

3. During fine control (when the lever is returned) (fine control → neutral)

When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

When this happens, fine control hole **f** is connected to drain chamber **D** and the pressure oil at port **P1** is released.

If the pressure at port **P1** drops too far, spool (1) is pushed down by metering spring (2), and fine control hole **f** is shut off from drain chamber **D**.

At almost the same time, it is connected to pump pressure chamber **PP**, and the pump pressure is supplied until the pressure at port **P1** recovers to a pressure that corresponds to the lever position.

When control valve spool returns, oil goes back into port **D**, through fine control hole **f**, into port **B** of the spool opposite the active spool. Oil flows through port **P2** and into port **B** to maintain the fill level (Fig. 3).

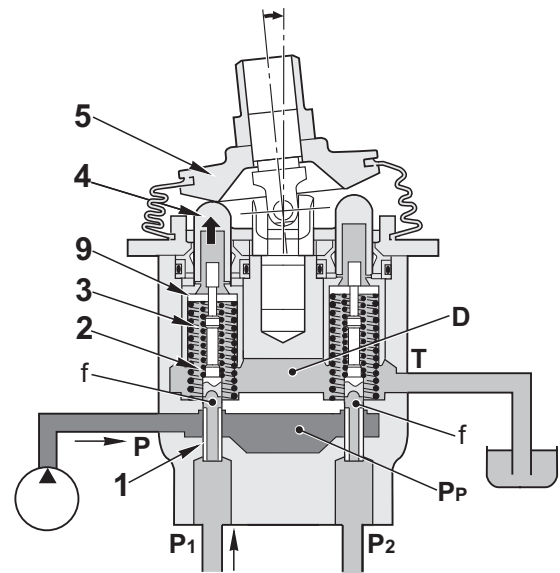
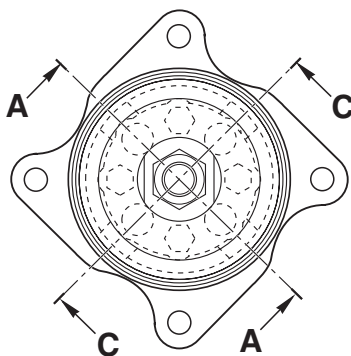
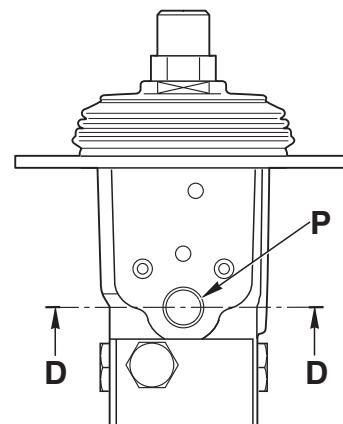
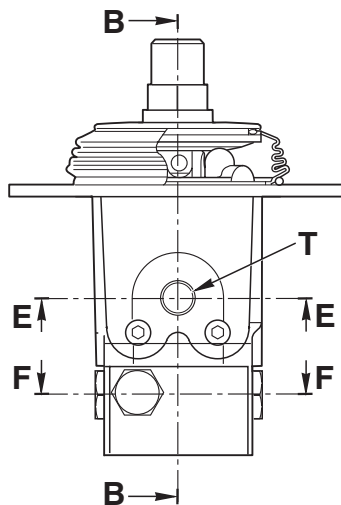
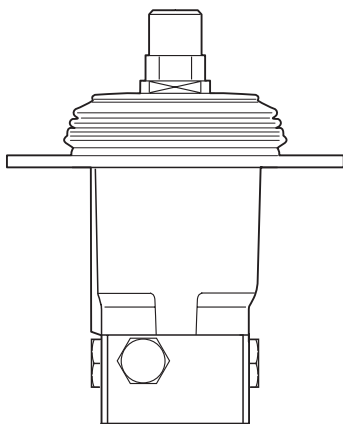
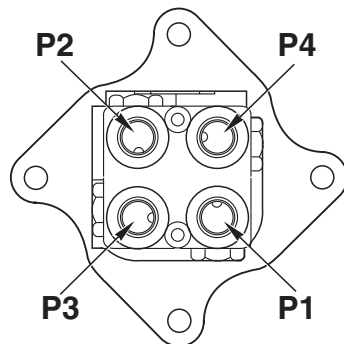


Fig. 3

RKS00840

L.H. PPC VALVE (STANDARD)

TRAVEL CONTROL

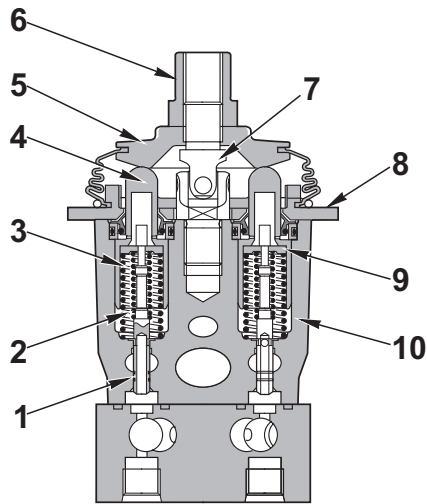


RKS00860

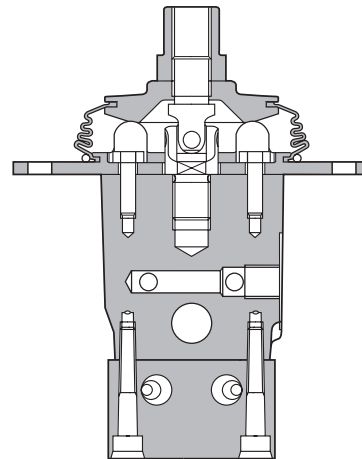
- P1 port - To hydraulic pump (DA2 port)
- P2 port - To hydraulic pump (DB1 port)
- P3 port - To hydraulic pump (DA1 port)
- P4 port - To hydraulic pump (DB2 port)
- P port - From solenoid valve group ST1 (B port)
- T port - To hydraulic tank

FUNCTION

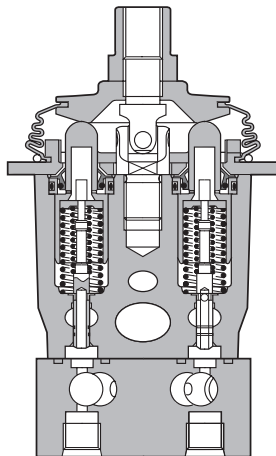
- P1 L.H. travel forward
- P2 L.H. travel reverse
- P3 R.H. travel forward
- P4 R.H. travel reverse
- ★ When acting control lever, two ports are pressurised contemporarily (i.e.: travel forward pressurise P1 and P3 ports).



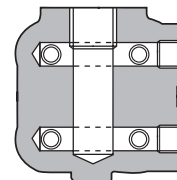
Section A - A



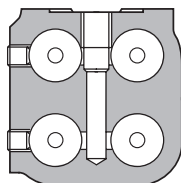
Section B - B



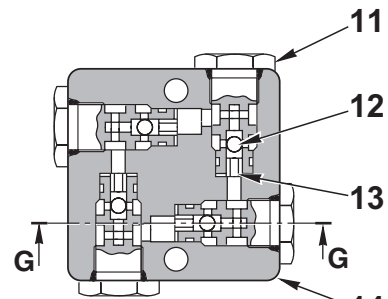
Section C - C



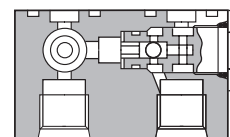
Section D - D



Section E - E



Section F - F



Section G - G

- 1. Spool
- 2. Metering spring
- 3. Centering spring
- 4. Piston
- 5. Disc
- 6. Nut
- 7. Joint

- 8. Cover
- 9. Stopper
- 10. Body
- 11. Plug
- 12. Ball
- 13. Seat
- 14. Body (for shuttle valve)

RKS00870

FUNCTION

1. NEUTRAL

Ports **P1** and **P2** of the PPC valve are connected to drain chamber **D** through fine control hole **f** in spool (1). (Fig. 1).

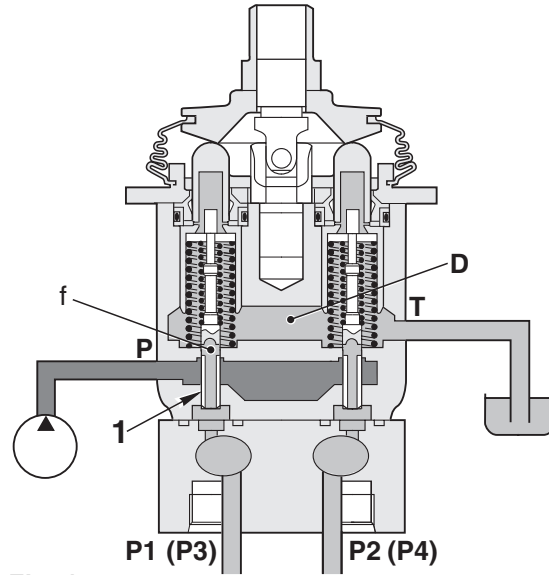


Fig. 1

RKS00890

2. During fine control (NEUTRAL → fine control)

When piston (4) starts to be pushed by disc (5), retainer (9) is pushed; spool (1) is also pushed by metering spring (2), and moves down.

When this happens, fine control hole **f** is shut off from drain chamber **D**, and at almost the same time, it is connected to pump pressure chamber **PP**, so pilot pressure oil from the control pump passes through fine control hole **f** and goes from port **P1**. When the pressure at port **P1** becomes higher, spool (1) is pushed back and fine control hole **f** is shut off from pump pressure chamber **PP**.

At almost the same time, it is connected to drain chamber **D** to release the pressure at port **P1**.

When this happens, spool (1) moves up or down so that the force of metering spring (2) is balanced with the pressure at port **P1**.

The relationship in the position of spool (1) and body (10) (fine control hole **f** is at a point midway between drain hole **D** and pump pressure chamber **PP**) does not change even if the pressure at port **P1** becomes max.

Therefore, metering spring (2) is compressed proportionally to the amount of movement of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever.

- a) until pressures on port **P1** are perfectly balanced;
- b) pressure at port **P1** on stem (1) reaches the value needed to counteract the force of spring (2).

This ensure proportionality between control lever position, **P1** circuit pressure, and main control valve stem displacement (Fig. 2).

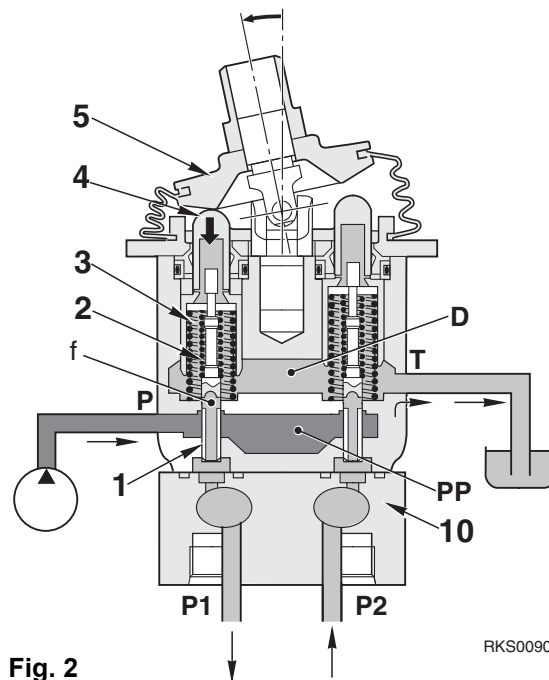


Fig. 2

RKS00900

**3. During fine control (when the lever is returned)
(fine control → neutral)**

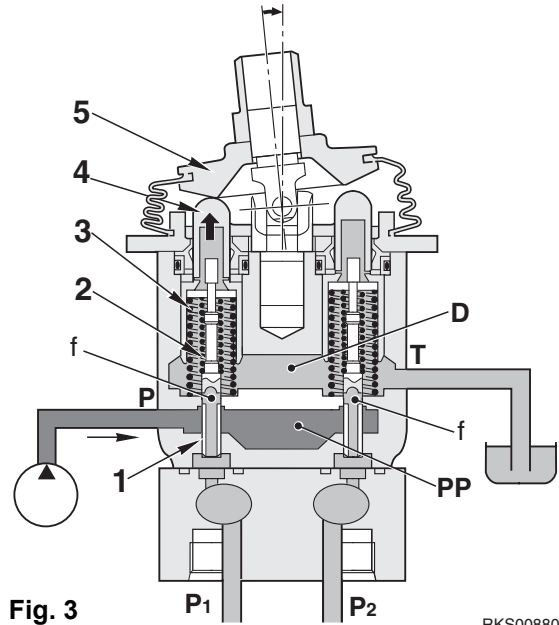
When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

When this happens, fine control hole **f** is connected to drain chamber **D** and the pressure oil at port **P1** is released.

If the pressure at port **P1** drops too far, spool (1) is pushed down by metering spring (2), and fine control hole **f** is shut off from drain chamber **D**.

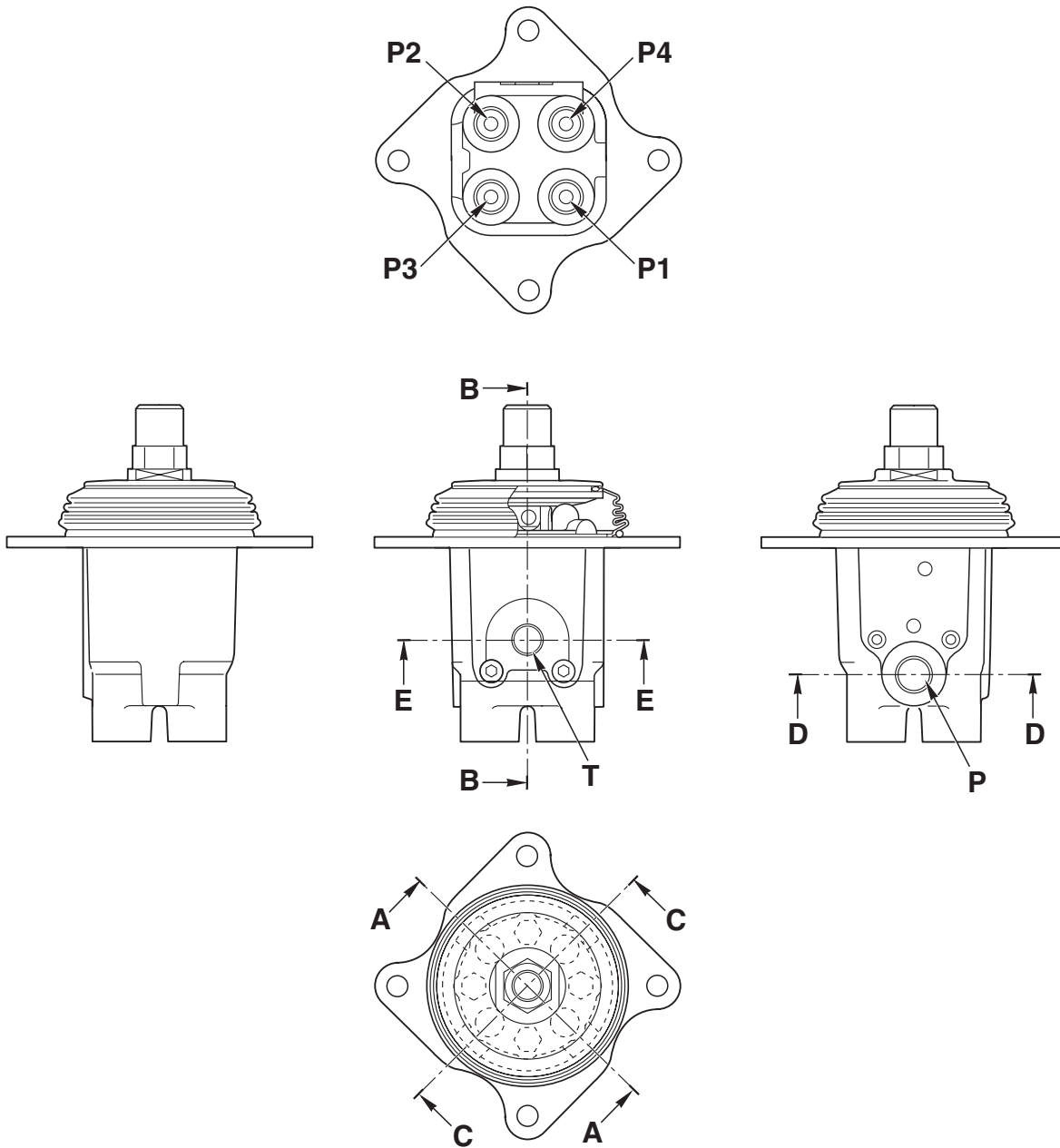
At almost the same time, it is connected to pump pressure chamber **PP**, and the pump pressure is supplied until the pressure at port **P1** recovers to a pressure that corresponds to the lever position.

When control valve spool returns, oil goes back into port **D**, through fine control hole **f**, into port **B** of the spool opposite the active spool. Oil flows through port **P2** and into port **B** to maintain the fill level (Fig. 3).



L.H. PPC VALVE - PATTERN CHANGE (OPTIONAL)

EQUIPMENT AND TRAVEL CONTROL



RKS00800

- P1 port - To pattern change valve (Pin 1 port)
- P2 port - To pattern change valve (Pin 2 port)
- P3 port - To pattern change valve (Pin 4 port)
- P4 port - To pattern change valve (Pin 3 port)
- P port - From solenoid valve group ST1
- T port - To hydraulic tank

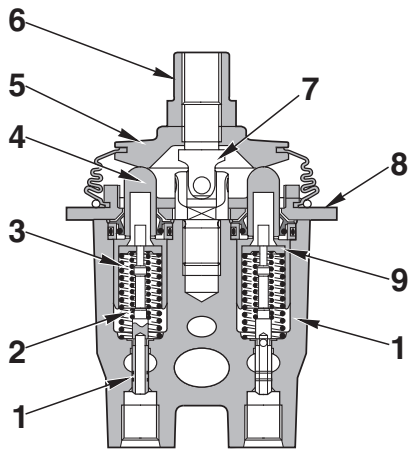
FUNCTION

ISO PATTERN:

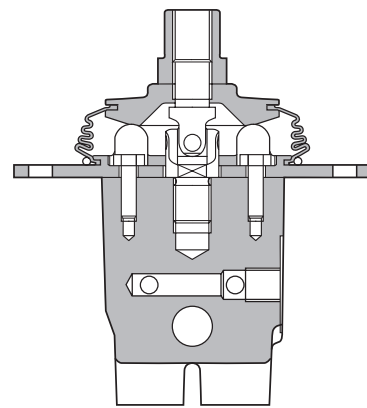
- P1 Travel forward
- P2 Travel reverse
- P3 L.H. travel
- P4 R.H. travel

OPTIONAL PATTERN:

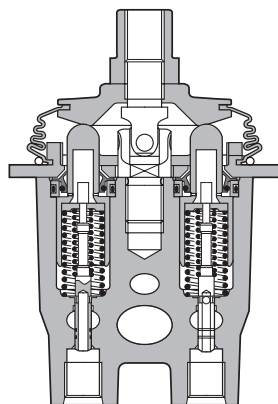
- P1 L.H. travel forward
- P2 L.H. travel reverse
- P3 Raise arm
- P4 Lower arm



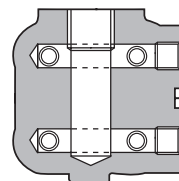
Section A - A



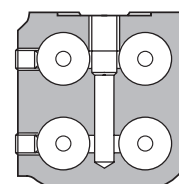
Section B - B



Section C - C



Section D - D



Section E - E

- 1. Spool
- 2. Metering spring
- 3. Centering spring
- 4. Piston

- 5. Disc
- 6. Nut
- 7. Joint
- 8. Cover
- 9. Stopper
- 10. Body

RKS00810

FUNCTION

1. Control lever in NEUTRAL position

Ports **P1** and **P2** of the PPC valve are connected to drain chamber **D** through fine control hole **f** in spool (1). (Fig. 1).

2. During fine control (NEUTRAL → fine control)

When piston (4) starts to be pushed by disc (5), retainer (9) is pushed; spool (1) is also pushed by metering spring (2), and moves down.

When this happens, fine control hole **f** is shut off from drain chamber **D**, and at almost the same time, it is connected to pump pressure chamber **PP**, so pilot pressure oil from the control pump passes through fine control hole **f** and goes from port **P1**. When the pressure at port **P1** becomes higher, spool (1) is pushed back and fine control hole **f** is shut off from pump pressure chamber **PP**.

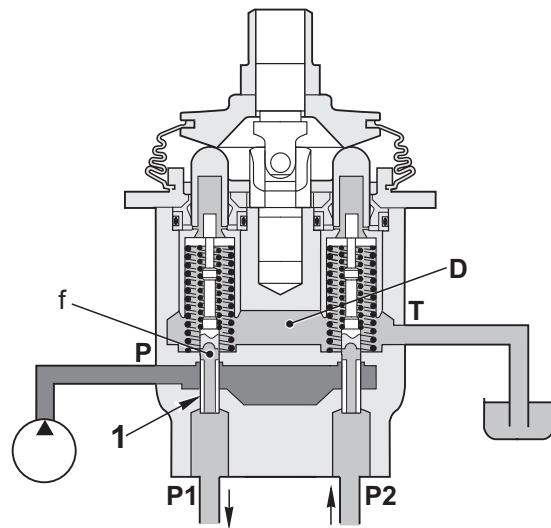
At almost the same time, it is connected to drain chamber **D** to release the pressure at port **P1**. When this happens, spool (1) moves up or down so that the force of metering spring (2) is balanced with the pressure at port **P1**.

The relationship in the position of spool (1) and body (10) (fine control hole **f** is at a point midway between drain hole **D** and pump pressure chamber **PP**) does not change even if the pressure at port **P1** becomes max.

Therefore, metering spring (2) is compressed proportionally to the amount of movement of the control lever, so the pressure at port **P1** also rises in proportion to the travel of the control lever.

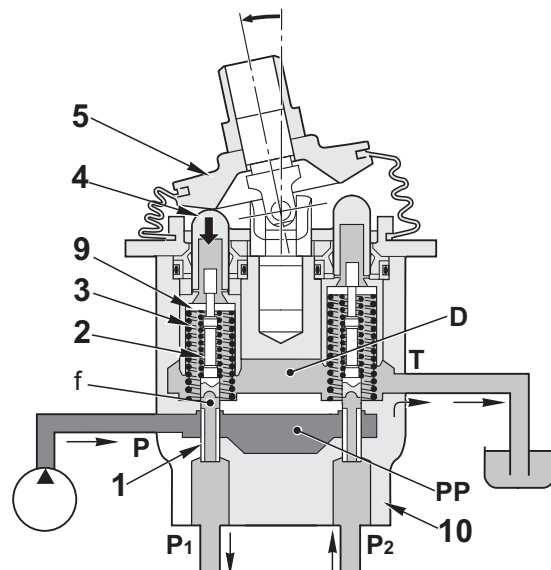
- a) until pressures on port **P1** are perfectly balanced;
- b) pressure at port **P1** on stem (1) reaches the value needed to counteract the force of spring (2).

This ensure proportionality between control lever position, **P1** circuit pressure, and main control valve stem displacement (Fig. 2).



RKS00820

Fig. 1



RKS00830

Fig. 2

**3. During fine control (when the lever is returned)
(fine control → neutral)**

When disc (5) starts to be returned, spool (1) is pushed up by the force of centering spring (3) and the pressure at port **P1**.

When this happens, fine control hole **f** is connected to drain chamber **D** and the pressure oil at port **P1** is released.

If the pressure at port **P1** drops too far, spool (1) is pushed down by metering spring (2), and fine control hole **f** is shut off from drain chamber **D**.

At almost the same time, it is connected to pump pressure chamber **PP**, and the pump pressure is supplied until the pressure at port **P1** recovers to a pressure that corresponds to the lever position.

When control valve spool returns, oil goes back into port **D**, through fine control hole **f**, into port **B** of the spool opposite the active spool. Oil flows through port **P2** and into port **B** to maintain the fill level (Fig. 3).

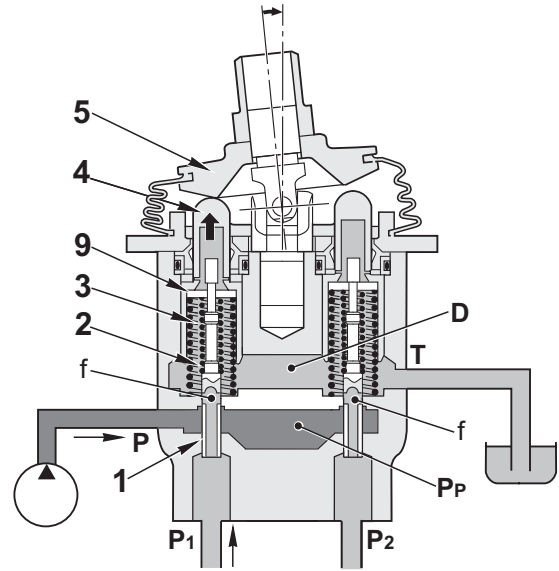
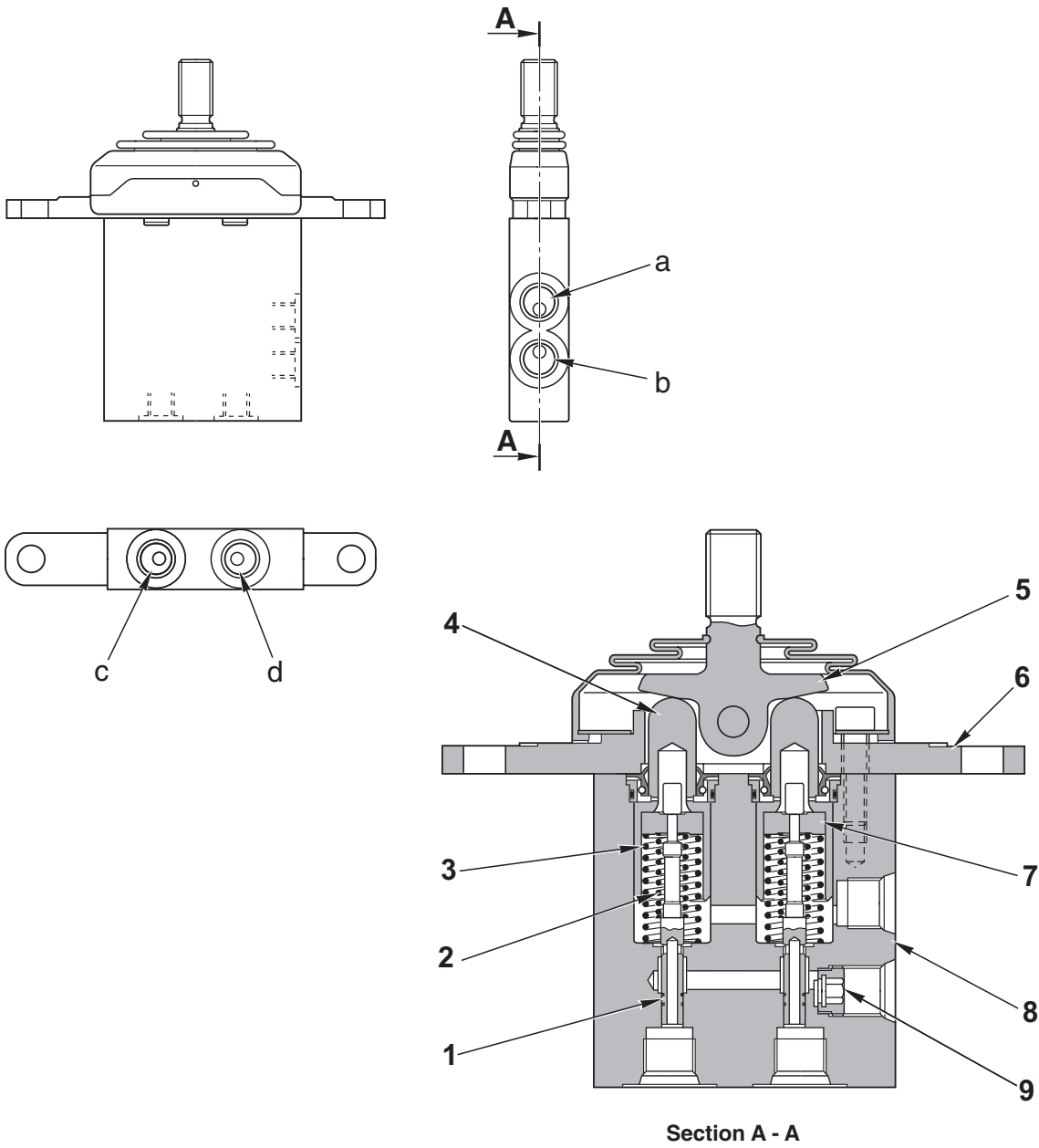


Fig. 3

RKS00840

EQUIPMENT CONTROL PPC VALVE



RKP00960

- | | | |
|--------------|--|----------------------|
| a. T port - | to solenoid valve group ST1 (T port) | 1. Spring |
| b. P port - | from solenoid valve group ST1 (A port) | 2. Metering spring |
| c. P1 port - | to control valve (PB10 port) | 3. Centering spring |
| d. P2 port - | to control valve (PA10 port) | 4. Piston |
| | | 5. Lever |
| | | 6. Cover |
| | | 7. Stopper |
| | | 8. Body |
| | | 9. Filter (100 mesh) |

PPC VALVE (foot) OPERATION

1. Control lever in NEUTRAL position

Control valve ports **A** and **B** and PPC valve ports **P1** and **P2** are connected to drain chamber **D** by means of fine control hole **f** in stem (1) (See Fig. 1).

2. During fine control (NEUTRAL → fine control)

When piston (4) starts to be pushed by lever (5), retainer (9) is pushed; spool (1) is also pushed by metering spring (2), and moves down.

When this happens, fine control hole **f** is shut off from drain chamber **D**, and at almost the same time, it is connected to pump pressure chamber **PP**, which is directly connected to the servocontrol circuit.

Pressure from servocontrol circuit passes through fine control hole **f** and increases pressure at port **P1-A**.

When the pressure **P1** becomes higher, stem (1) is pushed back and fine control hole **f** is reconnected to drain chamber **D**. When this happens, spring (2) is compressed.

The relationship in the position of spool (1) and body (10) (fine control hole **f** is at a point midway between drain hole **D** and pump pressure chamber **PP**) does not change even if the pressure at port **P1** becomes max.

Therefore, metering spring (2) is compressed proportionally to the amount of movement of the control lever (5) so the pressure at port **P1** also rises in proportion to the travel of the control lever (5). The balance position lasts until piston position changes, i.e.:

- a) until pressures on ports **A** and **P1** are perfectly balanced;
- b) pressure at port **A-P1** on stem (1) reaches the value needed to counteract the force of spring (2).

This ensures proportionality between control lever position, **A-P1** circuit pressure, and main control valve stem displacement (See Fig. 2).

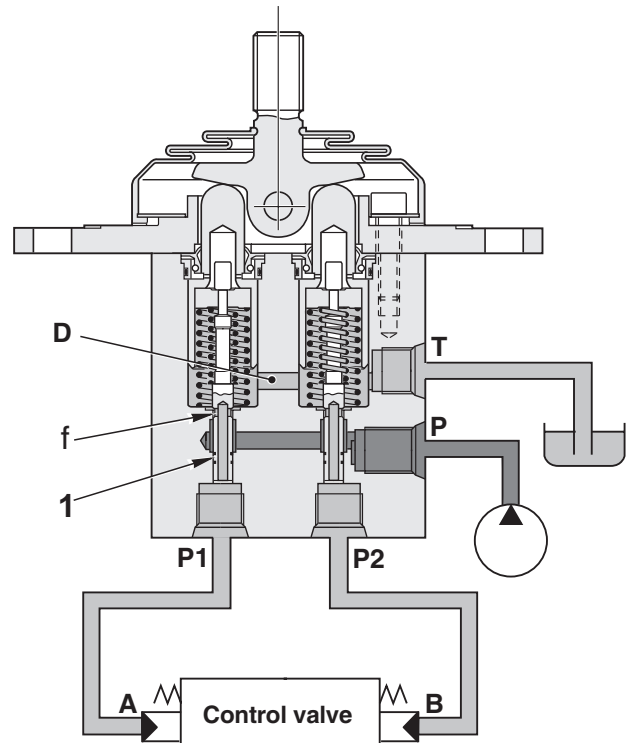


Fig. 1

RKP00970

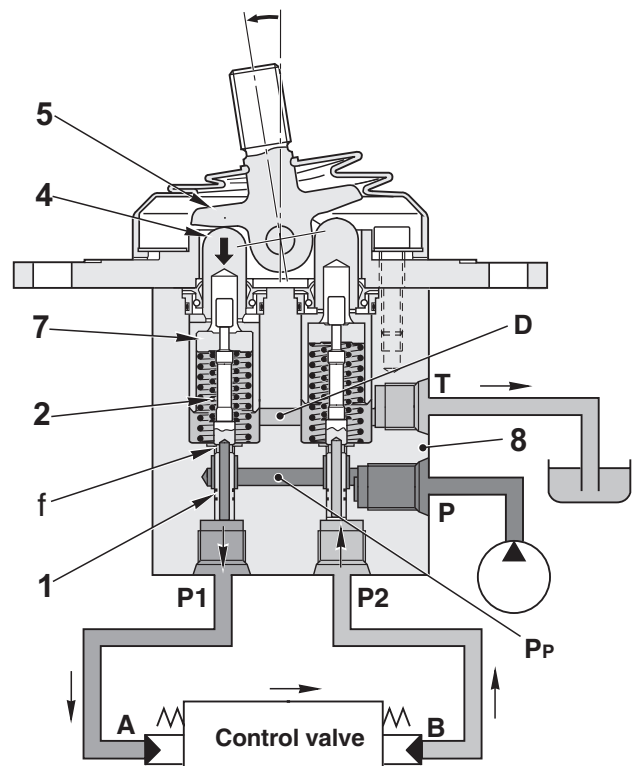


Fig. 2

RKP00980

3. During fine control (when the lever is returned) (fine control→neutral)

When control lever (5) starts to be returned, piston (4) is pushed up by spring (3) operating on retainer (9) and spool (1) is pushed up by the force of centering spring (2) and the pressure at port **P1**. When this happens, fine control hole **f** is connected to drain chamber **D** and the pressure oil at port **A-P1** is released.

If the pressure at port **P1** drops too far, spool (1) is pushed down by metering spring (2), and fine control hole **f** is shut off from drain chamber **D**. At almost the same time, it is connected to pump pressure chamber **PP**, and the pump pressure is supplied until the pressure at port **P1** recovers to a pressure that corresponds to the lever position.

When control valve spool returns, oil goes back into port **D**, through fine control hole **f'**, into port **B** of the spool opposite the active spool.

Oil flows through port **P2** and into port **B** to maintain the fill level. (See Fig. 3).

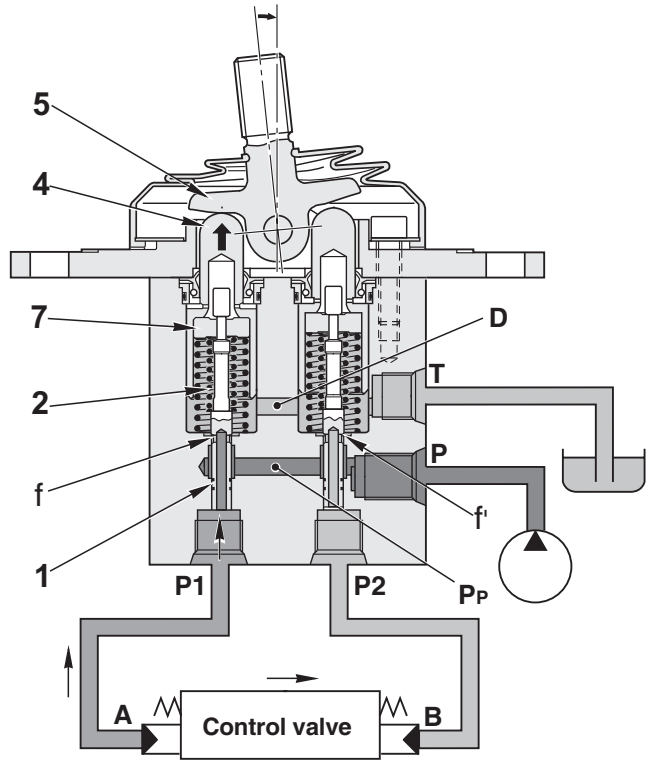


Fig. 3

RKP00990

4. Control lever at full position (neutral →full stroke)

When lever (5) pushes down on piston (4) and retainer (9) pushes down on stem (1), fine control hole **f** is connected to port **PP**, which connects to a constantly pressurised servo-control circuit.

This way, oil flows into port **A-P1** and pushes main control valve stem to the end of its travel, thereby sending the oil in port **B** to inlet **P2**, through fine control hole **f'**, into drain chamber **D** (See Fig. 4).

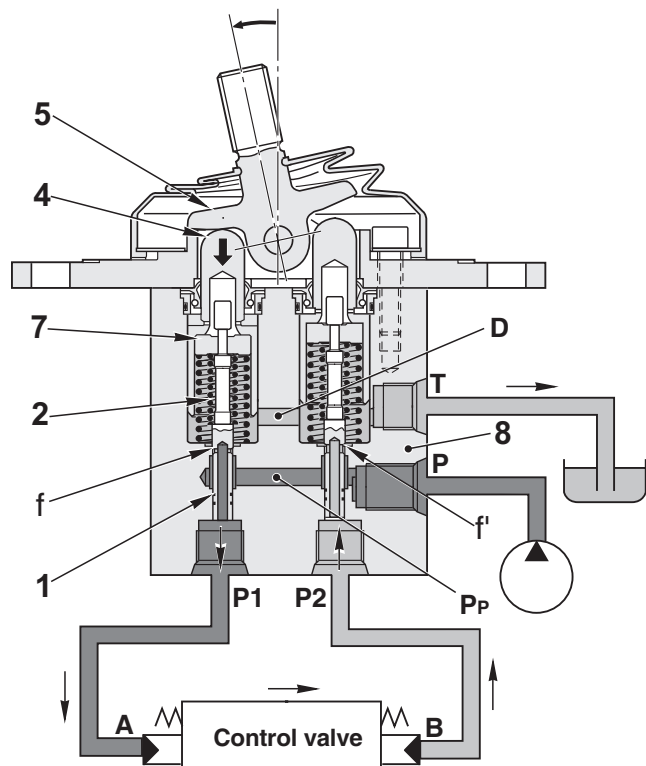


Fig. 4

RKP01000