



Lockheed-California Co.

**VERTICAL TAKEOFF JET**—Short haul transport design incorporating the new stopped-rotor concept, shown in an artist's drawing, could reach speeds of 500 miles per hour in multiple engine versions.

## ENGINEERING

## Engineering Teachers To Try Industry

► COLLEGE ENGINEERING teachers are leaving the theoretical world for a year to sink their teeth into the practical problems of industry.

The Ford Foundation is supporting the \$300,000 program in the belief that education in engineering is becoming too abstract, said Carl W. Borgmann, director of the Ford Foundation's Science and Engineering program. Newly graduated engineers are more skillful than ever in physics, mathematics and analytical scientific thought, he said, but too few are being trained who are "imaginative and skilled in some of the traditional functions of the engineer."

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## MEDICINE

## Month's Rest in Bed Part of Space Program

► THIRTEEN HEALTHY, husky young men have gone to bed for a month at the University of Southern California School of Medicine.

The young men are participating in a scientific research project on weightlessness which may have important implications for the welfare of future astronauts.

Their beds will correspond to the contoured couches on which spacemen will lie; the long, long rest relates to the period of weightlessness in space. By 1967, some U.S. astronauts will be exposed to weeks of such weightlessness while in orbit.

The participants in "Operation Sacktime" are not permitted to touch foot to floor. They underwent conditioning through pro-

gressive exercises before the test began.

Prolonged weightlessness is one of the more serious problems confronting future astronauts, because it may impair the "orthostatic response," which is the adjustment of the cardiovascular system to a change from the horizontal to the vertical position of the body. This change in posture approximates a change from zero to one times the force of gravity in respect to the vertical axis of the body and ordinarily is well tolerated by various cardiovascular compensations.

However, it is well established that prolonged bed rest results in decreased ability of the body to react to this even relatively small change in gravitational influence, and fainting is common for the person who stands for the first time after a long stay in a hospital bed.

## PUBLIC HEALTH

## Coal Miners' Bronchitis Related to Cigarettes

► HEAVY CIGARETTE smoking has a direct relation to coal miners' chronic bronchitis and obstructive lung disease such as emphysema, the American Thoracic Society was told.

Mine dust and burning electric cables, common irritants in coal miners' surroundings, however, showed no association with these diseases, Dr. William H. Anderson of the University of Louisville School of Medicine reported in New York after studying 205 miners.

Dr. Anderson found that cigarette smoking was the only one of the three suspected causes that could be correlated with the development of chronic bronchitis and other breathing difficulties.

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## AVIATION

## New Aircraft Designed With Rotors, Jet Speed

► A NEW TYPE of vertical takeoff aircraft combines the rotor of a helicopter with the speed of a jet. It could range in size from a small short haul vehicle to a large air transport.

The craft looks something like an airplane with two two-bladed helicopter rotors attached to the top and to the tail, members of the American Helicopter Society meeting in Washington, D. C., were told.

The plane would take off vertically like a helicopter, go into forward flight and stop the rotors in a fore-aft position.

Conventional airplane engine-propeller power plants would take over, enabling the plane to fly as fast as 500 miles per hour, said its designers, P. W. Theriault, I. H. Culver and L. Celniker of Lockheed-California Company, Burbank. The plane would return to rotor operation for hovering and landing.

Extensive wind tunnel tests with scale models indicate it is technically feasible to stop and start a rotor at forward speeds up to 160 knots, without affecting the rotor blades or the aircraft itself. Vibration is no greater than that of conventional helicopters.

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## ASTROPHYSICS

## Heavy Stars Possible Source of X-Rays

► EXTREMELY DENSE and hot stars that were created centuries ago by supernova explosions, stars that suddenly blaze forth more brightly than a million suns, may be the sources of mysterious celestial X-rays discovered recently.

These dense stars, although not yet proved to exist, are called "neutron stars." They are supposedly only about 12 miles in diameter, have a central temperature of a billion degrees, and are so dense that one cubic inch weighs about a billion tons.

One problem in proving that X-rays come from neutron stars is the lack of visible remnants of a supernova in one of the two X-ray sources so far discovered, the constellation Scorpius.

The second source discovered, the Crab Nebula, does show these remnants.

Dr. Minoru Oda, a researcher at the Massachusetts Institute of Technology on leave of absence from the Institute for Nuclear Study, University of Toyko, believes supernova remnants, if they exist around Scorpius, could be made visible or invisible by their surrounding environment.

If charged particles in the space surrounding these remnants were of low density, there would be no way to accelerate electrons as required to make the remnants visible, Dr. Oda stated in the British scientific journal, *Nature*, 202:1321, 1964.

Thus, the neutron-star hypothesis for X-ray sources appears to agree with suggestions that invisible supernova remnants surround the Scorpius source.

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