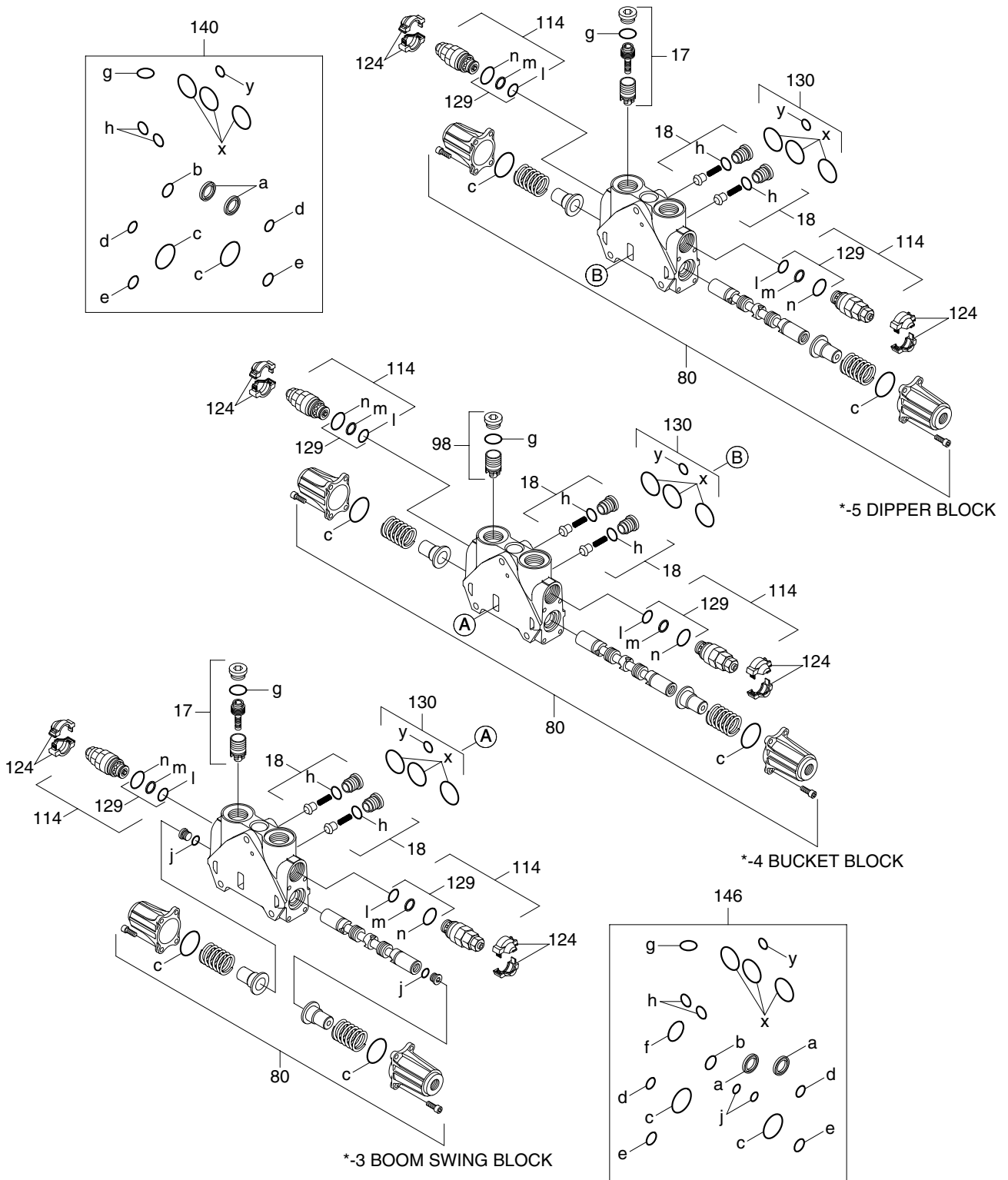


17) COMPLETE VALVE ASSEMBLY





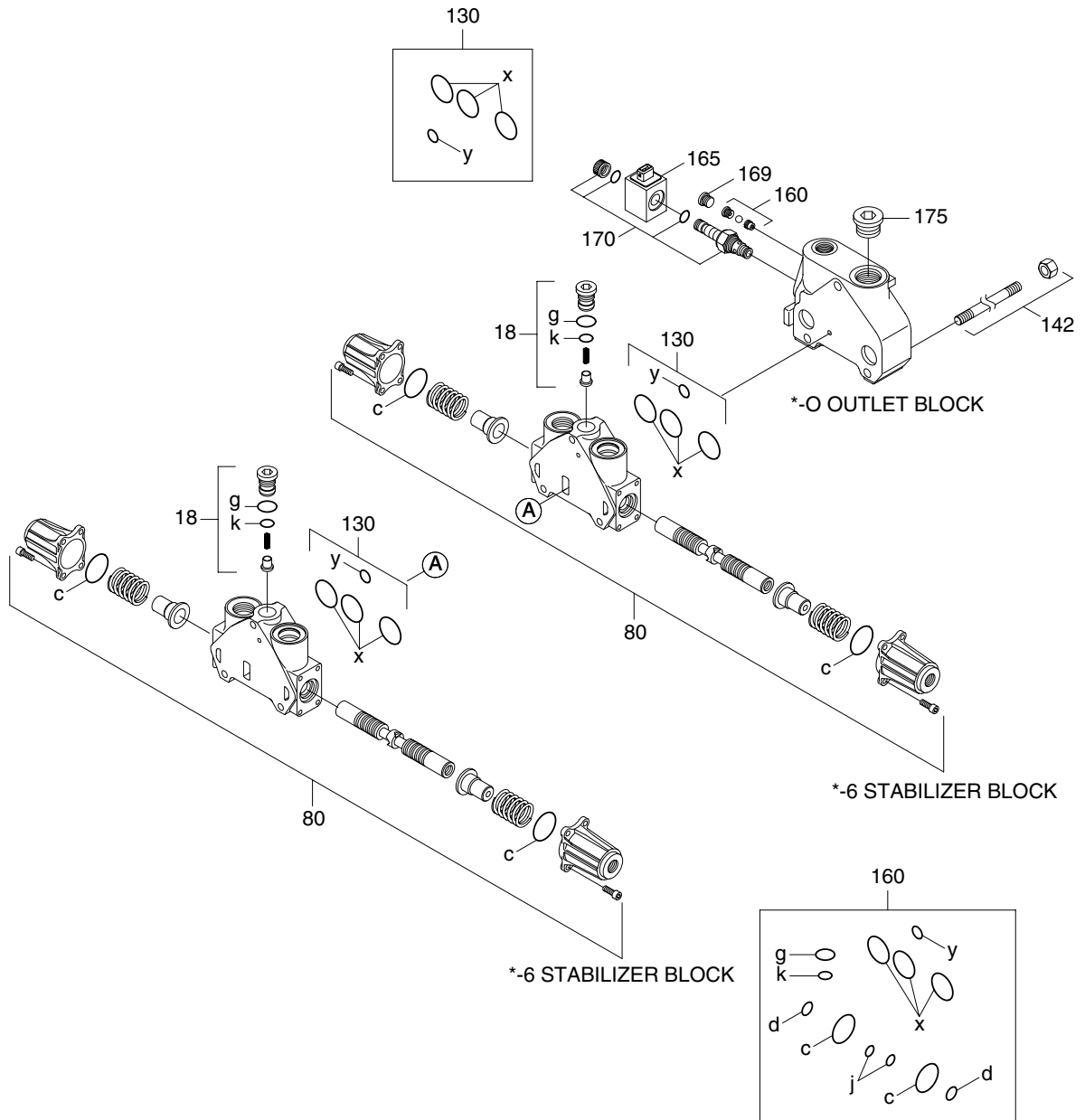
# STRUCTURE (2/3)



HB100WE34

- |    |                          |     |              |     |          |
|----|--------------------------|-----|--------------|-----|----------|
| 17 | Pressure compensator kit | 114 | Relief valve | 140 | Seal kit |
| 18 | Check valve kit          | 124 | Cover        | 146 | Seal kit |
| 80 | Hydraulic operation      | 129 | Seal kit     |     |          |
| 98 | Pressure compensator kit | 130 | Seal kit     |     |          |

# STRUCTURE (3/3)



HB100WE35

- 18 Check valve
- 80 Hydraulic operation
- 130 Seal kit

- 142 Stud & Nut
- 160 Seal kit
- 165 Solenoid

- 169 Plug
- 170 2 ways valve kit
- 175 Plug

## 2) REMOVAL / INSTALLATION OF THE CONTROL BLOCK

### (1) General recommendations

- ※ Before removing the control block from the machine, the block and its surroundings must be thoroughly cleaned (Do not direct the jet of a pressure washing unit directly at the unit).

No impurities must enter the hydraulic system. Plastic plugs are to be fitted on lines and orifices immediately following their removal.

- ▲ **Wear protective clothing and use suitable equipment to prevent accidents, particularly concerning the hydraulic fluid.**

**Use the lifting eyes and suitable handling equipment.**

**Set all actuators connected to the machine in neutral position (on the ground, at lower limit ...) to avoid accidents which could result from uncontrolled movements of the equipment when the hydraulic system is disconnected.**

**With the machine off, release the pressure remaining in the system by manipulating all of the distribution spools. This is performed by moving the handle in all directions.**

### (2) Removal

Install a vacuum pump on the tank to limit oil leakage when connections are removed.

After disconnecting the lines from the block, immediately fit the sealing plugs. Make sure to collect any possible oil leakage in a suitable receptacle.

Unscrew the mounting screws and remove the control block.

### (3) Installation

Contact faces must be perfectly clean.

Check the evenness of support area on the machine (tolerance: 0.5 mm).

Check the condition of line connector seals.

Clean the block if it has been in storage for a long period of time.

Correctly place and secure the control block onto the machine with the mounting screws.

Connect the lines to the block as per the connecting diagram and tighten to the torque specification.

Ensure that hoses are not twisted or rub.

Once correctly installed, the unit can be placed into operation.

### (4) Starting, maximal pressure set up

- ① Decalibrate the main relief valve (19 mm open end spanner on counternut) before starting the machine.
  - ② Maintain one of the control block spool valve in action before the linked hydraulic tank is at the end of stroke.
- ※ On the spool valve, the value of the port relief must be greater than that of the relief valve to adjust.
- ③ Adjust the maximum pressure measured using the main relief valve (6 mm socket wrench).
  - ④ Tighten the counternut of the adjusting screw to the torque :  $2.04 \pm 0.2 \text{ kgf} \cdot \text{m}$  ( $14.8 \pm 1.48 \text{ lbf} \cdot \text{ft}$ ).

### 3) INLET AND OUTLET ELEMENTS REPAIR PROCEDURE

#### (1) Main relief valve replacement

※ The control block does not need to be removed from the machine to perform this operation.

▲ Place all of the machine's actuators connected to the control block in neutral position.

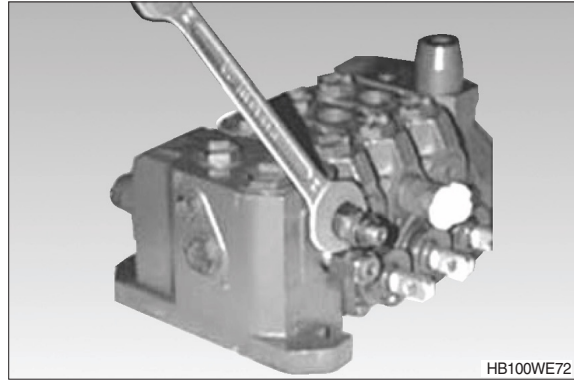
▲ Release stored pressure by operating all the spools.

※ Install a vacuum pump on the tank to limit oil leakage during this operation. Collect possible leaks with a suitable receptacle.

① On the inlet element, unscrew the pressure relief valve (24 mm open end spanner).

② Reassembly :

- Install the main relief valve on the inlet element.
- Torque :  $4.59 \pm 0.46$  kgf · m  
( $33.2 \pm 3.32$  lbf · ft).
- Set the main relief valve to the specified value (250 kgf/cm<sup>2</sup> [3560 psi])
- Fit a new appropriate locking cover.



## (2) Flow regulator replacement

※ The control block does not need to be removed from the machine to perform this operation.

▲ Place all of the machine's actuators connected to the control block in neutral position.

▲ Release stored pressure by operating all the spools.

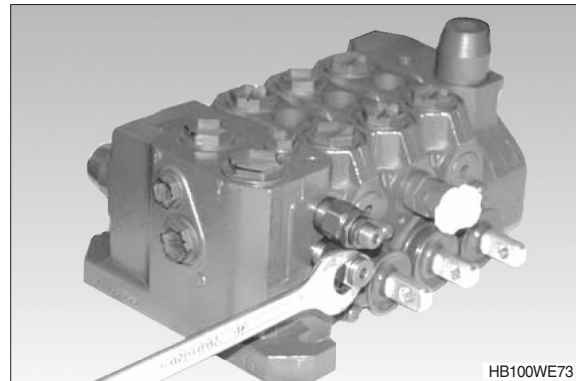
※ Install a vacuum pump on the tank to limit oil leakage during this operation.  
Collect possible leaks with a suitable receptacle.

① On the inlet or outlet element:

- Unscrew the main relief valve.
- Unscrew the flow regulator (22 mm open end spanner).

② Reassembly :

- Install the flow regulator on the inlet or outlet element.
- Torque :  $2.04 \pm 0.2 \text{ kgf} \cdot \text{m}$   
( $14.8 \pm 1.48 \text{ lbf} \cdot \text{ft}$ )

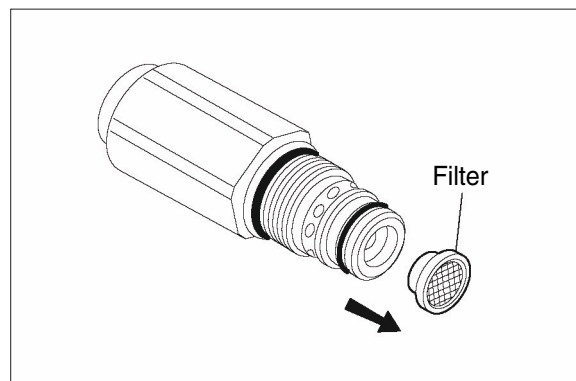


## (3) Flow regulator filter replacement

① Using pliers, extract the filter from the end of the flow regulator.

Be careful not to damage the seal and the end of the flow regulator.

② Reassemble parts in reverse order.





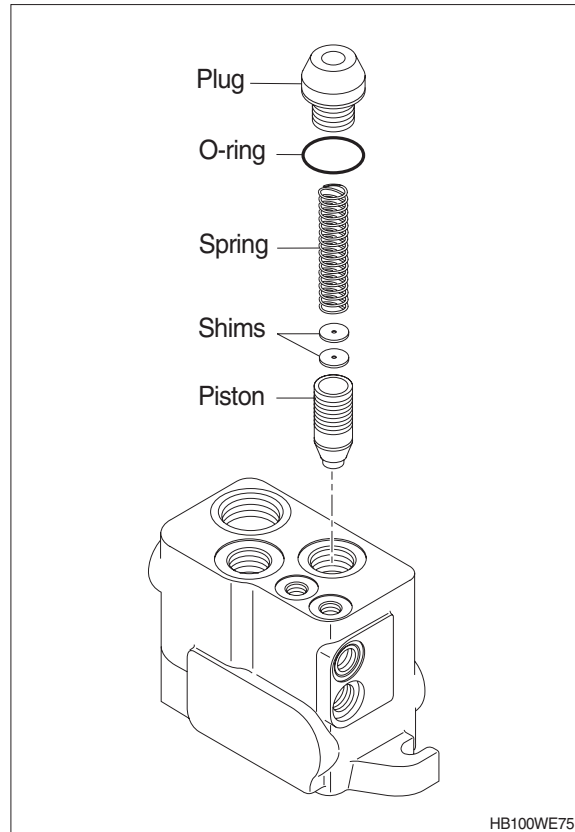
**(4) Removal of the regulation kit for "closed center"**

※ The control block does not need to be removed from the machine to perform this operation.

▲ **Place all of the machine's actuators connected to the control block in neutral position.**

▲ **Release stored pressure by manipulating all the spools.**

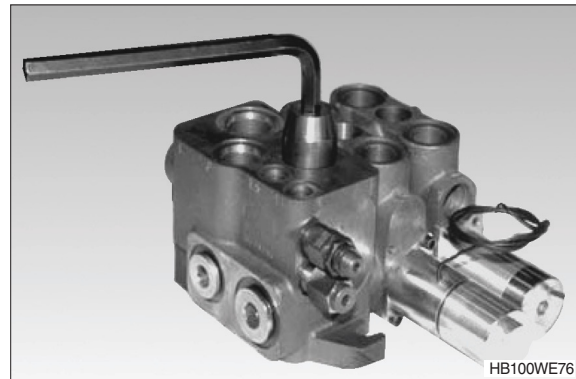
※ Install a vacuum pump on the tank to limit oil leakage during this operation. Collect possible leaks with a suitable receptacle.



① On the inlet element, unscrew the regulation kit plug (12 mm socket wrench).

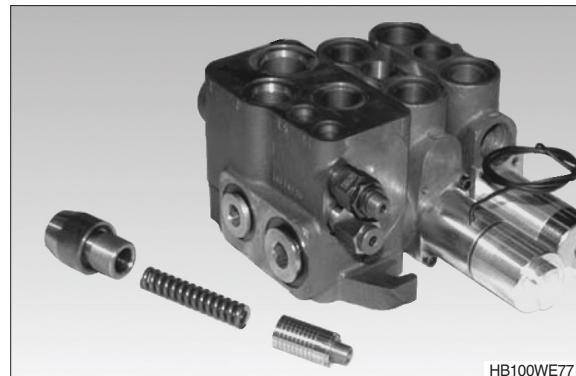
② Reassembly :

- Replace the plug O-ring.
- Torque :  $10.2 \pm 1.02 \text{ kgf} \cdot \text{m}$   
( $73.8 \pm 7.38 \text{ lbf} \cdot \text{ft}$ )



③ Remove spring, shims and piston.

④ Reassemble parts in reverse order.



#### 4) DISTRIBUTION ELEMENT REPAIR PROCEDURE

##### (1) Secondary valves replacement

※ The control block does not need to be removed from the machine to perform this operation.

▲ Place all of the machine's actuators connected to the control block in neutral position.

▲ Release stored pressure by operating all the spools.

※ Install a vacuum pump on the tank to limit oil leakage during this operation. Collect possible leaks with a suitable receptacle.

##### Port relief valve replacement

① On the distribution element in question, unscrew the port relief valve (24 mm open end spanner).

② Reassembly :

- Set the port relief valve to the specified value.
- Install the secondary port relief valve on the distribution element.
- Torque :  $7.14 \pm 0.71 \text{ kgf} \cdot \text{m}$   
( $51.6 \pm 5.16 \text{ lbf} \cdot \text{ft}$ )
- Fit a new appropriate locking cover.

③ Replace valve seals or port relief valve.

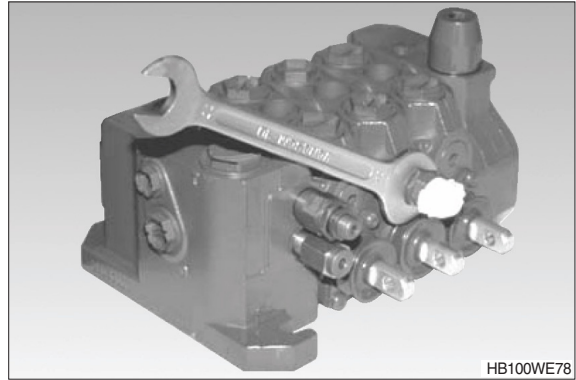
##### Plug replacement

① On the distribution element in question, unscrew the plug (8 mm socket wrench).

② Reassembly :

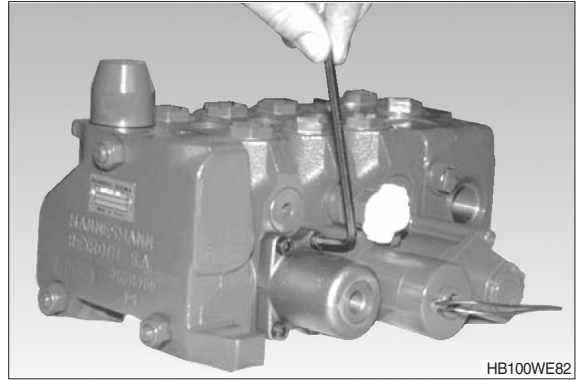
- Torque :  $7.14 \pm 0.71 \text{ kgf} \cdot \text{m}$   
( $51.6 \pm 5.16 \text{ lbf} \cdot \text{ft}$ )

③ Replace plug seals or plug.



## (2) Hydraulic control housing removal

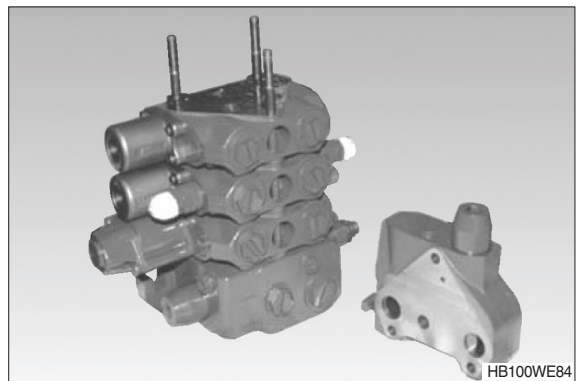
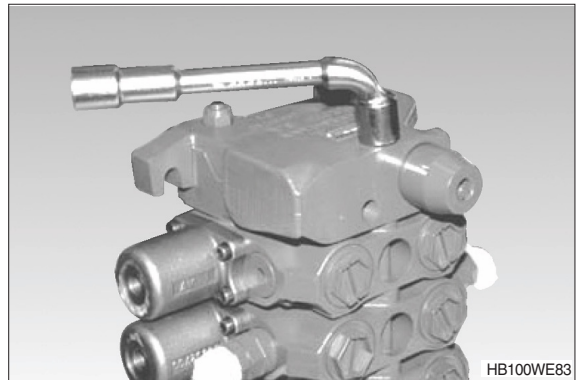
- ① Remove the 4 mounting screws (screwdriver for 5 mm socket wrench for socket head screws).
- ② Reassembly :  
Replace the O-ring on the body.  
· Torque :  $1.02 \pm 0.10 \text{ kgf} \cdot \text{m}$   
( $7.38 \pm 0.74 \text{ lbf} \cdot \text{ft}$ )
- ③ Reassemble parts in reverse order.



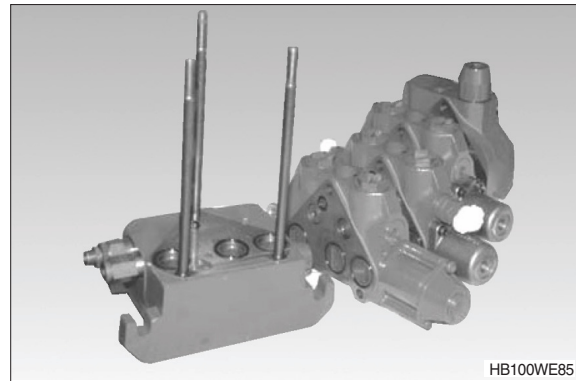
## (3) Control block disassembly / assembly

### Preliminary operation

- ① Remove the control block from the machine.
- ② Remove the 3 nuts (19 mm ring wrench)
- ③ Reassembly :  
· Torque :  $6.12 \pm 0.61 \text{ kgf} \cdot \text{m}$   
( $44.3 \pm 4.43 \text{ lbf} \cdot \text{ft}$ )
- ④ Remove the outlet element.

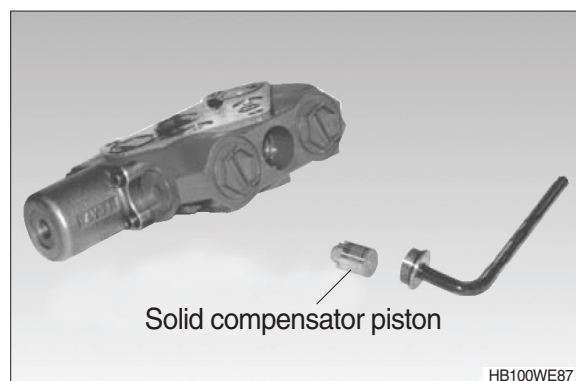


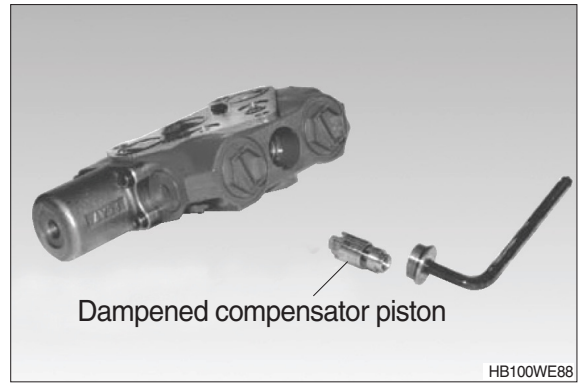
- ⑤ Separate the working sections from the inlet element.
- ⑥ Reassembly :
  - Replace the O-rings located between the working sections, the inlet element and the outlet element.
  - Check the cleanliness of the element faces.
  - Place the control block horizontally on an even support area to tight the nuts.
- ⑦ If the inlet element is to be replaced, remove the tie rods.
- ⑧ Reassembly :
  - Make sure that the tie rods are tightened to the specified torque.
- ⑨ Reassemble parts in reverse order.



#### Individual pressure compensator removal

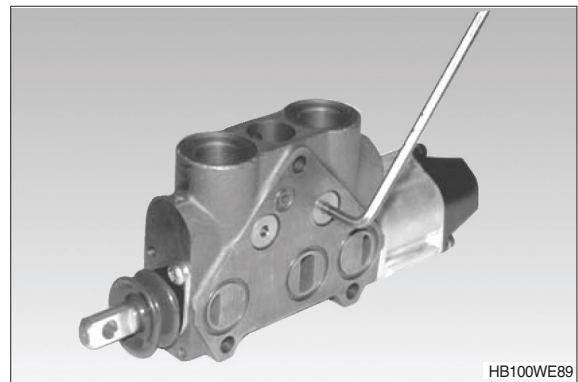
- ① Unscrew the compensator plug (8 mm socket wrench).
- ② Reassembly :
  - Replace the plug O-ring,
  - Torque :  $6.12 \pm 0.61 \text{ kgf} \cdot \text{m}$   
( $44.3 \pm 4.43 \text{ lbf} \cdot \text{ft}$ )
- ③ Remove the compensator piston using a magnet to extract it from its bore.
- ④ Clean the piston's nozzle with compressed air to remove all traces of pollution.
- ⑤ Check the condition of the bore in the distribution element body.
- ⑥ Reassemble parts in reverse order.



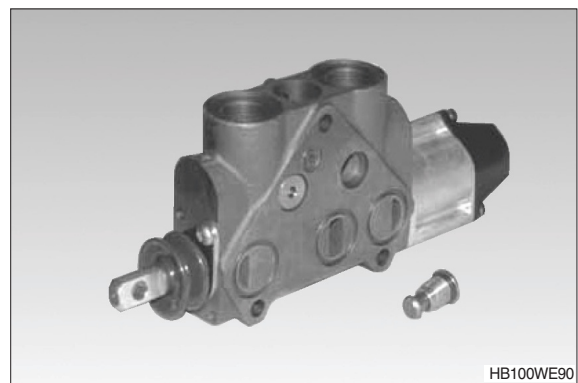


### Check valve compensator removal

- ① Unscrew the check valve plug (5 mm socket wrench).
- ② Reassembly :
  - Replace the plug O-ring.
  - Torque :  $3.06 \pm 0.31$  kgf · m  
( $22.1 \pm 2.21$  lbf · ft)

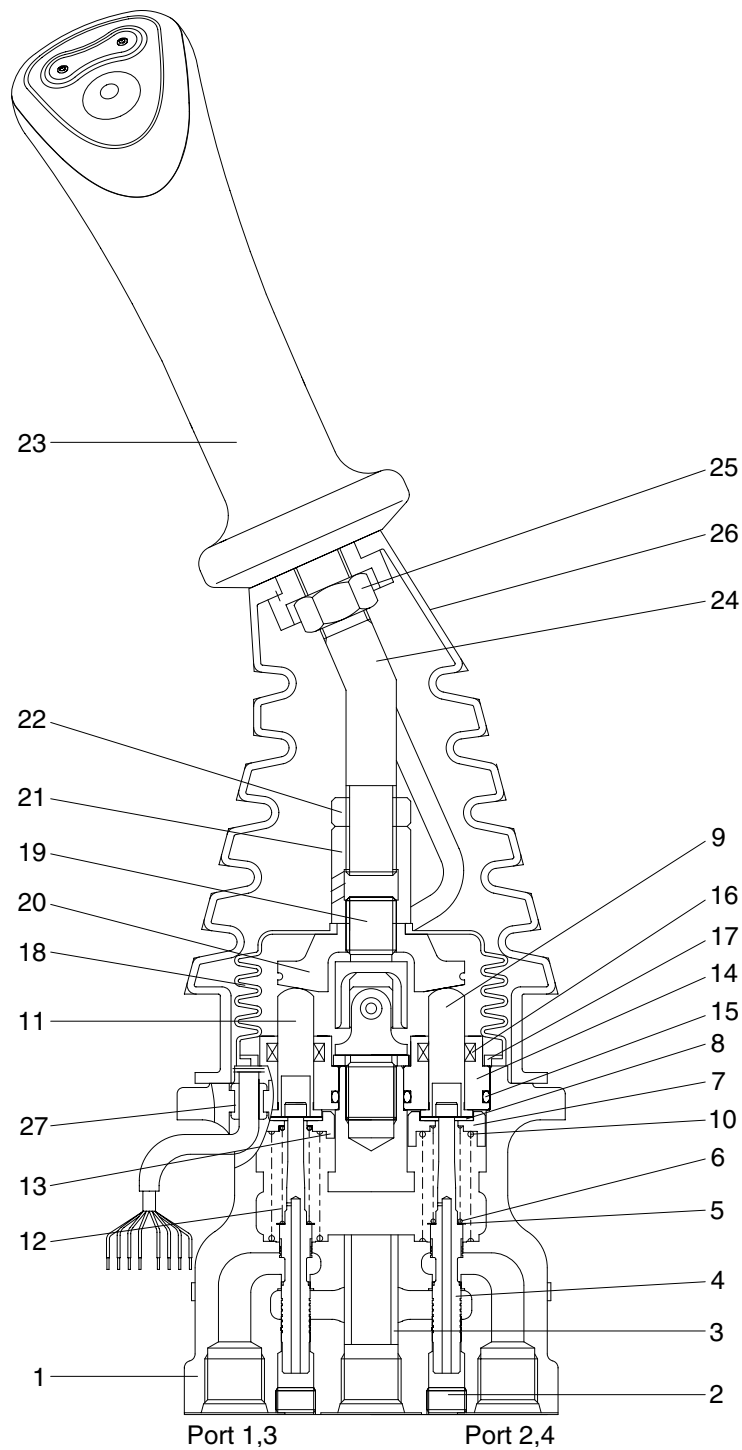


- ③ Visually check the condition of parts.
- ※ Replace the assembly if necessary.



#### 4. RCV LEVER

##### 1) STRUCTURE

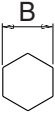


HB100WE145

1 Case	8 Stopper	15 O-ring	22 Lock nut
2 Plug	9 Push rod	16 Rod seal	23 Handle assembly
3 Bushing	10 Spring	17 Plate	24 Handle bar
4 Spool	11 Push rod	18 Boot	25 Nut
5 Shim	12 Spring	19 Joint assembly	26 Boot
6 Spring	13 Spring seat	20 Swash plate	27 Bushing
7 Spring seat	14 Plug	21 Adjusting nut	

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

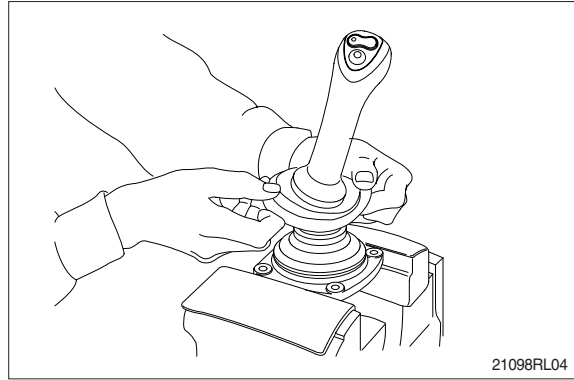
Tool name	Remark	
Allen wrench	6	
Spanner	22	
	27	
(+) Driver	Length 150	
(-) Driver	Width 4~5	
Torque wrench	Capable of tightening with the specified torques	

### (2) Tightening torque

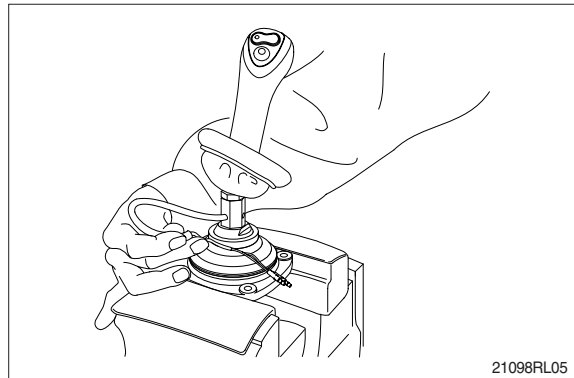
Part name	Item	Size	Torque	
			kgf · m	lbf · ft
Plug	2	PT 1/8	3.0	21.7
Joint	19	M14	3.5	25.3
Swash plate	20	M14	5.0±0.35	36.2±2.5
Adjusting nut	21	M14	5.0±0.35	36.2±2.5
Lock nut	22	M14	5.0±0.35	36.2±2.5

### 3) DISASSEMBLY

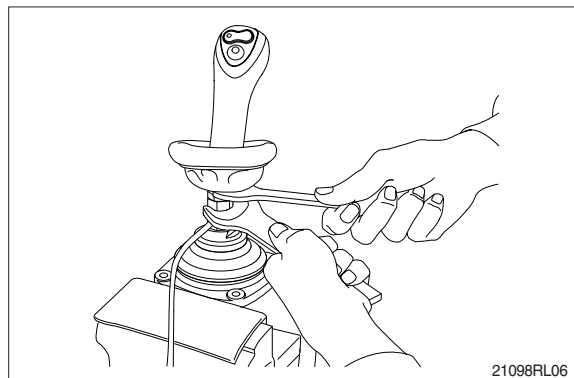
- (1) Clean pilot valve with kerosene.
  - ※ Put blind plugs into all ports
- (2) Fix pilot valve in a vise with copper (or lead) sheets.
- (3) Remove end of boot (26) from case (1) and take it out upwards.



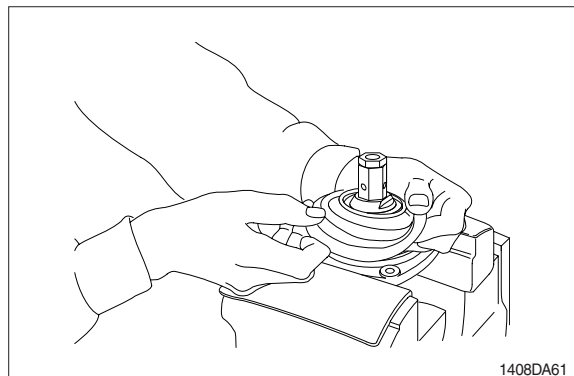
- ※ For valve with switch, remove cord also through hole of casing.



- (4) Loosen lock nut (22) and adjusting nut (21) with spanners on them respectively, and take out handle section as one body.

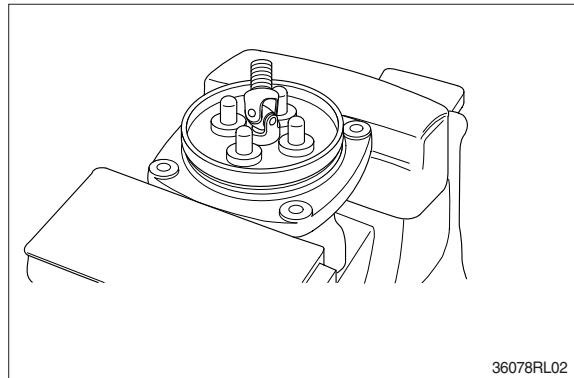
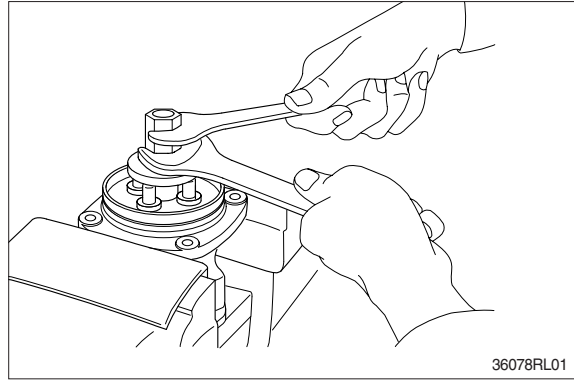


- (5) Remove the boot (18).



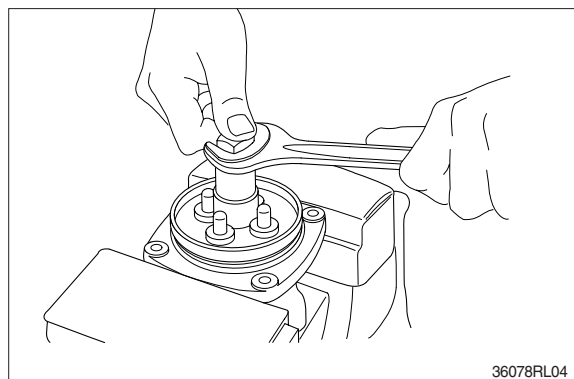
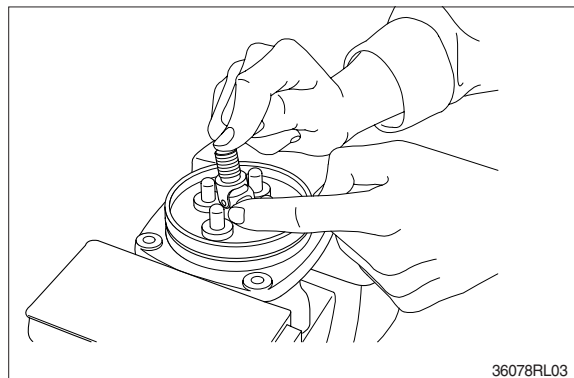


- (6) Loosen adjusting nut (21) and swash plate (20) with spanners on them respectively, and remove them.

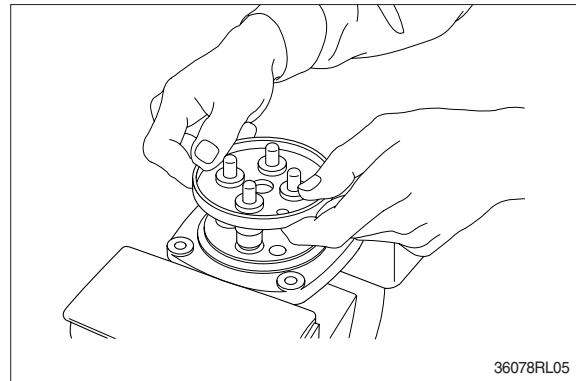


- (7) Turn joint anticlockwise to loosen it, utilizing jig (Special tool).

※ When return spring (10) is strong in force, plate (17), plug (14) and push rod (11) will come up on loosening joint. Pay attention to this.

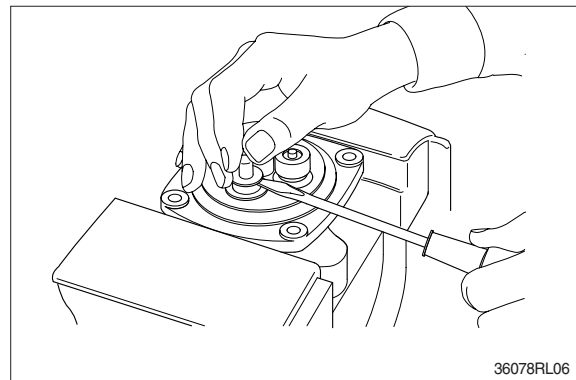


(8) Remove plate (17).



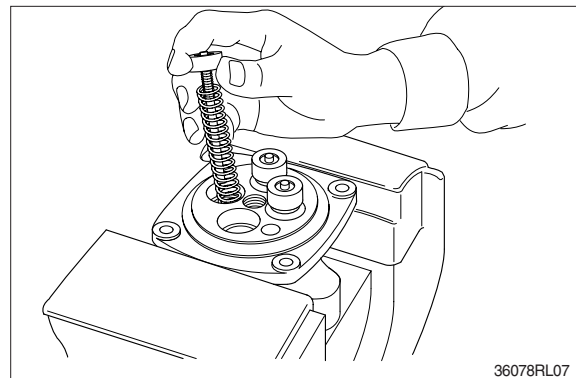
(9) When return spring (10) is weak in force, plug (14) stays in casing because of sliding resistance of O-ring.

- ※ Take it out with minus screwdriver. Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.
- ※ During taking out, plug may jump up due to return spring (10) force. Pay attention to this.

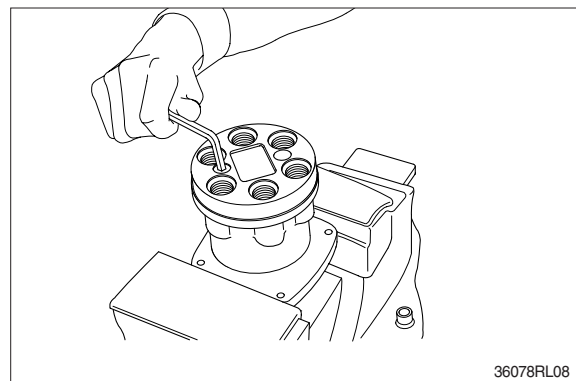


(10) Remove reducing valve subassembly and return spring (10) out of casing.

- ※ Record relative position of reducing valve subassembly and return springs.

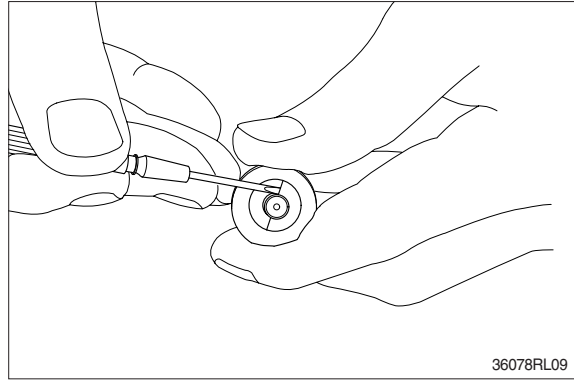


(11) Loosen hexagon socket head plug(2) with hexagon socket screw key.



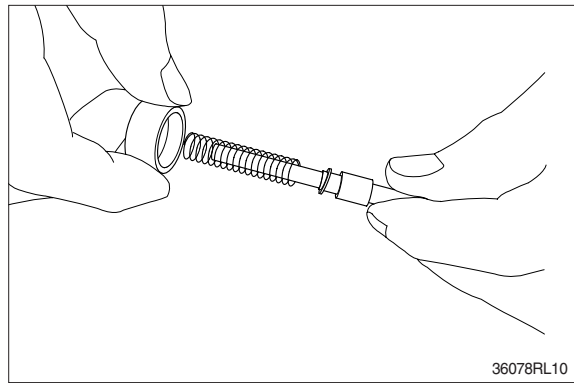
(12) For disassembling reducing valve section, stand it vertically with spool (4) bottom placed on flat workbench. Push down spring seat (7) and remove two pieces of semicircular stopper (8) with tip of small minus screwdriver.

- ※ Pay attention not to damage spool surface.
- ※ Record original position of spring seat (7).
- ※ Do not push down spring seat more than 6mm.

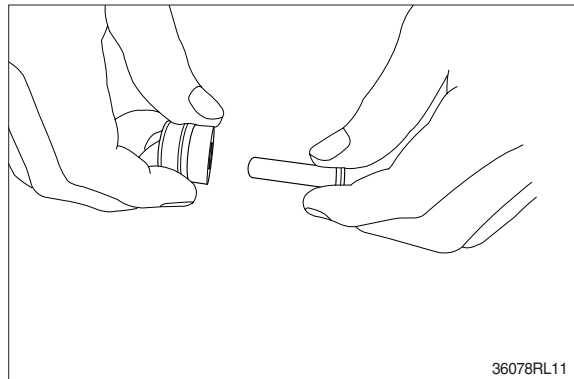


(13) Separate spool (4), spring seat (7), spring (6) and shim (5) individually.

- ※ Until being assembled, they should be handled as one subassembly group.

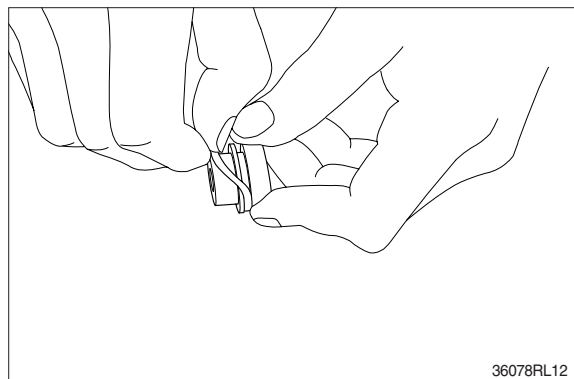


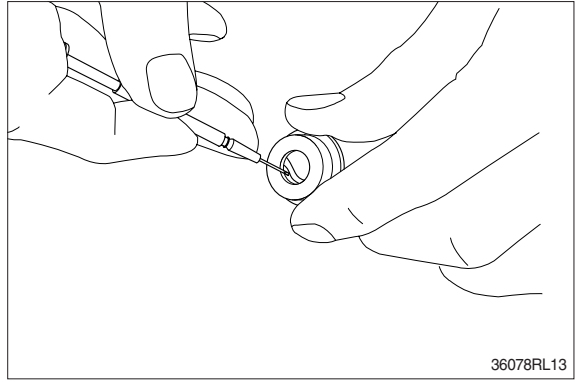
(14) Take push rod (11) out of plug (14).



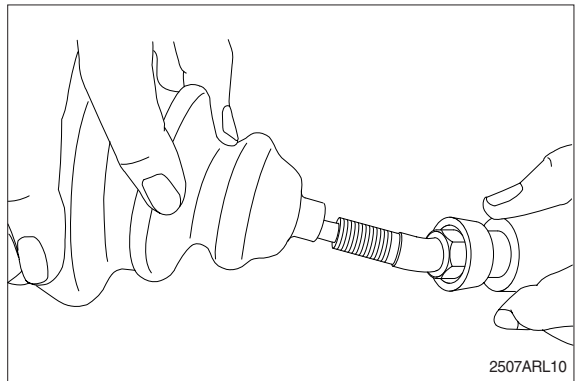
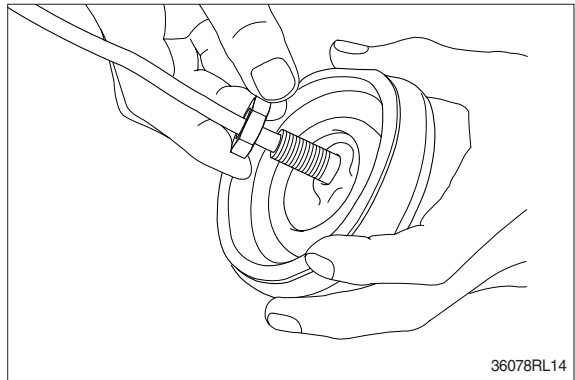
(15) Remove O-ring (15) and seal (16) from plug (14).

Use small minus screwdriver or so on to remove this seal.





(16) Remove lock nut (22) and then boot (26).



### **(16) Cleaning of parts**

- ① Put all parts in rough cleaning vessel filled with kerosene and clean them (rough cleaning).
  - ※ If dirty part is cleaned with kerosene just after putting it in vessel, it may be damaged. Leave it in kerosene for a while to loosen dust and dirty oil.
  - ※ If this kerosene is polluted, parts will be damaged and functions of reassembled valve will be degraded.  
Therefore, control cleanliness of kerosene fully.
- ② Put parts in final cleaning vessel filled with kerosene, turning it slowly to clean them even to their insides (finish cleaning).
  - ※ Do not dry parts with compressed air, since they will be damaged and/or rusted by dust and moisture in air.

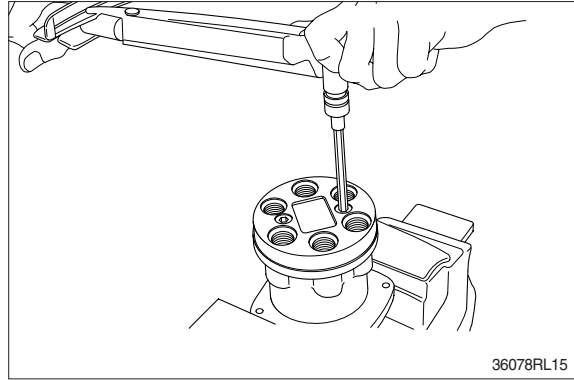
### **(17) Rust prevention of parts**

- Apply rust-preventives to all parts.
- ※ If left as they are after being cleaned, they will be rusted and will not display their functions fully after being reassembled.

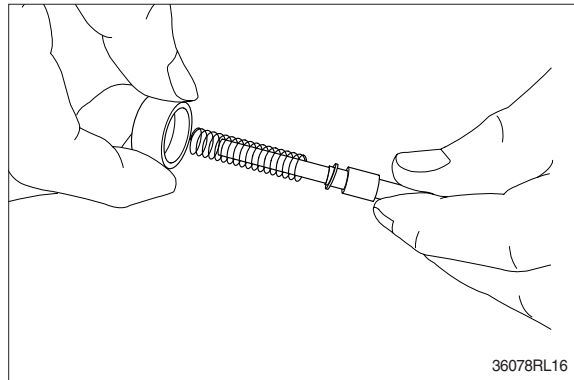
#### 4) ASSEMBLY

(1) Tighten hexagon socket head plug (2) to the specified torque.

※ Tighten two bolts alternately and slowly.

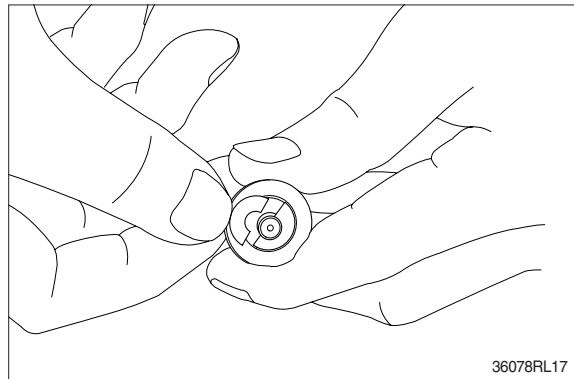


(2) Put shim (5), springs (6) and spring seat (7) onto spool (4) in this order.



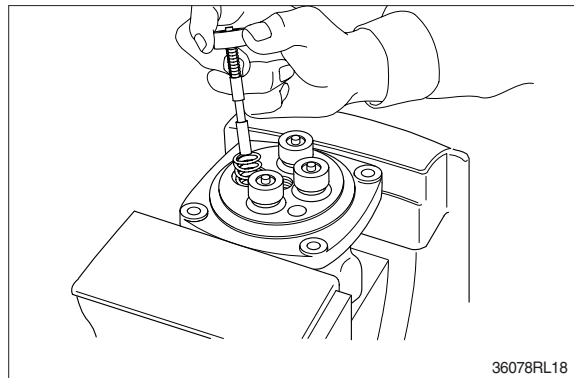
(3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (8) on spring seat without piling them on.

※ Assemble stopper (8) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6mm.

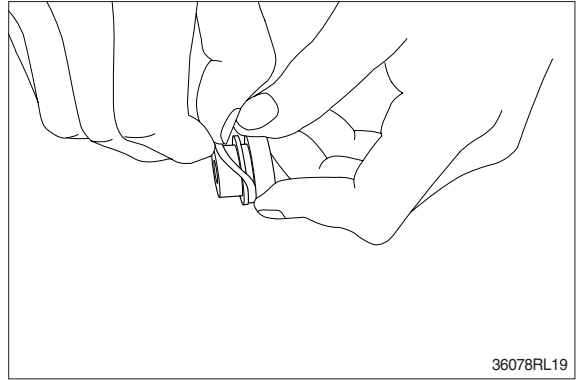


(4) Assemble spring (10) into casing (1). Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

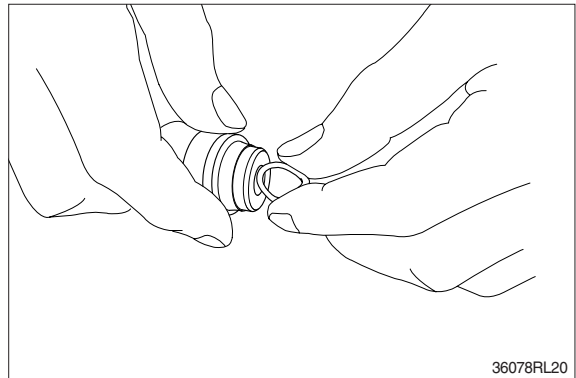


(5) Assemble O-ring (15) onto plug (14).



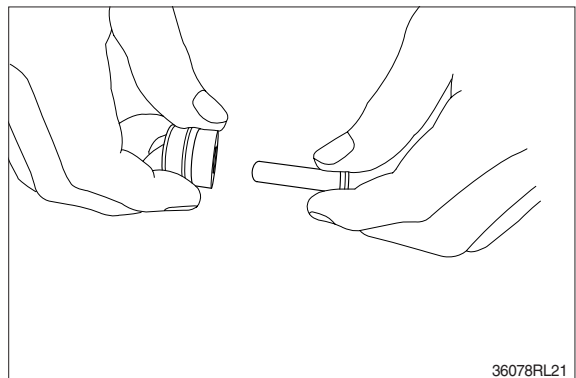
(6) Assemble seal (16) to plug (14).

※ Assemble seal in such lip direction as shown below.



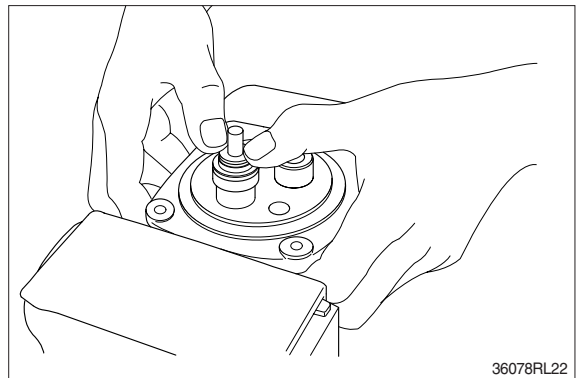
(7) Assemble push rod (11) to plug (14).

※ Apply working oil on push-rod surface.

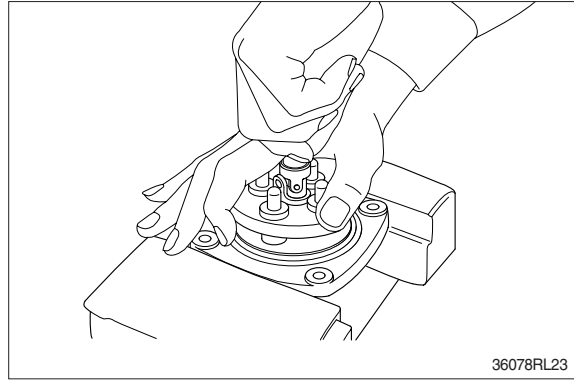


(8) Assemble plug subassembly to casing.

※ When return spring is weak in force, subassembly stops due to resistance of O-ring.

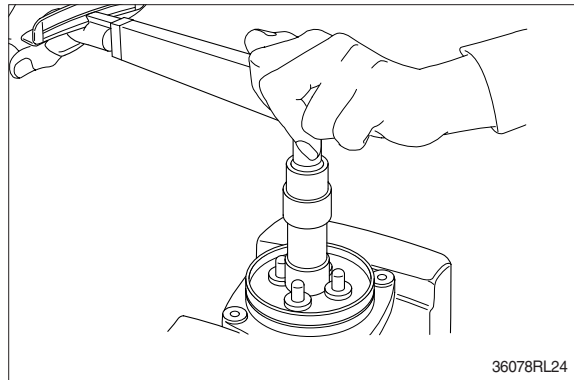


- (9) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (17), and tighten joint (19) temporarily.



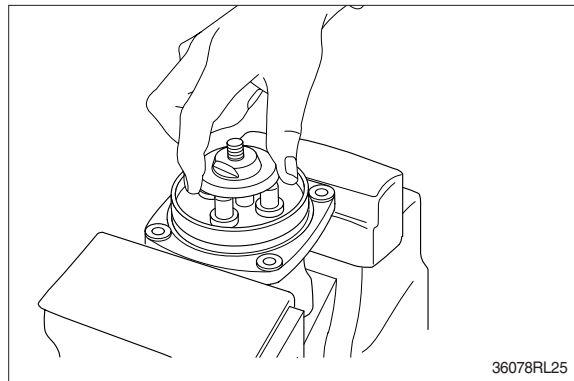
- (10) Fit plate (17).

- (11) Tighten joint (19) with the specified torque to casing, utilizing jig.



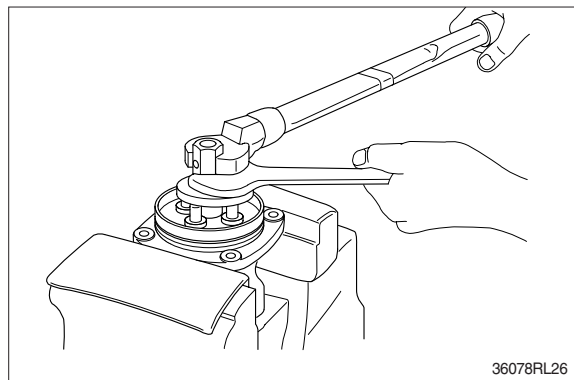
- (12) Assemble swash plate (20) to joint (19).

- ※ Screw it to position that it contacts with 4 push rods evenly.
- ※ Do not screw it over.



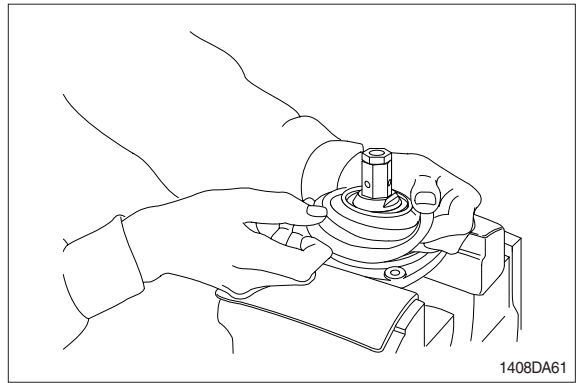
- (13) Assemble adjusting nut (21), apply spanner to width across flat of plate (20) to fix it, and tighten adjusting nut to the specified torque.

- ※ During tightening, do not change position of disk.

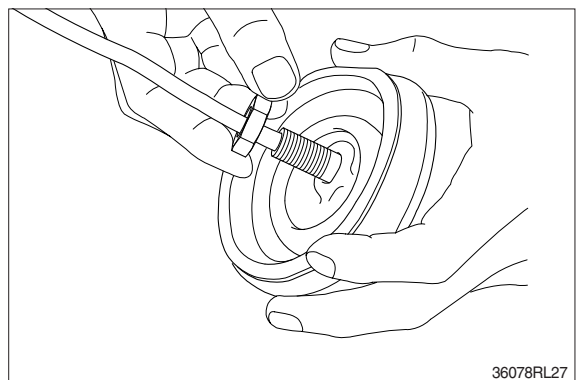
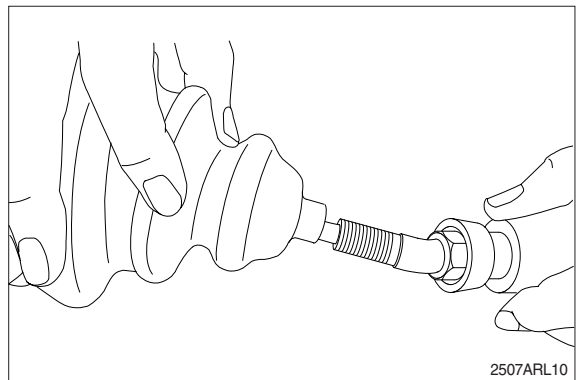




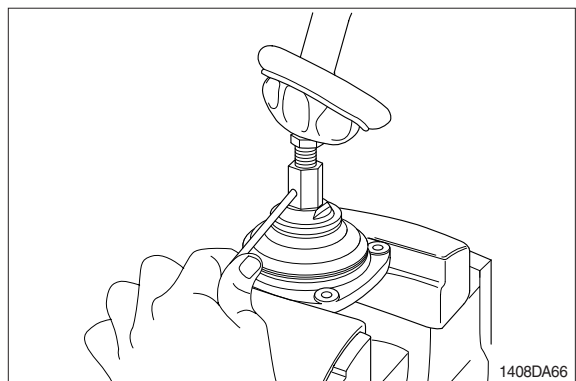
(14) Fit boot (18) to plate.



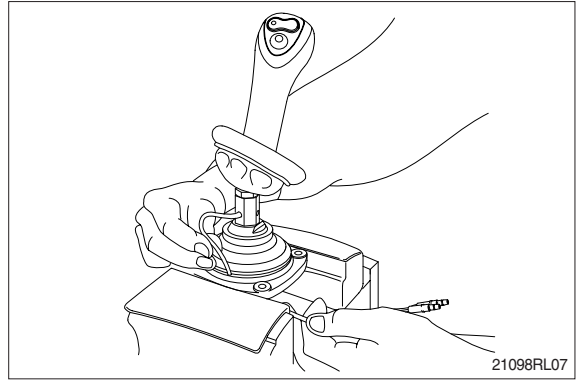
(15) Fit boot (26) and lock nut (22), and handle subassembly is assembled completely.



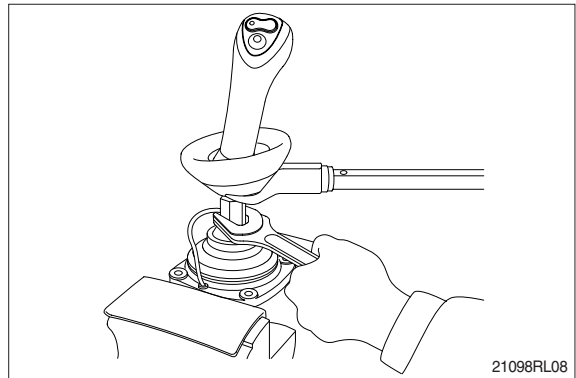
(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.



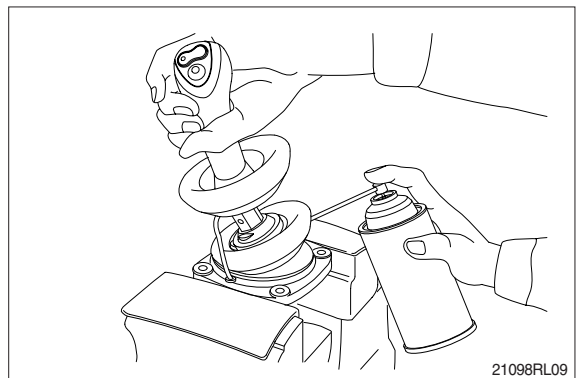
- (17) Assemble bushing (27) to plate and pass cord and tube through it.  
※ Provide margin necessary to operation.



- (18) Determine handle direction, tighten lock nut (22) to specified torque to fix handle.



- (19) Apply grease to rotating section of joint and contacting faces of disk and push rod.



- (20) Assemble lower end of bellows to casing.  
(21) Inject volatile rust-preventives through all ports and then put blind plugs in ports.

