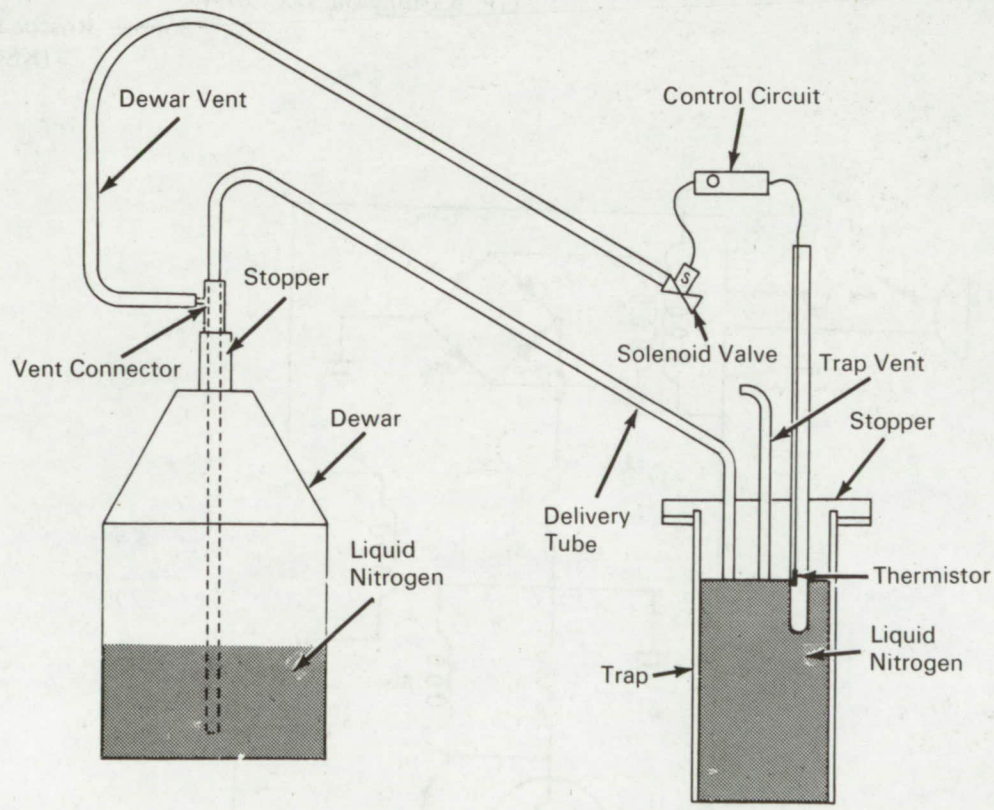


NASA TECH BRIEF



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Electronic Circuit Provides Automatic Level Control for Liquid Nitrogen Traps



The problem:

To provide an automatic level control for liquid nitrogen cold traps. These traps are used with mass spectrometers, leak detectors, and other high-vacuum devices requiring traps to promote greater efficiency in diffusion pump operation. In the past, the liquid nitrogen levels have been mechanically controlled by a glass tube partially filled with mercury and methane.

Although such systems operate satisfactorily at first, they require frequent cleaning and refilling.

The solution:

An electronic control of the liquid nitrogen levels, based on the principle of increased thermistor resistance corresponding to decreases in temperature. The electronically controlled apparatus is practically service-free, requiring only occasional reliability checks. It

(continued overleaf)

also eliminates the time-consuming and hazardous handling of glassware and liquid mercury.

How it's done:

The trap is filled by pressurizing the Dewar using ambient heating. The solenoid valve is in its normally closed position, so that the pressure forces the liquid nitrogen through the delivery tube. As the trap fills, the thermistor (TH₁), which is located at the desired trap level, is chilled by the liquid nitrogen. The thermistor resistance increases rapidly as it cools, causing the base of NPN transistor Q₁ to become more positive. When the base of Q₁ reaches a predetermined potential, the transistor conducts a current which energizes relay K₁, closing switch S₂. The resulting current through relay K₂ activates the solenoid valve which opens the Dewar ventline, stopping the pumping action at the desired trap level.

Notes:

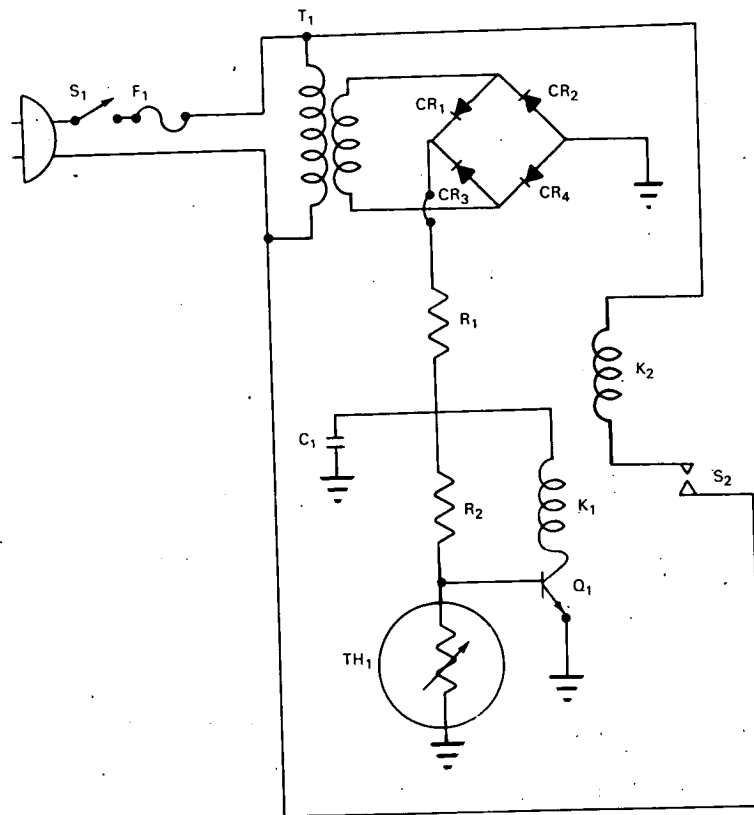
1. This device should be useful in the chemical process industries where constant liquid levels must be maintained at low temperatures such as in nitration mixtures, standard low-temperature baths, and refrigerants.
2. This invention may be of interest to manufacturers of cryogenic equipment.
3. Inquiries concerning this invention may be directed to:

Technology Utilization Officer
John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
Reference: B68-10061

Patent status:

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

Source: Roscoe R. Turvy
(KSC-10127)



CONTROL CIRCUIT