

ORBIT OF SATELLITE

This orbit will be inclined approximately 40° from the Equator. Both technical and functional considerations were involved in the choice. Because optical measurements will play an important role in observations of the satellite, intermediate latitudes appeared desirable, for the opportunities to observe the satellite by many nations over its entire course are thereby enhanced. In terms of observational stations a true equatorial orbit provides simplicity as against a true polar orbit. However, the equatorial orbit precludes appreciable latitude coverage and atmospheric conditions limit the possibilities for optical observations, while a polar orbit reduces opportunity for continuous observations from a practical set of fixed observation stations.

This orbit will permit the satellite to revolve about the earth in an apparent latitude range of about 40° on either side of the Equator. As it revolves about the earth once every hour and a half, the earth will rotate beneath. Since the earth rotates about its axis once every 24 hours, it will have made about one-sixteenth of a revolution each time the satellite orbits once completely. If the orbit of the satellite were circular, one-sixteenth of a revolution, or 22.5° , would be approximated accurately. The orbit is to be elliptical, however, so that more than one-sixteenth of a revolution will be made by the earth during one revolution of the satellite; the displacement will be about 25° . Thus, after one revolution, the satellite will appear about 25° west of its launching site, 30° west on its second passage, and so on.

This means that over the course of many revolutions, the orbit of the satellite will shift within a band between 40° north and 40° south of the earth's Equator. Two important advantages accrue from such a course:

First, the satellite's instruments will be able to record observations over a broad expanse of the high atmosphere. Such coverage is important in the International Geophysical Year program, for the primary objective of this unprecedented cooperative study is to secure data all over the earth and its atmosphere.

Second, the excellent bandwidth coverage will permit the scientists of a large number of nations to take measurements and to make observations. In the planned orbit the satellite will be observable from the United States, Central and South America, and Africa; southern Europe and possibly some regions in mid-northern latitudes; the Balkans and Middle East; the Caspian Sea and part of the U. S. S. R.; Pakistan, China, Japan, India, and several other countries in Asia in the mid-northern latitudes; Indonesia, Australia, and New Zealand. The United States National Committee hopes that later satellites may be launched so as to permit scientists of additional nations also to participate in the study.

RADIO AND OPTICAL TRACKING

Aside from the possibility of other orbits for future satellites, planned by the United States National Committee, which will permit even broader IGY participation, radio observations extend the possibilities of satellite observations even in its present latitude range. The United States plans to have radio observatories, in addition to optical