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Solar Radiation Satellite

The Solar Radiation I satellite is a 40 pound, 20 inch diameter, unit designed to measure the intensity of the radiation from the sun in the x-ray and the Lyman Alpha bands. The useful life of the satellite in orbit was nine months and the measurements provided new data in two areas. First, the magnet on the x-ray detector successfully deflected the Van Allen radiation and a clear view of the solar x-ray was possible at all altitudes experienced by the satellite. Secondly, the solar flare recorded on August 6, 1960 clearly showed that the ionospheric disturbances such as "Sudden Short Wave Fading" and "Short Cosmic Noise Absorbtion" are associated with changes in the intensity of solar x-ray emission and that these disturbances can occur without changes in the intensity of the solar radiation in the Lyman Alpha band. This refutes the established belief that ionospheric disturbances are coincident with solar Lyman Alpha changes.

With these new discoveries well established, it is possible to outline the next few logical steps in a continuing program. Since the Lyman Alpha intensity is relatively constant during solar disturbances, it is desirable to stress measurements of solar x-ray and eliminate the Lyman Alpha detector from Solar Radiation III. Two x-ray detectors are planned, one sensitive to wavelengths between 2 and 8 Angstroms and the other 8 to 20 Angstrom units. These measurements will indicate the hardness of the x-rays and will help understand the penetration characteristics of this radiation in the ionosphere.

For SR IV an additional telemetry channel will be added to provide for measurements on two additional detectors and the experiment will include three x-ray detectors and a Lyman Alpha detector. All x-ray detectors will include magnetic protection from the Van Allen radiation. Simultaneous measurements in the Lyman Alpha region and three x-ray bands should provide a far better understanding of solar disturbances than is presently available. All detectors on SR III and IV will have increased sensitivity over SR I to correspond to the lower solar activity this year. (Solar activity maximum was 1957 and we are nearing the minimum in the 11 year activity cycle).

Future plans for the Solar Radiation Series includes two main provisions. The present units are limited by the power supply and to relieve this condition a new design for a 24 inch diameter satellite is being developed. The solar power supply will provide sixty percent more power than SR III and this will provide telemetry channels to accommodate additional solar radiation measurements. The second severe limitation is flexibility of the system design and the 24 inch design includes separate containers for each electronic subsystem. This will permit easy replacement of subsystems that fail during the test program without disassembly of the satellite structure.

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The present status of satellite requirements and launch assignments is such that it is not possible to develop the electronic system to meet the requirements after the launch assignment is made. The only method that will appreciably decrease the satellite development time is to standardize and stockpile as many of the subsystems as possible. Present requirements indicate that shells, structures, solar power panels, storage batteries, telemetry systems, transmitters, antenna systems, and electrometer amplifiers can be stockpiled with little risk of waste due to obselescence. When the new structure is considered satisfactory under the Scout launch conditions, satellites containing all the engineering subsystems will be tested and placed on the shelf to await assignment, the parameters of the experiment, and a launch date. This will minimize the work required between assignment and launch and should provide maximum flexibility to the experimenter.

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