

# **YANMAR**

# **SERVICE MANUAL**

**DIESEL TRACTOR**  
(HYDRAULIC DEVICE)

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MODEL **YM240**

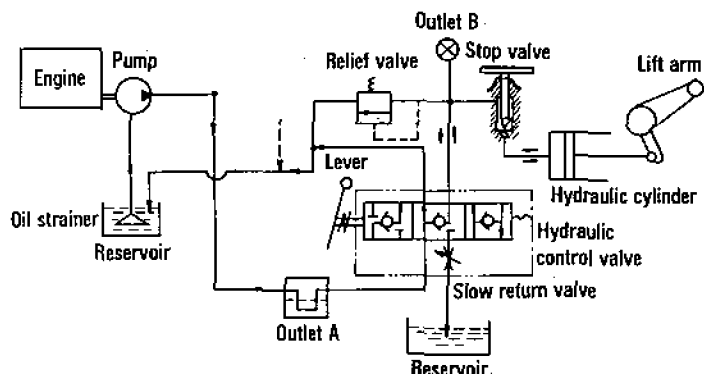
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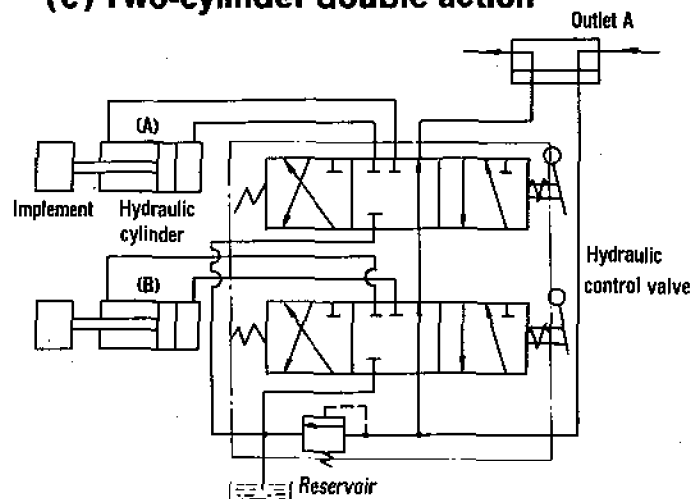
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# 1. Hydraulic piping system

## (1) Main hydraulic piping system

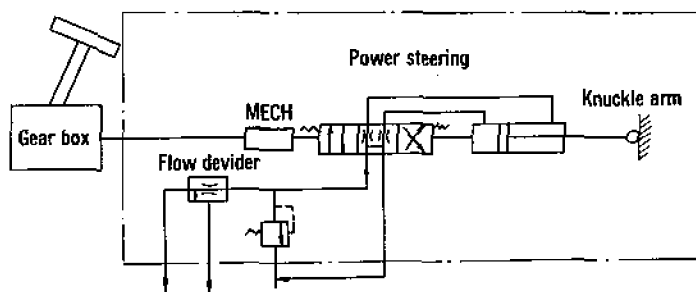


## (c) Two-cylinder double action

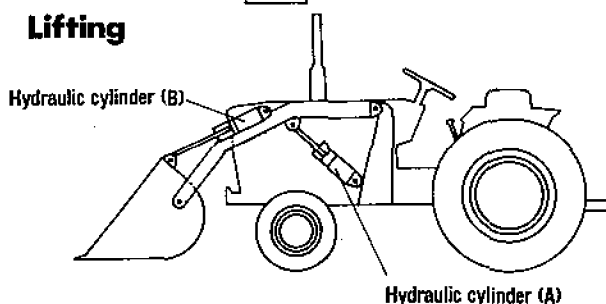


## (2) Implement

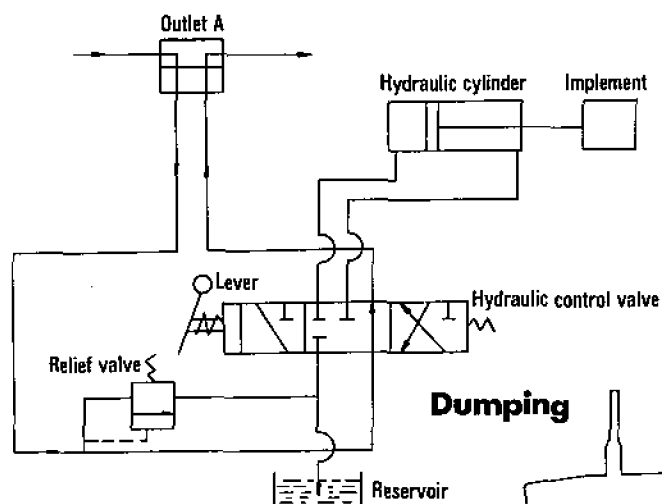
### (a) Power steering



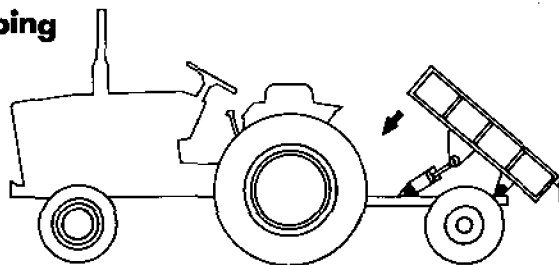
### Lifting



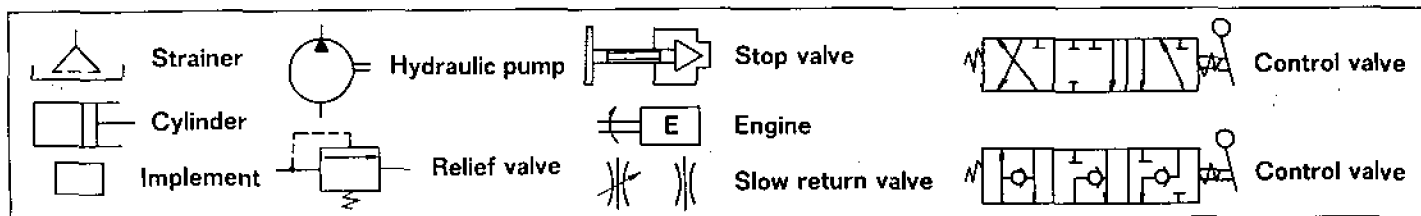
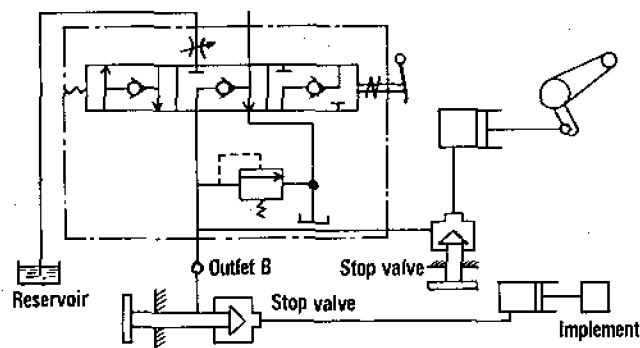
### (b) Single-cylinder double action



### Dumping



### (d) Single-cylinder single action



## 2. Nomenclature of the hydraulic system

- **Stop valve**

The stop valve prevents high-pressure fluid from flowing backwards from the cylinder.

- **Relief valve**

The relief valve operates whenever the pressure in the cylinder exceeds the specified pressure.

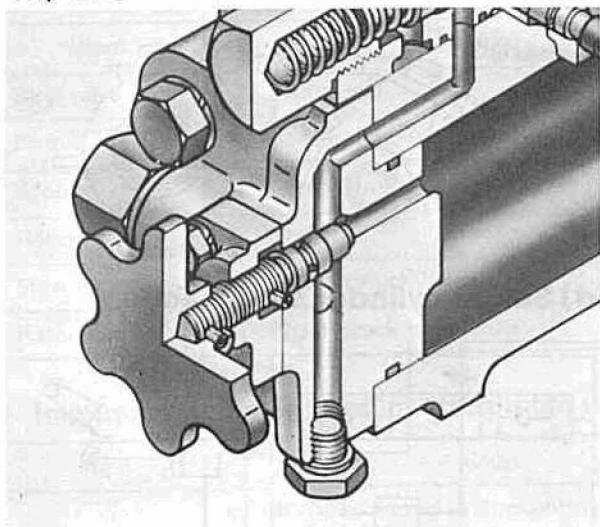
- **Slow-return valve**

The slow-return valve controls the volume of flow of the hydraulic fluid from the cylinder to the reservoir.

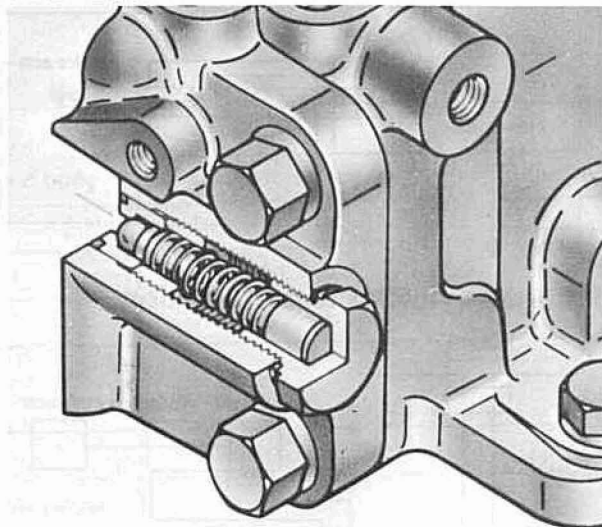
### Notes:

- The hydraulic device employs high precision parts, so if the hydraulic fluid is dirty or contains foreign matter, the efficiency of the device will be greatly impaired.
- When assembling or disassembling the hydraulic device, always follow the procedure described in the service manual.
- Before operating, always check the level of the hydraulic fluid. If it is low, refill to the level marked on the dipstick.
- The hydraulic fluid is supplied from the same reservoir to both the transmission and the hydraulic device.
- Always use "John Deere Type 303" hydraulic fluid or its equivalent.

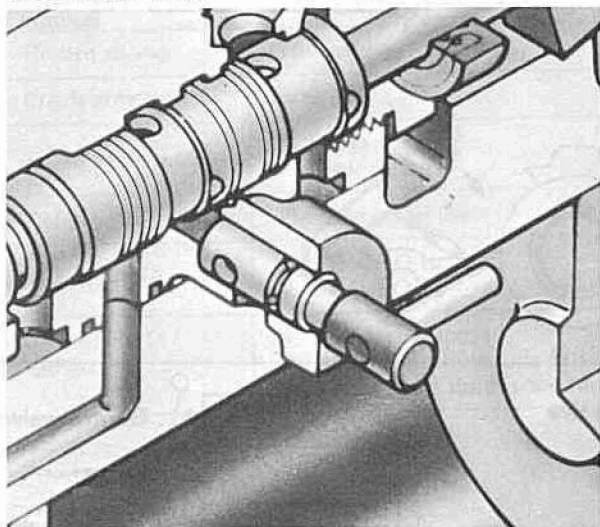
Stop valve



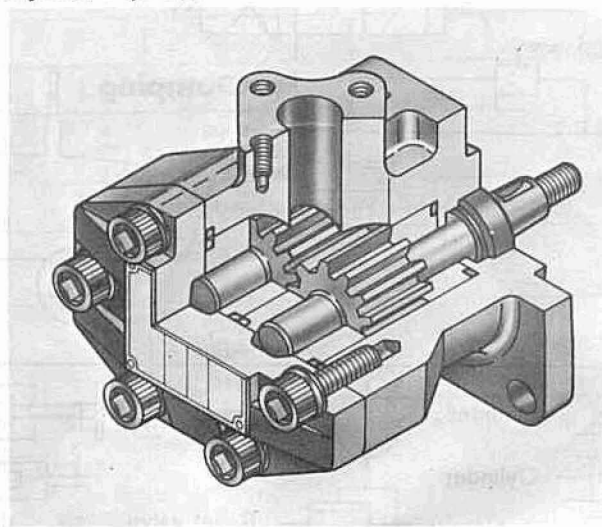
Relief valve



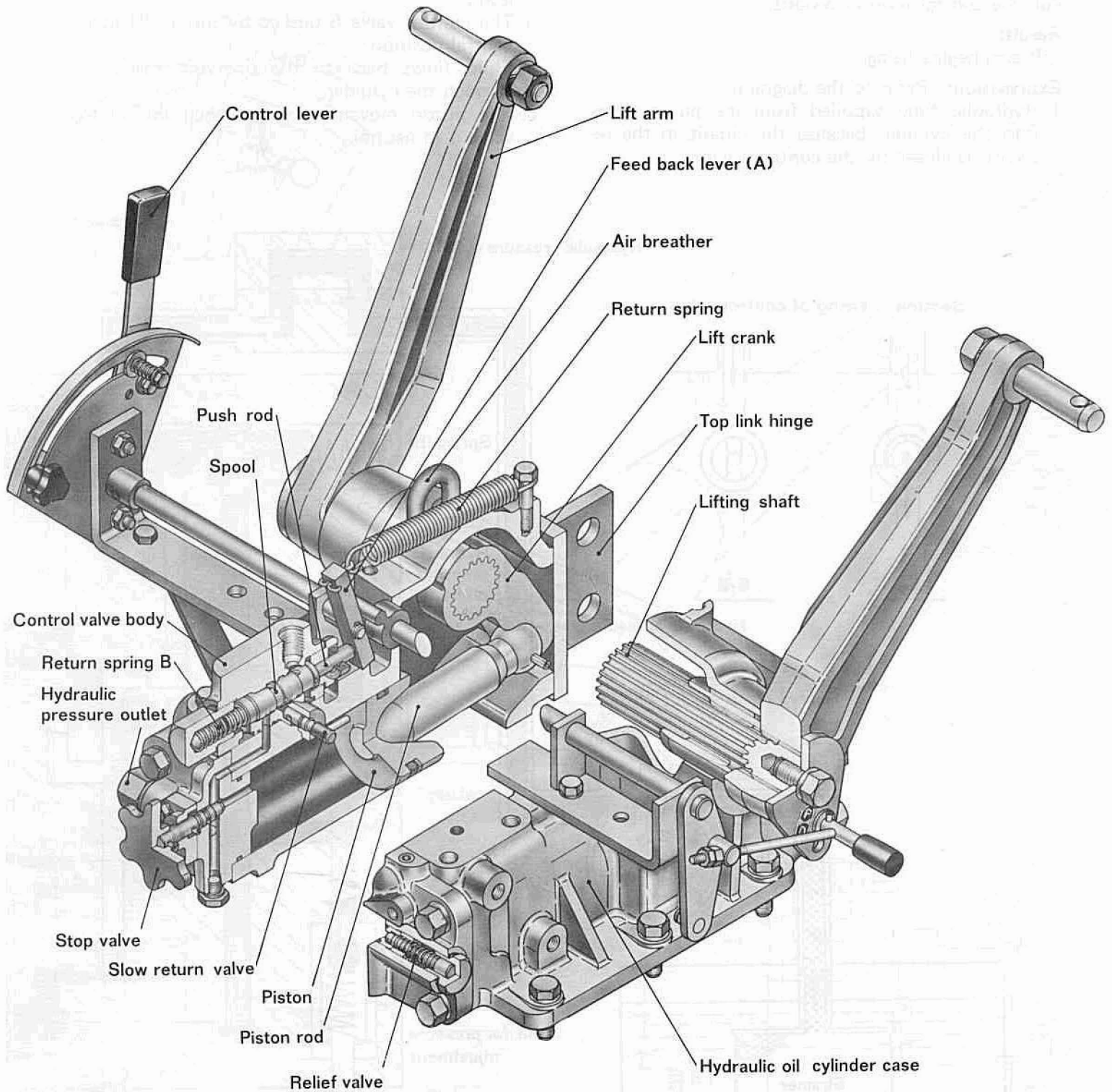
Slow-return valve



Hydraulic pump



The following cross-section of the PV3 positioning control valve is used for the model YM240 tractor.



# 3. Raising the lift arm

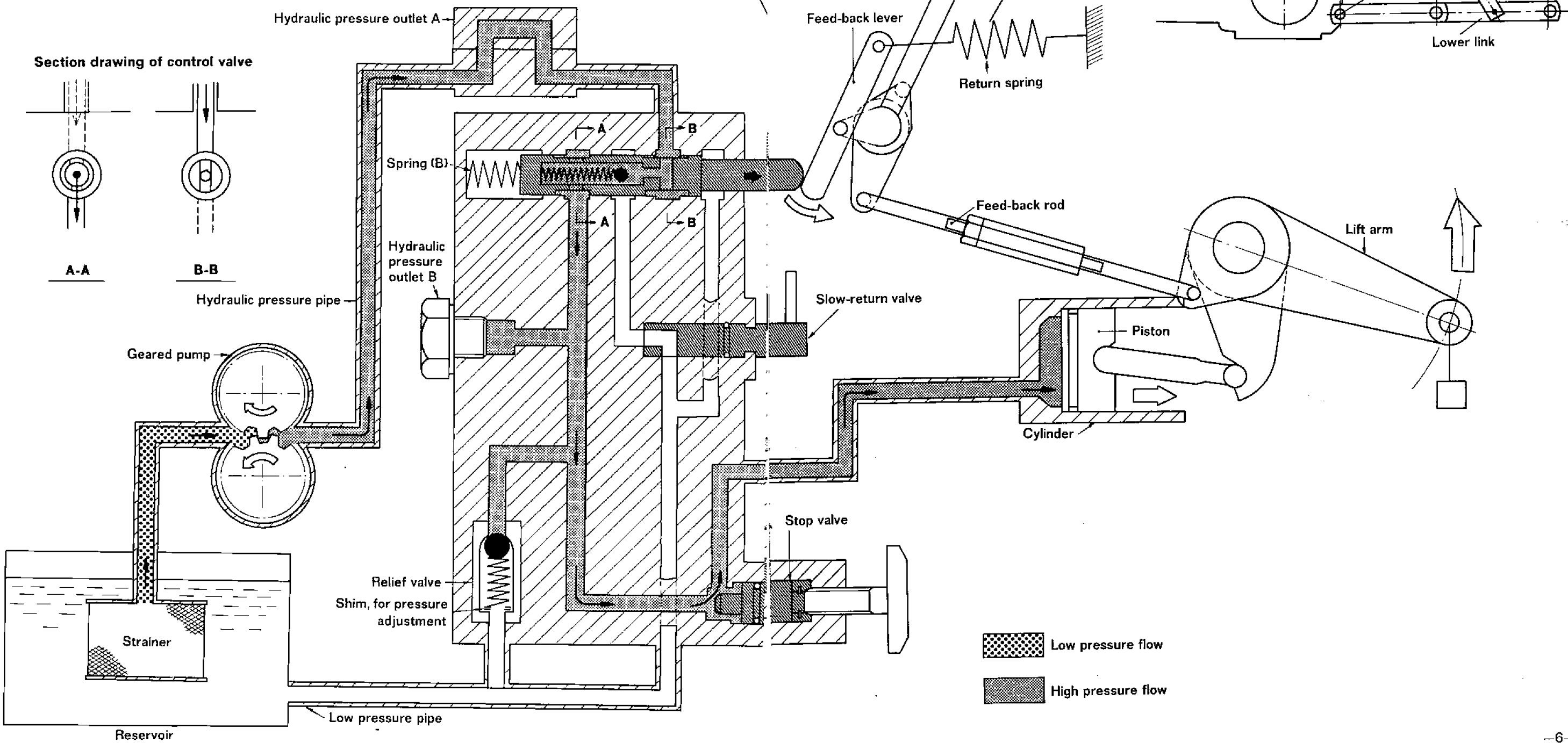
Condition:  
Lift arm is at its lowest position.

Action:  
Pull the control lever backwards.

Result:  
Lift arm begins rising.

Explanation: (Refer to the diagram)  
1. Hydraulic fluid supplied from the pump flows into the cylinder because the circuit to the reservoir is closed by the control valve.

- 2. The piston moves to the right, and causes the lift arm to rise.
- 3. The feed-back rod is pulled, moving the feed-back lever.
- 4. The control valve is pushed by spring (B) to the neutral position.
- 5. Fluid flows back to the reservoir, instead of through the cylinder.
- 6. The piston movement stops when the control valve is in neutral.





# 4. Lowering the lift arm

**Condition:**  
Lift arm is at its highest position.

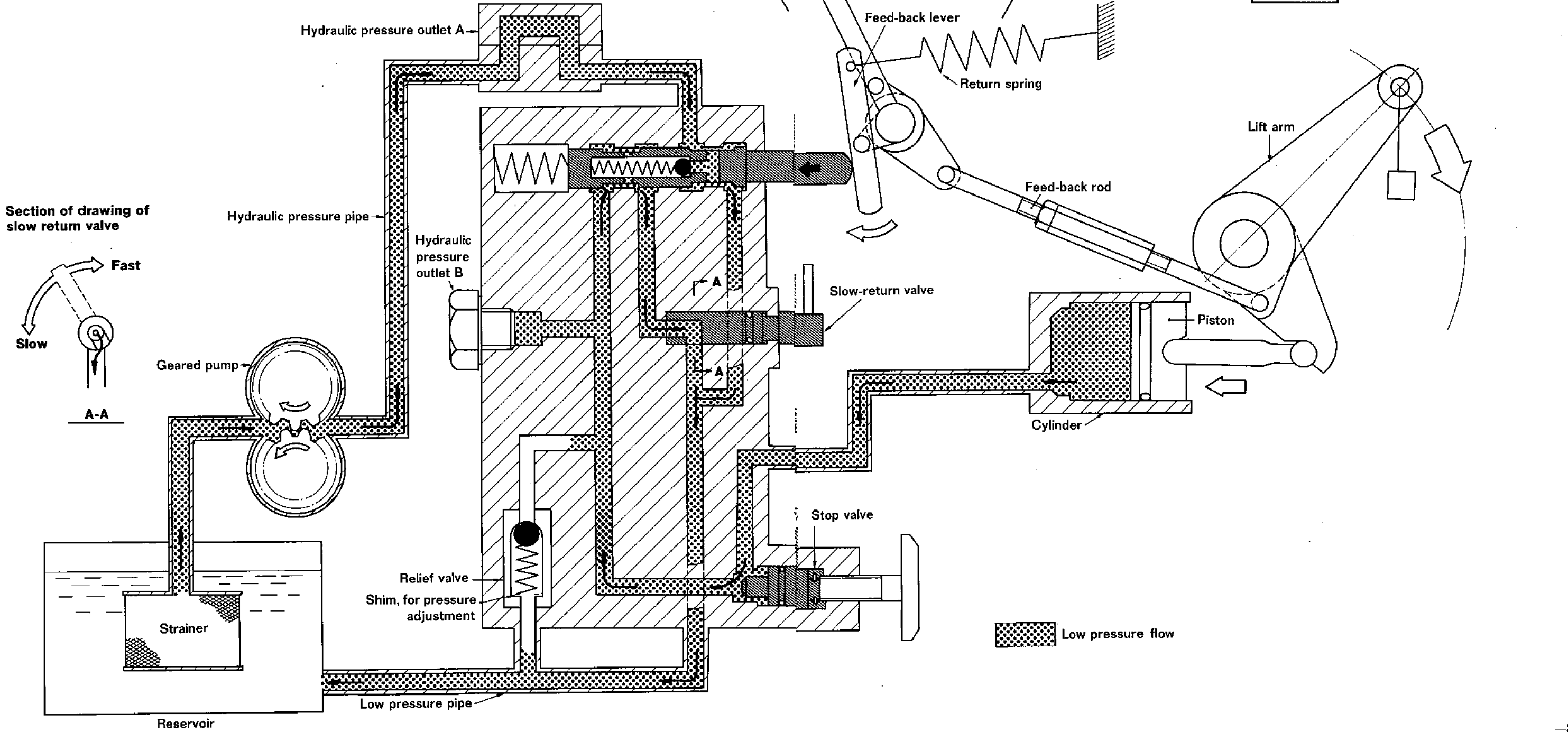
**Action:**  
Push the control lever forward.

**Result:**  
Lift arm is lowered.

**Explanation:** (Refer to the diagram)  
1. Fluid supplied by the pump flows through the control valve, and return to the reservoir.  
2. The weight of the implement pushes the piston, and drives away the fluid in the cylinder through

the slow-return valve, and into the reservoir.  
3. The lowering of the lift arm pushes the feed-back rod.  
4. The feed-back lever is pushed in the direction of the arrow, and pushes the control valve.  
5. The control valve is pushed into the neutral position, closing the circuit, and the fluid in the cylinder stops flowing.

**Note:**  
The speed of the implement's descent is controlled by the opening of the slow-return valve.

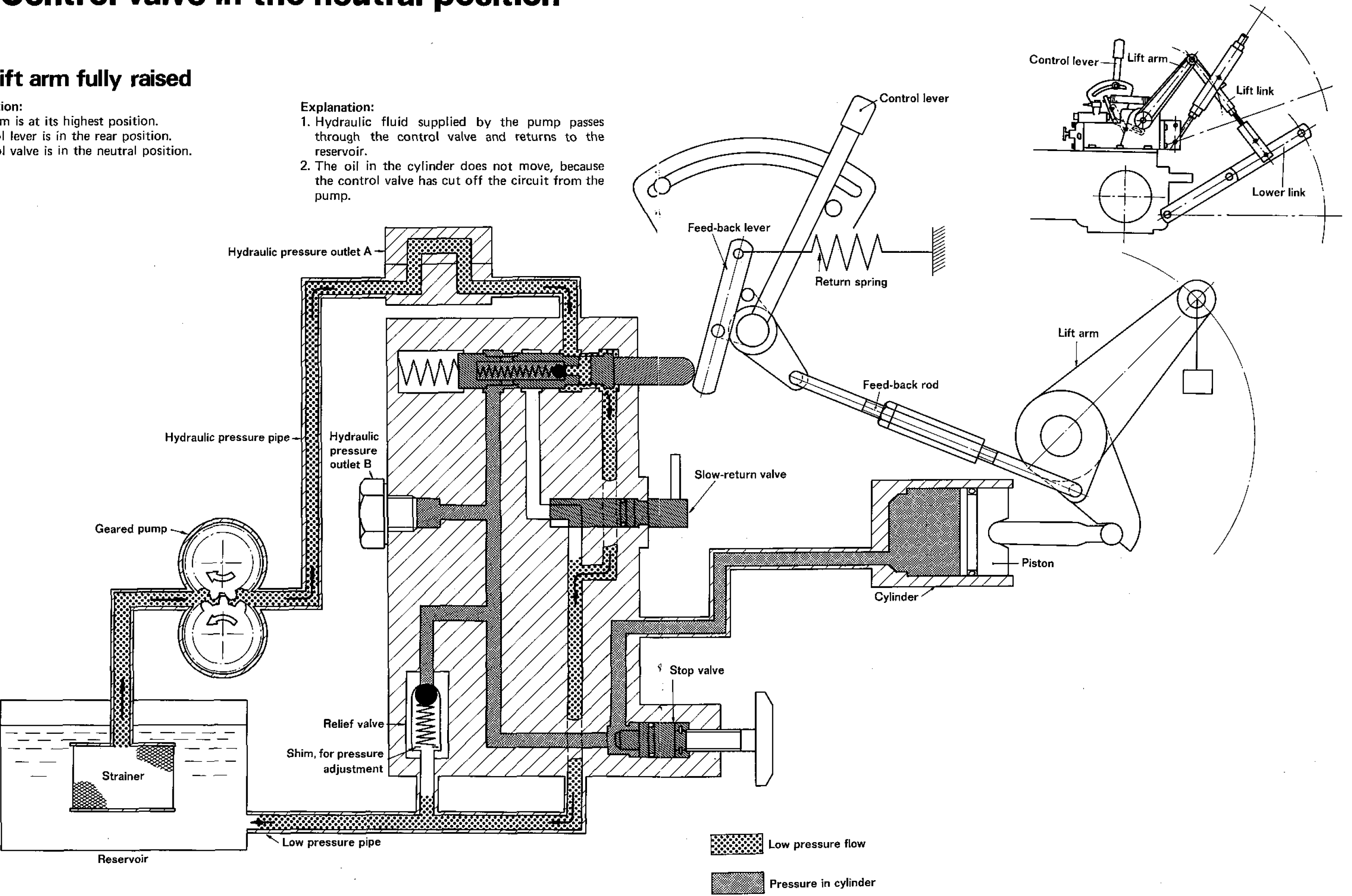


# 5. Control valve in the neutral position

## a) Lift arm fully raised

Condition:  
Lift arm is at its highest position.  
Control lever is in the rear position.  
Control valve is in the neutral position.

Explanation:  
1. Hydraulic fluid supplied by the pump passes through the control valve and returns to the reservoir.  
2. The oil in the cylinder does not move, because the control valve has cut off the circuit from the pump.



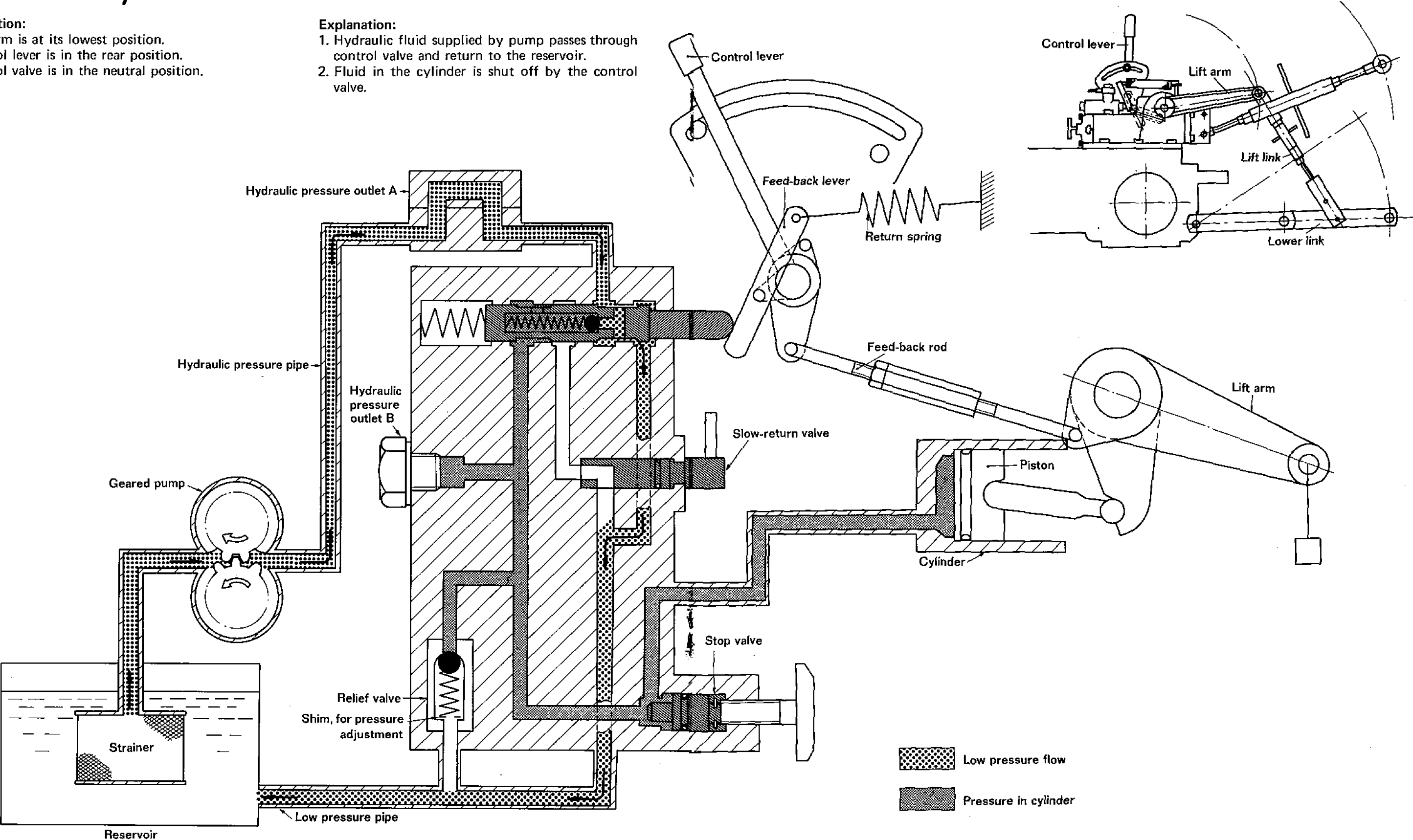


# 5. Control valve in the neutral position

## b) Lift arm fully lowered

Condition:  
Lift arm is at its lowest position.  
Control lever is in the rear position.  
Control valve is in the neutral position.

Explanation:  
1. Hydraulic fluid supplied by pump passes through control valve and return to the reservoir.  
2. Fluid in the cylinder is shut off by the control valve.



# 6. Relief valve

## a) Work under normal coditions

**Condition:**  
Stop valve is closed.

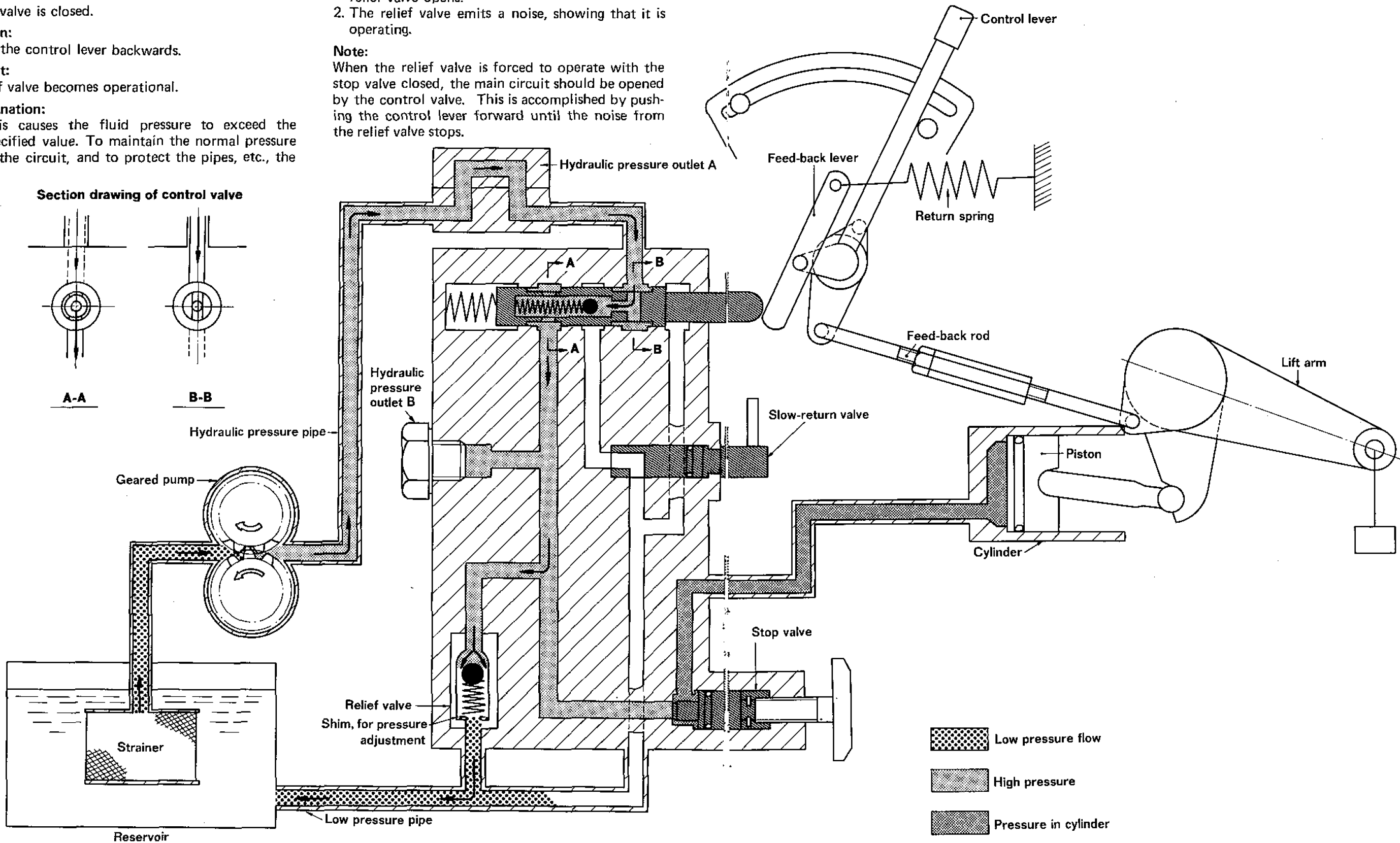
**Action:**  
Push the control lever backwards.

**Result:**  
Relief valve becomes operational.

**Explanation:**  
1. This causes the fluid pressure to exceed the specified value. To maintain the normal pressure in the circuit, and to protect the pipes, etc., the

relief valve opens.  
2. The relief valve emits a noise, showing that it is operating.

**Note:**  
When the relief valve is forced to operate with the stop valve closed, the main circuit should be opened by the control valve. This is accomplished by pushing the control lever forward until the noise from the relief valve stops.

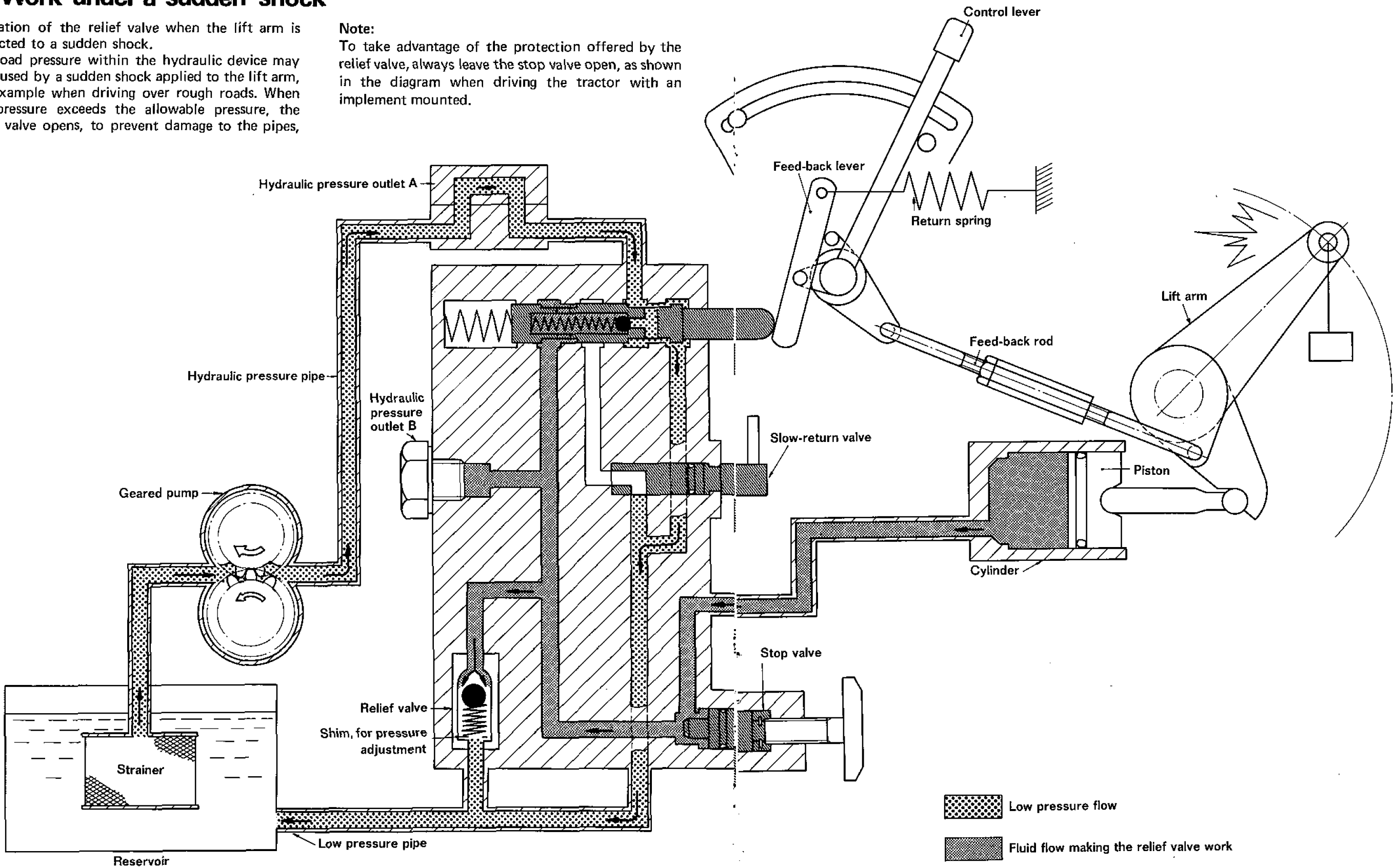


# 6. Relief valve

## b) Work under a sudden shock

Operation of the relief valve when the lift arm is subjected to a sudden shock. Overload pressure within the hydraulic device may be caused by a sudden shock applied to the lift arm, for example when driving over rough roads. When the pressure exceeds the allowable pressure, the relief valve opens, to prevent damage to the pipes, etc.

**Note:**  
To take advantage of the protection offered by the relief valve, always leave the stop valve open, as shown in the diagram when driving the tractor with an implement mounted.



# 7. Use of implements

## a) For outlet B

Finding the neutral position of the control lever:

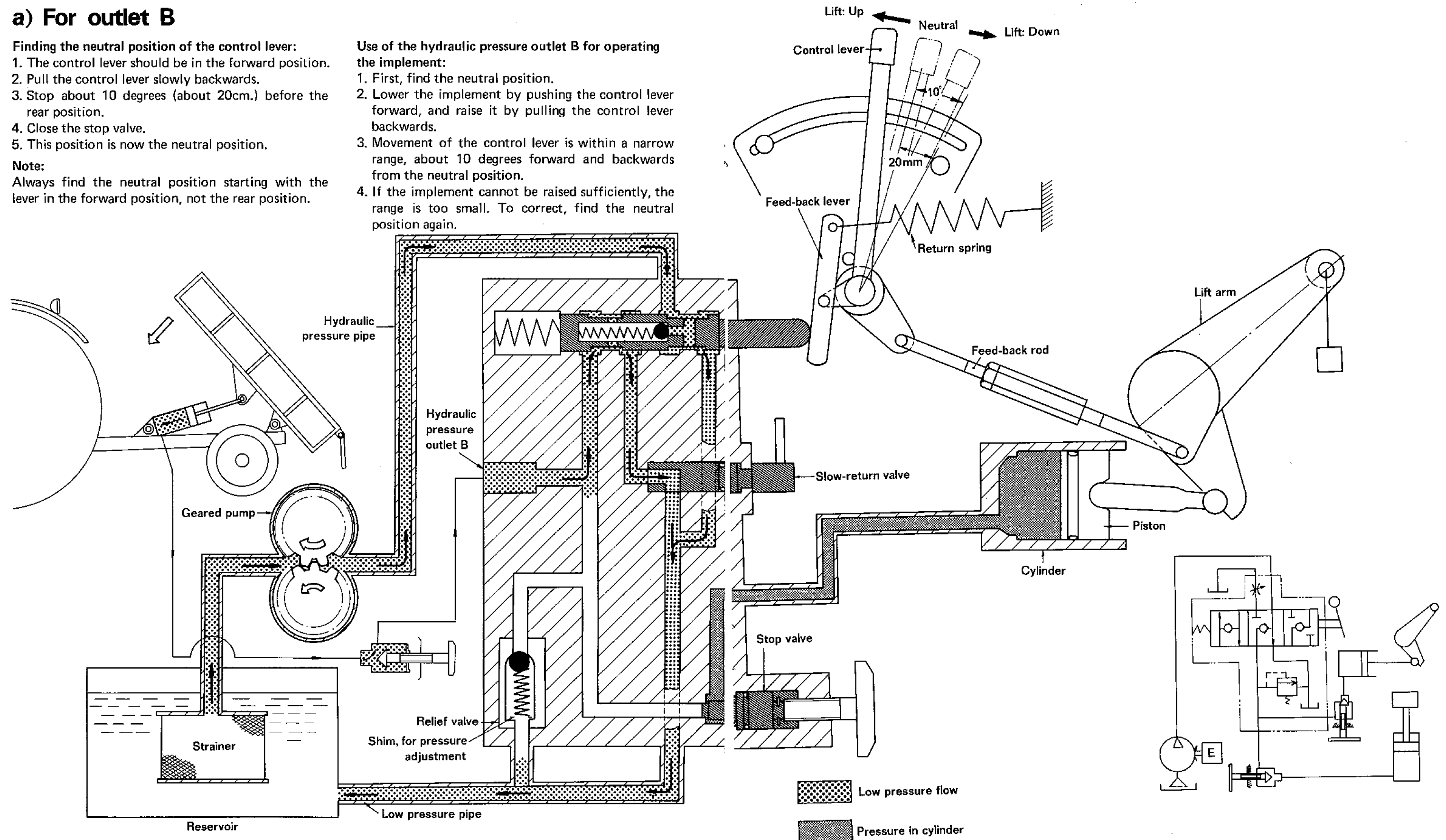
1. The control lever should be in the forward position.
2. Pull the control lever slowly backwards.
3. Stop about 10 degrees (about 20cm.) before the rear position.
4. Close the stop valve.
5. This position is now the neutral position.

**Note:**

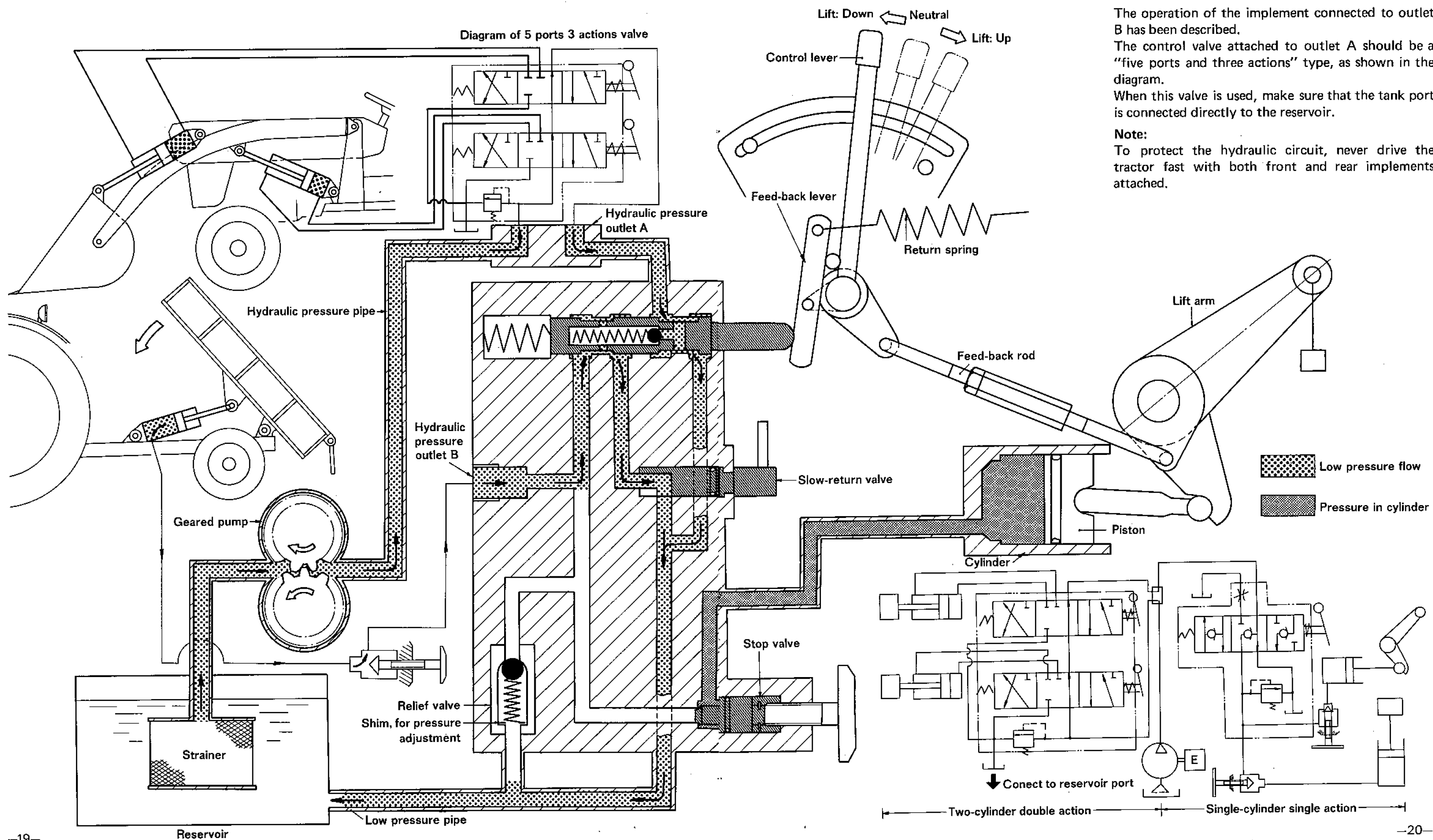
Always find the neutral position starting with the lever in the forward position, not the rear position.

Use of the hydraulic pressure outlet B for operating the implement:

1. First, find the neutral position.
2. Lower the implement by pushing the control lever forward, and raise it by pulling the control lever backwards.
3. Movement of the control lever is within a narrow range, about 10 degrees forward and backwards from the neutral position.
4. If the implement cannot be raised sufficiently, the range is too small. To correct, find the neutral position again.



# 7. Use of implements



## b) For outlet A & B

The operation of the implement connected to outlet B has been described. The control valve attached to outlet A should be a "five ports and three actions" type, as shown in the diagram. When this valve is used, make sure that the tank port is connected directly to the reservoir.

**Note:**  
To protect the hydraulic circuit, never drive the tractor fast with both front and rear implements attached.

# 8. Trouble-shooting

- 1) Free descent of the implement is continuously too fast when the engine is shut off, and the neutral position of the implement is unstable (sobbing phenomena) during operation.

Item	Cause	Remedy
Stop valve	Broken O-ring	Replace
Return spring	Too weak	Replace
Slow return valve	Broken O-ring	Replace
Spool	1. Faulty seats 2. Worn out	Replace spool & control valve body
Piston head	1. Broken O-ring 2. Back up ring	Replace Replace

- 2) Implement does not descend.

Item	Cause	Remedy
Stop valve	Faulty seat	Replace
Piston	Does not move smoothly	Replace
Spool	Foreign matter lodged between the spool and body	Clean or replace spool & control valve body
Return spring	Broken	Replace
Slow return valve	Valve is stuck "closed"	Open the valve
Piston head	Piston stuck to cylinder	Replace

- 3) Implement cannot be lifted, or lifting is too slow.

Item	Cause	Remedy
Hydraulic pump	1. Air is sucked in through the oil seal of the pump shaft 2. Worn gears 3. Insufficient movement	Exchange the oil seal
Stop valve	Faulty O-ring	Replace
Return spring	Too weak	Replace
Crank arm	Broken	Replace
Relief valve seat	1. Broken-O-ring 2. Back up ring	Replace Replace
Relief valve	Pressure is too low	Specific pressure 155 kg/sq. cm
Piston head	1. Broken O-ring 2. Back up ring	Replace Replace
Others	1. Strainer is clogged 2. Insufficient hydraulic fluid 3. Viscosity of fluid is too high	Clean Supplement Replace



4) Abnormal noises from the pump or control valve.

Item	Cause	Remedy
Hydraulic pump	1. <i>Moving portion of shaft is worn</i> 2. Shaft is bent	Replace Replace
Feed back arm	Rod distance is insufficient	Readjust
Others	1. Strainer is clogged 2. Viscosity of fluid is too high 3. Water is mixed in with the hydraulic fluid	Clean Replace Check the water leakage into the hydraulic line



**YANMAR DIESEL ENGINE CO., LTD.**

1-11-1, Marunouchi, Chiyoda-ku, Tokyo, Japan Cable: YANMAR TOKYO Telex: 0222-2310, 0222-4733

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