

gravity. We have, in effect, been looking at the universe through a screen that is opaque to both ultraviolet and infrared radiation, as well as to x-ray, gamma rays, and many types of high speed particles. Moreover, the atmosphere causes the stars to dance and twinkle, against a background glare, of scattered sunlight by day and of airglow by night. The removal of these restrictions promises to extend our observational reach by many many times.

"Our own efforts, and those of other groups elsewhere, are devoted to the investigation of the sun. And more specifically, towards getting an understanding of the origin of magnetic fields, of the source of the sun's spot cycle and solar activity, of the origin of the solar wind and solar flares, and the production of high energy particles and photons.

"At present, we are pursuing these studies with relatively small telescopes and spectographs, such as this instrument, which we have designed to fly in the unmanned OSO-Orbiting Solar Observatory-series of spacecraft, as illustrated by this model, and here the left-hand box is designed to represent our instrument.

"While much valuable ground work is being laid by observations with these small instruments, the questions we are asking about the sun, can only be answered through the use of much larger telescopes. Much valuable experience in manned operation of solar telescopes and also much valuable preliminary data will be gained during Apollo missions in low-earth orbit, with an installation like this one, called the "Atom."

"In the Atom concept here you see the Apollo spacecraft, with the astronauts in their places, controlling the pointing of a battery of solar telescopes toward the sun. Later on, the Apollo Applications program will make it possible for us to put the large telescopes into operation in space. For example, telescopes up to 60 inches in diameter, with which angles as small as a tenth of a second arc, can be resolved. Telescopes so large that they will undoubtedly have to be assembled in orbit by astronauts, who would then also play an important part in the operation of the telescopes. By making required major changes in the observational equipment, by performing instant analysis of output data, and then modifying subsequent observations, for example, by reacting to the outbreak of a solar flare, by performing maintenance and repair, and finally, by returning

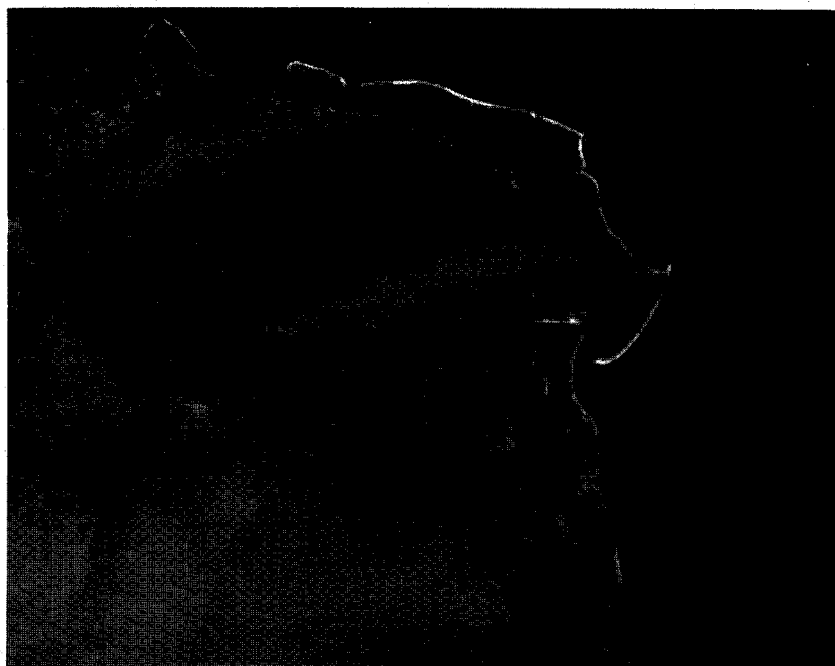


FIGURE 7