

September 1966

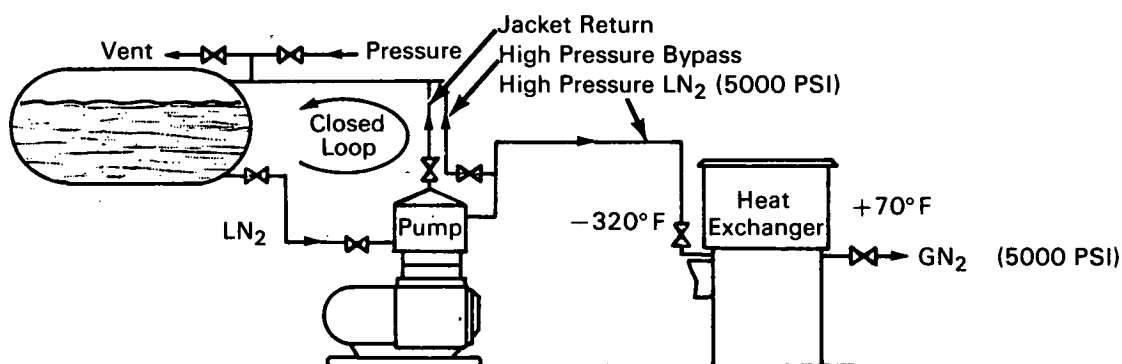
Brief 66-10408

NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U. S. space program and to encourage their commercial application. Copies are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Closed Loop Operation Eliminates Need for Auxiliary Gas in High Pressure Pumping Station



The problem:

The liquid nitrogen high pressure pump requires a continual bleed to maintain the liquid nitrogen level in the suction reservoir and coolant jacket. In an open loop system the bleed valve is vented to the atmosphere and a separate gaseous nitrogen source is provided to maintain the tank pressure of the liquid nitrogen. The open loop system requires continuous operator attendance to prevent burnout, extensive temperature rise in the heat exchanger, and possible explosion.

The solution:

A closed loop system in which the gaseous nitrogen generated in the pump and in the liquid nitrogen pipeline, due to heat leak, is fed back into the reservoir to maintain the pressure in the liquid nitrogen storage tank.

How it's done:

The bleed lines from the pump and jacket return

are connected to the top of the LN₂ storage tank. The nitrogen gas that is generated by the pump and by the heat leak in the LN₂ pipeline is then utilized to maintain the pressure in the storage tank. The gas is no longer vented to the atmosphere, eliminating the requirement for auxiliary gas to maintain the tank pressure, making the operation more efficient and safer.

Notes:

1. The closed loop method has been successfully applied to a relatively high (15 gpm) cryogenic pumping system.
2. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B66-10408

(continued overleaf)

Patent status:

Inquiries about obtaining rights for the commercial use of the invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: D. G. Landy
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center
(M-FS-893)