

MARINER

Test of relativity

Last summer Mariners 6 and 7 transmitted to earth the highest resolution pictures of Mars to date. This year the signals from the two craft will pass within one million miles of the sun's surface. It is hoped they will provide scientists a chance to check Einstein's general theory of relativity, which states that the velocity of light is slower in the gravitational field near the sun than in interplanetary space.

A theory by Dr. R. H. Dicke of Princeton University holds that the gravitational slowing should occur, but the amount should differ by as much as 10 percent (SN: 11/1, p. 396). Scientists have tried to devise an experiment that would distinguish between the two theories, so far without success. Measuring signals from the Mariner crafts, says Drs. Duane O. Muhleman of the California Institute of Technology and John D. Anderson of the Jet Propulsion Laboratory, may do the trick.

The sun occulted Mariner 6 on April 30; Mariner 7 passed behind the sun on May 10. By examining the signals received prior to the occult, which come from very close to the sun's surface, the investigators may be able to determine the degree to which the velocity of light is slower near the sun. If Einstein is right, the round trip of the signal will be slowed up by 200 millionths of a second.

One limitation on the tests, will be the ability of the investigators to discount the effects of interplanetary electrons which also slow the radio signals down, but by a smaller degree. Tests now under way should enable the scientists to determine electron density variations.

GENERAL AVIATION

Oxygen requirements

There are currently no oxygen requirements for general aviation operations in the Federal Aviation Regulations. Beginning June 17, a rule becomes effective requiring all aircraft to carry supplemental oxygen equipment (oxygen masks) when operating at cabin pressure altitudes above 12,500 feet mean sea level.

The rule applies to both pressurized and nonpressurized aircraft, regardless of weight. It does not affect airline or air taxi aircraft that are already required to have supplemental oxygen.

For flights of more than 30 minutes at 12,500 to 14,000 feet, only the required minimum flight crew will have to have the oxygen masks. However, above 15,000 feet the oxygen is required for each occupant.

In the case of pressurized aircraft, the new rule also requires that on flights above 25,000 feet, at least a 10-minute supply of reserve oxygen be available.

APOLLO 16

Precise mapping of the moon

The location of an Apollo spacecraft in lunar orbit is determined by earth radar. In the current series of spacecraft designs, there is no accurate way to determine the craft's exact distance from the moon's surface at a given time. Measurements of lunar valleys and

mountains are necessary to do this.

The spacecraft-design series beginning with Apollo 16 next year, however, will carry laser-altimeter coupled with a metric camera to provide accurate measurements of topographical features as well as the distance from the craft to the surface.

The altimeter will measure the craft's altitude from 40 to 80 nautical miles with an accuracy within two meters.

The laser will emit short duration light pulses directed in a narrow beam against the surface. A portion of the light will reflect back to the altimeter receiver. The time between sending the light and receiving the reflection will be measured to calculate the altitude above the surface.

A metric camera will be connected to the laser in a single unit. Each time the camera exposes a film frame, the laser will identify altitudes of known areas of the photograph.

SMALL CRAFT

Pilot warning devices

With air casualty rates increasing, several companies are researching and testing Pilot Warning Indicators for small aircraft, but delivery date is still two to five years away.

This week RCA Corp. presented plans for three versions of a collision avoidance or pilot warning device. The simplest version geared to the small craft would be priced between \$500 to \$1,000. It would warn the pilot of impending danger and alert him to look for another craft in the area.

By measuring characteristics of signals received in response to interrogations, an aircraft pilot can determine when a collision threat arises. The more complex versions offer hot-lines to ground control, traffic monitoring systems, and evasion maneuver instructions.

AIRPORT DESIGN

High-rise terminals

High-rise terminal buildings may be a partial answer to the airport space squeeze. Airport expansion upward rather than outward could save passenger time in flight departure and arrival and leave more space for the traffic loads of the jumbo jet era, suggests an elevator company.

Otis Elevator Co. of New York envisions terminals with passenger lounges and automobile parking on upper levels with giant elevators to take the passengers down to moving walks and out to the aircraft.

HELICOPTERS

Potential commercial uses

A hugh Sikorsky S-65 (CH-53D) helicopter flew 28 passengers from downtown London to downtown Paris in an hour and 22 minutes last month—a record time between the two metropolitan areas for air passengers.

Jet airliner trips between the two cities normally take one hour of air time and three hours of ground time, says John A. McKenna of Sikorsky Aircraft.

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