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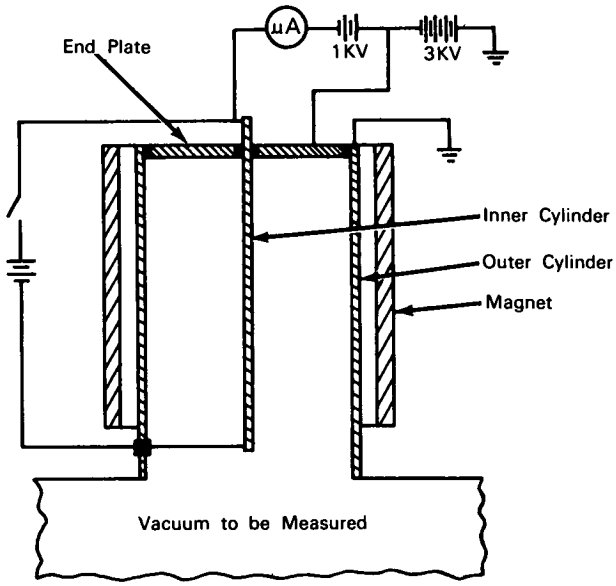
NASA TECH BRIEF

Ionization Vacuum Gage Starts Quickly, Is Unaffected by Spurious Currents



The problem: Typical ionization vacuum gages require appreciable time to begin functioning in a very high vacuum because there is very little gas to ionize for production of measurement electrons. Additionally, due to construction features and electrical paths, soft X-rays may be produced in conventional gages. These X-rays can cause electron emission from end plates and result in false indications of the vacuum being measured.

The solution: An ionization vacuum gage that includes a switch-operated starting device and a measurement instrument (microammeter) that is protected by circuit design from any spurious currents.

How it's done: A long outer cylinder surrounds a central anode that is a concentric inner cylinder. A magnet around the outer cylinder provides a magnetic field within that cylinder in the direction of its axis. The inner cylinder is connected to a microammeter, to a dual negative source totaling four kilovolts, and then to ground. Connection of the inner cylinder to the negative potential allows the outer cylinder to be grounded instead of being connected to a positive potential and insulated. This greatly simplifies mounting of the device. The length of the outer cylinder is equal to or longer than its diameter. This permits the electrons to remain within the chamber long enough to obtain sufficient ion current for convenient operation of the gage with only one end plate. Elimination of one end plate allows that end of the cylinder to be open to the vacuum to be measured. The end plate used is insulated from the outer cylinder and is

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connected to a point on the negative potential in between the potentials of the inner and outer cylinders. This accomplishes a dual purpose: current flowing from the end plate due to spurious emission of electrons not related to gas ionization will not register on the microammeter; also, with the end plate at a higher potential than the inner cylinder, the latter receives over 90% of the ion current.

When very high vacuums are to be measured, the switch is closed applying a positive potential to the inner cylinder which heats up and emits some electrons to start the gage working quickly.

Note:

Inquiries concerning this invention may be directed to:

Technology Utilization Officer
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, California, 91103
Reference: B65-10036

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.

Source: Donald C. Garwood
(JPL-304)