orbit, also discovered and mapped the artificial radiation belt produced by the high altitude nuclear explosion of 9 July 1962.

In the afternoon session on the observatory generation of satellites, John W. Townsend, Jr. (Goddard Space Flight Center), who acted as chairman, pointed out that this class of omnibus satellites has been adopted by NASA as a means for economically accomodating a variety of related scientific experiments in the same vehicle. Obvious advantages exist in making a large number of simultaneous observations and in reducing the total cost for each experiment, but disadvantages and limitations resulting from mutual interference or incompatibility of experiments must also be considered. Thus, there will still be room for the individual, special purpose unmanned scientific satellite for special cases.

Three pairs of technical papers were presented, dealing first with the mission and then the engineering design aspects of NASA's current observatory satellite programs. All of these projects are still in the design and qualification stage.

The mission of the Orbiting Geophysical Observatories, discussed by Wilfred E. Scull (Goddard Space Flight Center), includes the measurement of magnetic fields, energetic particles, interplanetary dust, atmospheric structure, electron and ion densities in the ionosphere, solar monitors, astronomy surveys, and certain meterological measurements. In addition, the OGO's may be used to test planetary instrumentation, vehicle support systems, and certain biological experiments. Two major orbits are contemplated in the program—the Eccentric Orbiting Geophysical Observatory (EGO), scheduled for late 1963, and the Polar Orbiting Geophysical Observatory (POGO), scheduled for 1964 launch. The engineering design, described by George J. Gleghorn (Space Technology Laboratories), features active thermal and attitude control, and extended booms for experiments requiring isolation from the body of the satellite.

Although the first Orbiting Solar Observatory (OSO) has been successfully orbited and has yielded much useful information, NASA's Advanced Orbiting Solar Observatory program is necessary to meet more demanding requirements in the period beyond 1966. John C. Lindsay (Goddard Space Flight Center) pointed out that improved stabilization and instrumentation will enable detailed study of the energy storage phenomena in the pre-flare active regions of the sun and also the flare mechanism and manifestations of energy release from solar flares. Optical measurements from such a spacecraft also may detect solar streamers and other evidences of energy transport from the sun to earth. A. J. Cervenka's (Goddard Space Flight Center) discussion on important engineering design features of the AOSO included orbit selection, stabilization requirements, orientation, data capacity, thermal control, power supply, command subsystem, and weight limitations imposed by the launch vehicle.

Glimpses of astronomical observations outside of the earth's atmosphere have been obtained recently from balloons and rockets, but only an orbiting observatory can produce the continuous and high quality observations that are required. A flexible, highly stabilized, and controlled OAO satellite concept was described by Robert R. Ziemer (Goddard Space Flight Center). Specific objectives include a new sky map in the ultraviolet portion of the spectrum, photometric systems capable of determining stellar energy distribution and emission line intensities in the spectral region from 3000 to 800 angstroms, and absolute spectrophotometric measurements of stars and nebulae in the ultraviolet. Another experiment will observe the absorption lines of interstellar gas in the far ultraviolet region. The engineering requirements of the 3600-pound OAO satellite were discussed by Walter H. Scott (Grumman Aircraft Engineering Co.). The stabilization and control system must be capable of orienting and maintaining the satellite in a stable attitude within 15-arc seconds over a 50-minute period. Using the experiment as an error source, the fine momentum wheels will then be able to hold the optical axes to 0.1-arc second. The structural and thermal design characteristics and the usual satellite support systems were also included in this final paper.

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J. GREGG STEPHENSON
Airborne Instruments Laboratory Division, Cutler-Hammer, Inc., Melville, New York