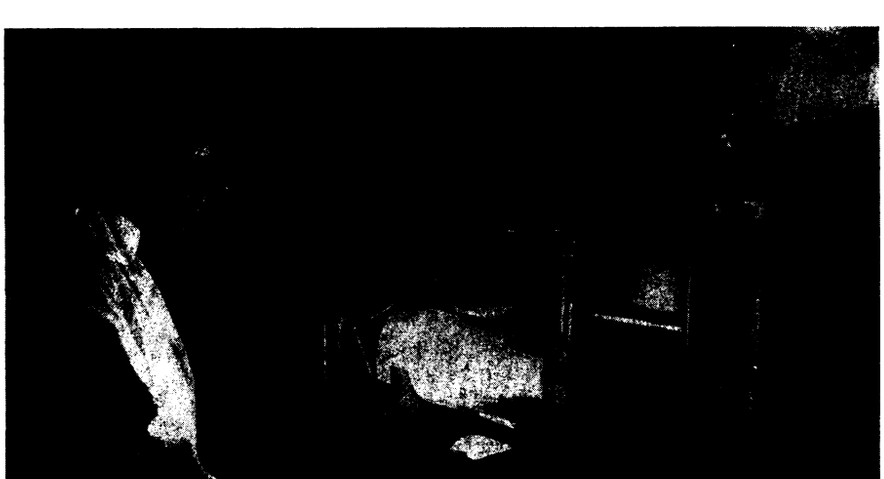

Lockheed

SPACE STUDY—Scientists at Lockheed Aircraft Corporation try new techniques in research with the ionized gas, plasma, which surrounds space vehicles reentering the earth's atmosphere and accounts for the brief communication blackouts during astronauts' final descent. Secrets of its behavior are expected to provide a new source of power for sending man into space.

ASTRONOMY

Mercury Rotation Set

Both optical and radar observations agree with a theoretical calculation that Mercury's rotational period is 58.6 earth days—By Ann Ewing

➤ THE PLANET MERCURY'S rotation period has now been pinned down to 58.6 earth days by both optical and radar observations. (See SNL, 87:277, 1965.)

Agreement between the optically observed rotation period and the recently discovered radar-determined rate is reported in Nature, 208:375, 1965.

Even without optical or radar observations, however, two scientists in Massachusetts have calculated from mathematical theory that the most likely period of Mercury's rotation is 58.6 days.

Dr. Giuseppe Colombo of the Smithsonian Astrophysical Observatory, Cambridge, Mass., and Dr. Irving Shapiro of Massachusetts Institute of Technology's Lincoln Laboratory did the theoretical calculations, based on the competition between gravity forces and tidal effects in the solid planet.

Dr. Colombo noted that the 58.6-day figure reported from a reanalysis of previous optical observations was nearly two-thirds of the 88-day period Mercury takes to revolve once around the sun. With Dr. Shapiro, he found that Mercury is the first observed object in the solar system that is "locked in" with respect to its position to the sun in a manner differing from the way the moon is locked to earth.

In the past, from optical observations, the planet's orbital period and the rotational period were thought to be the same, both 88 earth days long. This would have meant that Mercury's position with respect to the sun did not vary—broiled on the solar side, frozen on the other. The moon is linked with the earth in this way.

However, recent radar observations showed that the true rotational period of the planet is about 59 days, thus shaking the old theory that Mercury constantly had only one side turned sunward.

Although the planet is not in the same attitude to the sun at all times, it is nevertheless locked in, in a sense. This is because Mercury's rotational period never varies—it makes a neat and complete "about face" on every orbit. On one close approach as it swings around the sun every 88 days, Mercury "faces" the sun. On the next close solar approach, the planet presents its "back side" to the solar blast.

It accomplishes this feat because it rotates about its axis in exactly two-thirds of the time required to orbit the sun once. Hence a year on the planet lasts precisely one and one-half Mercury days.

The agreement between previous optical observations of Mercury's rotation rate and the newer radar figure was found from a reanalysis by Drs. W. E. McGovern of New York University, S. H. Gross of Airborne Instruments Laboratory, Melville, N.Y., and S. I. Rasool of the National Aeronautics and Space Administration's Goddard Space Flight Center.

• Science News Letter, 88:291 November 6, 1965

TECHNOLOGY

Gamma Rays Can Spot Invisible Air Movement

➤ AN INVISIBLE STREAM of gamma rays may help aircraft pilots watch for equally invisible, and often dangerous, turbulent air currents.

A group of Illinois scientists has found that a gamma ray source (in this case a fuel element from an atomic reactor) can be used to "mark" a column of air so that its movements can be detected by radar.

The fuel element was placed in a lead tube standing on end, allowing a beam of gamma rays to shoot upward, ionizing the air above to a height of several hundred feet. The ionized air could be seen by radar a quarter of a mile away.

The key to the technique is the fact that the "marked" column moves with the air currents, which can thus be tracked by radar.

Being able to observe invisible air movements would be particularly important to pilots during take-offs and landings, since freak downdrafts and crosswinds are common close to the ground.

Airport installations could include several gamma ray sources mounted at different locations on and around the runways. This would provide pilots with a better picture of air conditions over the field.

Another use of the system might be as a continuous air pollution monitor, with many gamma sources scattered throughout a city and feeding data to a central control station.

Aircraft might even be able to carry their own gamma sources, in order to monitor air turbulence at cruising altitudes up to 50,000 feet. The ionizing ray would be sent out ahead of the plane, which would use its radar to observe its own beam.

The project is being carried out by a team from Argonne National Laboratory in Argonne, Ill., headed by Steven L. Halverson and Harry Moses, including other members of the Laboratory and of the Illinois State Water Survey.

The original experiment was promising, but "we'd feel a lot better if we could repeat it," said Mr. Moses. There is some delay now, since the reactor is temporarily shut down and a suitable fuel element is not available, but a second experiment should take place within a month or two.

• Science News Letter, 88:291 November 6, 1965

EDUCATION

Grants Help Teachers Improve Their Teaching

➤ SOME 1,600 TEACHERS will have a chance to improve the quality of their teaching by spending an entire academic year in full-time study of their areas in science and mathematics.

The National Science Foundation has awarded 63 grants totaling about $10,614,500 to 60 colleges and universities to support Academic Year Institutes for secondary school teachers, a program now in its 11th year.