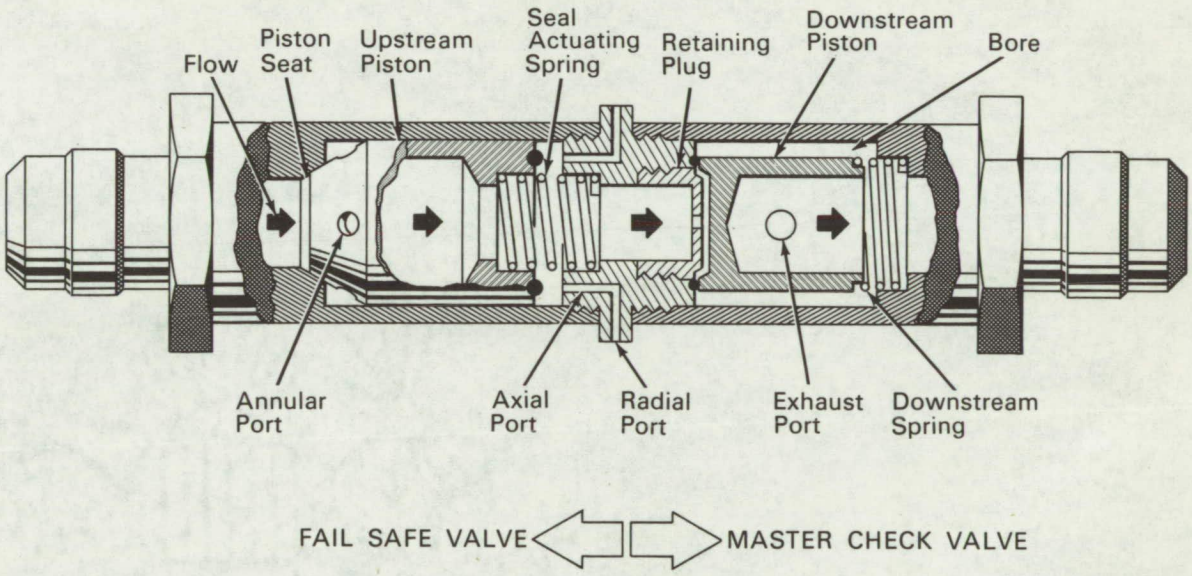
July 1965 Brief 65-10207

NASA TECH BRIEF

Fluid Check Valve Has Fail-Safe Feature



The problem: To design a check valve that will normally operate to ensure unidirectional fluid flow, and which in the event of operating failure will safely vent the downstream fluid to the atmosphere and give a positive indication of malfunction.

The solution: A dual valve incorporating a spring-loaded master check valve on the downstream side and a fail-safe valve on the upstream side.

How it's done: When fluid is admitted to the valve inlet in the normal manner, pressure is exerted on the valve face (conical frustum with annular ports) of the upstream piston, causing it to move downstream and compress the seal-actuating spring. This movement unseats the conical valve face and seats the piston O-rings against the axial ports in the upstream valve body. The fluid now passes into the annular ports in the upstream piston and out through the orifice in the retaining plug. This flow unseats the downstream piston (in the master check valve) from the downstream O-ring seal, admitting fluid into the master check valve bore. The fluid then enters the exhaust ports in the downstream piston and passes downstream through the outlet bore of the master check valve. If downstream pressure increases or upstream gas flow is terminated for any reason, the springs return both pistons to their valve seats and seal off the upstream and downstream portions of the valve. However, if the master check valve fails to close (because of fatigue or foreign matter in the valve seat of the downstream piston), the upstream (fail-safe) portion of the valve seals the upstream flow and vents the leaking fluid

(continued overleaf)

(from the downstream side) through the radial ports into the atmosphere. The fluid escaping through these ports also provides an indication of master check valve (downstream piston) failure.

Note: Inquiries concerning this invention may be directed to:

Technology Utilization Officer
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Reference: B65-10207

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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