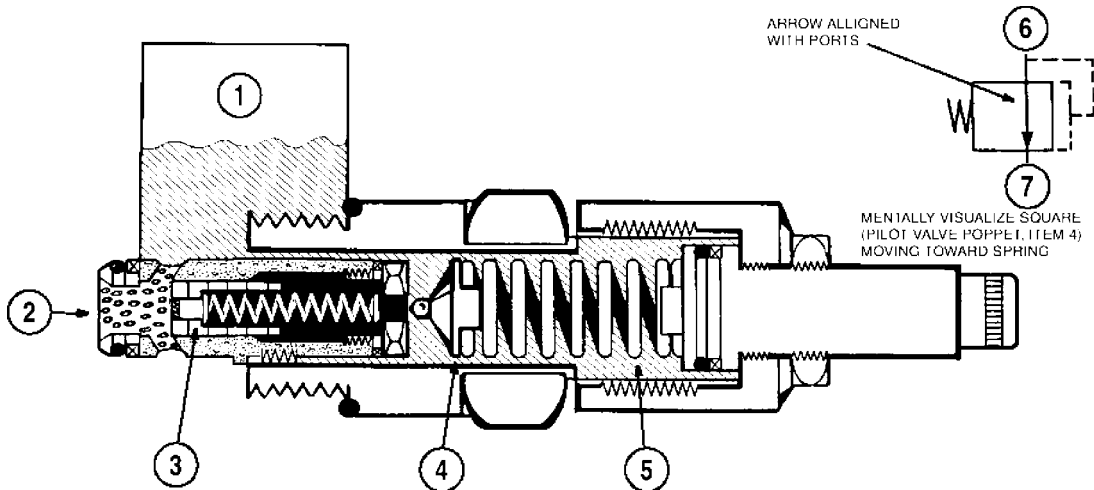


HS01D073

- |                     |                              |           |
|---------------------|------------------------------|-----------|
| 1. RETURN TO TANK   | 4. MAIN SPOOL CLOSED         | 7. INLET  |
| 2. ORIFICE & SCREEN | 5. SMALL SPRING              | 8. OUTLET |
| 3. PUMP PRESSURE    | 6. PILOT VALVE POPPET CLOSED |           |

**MAIN RELIEF VALVE - CLOSED POSITION**



HS01D074

- |                        |                            |                       |           |
|------------------------|----------------------------|-----------------------|-----------|
| 1. RETURN PORT TO TANK | 3. MAIN SPOOL OPEN         | 5. PILOT VALVE SPRING | 7. OUTLET |
| 2. PUMP PRESSURE       | 4. PILOT VALVE POPPET OPEN | 6. INLET              |           |

**MAIN RELIEF VALVE - OPEN POSITION**

## CIRCUIT RELIEF VALVE / ANTI-CAVITATION CHECK VALVE

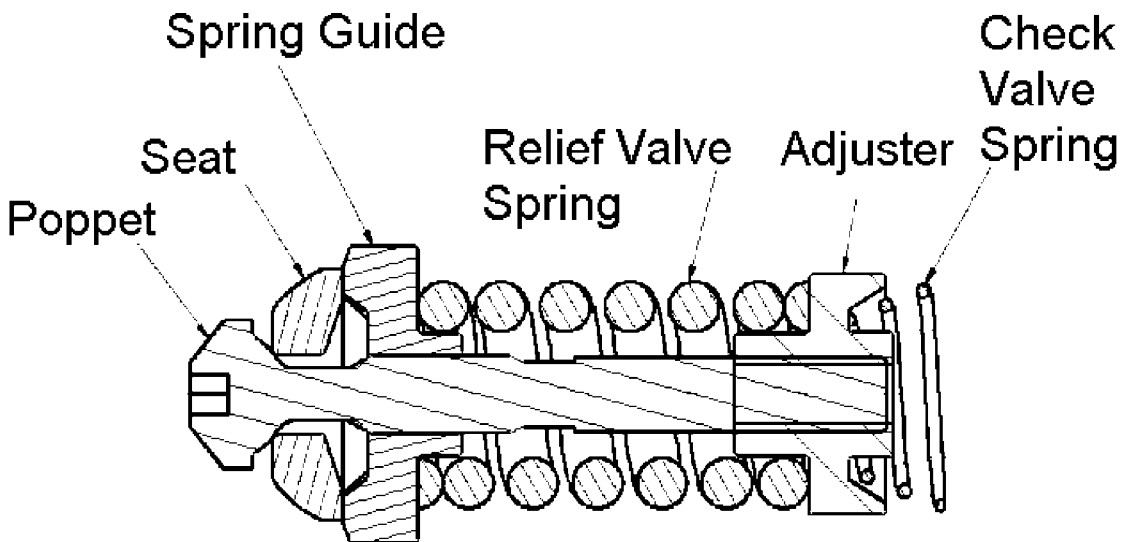
### Direct Acting Circuit Relief Valve

Circuit relief/Anti-cavitation check valves are used in the loader control valve at the A1 and B1 ports of the loader lift circuit and A2 and B2 ports of the bucket circuit. Circuit relief valves protect cylinders and lines from being over pressurized by outside forces or shock loads when control valve spools are in the neutral position.

The anti-cavitation check valve function of the circuit relief valve operates when the cylinder moves with no oil supply to the circuit. This could happen as the circuit relief valve on the opposite work port opens and creates a void in a work port.

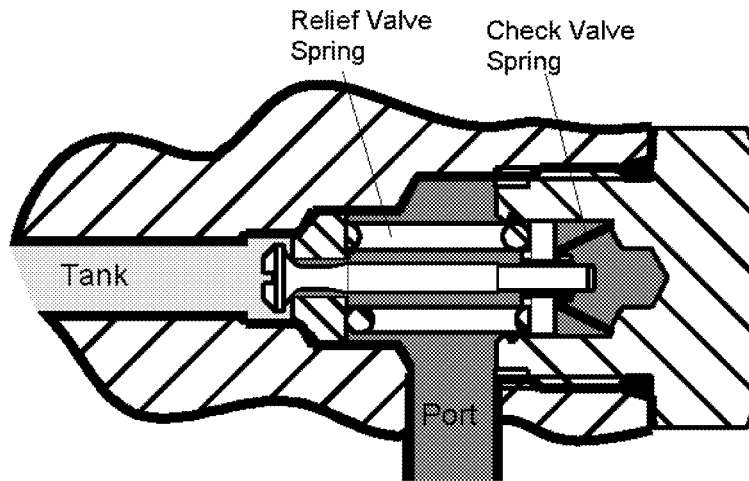
**Circuit Relief Valve Operation:** Circuit relief valves are of the direct acting type. They are normally closed, requiring hydraulic pressure to open. The valve is a poppet held against a seat by spring force. The poppet opens when hydraulic force against the poppet exceeds spring force. Oil passing the poppet enters the return passage of the control valve and continues on to the reservoir. Circuit relief valves should be checked using a hand pump.

**Anti-Cavitation Check Valve Operation:** If the cylinder travels with the control spool in neutral, the pressure in the work port is then less than the pressure in the valve return passage. The light check valve spring at the right end would then collapse allowing the circuit relief valve cartridge to move away from the valve body allowing return oil to flow into the work port. This would keep the cylinder full of oil.

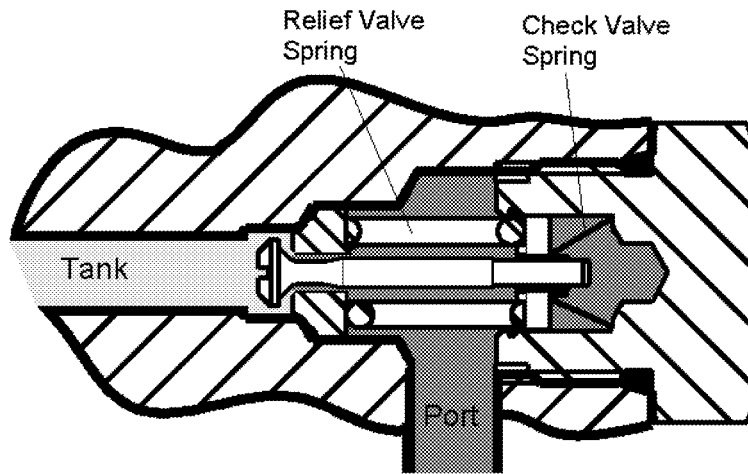


Circuit Relief Valve Cartridge

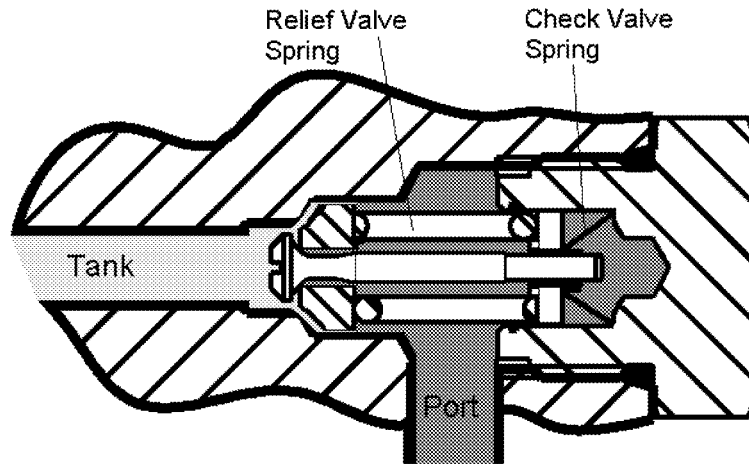
HS01D075



Circuit Relief Valve - Closed



Circuit Relief Valve - Open



Circuit Relief - Anti-Cavitation Function

CIRCUIT RELIEF VALVE - ANTI-CAVITATION CHECK VALVE

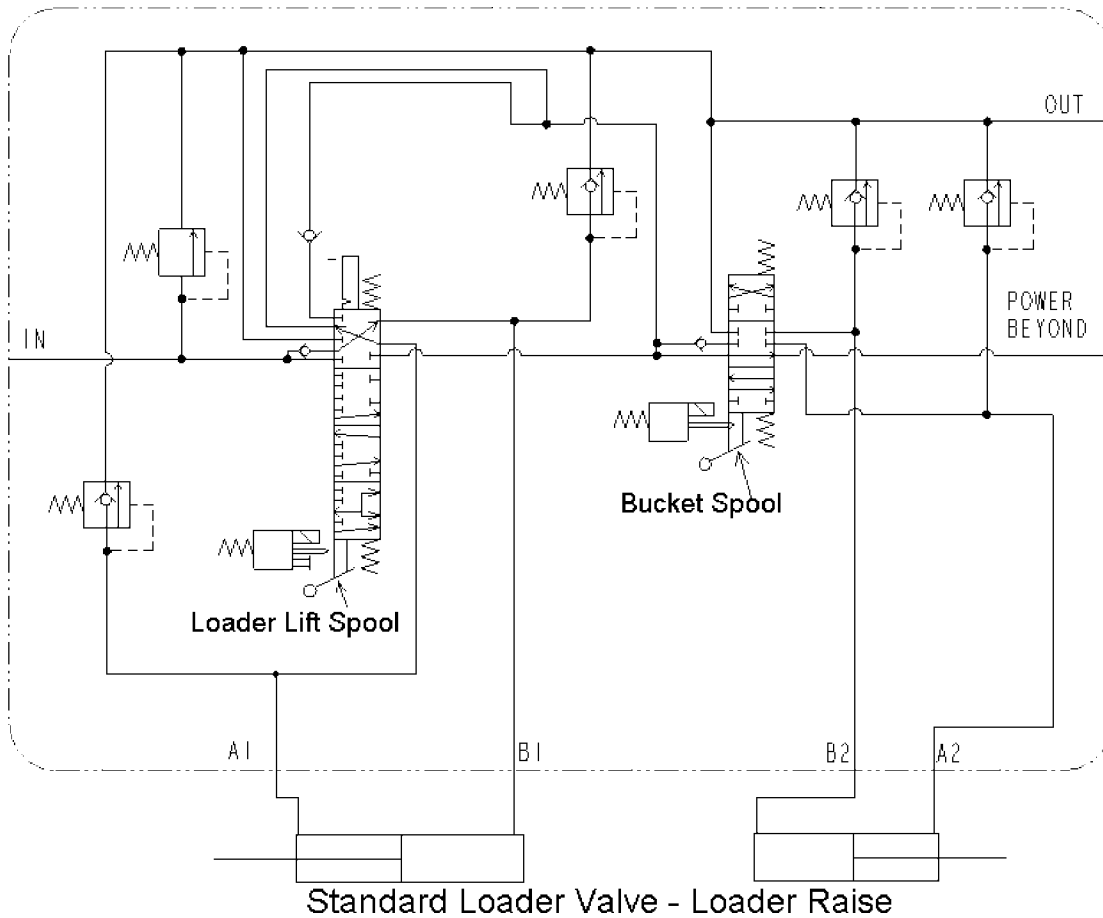
HS01D076

## LOADER CONTROL VALVE FUNCTION

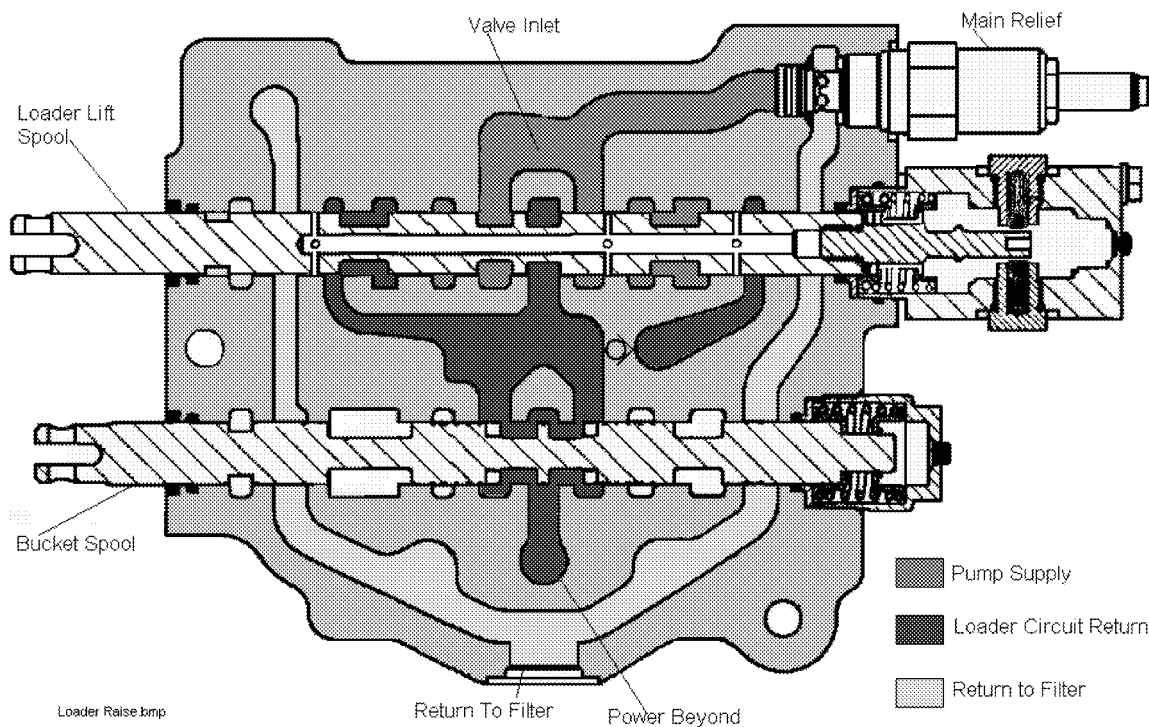
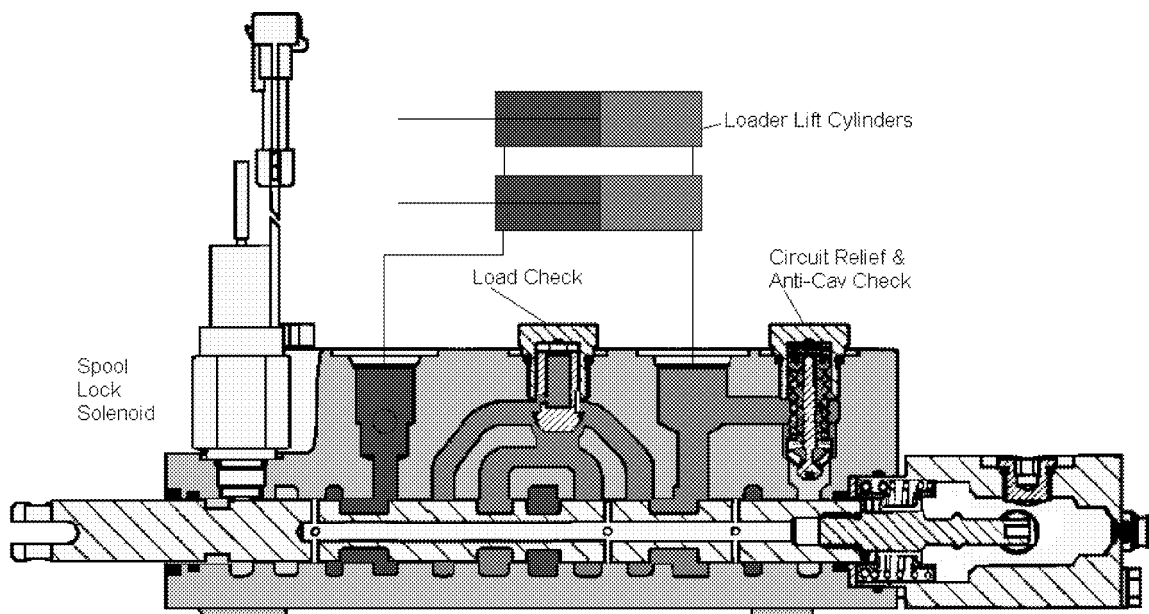
Oil flow from the equipment pump is sent to the loader control valve. Oil flow enters the control valve at the inlet port to the open center passage. The open center passage is connected to the main relief valve. The control valve is a two spool valve with the loader spool receiving oil first. With all spools in neutral, oil flows through the open center and out the power beyond port to supply the auxiliary circuit. With the loader spool activated, return oil from the loader circuit flows to the downstream open center passage and is available to the bucket spool or to the power beyond circuit. With the bucket spool activated, return oil from the bucket circuit flows to the return passage of the loader valve and then to the filter.

### Loader Spool Actuated to Raise Loader

Shifting the loader spool outward blocks the pump flow through the open center, sending pump flow through the load check valve and on to the B1 port. Oil from the B1 port enters the base end of the loader cylinders raising the loader frame. Oil returning from the rod end of the loader cylinders enters the control valve at the A1 port, and flows to the open center passage for use by the bucket or to the power beyond port to auxiliary circuits. If the bucket or auxiliary circuit is actuated, the circuit will function until the loader cylinders come to the end of their travel. Once the loader cylinders reach the end of their travel, oil flow is diverted to the main relief valve and all functions stop. At this point the loader spool must be returned to the neutral position, allowing pump flow to enter the open center passage.



HS01D077



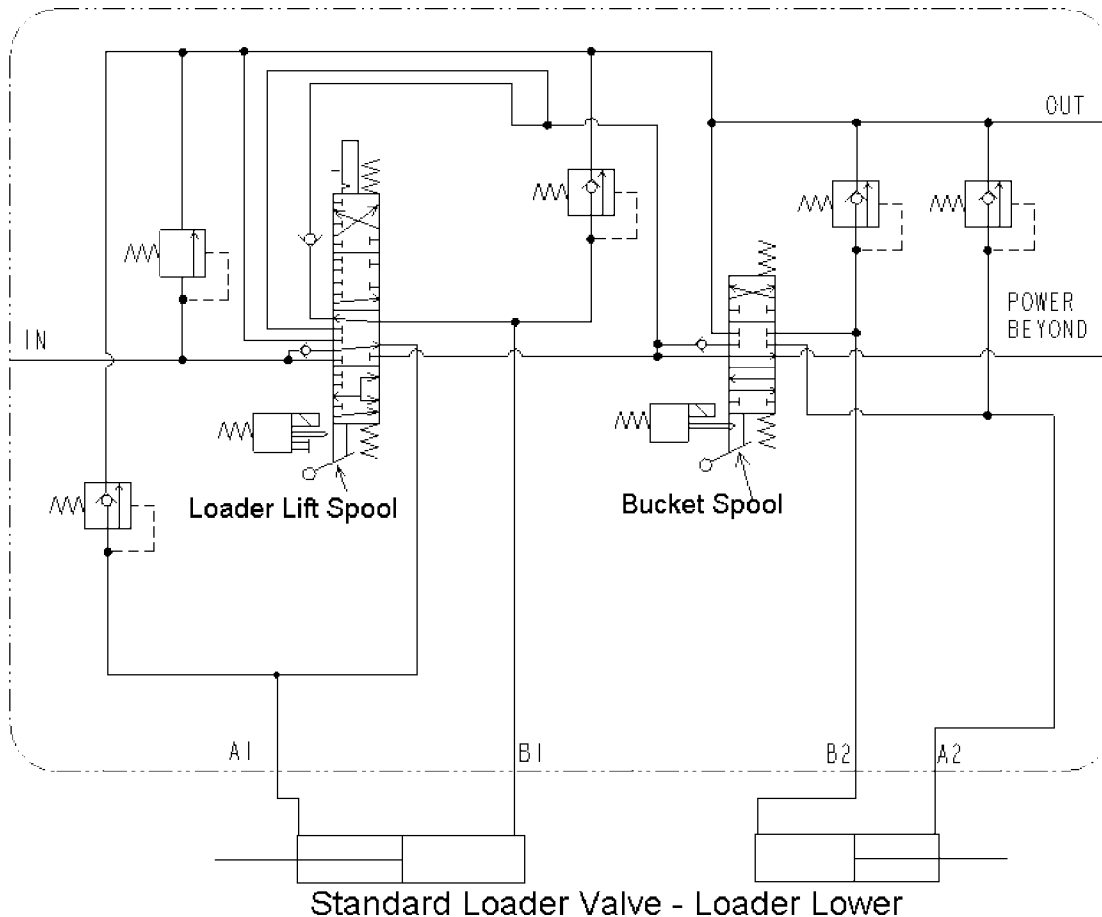
**CONTROL VALVE - LOADER SPOOL ACTUATED TO RAISE LOADER**

HS01D078

## Loader Spool Actuated to Lower Loader

Shifting the loader spool inward blocks the oil flow through the open center, sending pump flow through the load check and on to the A1 port. Oil from the A1 port enters the rod end of the loader cylinders, lowering the loader frame. Oil returning from the base end of the loader cylinders enters the control valve at the B1 port. Oil flow entering the B1 port enters the series passage, passing through the circuit check valve and on to the open center passage.

Oil flow entering the open center passage from the B1 port can be used to operate the bucket or flows out the power beyond port to auxiliary circuits. If the bucket or auxiliary circuit is actuated, the circuit will function until the loader cylinders come to the end of their travel. Once the loader cylinders reach the end of their travel, oil flow is diverted to the main relief valve and all functions stop. At this point the loader spool must be returned to the neutral position, allowing pump flow to enter the open center passage.



HS01D079