

## SPACE

# Tiny Dipoles Seen Safe

## See Front Cover

► **EVEN IF** the 350,000,000 tiny, hair-like "satellites" just launched do not spread out into an even band around the earth, no bad effects are anticipated.

The copper "hairs" were launched piggy-back on the U.S. Midas IV satellite in an attempt to find out if they could be used for global radio communications. The hairs, or dipoles, are expected to spread out 2,100 miles above the earth into a band five miles wide and 25 miles thick in 30 to 60 days.

If they scatter as scheduled, the dipoles will not interfere with observations of the sky by either radio or light, visible or ultraviolet, nor be an added hazard to manned space travel, a panel of experts, including seven top scientists, decided under approval of Dr. Jerome B. Wiesner, President Kennedy's science adviser.

Scientists, including some from Europe and Russia, have objected that these dipoles might interfere with astronomical observations, both optical and by radio. However,

Massachusetts Institute of Technology's Lincoln Laboratory, Lexington, Mass., in charge of the project, reported to SCIENCE SERVICE in an interview that even if the dipoles bunched together they would not interfere with observations because of the smaller area covered.

The Lincoln Laboratory reported that radio signals at the very high frequency of 8,000 megacycles would be bounced off the dipoles. This high frequency was chosen because it would not interfere with other satellite equipment, or ordinary radio broadcasting signals that are from 600 kilocycles to about one and a half megacycles. TV operates on higher frequencies up to about 900 megacycles.

Returns from the band will be very weak because there will be 1,200 feet between each dipole and only 90 in each cubic mile of air. Each of the dipoles is three-quarters of an inch long, one-third the thickness of a human hair, and one is scarcely visible when held between two fingers at arm's length. The 350,000,000 dipoles could be used to set up jam-free radio communication around the earth. This would be very

useful for U.S. military communications and for Voice of America broadcasts beaming toward Iron-Curtain countries.

Two transmitting and receiving stations have been built by Lincoln Laboratory. One is located at Parks Air Force Base near San Francisco. The other station with its 60-foot precision reflector, shown on the front cover, stands on Millstone Hill in Westford, Mass. These stations, about 3,000 miles apart, will make radar measurements, as well as transmit and receive communications signals for radio propagation measurements. The stations are equipped to attempt simultaneous two-way transmissions.

The dipoles will be pushed back into the atmosphere by solar radiation pressure and burn up in five to seven years. Because of the concern voiced by some scientists, no further dipoles will be sent up until the current experiments have been completely tested and evaluated.

By sending large amounts of dipoles into space (the first load weighed 75 pounds) it might be possible to set up global TV communications. However, this could involve so much material that visual and radio observations would be obscured.

The U.S. Air Force reported that the Midas IV satellite has achieved a nearly circular orbit of about 2,100 miles and takes 172 minutes to travel around the earth. The Midas series, of which Midas II and III are still in orbit, are designed to test telemetry equipment for detection of enemy missiles seconds after they are fired. The so-called West Ford dipole project is not connected with the Midas program. The tiny "satellites" merely hitched a ride on the rocket that carried the Midas into orbit.

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## TECHNOLOGY

# Cooling Capacity Rating

► **MANUFACTURERS** producing more than 85% of the nation's room air conditioners have announced a program to certify the accuracy of cooling capacity ratings in British thermal units.

Although Btu ratings already have been generally adopted to replace the inexact and sometimes misleading "tons" and "horsepower," certification will go one step further to ensure that published data are correct. The program will be effective with 1962 models.

Under the program, sponsored by the National Electrical Manufacturers Association, all models made by a participating manufacturer must be certified. Tests will conform to the NEMA standard, and each certified room air conditioner will bear a seal verifying its rating.

Along with NEMA members, companies that do not belong to the association as well as private brand re-sellers are eligible to participate. Manufacturers who have joined the certification program to date, and whose 1962 models will be certified, are:

Admiral Corp.; Airtemp Division of Chrysler Corp.; Albion Division of McGraw-Edison Co.; Amana Refrigeration, Inc.; Fedders Corp.; Friedrich Refrigerators, Inc.; General Electric Co. (including Hotpoint Division); Gibson Refrigerator Division of Hupp Corp.; Kelvinator Division of American Motors Corp.; Philco Corp.; Remington Corp.; Republic Air Conditioning Co.; Welbilt Corp.; Westinghouse Electric Corporation; and Whirlpool Corp.

Contracts are now being submitted to private brand re-sellers, and their names will be announced later. Other companies may join the program at any time.

Allan E. Bachman, executive vice-president of the National Better Business Bureau, said the certification program will be of great benefit to the consumer.

"When cooling capacity was designated in terms of tons," he said, "ratings were inexact. Technically, one ton of cooling means that 12,000 Btu's of heat will be removed in an hour's time. But the terms of the relationship were too broad. Anything from about 8,000 to 12,000 Btu's per hour seemed to qualify for a one-ton designation.

"Horsepower was even more unsatisfactory as a rating since the term simply refers to the output of the electric motor operating the compressor and had no precise meaning in regard to cooling capacity."

"Btu ratings—one Btu is the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit—is the only practical way to express cooling performance. But previously when Btu ratings were applied to room air conditioners there was still an area of uncertainty. Were the ratings uniform? More than that, were they believable?"

"Now every 1962 model carrying the NEMA seal will be certified to possess the Btu per hour cooling capacity marked on its nameplate. This will build public confidence in the validity of the ratings."

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**DRESSING TANK CARS**—A shot-blaster from Goodyear Tire & Rubber Co., Akron, Ohio, prepares a railway tank car for installation of a special rubber lining. The bonded rubber linings protect the car shells against corrosive liquids.