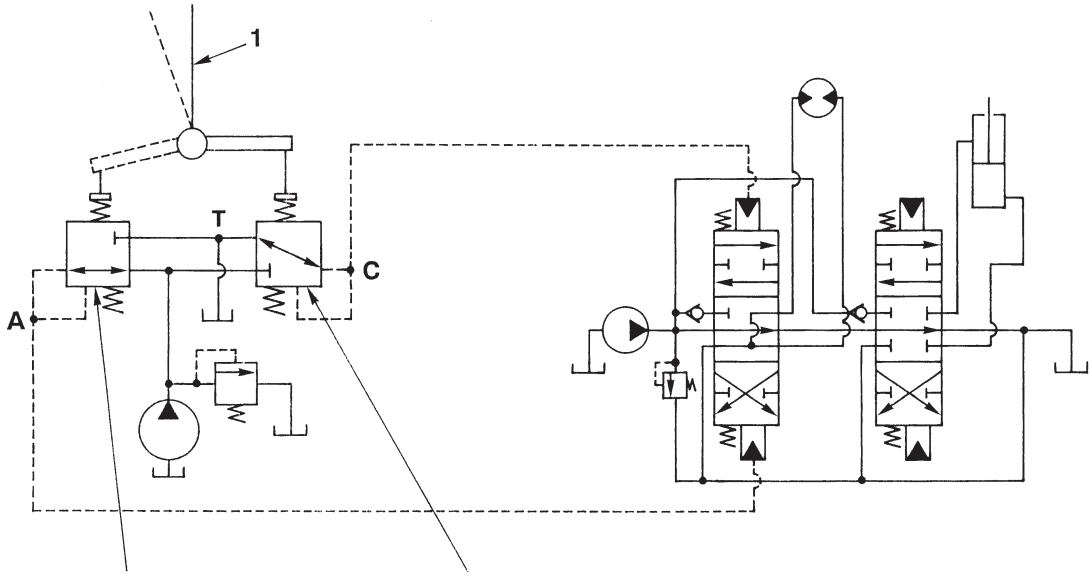
OPERATION

The pilot valve casing contains a vertical shaft hole with a reducing valve incorporated into it. When the handle is tilted, the push rod and spring seat are pushed down changing the secondary pressure spring's pressure.

The casing also contains an inlet port for hydraulic oil, port P (primary pressure), and an outlet port, port T (tank), and secondary pressure is taken from 4 ports, port 1, port 2, port 3 and port 4, on the bottom of the vertical shaft hole.



When the Handle is in Neutral

In this case, the force of the secondary pressure setting spring, which determines the pilot valve's output pressure (secondary pressure), is not transmitted to the spool. Therefore, the spool is pushed up by the return spring and is in the output port C position shown above, with oil not flowing between port P and the output port C but flowing between the T port and output port C.

When the Handle is Tilted

When the handle (1) is tilted and the push rod is pushed, the spool moves downward and port P and port A are joined. The oil in the pilot valve pump flows out to port A, generating pressure.

When the pressure in port A is the same as the set force of the spring (set pressure), there is a balance between the hydraulic pressure and the spring force.

When the pressure in port A is greater than the set pressure, port A and port P close and port A and port T open.

When the pressure at port A is lower than the set pressure, port A and port P open and port A and port T close.

In this way, the secondary pressure is kept constant.

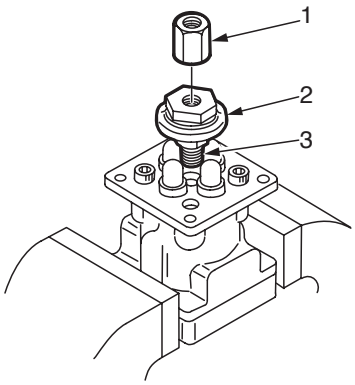
DISASSEMBLY AND ASSEMBLY

General Cautions

- Since all parts in the pilot valve are precision machined, carry out disassembly and reassembly operations in a clean place and take special care not to scratch the parts.
- Before disassembly, clean the outside surfaces of the pilot valve.
- Clean each of the disassembled parts and apply clean hydraulic oil to them.
- Replace all seals with new ones each time the pilot valve is disassembled.
- During assembly, remove all the foreign matter from each part and check them to make sure there are no burrs, bruises using or other marks on them. Remove all burrs and bruises using an oil stone.
- Apply thin coating of grease to seals when assembling them.

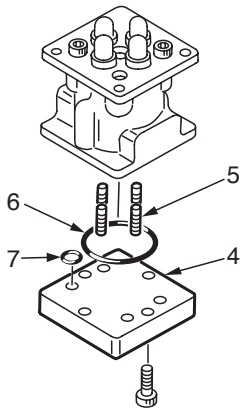
Disassembly

1. Remove the nut (1) and separate the joint from the cam (2).
   - Fix the valve to the vise using a copper plate or lead plate.
2. Remove the joint (3).



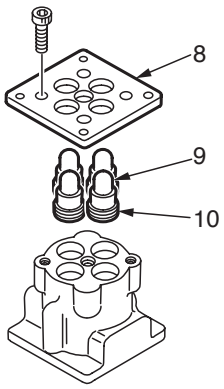
C4D301

3. Loosen the cap screws at the bottom and remove the port plate (4).
4. Remove the four pistons (5), one O-ring (6), and six O-rings (7).



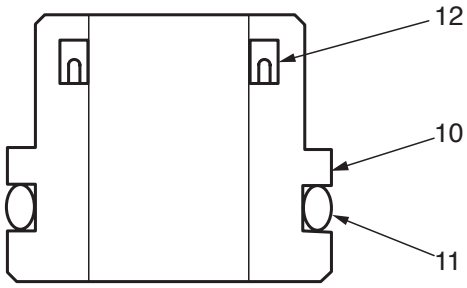
C4D302

5. Loosen the cap screws and remove the plate (8).
6. Remove the push rods (9) together with the sleeves (10).
   - The push rods for port 1 and port 3 are different from those for port 2 and port 4. Store them carefully so that they can be restored at the same positions when assembling.



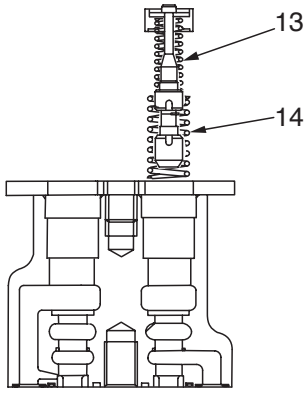
C4D303

7. Remove the O-ring (11) and U-packing (12) from the sleeve (10).



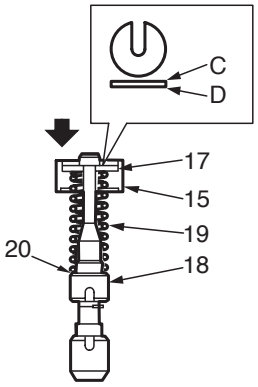
C4D304

8. Remove the spool assembly (13) and spring (14) from the casing.
   - The spool assemblies and springs for port 1 and port 3 are different from those for port 2 and port 4. Store them carefully so that they can be restored at the same positions when assembling.



C4D305

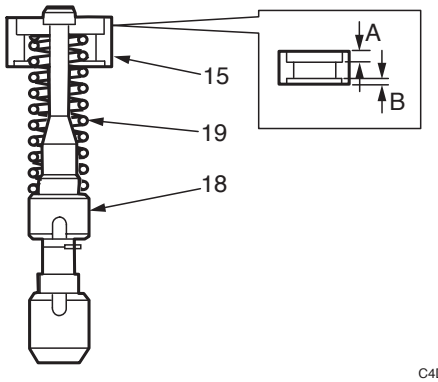
9. Disassemble the spool assembly.
   a. Push down the spring holder (15) and remove the retainer (17) from the spool (18).
   b. Remove the spring holder (15) and spring (19) from the spool (18).
      - Be careful not to lose the pressure adjusting shim (20) if assembled.



C4D306

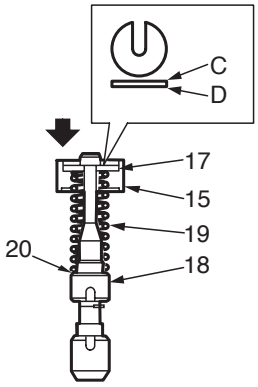
Assembly

1. Assemble the spring assembly.
   a. Fit the spring (19) to the spool (18) and install the spring holder (15).
      • Be careful of the direction of the spring holder.
        A: Make the side with the deeper hole up.
        B: Make the side with the shallow hole down.



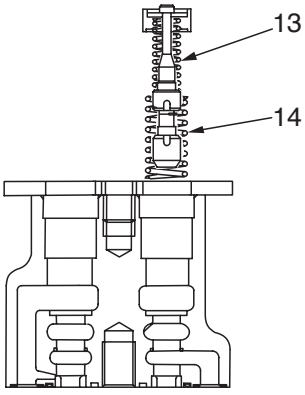
C4D307

   b. Push down the spring holder (15) and fit the retainer (17) to the spool (18).
      • Be careful of the direction of the retainer.
        C: Make the side with the sharp corner up.
        D: Make the side with the round corner down.



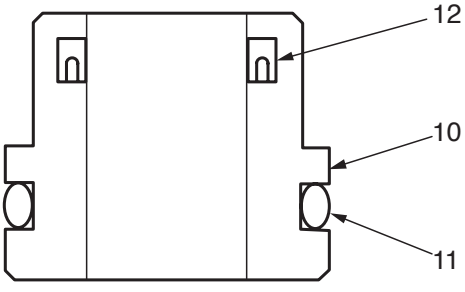
C4D306

2. Install the spring (14) and spool assembly (13) in the casing.
   • Install them at the same positions as previously assembled.
   • Be careful not to damage the spool hole.



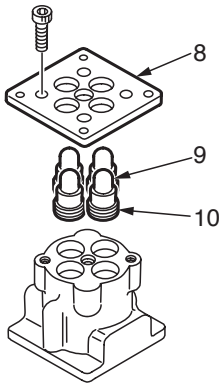
C4D305

3. Install the O-ring (11) and U-packing (12) in the sleeve (10).
   • Be careful of the direction of the U-packing.



C4D304

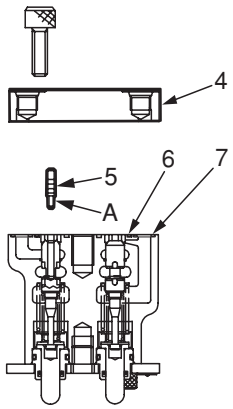
4. Assemble the push rods (9) and sleeves (10), and mount them on the spool assemblies in the casing.
   - Install them at the same positions as previously assembled.
   - Be careful not to damage the parts by pushing them too strongly.



C4D303

5. Mount the plate (8) and tighten the cap screws.
   Cap screw: 23.5 ±2 N·m

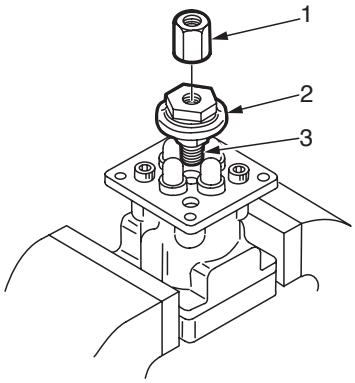
6. Turn the casing upside down to make the push rods the lower side and insert the four pistons (5) into the spool holes.
   - Let the side A with the smaller diameter (unpolished side) of the piston be positioned in the back of the holes.



C4D308

7. Install one O-ring (6), six O-rings (7) and the port plate (4) in the casing and tighten them with the cap screws.
   Cap screw: 23.5 ±2 N·m

8. Reverse the casing again to the original position and install the joint (3).
   Joint: 49 ±4.9 N·m
   - Apply Loctite #242 to the joint screws.

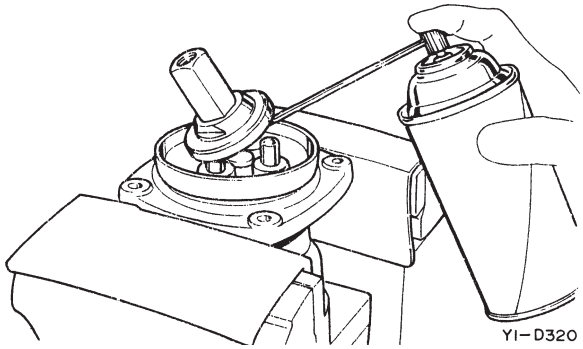


C4D301

9. Tighten the cam (2) with your fingers until it touches the push rod. Loosen the cam at an angle of around 45° before tightening the nut (1).
   Nut: 49 ±4.9 N·m

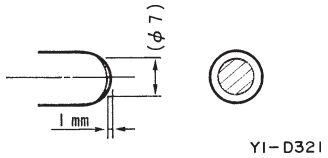
IMPORTANT: Never tighten the nut without loosening the cam, otherwise the cam will rotate with the nut, keeping the push rods pressed. This will generate secondary pressure in the neutral position that might cause erroneous operation.

10. Apply grease to the cam, push rods and joint rotating section.


YI-D320

INSPECTION AND ADJUSTMENT

Checking the Parts

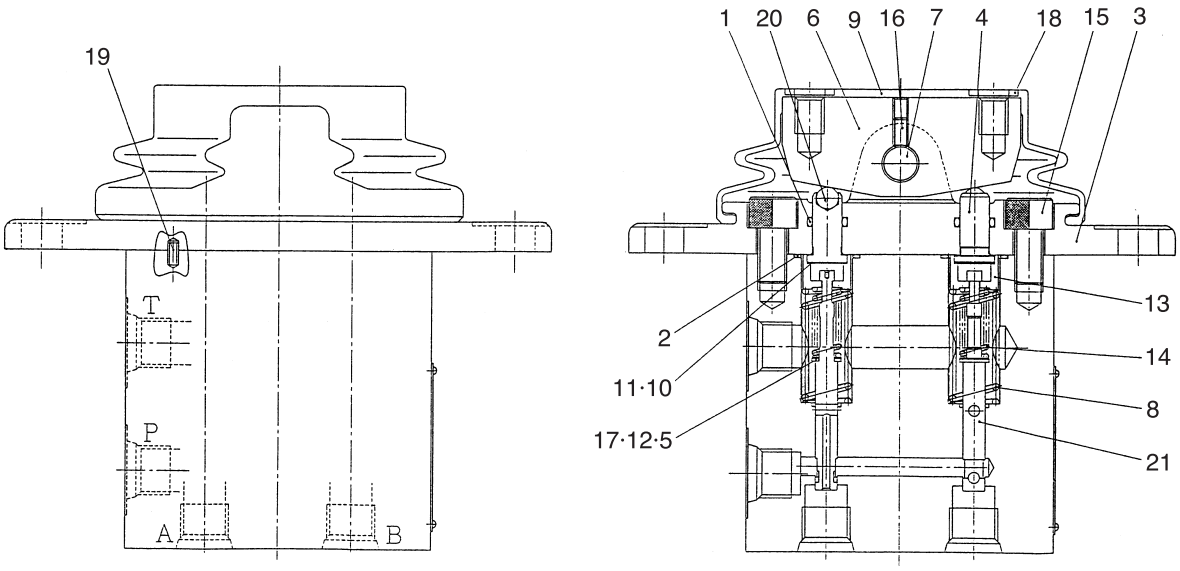
Parts	Judgment Criteria	Treatment
O-ring	——	• Replace
Seal	——	• Replace
Seal Washer	——	• Replace
Spool	• Wear on sliding portions is 10 μm or greater compared to non-sliding portions • Scratches on sliding portions • Spool doesn't move smoothly	• Replace • Replace • Repair or replace
Push Rod	• Front end is worn 1 mm or more  • Scratches in the sliding portion	• Replace • Replace
Plug	• Seal is imperfect due to damage	• Repair or replace
Operating Portion	• Tightening is loose at the pin, shaft or joint of the operating portion, with looseness of 2 mm or greater • Due to wear, etc. tightening is loose at the pin, shaft or joint of the operating portion, with looseness of 2 mm or greater	• Tighten to the specified torque • Replace
Casing, Port Plate	• Scratches, rust or corrosion on the spool and sliding portion • Scratches, rust or corrosion on seal portions which come in contact with the O-ring	• Replace • Repair or replace

TROUBLESHOOTING

Symptom	Probable Causes	Remedy
Secondary pressure doesn't rise	• Primary pressure is insufficient • Spring is damaged or permanently deformed • The clearance between the spool and casing is abnormally large • There is looseness in the handle	• Keep the primary pressure • Replace the spring • Replace the spool and casing assembly • Disassemble and reassemble, or replace the handle
Secondary pressure doesn't stabilize	• Sliding parts are catching • Tank line pressure fluctuates • Air gets mixed into the piping	• Repair or replace • Remove the abnormal portions of the tank line • Operate the machine several times and bleed out the air
Secondary pressure is high	• Tank line pressure is high • Sliding parts are catching	• Remove the abnormal portions of the tank line • Repair or replace

PILOT VALVE (Offset)

CONSTRUCTION



L2D300

1. O-ring
2. O-ring
3. Cover
4. Push Rod
5. Shim
6. Cam
7. Pin
8. Spring
9. Boot
10. Shim
11. Shim
12. Shim
13. Spring Holder
14. Spring
15. Cap Screw
16. Set Screw
17. Washer
18. Washer
19. Spring Pin
20. Ball
21. Spool