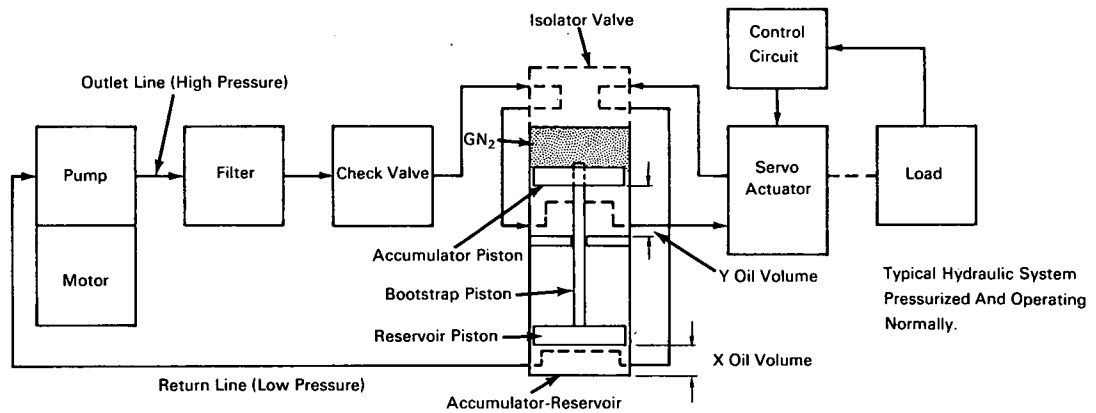
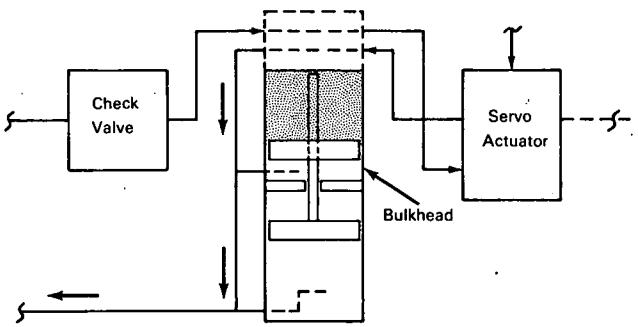
NASA TECH BRIEF

Accumulator Isolator Prevents Malfunctioning of Faulty Hydraulic System





The problem:

To prevent malfunction of a closed hydraulic system that has oil loss, gaseous nitrogen (GN_2) precharge loss, or a jammed piston. These defects degrade system operation and cause instability or serious damage to system components. Cavitation can result from the voids created in system lines and components when the accumulator oil volume, stored under operating conditions, exceeds the oil available from the reservoir; or when the accumulator-reservoir does not properly function.

The solution:

Bypass the normal accumulator reservoir function with a special isolator valve. When a closed hydraulic system loses oil, or GN_2 precharge, or has a jammed piston, the accumulator isolator converts the initial accumulator-reservoir to a reservoir function only. This greatly extends the life of the system, permitting near-normal operation until the defect is corrected.

(continued overleaf)

How it's done:

When a closed hydraulic system becomes defective, the isolating valve system must provide positive isolation of the reservoir from the high pressure side, return any (pressurized) stored oil from accumulator to reservoir, and prevent flow through the reservoir during system operation.

The diagram compares the oil flow in a normal operating system with that of a system in which the isolator valve has converted the accumulator-reservoir to reservoir function.

The flow of oil from the motor driven pump through the high pressure line, filter, and check valve are normally fed to the accumulator portion of the accumulator-reservoir and then to the servo-actuator to lift the load. The actuator return oil is fed through the reservoir portion of the accumulator-reservoir and the low pressure return line to the pump.

If the hydraulic system develops an oil leak, loses GN_2 precharge, or has a jammed piston, the isolator valve feeds the oil directly to the servo-actuator, bypassing the accumulator-reservoir.

Notes:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B67-10528

Patent status:

No patent action is contemplated by NASA.

Source: George D. Walsh
of The Boeing Company
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