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THE RADIATION DOSIMETER SATELLITE EXPERIMENT

The radiation dosimeter satellite experiment, nicknamed RADOSE, consists of two radiation dosimeters and three experimental aspect systems. See the enclosed block diagram.

Each dosimeter consists of an air-equivalent ion chamber, a blocking oscillator dosimeter circuit, and a magnetic countershift register. The dosimeter circuit produces one output pulse for every 100 milliroentgens of ionization due to incident radiation. The counter-shift registers store magnetically a running total of the number of dosimeter output pulses, and can be interrogated when desired using the satellite command system. Shift register readout is non-erasible. Information is in terms of total integrated dosages similar to that which a man might incur in orbit. Also, information concerning the energy of the incident radiation can be ascertained since one of the ion chambers is unshielded (1/16" of aluminum) and the other is shielded by 0.15 inch of lead.

Two of the experimental aspect systems, the so-called "Ion Collector Aspects," are angle-of-attack systems. Each utilizes a negatively biased metal disk for collecting positive ions and a current amplifier. Maximum signal is

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achieved when the disk is facing in the direction of the satellite's velocity vector. Diminishing signal (approximately according to the cosine function) occurs as the face of the disk is rotated through an angle, Phi, off from the direction of velocity. Output signal is also a function of ion density and satellite velocity. Aspect information is in terms of the angle Phi mentioned above. The ion collecting disks are four inches in diameter. The systems differ in amplifier sensitivity: one is 5×10^{-8} amps, the other is 5×10^{-7} amps full scale.

The third aspect system, the so-called "Pulse Width Aspect," consists of a solar cell detector and an on-off amplifier. The detector is mounted on the equatorial band of the satellite so that satellite spin causes the detector to sweep the sun. Due to a specially designed shade over the solar cell, the solar cell and amplifier are turned on and off twice per satellite revolution. Data received is in terms of pulse widths and is independent of pulse amplitudes. Information to be computed includes:

1. the satellite spin rate;
2. attitude of the equatorial plane; and,
3. satellite precession.