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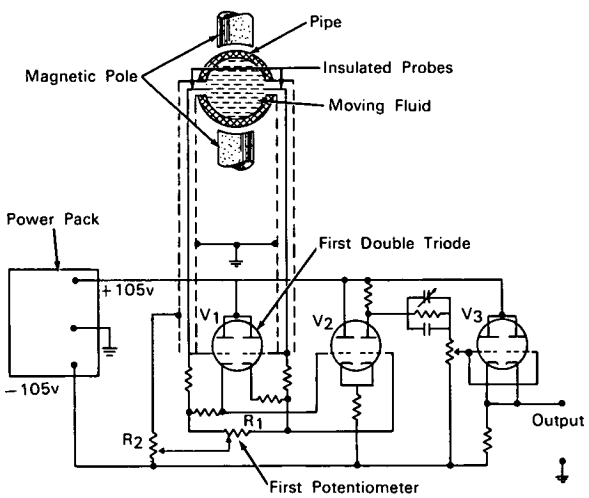
NASA TECH BRIEF

This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the NASA space program.

Meter Accurately Measures Flow of Low-Conductivity Fluids



The problem: To measure the flow of low-conductivity fluids with an electromagnetic flowmeter and yet avoid serious errors due to polarization and to electrochemical and electrostatic effects. Flow readings are based on the fluid's cutting lines of force in the magnetic field. Accurate measurement of the flow of low-conductivity fluids with an electromagnetic flowmeter is hindered by the fact that the potentials between the electrodes, resulting from error sources, are often of the same value as the potentials developed by the moving fluid.

The solution: An improved electromagnetic flowmeter in which the potentials developed at the measurement probes can be adjusted to minimize errors.

How it's done: Error effects are minimized through the use of a direct-coupled, differential cathode-follower, whose grid potential is adjustable with respect to ground.

V_1 is a double triode (such as a 12AY7) wired as a cathode-follower. Potentiometer R_1 controls the difference in potentials between the two cathodes of V_1 and, thus, indirectly controls the potential difference between the two flow measurement probes. Another adjustment can be made by setting potentiometer R_2, which varies the d.c. potential of the probes with respect to the fluid. Grid bias of the output tube V_3 (a 12BH7) can be controlled to give a zero reading. Flow can be registered by a metering or recording device, such as an oscilloscope or a motor-driven chart recorder.

Sensitivity of the instrument is independent of the fluid conductivity over a range of 1 to 1,500 micro-ohms/cm. Preliminary tests indicate that this instrument can overcome short-term shifts due to polarization. Flow measurements have been made on solutions with a conductivity as low as 2 micro-ohms/cm (isopropyl alcohol).

(continued overleaf)

Notes:

1. This innovation is intended primarily for laboratory usage and research purposes.
2. For further information about this innovation inquiries may be directed to:
   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
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   Reference: B63-10280

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

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