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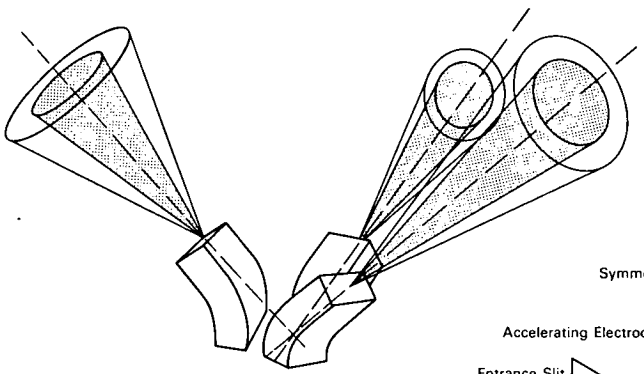
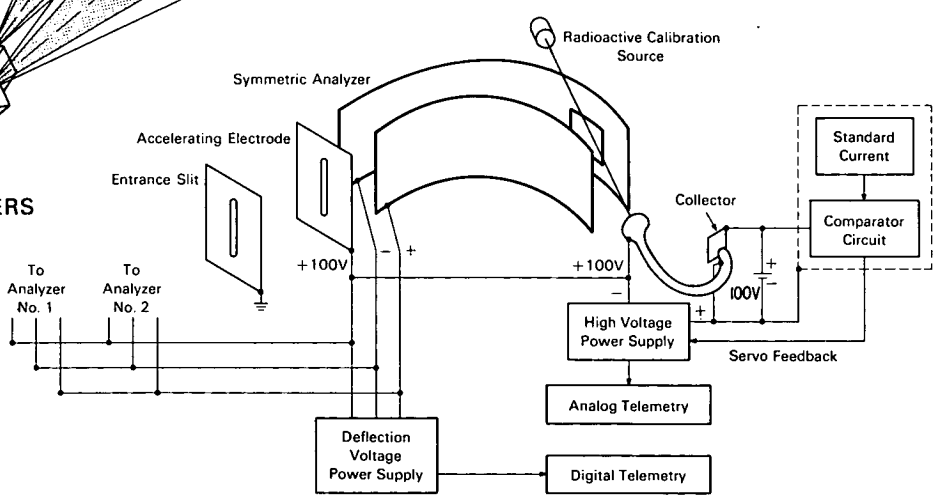
Brief 65-10213

NASA TECH BRIEF

Multiaxial Analyzer Detects Low-Energy Electrons



ENERGY ANALYZERS



SYSTEM DIAGRAM

The problem: To provide a method for detecting and measuring the intensity and direction of flow of electrons between zero and 10 kev. Although useful studies of electrons can be made with a wide angle device such as a Faraday cup, measurements made simultaneously in several directions can offer distinct advantages.

The solution: A system of three curved plate energy analyzers coupled with three electron multiplier tubes that is stepped uniformly through the energy interval by a common analyzer supply voltage.

How it's done: The three energy analyzers and electron multiplier tubes are arranged to measure electron flux in several directions simultaneously. Each detection system is completely independent except for the common stepping supply for the energy analyzers.

As voltage applied to the energy analyzers is increased in steps, higher energy electrons will be able to complete the circular path to the multiplier tubes. Current output from the multiplier tubes passes to the comparator circuit where it is compared with a standard current. Because the output current from the multiplier tubes increases with the number of electrons

(continued overleaf)

entering and because the gain of the tubes decreases with applied potential, electron flux at each energy level is determined by the change in applied potential required to maintain constant output current. The multiplier tubes are, therefore, operated as null detectors and a fraction of the potential applied to them is transmitted as a measure of electron flux. This provides a dynamic range of five orders of magnitude, and an approximate logarithmic compression of the scale of flux. This instrument will operate in any vacuum system with a pressure below 10^{-5}mm of mercury.

Notes:

1. This invention should be of interest to organizations dealing with low-energy electron flux related to ionospheric physics, explosion physics, nuclear devices, and auroral studies.
2. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10213

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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